

4.5 L and 6.8 L OEM Diesel Engines (PowerTech™ Plus)



OPERATOR'S MANUAL PowerTech™ Plus 4045 and 6068 OEM Diesel Engines OMRG36852 ISSUE 18AUG22 (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.

TP-6455 8/22



Introduction

OEM Engine and Drivetrain Warranty Registration

RG24614 —UN—21OCT13



Scan this code to register your OEM engine or drivetrain product online. You can also visit us directly at <http://jdpswarrantyreg.deere.com/WarrantyReg>.

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 <https://dealerlocator.deere.com/> or <https://dealerlocator.deere.ca/> 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.

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Foreword

THIS MANUAL CONTAINS INFORMATION to operate and service PowerTech Plus 4.5 L and 6.8 L Tier 3 / Stage IIIA emission-certified ¹ OEM engines:

IMPORTANT: Some information contained within this manual refers to engines that are capable of running on aviation (jet) fuels. These engines are specifically ordered and outfitted with special hardened components and fuel dosing element(s) that make the engine capable of using these fuels.

⚠ CAUTION: Engines NOT ordered and outfitted with these special components are NOT capable of using aviation (jet) fuels. If you have any questions, please contact your local servicing dealer.

READ THIS MANUAL carefully to learn how to operate and service your engine correctly. Failure to do so could result in personal injury or equipment damage.

THIS MANUAL SHOULD BE CONSIDERED a permanent part of your engine and should remain with the engine 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.

WRITE ENGINE SERIAL NUMBERS and option codes in the spaces indicated in the Record Keeping Section. Accurately record all the numbers. Your dealer also needs these numbers when you order parts. File the identification numbers in a secure place off the engine.

¹Emission certified for United States as EPA Tier 3 and for European Union as Stage IIIA.

SETTING FUEL DELIVERY beyond published factory specifications or otherwise overpowering will result in loss of warranty protection for this engine.

CERTAIN ENGINE ACCESSORIES such as radiator, air cleaner, and instruments are optional equipment on John Deere OEM Engines. These accessories may be provided by the equipment manufacturer instead of John Deere. This operator's manual applies only to the engine and those options available through the John Deere distribution network.

IMPORTANT: This manual covers only the PowerTech™ Plus Tier 3 / Stage III A emission-certified 4.5 L and 6.8 L OEM engines. These engines meet Tier 3 / Stage III A emission certification standards. (This is for both the U.S. EPA and European Union Council (EU) standards.) Engines with mechanical controls which are non-emission certified or Tier 1 / Stage I emission certified (U.S. and EU) are covered in a separate operators manual. Engines which are Tier 2 / Stage II emission-certified are covered in a separate operators manual.. Engines which are PowerTech™ E Tier 3 / Stage IIIA emission-certified are covered in a separate operators manual.

NOTE: This manual covers engines provided to OEM (Original Equipment Manufacturers). For engines in Deere machines, refer to the machine operator's manual.

Engine Owner

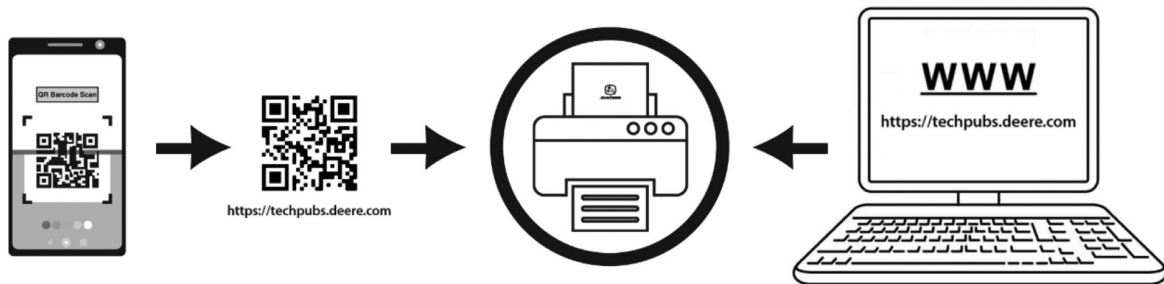
John Deere Engine Owner:

It is important for you to register your new engine for factory warranty. Registering your engine will allow your Service Dealer to verify your warranty status should a repair be needed. The easiest way to register your engine is via the internet. To register your engine for warranty via the internet, please use the following URL:

<http://www.johndeere.com/enginewarranty> Your John Deere Engine Distributor or local John Deere Service Dealer will also be happy to provide this service. If you would like to view the John Deere Service Dealer network or locate your nearest Dealer, use the following URL: <http://www.johndeere.com/dealer>

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Download Instructions



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Identification Views

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



John Deere 6068 Base Engine

RG13546 —UN—11NOV04



John Deere 4045 Base Engine

RG14361 —UN—14DEC05

JR74534,00002F6 -19-12JUL21-1/1

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Record Keeping

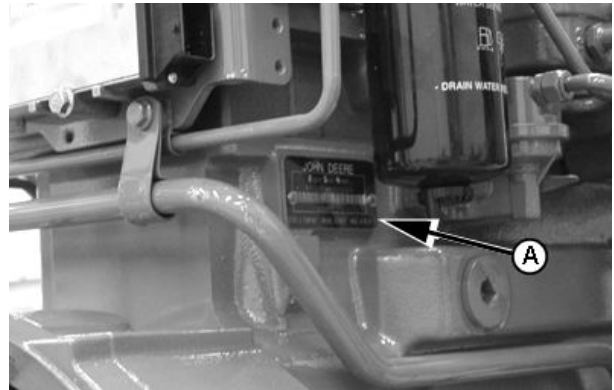
Engine Serial Number Plate

Each engine has a 13-digit John Deere engine serial number. The first two digits identify the factory that produced the engine:

- “CD” = Saran, France
- “PE” = Torreon, Mexico

The engine's serial number plate (A) is located on the right-hand side of cylinder block behind the fuel filter.

A—Serial Number Plate



13-Digit Engine Serial Number Plate

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Record Engine Serial Number

Record all of the numbers and letters found on your engine serial number plate in the spaces provided below.

This information is very important for repair parts or warranty information. Use all 13 digits when providing engine serial number.

Engine Serial Number (B)

Engine Model Number (C)

NOTE: Engine serial numbers on the 7th digit indicates the Emission Level as follows:

- “B” for non-certified engines
- “C” for Tier 1 / Stage I engines
- “G” for Tier 2 / Stage II engines
- “L” for Tier 3 / Stage IIIA engines

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



Saran Factory Engine Serial Number Plate

RG33180 —UN—18NOV20



Torreon Factory Engine Serial Number Plate



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RG13716 —UN—23JAN06

Engine Option Codes

JOHN DEERE **Number PE6068U000094**

6068HFC09 **6.8 L** **2732F** A

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 your authorized servicing dealer or engine distributor 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).

Your 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, consult your servicing dealer or engine distributor 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
21_____	Thermostat Cover

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
67_____	Engine Sensors

Continued on next page

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Record Keeping

Option Codes	Description	Option Codes	Description
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 -19-16AUG21-2/2

Record High-Pressure Fuel Pump Model Number

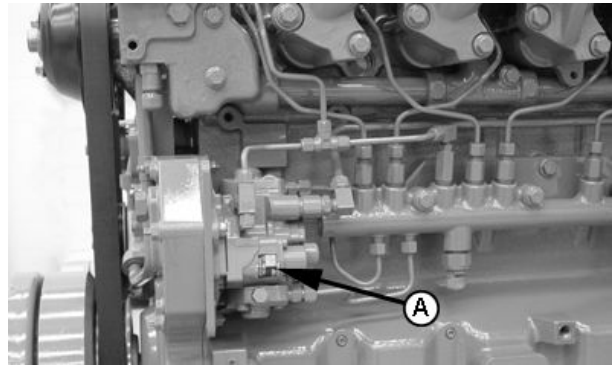
Record the high-pressure fuel pump model and serial number information found on the serial number plate (A).

Model No. _____ RPM _____

Manufacturer's No. _____

Serial No. _____

A—Serial Number Plate



Record High-Pressure Fuel Pump Serial Number

RG13718 —UN—11NOV04

OURGP12,0000080 -19-15SEP04-1/1

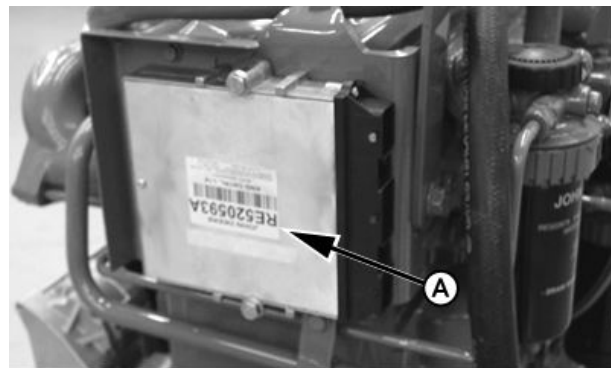
Record Engine Control Unit (ECU) Serial Number

Record the part number and serial number information found on the serial number label (A) on the Engine Control Unit (ECU) mounted on or near the engine.

Part No. _____

Serial No. _____

A—Serial Number Label

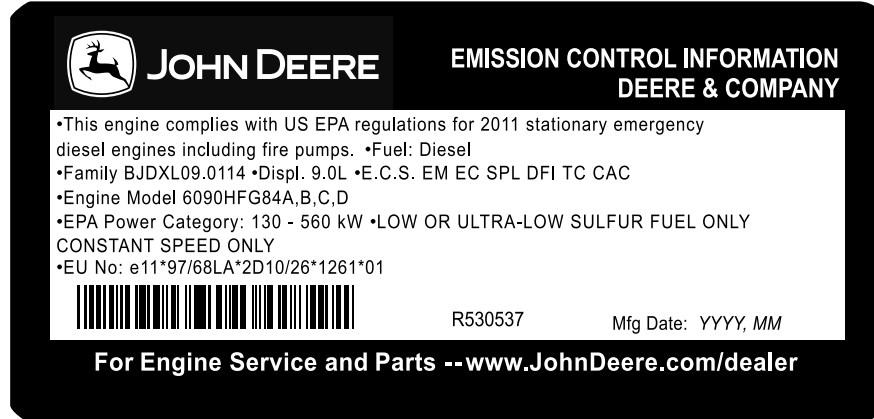


Record Engine Control Unit (ECU) Serial Number

RG13799 —UN—18NOV04

OURGP12,00000AD -19-27JUL06-1/1

Emergency Stationary Engine Rule



Emissions Label

Emissions Label

After Tier 4 standards take effect, engine manufacturers of emergency stationary engines that do not meet the standards for non-emergency engines must add to each such emergency engine a permanent label (such as the emission label as shown) which states that the engine is limited to stationary emergency use. On John Deere engines this is stated in the EPA emission label on each engine.

Fuel Requirements

Beginning 01 Oct 10, owners and operators of stationary engines that use diesel fuel must only use diesel fuel meeting the requirements of 40 CFR 80.510 (b), which requires that diesel fuel have a maximum sulfur content of 15 PPM and either a minimum cetane index of 40 or a maximum aromatic content of 35 volume percent.

Operation, Maintenance and Testing

The operation of emergency engines is limited to emergency operations and required maintenance and testing.

There is no time limit on the use of emergency stationary engines in emergency situations.

Maintenance and testing is limited to 100 hours per year. The EPA has also included a provision that allows anyone to petition the Administrator for additional hours, beyond the allowed 100 hours per year, if such additional hours should prove to be necessary for maintenance and testing reasons. The EPA will not require a petition for additional hours if the hours beyond 100 hours per year for maintenance and testing purposes are mandated by regulation such as State or Local requirements.

KW40574,0000003 -19-12MAY16-1/1

RG19597 —UN—20OCT10

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.



T81389 —UN—28JUN13

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

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.



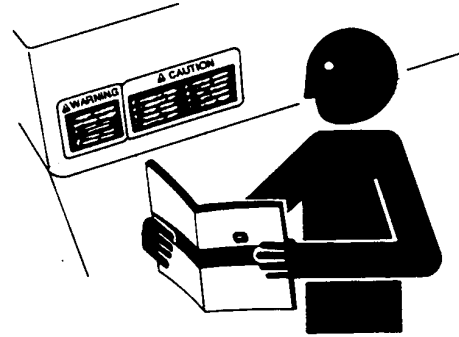
TS201 —UN—15APR13

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.

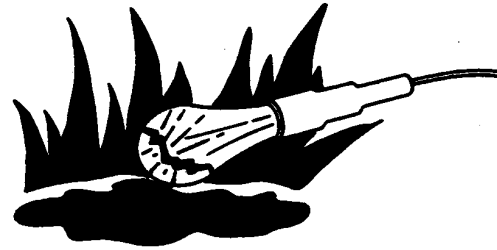


TS201 —UN—15APR13

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.



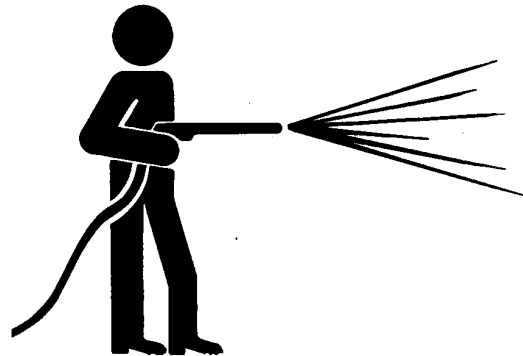
TS223 —UN—23AUG88

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 —UN—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

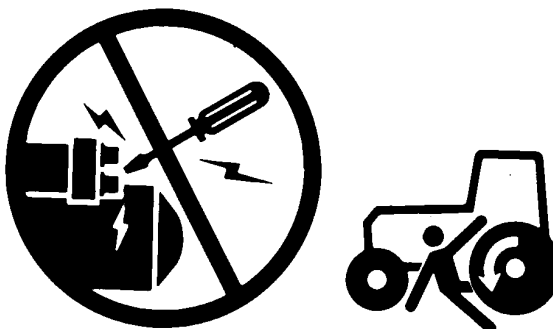
DX,LIVE -19-25SEP92-1/1

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 —UN—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

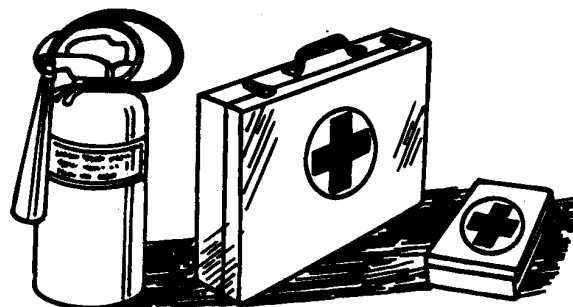
TS202 —UN—23AUG88

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.



TS227 —UN—15APR13

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

Handle Fluids Safely—Avoid Fires

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

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

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

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



TS227 —UN—15APR13

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

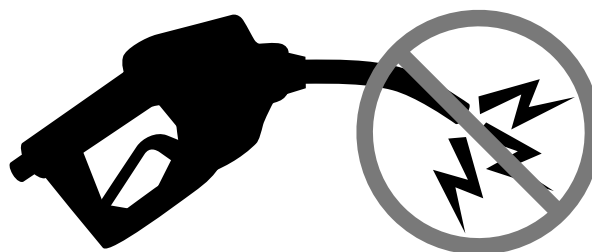
Avoid Static Electricity Risk When Refueling

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

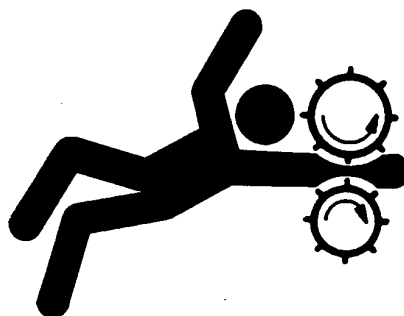
RG21992 —UN—21AUG13

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.



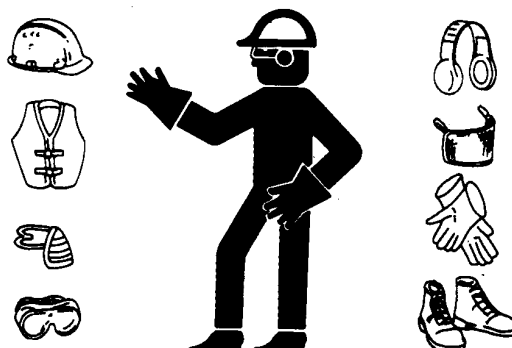
TS228 —UN—23AUG88

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.



TS207 —UN—23AUG88

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

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.

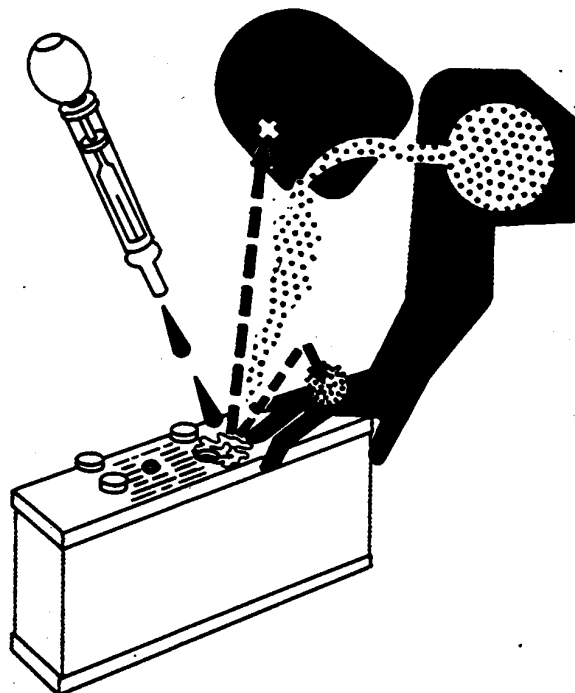
If acid is swallowed:

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.**



TS204 —UN—15APR13



TS203 —UN—23AUG88

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

Prevent Acid Burns

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

Avoid the hazard by:

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

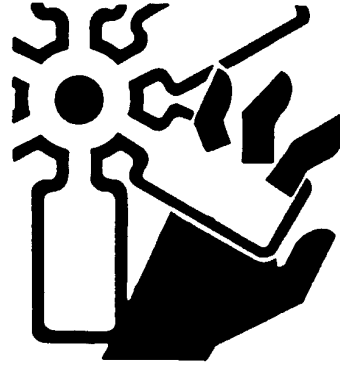
DX,ROTATING -19-18AUG09-1/1

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.

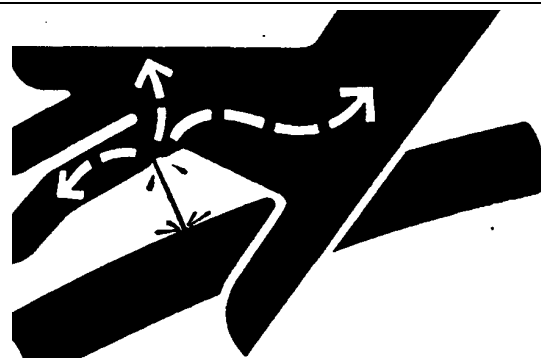
Replace worn or damaged hose assemblies immediately with John Deere approved replacement parts.

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.

If an accident occurs, see a doctor immediately. Any fluid injected into the skin must be surgically removed within



a few hours or gangrene may result. Doctors unfamiliar with this type of injury should reference a knowledgeable medical source. Such information is available in English from Deere & Company Medical Department in Moline, Illinois, U.S.A., by calling 1-800-822-8262 or +1 309-748-5636.

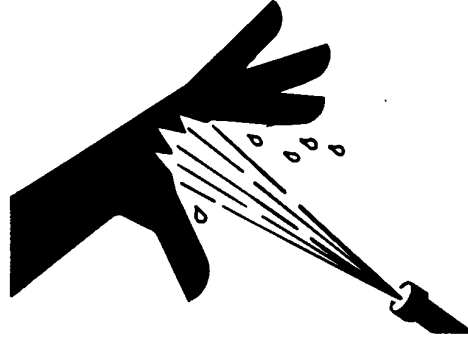
DX,FLUID -19-12OCT11-1/1

X9811 —UN—23AUG88

Do Not Open High-Pressure Fuel System

High-pressure fluid remaining in fuel lines can cause serious injury. 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.

Only technicians familiar with this type of system can perform repairs. (See your John Deere dealer.)



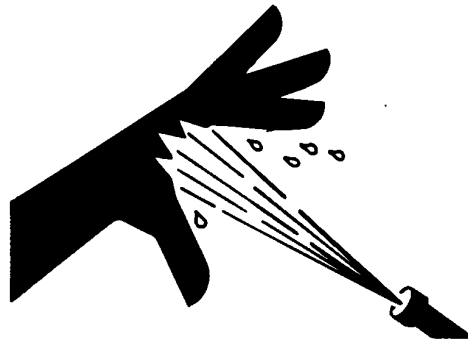
TS1343 —UN—18MAR92

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

Protect Against High Pressure Spray

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

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



TS1343 —UN—18MAR92

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

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).



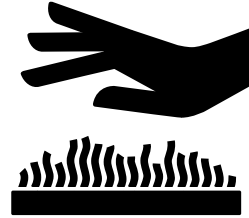
TS204 —UN—15APR13

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.



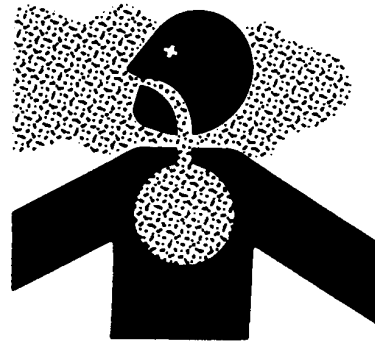
RG17488 —UN—21AUG09

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

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.



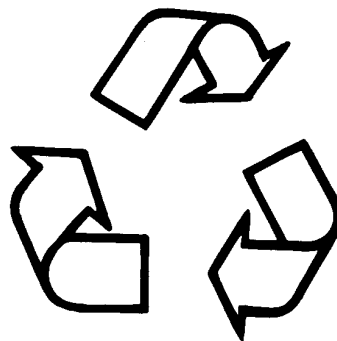
TS281 —UN—15APR13

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);



TS 1133 —UN—15APR13

filters; batteries; and, other substances or parts.

Burning of flammable fluids or components in other than specially designed incinerators may be prohibited by law and could result in exposure to harmful fumes or ashes.

- Service and dispose of air conditioning systems appropriately. Government regulations may require a certified service center to recover and recycle air conditioning refrigerants which could damage the atmosphere if allowed to escape.
- Evaluate recycling options for tires, metal, plastic, glass, rubber, and electronic components which may be recyclable, in part or completely.
- Contact your local environmental or recycling center, or your John Deere dealer for information on the proper way to recycle or dispose of waste.

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

Fuels, Lubricants, and Coolant

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 must 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.**

¹See 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 A and 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.

DX,FUEL1 -19-13JUL20-1/1

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 B20 (20% BioDiesel). Further increase in lubricity is limited for BioDiesel blends greater than B20.

DX,FUEL5 -19-07FEB14-1/1

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. Contact your fuel supplier or John Deere dealer for recommendations.

DX,FUEL4 -19-13JAN18-1/1

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 gas-oil, 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 B20 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 B20.

Biodiesel concentrations above B20 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 equivalent, which contain detergent and dispersant additives, are required when using biodiesel blends from B10 to B20, and are recommended when using lower biodiesel blends.

John Deere Engines Without Exhaust Filter

Biodiesel blends up to B20 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 B20.

These John Deere engines can operate on biodiesel blends above B20 (up to 100% biodiesel). Operate at levels above B20 ONLY if the biodiesel is permitted by law and meets the EN 14214 specification (primarily available in Europe). Engines operating on biodiesel blends above B20 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 equivalent, 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 must 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 B20 must be used within 90 days of the date of biodiesel manufacture. Biodiesel blends above B20 must be used within 45 days from the date of biodiesel manufacture.

When using biodiesel blends up to B20, the following must 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 must also be considered if using biodiesel blends above B20:

- 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 -19-13JAN18-1/2

- 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 B20 contain more ash, using blends above B20 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 -19-13JAN18-2/2

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 for more information on diesel fuel analysis.

DX,FUEL6 -19-13JAN18-1/1

Aviation (Jet) Fuels

Aviation (jet) fuels may be used in jet fuel capable engines with the following restrictions.

Type	Comments
Jet A	Lower viscosity and density than base No. 2-D diesel fuel. Power loss up to 10% can be expected.
Jet A-1	Lower viscosity and density than base No. 2-D diesel fuel. Power loss up to 10% can be expected.
Jet B	Not Recommended. Lower density and extremely low viscosity compared to base No. 2-D diesel fuel. Power loss up to 14% can be expected.
JP-4	Not Recommended. Lower density and extremely low viscosity compared to base No. 2-D diesel fuel. Power loss up to 12% can be expected.
JP-5	Lower viscosity and density than base No. 2-D diesel fuel. Power loss up to 9% can be expected.
JP-7	Lower viscosity and density than base No. 2-D diesel fuel. Power loss up to 10% can be expected.
JP-8	Lower viscosity and density than base No. 2-D diesel fuel. Power loss up to 10% can be expected.

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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 dealer 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.

Ether

An ether port on the intake is available to aid cold weather starting.

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

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 must be completely open by the time the intake manifold air temperature reaches the maximum allowable temperature out of the charge air cooler.

For more information, see your John Deere dealer.

DX,FUEL10 -19-13JAN18-1/1

Diesel Engine Break-In Oil — Non-Emissions Certified and Certified Tier 1, Tier 2, Tier 3, Stage I, Stage II, and Stage III

New engines are filled at the factory with either John Deere Break-In™ or John Deere Break-In Plus™ Engine Oil. During the break-in period, add John Deere Break-In™ or Break-In Plus™ Engine Oil, respectively, 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.

If John Deere Break-In™ Engine Oil is used during the initial operation of a new or rebuilt engine, change the oil and filter at a maximum of 100 hours.

If John Deere Break-In Plus™ Engine Oil is used, change the oil and filter at a minimum of 100 hours and a maximum equal to the interval specified for John Deere Plus-50™ II or Plus-50™ oil.

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

If John Deere Break-In™ or Break-In Plus™ Engine Oil is not available, use an SAE 10W-30 viscosity grade diesel engine oil meeting one of the following and change the oil and filter at a maximum of 100 hours of operation:

- API Service Classification CE
- API Service Classification CD
- API Service Classification CC
- ACEA Oil Sequence E2

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

- ACEA Oil Sequence E1

IMPORTANT: Do not use Plus-50™ II, Plus-50™, or engine oils meeting any of the following for the initial break-in of a new or rebuilt engine:

API CK-4	ACEA E9
API CJ-4	ACEA E7
API CI-4 PLUS	ACEA E6
API CI-4	ACEA E5
API CH-4	ACEA E4
API CG-4	ACEA E3
API CF-4	
API CF-2	
API CF	

These oils do not allow the engine to break in properly.

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, John Deere Plus-50™, or other diesel engine oil as recommended in this manual.

DX,ENOIL4 -19-02NOV16-1/1

Diesel Engine Oil — Tier 3 and Stage IIIA

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 oil is preferred.

John Deere Plus-50™ is also recommended.

John Deere Torq-Gard™ is also allowed.

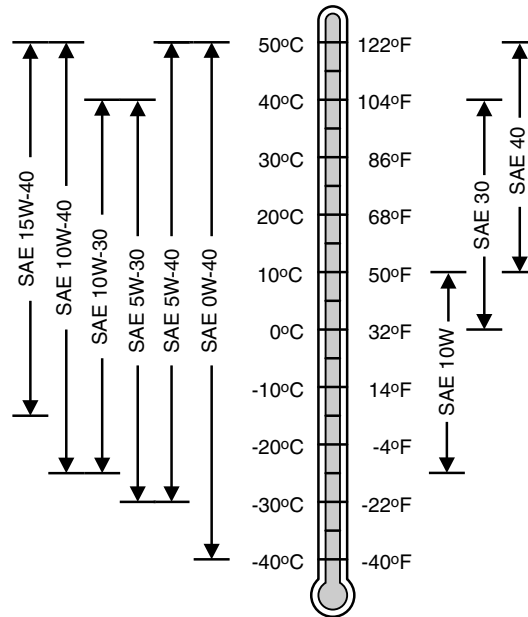
Other oils may be used if they meet one or more of the following standards:

- API Service Category CK-4
- API Service Category CJ-4
- API Service Category CI-4 PLUS
- API Service Category CI-4
- ACEA Oil Sequence E9
- ACEA Oil Sequence E7
- ACEA Oil Sequence E6
- ACEA Oil Sequence E5
- ACEA Oil Sequence E4

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.

Plus-50 is a trademark of Deere & Company
Torq-Gard is a trademark of Deere & Company



Oil Viscosities for Air Temperature Ranges

DO NOT use diesel fuel with sulfur content greater than 10 000 mg/kg (10 000 ppm).

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DX,ENOIL11 -19-23APR19-1/1

Engine Oil and Filter Service Intervals — Tier 3 and Stage IIIA — OEM Applications

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:

- “Plus-50 Oils” include John Deere Plus-50™ II and John Deere Plus-50™
- “Other Oils” include John Deere Torq-Gard™, API CK-4, API CJ-4, API CI-4 PLUS, API CI-4, ACEA E9, ACEA E7, ACEA E6, ACEA E5, and ACEA E4

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.

- 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 service interval
- **BEFORE** using diesel fuel with sulfur content greater than 2000 mg/kg (2000 ppm), contact your John Deere dealer or qualified service provider
- **DO NOT** use diesel fuel with sulfur content greater than 10 000 mg/kg (10 000 ppm)

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 2000 mg/kg (2000 ppm) for PowerTech™ Plus engines or 5000 mg/kg (5000 ppm) for PowerTech™ engine
- Use of John Deere Plus-50™ II or John Deere Plus-50™ 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 intervals**
- **Use only approved oil types**

Tier 3 and Stage IIIA —PowerTech™ Plus					Tier 3 and Stage IIIA —PowerTech™		
Oil Pan Size (L/kW)					Oil Pan Size (L/kW)		
Oil pan capacity	Greater than or equal to 0.10	Greater than or equal to 0.12	Greater than or equal to 0.14	Greater than or equal to 0.22	Greater than or equal to 0.10	Greater than or equal to 0.12	Greater than or equal to 0.14
Fuel Sulfur	Less than 1000 mg/kg (1000 ppm)				Less than 1000 mg/kg (1000 ppm)		
Plus-50 Oils	375 hours	500 hours	500 hours	500 hours	375 hours	500 hours	500 hours
Other Oils	250 hours	250 hours	250 hours	250 hours	250 hours	250 hours	250 hours
Fuel Sulfur	1000—2000 mg/kg (1000—2000 ppm)				1000—2000 mg/kg (1000—2000 ppm)		
Plus-50 Oils	300 hours	300 hours	500 hours	500 hours	300 hours	400 hours	500 hours
Other Oils	200 hours	200 hours	250 hours	250 hours	200 hours	200 hours	250 hours
Fuel Sulfur	2000—5000 mg/kg (2000—5000 ppm)				2000—5000 mg/kg (2000—5000 ppm)		
Plus-50 Oils	Not Recommended Contact John Deere dealer (dealer refers to DTAC solution)				275 hours	350 hours	500 hours
Other Oils	Not Recommended Contact John Deere dealer (dealer refers to DTAC solution)				150 hours	175 hours	250 hours
Fuel Sulfur	5000—10 000 mg/kg (5000—10 000 ppm)				5000—10 000 mg/kg (5000—10000 ppm)		
Plus-50 Oils	Not Recommended Contact John Deere dealer (dealer refers to DTAC solution)				187 hours	250 hours	250 hours
Other Oils	Not Recommended Contact John Deere dealer (dealer refers to DTAC solution)				125 hours	125 hours	125 hours

Oil analysis may extend the service interval of “Other Oils”, to a maximum not to exceed the interval for Plus-50 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 oils is reached.

Plus-50 is a trademark of Deere & Company

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DX,ENOIL13,T3,OEM -19-13JAN18-1/2

Fuels, Lubricants, and Coolant

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DX,ENOIL13,T3,OEM -19-13JAN18-2/2

Diesel Engine Oil and Filter Service Intervals

4045 (4.5 L) Engine Oil and Filter Service Intervals in Hours of Operation									
Power Rating	Fuel Sulfur Content ^a	Oil Pan Option Codes							
		1903, 19BB		19AE, 19BC		1923, 19BA		1976, 19AZ	
		Interval		Interval		Interval		Interval	
kW (hp)		Other Oils	Plus-50 Oils	Other Oils	Plus-50 Oils	Other Oils	Plus-50 Oils	Other Oils	Plus-50 Oils
111 (149)	Less Than 0.10% (1000 ppm)	250	375	250	500	250	500	250	500
	0.10% - 0.20% (1000 - 2000 ppm)	200	300	200	300	250	500	250	500
	0.20% - 0.50% (2000 - 5000 ppm)	150	250	150	250	200	300	200	300
115 (154)	Less Than 0.10% (1000 ppm)	250	375	250	500	250	500	250	500
	0.10% - 0.20% (1000 - 2000 ppm)	200	300	200	300	200	300	250	500
	0.20% - 0.50% (2000 - 5000 ppm)	150	250	150	250	150	250	200	300
129 (173)	Less Than 0.10% (1000 ppm)	* b	* b	250	375	250	500	250	500
	0.10% - 0.20% (1000 - 2000 ppm)	* b	* b	200	300	200	300	250	500
	0.20% - 0.50% (2000 - 5000 ppm)	* b	* b	150	250	150	250	200	300
147 (197)	Less Than 0.10% (1000 ppm)	* b	* b	250	375	250	375	250	500
	0.10% - 0.20% (1000 - 2000 ppm)	* b	* b	200	300	200	300	250	500
	0.20% - 0.50% (2000 - 5000 ppm)	* b	* b	150	250	150	250	200	300

Use of premium oil also requires use of an approved John Deere oil filter.

^a If considering fuel with sulfur content of 0.50% - 1.00% (5000 ppm - 10,000 ppm), contact your John Deere Dealer (dealer to reference DTAC solution).

^b Asterisks indicate: Not available in this engine power level with oil pan options above.

6068 (6.8 L) Engine Oil and Filter Service Intervals in Hours of Operation													
Power Rating	Fuel Sulfur Content ^a	Oil Pan Option Codes											
		1907, 1908, 1909, 19AS, 19AT		19AQ		1924		19AC, 19AV		1961		19AU	
		Interval		Interval		Interval		Interval		Interval		Interval	
kW (hp)		Other Oils	Plus-50 Oils	Other Oils	Plus-50 Oils	Other Oils	Plus-50 Oils	Other Oils	Plus-50 Oils	Other Oils	Plus-50 Oils	Other Oils	Plus-50 Oils
134-140 (180-188)	Less Than 0.10% (1000 ppm)	250	500	250	500	250	500	250	500	250	500	250	500
	0.10% - 0.20% (1000 - 2000 ppm)	250	500	250	500	250	500	250	500	250	500	250	500
	0.20% - 0.50% (2000 - 5000 ppm)	200	300	200	300	200	300	200	300	250	500	250	500
144 (193)	Less Than 0.10% (1000 ppm)	250	500	250	500	250	500	250	500	250	500	250	500

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6068 (6.8 L) Engine Oil and Filter Service Intervals in Hours of Operation													
Power Rating	Fuel Sulfur Content ^a	Oil Pan Option Codes											
		1907, 1908, 1909, 19AS, 19AT		19AQ		1924		19AC, 19AV		1961		19AU	
		Interval		Interval		Interval		Interval		Interval		Interval	
kW (hp)		Other Oils	P-lu-s-50 Oils	Other Oils	P-lu-s-50 Oils	Other Oil-sl	P-lu-s-50 Oils	Other Oil-sl	P-lu-s-50 Oils	Other Oils	P-lu-s-50 Oill	Other Oils	P-lu-s-50 Oils
	0.10% - 0.20% (1000 - 2000 ppm)	200	300	250	500	250	500	250	500	250	500	250	500
	0.20% - 0.50% (2000 - 5000 ppm)	150	250	200	300	200	300	200	300	250	500	250	500
149 (200)	Less Than 0.10% (1000 ppm)	250	500	250	500	250	500	250	500	250	500	250	500
	0.10% - 0.20% (1000 - 2000 ppm)	200	300	200	300	250	500	250	500	250	500	250	500
	0.20% - 0.50% (2000 - 5000 ppm)	150	250	150	250	200	300	200	300	250	500	250	500
155-162 (208-217)	Less Than 0.10% (1000 ppm)	250	500	250	500	250	500	250	500	250	500	250	500
	0.10% - 0.20% (1000 - 2000 ppm)	200	300	200	300	250	500	250	500	250	500	250	500
	0.20% - 0.50% (2000 - 5000 ppm)	150	250	150	250	200	300	200	300	200	300	200	300
168-173 (225-232)	Less Than 0.10% (1000 ppm)	250	375	250	500	250	500	250	500	250	500	250	500
	0.10% - 0.20% (1000 - 2000 ppm)	200	300	200	300	250	500	250	500	250	500	250	500
	0.20% - 0.50% (2000 - 5000 ppm)	150	250	150	250	200	300	200	300	200	300	200	300
175 (235)	Less Than 0.10% (1000 ppm)	250	375	250	375	250	500	250	500	250	500	250	500
	0.10% - 0.20% (1000 - 2000 ppm)	200	300	200	300	250	500	250	500	250	500	250	500
	0.20% - 0.50% (2000 - 5000 ppm)	150	250	150	250	200	300	200	300	200	300	200	300
181-198 (243-266)	Less Than 0.10% (1000 ppm)	250	375	250	375	250	500	250	500	250	500	250	500
	0.10% - 0.20% (1000 - 2000 ppm)	200	300	200	300	200	300	250	500	250	500	250	500
	0.20% - 0.50% (2000 - 5000 ppm)	150	250	150	250	150	250	200	300	200	300	200	300
205 (275)	Less Than 0.10% (1000 ppm)	* b	* b	250	375	250	500	250	500	250	500	250	500
	0.10% - 0.20% (1000 - 2000 ppm)	* b	* b	200	300	200	300	200	300	250	500	250	500
	0.20% - 0.50% (2000 - 5000 ppm)	* b	* b	150	250	150	250	150	250	200	300	200	300
Use of premium oil also requires use of an approved John Deere oil filter.													

^a If considering fuel with sulfur content of 0.50% - 1.00% (5000 ppm - 10,000 ppm), contact your John Deere Dealer (dealer to reference DTAC solution).

Continued on next page

OURGP11,0000054 -19-26JUN08-2/3

^b Asterisks indicate: Not available in this engine power level with oil pan options above.

6068 (6.8 L) Engine Oil and Filter Service Intervals in Hours of Operation, Continued													
Power Rating	Fuel Sulfur Content ^a	Oil Pan Option Codes											
		1907, 1908, 1909, 19AS, 19AT		19AQ		1924		19AC, 19AV		1961		19AU	
		Interval		Interval		Interval		Interval		Interval		Interval	
kW (hp)		Other Oils	P-lu-s-50 Oils	Other Oils	P-lu-s-50 Oils	Other Oils	P-lu-s-50 Oils	Other Oils	P-lu-s-50 Oils	Other Oils	P-lu-s-50 Oils	Other Oils	P-lu-s-50 Oils
212-235 (284-315)	Less Than 0.10% (1000 ppm)	* b	* b	* b	* b	250	375	250	500	250	500	250	500
	0.10% - 0.20% (1000 - 2000 ppm)	* b	* b	* b	* b	200	300	200	300	250	500	250	500
	0.20% - 0.50% (2000 - 5000 ppm)	* b	* b	* b	* b	150	250	150	250	200	300	200	300
Use of premium oil also requires use of an approved John Deere oil filter.													

