PowerTech™M 2.4 L and 3.0 L OEM Diesel Engines

OPERATOR'S MANUAL

PowerTech™ 2.4 L and 3.0 L OEM Diesel Engines

OMRG34851 ISSUE 19FEB14 (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.

Additional Proposition 65 Warnings can be found in this manual.

John Deere Power Systems

PRINTED IN U.S.A.

OEM Engine and Drivetrain Warranty Registration

Why registering your OEM engine or drivetrain product is a really smart idea:[1]

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.

NOTE: A mail-in registration form is located at the back of this manual.

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

[1]Register your OEM engine or drivetrain product online and select an authorized John Deere service location. If available in your region, you'll receive information regarding new products and current money-saving offers from John Deere. Limit one money-saving offer per engine warranty registration. Not transferable. Not valid with any other offer. Offer ends 90 days from the date of issue. Some restrictions apply. See your John Deere service location for complete details.

RG24614 —UN—21OCT13

Scan this code to register your OEM engine online now and learn of current money-saving offers available to you.[1] You can also visit us directly at JohnDeere.com/warranty.

Equipment operators can't afford downtime or unexpected repairs. That's why we offer a 2-year/2,000-hour warranty, with unlimited hours in the first year, on our OEM industrial and marine engines. This warranty takes effect the date that the engine is delivered to the first retail purchaser. In addition, 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. Be sure to register your engine or drivetrain product and take full advantage of the John Deere service and support network.

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 JohnDeere.com/dealer to find the authorized engine or drivetrain service location nearest you. For complete warranty details visit JohnDeere.com/warrantystatements to view, download, or print the warranty statement for your engine or drivetrain product.

ZE59858,000025E -19-02DEC13-1/1

Foreword

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.

RIGHT-HAND AND LEFT-HAND sides are determined by standing at the drive or flywheel end (rear) of the engine and facing toward the front of the engine.

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.

SETTING FUEL DELIVERY outside the published factory specifications or otherwise modifying or tampering with the engine fuel system settings including ECU software parameters may subject the user to civil fines and penalties. Such actions will also be taken into consideration if claims are made under the provisions of John Deere's engine warranty.

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.

NOTE: This manual covers only engines provided to OEM (Outside Equipment Manufacturers). For engines in Deere machines, refer to the machine operators manual.

VP98307,00000A5 -19-20SEP12-1/1

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 that 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. Engine service can be done by all Ag, C&FD, and JDPS branded dealers. To view the John Deere Service Dealer network or locate your nearest Dealer, use the following URL: http://www.johndeere.com/dealer

JR74534,000026F -19-21JUN12-1/1

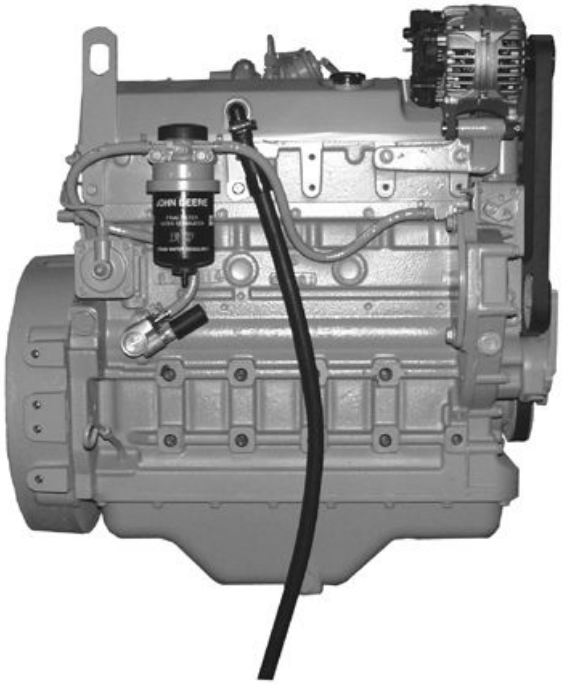
PowerTech™ 2.4 L and 3.0 L Diesel Engines

RG12961 —UN—03JUN03

2.4 L Right Side View