^a If considering fuel with sulfur content of 0.50% - 1.00% (5000 ppm - 10,000 ppm), contact your John Deere Dealer (dealer to reference DTAC solution).

^b Asterisks indicate: Not available in this engine power level with oil pan options above.

OURGP11,0000054 -19-26JUN08-3/3

Engine Oil and Filter Service Intervals (Jet Fuel Capable Engines Only)

The oil and filter service interval information in the following chart should be used as a guideline. Actual service intervals depend on operation and maintenance

practices. Use oil analysis to determine the actual useful life of the oil and to aid in selection of the proper oil and filter service interval. 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 fuel.

4045 (4.5 L) Engine Oil and Filter Service Intervals in Hours of Operation

		Oil Pan Option Code		Dosing Element Option Code	
Power Rating	Fuel Sulfur Content ^a	1976		8196	
		Interval		Interval	
kW (hp)		Std Oil	Prem Oil	Std Oil	Prem Oil
129 (173)	Aviation (Jet) Fuels	250	250	250	250
	Diesel Fuel - Less Than 0.10% (1000 ppm)	250	500	250	250
	Diesel Fuel - 0.10% - 0.20% (1000 - 2000 ppm)	250	500	250	250
	Diesel Fuel - 0.20% - 0.50% (2000 - 5000 ppm)	200	300	250	250

Use of premium oil also requires use of an approved John Deere oil filter.

^a When using jet fuels, the service interval recommendation is to change all filters and dosing element every 250 hr.

6068 (6.8 L) Engine Oil and Filter Service Intervals in Hours of Operation

		Oil Pan Option Code		Dosing Element Option Code	
Power Rating	Fuel Sulfur Content ^a	1946		81AE	
		Interval		Interval	
kW (hp)		Std Oil	Prem Oil	Std Oil	Prem Oil
129 (173)	Aviation (Jet) Fuels	250	250	250	250
	Diesel Fuel - Less Than 0.10% (1000 ppm)	250	500	250	250
	Diesel Fuel - 0.10% - 0.20% (1000 - 2000 ppm)	250	500	250	250
	Diesel Fuel - 0.20% - 0.50% (2000 - 5000 ppm)	200	300	250	250

Use of premium oil also requires use of an approved John Deere oil filter.

^a When using jet fuels, the service interval recommendation is to change all filters and dosing element every 250 hr.

AS60879,00000DF -19-26JUN08-1/1

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.

Consult your John Deere dealer to obtain specific information and recommendations.

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

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

Alternative and Synthetic Lubricants

Conditions in certain geographical areas may require lubricant recommendations different from those printed in this manual.

Some John Deere brand coolants and lubricants may not be available in your location.

Consult your John Deere dealer to obtain information and recommendations.

Synthetic lubricants may be used if they meet the performance requirements as shown in this manual.

The temperature limits and service intervals shown in this manual apply to John Deere branded fluids or fluids that have been tested and/or approved for use in John Deere equipment.

Re-refined base stock products may be used if the finished lubricant meets the performance requirements.

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

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 critical to proper operation and lubrication.

Always change filters regularly as specified in this manual.

Use filters meeting John Deere performance specifications.

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

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:

COOL-GARD is a trademark of Deere & Company

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.

DX, COOL3 -19-25AUG20-1/1

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 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

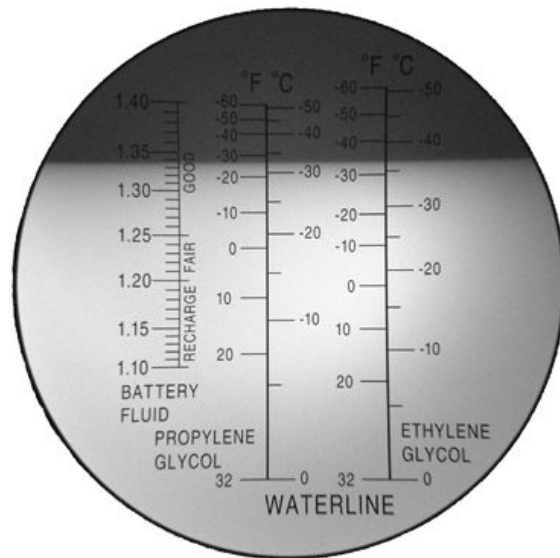


Image with a Drop of 50/50 Coolant Placed on the Refractometer Window

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

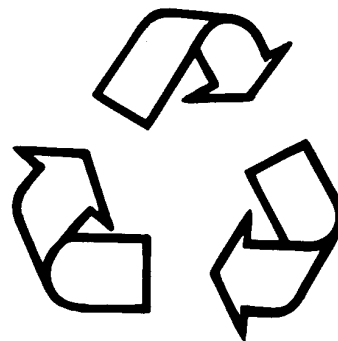
Disposing of Coolant

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 your local environmental or recycling center, or from your John Deere engine distributor or servicing dealer.



Recycle Waste

RG, RG34710, 7543 -19-26APR18-1/1

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).

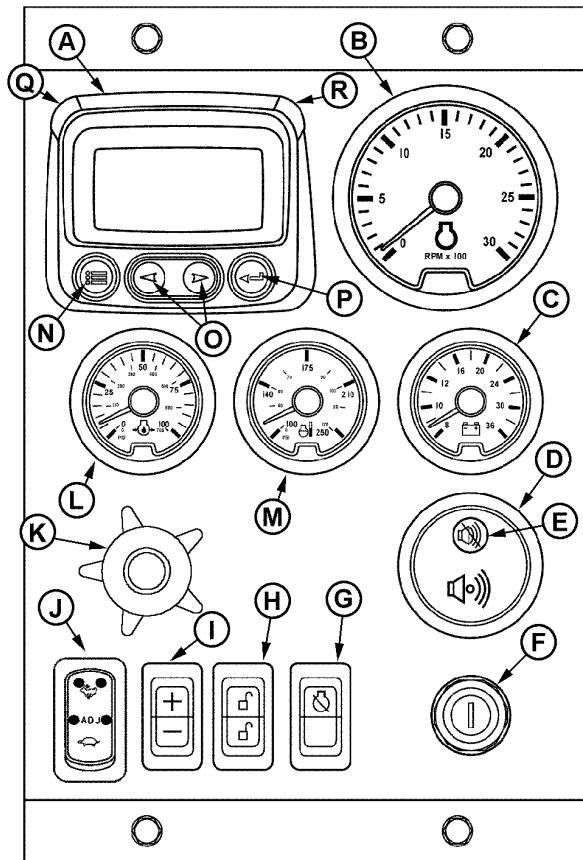
E—Audible Alarm Override Button

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

RG13276—UN—28OCT03

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 (DTCs), and perform preliminary diagnostics. The gauge is linked to the electronic control system and sensors.

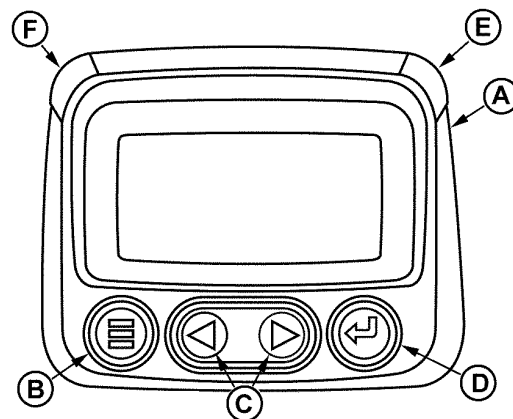
The menu key (B) allows the operator to access the main menu of the diagnostic gauge. For more information see PV101 Diagnostic Gauge — Main Menu in Section 15. This key also allows the operator to cancel an option and go back to the previous menu or home menu.

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 enter 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.



Diagnostic Gauge

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

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

RG13132 —UN—09SEP03

BL90236,000002A -19-16AUG21-1/1

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:

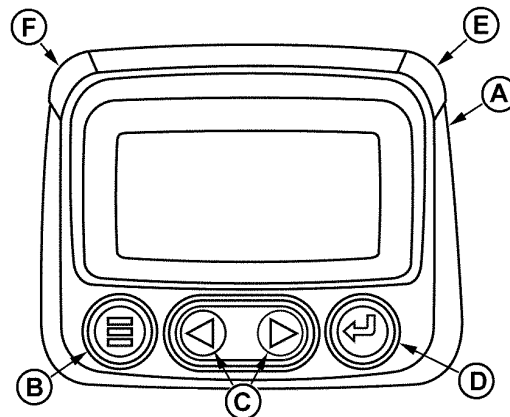
- Go to 4-up display
- Exhaust filter
- Engine speed control
- Languages
- Stored codes
- Engine configuration
- Setup 1-up display
- Setup 4-up display
- Select units
- Adjust backlight
- Adjust contrast
- Utilities

Listed are examples of features available in main menu items.

In Utilities:

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

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



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

RG13132 —UN—09SEP03

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

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

BL90236,0000025 -19-02JUN16-1/1

DG14 Diagnostic Gauge — Using

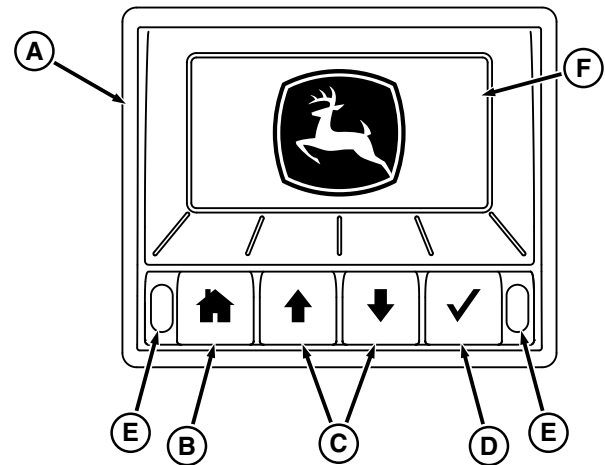
The diagnostic gauge (A) allows the operator to monitor engine functions, view diagnostic trouble codes (DTCs), and perform preliminary diagnostics. The gauge is linked to the electronic control system and sensors.

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

RG27904—UN—25FEB16

BL90236,0000028 -19-19AUG21-1/1

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:

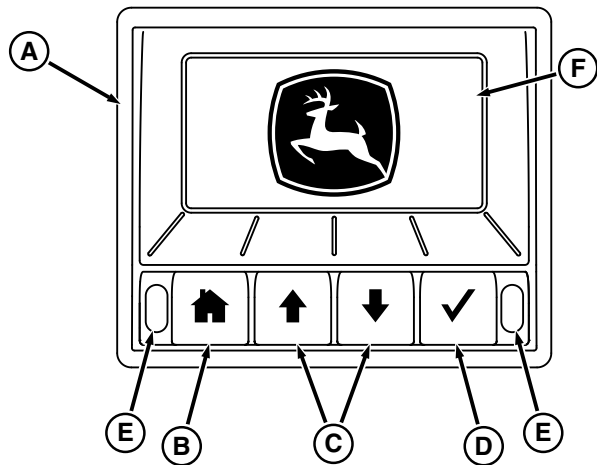
- Adjust backlight
- Adjust indicator brightness
- Display option setup

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

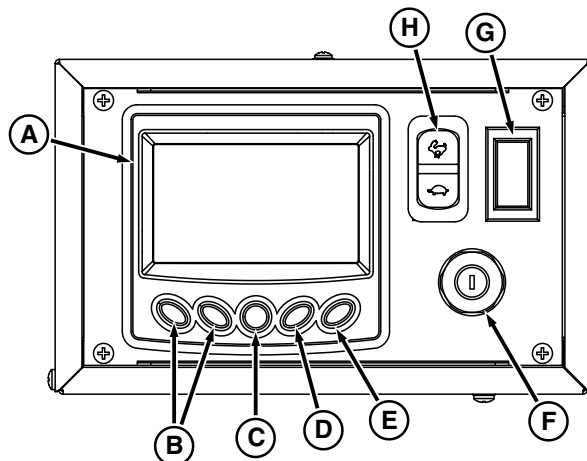
The select key (D) allows the operator to access menu items selected by the arrow keys (B) and confirm changes made by the operator.

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

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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

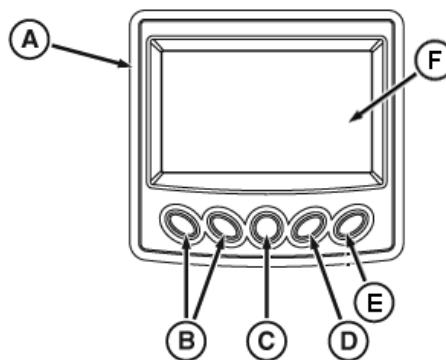
The diagnostic gauge (A) allow the operator to monitor engine functions, view diagnostic trouble codes (DTCs), and perform preliminary diagnostics. The gauge is linked to the electronic control system and sensors.

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.



PV480 Diagnostic Gauge

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 — 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:

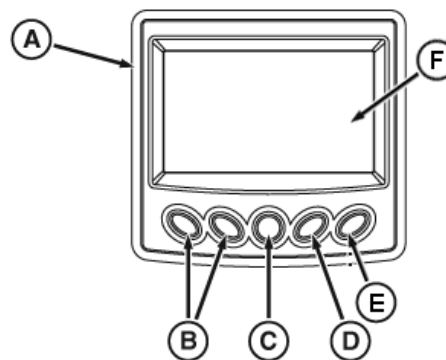
- Auto features
- Manual features
- Clock start
- Temperature start

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)



PV480 Diagnostic Gauge

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:

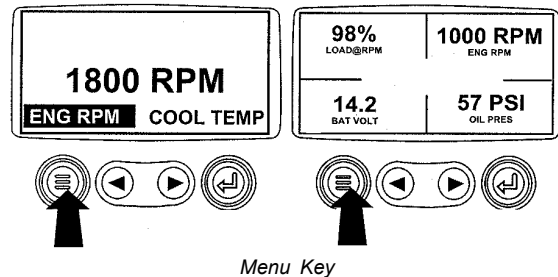
1. Press Menu key on diagnostic gauge.
2. Press Arrow keys to scroll up or down to FAULTS.
3. Press Select key.
4. Press Arrow keys to scroll up or down to STORED FAULTS.
5. Press Select key.
6. Press Arrow keys to scroll up or down to VIEW.
7. Press Select key.
8. Press Arrow keys to scroll through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

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

Main Menu Navigation

NOTE: The engine does not need to be running to navigate the diagnostic gauge screens. If engine start up is desired, See Starting The Engine. All of the engine values illustrated on the diagnostic gauge indicate the engine is running.

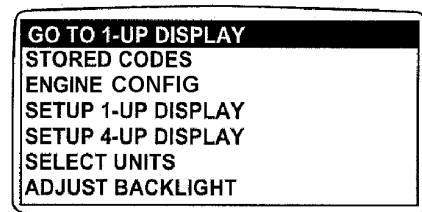
1. Turn the key switch to the ON position. Starting at the single or four engine parameter display, press the "Menu" key.



Menu Key

OURGP11,00000A9 -19-27MAY16-1/5

2. The first seven items of the "Main Menu" will be displayed.

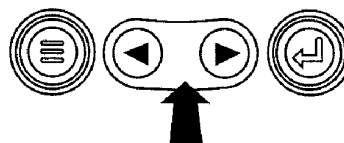
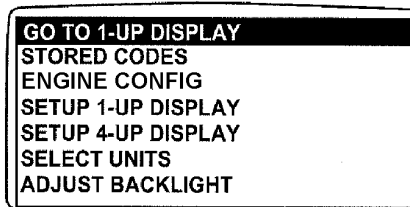


Menu Display

Continued on next page

OURGP11,00000A9 -19-27MAY16-2/5

3. Pressing the "Arrow" keys will scroll through the menu selections.

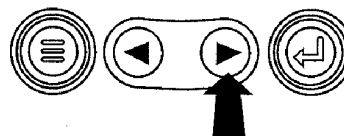
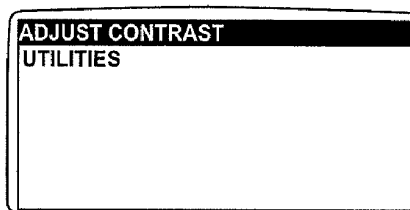


Main Menu Items

OURGP11,00000A9 -19-27MAY16-3/5

RG13161 —UN—02OCT03

4. Pressing the right arrow key will scroll down to reveal the last items of "Main Menu" screen, highlighting the next item down.

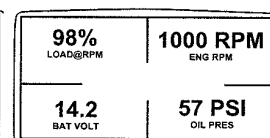
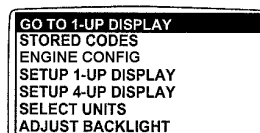


Last Items On Main Menu

OURGP11,00000A9 -19-27MAY16-4/5

RG13162 —UN—26SEP03

5. Use the arrow keys to scroll to the desired menu item or press the "Menu Button" to exit the main menu and return to the engine parameter display.



Use Arrow Buttons To Scroll / Quadrant Display

OURGP11,00000A9 -19-27MAY16-5/5

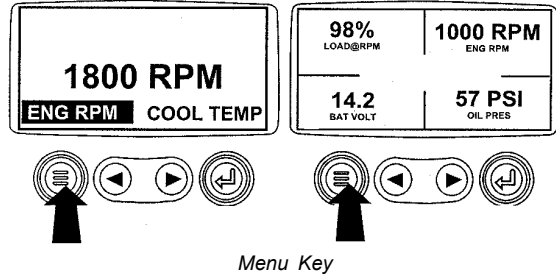
RG13163 —UN—02OCT03

Engine Configuration Data

NOTE: The engine configuration data is a read only function.

NOTE: The engine does not need to be running to navigate the diagnostic gauge screens. If engine start up is desired, See *Starting The Engine*. All of the engine values illustrated on the diagnostic gauge indicate the engine is running.

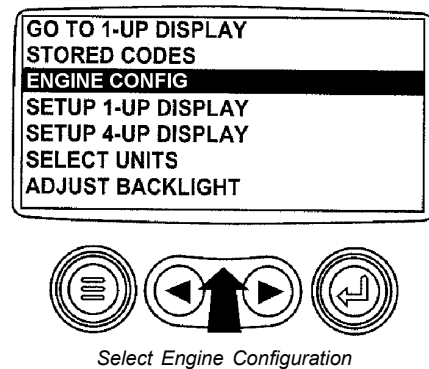
1. Turn the key switch to the ON position. Starting at the single or four engine parameter display, press the "Menu" key.



RG13159—UN—26SEP03

OURGP11,00000AB -19-27MAY16-1/6

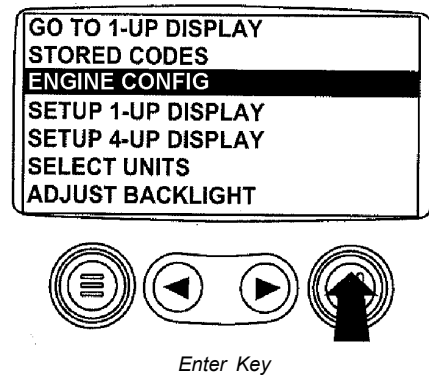
2. The main menu will be displayed. Use the "Arrow" keys to scroll through the menu until "Engine Config" is highlighted.



RG13164—UN—07OCT03

OURGP11,00000AB -19-27MAY16-2/6

3. Once "Engine Config" menu item has been highlighted, press the "Enter" key to view the engine configuration data.

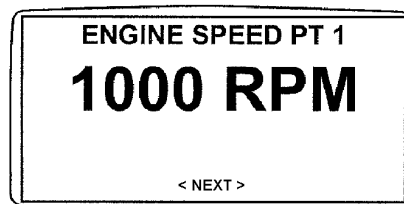


RG13165—UN—02OCT03

Continued on next page

OURGP11,00000AB -19-27MAY16-3/6

- Use the "Arrow" keys to scroll through the engine configuration data.

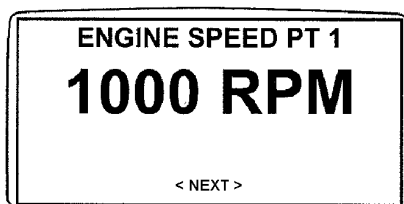


Use Arrow Keys To Scroll

OURGP11,00000AB -19-27MAY16-4/6

RG13166 —UN—28SEP03

- Press the "Menu" key to return to the main menu.

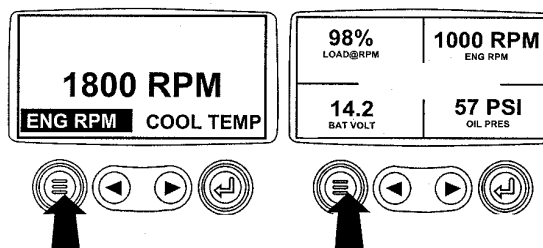


Return To Main Menu

OURGP11,00000AB -19-27MAY16-5/6

RG13167 —UN—28SEP03

- Press the "Menu" key to exit the main menu and return to the engine parameter display.



Exit Main Menu

OURGP11,00000AB -19-27MAY16-6/6

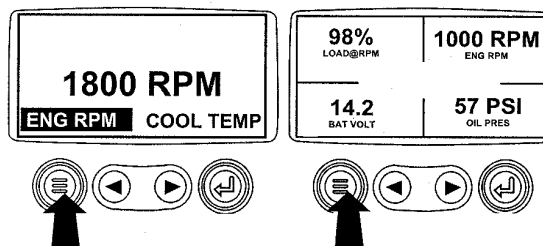
RG13159 —UN—26SEP03

Accessing Stored Trouble Codes

NOTE: The engine does not need to be running to navigate the diagnostic gauge screens. If engine start up is desired, See Starting The Engine. All of the engine values illustrated on the diagnostic gauge indicate the engine is running.

For description of trouble codes, see chart in Troubleshooting Section.

- Turn the key switch to the ON position. Starting at the single or four engine parameter display, press the "Menu" key.



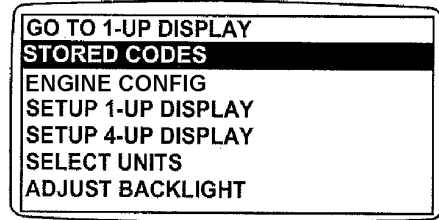
Menu Key

Continued on next page

OURGP11,00000AC -19-27MAY16-1/6

RG13159 —UN—26SEP03

- The main menu will be displayed. Use the "Arrow" keys to scroll through the menu until "Stored Codes" is highlighted.

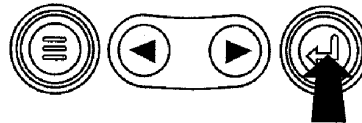
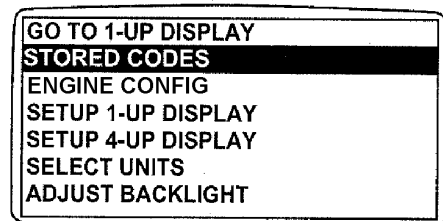


Select Stored Codes

OURGP11,00000AC -19-27MAY16-2/6

RG13168 —UN—02OCT03

- Once the "Stored Codes" menu item has been highlighted press the "Enter" key to view the stored codes.

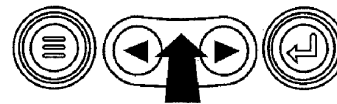
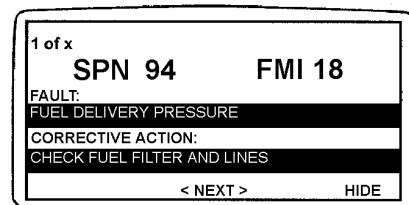


Enter Key

OURGP11,00000AC -19-27MAY16-3/6

RG13169 —UN—02OCT03

- If the word "Next" appears above the "Arrow" keys, there are more stored codes that may be viewed. Use the "Arrow" key to scroll to the next stored code.



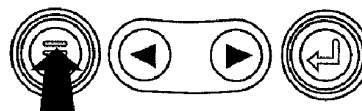
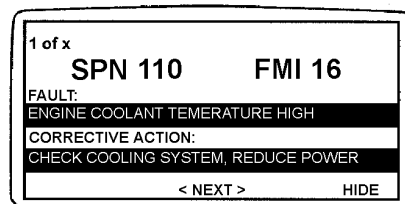
Use Arrow Keys To Scroll

Continued on next page

OURGP11,00000AC -19-27MAY16-4/6

RG13245 —UN—02OCT03

- Press the "Menu" key to return to the main menu.

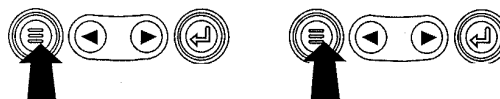
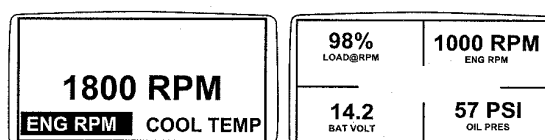


Return To Main Menu

OURGP11,00000AC -19-27MAY16-5/6

RG13246 —UN—02OCT03

- Press the "Menu" key to exit the main menu and return to the engine parameter display.



Exit Main Menu

OURGP11,00000AC -19-27MAY16-6/6

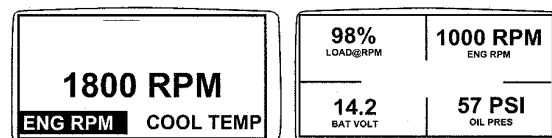
RG13159 —UN—26SEP03

Accessing Active Trouble Codes

NOTE: The engine does not need to be running to navigate the diagnostic gauge screens. If engine start up is desired, See *Starting The Engine*. All of the engine values illustrated on the diagnostic gauge indicate the engine is running.

For description of trouble codes, see chart in *Troubleshooting Section*.

- During normal operation the single or four parameter screen will be displayed.



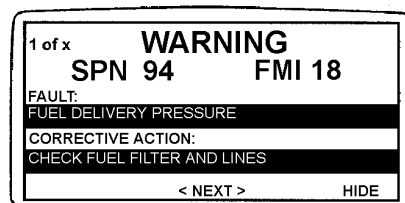
Normal Operation

OURGP11,00000AD -19-27MAY16-1/7

RG13172 —UN—26SEP03

- When the diagnostic gauge receives a trouble code from an engine control unit, the single or four parameter screen will be replaced with the "Warning" message. The SPN and FMI number will be displayed along with a description of the problem and the corrective action needed.

IMPORTANT: Ignoring active trouble codes can result in severe engine damage.



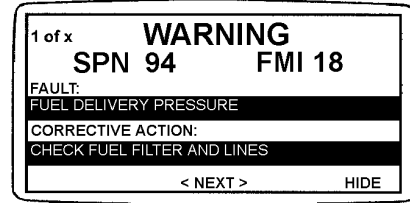
Active Trouble Codes Displayed

Continued on next page

OURGP11,00000AD -19-27MAY16-2/7

RG13240 —UN—30SEP03

3. If the word "Next" appears above the arrow keys, there are more trouble codes that can be viewed by using the arrow keys to scroll to the next trouble code.



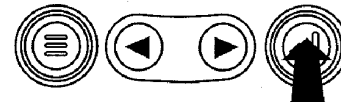
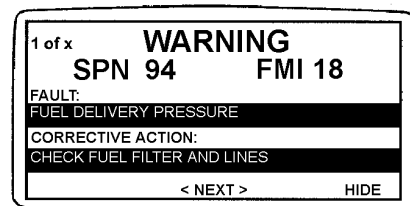
Use Arrow Keys To Scroll

OURGP11,00000AD -19-27MAY16-3/7

RG13241 —UN—30SEP03

IMPORTANT: Ignoring active trouble codes can result in severe engine damage.

4. To acknowledge and hide the code and return to the single or four parameter display, press the "Enter" Key.

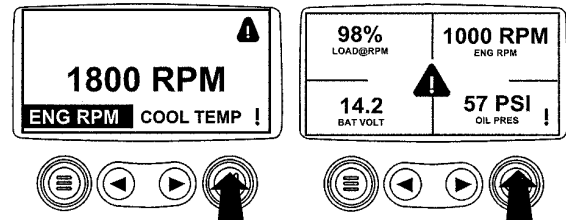


Hide Trouble Codes

OURGP11,00000AD -19-27MAY16-4/7

RG13242 —UN—30SEP03

5. The display will return to the single or four parameter display, but the display will contain the warning icon. Pressing the "Enter" key will redisplay the hidden trouble code.



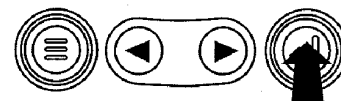
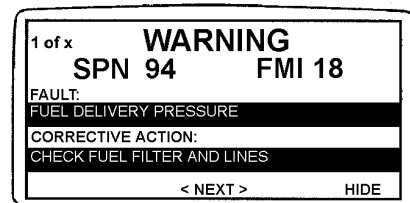
Active Trouble Code Icon

OURGP11,00000AD -19-27MAY16-5/7

RG13176 —UN—26SEP03

IMPORTANT: Ignoring active trouble codes can result in severe engine damage.

6. Pressing the "Enter" key once again will hide the trouble code and return the screen to the single or four parameter display.



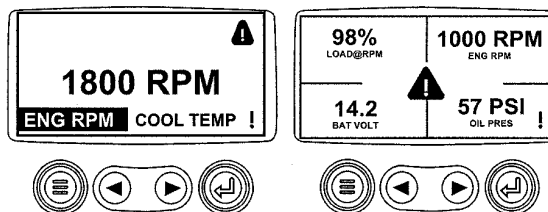
Enter Key

Continued on next page

OURGP11,00000AD -19-27MAY16-6/7

RG13242 —UN—30SEP03

7. The single or four parameter screen will display the warning icon until the trouble code condition is corrected.



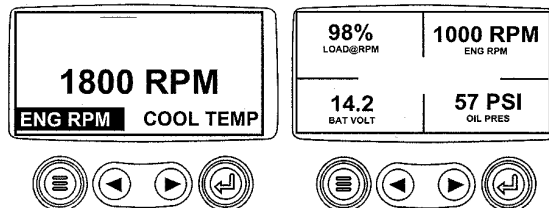
Active Trouble Code Condition

OURGP11,00000AD -19-27MAY16-7/7

RG13243 —UN—01OCT03

Engine Shutdown Codes

1. During normal operation the single or four parameter screen will be displayed.



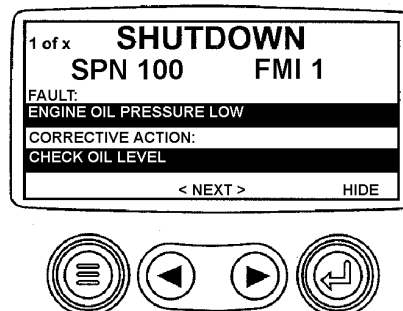
Normal Operation

OURGP11,00000AE -19-27MAY16-1/6

RG13172 —UN—26SEP03

2. When the diagnostic gauge receives a severe trouble code from an engine control unit, the single or four parameter screen will be replaced with the "Shutdown" message. The SPN and FMI number will be displayed along with a description of the problem and the corrective action needed.

If the word "Next" appears above the arrow keys, there are more trouble codes that can be viewed by using the arrow keys to scroll to the next trouble code.



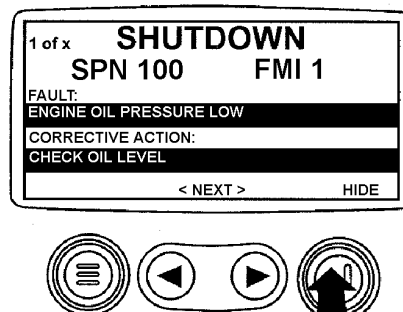
Shutdown Message

OURGP11,00000AE -19-27MAY16-2/6

RG13238 —UN—29SEP03

3. To acknowledge and hide the trouble code and return to the single or four parameter display, press the "Enter" key".

IMPORTANT: Ignoring the shutdown message can result in severe engine damage.



Hide Trouble Code

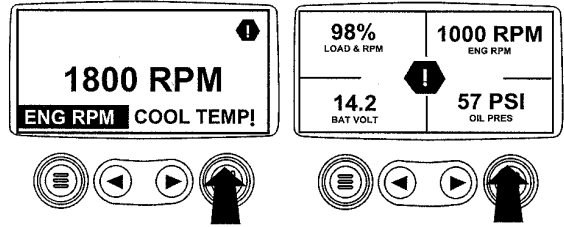
Continued on next page

OURGP11,00000AE -19-27MAY16-3/6

RG13239 —UN—29SEP03

- The display will return to the single or four parameter display, but the display will contain the "Shutdown" icon. Pressing the "Enter" key will redisplay the hidden trouble code.

IMPORTANT: Ignoring the shutdown message can result in severe engine damage.

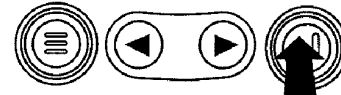
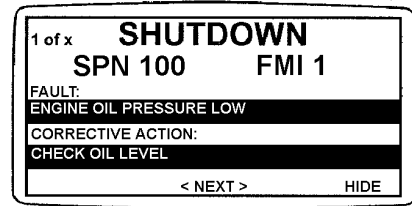


Flashing Shutdown Icon

OURGP11,00000AE -19-27MAY16-4/6

RG13179—UN—26SEP03

- Pressing the "Enter" key once again will hide the trouble code and return the screen to the single or four parameter display.



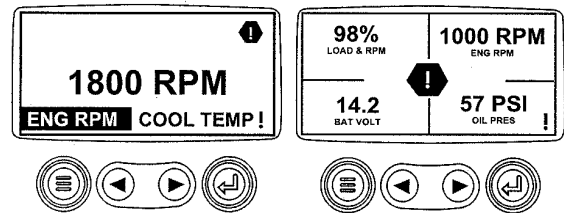
Redisplay Trouble Code

OURGP11,00000AE -19-27MAY16-5/6

RG13239—UN—29SEP03

- The single or four parameter screen will display the shutdown icon until the trouble code condition is corrected.

IMPORTANT: Ignoring the shutdown message can result in severe engine damage.



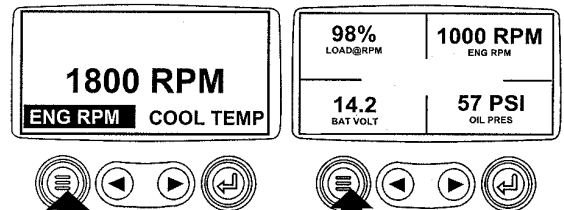
Shutdown Icon

OURGP11,00000AE -19-27MAY16-6/6

RG13180—UN—26SEP03

Adjusting Backlighting

- Turn the key switch to the ON position. Starting at the single or four engine parameter display, press the "Menu" key.



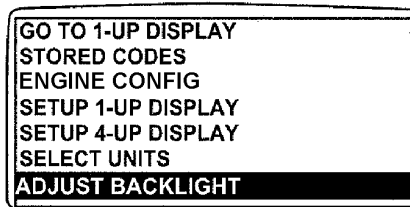
Menu Key

Continued on next page

OURGP11,0000237 -19-23AUG10-1/6

RG13159—UN—26SEP03

2. The main menu will be displayed. Use the "Arrow" keys to scroll through the menu until "Adjust Backlight" is highlighted.

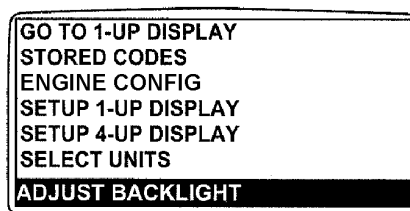


Select Adjust Backlight

OURGP11,0000237 -19-23AUG10-2/6

RG13181 —UN—02OCT03

3. Once the "Adjust Backlight" menu item has been highlighted, press the "Enter" key to activate the "Adjust Backlight" function.

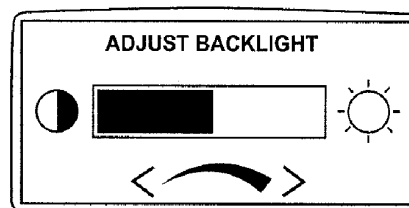


Press Enter Key

OURGP11,0000237 -19-23AUG10-3/6

RG13182 —UN—02OCT03

4. Use the "Arrow" keys to select the desired backlight intensity.



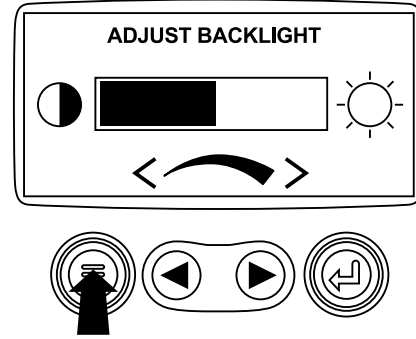
Adjust Backlight Intensity

Continued on next page

OURGP11,0000237 -19-23AUG10-4/6

RG13183 —UN—29SEP03

5. Press the "Menu" key to return to the main menu.

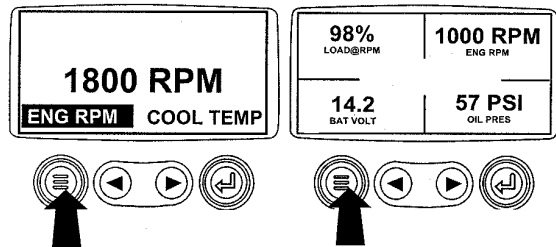


Return to Main Menu

OURGP11,0000237 -19-23AUG10-5/6

RG19048 —UN—23AUG10

6. Press the "Menu" key to exit the main menu and return to the engine parameter display.



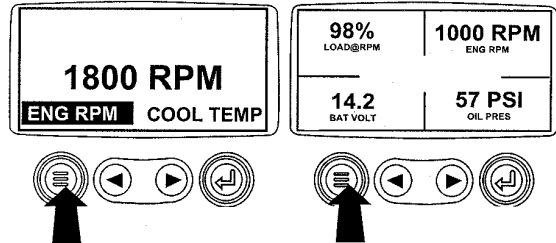
Exit Main Menu

OURGP11,0000237 -19-23AUG10-6/6

RG13159 —UN—26SEP03

Adjusting Contrast

1. Turn the key switch to the ON position. Starting at the single or four engine parameter display press the "Menu" key.

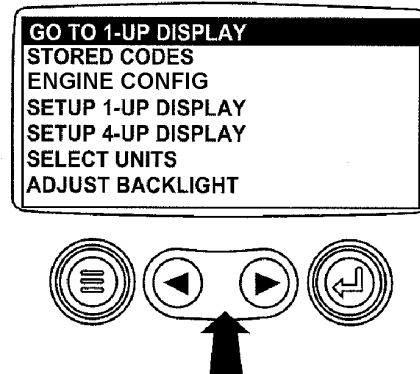


Menu Key

OURGP11,00000AF -19-27MAY16-1/6

RG13159 —UN—26SEP03

2. The main menu will be displayed. Use the "Arrow" keys to scroll through the menu until "Adjust Contrast" is highlighted.



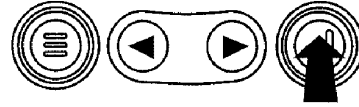
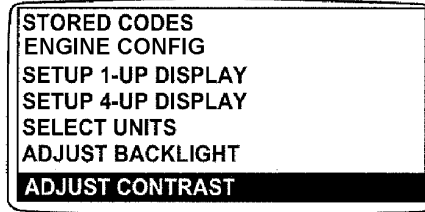
Select Adjust Contrast

Continued on next page

OURGP11,00000AF -19-27MAY16-2/6

RG13161 —UN—02OCT03

- Once the "Adjust Contrast" menu item has been highlighted, press the "Enter" key to activate the "Adjust Contrast" function.

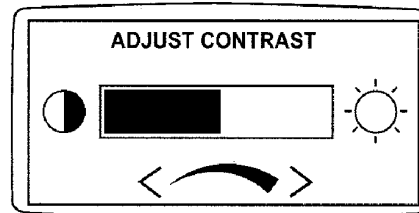


Press Enter Key

OURGP11,00000AF -19-27MAY16-3/6

RG13185 —UN—02OCT03

- Use the "Arrow" keys to select the desired contrast intensity.

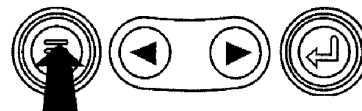
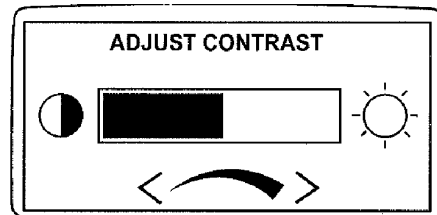


Adjust Contrast Intensity

OURGP11,00000AF -19-27MAY16-4/6

RG13186 —UN—29SEP03

- Press the "Menu" key to return to the main menu.



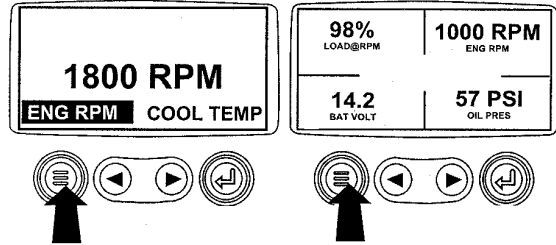
Return To Main Menu

Continued on next page

OURGP11,00000AF -19-27MAY16-5/6

RG13187 —UN—26SEP03

- Press the "Menu" key to exit the main menu and return to the engine parameter display.



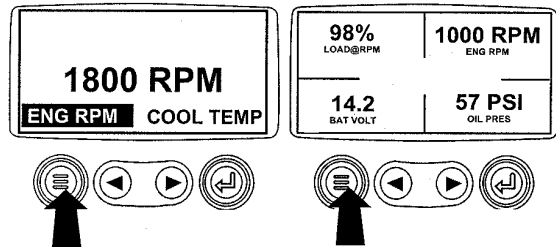
Exit Main Menu

OURGP11,00000AF -19-27MAY16-6/6

RG13159—UN—26SEP03

Selecting Units Of Measurement

- Turn the key switch to the ON position. Starting at the single or four engine parameter display, press the "Menu" key.

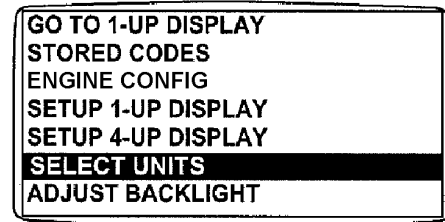


Menu Key

OURGP11,00000B0 -19-27MAY16-1/7

RG13159—UN—26SEP03

- The main menu will be displayed. Use the "Arrow" keys to scroll through the menu until "Select Units" is highlighted.

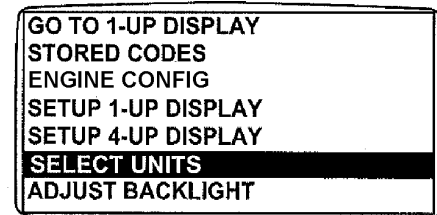


Select Units

OURGP11,00000B0 -19-27MAY16-2/7

RG13188—UN—02OCT03

- Once the "Select Units" menu item has been highlighted press the "Enter" key to access the "Select Units" function.



Press Enter Key

Continued on next page

OURGP11,00000B0 -19-27MAY16-3/7

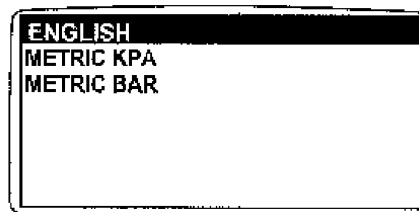
RG13189—UN—02OCT03

4. There are three choices for units of measurement, English, Metric kPa or Metric Bar.

English is for Imperial units, with pressures displayed in PSI and temperatures in °F.

Metric kPa and Metric bar are for IS units, with pressures displayed in kPa and bar respectively, and temperatures in °C.

Use the "Arrow" keys to highlight the desired units of measurement.

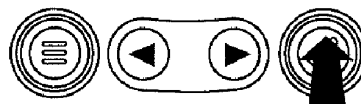
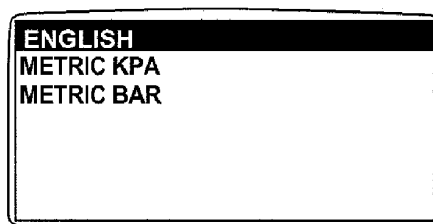


Select Desired Units

OURGP11,00000B0 -19-27MAY16-4/7

RG13190 —UN—26SEP03

5. Press the "Enter" key to select the highlighted units.

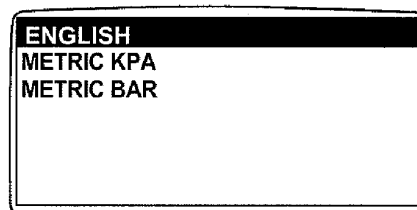


Press Enter Key to Select

OURGP11,00000B0 -19-27MAY16-5/7

RG13191 —UN—30SEP03

6. Press the "Menu" key to return to the main menu.



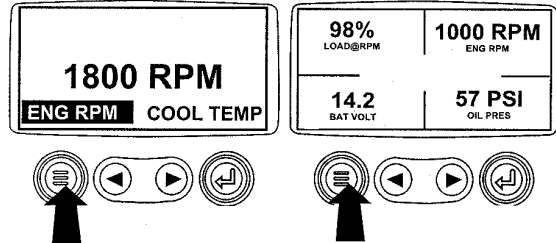
Return To Main Menu

Continued on next page

OURGP11,00000B0 -19-27MAY16-6/7

RG13192 —UN—26SEP03

- Press the "Menu" key to return to the engine parameter display.



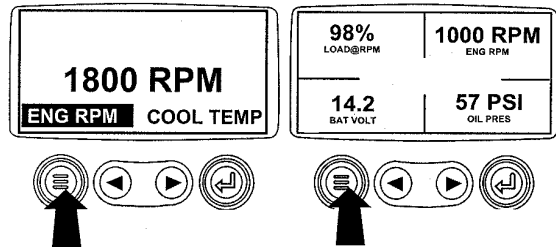
Press Menu Key

OURGP11,00000B0 -19-27MAY16-7/7

RG13159 —UN—26SEP03

Setup 1-Up Display

- Turn the key switch to the ON position. Starting at the single engine parameter display, press the "Menu" key.

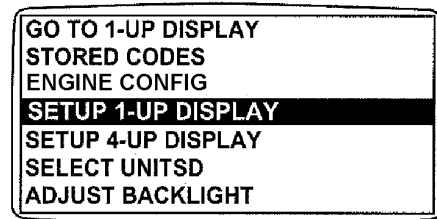


Menu Key

OURGP11,00000B1 -19-27MAY16-1/18

RG13159 —UN—26SEP03

- Use the "Arrow" keys to scroll through the menu until "Setup 1-Up Display" is highlighted.

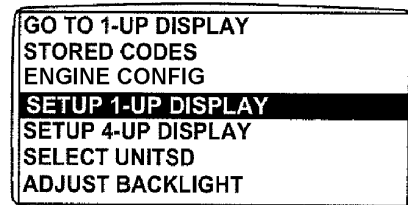


Setup 1-Up Display

OURGP11,00000B1 -19-27MAY16-2/18

RG13193 —UN—02OCT03

- Once "Setup 1-Up Display" menu item has been highlighted press the "Enter" key to access the "Setup 1-Up Display" function.



Press Enter Key

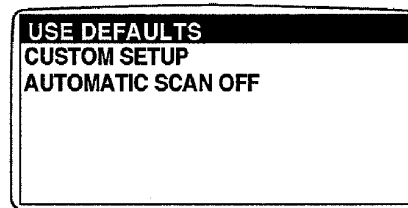
Continued on next page

OURGP11,00000B1 -19-27MAY16-3/18

RG13194 —UN—02OCT03

4. Three options are available for modification of the 1-Up Display.

- a. **Use Defaults** – This option contains the following engine parameters for display: Engine Hours, Engine Speed, Battery Voltage, % Load, Coolant Temperature and Oil Pressure.
- b. **Custom Setup** – This option contains a list of engine parameters. Engine parameters from this list can be selected to replace any or all of the default parameters. This option can be used to add parameters available for scrolling in the 1-Up Display.
- c. **Automatic Scan** – Selecting the scan function will allow the 1-Up Display to scroll through the selected set of parameters one at a time, momentarily pausing at each.

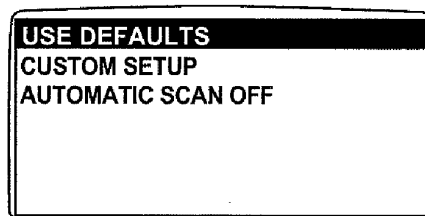


1-Up Display Options

OURGP11,00000B1 -19-27MAY16-4/18

RG13196 —UN—26SEP03

5. **Use Defaults** - To select "Use Defaults" use the Arrow keys to scroll to and highlight "Use Defaults" in the menu display.

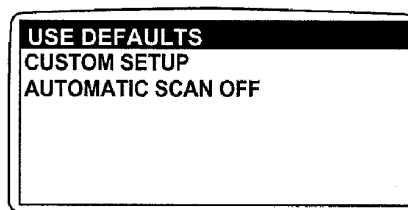


Select Defaults

OURGP11,00000B1 -19-27MAY16-5/18

RG13195 —UN—26SEP03

6. Press the "Enter" key to activate the "Use Defaults" function.



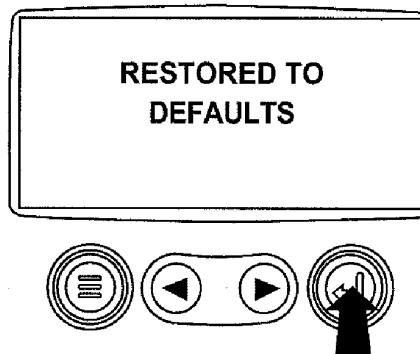
Defaults Selected

Continued on next page

OURGP11,00000B1 -19-27MAY16-6/18

RG13197 —UN—29SEP03

7. The display parameters are reset to the factory defaults, then the display will return to the "Setup 1-Up Display" menu.

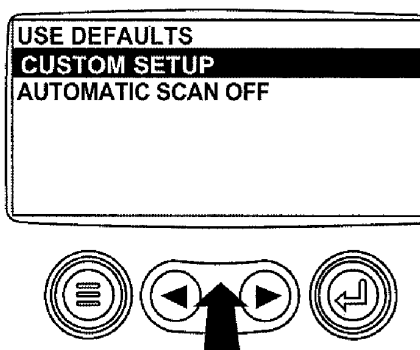


Restored To Defaults

OURGP11,00000B1 -19-27MAY16-7/18

RG13149 —UN—24SEP03

8. **Custom Setup** - To perform a custom setup of the 1-Up Display, use the arrow buttons to scroll to and highlight "Custom Setup" on the display.

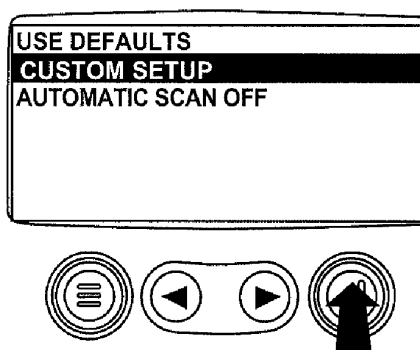


Select Custom Setup

OURGP11,00000B1 -19-27MAY16-8/18

RG13198 —UN—26SEP03

9. Press the "Enter" key to display a list of engine parameters.



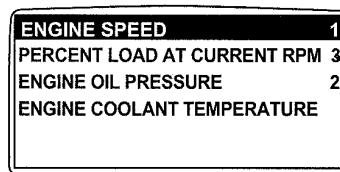
Engine Parameters

Continued on next page

OURGP11,00000B1 -19-27MAY16-9/18

RG13199 —UN—26SEP03

10. Use the "Arrow" keys to scroll to and highlight a selected parameter (parameter with a number to right of it).



This number indicates the order of display for the parameters and that the parameter is selected for display.

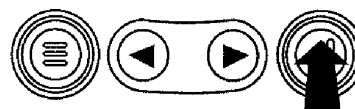
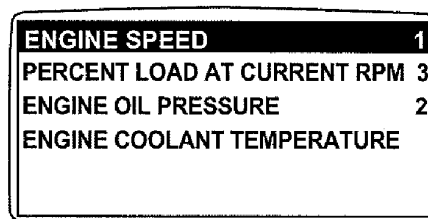


Select Parameters

OURGP11,00000B1 -19-27MAY16-10/18

RG13150 —UN—24SEP03

11. Press the "Enter" key to deselect the selected parameter, removing it from the list of parameters being displayed on the 1-Up Display.

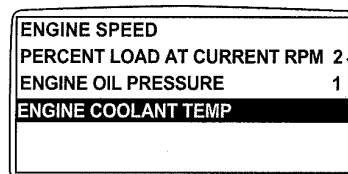


Deselect Parameters

OURGP11,00000B1 -19-27MAY16-11/18

RG13219 —UN—26SEP03

12. Use the "Arrow" keys to scroll and highlight the desired parameter that has not been selected for display (parameter without a number to right of it).



Note that the numbers now indicate the new order of display for the parameters.



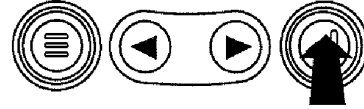
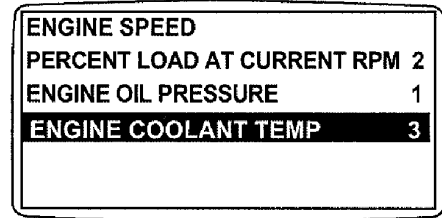
Select Desired Parameters

Continued on next page

OURGP11,00000B1 -19-27MAY16-12/18

RG13151 —UN—24SEP03

13. Press the "Enter" key to select the parameter for inclusion in the Single Engine Parameter Display.
14. Continue to scroll through and select additional parameters for the custom 1-Up Display. Press the "Menu" key at any time to return to the "Custom Setup" menu.

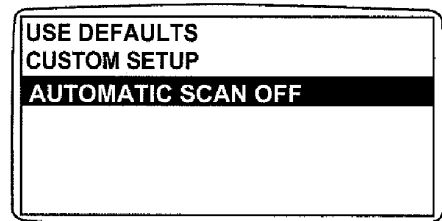


Select Parameters For Display

OURGP11,00000B1 -19-27MAY16-13/18

RG13220 —UN—26SEP03

15. **Automatic Scan** - Selecting the scan function will allow the 1- Up Display to scroll through the selected set of parameters one at a time. Use the "Arrow" keys to scroll to the "Automatic Scan" function.

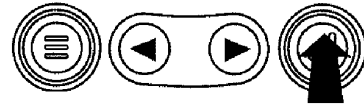
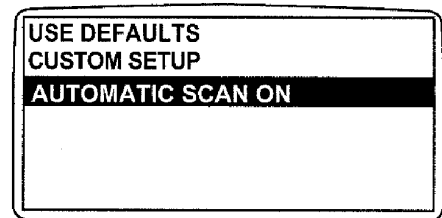


Automatic Scan Off

OURGP11,00000B1 -19-27MAY16-14/18

RG13221 —UN—26SEP03

16. Press the "Enter" key to toggle the "Automatic Scan" function on.



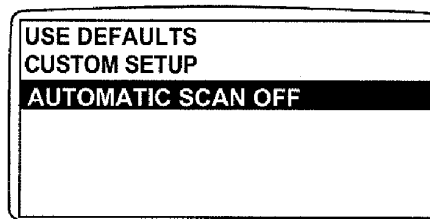
Automatic Scan On

Continued on next page

OURGP11,00000B1 -19-27MAY16-15/18

RG13222 —UN—26SEP03

17. Press the "Enter" key again to toggle the "Automatic Scan" function off.

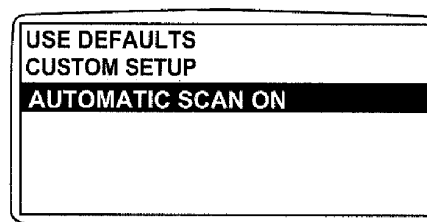


Automatic Scan Off

OURGP11,00000B1 -19-27MAY16-16/18

RG13223 —UN—26SEP03

18. Once the "Use Defaults", "Custom Setup" and "Automatic Scan" functions have been set, press the "Menu" key to return to the main menu.

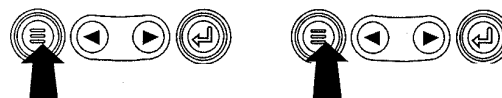
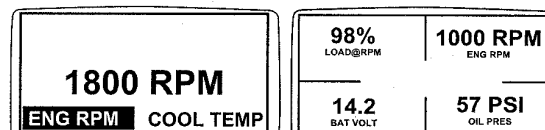


Menu Key

OURGP11,00000B1 -19-27MAY16-17/18

RG13224 —UN—26SEP03

19. Press the "Menu" key to exit the main menu and return to the engine parameter display.



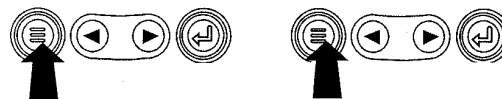
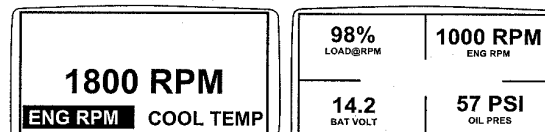
Exit Main Menu

OURGP11,00000B1 -19-27MAY16-18/18

RG13159 —UN—26SEP03

Setup 4-Up Display

1. Turn the key switch to the ON position. From the single or four engine parameter display, press the "Menu" key.



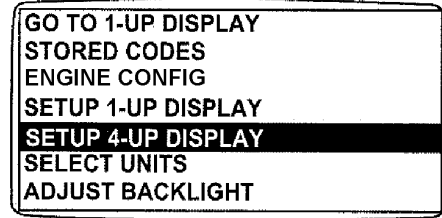
Menu Key

OURGP11,00000B2 -19-27MAY16-1/14

RG13159 —UN—26SEP03

Continued on next page

2. The main menu will be displayed. Use the "Arrow" keys to scroll through the menu until "Setup 4-Up Display" is highlighted.

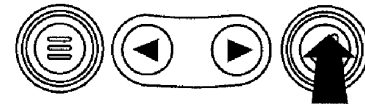
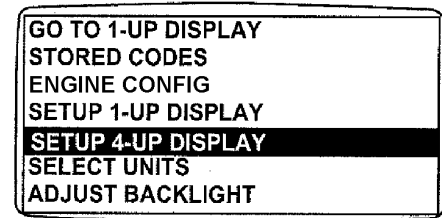


Select Setup 4-Up Display

OURGP11,00000B2 -19-27MAY16-2/14

RG-13225 —UN—02OCT03

3. Once the "Setup 4-Up Display" menu item has been highlighted, press the "Enter" key to activate the "Setup 4-Up Display" menu.

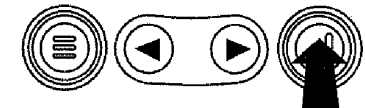
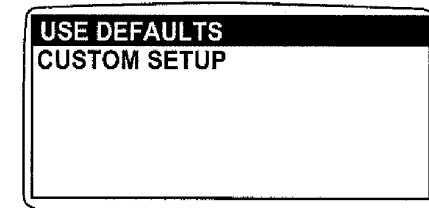


Press Enter Key

OURGP11,00000B2 -19-27MAY16-3/14

RG-13226 —UN—02OCT03

4. Two options are available for the 4-Up Display.
- Use Defaults** – This option contains the following engine parameters for display: Engine Speed, Battery Voltage, Coolant Temperature and Oil Pressure.
 - Custom Setup** – This option contains a list of engine parameters. Engine parameters from this list can be selected to replace any or all of the default parameters.



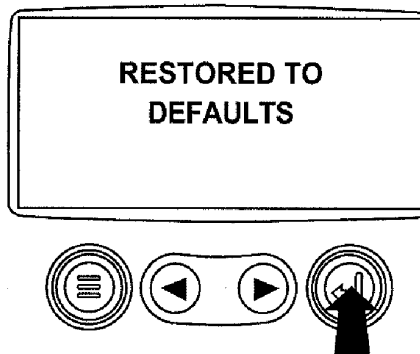
Select Factory Defaults

Continued on next page

OURGP11,00000B2 -19-27MAY16-4/14

RG-13244 —UN—02OCT03

5. To reset the display parameters to the factory defaults, scroll to and highlight "Use Defaults". Press the "Enter" key to activate the "Use Defaults" function. A message indicating the display parameters are reset to the factory defaults will be displayed, then the display will return to the "Setup 4-Up Display" menu.

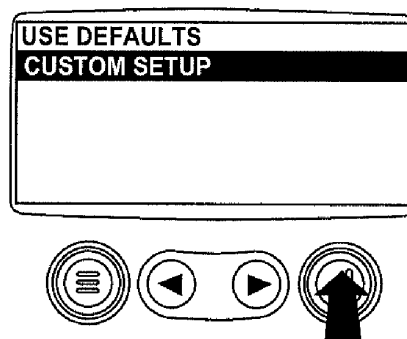


Restored To Defaults

OURGP11,00000B2 -19-27MAY16-5/14

RG13149 —UN—24SEP03

6. **Custom Setup** - To perform a custom setup of the 4-Up Display, use the arrow buttons to scroll to and highlight "Custom Setup" on the display.

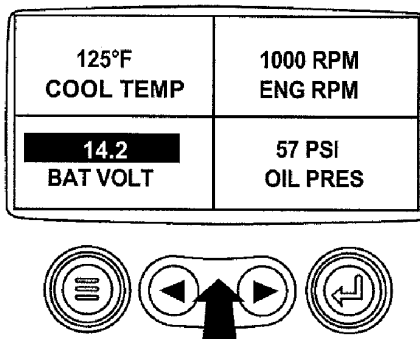


Custom Setup

OURGP11,00000B2 -19-27MAY16-6/14

RG13227 —UN—26SEP03

7. The quadrant with the highlighted parameter value is the current selected parameter. Use the "Arrow" keys to highlight the value in the quadrant you wish to change to a new parameter.



Select Parameters

Continued on next page

OURGP11,00000B2 -19-27MAY16-7/14

RG13228 —UN—26SEP03

8. Press the "Enter" key and a list of engine parameters will be displayed.

125°F COOL TEMP	1000 RPM ENG RPM
14.2 BAT VOLT	57 PSI OIL PRES



List Of Engine Parameters

OURGP11,00000B2 -19-27MAY16-8/14

RG13229 —UN—26SEP03

9. The parameter that is highlighted is the selected parameter for the screen. Use the "arrow" keys to highlight the new parameter to be placed in the "4-Up Display".

ENGINE SPEED	3
ENGINE HOURS	
ENGINE COOLANT TEMPERATURE	1
BATTERY POTENTIAL	
ENGINE OIL TEMPERATURE	2
ENGINE OIL PRESSURE	4

The number to the right of the parameter indicates the quadrant in which it is displayed.
1. = Upper Left Quadrant
2. = Lower Left Quadrant
3. = Upper Right Quadrant
4. = Lower Right Quadrant



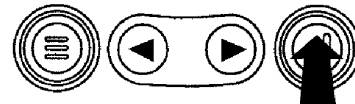
Select Desired Engine Parameter

OURGP11,00000B2 -19-27MAY16-9/14

RG13230 —UN—26SEP03

10. Press the "Enter" key to change the selected parameter in the quadrant to the new parameter.

ENGINE SPEED	3
ENGINE HOURS	
ENGINE COOLANT TEMPERATURE	1
BATTERY POTENTIAL	2
ENGINE OIL TEMPERATURE	
ENGINE OIL PRESSURE	4



Enter Selected Parameter

OURGP11,00000B2 -19-27MAY16-10/14

RG13231 —UN—26SEP03

11. Use the "Menu" keys to return to the "4-Up Custom Setup" screen.

ENGINE SPEED	3
ENGINE HOURS	
ENGINE COOLANT TEMPERATURE	1
BATTERY POTENTIAL	
ENGINE OIL TEMPERATURE	2
ENGINE OIL PRESSURE	4

Note the number to the right of the selected parameter indicating that the parameter is now assigned to that display location.



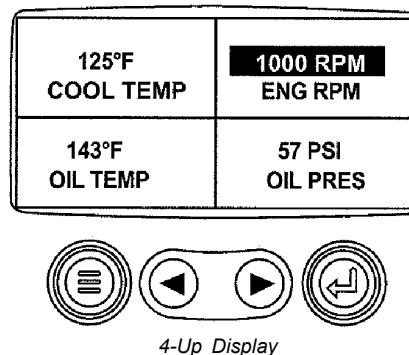
Return To 4-Up Custom Setup

Continued on next page

OURGP11,00000B2 -19-27MAY16-11/14

RG13232 —UN—26SEP03

12. The selected quadrant has now changed to the new selected parameter.

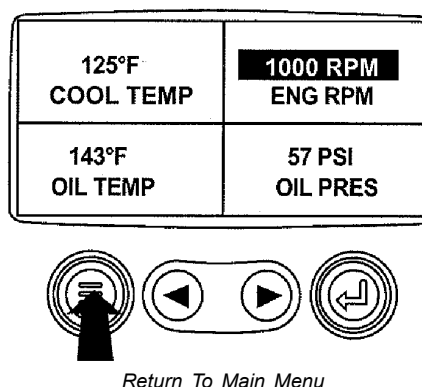


OURGP11,00000B2 -19-27MAY16-12/14

RG13153 —UN—24SEP03

13. Repeat the parameter selection process until all spaces are as desired.

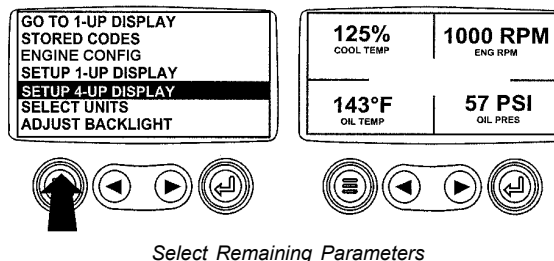
14. Press the "Menu" key to return to the main menu.



OURGP11,00000B2 -19-27MAY16-13/14

RG13154 —UN—24SEP03

15. Press the "Menu" key to exit the main menu and return to the engine parameter display.



OURGP11,00000B2 -19-27MAY16-14/14

RG13155 —UN—07OCT03

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 an authorized John Deere dealer or servicing dealer.

BL90236,0000031 -19-13FEB14-1/1

Engine Operation

Engine Break-In Service

The engine is ready for normal operation. However, extra care during the first 100 hours of operation will result in more satisfactory long-term engine performance and life. DO NOT exceed 100 hours of operation with break-in oil.

1. This engine is factory-filled with John Deere DIESEL ENGINE BREAK-IN OIL (SAE 10W-30). 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 makeup 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 DIESEL ENGINE BREAK-IN OIL and a new John Deere oil filter.



Check Engine Oil

RG13719 —UN—11NOV04

OURGP11,0000055 -19-07DEC05-1/4

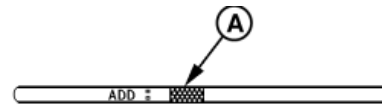
IMPORTANT: DO NOT add makeup oil until the oil level is BELOW the ADD mark on dipstick. John Deere ENGINE BREAK-IN OIL (TY22041) should be used to make up any oil consumed during the break-in period.

3. Check engine oil level more frequently during engine break-in period. If oil must be added during this period, John Deere DIESEL ENGINE BREAK-IN OIL is preferred. See DIESEL ENGINE BREAK-IN OIL, in Fuels, Lubricants, and Coolant Section for other oils allowed.

IMPORTANT: Do not use PLUS-50 oil or engine oils meeting any of the following during the first 100 hours of operation of a new or rebuilt engine:

API CI-4 PLUS	API CF
API CI-4	ACEA E7
API CH-4	ACEA E6
API CG-4	ACEA E5
API CF-4	ACEA E4
API CF-2	ACEA E3

RG8028A —UN—15JAN99



Crosshatch Pattern On Dipstick

A—Crosshatch Pattern On Dipstick

These oils will not allow the engine to break-in properly.

DO NOT fill above the crosshatch pattern (A) or the FULL mark, whichever is present. Oil levels anywhere within the crosshatch are considered in the acceptable operating range.

Continued on next page

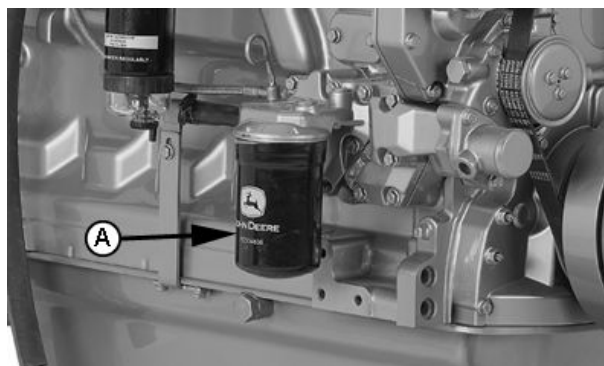
OURGP11,0000055 -19-07DEC05-2/4

4. During the first 20 hours, avoid prolonged periods of engine idling or sustained maximum load operation. If engine will idle longer than 5 minutes, stop engine.
5. Before the first 100 hours (maximum), change engine oil and replace engine oil filter (A). (See CHANGING ENGINE OIL AND REPLACING FILTER in Lubrication and Maintenance/500 Hour/12 Month Section.) Fill crankcase with the normal seasonal viscosity grade oil. (See DIESEL ENGINE OIL, in Fuels, Lubricants, and Coolant Section.)

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

If temperature is below 0°C (32°F), it may be necessary to use cold weather starting aids (See COLD WEATHER OPERATION, later in this section).

If air temperature is below -10°C (14°F), use an engine block heater.



Engine Oil Filter

A—Engine Oil Filter

RG13721 —UN—11NOV04

OURGP11,0000055 -19-07DEC05-3/4

6. Watch coolant temperature gauge (A) closely. If coolant temperature rises above 112°C (234°F), reduce load on engine. Unless temperature drops quickly, stop the engine and determine the cause before resuming operation.

NOTE: When the coolant temperature gauge reads approximately 115°C (239°F), the engine will shutdown automatically, if equipped with safety controls.

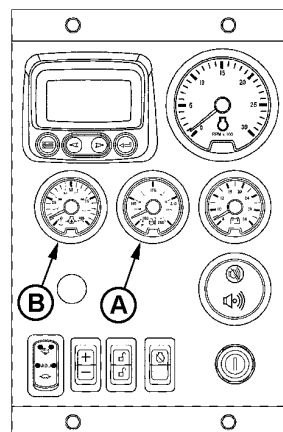
7. Watch oil pressure gauge (B) for pressure within specification.

Specification

Engine ¹ —Oil Pressure at Full Load Rated Speed	
With Oil Warmed to 115°C (240°F).....	345 ± 103 kPa (3.45 ± 1.03 bar) (50 ± 15 psi)
Minimum Oil Pressure at Slow Idle.....	105 kPa (1.05 bar) (15 psi)
Coolant Temperature Range	82°–94°C (180°–202°F)

8. Check poly-vee belt for proper alignment and seating in pulley grooves.

¹Engine oil pressure at rated speed can be as low as 241 kPa (2.41 bar) (35 psi) and as high as 586 kPa (5.86 bar) (85 psi). This not detrimental to the engine.



Watch Coolant Temperature and Oil Pressure on Panel

A—Engine Coolant Temperature Gauge

B—Oil Pressure Gauge

RG13720 —UN—11NOV04

OURGP11,0000055 -19-07DEC05-4/4

Starting the Engine

The following instructions apply to the optional controls and instruments available through the John Deere Parts Distribution Network. The controls and instruments for your engine may be different from those shown here; always follow manufacturer's instructions.

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, later in this section).

1. Perform all prestarting checks outlined in Lubrication & Maintenance/Daily Section later in this manual.
2. Open the fuel supply shut-off valve, if equipped.



Use Proper Ventilation

3. Disengage power (or clutch if equipped) to any engine drivelines.

OURGP12.0000086 -19-25MAR10-1/3

4. Set slow idle as follows:

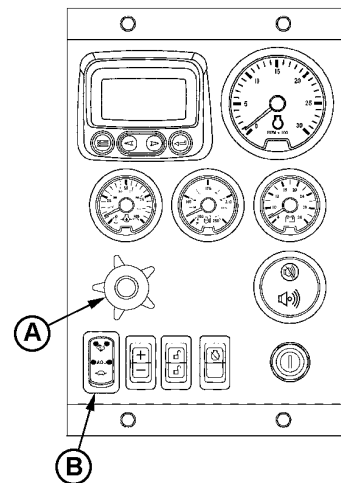
Panels with high-low speed select rocker switch (B) only: Set slow speed by pressing lower half of switch.

Panels with optional analog throttle(s) (A) : Set high-low speed select rocker switch 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 Troubleshooting section.

A—Analog Throttle Control (Optional)

B—Speed Select Rocker Switch



Analog Throttle Control and Speed Select Switch

Continued on next page

OURGP12.0000086 -19-25MAR10-2/3

TS220 —UN—15APR13

RG13722 —UN—11NOV04

5. Turn the key start switch (A) clockwise to the "ON" position. Wait until the Engine Preheater Indicator light turns off, then turn the key start switch clockwise "START" position to crank the engine. (In cold weather, preheater indicator light remains on longer while engine is warmed. See COLD WEATHER OPERATION later in this 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 will prevent possible damage to the starter and/or flywheel.

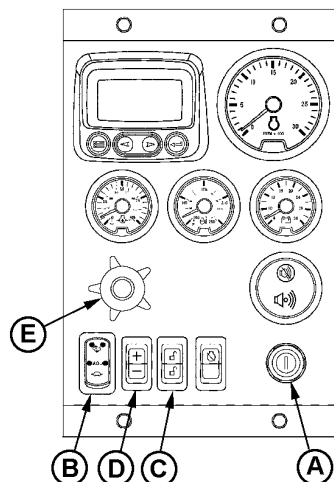
6. After engine starts, idle engine at not more than 1200 rpm until warm. (See WARMING ENGINE later in this section).

Panels with high-low speed select rocker switch (B) only: Set rpm using bump speed enable switch (C) with speed select rocker switch (D).

Panels with optional analog throttle (E): Set either high-low speed select switch (B) or analog throttle (E) to slow speed, and set desired speed with remaining control. (See "Changing Engine Speeds" later in this section).

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



Start And Idle Engine Controls On Instrument Panel

- | | |
|---------------------------------------|--------------------------------------|
| A—Key Start Switch | D—Speed Select Rocker Switch |
| B—High-Low Speed Select Rocker Switch | E—Analog Throttle Control (Optional) |
| C—Bump Speed Enable Rocker Switch | |

determine the cause. (For normal gauge pressures and temperatures, see BREAK-IN SERVICE earlier in this section.)

RG13723 —UN—11NOV04

OURGP12,0000086 -19-25MAR10-3/3

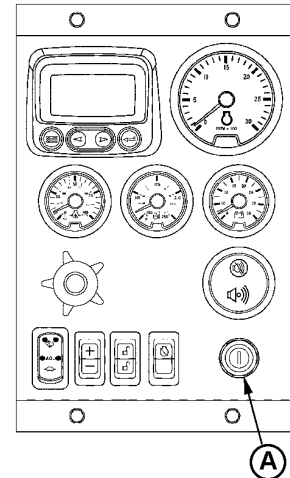
Restarting Engine After Emergency Shutdown

In the event of an emergency engine shutdown, the following procedures are required to restart the engine.

1. Correct the condition causing the emergency shutdown.
2. Perform initial restarting procedures, as required. See STARTING THE ENGINE, steps 1 through 4, earlier in this section.

NOTE: For ALL emergency shutdowns, the controller must be reset before the engine can be restarted.

3. To restart the controller, cycle the key start switch (A) as follows:
 - a. Turn key switch OFF.
 - b. Wait 15 seconds.
 - c. Turn key switch clockwise to crank the engine.
4. Perform final restarting procedures, as required. See STARTING THE ENGINE, steps 6 and 7, earlier in this section.



Restarting the Engine

A—Key Start Switch

OURGP12,0000085 -19-22DEC11-1/1

RG13738 —UN—11NOV04

Normal Engine Operation

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

Normal engine coolant operating temperature range is 82°—94°C (180°—202°F). If coolant temperature rises above 112°C (234°F), reduce load on engine. Unless temperature drops quickly, stop engine and determine cause before resuming operation.

Normal engine oil pressure at slow idle should be at least 105 kPa (15 psi) and should rise to at least 172 kPa (1.72 bar) (25 psi) at rated speed. Engine oil pressure at rated speed can be as low as 241 kPa (2.41 bar) (35 psi) and high as 586 kPa (5.86 bar) (85 psi). This not detrimental to the engine.

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.

IMPORTANT: Should the engine die while operating under load, immediately remove load and restart

the engine. Overheating of the turbocharger parts may occur when oil flow is stopped.

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 black exhaust
- Excessive fuel consumption
- Excessive oil consumption
- Fluid leaks

NOTE: These engines meet emission standards with an exhaust gas recirculation system and a variable geometry turbocharger. A revving sound may be heard for an instant after starting, as the variable geometry turbocharger recycles. This is normal.

RG41061,0000022 -19-26MAR10-1/1

Warming Engine

The electronically-controlled engines will operate at an accelerated slow idle of 1050 rpm until the engine coolant warms up to 20° C (68° F). Then engine idle drops to normal.

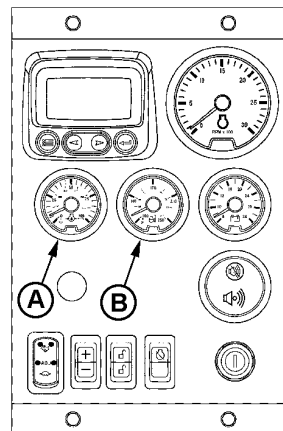
IMPORTANT: To assure proper lubrication, operate engine at or below 1200 rpm with no load for 1–2 minutes. Extend this period 2–4 minutes when operating at temperatures below freezing.

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 high idle for 1 to 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 (A) as soon as engine starts. If gauge needle does not rise above minimum oil pressure specification of 105 kPa (1.05bar) (15 psi) within 5 seconds, stop the engine and determine the cause. Normal engine oil pressure should be 345 kPa \pm 103 (3.45 \pm 1.03 bar) (50 \pm 15 psi) at rated full load speed (1800–2400 rpm) with oil at normal operating temperature of 115°C (240°F).

NOTE: On certain engines, the oil pressure and coolant temperature gauges are replaced by indicator warning lights. The lights must be "OFF" when engine is running.

2. Watch coolant temperature gauge (B). Do not place engine under full load until it is properly warmed up.



Oil Pressure and Coolant Temperature Gauges On Panel

A—Engine Oil Pressure Gauge B—Engine Coolant Temperature Gauge

The normal engine coolant temperature range is 82°–94°C (180°–202°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.

OURGP11,0000057 -19-17APR08-1/1

RG13724 —UN—11NOV04

Cold Weather Operation

CAUTION: DO NOT use starting fluid on engines equipped with glow plugs or air intake heaters. Ether injector starting fluid is highly flammable and may explode, causing serious injury.

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

Engines may be equipped with a block heater, air intake heater, coolant heater or fuel heater as cold weather starting aids. Your engines may be equipped with glow plugs as an automatic cold weather starting aid (see steps 1-4 following).

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 of oil (per engine and machine operator's manual) is critical to achieving adequate cold weather cranking speed.

Synthetic oils have improved flow at low temperatures, especially in arctic conditions.

If air temperature is below -10°C (14°F), use an engine block heater.

Other cold weather starting aids are required at temperatures below -25°C (-13°F) or at altitudes above 1500 m (5000 ft). (See "Using a Booster Battery or Charger" later in this section.)

A—Minimum Cranking RPM

B—No Aids

C—Electric Air Heat

D—Block Heat

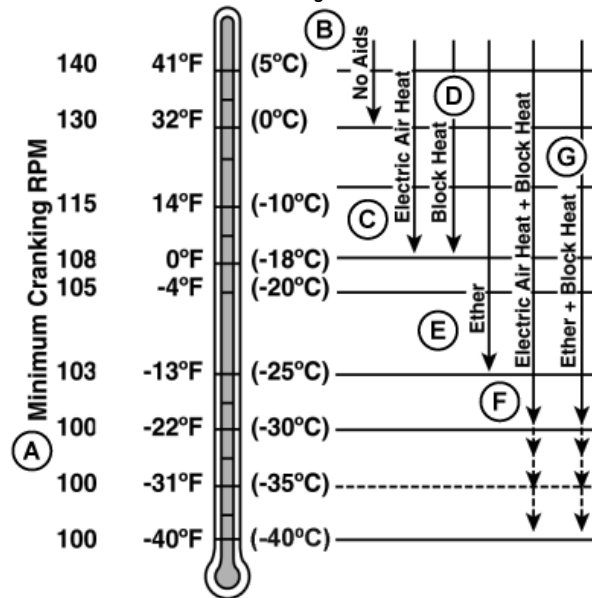
E—Ether (See Caution)

F—Electric Air Heat and Block Heat

G—Ether and Block Heat (See Caution)



Handle Starting Fluid with Care



Cold Weather Starting Guidelines

Continued on next page

OURGP11,0000058 -19-04JAN11-1/2

TS1356 —UN—18MAR92

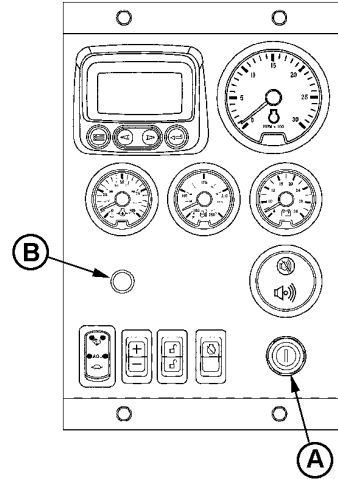
RG19813 —UN—15DEC10

1. Follow steps 1—4 as listed under STARTING THE ENGINE, earlier in this section, then proceed as follows according to the instrument (gauge) panel on your engine.

NOTE: Glow plugs operate automatically through the ECU. The Engine Preheater Indicator light (B) on these engines, should always illuminate when the switch is turned ON. In warm weather, the light illuminates briefly as a light check. In cold weather, the light remains on during the automatic operation of the glow plugs. Operating time depends on temperature. Do not crank engine until light turns off.

2. Turn key start switch (A) ON to activate glow plugs, but DO NOT crank engine until Engine Preheater Indicator light (B) turns off.
3. Follow remaining steps 5—7 as listed earlier in "Starting Engine" section.

Additional information on cold weather operation is available from your authorized servicing dealer.



Activating Glow Plugs (if applicable) with Key Start Switch

A—Key Start Switch

RG13864 —UN—28JAN05

OURGP11,0000058 -19-04JAN11-2/2

Using a Booster Battery or Charger

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

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.

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: Be sure 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.

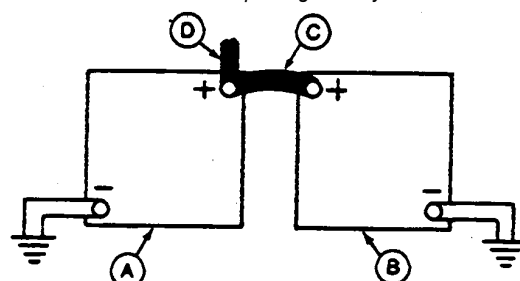
1. Connect booster battery or batteries to produce the required system voltage for your engine application.

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

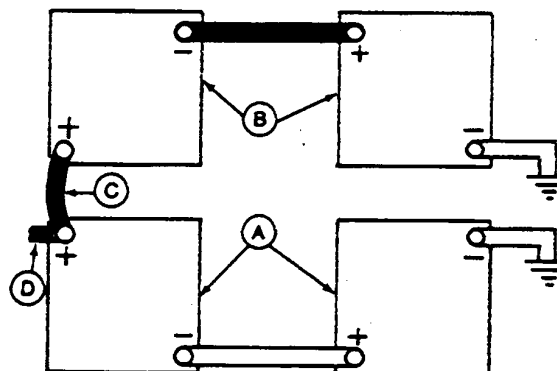
2. Connect one end of jumper cable to the POSITIVE (+) post of the booster battery.
3. Connect the other end of the jumper cable to the POSITIVE (+) post of battery connected to starter.
4. Connect one end of the other jumper cable to the NEGATIVE (-) post of the booster battery.
5. ALWAYS complete the 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. Disconnect NEGATIVE (-) cable first.



Exploding Battery



12-Volt System



24-Volt System

A—12-Volt Machine Battery (ies)
B—12-Volt Booster Battery (ies)

C—Booster Cable
D—Cable to Starting Motor

RG, RG34710, 5564 -19-27JUL06-1/1

TS204 —UN—15APR13

RG4678 —UN—14DEC88

RG4698 —UN—14DEC88

Avoid Excessive Engine Idling

Prolonged 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 temperatures, engine should be idled at slow idle speed.

Slow idle speed for this engine is 800 rpm at factory. If an engine will be idling for more than 5 minutes, stop and restart later.

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

OURGP12,00000AE -19-16NOV04-1/1

Changing Engine Speed

Changing from slow to fast speed using Adjustable High-Low Speed Select Rocker Switch (A)

Engine panels have an adjustable **three-position** rocker switch (A) that can be used to select slow idle, fast idle, or an adjustable ("ADJ") intermediate speed.

- For slow speed, press lower half of rocker switch (indicated by turtle symbol).
- For fast speed, press upper half of rocker switch (indicated by rabbit symbol).

NOTE: To adjust preset fast or slow speeds with adjustable High-Low Speed Select Rocker Switch:

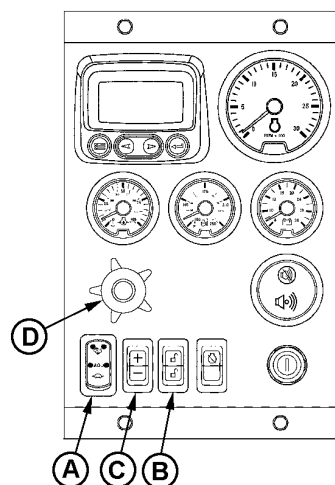
1. Select middle position (ADJ) or slow (turtle) position on the optional Adjustable Three-State Speed Select Rocker Switch (A).
2. Press and hold top or bottom half of Bump Speed Enable Rocker Switch (B) while using Speed Select Rocker Switch (C).
3. Use Speed Select Rocker Switch (C) to bump engine speed up (+) or down (-).

NOTE: Slow (turtle) position is factory preset at low engine idle, while middle (ADJ) position is factory set at high engine idle.

NOTE: Once the speed has been set, the Bump Speed Enable Switch (B) must be pressed and released three times within two seconds to commit the new slow or fast speed to memory. If not done, the engine's new slow or fast speed will only be effective until the key is shut off. Then the speed will revert to its previous setting.

Changing engine speed using optional analog throttle (D)

NOTE: Pushing in on analog throttle will immediately take engine to slow idle speed.



Changing Engine Speed with Full-Featured Panel

- | | |
|---------------------------------------|--------------------------------------|
| A—High-Low Speed Select Rocker Switch | C—Speed Select Rocker Switch |
| B—Bump Speed Enable Rocker Switch | D—Analog Throttle Control (Optional) |

1. Set High-Low Speed Select Rocker Switch (A) to low speed "turtle" position.
2. Turn analog throttle (D) clockwise to increase speed or counterclockwise to decrease speed.

NOTE: Engine Control Unit (ECU) reads the higher of the High-Low Speed Select Rocker Switch or the Analog Throttle(s) Speed Settings. With High-Low switch at low speed, Analog Throttle(s) will control speed higher than low idle setting.

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OURGP12,000008A -19-22SEP04-1/2

RG13725 —UN—11NOV04

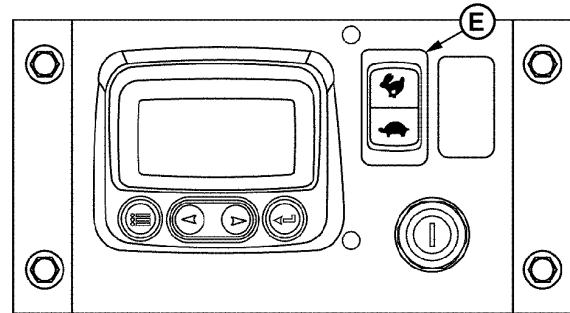
Changing engine speeds on engines equipped with the Basic Instrument Panel

The basic instrument panel has a “ramp” throttle switch (E) with a spring loaded return to the center rest position (Off).

To increase the engine speed, press and hold upper half of rocker switch (E) (indicated by rabbit symbol) to increase or ramp up the engine speed to desired speed. Release the rocker switch.

Press lower half of rocker switch (indicated by turtle symbol) to decrease or ramp down the engine speed to desired speed. Release the rocker switch.

The settings will not be stored, so above steps must be repeated for each speed change.



Changing Engine Speed With Basic Panel

E—High-Low Speed Select Rocker Switch

OURGP12.000008A -19-22SEP04-2/2

RG13289 —UN—30OCT03

Stopping The Engine

1. Disengage clutch, if equipped, controlling engine power driveline.

IMPORTANT: 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.

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.

2. Run engine at 1000—1200 rpm for at least 2 minutes to cool.

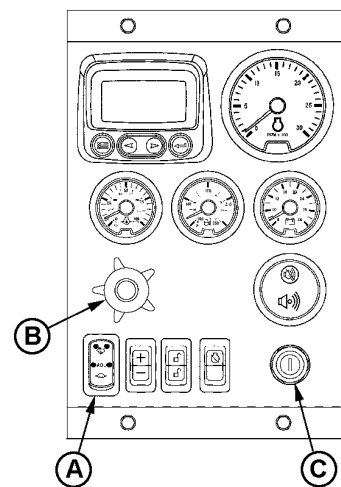
3. Set either High-Low Speed Select Rocker Switch (A) or Analog Throttle (B) to low idle, and set desired speed with remaining control.

NOTE: Engine Control Unit (ECU) reads the higher of the High-Low Speed Select Rocker Switch or the Analog Throttle(s) Speed settings.

4. Push in on analog throttle potentiometer handle (if equipped) so that engine goes to slow idle, or set slow speed with High-Low Speed Select Rocker Switch.

5. Turn key switch (C) to “OFF” position to stop the engine. Remove ignition key.

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



Stopping the Engine



Exhaust Stack Rain Cap

A—High-Low Speed Select Rocker Switch
B—Analog Throttle (Optional)

C—Key Switch
D—Exhaust Stack Rain Cap

OURGP12.000008B -19-22SEP04-1/1

RG13726 —UN—11NOV04

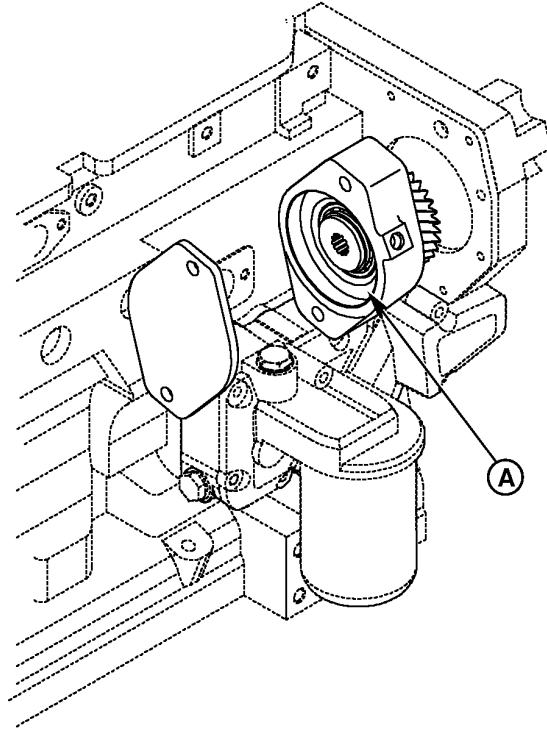
RG13727 —UN—11NOV04

Auxiliary Gear Drive Limitations

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

- 30 kW (40 hp) Continuous Operation at 2500 rpm
- 37 kW (50 hp) Intermittent Operation at 2500 rpm

A—Auxiliary Gear Drive



Auxiliary Gear Drive

RG7634A —UN—22JAN99

RG, RG34710, 5555 -19-27JUL06-1/1

Generator Set (Standby) Applications

To assure that your engine will deliver efficient standby 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 extended period of time with no load.

RG, RG34710, 5556 -19-27JUL06-1/1

Lubrication and Maintenance

Required Emission-Related Information

Service Provider

A qualified 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.

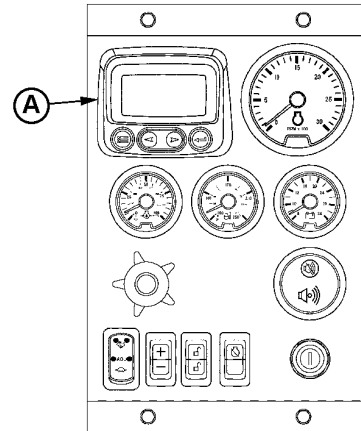
DX,EMISSIONS,REQINFO -19-12JUN15-1/1

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

OURGP11,0000059 -19-16JUL15-1/1

RG13728—UN—11NOV04

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 engine distributor, servicing dealer 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.



John Deere Parts Network

DPSG,OUOE003,20 -19-27JUL06-1/1

TS100—UN—23AUG88

Lubrication and Maintenance Service Interval Chart

Item	Lubrication and Maintenance Service Intervals				
	Daily ^a	500 Hours/ 12 Month	1500 Hours	2000 Hours/ 24 Month	As Required
Operate Engine at Rated Speed and 50%-70% Load a Minimum of 30 Minutes	•				
Check Engine Oil and Coolant Level	•				
Check Fuel Filter/Water Bowl	•				
Check Air Cleaner Dust Unloader Valve & Restriction Indicator Gauge ^b	•				
Visual Walk Around Inspection	•				
Service Fire Extinguisher		•			
Check Engine Mounts		•			
Service Battery		•			
Change Engine Oil And Replace Oil Filter ^{c, d}		•			
Check Crankcase Vent System		•			
Check Air Intake Hoses, Connections, and System		•			
Replace Fuel Filter Elements		•			
Check Automatic Belt Tensioner and Belt Wear		•			
Check Engine Electrical Ground Connection		•			
Coolant Solution Analysis-Add SCAs as required		•			
Pressure Test Cooling System		•			
Check Engine Speeds		•			
Open Crankcase Ventilation (OCV) Filter			•		
Check Cooling System		•			
Test Thermostats				•	
Check Crankshaft Vibration Damper (6.8 L Engines) ^e				•	
Flush and Refill Cooling System ^f				•	
Check and Adjust Engine Valve Clearance				•	
Add Coolant					•
Replace Air Cleaner Elements					•
Replace Fan and Alternator Belts					•
Check Fuses					•
Check Air Compressor (If Equipped)					•
Bleed Fuel System					•

^aStandby generator applications may allow intervals up to every 2 weeks.

^bReplace primary air cleaner element when restriction indicator shows a vacuum of 625 mm (25 in) H₂O.

^cDuring engine break in, change the oil and filter for the first time before 100 hours of operation.

^dService intervals depend on sulfur content of the diesel fuel, oil pan capacity, and the oil and filter used, which means that intervals may be REDUCED. (See DIESEL ENGINE OIL AND FILTER SERVICE INTERVALS in Fuels, Lubricants, and Coolant Section.)

^eReplace crankshaft damper every 4500 hours or 60 months, whichever occurs first.

^fIf John Deere Cool-Gard is used, the flushing interval may be extended to 3000 hours or 36 months. If John Deere Cool-Gard is used and the coolant is tested annually AND additives are replenished as needed by adding a supplemental coolant additive, the flushing interval may be extended to 5000 hours or 60 months, whichever occurs first.

AK08008,00000EA -19-25JUN18-1/1

Lubrication and Maintenance Service Interval Chart—Jet Fuel Capable Engines

Item	Lubrication and Maintenance Service Intervals				
	Daily	250 Hours of Operation/or Every 12 Months	500 Hours of Operation/or Every 12 Months	2000 Hours of Operation/or Every 24 Months	As Required
Check Engine Oil and Coolant Level	•				
Check Fuel Filter/Water Bowl	•				
Check Air Cleaner Dust Unloader Valve & Restriction Indicator Gauge ^a	•				
Visual Walk Around Inspection	•				
Replace Fuel Filter Elements		•			
Replace Dosing Element		•			
Change Engine Oil And Replace Oil Filter ^{b,c}		•			
Service Fire Extinguisher			•		
Check Engine Mounts			•		
Service Battery			•		
Check Crankcase Vent System			•		
Check Air Intake Hoses, Connections, & System			•		
Check Automatic Belt Tensioner and Belt Wear			•		
Check Engine Electrical Ground Connection			•		
Coolant Solution Analysis-Add SCAs as required			•		
Pressure Test Cooling System			•		
Check Engine Speeds			•		
Check Cooling System			•		
Test Thermostats				•	
Check Crankshaft Vibration Damper (6.8 L Engines) ^d				•	
Flush and Refill Cooling System ^e				•	
Check and Adjust Engine Valve Clearance				•	
Test Glow Plugs (If Equipped)				•	
Add Coolant					•
Replace Air Cleaner Elements					•
Replace Fan and Alternator Belts					•
Check Fuses					•
Check Air Compressor (If Equipped)					•
Bleed Fuel System					•

^a Replace 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.

^b During engine break-in, change the oil and filter for the first time after 100 hours of operation (maximum).

^c Service intervals depend on sulfur content of the fuel, oil pan capacity, and the oil and filter used. (See ENGINE OIL AND FILTER SERVICE INTERVALS (JET FUEL CAPABLE ENGINES ONLY) earlier in this manual.)

^d Replace crankshaft damper every 4500 hours or 60 months, whichever occurs first.

^e If John Deere COOL-GARD is used, the flushing interval may be extended to 3000 hours or 36 months. If John Deere COOL-GARD is used and the coolant is tested annually AND additives are replenished as needed by adding a supplemental coolant additive, the flushing interval may be extended to 5000 hours or 60 months, whichever occurs first.

AS60879,00000E0 -19-10JUL15-1/1

Lubrication & Maintenance/Daily

Daily Prestarting Checks

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

IMPORTANT: DO NOT add makeup oil until the oil level is **BELOW** the crosshatch marks (B) on the dipstick.

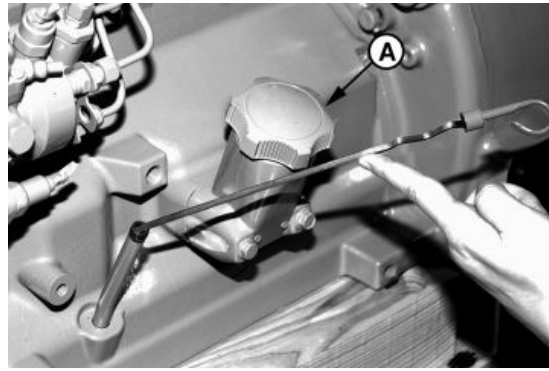
1. Check engine oil level on dipstick. Add as required, using seasonal viscosity grade oil. (See DIESEL ENGINE OIL in Fuels, Lubricants, and Coolant Section for oil specifications.)

Depending on application, oil may be added at oil filler cap (A) on left side of engine, right side of engine (not shown), or rocker arm cover location.

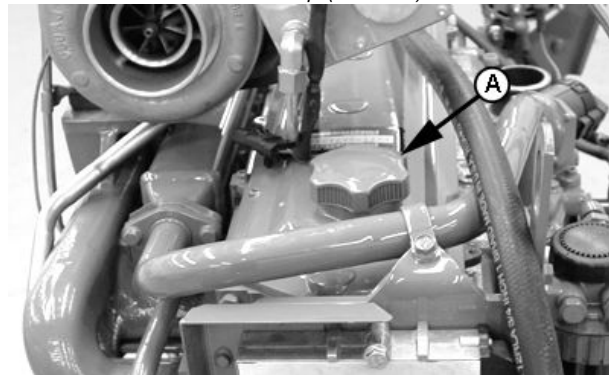
IMPORTANT: DO NOT fill above the top mark on the dipstick. Oil levels anywhere within crosshatch marks (B) are considered in the acceptable operating range.

A—Oil Filler Cap

B—Crosshatch Marks On Dipstick

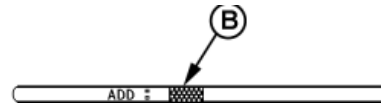


Oil Filler Cap (Left Side)



Oil Filler Cap (Rocker Arm Cover)

RG13730 —UN—11NOV04



Crosshatch on Dipstick

Continued on next page

OURGP11,0000069 -19-04.JAN06-1/4

RG8009A —UN—16JUN00

RG13731 —UN—11NOV04

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

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

2. Check the coolant level when engine is cold. Coolant level should be at bottom of surge tank filler neck or radiator filler neck (A). If equipped with a translucent surge tank, coolant level should be at cool fill line indicator on surge tank. Add proper coolant solution to radiator (B) or surge tank with if level is low. (See **ADDING COOLANT** in Service As Required Section.) Check overall cooling system for leaks.

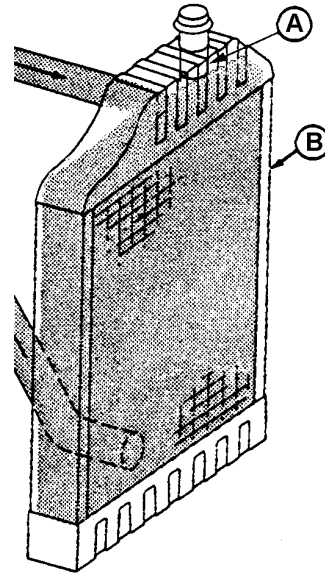
NOTE: Refer to your vehicle's operator's manual for recommendations for non-John Deere supplied accessories.

A—Radiator Filler Neck

B—Radiator



High-Pressure Fluids



Fill Radiator

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OURGP11,0000069 -19-04JAN06-2/4

TS281 —UN—15APR13

RG13295 —UN—20NOV03

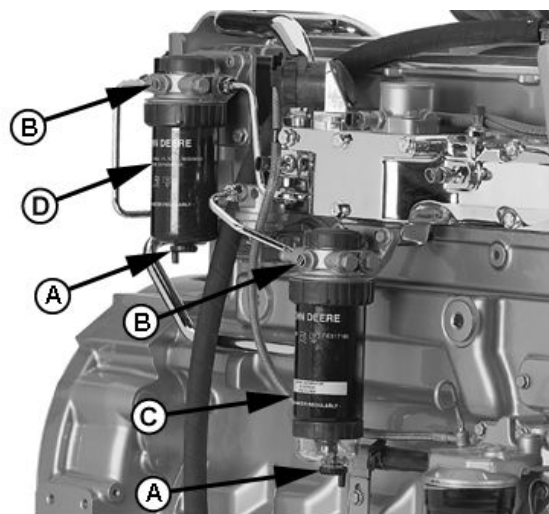
NOTE: Engine is equipped with a water-in-fuel sensor at the primary fuel filter (C). Indicator light will signal the operator that water should be drained from the filter bowl.

3. Check the primary fuel filter (C) and the final fuel filter (D) for water or debris. If filter is fitted with a see-through bowl, drain as needed based on a daily visual inspection.

IMPORTANT: Drain water into a suitable container and dispose of properly.

- a. Loosen drain plugs (A) at bottom of fuel filters or bowls, if equipped, half turn to one turn.
- b. Loosen air bleed plugs (B) two full turns on fuel filter mounting and drain water from bottom until fuel starts to drain out.
- c. When fuel starts to drain out, tighten drain plugs securely.

After draining water from the fuel filters, the filters must be primed by bleeding all air from the fuel system. See BLEEDING FUEL SYSTEM in Service As Required Section, later in this manual



Drain Fuel Filters

A—Drain Plug
B—Air Bleed Plug

C—Primary Fuel Filter
D—Final Fuel Filter

OURGP11,0000069 -19-04JAN06-3/4

4. If the air cleaner has an automatic dust unloader valve (A), squeeze the unloader valve on air cleaner assembly to clear away any dust buildup.

If equipped with air intake restriction indicator gauge (B), check gauge to determine if air cleaner needs to be serviced.

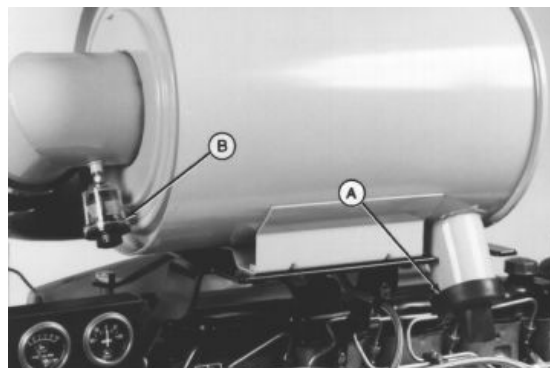
IMPORTANT: Maximum air intake restriction is 6.25 kPa (0.06 bar) (1.0 psi) (25 in. H₂O). A clogged air cleaner element will cause excessive intake restriction and a reduced air supply to the engine.

5. Make a thorough inspection of the engine compartment. Look for oil or coolant leaks, worn fan and accessory drive belts, loose connections and trash build-up. Remove trash buildup and have repairs made as needed if leaks are found.

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

Inspect:

- Radiator for leaks and trash build-up.
- Air intake system hoses and connections for cracks and loose clamps.
- Fan, alternator, and accessory drive belts for cracks, breaks or other damage.



Dust Unloader Valve and Indicator Gauge

A—Dust Unloader Valve

B—Air Restriction Indicator

- Coolant pump for coolant leaks.

NOTE: It is normal for a small amount of leakage to occur as the engine cools down and parts contract. Excessive coolant leakage may indicate the need to replace the coolant pump seal. Contact your engine distributor or servicing dealer for repairs.

OURGP11,0000069 -19-04JAN06-4/4

Servicing Fire Extinguisher

A fire extinguisher (A) is available from your authorized servicing dealer or engine distributor.

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

OURGP12,00000B9 -19-11OCT06-1/1

RW4918 —UN—15DEC88

Checking Engine Mounts

Engine mounting is the responsibility of the vehicle or generator 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, 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.

OURGP11,0000110 -19-16OCT03-1/1

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.**

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

OURGP12,00000DE -19-04JAN05-1/2

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. 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 10–15 minutes. Get medical attention immediately.

If acid is swallowed:

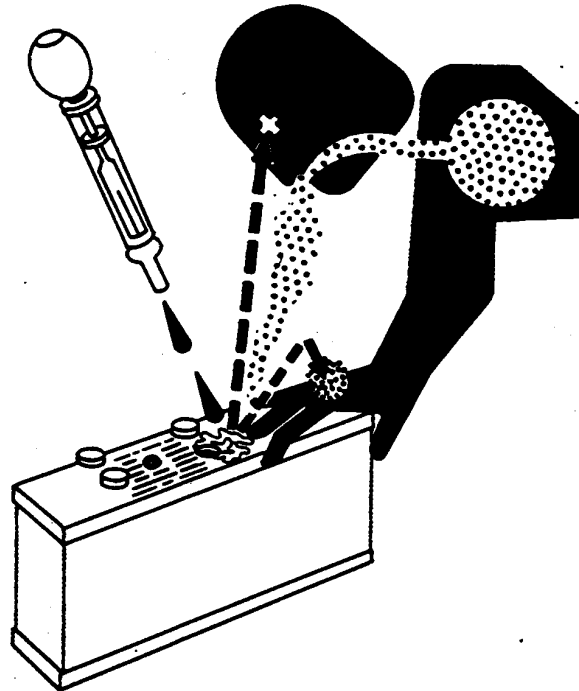
1. Drink large amounts of water or milk.
2. Then drink milk of magnesia, beaten eggs, or vegetable oil.
3. Get medical attention immediately.

In freezing weather, run engine at least 30 minutes to assure thorough mixing after adding water to battery.

If necessary to replace battery(ies), replacements must meet or exceed the following recommended capacities at -18°C (0°F):

Specification

12 Volt Standard Duty Starter—Cold Cranking	
Amps.....	640
12 Volt Heavy Duty Starter—Cold Cranking	
Amps.....	800



Sulfuric Acid

24 Volt Standard Duty Starter—Cold Cranking	
Amps.....	570

TS203 —UN—23AUG88

OURGP12,00000DE -19-04JAN05-2/2

Changing Engine Oil and Replacing Filter

IMPORTANT: Changing engine oil and filter every 250 hours (Jet Fuel Capable Engines) or 500 hours (Diesel Fuel Engines) or 12 months depends on the following requirements:

- Engine equipped with an extended drain interval oil pan
- Use of fuel with sulfur content less than 0.50% (5000 ppm)
- Use of premium oil John Deere PLUS-50, ACEA E7 or ACEA E6
- Use of an approved John Deere oil filter
- Unless all of these conditions are met, change interval is **REDUCED**

Refer to applicable **ENGINE OIL AND FILTER SERVICE INTERVALS**, in Fuels, Lubricants and Coolant Section.

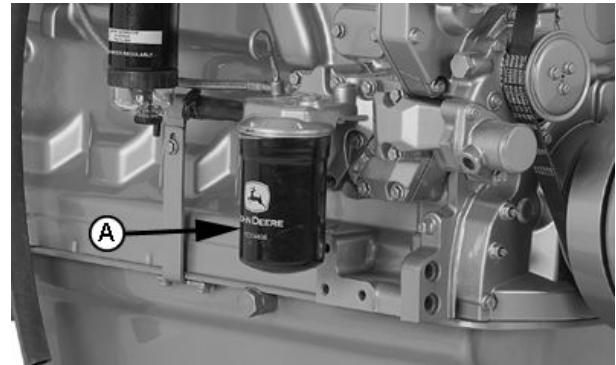
NOTE: During **break-in**, change engine oil and filter for the first time before **100** hours maximum of operation.

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 your John Deere engine distributor or servicing dealer. Oil samples should be taken prior to the oil change. Refer to instructions provided with kit.

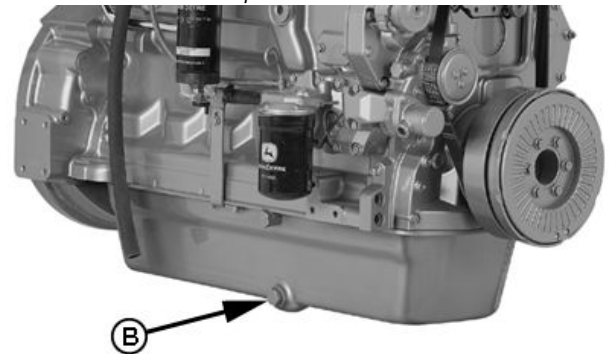
To change engine oil and oil filter:

1. Run engine approximately 5 minutes to warm up oil. Shut engine off.
2. Remove oil pan drain plug (B).
3. Drain crankcase oil from engine while warm.

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



Special Oil Filter



Oil Pan Drain Plug

A—Oil Filter

B—Oil Pan Drain Plug

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

Continued on next page

OURGP11,000005C -19-30JUN08-1/3

RG13721 —UN—11NOV04

RG13741 —UN—11NOV04

4. Turn filter element (A) using a suitable filter wrench to remove. Discard oil filter element.

NOTE: Depending on engine application, oil filter may be located on either side of the engine in a high- or low-mount location.

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

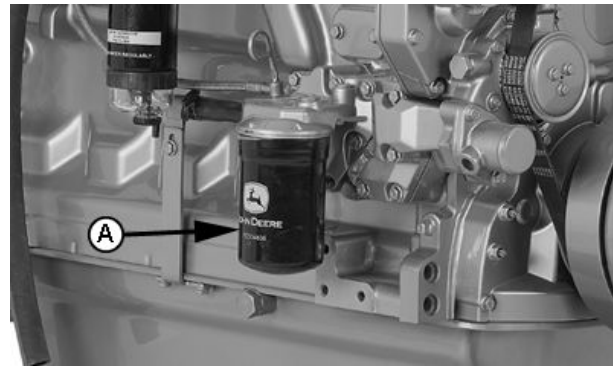
5. Apply clean engine oil to the new filter at the inner (B) and outer (C) seals and to filter threads.
6. Wipe both sealing surfaces of the header (D, E) with a clean rag. Ensure notches in dust seal (F) are properly installed in the slots in the housing. Replace dust seal if damaged.

IMPORTANT: When installing filter element, **HAND TIGHTEN** only. A filter wrench may be used for **REMOVAL ONLY**. Be sure notches in dust seal (F) are properly installed in the slots in the housing.

7. Install and tighten oil filter by hand until firmly against dust seal (F). DO NOT apply an extra 3/4 to 1-1/4 turn after gasket contact as done with standard filters.
8. Tighten drain plug to specifications.

Specification

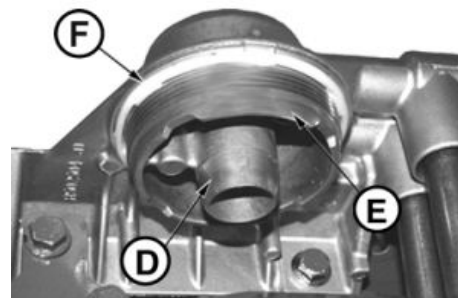
Oil Pan Drain Plug With Copper Washer—Torque.....	70 Nm (52 lb ft)
Oil Pan Drain Plug With O-Ring—Torque.....	50 Nm (37 lb ft)
Oil Pan Drain Plug With Packing (6068 Engine Code 1961, Steel Oil Pan)—Torque.....	40 Nm (29 lb ft)
Bi-Material Oil Pan Drain Plug—Torque.....	30 Nm (22 lb ft)



Oil Filter And Mounting Header



Oil Filter Seals



Filter And Mounting Header

A—Oil Filter Element
B—Inner Seal
C—Outer Seal

D—Sealing Surface On Header
E—Sealing Surface On Header
F—Dust Seal

Continued on next page

OURGP11,000005C -19-30JUN08-2/3

RG13721 —UN—11NOV04

RG11617 —UN—24OCT01

RG11618 —UN—24OCT01

9. Fill engine crankcase with correct John Deere engine oil through rocker arm cover oil filler cap (A) or oil filler cap on either side of engine depending on engine application. (See DIESEL ENGINE OIL in Fuels, Lubricants, and Coolant Section for determining correct engine oil.)

To determine the correct oil fill quantity for your engine, see ENGINE CRANKCASE OIL FILL QUANTITIES in the Specifications Section of this manual.

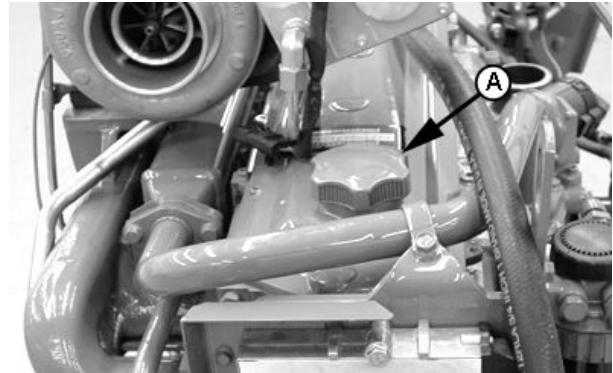
IMPORTANT: Immediately after completing any oil change, crank engine for 30 seconds without permitting engine to start. This will help insure adequate lubrication to engine components before engine starts.

NOTE: Crankcase oil capacity may vary slightly. ALWAYS fill crankcase within crosshatch marks on dipstick. DO NOT overfill.

10. Start engine and run to check for possible leaks.
11. Stop engine and check oil level after 10 minutes. Oil level reading should be within crosshatch marks (B) on dipstick.

A—Oil Filler Cap

B—Crosshatch Marks on Dipstick

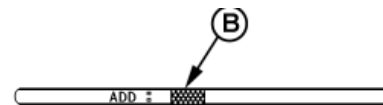


Rocker Arm Cover Oil Filler



Left Side Oil Filler

RG13730 —UN—11NOV04



Crosshatch Marks on Dipstick

OURGP11,000005C -19-30JUN08-3/3

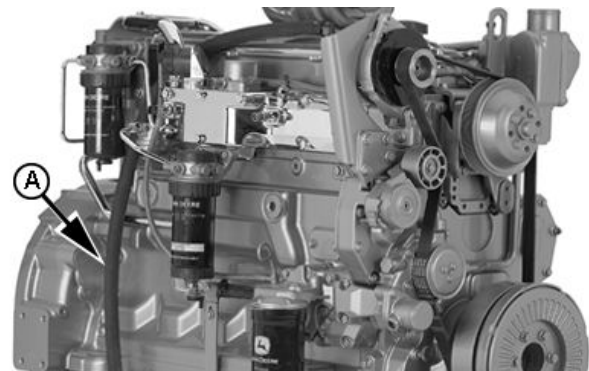
Checking Crankcase Vent System

Crankcase Vent Tube (If Equipped)

If you operate the engine in dusty conditions, check the system at shorter intervals.

1. If equipped, remove and clean crankcase vent tube (A).
2. Install the vent tube. Be sure the O-ring fits correctly in the rocker arm cover for elbow adapter. Tighten hose clamp securely.

A—Crankcase Vent Tube



Crankcase Vent Tube

OURGP12,00000A8 -19-30SEP04-1/1

Checking Air Intake System

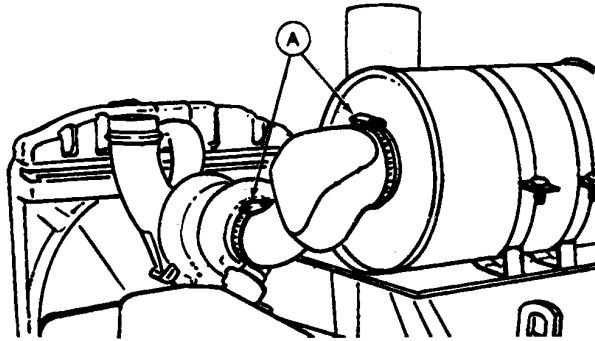
IMPORTANT: The air intake system must not leak. Any leak, no matter how small, may result in internal engine damage due to abrasive dirt and dust entering the intake system.

1. Inspect all intake hoses (piping) for cracks. Replace as necessary.
2. Check clamps (A) on piping which connect the air cleaner, engine and, if present, turbocharger. Tighten clamps as necessary. This will help prevent dirt from entering the air intake system through loose connections causing internal engine damage.
3. If engine has a rubber dust unloader valve (B), inspect the valve on bottom of air cleaner for cracks or plugging. Replace as necessary.

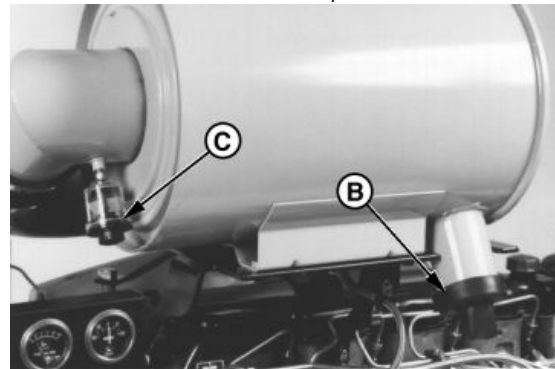
IMPORTANT: ALWAYS REPLACE primary air cleaner element when air restriction indicator shows a vacuum of 625 mm (25 in.) H₂O, is torn, or visibly dirty.

4. Test air restriction indicator (C) for proper operation. Replace indicator as necessary.

IMPORTANT: If not equipped with air restriction indicator, replace air cleaner elements at 250 Hours for jet fuel applications, 500 Hours for diesel applications, or at 12 Months, whichever occurs first.



Check Clamps



Unloader Valve and Air Restriction Indicator

A—Clamps
B—Dust Unloader Valve

C—Air Restriction Indicator

RG4689 —UN—20DEC88

RG7332B —UN—22JAN99

OURGP12,00000BA -19-26JUN08-1/1

Replacing Fuel Filter Elements (Diesel Fuel)

Engines may be equipped with dual fuel filters: a primary filter (F) with water bowl, and a final filter (B). Both filters are replaced at the same 500-hour interval or every 12 months.

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 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.

IMPORTANT: 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 operation, whichever comes first.

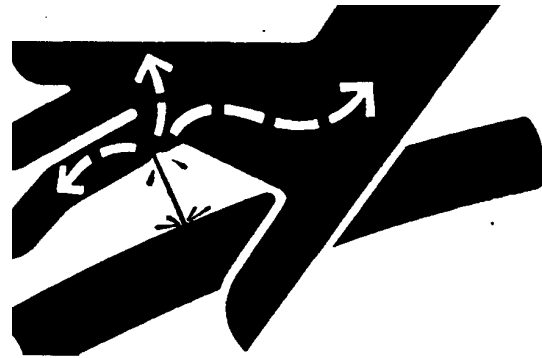
1. Close fuel shut-off valve, if equipped.
2. Thoroughly clean fuel filter assemblies and surrounding areas.
3. Disconnect water sensor wiring from primary fuel filter.
4. Loosen drain plugs (C) and drain fuel into a suitable container.

NOTE: Lifting up on retaining rings (A) as they are rotated helps to get them past raised locators.

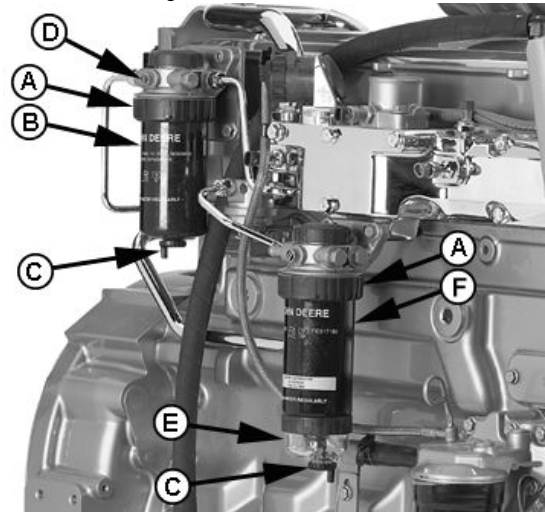
5. Firmly grasp the retaining rings (A) and rotate them clockwise 1/4 turn (when viewed from the top). Remove ring with final fuel filter element (B) and with primary fuel filter element (F).
6. Loosen ring and remove water separator bowl (E) with primary fuel filter element. Drain and clean bowl. Dry bowl with compressed air.
7. Inspect filter mounting base for cleanliness. Clean as required.

NOTE: Raised locators on fuel filter canisters must be indexed properly with slots in mounting base for correct installation.

8. Install new filter elements onto mounting bases. Be sure elements are properly indexed and firmly seated on bases. It may be necessary to rotate filters for correct alignment.



High-Pressure Fluids



Fuel Filters

- | | |
|-----------------------------|-------------------------------|
| A—Retaining Ring | D—Bleed Plug |
| B—Final Fuel Filter Element | E—Water Separator Bowl |
| C—Drain Plug | F—Primary Fuel Filter Element |

9. Align keys on filter element with slots in filter base.
10. Install retaining ring onto mounting base making certain dust seal is in place on filter base. Hand tighten ring counterclockwise (about 1/3 turn) until it “snaps” into the detent. DO NOT overtighten retaining ring.

NOTE: The proper installation is indicated when a “click” is heard and a release of the retaining ring is felt.

A plug is provided with the new element for plugging the used element.

11. Install water separator bowl on primary fuel filter and tighten ring.
12. Reconnect water sensor wiring.
13. Open fuel shut-off valve and bleed the fuel system. (See BLEEDING FUEL SYSTEM in Service As Required Section.) Tighten bleed plug (D).

OURGP12,00000F5 -19-30JUN08-1/1

X9811 —UN—23AUG88

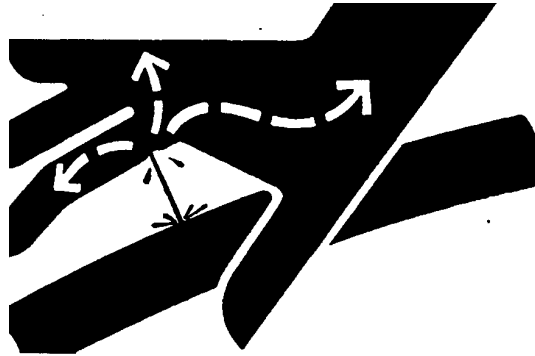
RG13807 —UN—02DEC04

Replacing Fuel Filter and Dosing Elements (Jet Fuel Capable Engines)

CAUTION: Before performing any maintenance to fuel system related components, be sure that machine is in the Key OFF position AND that the electric fuel transfer (lift) pump or battery is disconnected. Whenever the machine is in the Key ON position, power is applied to the electric fuel transfer (lift) pump.

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 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.



High-Pressure Fluids

IMPORTANT: 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 250 hours operation, whichever comes first.

Engines are equipped with dual fuel filters: a primary filter with water separator bowl, and a final filter. Both filters and the dosing element are replaced at the same 250-hour interval or every 12 months.

Continued on next page

AS60879,00000E5 -19-25SEP08-1/2

X9811 —UN—23AUG88

1. Close fuel shut-off valve, if equipped.
2. Thoroughly clean fuel filter assemblies and surrounding areas.
3. Disconnect water in fuel sensor (H) wiring from primary fuel filter (B).
4. Loosen drain plugs (I) and drain fuel into a suitable container.

NOTE: *Lifting up on retaining rings (G) as they are rotated helps to get them past raised locators.*

5. Firmly grasp the retaining rings (G) and rotate them clockwise 1/4 turn (when viewed from the top). Remove ring with final fuel filter element (A) and with primary fuel filter element (B).
6. Loosen ring and remove water separator bowl (D) with primary fuel filter element. Drain and clean bowl. Dry bowl with compressed air.
7. Inspect filter mounting base for cleanliness. Clean as required.

NOTE: *Raised locators on fuel filter canisters must be indexed properly with slots in mounting base for correct installation.*

8. Install new filter elements onto mounting bases. Be sure elements are properly indexed and firmly seated on bases. It may be necessary to rotate filters for correct alignment.
9. Align keys on filter element with slots in filter base.
10. Install retaining ring onto mounting base making certain dust seal is in place on filter base. Hand tighten ring counterclockwise (about 1/3 turn) until it "snaps" into the detent. DO NOT overtighten retaining ring.

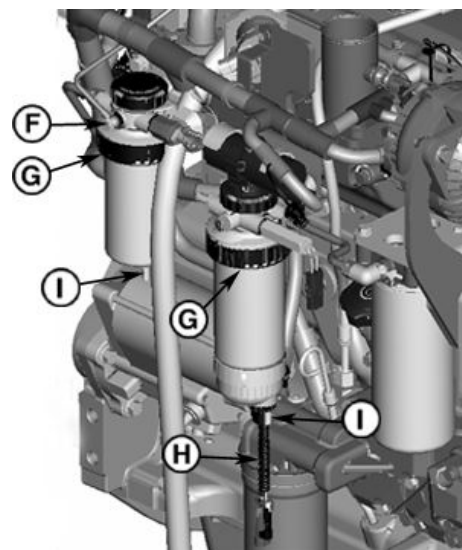
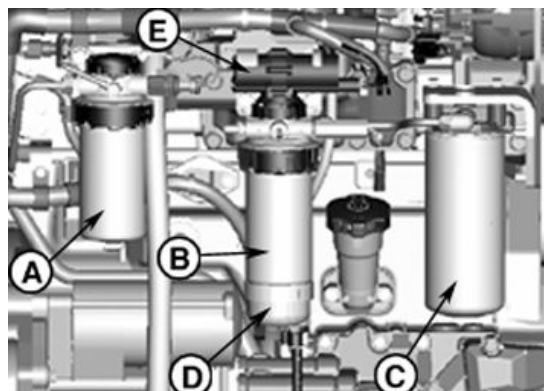
NOTE: *The proper installation is indicated when a "click" is heard and a release of the retaining ring is felt.*

A plug is provided with the new element for plugging the used element.

11. Install water separator bowl on primary fuel filter and tighten ring.
12. Turn dosing element (C) using a suitable filter or strap wrench to remove. Discard dosing element.

NOTE: *New dosing element canister should come approximately 3/4 full of lubricating additive. Be sure that when removing cap, that the canister is held right side up so as not to spill the fluid.*

13. Remove cap from new dosing element canister.
14. Wipe the sealing surfaces of the header with a clean rag.



A—Final Fuel Filter Element
B—Primary Fuel Filter Element
C—Dosing Element
D—Water Separator Bowl
E—Electric Fuel Transfer (Lift) Pump
F—Constant Air Bleed
G—Retaining Ring
H—Water in Fuel Sensor
I—Drain Plug

15. Install and tighten dosing element by hand until firmly against the header. Apply an extra 3/4 turn after gasket contact is made.
16. Reconnect water in fuel sensor wiring.
17. Open fuel shut-off valve, if equipped.

NOTE: *The electric fuel transfer (lift) pump (E) and constant air bleed (F) enables the fuel system to self prime.*

18. Key on for 30 seconds to prime fuel system, then start engine and check for possible leaks.

AS60879.00000E5 -19-25SEP08-2/2

RG15342—UN—29JUN07

RG15405—UN—29JUN07

Checking Belt Tensioner Spring Tension and Belt Wear (Automatic Tensioner)

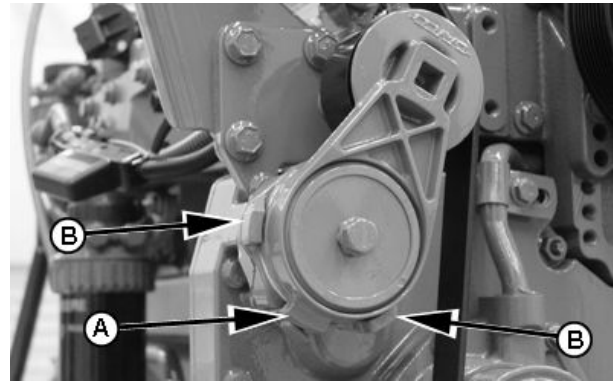
Belt drive systems equipped with automatic (spring) belt tensioners cannot be adjusted or repaired. The automatic belt tensioner is designed to maintain proper belt tension over the life of the belt. If tensioner spring tension is not within specification, replace tensioner assembly.

Checking Belt Wear

The belt tensioner is designed to operate within the limit of arm movement provided by the cast stops (A and B) when correct belt length and geometry is used.

Visually inspect cast stops (A and B) on belt tensioner assembly.

If the tensioner cast stop (A) on swing arm is hitting either fixed cast stop (B), check mounting brackets (alternator, belt tensioner, idler pulley, etc.) and the belt length. Replace belt as needed (see REPLACING FAN AND ALTERNATOR BELTS in Service As Required Section).



Cast Stops

A—Tensioner Cast Stop

B—Fixed Cast Stop

Continued on next page

OURGP11,000005D -19-07DEC05-1/2

RG13744 —UN—11NOV04

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 square hole in tensioner arm. Remove belt from pulleys.

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, see your John Deere dealer.

2. Release tension on tension 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 (A) and put a mark (B) on tensioner mounting base.
5. Install torque wrench (C) so that it is aligned with centers of pulley and tensioner. 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.

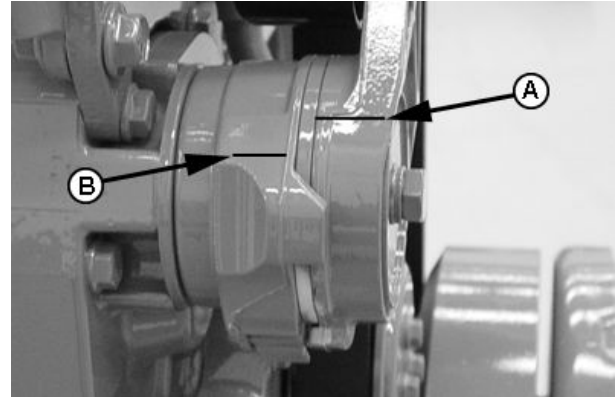
Specification

Spring Tension—Torque..... 18-22 N·m (13-16 lb-ft)

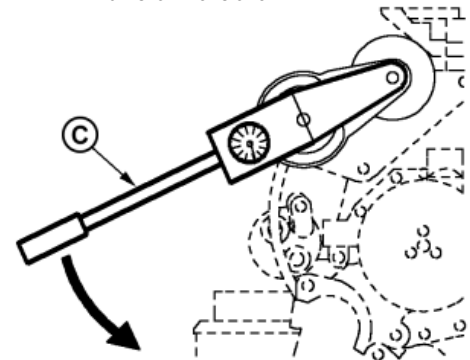
NOTE: Threads on belt tensioner roller cap screw are **LEFT-HAND** threads

A—Mark On Swing Arm
B—Mark On Tensioner
Mounting Base

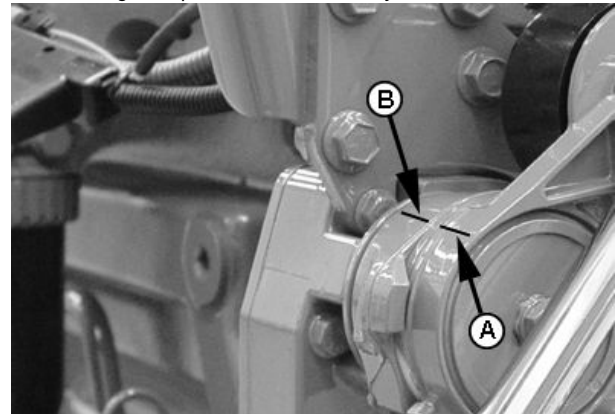
C—Torque Wrench



Marks on Tensioner



Align Torque Wrench With Pulley and Tensioner



Align Marks

OURGP11,000005D -19-07DEC05-2/2

RG13745 —UN—11NOV04

RG12085 —UN—28JAN02

RG13746 —UN—11NOV04

Checking Engine Electrical Ground Connections

Keep all engine ground connections clean and tight to prevent electrical arcing which can damage electronic components.

Also see precautions in Troubleshooting Section when welding on engine or machine.

OUOD002,0000169 -19-27JUL06-1/1

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 the time the engine coolant temperature reaches 80°C (176°F) or damage to EGR cooler may result.

1. Visually check entire cooling system for leaks. Tighten all clamps securely.



High-Pressure Fluids

2. Thoroughly inspect all cooling system hoses for hard, flimsy, or cracked condition. Replace hoses if any of the above conditions are found.
3. Inspect the coolant pump for wear or leakage.

OURGP11,000005E -19-07DEC05-1/1

TS281 —UN—15APR13

Replenishing Supplemental Coolant Additives (SCAs) Between Coolant Changes

IMPORTANT: Do not add supplemental coolant additives when the cooling system is drained and refilled with John Deere COOL-GARD™

NOTE: If system is to be filled with coolant that does not contain SCAs, the coolant must be precharged. Determine the total system capacity and premix with 3% John Deere Coolant Conditioner.

Through time and use, the concentration of coolant additives is gradually depleted during engine operation. Periodic replenishment of inhibitors is required, even when John Deere COOL-GARD™ is used. The cooling system must be recharged with additional supplemental coolant additives available in the form of liquid coolant conditioner.

Maintaining the correct coolant conditioner concentration (SCAs) and freeze point is essential in your cooling system to protect against rust, liner pitting and corrosion, and freeze-ups due to incorrect coolant dilution.

John Deere LIQUID COOLANT CONDITIONER is recommended as a supplemental coolant additive in John Deere engines.

DO NOT mix one brand of SCA with a different brand.

Test the coolant solution at 500 hours or 12 months of operation using either John Deere coolant test strips or a COOLSCAN™ or COOLSCAN PLUS™ analysis. If a COOLSCAN™ or COOLSCAN PLUS™ analysis is not available, recharge the system per instructions printed on label of John Deere Liquid Coolant Conditioner.

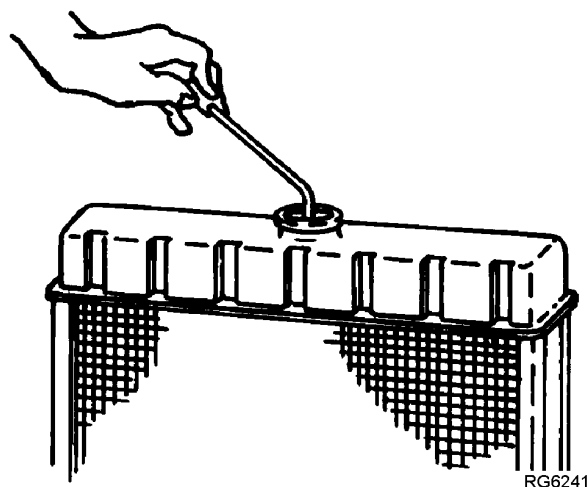
IMPORTANT: ALWAYS maintain coolant at correct level and concentration. DO NOT operate engine without coolant even for a few minutes as this can severely damage the EGR cooler tank (if equipped).

If frequent coolant makeup is required, the glycol concentration should be checked with JT07298 Coolant/Battery Tester to ensure that the desired freeze point is maintained. Follow manufacturer's instructions provided with Coolant/Battery Tester.

Add the manufacturer's recommended concentration of supplemental coolant additive. DO NOT add more than the recommended amount.

The use of non-recommended supplemental coolant additives may result in additive drop-out and gelation of the coolant.

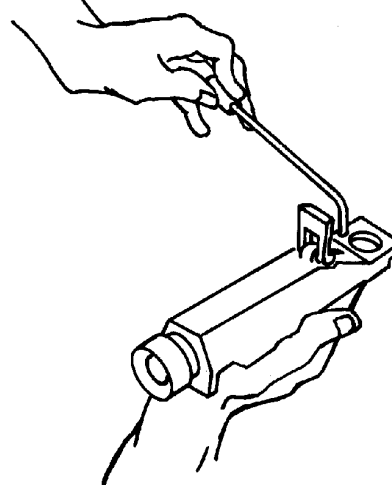
COOL-GARD is a trademark of Deere & Company
COOLSCAN is a trademark of Deere & Company
COOLSCAN PLUS is a trademark of Deere & Company
COOLSCAN PLUS is a trademark of Deere & Company



Radiator Coolant Check

RG6241

RG6261—UN—08DEC97



JT07298 Coolant/Battery Tester

RG6262

RG6262—UN—05DEC97

If other coolants are used, consult the coolant supplier and follow the manufacturer's recommendation for use of supplemental coolant additives.

See DIESEL ENGINE COOLANTS AND SUPPLEMENTAL ADDITIVE INFORMATION for proper mixing of coolant ingredients before adding to the cooling system.

OURGP11.000004C -19-07NOV08-1/1

Testing Diesel Engine Coolant

Maintaining adequate concentrations of glycol and inhibiting additives in the coolant is critical to protect the engine and cooling system against freezing, corrosion, and cylinder liner erosion and pitting.

Test the coolant solution at intervals of 12 months or less and whenever excessive coolant is lost through leaks or overheating.

Coolant Test Strips

Coolant test strips are available from your John Deere dealer. These test strips provide a simple, effective method to check the freeze point and additive levels of your engine coolant.

When Using John Deere COOL-GARD II

John Deere COOL-GARD II Premix™, COOL-GARD II PG Premix and COOL-GARD II Concentrate are maintenance free coolants for up to six years or 6000 hours of operation, provided that the cooling system is topped off using only John Deere COOL-GARD II Premix or COOL-GARD II PG premix. Test the coolant condition annually with coolant test strips designed for use with John Deere COOL-GARD II coolants. If the test strip chart indicates that additive is required, add John Deere COOL-GARD II Coolant Extender as directed.

COOL-GARD is a trademark of Deere & Company

Add only the recommended concentration of John Deere COOL-GARD II Coolant Extender. DO NOT add more than the recommended amount.

When Using Nitrite-Containing Coolants

Compare the test strip results to the supplemental coolant additive (SCA) chart to determine the amount of inhibiting additives in your coolant and whether more John Deere Liquid Coolant Conditioner should be added.

Add only the recommended concentration of John Deere Liquid Coolant Conditioner. DO NOT add more than the recommended amount.

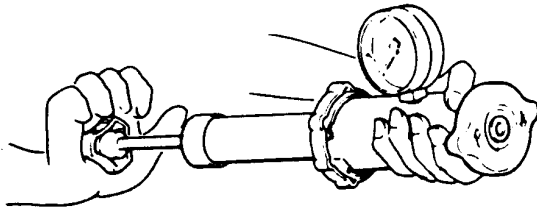
Coolant Analysis

For a more thorough evaluation of your coolant, perform a coolant analysis. The coolant analysis can provide critical data such as freezing point, antifreeze level, pH, alkalinity, nitrite content (cavitation control additive), molybdate content (rust inhibitor additive), silicate content, corrosion metals, and visual assessment.

Contact your John Deere dealer for more information on coolant analysis.

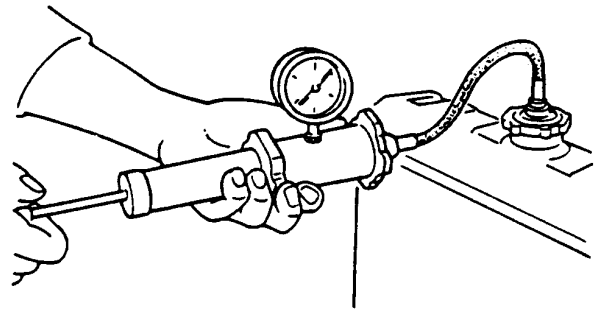
DX,COOL9 -19-11APR11-1/1

Pressure Testing Cooling System



Test Radiator Cap

RG6557—UN—20JAN93



Test Cooling System

RG6558—UN—20JAN93

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.

NOTE: These tests apply only to John Deere radiators. For other brands, see manufacturers literature.

Test Radiator Cap

1. Remove radiator cap and attach to D05104ST Tester as shown.
2. Pressurize cap to specification listed. Gauge should hold pressure for 10 seconds at least to pressure listed if cap is acceptable.

If gauge does not hold pressure, replace radiator cap.

Specification

Radiator Cap Holding
Pressure (Not
Opening For 10
Seconds)—Pressure..... 100 kPa (1.0 bar) (14.5 psi)

3. Remove the cap from gauge, turn it 180°, and retest cap. This will verify that the first measurement was accurate.

Test Cooling System

NOTE: Engine should be warmed up to test overall cooling system.

1. Allow engine to cool, then carefully remove radiator cap.
2. Fill radiator with coolant to the normal operating level.

IMPORTANT: DO NOT apply excessive pressure to cooling system, doing so may damage radiator and hoses.

3. Connect gauge and adapter to radiator filler neck. Pressurize cooling system to specification listed for radiator cap.
4. With pressure applied, check all cooling system hose connections, radiator, and overall engine for leaks.

If leakage is detected, correct as necessary and pressure test system again.

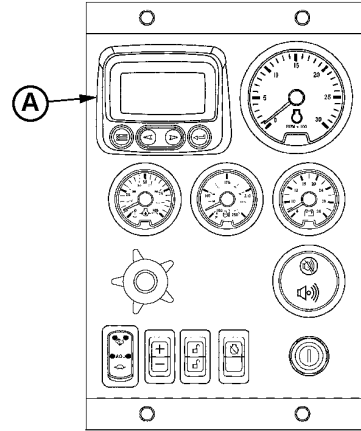
If no leakage is detected, but the gauge indicated a drop in pressure, coolant may be leaking internally within the system or at the block-to-head gasket. Have your engine distributor or servicing dealer correct this problem immediately.

OURGP12,00000AF -19-17NOV04-1/1

Checking and Adjusting Engine Speeds

Use tachometer on the diagnostic gauge (A) to verify engine speeds. (Refer to ENGINE POWER RATINGS AND FUEL SYSTEM SPECIFICATIONS in Specifications Section later in this manual for engine speed specifications.) If engine speed adjustment is required, see your authorized servicing dealer or engine distributor.

A—Tachometer



Using Tachometer to Check Engine Speeds

OURGP12,0000090 -19-11OCT06-1/1

RG13728 —UN—11NOV04

Lubrication & Maint./2000 Hour/24 Month

Checking Crankshaft Vibration Damper (6-Cylinder Engine Only)

IMPORTANT: Crankshaft vibration damper assembly is not repairable and should be replaced every 4500 hours or 60 months, whichever occurs first.

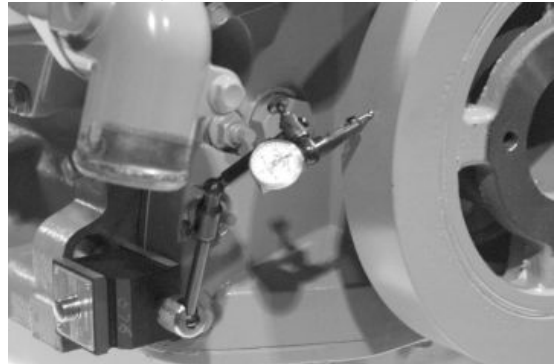
1. Remove belts (shown removed).
2. Grasp crankshaft vibration damper with both hands and attempt to turn it in both directions. If rotation is felt, crankshaft vibration damper is defective and should be replaced.
3. Check crankshaft vibration damper radial runout by positioning dial indicator so probe contacts crankshaft vibration damper outer diameter.
4. With engine at operating temperature, rotate crankshaft using JD281A, JDE81-4, or JDE83 flywheel turning tool.
5. Note dial indicator reading. If runout exceeds specification, replace crankshaft vibration damper.

Specification

Crankshaft Vibration
Damper—Maximum
Radial Runout..... 1.50 mm (0.060 in)



Grasp Crankshaft Vibration Damper



Check Runout

RG8018 —UN—15JAN99

RG7508 —UN—23NOV97

RG, RG34710, 5585 -19-27OCT15-1/1

Flushing and Refilling Cooling System

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

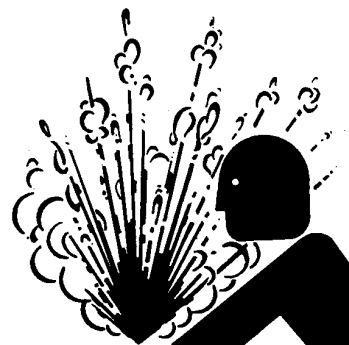
Shut off engine. Only remove filler cap when cool enough to touch with bare hands. Slowly loosen cap to first stop to relieve pressure before removing completely.

NOTE: When John Deere COOL-GARD is used, the drain interval is 3000 hours or 36 months. The drain interval may be extended to 5000 hours or 60 months of operation, **provided that the coolant is tested annually AND additives are replenished, as needed, by adding a supplemental coolant additive (SCA).**

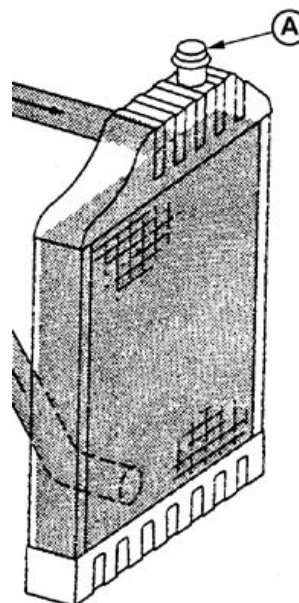
If COOL-GARD is not used, the flushing interval is 2000 hours or 24 months of operation.

Drain old coolant, flush the entire cooling system, test thermostats, 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 and Maintenance 250 Hour (Jet Fuel Capable Engine) /500 Hour/12 Month Section.)
2. Slowly open the engine cooling system filler cap or radiator cap (A) to relieve pressure and allow coolant to drain faster.



High-Pressure Fluids



Radiator Cap

Continued on next page

OURGP11,000006A -19-07MAY08-1/3

TS281 —UN—15APR13

RG12833 —UN—13FEB03

NOTE: Oil cooler housing coolant drain plug (A) is normally preferred, as it is the lowest drain location. Engine block drain plug (B), located behind the fuel rail, is not easily accessible. Block heater ports (C) are another option for draining. These engines use several different oil filter adapters. Use either drain plug (A) or (B), or block heater ports (C), to drain coolant, whichever is more accessible for the oil filter adapter on your engine.

3. Open oil cooler housing coolant drain plug (A), engine block drain plug (B), or block heater ports (C). Drain all coolant from engine block.
4. Open radiator drain valve. Drain all coolant from radiator.
5. Remove thermostats at this time, if not previously done. Install cover (without thermostats and seals) and tighten cap screws to specifications.

Specification

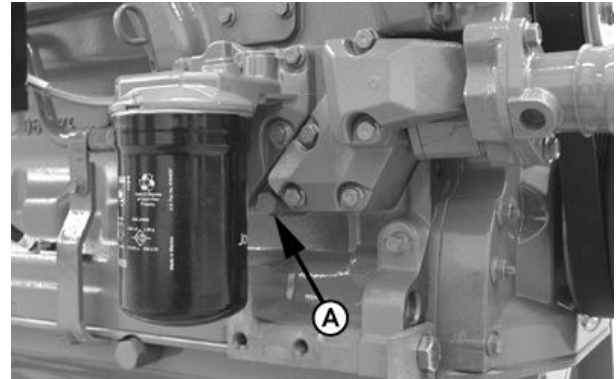
Thermostat Cover Cap

Screw—Torque..... 66—80 N·m (49—59 lb-ft)

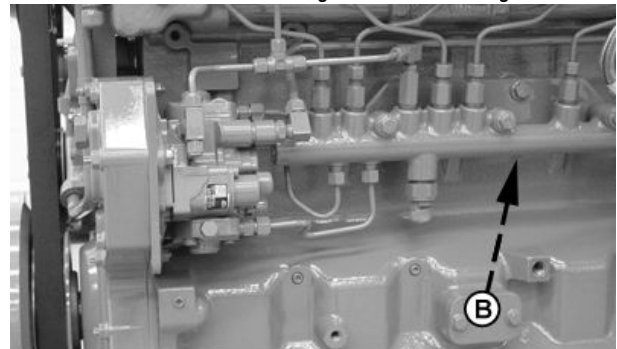
6. Test thermostat opening temperature. (See Inspecting Thermostats And Testing Opening Temperature in Service As Required Section.)
7. Close all drain valves after coolant has drained.

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.

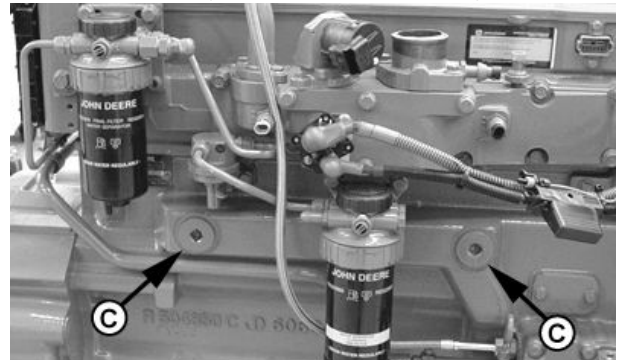
8. Fill the cooling system with clean water. Run the engine about 10 minutes to stir up possible rust or sediment.
9. Stop engine, pull off lower radiator hose and remove radiator cap. Immediately drain the water from system before rust and sediment settle.
10. After draining water, close drain valves. Reinstall radiator cap and radiator hose and clamp. Fill the cooling system with clean water and a heavy duty cooling system cleaner such as Fleetguard® RESTORE™ and 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, remove radiator cap and pull off lower radiator hose to drain out flushing water.
12. Close all drain valves on engine and radiator. Reinstall radiator hose and tighten clamps securely. Install thermostats using a new gasket. (See TESTING THERMOSTATS OPENING TEMPERATURE later in this section.)



Oil Cooler Housing Coolant Drain Plug



Engine Block Coolant Drain Plug



Block Heater Ports

A—Oil Cooler Housing Coolant Drain Plug
B—Engine Block Drain Plug
C—Block Heater Ports

IMPORTANT: Air must be expelled from cooling system when system is refilled. Loosen plug on top of thermostat housing to allow air to escape when filling system. Retighten plug when all the air has been expelled. Cooling system must be free of air when operating engine or damage to EGR cooler may result..

Continued on next page

OURGP11.000006A -19-07MAY08-2/3

13. Add coolant to radiator or surge tank (See specification for capacity, which can vary with application). Coolant level should be at bottom of surge tank filler neck or radiator filler neck. If equipped with a translucent surge tank, coolant level should be at cool fill line indicator on surge tank. Install radiator cap.

Specification

4.5 L Engine—Coolant	
Capacity.....	8.5 L (9 qt)
6.8 L Engine—Coolant	
Capacity.....	11.8 L (12.5 qt)

Fleetguard is a trademark of Cummins Engine Company, Inc.

RESTORE is a trademark of Fleetguard.

RESTORE PLUS is a trademark of Fleetguard.

14. Run engine until it reaches operating temperature. This mixes the solution uniformly and circulates it through the entire system. The normal engine coolant temperature range is 82°—94°C (180°—202°F).
15. After running engine, check coolant level and entire cooling system for leaks.
16. Inspect the fan belt for wear and check belt tension. (See Checking Belt Tensioner Spring Tension and Belt Wear in Lubrication and Maintenance 250 Hour (Jet Fuel Engine) or 500 Hour/12 Month section.

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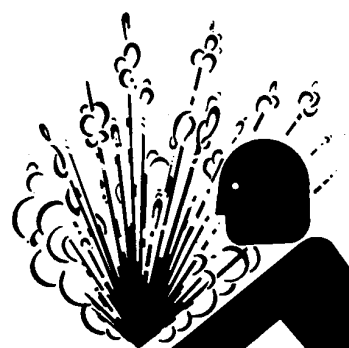
Testing Thermostats Opening Temperature

To Remove Thermostats

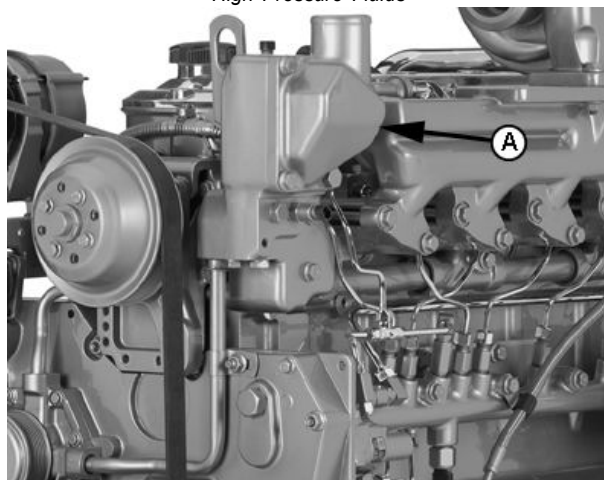
CAUTION: Explosive release of fluids from pressurized cooling system can cause serious burns. DO NOT drain coolant until it has cooled below operating temperature. Always loosen radiator pressure cap or drain valve slowly to relieve pressure.

1. Visually inspect area around thermostat housing for leaks.
2. Remove radiator pressure cap and partially drain cooling system.
3. Remove thermostat cover (A). Clean and check cover for cracks or damage

A — Thermostat Cover



High Pressure Fluids



Thermostat Cover

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OURGP11,0000068 -19-03JAN06-1/4

TS281 —UN—15APR13

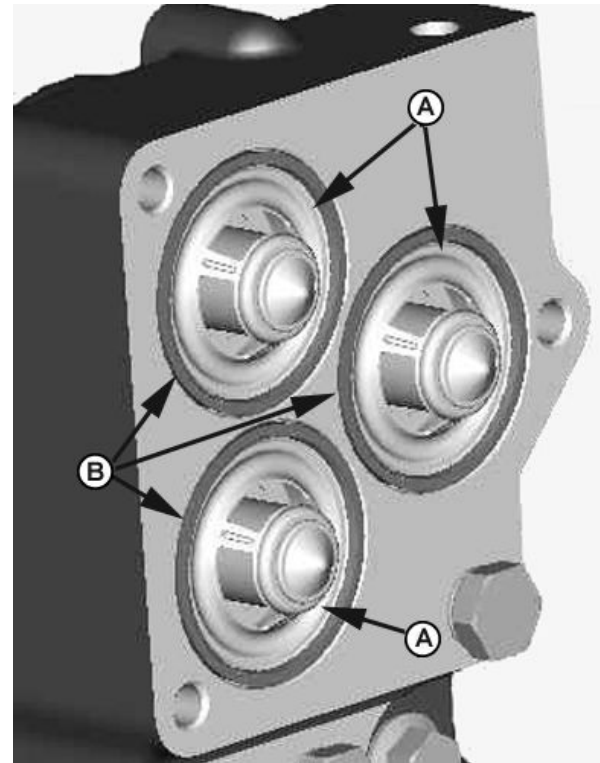
RG13737 —UN—11NOV04

NOTE: Some earlier 6.8 L engines may have one non-blocking thermostat. Replace the non-blocking thermostat with a partial blocking thermostat. See your engine distributor.

4. Remove all three thermostats (A) from the housing.
5. Remove and discard rubber seal (B) from each of the three thermostats.

A—Thermostats

B—Rubber Seal



Thermostats

Continued on next page

OURGP11,0000068 -19-03JAN06-2/4

RG14362—UN—06JAN06

Testing Thermostats Opening Temperature

NOTE: Perform the following test for the two blocking thermostats as well as for the non-blocking thermostat.

1. Remove thermostats.
2. Visually inspect thermostats for corrosion or damage. Replace as a matched set as necessary.

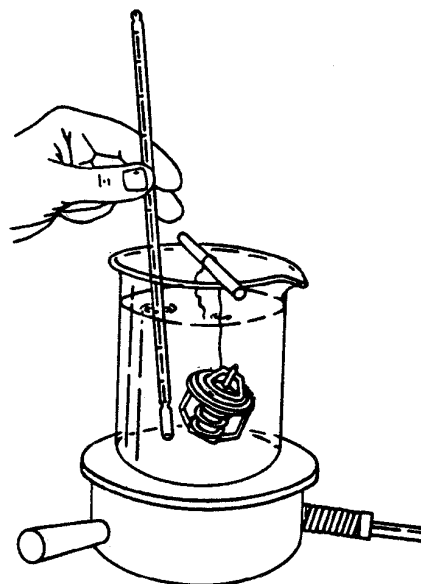
CAUTION: DO NOT allow thermostat or thermometer to rest against the side or bottom of container when heating water. Either may rupture if overheated.

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 the specification given in chart below.

NOTE: Due to varying tolerances of different suppliers, initial opening and full open temperatures may vary slightly from specified temperatures.

THERMOSTAT TEST SPECIFICATIONS

Rating	Initial Opening (Range)	Full Open (Nominal)
71°C (160°F)	69—72°C (156—162°F)	84°C (182°F)
77°C (170°F)	74—78°C (166—172°F)	89°C (192°F)
82°C (180°F)	80—84°C (175—182°F)	94°C (202°F)
89°C (192°F)	86—90°C (187—194°F)	101°C (214°F)
90°C (195°F)	89—93°C (192—199°F)	103°C (218°F)
92°C (197°F)	89—93°C (193—200°F)	105°C (221°F)
96°C (205°F)	94—97°C (201—207°F)	100°C (213°F)
99°C (210°F)	96—100°C (205—212°F)	111°C (232°F)



Testing Thermostat Opening Temperature

RG5971 —UN—23NOV97

5. Remove thermostat and observe its closing action as it cools. In ambient air the thermostat should close completely. Closing action should be smooth and slow.
6. If any thermostat is defective, replace all three thermostats.

Continued on next page

OURGP11,0000068 -19-03JAN06-3/4

To Install Thermostats

1. Install new rubber seal (A) for each thermostat.

IMPORTANT: Install each thermostat in the same location from which it was removed.

2. Install thermostats into housing.
3. Install thermostat cover and tighten thermostat cover cap screws to specifications.

Specification

Thermostat Cover Cap

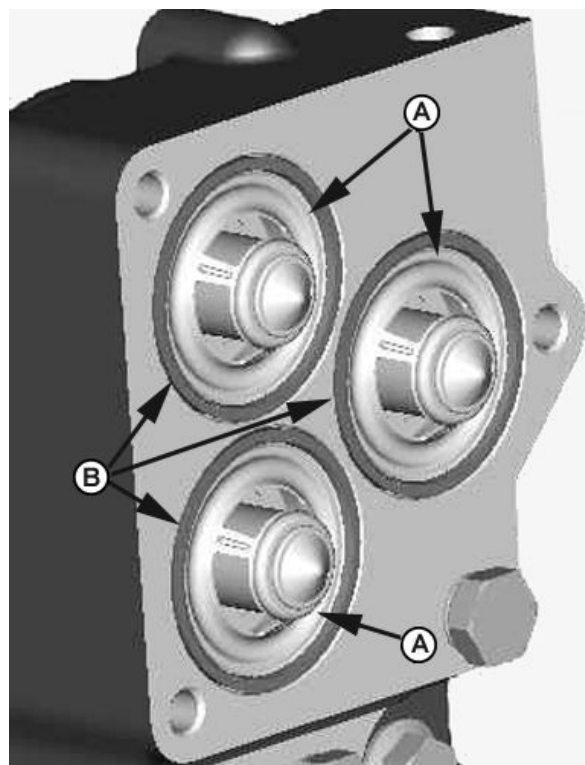
Screw—Torque..... 73 N·m (55 lb-ft)

4. If not already done, fill cooling system and check for leaks.

IMPORTANT: Air must be expelled from cooling system when system is refilled. Loosen plug on top of thermostat housing to allow air to escape when filling system. Retighten plug after filling cooling system.

A—Thermostats

B—Rubber Seal



Installing Thermostats

OURGP11,0000068 -19-03JAN06-4/4

RG14362—UN—06JAN06

Checking and Adjusting Valve Clearance

CAUTION: To prevent accidental starting of engine while performing valve adjustments, always disconnect **NEGATIVE (—)** battery terminal.

IMPORTANT: Valve clearance **MUST BE** checked and adjusted with engine **COLD**.

1. Remove rocker arm cover and crankcase ventilator tube.

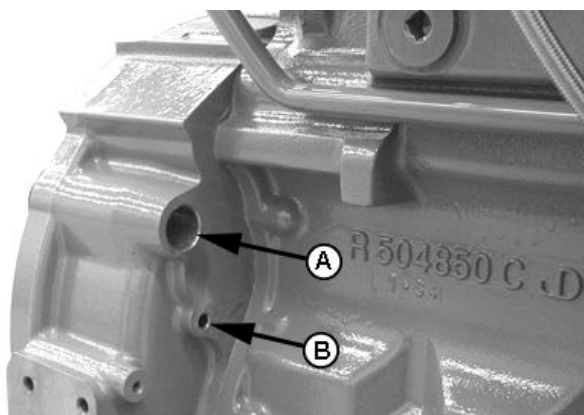
IMPORTANT: Visually inspect contact surfaces of valve tips, bridges and rocker arm wear pads. Check all parts for excessive wear, breakage, or cracks. Replace parts that show visible damage.

Rocker arms that exhibit excessive valve clearance should be inspected more thoroughly to identify damaged parts.

2. Remove plastic plugs or cover plate from engine timing/rotation hole (A) and timing pin hole (B).

NOTE: Some engines are equipped with flywheel housings which do not allow use of an engine flywheel rotation tool. These engines with straight nose crankshafts may be rotated from front nose of engine, using JDG966 Crankshaft Front/Rear Rotation Adapter.

3. Using JDE83 or JDG820 Flywheel Turning Tool, rotate engine flywheel in running direction (clockwise



Flywheel Housing Timing Holes

A—Timing/Rotation Hole

B—Timing Pin Hole

viewed from front) until No. 1 (front) cylinder is at TDC compression stroke. Insert JDG1571 or JDE81-4 Timing Pin in flywheel.

If No. 1 cylinder rocker arms are loose, the engine is at No. 1 TDC compression.

If No. 1 cylinder rocker arms are not loose, rotate engine one full revolution (360°) to No. 1 TDC compression.

OURGP12,0000092 -19-28SEP04-1/4

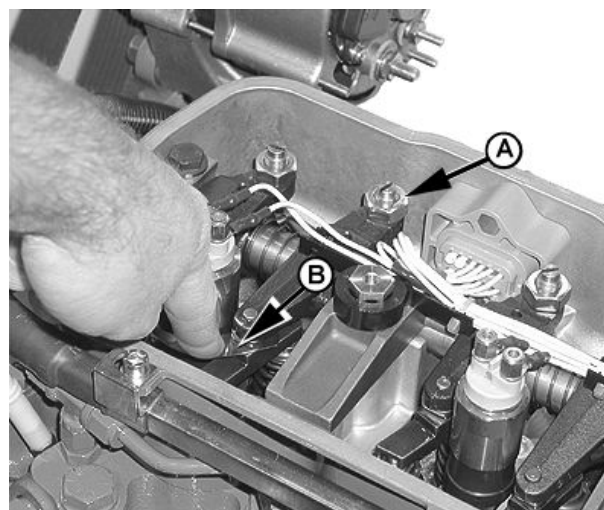
4. Adjust valves to specifications below using the appropriate valve clearance adjustment procedure for 4-cylinder or 6-cylinder engines as outlined in the following blocks. Loosen the jam nut (A) on rocker arm adjusting screw. Turn adjusting screw until feeler gauge (B) slips with a slight drag. Hold the adjusting screw from turning with screwdriver and tighten jam nut to specifications. Recheck clearance again after tightening jam nut. Readjust clearance as necessary.

Specification

Intake Valve Clearance	
Adjustment (Rocker Arm-to-Bridge) (Engine Cold)—Clearance.....	0.36 mm (0.014 in.)
Exhaust Valve Clearance	
Adjustment (Rocker Arm-to-Bridge) (Engine Cold)—Clearance.....	0.46 mm (0.018 in.)
Rocker Arm Adjusting Screw Jam Nut—Torque.....	27 N·m (20 lb-ft)

NOTE: While rocker arm cover is removed, test glow plugs. (See following procedure.)

5. Install rocker arm cover and crankcase ventilator tube.
6. Reconnect battery terminal.



Adjusting Valves

A—Adjusting Screw Jam Nut

B—Feeler Gauge

Continued on next page

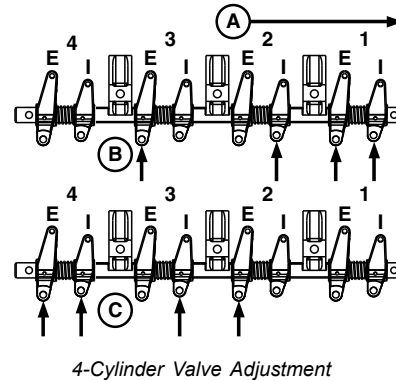
OURGP12,0000092 -19-28SEP04-2/4

4-Cylinder Engine:

NOTE: Firing order is 1-3-4-2.

1. Using JDG1571 or JDE81-4 Timing Pin, lock No. 1 piston at TDC compression stroke (B).
2. Adjust valve clearance on No. 1 and 3 exhaust valves and No. 1 and 2 intake valves.
3. Turn crankshaft 360°. Lock No. 4 piston at TDC compression stroke (C).
4. Adjust valve clearance on No. 2 and 4 exhaust valves and No. 3 and 4 intake valves.

A—Front of Engine
B—No. 1 Piston TDC Compression
C—No. 4 Piston TDC Compression
E—Exhaust Valve
I—Intake Valve



OURGP12.0000092 -19-28SEP04-3/4

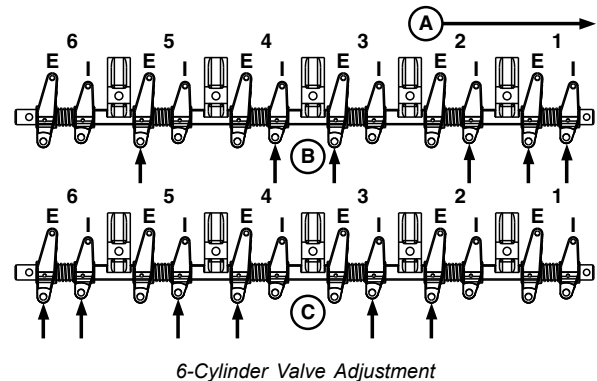
RG12357—UN—29MAY02

6-Cylinder Engine:

NOTE: Firing order is 1-5-3-6-2-4.

1. Lock No. 1 piston at TDC compression stroke (B).
2. Adjust valve clearance on No. 1, 3 and 5 exhaust valves and No. 1, 2, and 4 intake valves.
3. Turn crankshaft 360°. Lock No. 6 piston at TDC compression stroke (C).
4. Adjust valve clearance on No. 2, 4 and 6 exhaust valves and No. 3, 5, and 6 intake valves.

A—Front of Engine
B—No. 1 Piston TDC Compression
C—No. 6 Piston TDC Compression
E—Exhaust Valve
I—Intake Valve



OURGP12.0000092 -19-28SEP04-4/4

RG12170—UN—21MAY02

Testing Glow Plugs for Continuity (If Applicable)

CAUTION: To prevent accidental starting of engine while performing this test, always disconnect **NEGATIVE (—) battery terminal**.

While checking valve clearance with rocker arm cover removed, check each glow plug (A) for continuity using a multimeter.

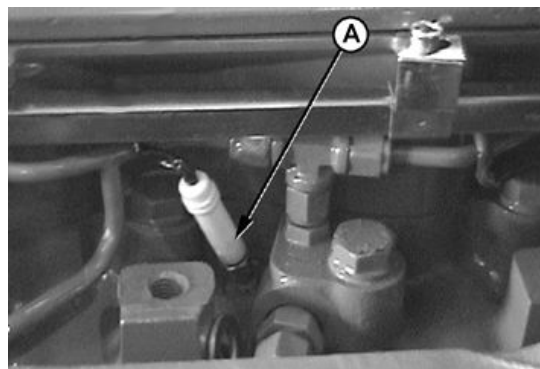
Check continuity between glow plug and ground on cylinder head. If resistance is infinite (no current), the glow plug is damaged and must be replaced.

Install new glow plugs and torque to specifications.

Specification

Glow Plug—Torque.....15 Nm (11 lb-ft)

Reinstall rocker arm cover and crankcase ventilator tube.



Testing Glow Plugs for Continuity

A—Glow Plug

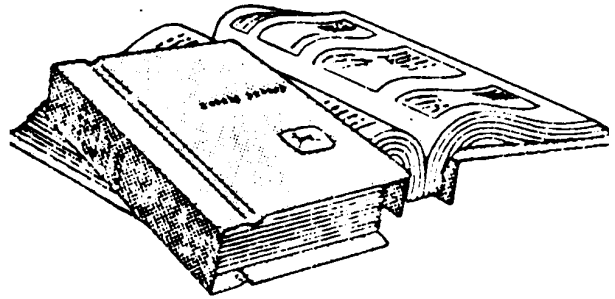
RG13802 —UN—18NOV04

OURGP12,0000093 -19-25JUN08-1/1

Service As Required

Additional Service Information

This is not a detailed service manual. If you want more detailed service information, contact your John Deere dealer or engine distributor.



Component Technical Manuals

OURGP11,0000048 -19-23AUG10-1/1

RG4624 —UN—15DEC88

Do Not Modify Fuel System

CAUTION: Do not open high-pressure fuel system.

High-pressure fluid remaining in fuel lines can cause serious injury. 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.

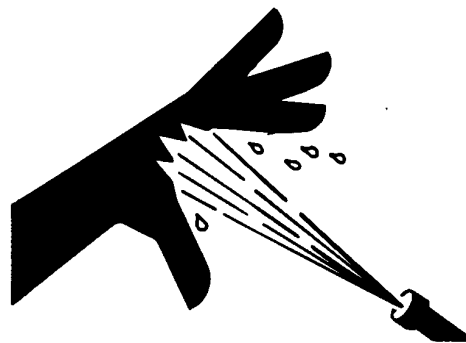
Only technicians familiar with this type of system can perform repairs. (See your John Deere dealer.)

IMPORTANT: Never steam clean or pour cold water on a high-pressure fuel pump while it is still warm. To do so may cause seizure of pump parts.

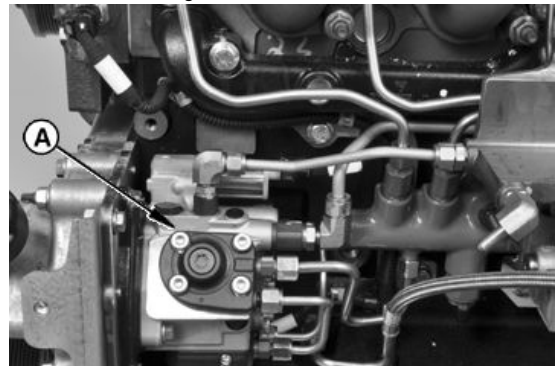
Modification or alteration of the high-pressure fuel pump (A), the injection timing, or the fuel injectors in ways not recommended by the manufacturer will terminate the warranty obligation to the purchaser.

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. (See your authorized servicing dealer or engine distributor.)



High-Pressure Fuel Lines



High-Pressure Fuel Pump

A—High-Pressure Fuel Pump

OURGP12,0000095 -19-16APR10-1/1

TS1343 —UN—18MAR92

RG18331 —UN—16APR10

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 first stop 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. **DO NOT** use any other stop-leak additives in the cooling system.

Air must be expelled from cooling system when coolant is added. Cooling system must be free of air by the time the engine coolant temperature reaches 80°C (176°F) or damage to EGR cooler may result.

Coolant level should be maintained to the bottom of the surge tank filler neck or radiator filler neck (A). If needed, add coolant as follows.

1. Loosen temperature sending unit fitting at rear of cylinder head to allow air to escape when filling system.

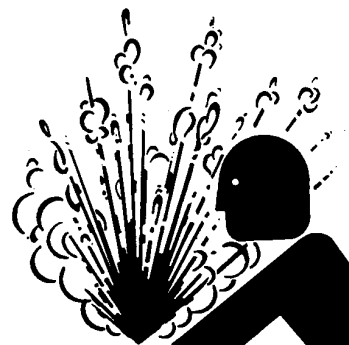
IMPORTANT: When adding coolant to the system, use the appropriate coolant solution. (See **ENGINE COOLANT SPECIFICATIONS** in **Fuels, Lubricants, and Coolant Section** for mixing of coolant ingredients before adding to cooling system.)

Do not overfill cooling system. A pressurized system needs space for heat expansion without overflowing at top of radiator.

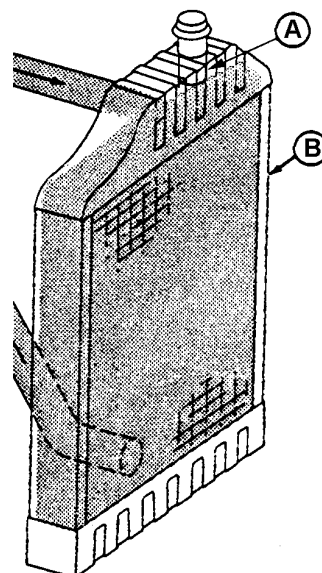
2. Add coolant until level is at bottom of surge tank filler neck or radiator filler neck (A). If equipped with a translucent surge tank, coolant level should be at cool fill line indicator on surge tank.

3. Tighten plugs and fittings when air has been expelled from system.
4. Run engine until it reaches operating temperature.

OURGP11,000005F -19-07MAY08-1/1



High-Pressure Fluids



Radiator and Coolant

A—Radiator Filler Neck

B—Radiator

TS281 —UN—15APR13

RG13295 —UN—20NOV03

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.

ZE59858,0000009 -19-07JUL20-1/1

Replacing Single Stage Air Cleaner

IMPORTANT: ALWAYS REPLACE air cleaner 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 single stage air cleaner kits. Refer to manufacturers' instructions for servicing air cleaners not supplied by John Deere.

1. If equipped, loosen body clamp.
2. Loosen clamp around outlet neck (A).
3. Remove air cleaner.
4. Install new filter so that overlap (B) of air cleaner outlet neck and engine intake pipe is to specification below.

Specification

Air Cleaner Neck to
Engine Intake—Overlap..... 38 mm (1.5 in.)

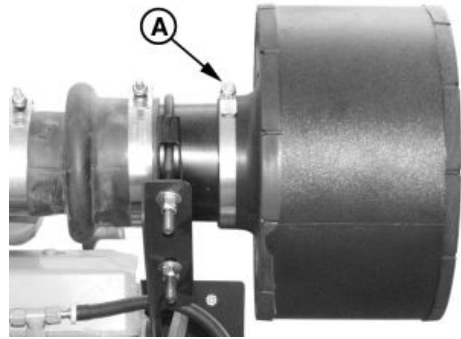
5. Tighten neck clamp (A) to specification below.

Specification

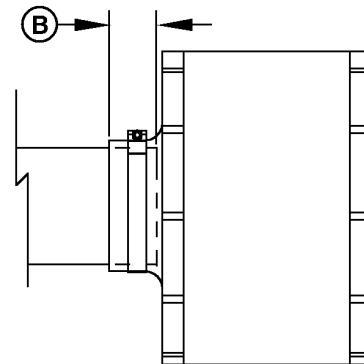
Air Cleaner Neck
Clamp—Torque..... 6.8 N·m (60 lb.-in.)

IMPORTANT: Do NOT overtighten body clamp.
Overtightening may cause crushing of air cleaner body. Tighten body clamp only until snug.

6. If equipped, tighten body clamp until snug.



Single Stage Air Filter



Installation of Single Stage Air Cleaner

A—Outlet Neck Clamp

B—Filter to Engine Overlap

RG11319A —UN—06SEP00

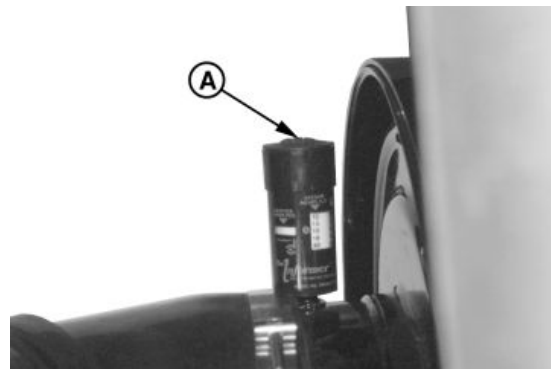
RG11320 —UN—07SEP00

RG, RG34710, 5594 -19-18DEC13-1/2

IMPORTANT: Whenever the air cleaner has been serviced or removed, ALWAYS fully depress the air filter restriction indicator reset button (if equipped) to assure accurate readings.

7. If equipped, fully depress air filter restriction indicator reset button (A) and release to reset indicator.

A—Air Filter Restriction Indicator



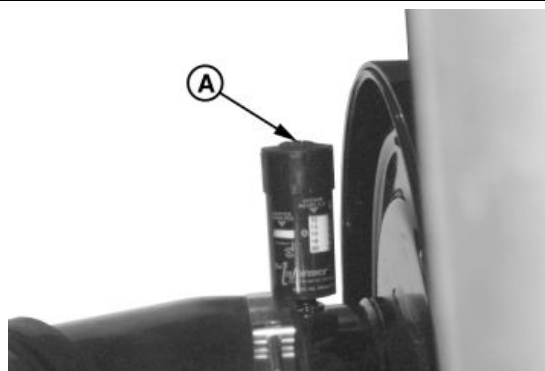
RG8719B —UN—03SEP99

RG, RG34710, 5594 -19-18DEC13-2/2

Replacing Axial Seal Air Cleaner Filter Element

IMPORTANT: ALWAYS REPLACE primary air cleaner element when air restriction indicator (A) shows a vacuum of 625 mm (25 in.) H₂O, is torn, or visibly dirty.

NOTE: This procedure applies to John Deere 2-stage axial seal air cleaner kits. Refer to manufacturers' instructions for servicing air cleaners not supplied by John Deere.



Air restriction Indicator

RG8719B—UN—03SEP99

Continued on next page

OURGP11,000013A -19-24SEP14-1/2

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.

4. To replace secondary element, remove retaining nut (D) and secondary element (E). Immediately replace secondary element with new element to prevent dust from entering air intake system.

Specification

Retaining Nut—Torque..... 20 N·m (177 lb.-in.)

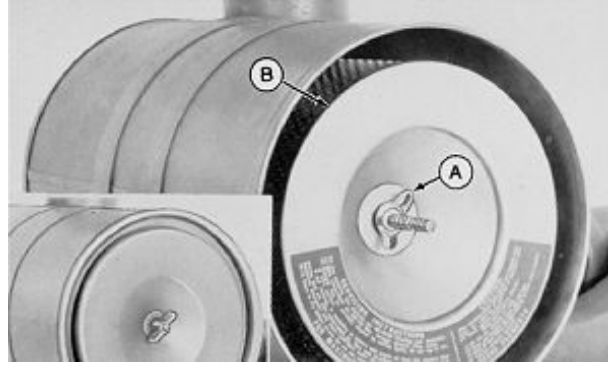
5. Install new primary element and tighten wing nut securely. Install cover assembly and tighten retaining wing nut securely.

IMPORTANT: Whenever the air cleaner has been serviced or had cover removed, **ALWAYS** fully depress the air restriction indicator reset button (if equipped) to assure accurate readings.

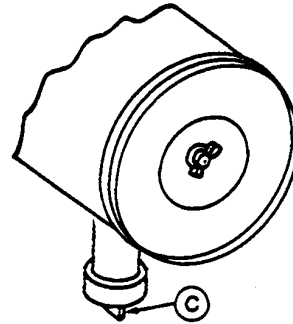
6. If equipped, fully depress air restriction indicator reset button and release to reset indicator.

A—Wing Nut
B—Primary Element
C—Dust Unloader Valve

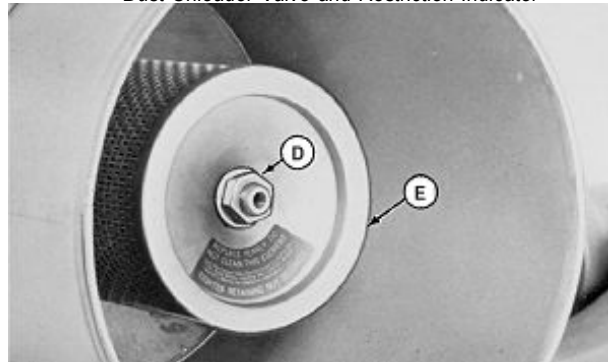
D—Retaining Nut
E—Secondary Element



Wing Nut and Primary Element



Dust Unloader Valve and Restriction Indicator



Retaining Nut and Secondary Element

RG4686—UN—20DEC88

RG4687—UN—20DEC88

RG11068—UN—26JUN00

OURGP11,000013A -19-24SEP14-2/2

Replacing Radial Seal Air Cleaner Filter Element

IMPORTANT: ALWAYS REPLACE primary air cleaner element when air restriction indicator shows a vacuum of 625 mm (25 in.) H₂O, is torn, or visibly dirty.

NOTE: This procedure applies to John Deere 2-stage radial seal air cleaner kits. Refer to manufacturers' instructions for servicing air cleaners not supplied by John Deere.

1. Unlatch and remove dust cap/cover (A) of air cleaner.
2. Move end of filter (B) back and forth gently to break seal.
3. Pull filter (B) off outlet tube and out of housing.
4. Thoroughly clean all dirt from inside housing and from outlet bore.

IMPORTANT: Remove secondary (safety) element (C) 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.

5. To replace secondary element (C), pull filter element out gently. Immediately replace secondary element with new element to prevent dust from entering air intake system.
6. Install new primary filter element. Apply pressure by hand at outer rim of filter.

IMPORTANT: Do NOT use latches on cover to force filter into air cleaner. Using cover to force filter will damage cleaner housing.

7. Close housing with dust unloader valve aimed down and latch latches.

IMPORTANT: Whenever the air cleaner has been serviced or cover has been removed, ALWAYS fully depress the air restriction indicator reset button (if equipped) to assure accurate readings.

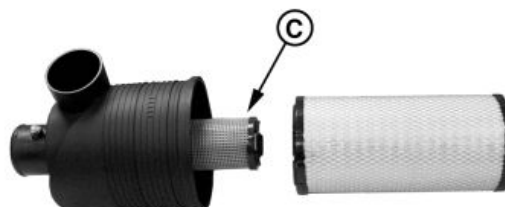
8. If equipped, fully depress air restriction indicator reset button and release to reset indicator.



Dust Cap/Cover



Primary Filter Element



Secondary Filter Element

A—Dust Cap/Cover
B—Primary Filter Element

C—Secondary Filter Element

RG11321A—UN—08SEP00

RG11322A—UN—08SEP00

RG11327A—UN—08SEP00

RG41165,000008B -19-07OCT10-1/1

Replacing Fan and Alternator Belts

Refer to CHECKING BELT TENSIONER SPRING TENSION AND BELT WEAR in Lubrication and Maintenance/500 Hour/12 Month Section for additional information on the belt tensioner.

1. Inspect belts for cracks, fraying, or stretched out areas. Replace if necessary.
2. To replace belt with automatic tensioner, release tension on belt using a long handled 1/2 inch drive tool in square hole in end of tensioner arm.

To replace belt with manual tensioner, release tension at belt tensioner (See MANUAL BELT TENSIONER ADJUSTMENT in Lubrication and Maintenance/500 Hour/12 Month Section.)

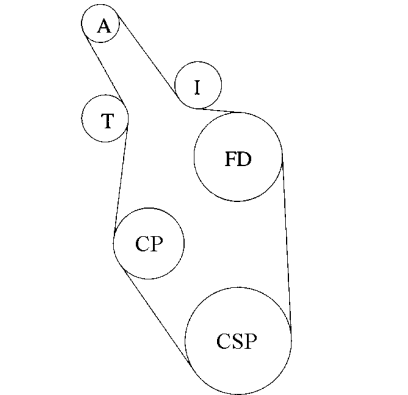
3. Remove poly-vee belt from pulleys and discard belt.

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, see your John Deere dealer.

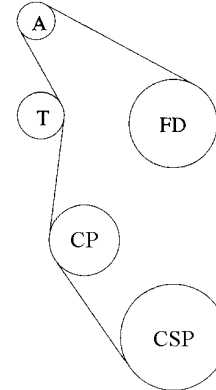
4. Install new belt, making sure belt is correctly seated in all pulley grooves. Refer to belt routing at right for your application.
5. Apply tension to belt with tensioner. Remove drive tool.
6. Install fan guard if removed.
7. Start engine and check belt alignment.

*Measured from crank centerline to fan drive center.

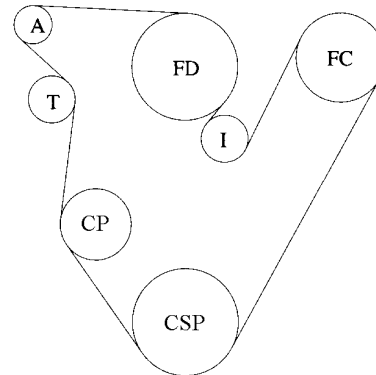
A—Alternator	I—Idler Pulley
CSP—Crankshaft Pulley	T—Tensioner
FC—Freon (A/C) Compressor	CP—Coolant Pump
FD—Fan Drive	



290 mm (11.4 in.) Fan Height and Lower*



338 mm (13.3 in.) Fan Height and Higher Without Freon Compressor*



402 mm (15.8 in.) Fan Height With Freon Compressor*

OURGP11,0000061 -19-08DEC05-1/1

RG11950 —UN—07NOV01

RG11951 —UN—07NOV01

RG11952 —UN—07NOV01

Checking Fuses

A separate wiring harness fuse (10 amp) and a main system fuse (20 amp) are shown in the Engine Wiring Diagrams in the Troubleshooting Section.

A separate wiring harness for glow plugs has fuse protection. To replace fuse, remove cap from holder on jumper cable and replace with a 50-amp fuse.

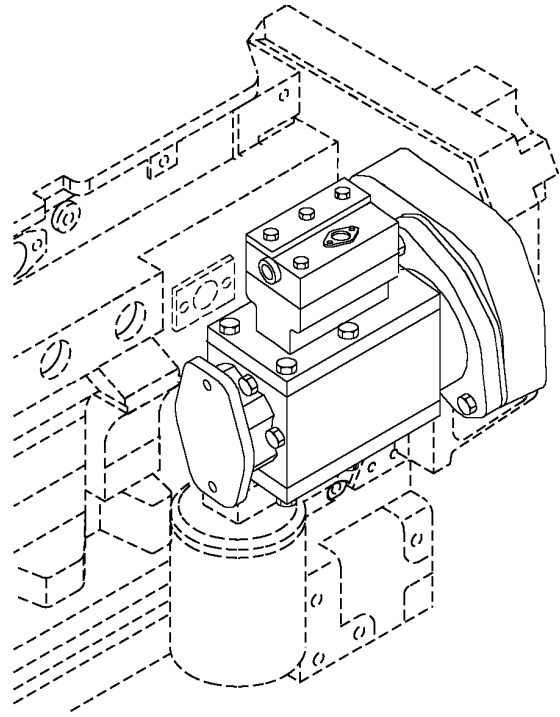
OURGP11,0000062 -19-08DEC05-1/1

Checking Air Compressors (If Equipped)

Air compressors are offered as options with John Deere OEM engines to provide compressed air to operate air-powered devices like vehicle air brakes.

Air compressors are engine-driven piston types. They are either air cooled or cooled with engine coolant. The compressors are lubricated with engine oil. The compressor runs continuously as gear or spline driven 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).

See your John Deere engine distributor or servicing dealer for diagnostic and troubleshooting information. If diagnosis leads to an internal fault in the compressor, replace the complete compressor as a new or remanufactured unit.



Air Compressor (Optional)

RG12836 —JUN—27FEB03

OURGP12,00001E0 -19-27JUL06-1/1

Bleeding Fuel System

CAUTION: High-pressure fluid remaining in fuel lines can cause serious injury. 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. Only technicians familiar with this type of system can perform repairs. (See your John Deere dealer.)

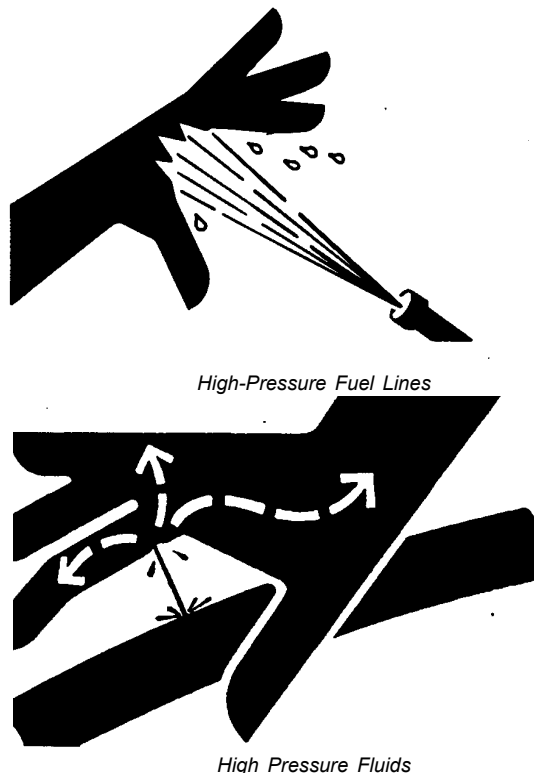
Escaping fluid under pressure can penetrate the skin causing serious injury. Avoid hazards by relieving pressure before disconnecting hydraulic or other lines. Tighten all connections before applying pressure. Search for leaks with a piece of cardboard. Protect hands and body from high pressure fluids.

If an accident occurs, see a doctor immediately. Any fluid injected into the skin must be surgically removed within a few hours or gangrene may result. Doctors unfamiliar with this type of injury may call the Deere & Company Medical Department in Moline, Illinois, or other knowledgeable medical source.

Any time the fuel system has been opened up for service (lines disconnected or filters removed), it will be necessary to bleed air from the system.

IMPORTANT: Warning do not pressurize the fuel tank to prime the fuel system after running out of fuel or servicing the fuel filters. Pressurizing the fuel system will rupture the front seal on the high pressure pump requiring the replacement of the High Pressure pump.

A ruptured front seal on the High Pressure Fuel Pump will fill the engine crankcase with diesel fuel causing server damage to the engine.



IMPORTANT: Four-valve cylinder head engines are especially sensitive to fuel contamination. Do not crack any fuel lines to bleed the fuel system.

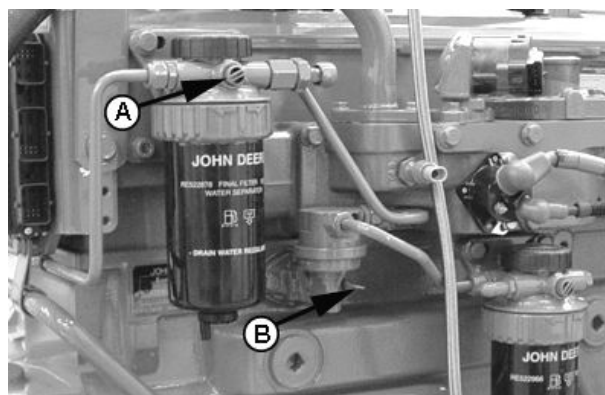
OURGP12,0000098 -19-07MAY08-1/2

1. Loosen the air bleed vent screw (A) on fuel filter base two full turns by hand .
2. Operate fuel supply pump primer lever (B), or primer button on fuel filter base (if equipped), until fuel flows out of bleed vent screw.
3. Tighten bleed vent screw securely. Continue operating primer until pumping action is not felt.
4. Start engine and check for leaks.

If engine will not start, repeat steps 1-4.

A—Bleed Vent Screw

B—Primer Lever



Bleeding Fuel System

OURGP12,0000098 -19-07MAY08-2/2

Troubleshooting

General Troubleshooting Information

Troubleshooting engine problems can be difficult. An engine wiring diagram is provided in this section to help isolate electrical problems on power units using John Deere wiring harness and instrument (gauge) panel.

Later in this section is a list of possible engine problems that may be encountered accompanied by possible causes and corrections. The illustrated diagrams and troubleshooting information are of a general nature; final design of the overall system for your engine application may be different. See your engine distributor or servicing dealer if you are in doubt.

A reliable program for troubleshooting engine problems should include the following basic diagnostic thought process:

- Know the engine and all related systems.
- Study the problem thoroughly.
- Relate the symptoms to your knowledge of engine and systems.
- 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 to signal problems (see Displaying Of Diagnostic Trouble Codes (DTCs), later in this section).

1. *If fault codes are present, perform the suggested corrective actions.*
2. *If this does not correct the engine problem, contact your servicing dealer.*
3. *If engine has problems but no fault codes are displayed, refer to ENGINE TROUBLESHOOTING later in this section for problems and solutions.*

OURGP12,00000EF -19-27MAY16-1/1

Instrument Panel Method for Retrieving Diagnostic Trouble Codes

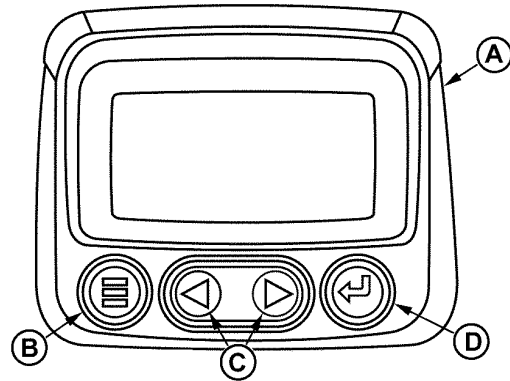
IMPORTANT: Care should be used during diagnostic procedures to avoid damaging the terminals of connectors, sensors, and actuators. Probes should not be poked into or around the terminals or damage will result. Probes should only be touched against the terminals to make measurements.

Diagnosis of the Deere electronic control system on engines with Deere electronic instrument panel should be performed as follows:

1. Make sure all engine mechanical and other systems not related to the electronic control system are operating properly. (See ENGINE TROUBLESHOOTING later in this section.)

NOTE: Diagnostic gauge (A) uses the menu key (B) to access various engine functions, two arrow keys (C) to scroll through the engine parameter list and view the menu list, and an enter key (D) for selecting highlighted items.

2. Read and record DTC(s) displayed on LCD of diagnostic gauge (A). For procedure to access diagnostic trouble codes, refer to "Using Diagnostic Gauge to Access Engine Information", earlier in this manual.



Trouble Code Display On Instrument Panel

A—Diagnostic Gauge
B—Menu Key

C—Arrow Keys
D—Enter Key

3. Go to the **LISTING OF DIAGNOSTIC TROUBLE CODES (DTCs)** later in this section, to interpret to the DTC(s) present.

4. Contact your nearest engine distributor or servicing dealer with a list of DTC(s) so that necessary repairs can be made.

OURGP11,0000063 -19-08DEC05-1/1

Displaying Of Diagnostic Trouble Codes (DTCs)

SPN/FMI CODES

Stored and active diagnostic trouble codes are output on the diagnostic gauge on the Deere electronic instrument panel according to the J1939 standard as a two-part code as shown on the tables on the following pages.

The first part is a Suspect Parameter Number (SPN) followed by a Failure Mode Identifier (FMI) code. In order to determine the exact failure, both parts (SPN and FMI) of the code are needed.

The SPN identifies the system or the component that has the failure; for example SPN 000110 indicates a failure in the engine coolant temperature circuit.

The FMI identifies the type of failure that has occurred; for example FMI 03 indicates value above normal. Combining SPN 000110 with FMI 03 yields a fault code "engine coolant temperature input voltage too high". A corrective action will also be displayed, "check sensor and wiring". If this check does not solve the engine fault, contact your servicing dealer.

Always contact your servicing dealer for help in correcting unsolved diagnostic trouble codes which are displayed for your engine.

OURGP12,00000F0 -19-24AUG10-1/1

Listing of Diagnostic Trouble Codes (DTCs)

NOTE: Not all of these codes are used on all OEM engine applications

NOTE: If the corrective actions below do not solve the engine fault, contact your servicing dealer.

Fault Codes

SPN	FMI	Description of Fault	Corrective Action
0000 28	03.....	Throttle #3 Voltage Out of Range High	Check Sensor and Wiring
	04.....	Throttle #3 Voltage Out of Range Low	Check Sensor and Wiring
	14.....	Throttle #3 Voltage Out of Range	Contact Servicing Dealer
0000 29	03.....	Throttle #2 Voltage Out of Range High	Check Sensor and Wiring
	04.....	Throttle #2 Voltage Out of Range Low	Check Sensor and Wiring
	14.....	Throttle #2 Voltage Out of Range	Contact Servicing Dealer
0000 91	03.....	Throttle Voltage Out of Range High	Check Switch and Wiring
	04.....	Throttle Voltage Out of Range Low	Check Switch and Wiring
	14.....	Throttle Voltage Out of Range	Check Sensor and Wiring
00094	03.....	Fuel Pressure Voltage Out of range High	Check Sensor and Wiring
	04.....	Fuel Pressure Voltage Out of Range Low	Check Sensor and Wiring
0000 97	03.....	Water in Fuel Voltage Out of Range High	Check Sensor and Wiring
	04.....	Water in Fuel Voltage Out of Range Low	Check Sensor and Wiring
	16.....	Water in Fuel Detected	Stop and Drain Water Separator
0001 00	01.....	Engine Oil Pressure Low-Most Severe	Check Oil Level
	03.....	Engine Oil Pressure Voltage Out of Range High	Check Sensor and Wiring
	04.....	Engine Oil Pressure Voltage Out of Range Low	Check Sensor and Wiring
	18.....	Engine Oil Pressure Low-Moderately Severe	Check Oil Level
	31.....	Oil Pressure Detected with Zero Engine Speed	Contact Servicing Dealer
0001 02	02.....	Manifold Air Pressure Sensor In-Range Failure	Contact Servicing Dealer
	03.....	Manifold Air Pressure Voltage Out of Range High	Contact Servicing Dealer
	04.....	Manifold Air Pressure Voltage Out of Range Low	Contact Servicing Dealer
0001 03	00.....	Turbocharger Speed High-Most Severe	Contact Servicing Dealer
	02.....	Turbocharger Speed Data Incorrect	Contact Servicing Dealer
	05.....	Turbocharger Harness Open Circuit	Contact Servicing Dealer
	06.....	Turbocharger Harness Shorted To Ground	Contact Servicing Dealer
	08.....	Turbocharger Speed Signal In-Range Failure	Contact Servicing Dealer
	31.....	Turbocharger Speed Signal Missing	Contact Servicing Dealer
0001 05	00.....	Exhaust Gas Recirculation Air Temperature High-Most Severe	Check Air Cleaner, Aftercooler, or Room Temperature
	03.....	Exhaust Gas Recirculation Air Temperature Input Voltage Out of Range High	Check Sensor and Wiring
	04.....	Exhaust Gas Recirculation Air Temperature Input Voltage Out of Range Low	Check Sensor and Wiring

Continued on next page

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Troubleshooting

SPN	FMI	Description of Fault	Corrective Action
	15.....	Exhaust Gas Recirculation Air Temperature High-Least Severe.....	Check Air Cleaner, Aftercooler, or Room Temperature
	16.....	Exhaust Gas Recirculation Air Temperature High-Moderately Severe.....	Check Air Cleaner, Aftercooler, or Room Temperature
0001 08	02.....	Barometric Air Pressure Sensor Signal Invalid	Contact Servicing Dealer
	31.....	Barometric Air Pressure Sensor Signal Invalid	Contact Servicing Dealer
0001 10	00.....	Engine Coolant Temperature High-Most Severe	Check Cooling System, Reduce Power
0001 10	03.....	Engine Coolant Temperature Input Voltage Out of Range High	Check Sensor and Wiring
	04.....	Engine Coolant Temperature Input Voltage Out of Range Low.....	Check Sensor and Wiring
	15.....	Engine Coolant Temperature High-Least Severe.....	Check Cooling System, Reduce Power
	16.....	Engine Coolant Temperature High-Moderately Severe	Check Cooling System, Reduce Power
	17.....	Engine Coolant Temperature Low-Least Severe	Check Cooling System
0001 11	01.....	Coolant Level Low	Check Operator's Manual
0001 57	03.....	Fuel Rail Pressure Voltage Out of Range High	Contact Servicing Dealer
	04.....	Fuel Rail Pressure Voltage Out of Range Low	Contact Servicing Dealer
	10.....	Fuel Rail Pressure Drops Too Fast	Contact Servicing Dealer
	17.....	Fuel Rail Pressure Not Developed	Contact Servicing Dealer
0001 58	17.....	Keyswitch Circuit Problem	Contact Servicing Dealer
0001 74	00.....	Fuel Temperature High-Most Severe	Add Fuel or Switch Fuel Tanks
	03.....	Fuel Temperature Voltage Out of Range High	Check Sensor and Wiring
	04.....	Fuel Temperature Voltage Out of Range Low	Check Sensor and Wiring
	16.....	Fuel Temperature High-Moderately Severe	Add Fuel or Switch Fuel Tanks
0001 89	00.....	Engine Speed Derate	Check Fault Codes or Contact Servicing Dealer
0001 90	00.....	Engine Speed High-Most Severe	Reduce Engine Speed
	16.....	Engine Speed High-Moderately Severe	Reduce Engine Speed
0004 12	00.....	Exhaust Gas Recirculation Temperature Input Voltage High-Most Severe	Contact Servicing Dealer
	03.....	Exhaust Gas Recirculation Temperature Voltage Out of Range High	Contact Servicing Dealer
	04.....	Exhaust Gas Recirculation Temperature Voltage Out of Range Low.....	Contact Servicing Dealer
	16.....	Exhaust Gas Recirculation Temperature Moderately Severe ..	Contact Servicing Dealer
0006 11	03.....	Electronic Injector Wiring Shorted to Power Source	Check Wiring
	04.....	Electronic Injector Wiring Shorted to Ground.....	Check Wiring
0006 20	03.....	5V Sensor Supply Voltage Out of Range High	Check Wiring
	04.....	5V Sensor Supply Voltage Out of Range Low	Check Wiring

Continued on next page

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Troubleshooting

SPN	FMI	Description of Fault	Corrective Action
0006 27	01.....	Electronic Injector Supply Voltage Low	Check Battery Voltage and Wiring
	16.....	ECU Power Supply Voltage High	Contact Servicing Dealer
	18.....	ECU Power Supply Voltage Low	Contact Servicing Dealer
0006 28	12.....	ECU Programming Error.....	Contact Servicing Dealer
0006 29	12.....	ECU Programming Error.....	Contact Servicing Dealer
	13.....	ECU Error.....	Contact Service Dealer
0006 36	02.....	Engine Position Sensor Noise	Check Sensor and Wiring
	05.....	Engine Position Sensor Current Low or Open Circuit	Contact Servicing Dealer
	06.....	Engine Position Sensor Current High or Grounded Circuit	Contact Servicing Dealer
	08.....	Engine Position Sensor Input Missing	Check Sensor and Wiring
	10.....	Engine Position Sensor Pattern Error.....	Check Sensor and Wiring
0006 37	02.....	Timing (Crank) Position Sensor Noise	Check Sensor and Wiring
	05.....	Timing (Crank) Position Sensor Current Low or Open Circuit ..	Contact Servicing Dealer
	06.....	Timing (Crank) Position Sensor Current High or Grounded Circuit.....	Contact Servicing Dealer
	07.....	Crank/Camshaft Positions Out of Sync.....	Check Sensor and Wiring
	08.....	Crank Position Input Missing	Check Sensor and Wiring
	10.....	Crank Position Input Pattern Error.....	Check Sensor and Wiring
0006 40	31.....	External Engine Protection Signal Not Recognized	Engine External Protection Unknown. Check Installation
0006 41	04.....	Turbocharger Actuator Disabled	Contact Servicing Dealer
	05.....	Turbocharger Actuator Current Low or Open Circuit.....	Contact Servicing Dealer
	12.....	Turbocharger Actuator Communication Error	Contact Servicing Dealer
	13.....	Turbocharger Learn Error	Contact Servicing Dealer
	16.....	Turbocharger Temperature High-Moderately Severe	Contact Servicing Dealer
0006 51	02.....	Cylinder #1 Injector Part Number Not Recognized	Contact Servicing Dealer
	05.....	Cylinder #1 Electronic Injector Circuit Open	Check Injector Wiring or Injector Solenoid
	06.....	Cylinder #1 Electronic Injector Circuit Shorted.....	Check Injector Wiring or Injector Solenoid
	07.....	Cylinder #1 Electronic Injector Fuel Flow Low	Injector Failed or Flow Limiter Closed
	13.....	Cylinder #1 Injector QR Code String Error.....	Contact Servicing Dealer
0006 52	02.....	Cylinder #2 Injector Part Number Not Recognized	Contact Servicing Dealer
	05.....	Cylinder #2 Electronic Injector Circuit Open	Check Injector Wiring or Injector Solenoid
	06.....	Cylinder #2 Electronic Injector Circuit Shorted.....	Check Injector Wiring or Injector Solenoid
	07.....	Cylinder #2 Electronic Injector Fuel Flow Low	Injector Failed or Flow Limiter Closed
	13.....	Cylinder #2 Injector QR Code String Error.....	Contact Servicing Dealer
0006 53	02.....	Cylinder #3 Injector Part Number Not Recognized.....	Contact Servicing Dealer
	05.....	Cylinder #3 Electronic Injector Circuit Open	Check Injector Wiring or Injector Solenoid

Continued on next page

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Troubleshooting

SPN	FMI	Description of Fault	Corrective Action
0006 54	06.....	Cylinder #3 Electronic Injector Circuit Shorted	Check Injector Wiring or Injector Solenoid
	07.....	Cylinder #3 Electronic Injector Fuel Flow Low	Injector Failed or Flow Limiter Closed
	13.....	Cylinder #3 Injector QR Code String Error	Contact Servicing Dealer
	02.....	Cylinder #4 Injector Part Number Not Recognized	Contact Servicing Dealer
	05.....	Cylinder #4 Electronic Injector Circuit Open	Check Injector Wiring or Injector Solenoid
0006 55	06.....	Cylinder #4 Electronic Injector Circuit Shorted	Check Injector Wiring or Injector Solenoid
	07.....	Cylinder #4 Electronic Injector Fuel Flow Low	Injector Failed or Flow Limiter Closed
	13.....	Cylinder #4 Injector QR Code String Error	Contact Servicing Dealer
	02.....	Cylinder #5 Injector Part Number Not Recognized	Contact Servicing Dealer
	05.....	Cylinder #5 Electronic Injector Circuit Open	Check Injector Wiring or Injector Solenoid
0006 56	06.....	Cylinder #5 Electronic Injector Circuit Shorted	Check Injector Wiring or Injector Solenoid
	07.....	Cylinder #5 Electronic Injector Fuel Flow Low	Injector Failed or Flow Limiter Closed
	13.....	Cylinder #5 Injector QR Code String Error	Contact Servicing Dealer
	02.....	Cylinder #6 Injector Part Number Not Recognized	Contact Servicing Dealer
	05.....	Cylinder #6 Electronic Injector Circuit Open	Check Injector Wiring or Injector Solenoid
0006 76	06.....	Cylinder #6 Electronic Injector Circuit Shorted	Check Injector Wiring or Injector Solenoid
	07.....	Cylinder #6 Electronic Injector Fuel Flow Low	Injector Failed or Flow Limiter Closed
	13.....	Cylinder #6 Injector QR Code String Error	Contact Servicing Dealer
	03.....	Glow Plug Relay Voltage High	Check Relay and Wiring
	04.....	Glow Plug Relay Voltage Low	Check Relay and Wiring
0008 98	09.....	Vehicle Speed or Torque Message Invalid	Contact Servicing Dealer
0009 70	31.....	Auxiliary Engine Shutdown Signal	Non Engine Fault. Check Other Shutdown Devices
0009 71	31.....	Auxiliary Engine Derate Signal	Non Engine Fault. Check Other Shutdown Devices
0010 79	03.....	Sensor Supply Voltage 3 Out of Range High	Check Wiring
	04.....	Sensor Supply Voltage 3 Out of Range Low	Check Wiring
0010 80	03.....	Fuel Rail Pressure Sensor Supply Voltage 2 Out of Range High	Check Wiring
	04.....	Fuel Rail Pressure Sensor Supply Voltage 2 Out of Range Low	Check Wiring
0011 09	31.....	Engine Protection System Approaching Shutdown	Check Fault Codes
0011 10	31.....	Engine Protection System Shutdown Engine	Check Fault Codes
0011 36	00.....	ECU Temperature High-Most Severe	Contact Servicing Dealer
	16.....	ECU Temperature High-Moderately Severe	Contact Servicing Dealer
0011 72	03.....	Turbo Compressor Inlet Temperature Input Voltage Out of Range High	Contact Servicing Dealer
	04.....	Turbo Compressor Inlet Temperature Input Voltage Out of Range Low	Contact Servicing Dealer

Continued on next page

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Troubleshooting

SPN	FMI	Description of Fault	Corrective Action
0011 80	16.....	Turbo Compressor Inlet Temperature High-Moderately Severe	Contact Servicing Dealer
	00.....	Turbo Turbine Inlet Temperature High-Most Severe	Contact Servicing Dealer
0012 09	16.....	Turbo Turbine Inlet Temperature High-Moderately Severe	Contact Servicing Dealer
	02.....	Exhaust Pressure Incorrect	Contact Servicing Dealer
	03.....	Exhaust Pressure Sensor Voltage Out of Range High	Contact Servicing Dealer
0013 47	04.....	Exhaust Pressure Sensor Voltage Out of Range Low	Contact Servicing Dealer
	03.....	Fuel Pump Pressurizing Assembly #1 Sensor Voltage High ...	Contact Servicing Dealer
	05.....	Fuel Pump Pressurizing Assembly #1 Sensor Circuit Open, Shorted to Ground, or Overloaded	Check Pump Wiring
	07.....	Fuel Pump Assembly #1 Rail Pressure Control Mismatch	Check Fuel Filter and Lines
0015 69	31.....	Engine Protection Derate	Check Fault Codes
0026 30	00.....	Exhaust Gas Recirculation Fresh Air Temperature High-Most Severe	Contact Servicing Dealer
	03.....	Exhaust Gas Recirculation Fresh Air Temperature Voltage Out of Range High	Contact Servicing Dealer
	04.....	Exhaust Gas Recirculation Fresh Air Temperature Voltage Out of Range Low	Contact Servicing Dealer
	15.....	Exhaust Gas Recirculation Fresh Air Temperature High-Least Severe	Contact Servicing Dealer
	16.....	Exhaust Gas Recirculation Fresh Air Temperature High-Moderately Severe	Contact Servicing Dealer
0026 59	02.....	Exhaust Gas Recirculation Flow/Temperature Mismatch	Contact Servicing Dealer
	15.....	Exhaust Gas Recirculation Flow Rate Above Normal	Contact Servicing Dealer
	17.....	Exhaust Gas Recirculation Flow Rate Below Normal	Contact Servicing Dealer
0027 90	16.....	Turbocharger Compressor Outlet Temperature High-Most Severe	Contact Servicing Dealer
0027 91	02.....	Exhaust Gas Recirculation Valve Sensor Voltage Mismatch...	Contact Servicing Dealer
	03.....	Exhaust Gas Recirculation Valve Sensor Voltage Out of Range High	Contact Servicing Dealer
	04.....	Exhaust Gas Recirculation Valve Sensor Voltage Out of Range Low	Contact Servicing Dealer
	05.....	Exhaust Gas Recirculation Valve Current Low or Open Circuit	Contact Servicing Dealer
	06.....	Exhaust Gas Recirculation Valve Current High or Grounded Circuit	Contact Servicing Dealer
	07.....	Exhaust Gas Recirculation Valve Not Responding or Out of Adjustment	Contact Servicing Dealer
	13.....	Exhaust Gas Recirculation Valve Out of Calibration	Contact Servicing Dealer
	14.....	Exhaust Gas Recirculation Valve Off	Contact Servicing Dealer
	31.....	Exhaust Gas Recirculation Valve Position Error	Contact Servicing Dealer
	07.....	Turbocharger Actuator Not Responding or Out Of Adjustment	Contact Servicing Dealer
0027 95	12.....	Turbocharger Actuator Bad Intelligent Device Or Component ..	Contact Servicing Dealer

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SPN	FMI	Description of Fault	Corrective Action
5232 22	03.....	Sensor Supply Voltage #5 Out of Range High	Contact Servicing Dealer
	04.....	Sensor Supply Voltage #5 Out of Range Low	Contact Servicing Dealer
5232 29	03.....	Sensor Supply Voltage #4 Out of Range High	Contact Servicing Dealer
	04.....	Sensor Supply Voltage #4 Out of Range Low	Contact Servicing Dealer

Fault Code Listing in Ascending SPN/FMI Codes

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Intermittent Fault Diagnostics (With Electronic Controls)

Intermittent faults are problems that periodically “go away”. A problem such as a terminal that intermittently doesn't make contact can cause an intermittent fault. Other intermittent may be set only under certain operating conditions such as heavy load, extended idle, etc. When diagnosing intermittent faults, take special note of the condition of wiring and connectors, since a high percentage of intermittent problems originate 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 connectors, poorly positioned terminals, damaged connectors and corroded or damaged splices and terminals. Look for broken wires, damaged splices, and wire-to-wire shorts. Use good judgement 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 faults:

- If the problem is intermittent, try to reproduce the operating conditions that were present when the diagnostic trouble code (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 faults:

- Faulty connection between sensor or actuator harness.
- Faulty contact between terminals in connector.
- Faulty terminal/wire connection.
- Electromagnetic interference (EMI) from an improperly installed 2-way radio, etc., can cause faulty signals to be sent to the ECU.

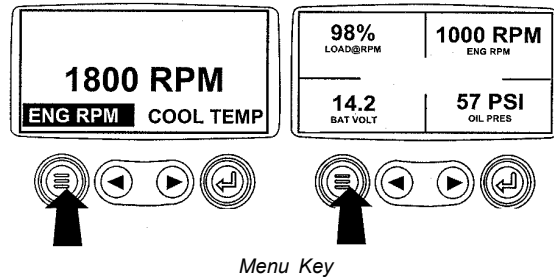
NOTE: Refer to wiring diagrams earlier in this section as a guide to connection and wiring.

OUOD007,0000036 -19-27JUL06-1/1

Displaying Diagnostic Gauge Software

NOTE: The following steps can be used to display the software version of the diagnostic gauge if needed by your dealer for troubleshooting. This is a read only function.

1. Starting at the single or four engine parameter display, press the "Menu" key.

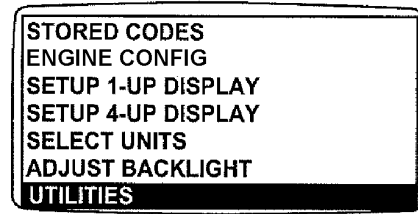


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OURGP12,000009F -19-28SEP04-1/4

RG13159 —UN—26SEP03

- The main menu will be displayed. Use the "Arrow" key to scroll through the menu until "Utilities" is highlighted.

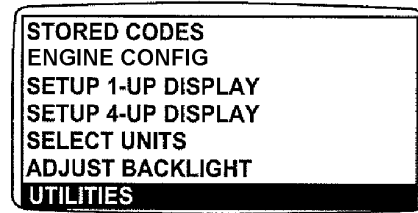


Select Utilities

OURGP12.000009F -19-28SEP04-2/4

RG13234 —UN—22OCT03

- Once "Utilities" is highlighted, press "Enter" to activate the utilities function.

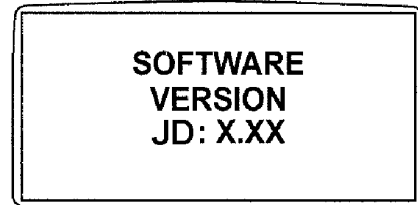


Select Utilities

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RG13237 —UN—22OCT03

- Scroll to the "Software Version". Press "Enter" to view the software version. Press the menu button twice to return to the main menu.



Software Version

OURGP12.000009F -19-28SEP04-4/4

RG13236 —UN—13OCT03

Engine Troubleshooting

NOTE: Before troubleshooting the engine, first retrieve any fault codes on the diagnostic gauge display

and perform the corrective actions. (See earlier in this section.) If any problems remain, use the following charts to solve engine problems.

Symptom	Problem	Solution
Engine cranks but will not start	Incorrect starting procedure.	Verify correct starting procedure.
	No fuel.	Check fuel in tank.
	Fuel filter plugged or full of water.	Replace fuel filter or drain water from filter.
	Exhaust restricted.	Check and correct exhaust restriction.
	Injection pump not getting fuel or air in fuel system.	Check fuel flow at supply pump or bleed fuel system.
	Faulty injection pump or nozzles.	Consult authorized diesel repair station for repair or replacement.
Engine hard to start or will not start	Engine starting under load.	Disengage PTO.
	Improper starting procedure.	Review starting procedure.
	No fuel.	Check fuel tank.
	Air in fuel line.	Bleed fuel line.
	Cold weather.	Use cold weather starting aids.
	Slow starter speed.	See "Starter Cranks Slowly".
	Crankcase oil too heavy.	Use oil of proper viscosity.
	Improper type of fuel.	Consult fuel supplier; use proper type fuel for operating conditions.
	Water, dirt, or air in fuel system.	Drain, flush, fill, and bleed system.
	Clogged fuel filter.	Replace filter element.
	Dirty or faulty injection nozzles.	Have authorized servicing dealer or engine distributor check injectors.
	Defective glow plugs (Cold weather starting)	Test glow plugs (See 3000 hour/36 month maintenance section)

Continued on next page

OURGP12,00000F7 -19-02MAR16-1/7

Symptom	Problem	Solution
Engine knocks	Electronic fuel system problem (if equipped)	See your John Deere distributor or servicing dealer.
	Low engine oil level.	Add oil to engine crankcase.
	Low coolant temperature.	Remove and check thermostat.
	Engine overheating.	See "Engine Overheats".
Abnormal Engine Noise	Engine cold	Wrong or defective thermostat. Remove and check thermostat.
	Turbocharger bearings not lubricated (insufficient oil pressure)	Determine cause of lack of lubrication; repair as required. See your John Deere engine distributor or servicing dealer.
	Worn timing gears or excess backlash	Check timing gear back lash. See your John Deere engine distributor or servicing dealer.
	Excessive valve clearance	Check and adjust valve clearance. See CHECKING AND ADJUSTING VALVE CLEARANCE in the "Lubrication and Maintenance/3000 Hour/36 Month" section earlier in this manual.
	Worn main or connecting rod bearings	Determine bearing clearance. See your John Deere engine distributor or servicing dealer.
	Excessive crankshaft end play	Check crankshaft end play. See your John Deere engine distributor or servicing dealer.
	Loose main bearing caps	Check bearing clearance; replace bearings and bearing cap screws as required. See your John Deere engine distributor or servicing dealer.
	Worn connecting rod bushings and piston pins	Inspect piston pins and bushings. See your John Deere engine distributor or servicing dealer.
	Scored pistons	Inspect pistons. See your John Deere engine distributor or servicing dealer.

Continued on next page

OURGP12.00000F7 -19-02MAR16-2/7

Troubleshooting

Symptom	Problem	Solution
Engine runs irregularly or stalls frequently	Worn camshaft lobes	Inspect camshaft. See your John Deere engine distributor or servicing dealer.
	Worn rocker arm shaft(s)	Inspect rocker arm shafts. See your John Deere engine distributor or servicing dealer.
	Clogged fuel filter.	Replace fuel filter element.
	Water, dirt, or air in fuel system.	Drain, flush, fill, and bleed system.
	Low coolant temperature.	Remove and check thermostat.
Below normal engine temperature	Dirty or faulty injection nozzles.	Have authorized servicing dealer or engine distributor check injectors.
	Electronic fuel system problem	See your John Deere distributor or servicing dealer.
	Defective thermostat.	Remove and check thermostat.
Lack of power	Defective temperature gauge or sender.	Check gauge, sender, and connections.
	Poor quality fuel	Change to better quality fuel.
	Engine overloaded.	Reduce load.
	Intake air restriction.	Service air cleaner.
	Clogged fuel filter.	Replace filter elements.
	Improper type of fuel.	Use proper fuel.
	Overheated engine.	See "Engine Overheats".
	Below normal engine temperature.	Remove and check thermostat.
	Improper valve clearance.	See your authorized servicing dealer or engine distributor.
	Dirty or faulty injection nozzles.	Have authorized servicing dealer or engine distributor check injectors.
	Injection pump out of time.	See your authorized servicing dealer or engine distributor.

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OURGP12,00000F7 -19-02MAR16-3/7

Symptom	Problem	Solution
	Electronic fuel system problem	See your John Deere distributor or servicing dealer.
	Turbocharger not functioning.	See your authorized servicing dealer or engine distributor.
	Leaking exhaust manifold gasket.	See your authorized servicing dealer or engine distributor.
	Restricted fuel hose.	Clean or replace fuel hose.
	Low fast idle speed.	See your authorized servicing dealer or engine distributor.
Low oil pressure	Low oil level.	Add oil.
	Restricted crankcase vent tube.	Clean vent tube, verify crankcase oil level is not too high.
	Improper type of oil.	Drain, fill crankcase with oil of proper viscosity and quality.
High oil consumption	Crankcase oil too light.	Use proper viscosity oil.
	Oil leaks.	Check for leaks in lines, gaskets, and drain plug.
	Restricted crankcase vent tube.	Clean vent tube, verify crankcase oil level is not too high.
	Defective turbocharger.	See your authorized servicing dealer or engine distributor.
Engine emits white smoke	Improper type of fuel.	Use proper fuel.
	Low engine temperature.	Warm up engine to normal operating temperature.
	Defective thermostat.	Remove and check thermostat.
	Defective injection nozzles.	See your authorized servicing dealer or engine distributor.
	Defective glow plugs.	Test glow plugs. (See 3000 hour/36 month maintenance section.)
Engine emits black or gray exhaust smoke	Improper type of fuel.	Use proper fuel.

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OURGP12.00000F7 -19-02MAR16-4/7

Troubleshooting

Symptom	Problem	Solution
	Clogged or dirty air cleaner.	Service air cleaner.
	Engine overloaded.	Reduce load.
	Injection nozzles dirty.	See your authorized servicing dealer or engine distributor.
	Electronic fuel system problem	See your authorized servicing dealer or engine distributor.
	Turbocharger not functioning.	See your authorized servicing dealer or engine distributor.
Engine overheats	Coolant stays at high temperature	Check for debris in front of cooling package
	Engine overloaded.	Reduce load.
	Low coolant level.	Fill radiator to proper level, check radiator and hoses for loose connections or leaks.
	Faulty radiator cap.	Have technician check.
	Stretched poly-vee belt or defective belt tensioner.	Check automatic belt tensioner and check belts for stretching. Replace as required.
	Low engine oil level.	Check oil level. Add oil as required.
	Cooling system needs flushing.	Flush cooling system.
	Defective thermostat.	Remove and check thermostat.
	Defective temperature gauge or sender.	Check coolant temperature with thermometer and replace, if necessary.
	Incorrect grade of fuel.	Use correct grade of fuel.
High fuel consumption	Improper type of fuel.	Use proper type of fuel.
	Clogged or dirty air cleaner.	Service air cleaner.
	Engine overloaded.	Reduce load.
	Improper valve clearance.	See your authorized servicing dealer or engine distributor.

Continued on next page

OURGP12,00000F7 -19-02MAR16-5/7

Symptom	Problem	Solution
	Injection nozzles dirty.	See your authorized servicing dealer or engine distributor.
	Electronic fuel system problem	See your authorized servicing dealer or engine distributor.
	Defective turbocharger.	See your authorized servicing dealer or engine distributor.
	Low engine temperature.	Check thermostat.
Undercharged electrical system	Excessive electrical load from added accessories.	Remove accessories or install higher output alternator.
	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.
	Defective battery.	Test battery.
Battery uses too much water	Defective alternator.	Test charging system.
	Cracked battery case.	Check for moisture and replace as necessary.
	Defective battery.	Test battery.
	Battery charging rate too high.	Test charging system.
Batteries will not charge	Loose or corroded connections.	Clean and tighten connections.
	Sulfated or worn-out batteries.	See your authorized servicing dealer or engine distributor.
	Stretched poly-vee belt or defective belt tensioner.	Adjust belt tension or replace belts.
Starter will not crank	PTO engaged (if equipped).	Disengage PTO.
	Loose or corroded connections.	Clean and tighten loose connections.
	Low battery output voltage.	See your authorized servicing dealer or engine distributor.
	Faulty start circuit relay.	See your authorized servicing dealer or engine distributor.

Continued on next page

OURGP12,00000F7 -19-02MAR16-6/7

Troubleshooting

Symptom	Problem	Solution
Starter cranks slowly	Blown main system fuse.	Replace fuse.
	Low battery output.	See your authorized servicing dealer or engine distributor.
	Crankcase oil too heavy.	Use proper viscosity oil.
	Loose or corroded connections.	Clean and tighten loose connections.
Starter and hour meter functions; rest of electrical system does not function	Blown fuse.	Replace fuse.
Entire electrical system does not function	Faulty battery connection.	Clean and tighten connections.
	Sulfated or worn-out batteries.	See your authorized servicing dealer or engine distributor.
	Blown main system fuse.	Replace fuse.

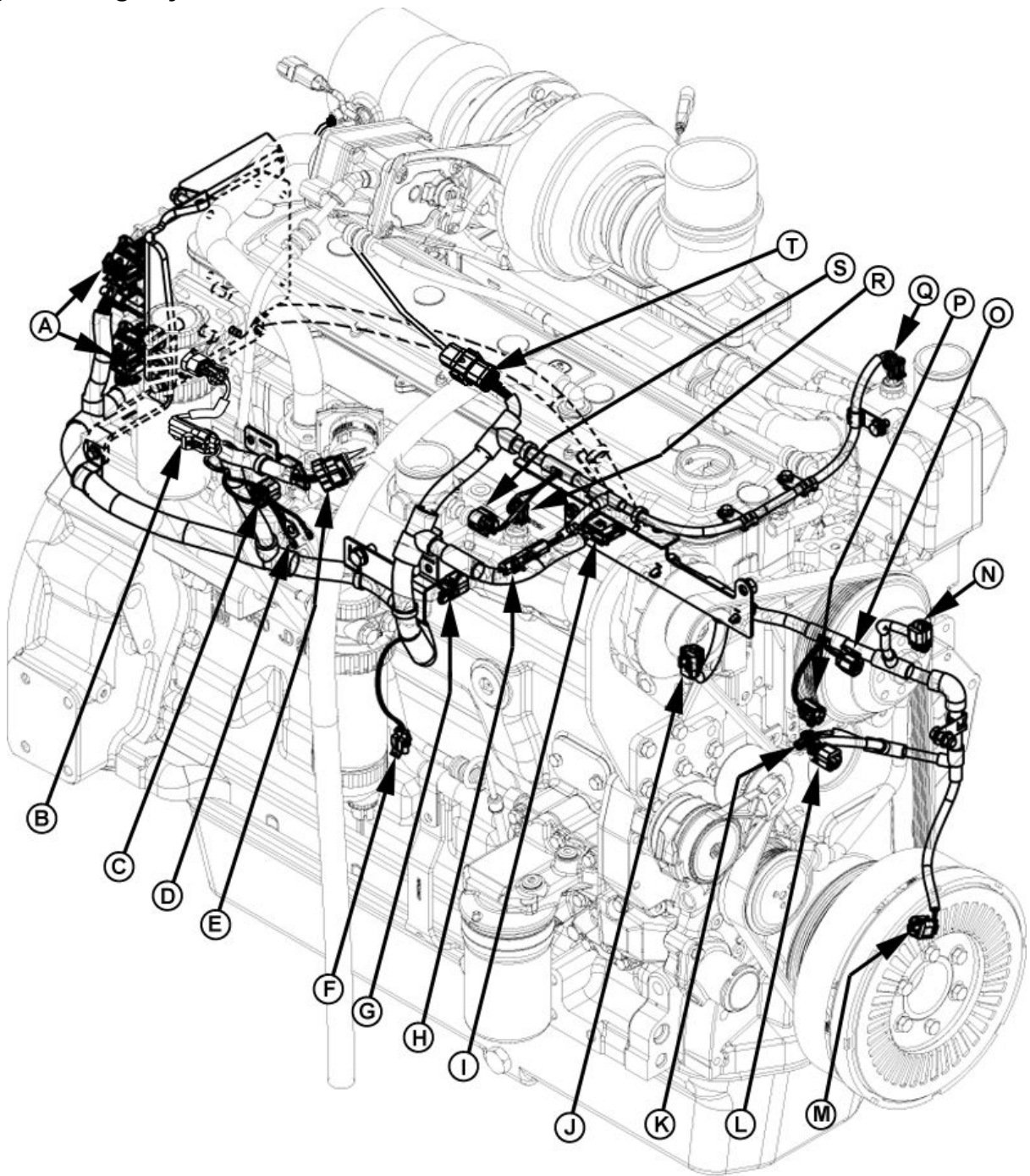
OURGP12,00000F7 -19-02MAR16-7/7

Precautions for Electrical System When Steam Cleaning Engine

IMPORTANT: Do not steam clean any electrical or electronic components while steam cleaning the engine as it could damage sensitive parts.

OURGP11,000012A -19-24AUG10-1/1

Engine Wiring Layout



Engine Wiring Layout

RG13862 — UN — 25 JAN 05

Continued on next page

OURGP12.0000099 -19-28SEP04-1/2

A—Engine Control Unit (ECU) Connector	F—Water-In-Fuel Sensor Connector	L—Camshaft Position Sensor Connector	R—Manifold Air Pressure Sensor Connector
B—Fuel Pressure Sensor Jumper Connector	G—Exhaust Gas Recirculation (EGR) Mixed Air Temperature Sensor Connector	M—Crankshaft Speed Sensor Connector	S—Exhaust Gas Recirculation (EGR) Fresh Air Sensor Connector
C—Exhaust Gas Recirculation (EGR) Exhaust Temperature Sensor Connector	H—Alternator Excitation Connector	N—Coolant Temperature Sensor Connector	T—Turbocharger Sensor Jumper Connector
D—Glow Plug Relay Connectors (3)	I—Fuel Injector Connector	O—Pump Control Valve Connector	
E—Exhaust Gas Recirculation (EGR) Valve Sensor Connector	J—Rail Pressure Sensor Connector	P—Fuel Temperature Sensor Connector	
	K—Oil Pressure Sensor Connector	Q—Exhaust Pressure Sensor Connector	

OURGP12,0000099 -19-28SEP04-2/2

Precautions For Welding

IMPORTANT: Welding on an engine is not recommended. If welding must be performed, follow the following precautions.

IMPORTANT: ALWAYS disconnect Engine Control Unit (ECU) connectors and battery before welding on engine or machine. High currents or electro-static discharge in electronic components from welding may cause permanent damage. Remove battery or flammable liquid lines if welding near those items.

1. Disconnect connectors from ECU.
2. Disconnect battery cables from battery.
3. If necessary, disconnect flammable liquid lines or battery.
4. Connect welder ground to same engine component as the welding point and be sure ECU or other electronic components are not in ground path.

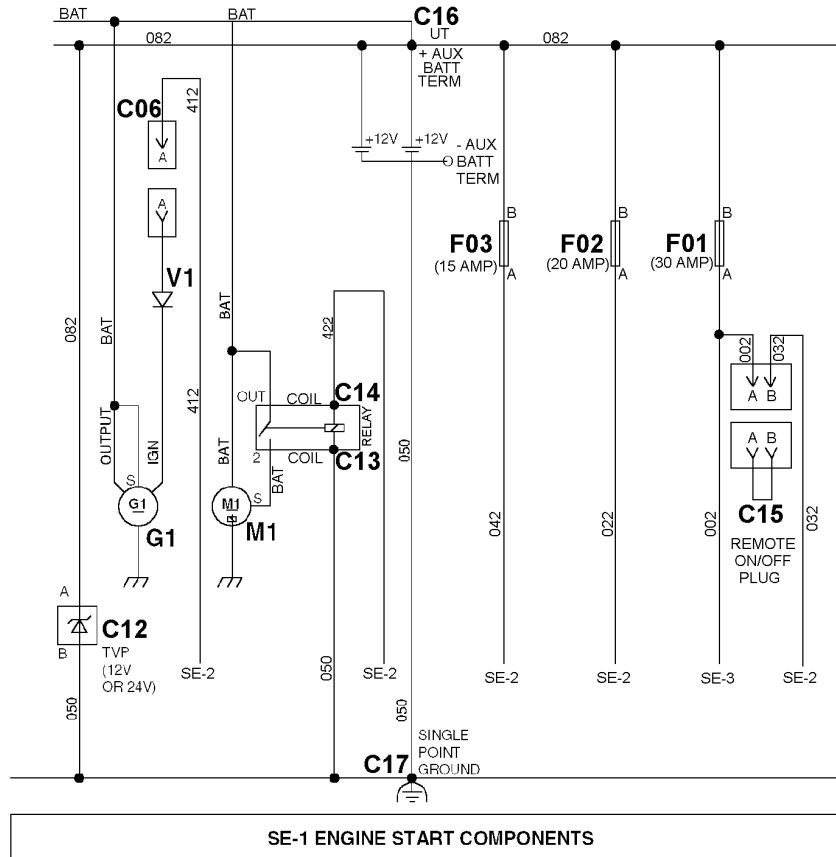


5. Never connect welder ground to crankshaft damper or pulley, engine flywheel, or any driveline components. Be sure that engine bearings are not in ground path, as this can create bearing damage.

TS953 —UN—15MAY90

OUD002,000016B -19-01SEP10-1/1

Engine Wiring Diagram (Engines With Full-Featured Instrument Panel)

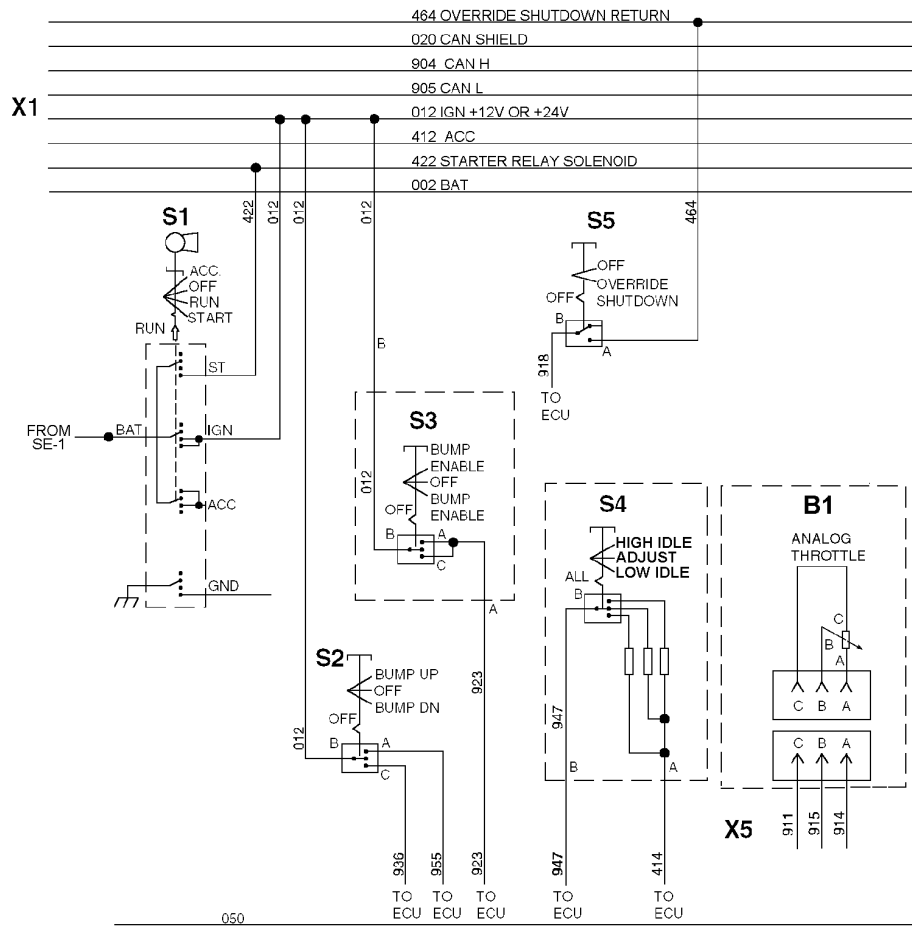


- | | | | |
|-----------------------------------|---------------------------------|------------------------------------|-----------------------------------------|
| B1—Analog Throttle | F01— Fuse (30 Amp)(System) | P4—Coolant Temperature Gauge | S4—High-Low Speed Select Switch |
| C06— Alternator Harness Connector | F02— Fuse (20 Amp)(ECU) | P5— Tachometer Display | S5—Override Shutdown Switch (Momentary) |
| C12— Transient Voltage Protector | F03— Fuse (15 Amp)(Fuel Filter) | P6—Hour Meter/Diagnostic Gauge | V1— Diode |
| C13— Starter Relay | G1—Alternator | S1—Ignition Key Switch | X1— Vehicle Harness Connector |
| C14— Starter Relay | M1—Starter Motor | S2—Speed Select Switch (Momentary) | X4— CAN Terminator |
| C15— Remote On/Off | P1—Optional Gauge | S3—Bump Enable Switch (Momentary) | X5—Analog Throttle Connector |
| C16— Battery | P2—Optional Gauge | | |
| C17— Single Point Ground | P3—Oil Pressure Gauge | | |

OURGP12,00000EC -19-12SEP06-1/1

RG13874—JUN—08APR05

Engine Wiring Diagram (Engines With Full-Featured Instrument Panel) (Continued)



SE-2 INSTRUMENT PANEL (CONTINUED NEXT PAGE)

B1—Analog Throttle
C06— Alternator Harness Connector
C12— Transient Voltage Protector
C13— Starter Relay
C14— Starter Relay
C15— Remote On/Off
C16— Battery
C17— Single Point Ground

F01— Fuse (30 Amp)(System)
F02— Fuse (20 Amp)(ECU)
F03— Fuse (15 Amp)(Fuel Filter)
G1—Alternator
M1—Starter Motor
P1— Optional Gauge
P2— Optional Gauge
P3— Oil Pressure Gauge

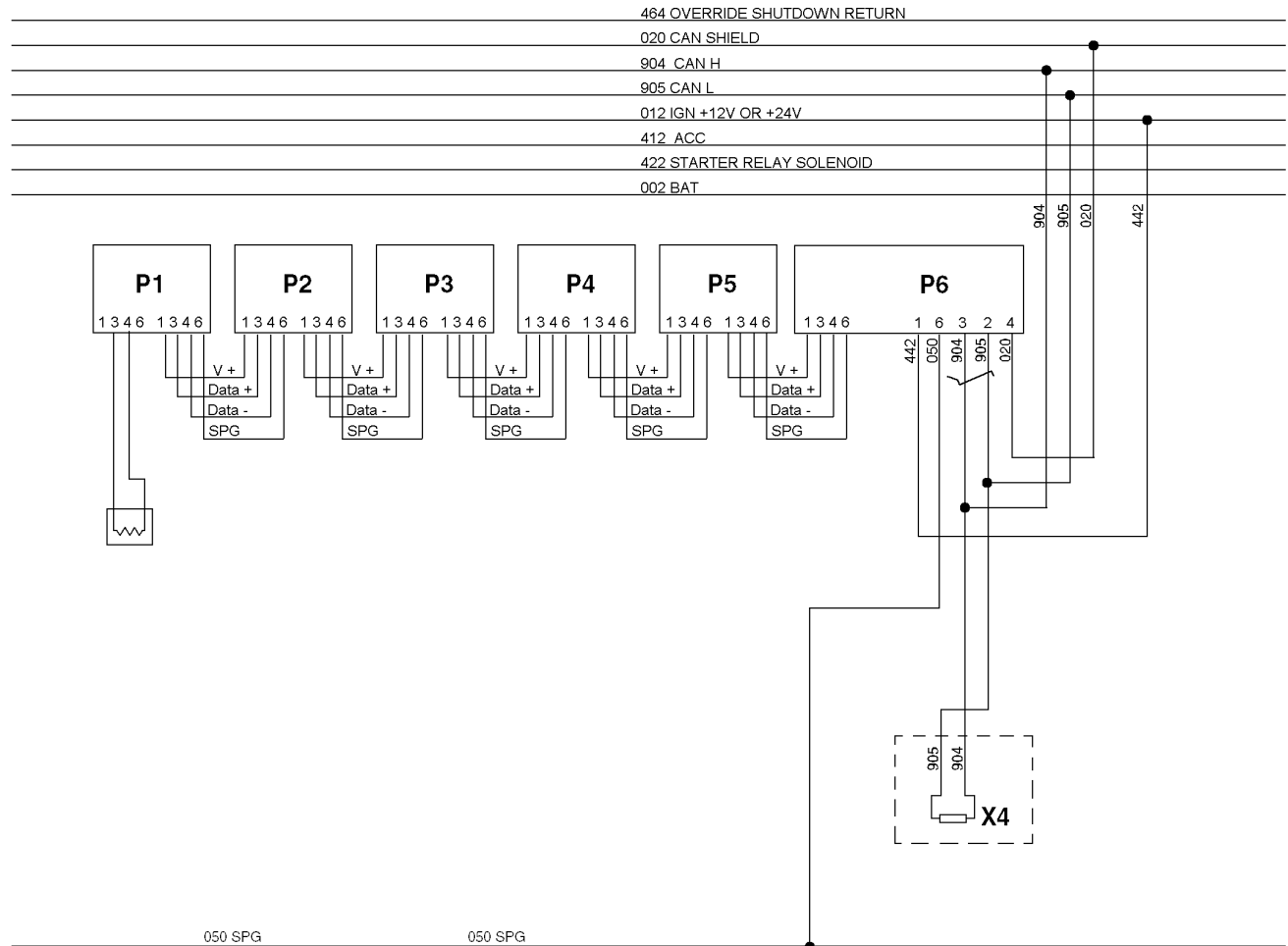
P4— Coolant Temperature Gauge
P5— Tachometer Display
P6— Hour Meter/Diagnostic Gauge
S1— Ignition Key Switch
S2— Speed Select Switch (Momentary)
S3— Bump Enable Switch (Momentary)

S4— High-Low Speed Select Switch
S5— Override Shutdown Switch (Momentary)
V1— Diode
X1— Vehicle Harness Connector
X4— CAN Terminator
X5— Analog Throttle Connector

OURGP12,00000ED -19-08APR05-1/1

RG13873—UN—08APR05

Engine Wiring Diagram (Engines With Full-Featured Instrument Panel) (Continued)



SE-2 INSTRUMENT PANEL (CONTINUED)

- | | | | |
|-----------------------------------|---------------------------------|------------------------------------|-----------------------------------------|
| B1—Analog Throttle | F01— Fuse (30 Amp)(System) | P4—Coolant Temperature Gauge | S4—High-Low Speed Select Switch |
| C06— Alternator Harness Connector | F02— Fuse (20 Amp)(ECU) | P5—Tachometer Display | S5—Override Shutdown Switch (Momentary) |
| C12— Transient Voltage Protector | F03— Fuse (15 Amp)(Fuel Filter) | P6—Hour Meter/Diagnostic Gauge | V1—Diode |
| C13— Starter Relay | G1—Alternator | S1—Ignition Key Switch | X1—Vehicle Harness Connector |
| C14— Starter Relay | M1—Starter Motor | S2—Speed Select Switch (Momentary) | X4—CAN Terminator |
| C15— Remote On/Off | P1—Optional Gauge | S3—Bump Enable Switch (Momentary) | X5—Analog Throttle Connector |
| C16— Battery | P2—Optional Gauge | | |
| C17— Single Point Ground | P3—Oil Pressure Gauge | | |

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RG13272 —UN—26JAN04

Storage

Engine Storage Guidelines

IMPORTANT: 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 more than six months **must** have long-term storage preparation. See Preparing Engine for Long-Term Storage in the Storage Section.

OURGP12,00000DF -19-04FEB15-1/1

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.

See your authorized dealer for the proper procedure for your application.

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

OUOD006,00000FC -19-23MAR22-1/2

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. Clean the exterior of the engine with salt-free water and touch up any scratched or chipped painted surfaces with a good quality paint.
12. Coat all exposed bare metal surfaces with grease or corrosion inhibitor if not feasible to paint.
13. Seal all openings on engine with plastic bags and tape.
14. 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.

OUOD006,00000FC -19-23MAR22-2/2

Removing Engine from Long Term Storage

Refer to the appropriate section for detailed services listed below or have your authorized servicing dealer or engine distributor perform services that you may not be familiar with.

1. Remove all protective coverings from engine. Unseal all openings in engine and remove covering from electrical systems.
2. Remove the batteries from storage. Install batteries (fully charged) and connect the terminals.
3. Install fan/alternator poly-vee belt if removed.
4. Fill fuel tank.
5. Perform all appropriate prestarting checks. (See DAILY PRESTARTING CHECKS in Lubrication and Maintenance/Daily Section.)

IMPORTANT: DO NOT operate starter more than 30 seconds at a time. Wait at least 2 minutes for starter to cool before trying again.

6. 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.
7. Start engine and run at low idle and no load for several minutes. Warm up carefully and check all gauges before placing engine under load.
8. On the first day of operation after storage, check overall engine for leaks and check all gauges for correct operation.

NOTE: If using BIODIESEL blends after long term storage, frequency of fuel filter plugging may increase initially.

OUOD006,00000FD -19-02OCT07-1/1

Specifications

General OEM Engine Specifications

ITEM	4045 (4.5L)	6068 (6.8L)
Number of Cylinders	4	6
Bore	106 mm (4.19 in.)	106 mm (4.19 in.)
Stroke	127 mm (5.0 in.)	127 mm (5.0 in.)
Displacement	4.5 L (276 cu in.)	6.8 L (414 cu in.)
Compression Ratio	17.0:1	17.0:1
Aspiration	Air-To-Air Intercooled, Turbocharged	Air-To-Air Intercooled, Turbocharged
Engine Firing Order	1-3-4-2	1-5-3-6-2-4
Valves Per Cylinder	2 Intake 2 Exhaust	2 Intake 2 Exhaust
Valve Clearance (Cold)		
Intake Valves	0.36 mm (0.014 in.)	0.36 mm (0.014 in.)
Exhaust Valves	0.46 mm (0.018 in.)	0.46 mm (0.018 in.)
Max. Crank Pressure	0.5 kPa (2 H ₂ O)	0.5 kPa (2 H ₂ O)
Vibration Damper Maximum Radial Runout	1.50 mm (0.060 in.)	1.50 mm (0.060 in.)
Battery Capacities (CCA)		
12-Volt System	800	800
24-Volt System	570	570
Governor Regulation (Industrial)	7—10 %	7—10 %
Governor Regulation (Generator)	5%	5%
Thermostat Start To Open Temperature	82°C (180°F)	82°C (180°F)
Thermostat Fully Open Temperature	94°C (202°F)	94°C (202°F)
Coolant Capacity ^a	8.5 L (9 qt)	11.8 L (12.5 qt)
Recommended Radiator Pressure Cap	100 kPa (14.5 psi)	100 kPa (14.5 psi)
Crankcase Oil Fill Capacity	See "Engine Crankcase Oil Fill Quantities" later in this section.	
Oil Pressure At Rated Speed, Full Load With Oil Warmed to 105°C (220°F)	345 ± 103 kPa (3.45 ± 1.03 bar) (50 ± 15 psi)	345 ± 103 kPa (3.45 ± 1.03 bar) (50 ± 15 psi)
Oil Pressure At Low Idle (Minimum)	105 kPa (15 psi)	105 kPa (15 psi)
Length	860 mm (33.9 in.)	1165 mm (45.9 in.)
Width	612 mm (24.1 in.)	597 mm (23.5 in.)
Height	994 mm (39.1 in.)	1046 mm (41.2 in.)
Weight	451 kg (993 lb)	678 kg (1495 lb)

^aCoolant capacity may vary with different engine applications.

OURGP11.0000064 -19-07MAY08-1/1

Engine Power Ratings And Fuel System Specifications

NOTE: Power ratings are for bare engines without drag effect of cooling fan or accessories like air compressors.

NOTE: Engine speeds listed are preset to factory specification. Slow idle speed may be reset 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.

Engine Model	Fuel System Option Codes	Electronic Software Option Codes	System Voltage	Power Rating @ Rated Speed kW (hp)	Rated Speed (rpm)	Slow Idle (rpm)	Fast Idle (rpm)
4045 (4.5 L) (4-Valve Head)	169D	72LN	12V	111 (149)	2000	800	2200
	169D	72LP	24V	111 (149)	2000	800	2200
	169D	72LL	12V	115 (154)	2200	800	2400
	169D	72LM	24V	115 (154)	2200	800	2400
	169D	72LJ	12V	115 (154)	2400	800	2600
	169D	72LK	24V	115 (154)	2400	800	2600
	169D	72LG	12V	129 (173)	2400	800	2600
	169D	72LH	24V	129 (173)	2400	800	2600
	169D	72LQ	12V	147 (197)	1800	1400	1870
	169D	72LR	24V	147 (197)	1800	1400	1870
	16P2	72WL	24V	129 (173)	2400	800	2600
	16P2	72GC	24V	129 (173)	2400	800	2600
	16P2	72GH	24V	116 (156)	2400	800	2600
	16P2	72GJ	24V	116 (156)	2200	800	2400
	16P2	72GK	24V	111 (149)	2000	800	2200
	16P2	72GL (Dual Frequency)	24V	147 (197); 103 (138)	1800; 1500	1400	1870
	16W3	7253	12V	101 (135)	2100	800	2600
6068 (6.8 L) 4-Valve Head)	167W	72JJ	12V	134 (180)	2200	800	2400
	167W	72JK	24V	134 (180)	2200	800	2400
	167W	72JC	12V	138 (185)	2400	800	2600
	167W	72JD	24V	138 (185)	2400	800	2600
	167W	72JE	12V	138 (185)	2200	800	2400
	167W	72JF	24V	138 (185)	2200	800	2400
	167W	72JG	12V	138 (185)	2200	800	2400
	167W	72JH	24V	138 (185)	2200	800	2400
	167W	72HY	12V	144 (193)	2000	800	2100
	167W	72HZ	24V	144 (193)	2000	800	2100
	167W	72JA	12V	144 (193)	2000	800	2100
	167W	72JB	24V	144 (193)	2000	800	2100
	167W	72HS	12V	149 (200)	2400	800	2600
	167W	72HT	24V	149 (200)	2400	800	2600
	167W	72HU	12V	149 (200)	2200	800	2400

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BK34394.0000128 -19-12FEB14-1/3

Specifications

Engine Model	Fuel System Option Codes	Electronic Software Option Codes	System Voltage	Power Rating @ Rated Speed kW (hp)	Rated Speed (rpm)	Slow Idle (rpm)	Fast Idle (rpm)
	167W	72HV.....	24V.....	149 (200).....	2200	800	2400
	167W	72HW.....	12V.....	149 (200).....	2200	800	2400
	167W	72HX.....	24V.....	149 (200).....	2200	800	2400
	167W	72HN	12V.....	162 (217).....	2000	800	2100
	167W	72HP.....	24V.....	162 (217).....	2000	800	2100
	167W	72HQ	12V.....	162 (217).....	2000	800	2100
	167W	72HR	24V.....	162 (217).....	2000	800	2100
	167W	72HG	12V.....	168 (225).....	2400	800	2600
	167W	72HH	24V.....	168 (225).....	2400	800	2600
	167W	72HJ	12V.....	168 (225).....	2200	800	2400
	167W	72HK.....	24V.....	168 (225).....	2200	800	2400
	167W	72HL	12V.....	168 (225).....	2200	800	2400
	167W	72HM	24V.....	168 (225).....	2200	800	2400
	167W	72HE.....	12V.....	181 (243).....	2000	800	2100
	167W	72HF.....	24V.....	181 (243).....	2000	800	2100
	167W	72HA.....	12V.....	187 (250).....	2400	800	2600
	167W	72HB.....	24V.....	187 (250).....	2400	800	2600
	167W	72HC	12V.....	187 (250).....	2200	800	2400
	167W	72HD	24V.....	187 (250).....	2200	800	2400
	167W	72GY	12V.....	205 (275).....	2400	800	2600
	167W	72GZ.....	24V.....	205 (275).....	2400	800	2600
	167W	72SZ	12V.....	212 (284).....	1800	1400	1870
	167W	72TA	24V.....	212 (284).....	1800	1400	1870
	167W	72JL	12V.....	235 (315).....	1800	1400	1870
	167W	72JM.....	24V.....	235 (315).....	1800	1400	1870
	16R2	72GM	24V.....	205 (275).....	200.....	800	2600
	16R2	72GR	24V.....	187 (251).....	200.....	800	2600
	16R2	72GS	24V.....	187 (251).....	200.....	800	2400
	16R2	72GV	24V.....	181 (243).....	200.....	800	2200
	16R2	72GX	24V.....	168 (226).....	200.....	800	2600
	16R2	72KR.....	24V.....	168 (226).....	200.....	800	2400
	16R2	72KT	24V.....	168 (226).....	200.....	800	2400
	16R2	72KX.....	24V.....	162 (217).....	200.....	800	2400
	16R2	72LA	24V.....	162 (217).....	200.....	800	2200
	16R2	72LD	24V.....	149 (200).....	200.....	800	2600
	16R2	72LE	24V.....	149 (200).....	200.....	800	2400
	16R2	72LF	24V.....	149 (200).....	200.....	800	2400
	16R2	72NL	24V.....	144 (200).....	200.....	800	2200
	16R2	72PK.....	24V.....	144 (200).....	200.....	800	2200
	16R2	72PL	24V.....	138 (185).....	200.....	800	2600

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BK34394.0000128 - 19-12FEB14-2

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BK34394,0000128 -19-12FEB14-2/3

Specifications

Engine Model	Fuel System Option Codes	Electronic Software Option Codes	System Voltage	Power Rating @ Rated Speed kW (hp)	Rated Speed (rpm)	Slow Idle (rpm)	Fast Idle (rpm)
	16R2	72PM	24V	138 (185).....	200.....	800	2400
	16R2	72PN.....	24V	138 (185).....	200.....	800	2400
	16R2	72PR.....	24V	134 (180).....	200.....	800	2200
	16R2	72PW (Dual Frequency)	24V	235 (315); 205 (275).....	1800; 1500	1400	1870
	16S4	72VG	24V	129 (173).....	2250	800	2400

BK34394,0000128 -19-12FEB14-3/3

Engine Crankcase Oil Fill Quantities

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 option group. The last two digits of each code identify the specific oil pan on your engine.

The following table lists engine crankcase oil fill quantities:

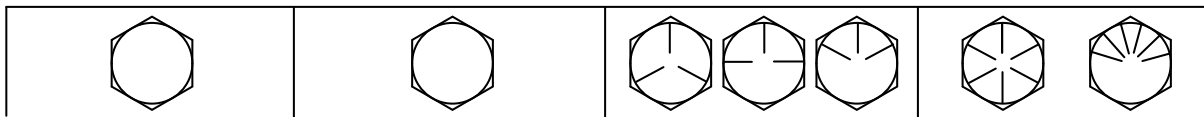
Engine Model	Oil Pan Option Code(s)	Crankcase Oil Capacity L (qt)
4045 (4.5 L)	1903	13.0 (13.7)
	1923	15.0 (15.8)
	1949	12.0 (12.7)
	1972	14.0 (14.8)
	1976	20.5 (21.6)
	19AB	16.0 (16.9)
	19AE	14.7 (15.5)
	19AZ	20.5 (21.6)
	19BA	15.0 (15.8)
	19BB	13.0 (13.7)
	19BC	14.7 (15.5)
	19CX	21.0 (22.2)
6068 (6.8 L)	1907	19.5 (20.6)
	1908	19.0 (20.1)
	1909	19.0 (20.1)
	1924	24.2 (25.6)
	1961	33.0 (34.9)
	1968	33.0 (34.9)
	19AC	28.0 (29.6)
	19AQ	19.5 (20.6)
	19AS	19.0 (20.1)
	19AT	19.0 (20.1)
	19AU	33.0 (34.9)
	19AV	28.0 (29.6)
	19CM	32.0 (33.8)
	19CN	32.0 (33.8)
	19CP	32.0 (33.8)
	19CQ	27.0 (28.5)

NOTE: Crankcase oil capacity may vary slightly from amount shown. ALWAYS fill crankcase to within crosshatch on dipstick. DO NOT overfill.

JR74534,0000378 -19-16JUL15-1/1

Unified Inch Bolt and Screw Torque Values

TS1671 —UN—01MAY03



Bolt or Screw	SAE Grade 1				SAE Grade 2 ^a				SAE Grade 5, 5.1 or 5.2				SAE Grade 8 or 8.2			
	Lubricated ^b		Dry ^c		Lubricated ^b		Dry ^c		Lubricated ^b		Dry ^c		Lubricated ^b		Dry ^c	
Size	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	3.7	33	4.7	42	6	53	7.5	66	9.5	84	12	106	13.5	120	17	150
5/16	7.7	68	9.8	86	12	106	15.5	137	19.5	172	25	221	28	20.5	35	26
3/8	13.5	120	17.5	155	22	194	27	240	35	26	44	32.5	49	36	63	46
7/16	22	194	28	20.5	35	26	44	32.5	56	41	70	52	80	59	100	74
1/2	34	25	42	31	53	39	67	49	85	63	110	80	120	88	155	115
9/16	48	35.5	60	45	76	56	95	70	125	92	155	115	175	130	220	165
5/8	67	49	85	63	105	77	135	100	170	125	215	160	240	175	305	225
3/4	120	88	150	110	190	140	240	175	300	220	380	280	425	315	540	400
7/8	190	140	240	175	190	140	240	175	490	360	615	455	690	510	870	640
1	285	210	360	265	285	210	360	265	730	540	920	680	1030	760	1300	960
1-1/8	400	300	510	375	400	300	510	375	910	670	1150	850	1450	1075	1850	1350
1-1/4	570	420	725	535	570	420	725	535	1280	945	1630	1200	2050	1500	2600	1920
1-3/8	750	550	950	700	750	550	950	700	1700	1250	2140	1580	2700	2000	3400	2500
1-1/2	990	730	1250	930	990	730	1250	930	2250	1650	2850	2100	3600	2650	4550	3350
Torque values listed are for general use only, based on the strength of the bolt or screw. DO NOT use these values if a different torque value or tightening procedure is given for a specific application. For plastic insert or crimped steel type lock nuts, for stainless steel fasteners, or for nuts on U-bolts, see the tightening instructions for the specific application. Shear bolts are designed to fail under predetermined loads. Always replace shear bolts with identical grade.									Replace fasteners with the same or higher grade. If higher grade fasteners are used, tighten these to the strength of the original. Make sure fastener threads are clean and that you properly start thread engagement. When possible, lubricate plain or zinc plated fasteners other than lock nuts, wheel bolts or wheel nuts, unless different instructions are given for the specific application.							

^aGrade 2 applies for hex cap screws (not hex bolts) up to 6 in. (152 mm) long. Grade 1 applies for hex cap screws over 6 in. (152 mm) long, and for all other types of bolts and screws of any length.

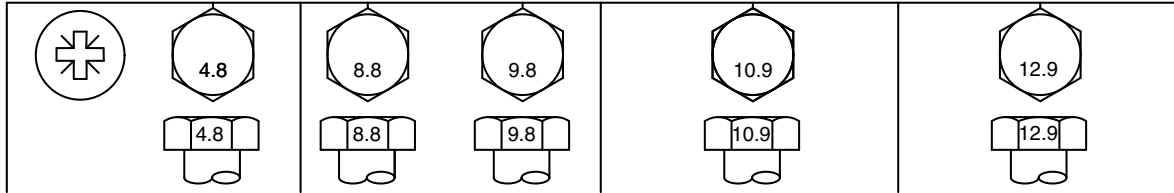
^b"Lubricated" means coated with a lubricant such as engine oil, fasteners with phosphate and oil coatings, or 7/8 in. and larger fasteners with JDM F13C zinc flake coating.

^c"Dry" means plain or zinc plated without any lubrication, or 1/4 to 3/4 in. fasteners with JDM F13B zinc flake coating.

TORQ1 -19-24AUG10-1/1

Metric Bolt and Screw Torque Values

TS1742 —UN—31MAY18



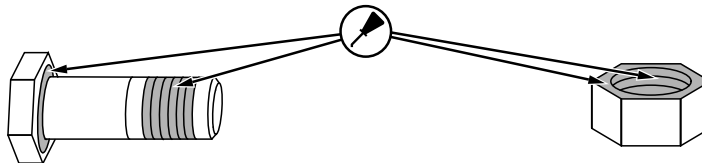
Bolt or Screw Size	Class 4.8				Class 8.8 or 9.8				Class 10.9				Class 12.9			
	Hex Head ^a		Flange Head ^b		Hex Head ^a		Flange Head ^b		Hex Head ^a		Flange Head ^b		Hex Head ^a		Flange Head ^b	
	N·m	lb·in	N·m	lb·in	N·m	lb·in	N·m	lb·in	N·m	lb·in	N·m	lb·in	N·m	lb·in	N·m	lb·in
M6	3.6	31.9	3.9	34.5	6.7	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 you operate your engine by regular observation of hour meter.
2. Check your record regularly to learn when your engine needs service.
3. DO ALL the services within an interval section. Write the number of hours (from your 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.

IMPORTANT: 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.

RG, RG34710, 5620 -19-24AUG10-1/1

Daily (Prestarting) Service

- Check engine oil level.
- Check coolant level.
- Check fuel filters/water bowls.

- Check air cleaner dust unloader valve and air restriction indicator, if equipped.
- Perform visual walkaround inspection.

RG, RG34710, 5621 -19-24AUG10-1/1

250 Hour/12 Month Service (Jet Fuel Capable Engines)

- Change engine oil and filter.¹
- Replace fuel filter elements.

- Replace dosing element

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¹Service intervals depend on sulfur content of the fuel, oil pan capacity, and the oil and filter used. (See ENGINE OIL AND FILTER SERVICE INTERVALS (JET FUEL CAPABLE ENGINES ONLY), in Fuels, Lubricants, and Coolant Section.)

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500 Hour/12 Month Service

- Service fire extinguisher.
- Check engine mounts.
- Service battery.
- Change engine oil and filter.¹
- Check crankcase vent system.
- Check air intake hoses, connections, and system.
- Replace fuel filter elements.
- Check automatic belt tensioner and belt wear.
- Check engine electrical ground connection.
- Check cooling system.
- Coolant solution analysis – add SCAs as needed.
- Pressure test cooling system.
- Check engine speeds.

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¹Service 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.)

OURGP12,00000A3 -19-29SEP04-1/1

2000 Hour/24 Month Service

- Check crankshaft vibration damper (6-cylinder only).
- Flush and refill cooling system.¹
- Test thermostats.
- Check and adjust valve clearance.
- Test glow plugs

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¹If John Deere COOL-GARD is used, the flushing interval may be extended to 3000 hours, or 36 months. If John Deere COOL-GARD is used and the coolant is tested annually AND additives are replenished as needed by adding a supplemental coolant additive, the flushing interval may be extended to 5000 hours or 60 months, whichever occurs first.

OURGP12.00000A4 -19-29SEP04-1/1

Service as Required

- Add coolant
- Service air cleaner.
- Replace poly-vee belts.

- Check fuses
- Check air compressor (if equipped)
- Bleed fuel system

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RG, RG34710, 5627 -19-11MAR03-1/1

Warranty

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 by John Deere, John Deere makes the following warranty to the first retail purchaser and each subsequent purchaser (if purchase is made prior to the 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 before the accumulation of 2000 hours of use

NOTE: In the absence of a functional hourmeter, hours of use are determined on the basis of 12 hours of use per calendar day.

Warranty Coverage

This warranty applies to the engine and to integral components and accessories sold by John Deere, and delivered to the first retail purchaser on or after 1 May 2010.

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. Warrantable repairs will be made without charge for parts or engine repair labor, including reasonable labor costs to remove and reinstall non-engine parts or components of the equipment in which the engine is installed. If necessary, reasonable labor costs for engine removal and reinstallation will also be included. All coverage is based on the defect appearing within the warranty period as measured from the date of delivery to the first retail purchaser.

Obtaining Warranty Service

Warranty service must be requested of the nearest authorized 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. (See When Warranty Service Is Needed.)

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.

Continued on next page

CM22194,00011A1 -19-10MAY22-1/3

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.

Consequences of negligence, misuse, or accident involving the product, or improper application, installation, or storage.

Consequences of service performed by someone other than an authorized John Deere engine service outlet.

Consequences of any product modification or alteration not approved by John Deere, including, but not limited to, tampering with engine fuel and air delivery systems.

Consequences of failure of non-product components.

Consequences of fuels, lubricants, or coolants that fail to meet the specifications and requirements listed in the Operator's Manual.

The effects of cooling system neglect as manifested in cylinder liner or cylinder block cavitation ("pitting", "erosion", "electrolysis").

Any premium for overtime labor requested by the purchaser.

Costs of transporting 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 are in excess of the travel reimbursement payable to the dealer had the warranty service been performed at the product's location.

Costs incurred in gaining access; for example, overcoming physical barriers such as walls, fences, floors, decks, or similar structures impeding access to the product, rental of cranes or similar, or construction of ramps or lifts or protective structures for product removal and reinstallation.

Incidental travel costs including meals, lodging, and similar, and any travel time or mileage costs in excess of the maximum allowance.

Service outlet costs incurred in solving or attempting to solve non-warrantable problems.

Services performed by a party other than an authorized John Deere service dealer.

Charges by dealers for initial start-up and inspection deemed unnecessary by John Deere when an Operator's Manual is supplied with the product are followed.

Costs related to interpretation or translation services.

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 of performance of its engines other than those set forth in this booklet, 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, or 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 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 cost of the engine.

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!

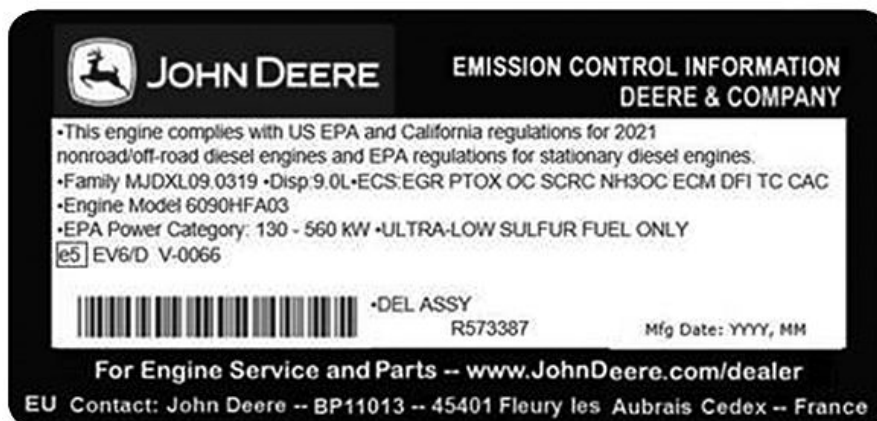
Typing is preferred, but legible handwritten reports are acceptable. "Block" numbers and Roman alphabet letters should be used. For example: 1,2,3,4 and A, B, C, D.

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.

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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.

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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
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.

Emission_CI_EPA (18Dec09)

Continued on next page

DX,EMISSIONS,EPA -19-12DEC12-1/2



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.

Emission_CI_EPA (18Dec09)

TS1721 —UN—15JUL13

DX,EMISSIONS,EPA -19-12DEC12-2/2

CARB Non-road Emissions Control Warranty Statement—Compression Ignition

Emissions Control Warranty Statement 2019 through 2021

DXLOGOV1 —UN—28APR09



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 CARB regulations for nonroad 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 on 2019 through 2021 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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DX,EMISSIONS,CARB -19-26AUG20-1/8

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 or 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
<ul style="list-style-type: none"> • Intake manifold • Turbocharger • Charge air cooler 	Particulate Controls <ul style="list-style-type: none"> • Any device used to capture particulate emissions • Any device used in the regeneration of the capturing system • Enclosures and manifolding • Smoke Puff Limiters 	<ul style="list-style-type: none"> • NOx absorbers and catalysts
Fuel Metering system		SCR systems and urea containers/dispensing systems
<ul style="list-style-type: none"> • Fuel injection system 		Miscellaneous Items used in Above Systems
Exhaust Gas Recirculation		<ul style="list-style-type: none"> • Electronic control units, sensors, actuators, wiring harnesses, hoses, connectors, clamps, fittings, gasket, mounting hardware
<ul style="list-style-type: none"> • EGR valve 	Positive Crankcase Ventilation (PCV) System	
Catalyst or Thermal Reactor Systems	<ul style="list-style-type: none"> • PCV valve • Oil filler cap 	
<ul style="list-style-type: none"> • 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.

Emission_CI_CARB (01Feb17)

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DX,EMISSIONS,CARB -19-26AUG20-2/8

Emissions Control Warranty Statement 2019 through 2021

DXLOGOV1 —UN—28APR09



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 CARB regulations for nonroad 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 on 2019 through 2021 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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DX,EMISSIONS,CARB -19-26AUG20-3/8

RG29280 —UN—02FEB17

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 or 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
<ul style="list-style-type: none"> • Intake manifold • Turbocharger • Charge air cooler 	Particulate Controls <ul style="list-style-type: none"> • Any device used to capture particulate emissions • Any device used in the regeneration of the capturing system • Enclosures and manifolding • Smoke Puff Limiters 	<ul style="list-style-type: none"> • NOx absorbers and catalysts
Fuel Metering system		SCR systems and urea containers/dispensing systems
<ul style="list-style-type: none"> • Fuel injection system 		Miscellaneous Items used in Above Systems
Exhaust Gas Recirculation	Positive Crankcase Ventilation (PCV) System	<ul style="list-style-type: none"> • Electronic control units, sensors, actuators, wiring harnesses, hoses, connectors, clamps, fittings, gasket, mounting hardware
<ul style="list-style-type: none"> • EGR valve 	<ul style="list-style-type: none"> • PCV valve • Oil filler cap 	
Catalyst or Thermal Reactor Systems		
<ul style="list-style-type: none"> • 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.

Emission_CI_CARB (01Feb17)

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DX,EMISSIONS,CARB -19-26AUG20-4/8

RG29281 —UN—27FEB17

Emissions Control Warranty Statement 2022 through 2024

DXLOGOV1 —UN—28APR09



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 on 2022 through 2024 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. John Deere warrants that this engine is free from defects in materials and workmanship which would cause the failure of emissions warranted parts 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. This applies to 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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DX,EMISSIONS,CARB -19-26AUG20-5/8

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 or 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
<ul style="list-style-type: none"> • Intake manifold • Turbocharger • Charge air cooler 	Particulate Controls <ul style="list-style-type: none"> • Any device used to capture particulate emissions • Any device used in the regeneration of the capturing system • Enclosures and manifold • Smoke Puff Limiters 	<ul style="list-style-type: none"> • NOx absorbers and catalysts
Fuel Metering system		SCR systems and urea containers/dispensing systems
<ul style="list-style-type: none"> • Fuel injection system 		Miscellaneous Items used in Above Systems
Exhaust Gas Recirculation		<ul style="list-style-type: none"> • Electronic control units, sensors, actuators, wiring harnesses, hoses, connectors, clamps, fittings, gasket, mounting hardware
<ul style="list-style-type: none"> • EGR valve 	Positive Crankcase Ventilation (PCV) System	
Catalyst or Thermal Reactor Systems	<ul style="list-style-type: none"> • PCV valve • Oil filler cap 	
<ul style="list-style-type: none"> • 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.

Emission_CI_CARB (14Apr20)

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DX,EMISSIONS,CARB -19-26AUG20-6/8

Emissions Control Warranty Statement 2022 through 2024

DXLOGOV1 —UN—28APR09



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 on 2022 through 2024 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. John Deere warrants that this engine is free from defects in materials and workmanship which would cause the failure of emissions warranted parts 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. This applies to 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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DX,EMISSIONS,CARB -19-26AUG20-7/8

RG32758 —UN—19AUG20

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 or 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.

Emission_CI_CARB (14Apr20)

DX,EMISSIONS,CARB -19-26AUG20-8/8

RG32759 —UN—19AUG20

John Deere Service Literature Available

Technical Information

Technical information can be purchased from John Deere. Publications are available in print or CD-ROM format.

Orders can be made using one of the following:

- John Deere Technical Information Store:
www.JohnDeere.com/TechInfoStore
- Call 1-800-522-7448
- Contact your John Deere dealer

Available information includes:

PARTS CATALOGS list service parts available for your machine with exploded view illustrations to help you identify the correct parts. It is also useful in assembling and disassembling.



TS189 —UN—17JAN89

DX,SERVIT -19-07DEC16-1/4

OPERATOR'S MANUALS providing safety, operating, maintenance, and service information.



TS191 —UN—02DEC88

DX,SERVIT -19-07DEC16-2/4

TECHNICAL MANUALS outlining service information for your machine. Included are specifications, illustrated assembly and disassembly procedures, hydraulic oil flow diagrams, and wiring diagrams. Some products have separate manuals for repair and diagnostic information. Some components, such as engines, are available in a separate component technical manual.



TS224 —UN—17JAN89

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DX,SERVIT -19-07DEC16-3/4

EDUCATIONAL CURRICULUM including five comprehensive series of books detailing basic information regardless of manufacturer:

- Agricultural Primer series covers technology in farming and ranching.
- Farm Business Management series examines “real-world” problems and offers practical solutions in the areas of marketing, financing, equipment selection, and compliance.
- Fundamentals of Services manuals show you how to repair and maintain off-road equipment.
- Fundamentals of Machine Operation manuals explain machine capacities and adjustments, how to improve machine performance, and how to eliminate unnecessary field operations.
- Fundamentals of Compact Equipment manuals provide instruction in servicing and maintaining equipment up to 40 PTO horsepower.



TS1663 —UN—10OCT97

DX.SERVLIT -19-07DEC16-4/4

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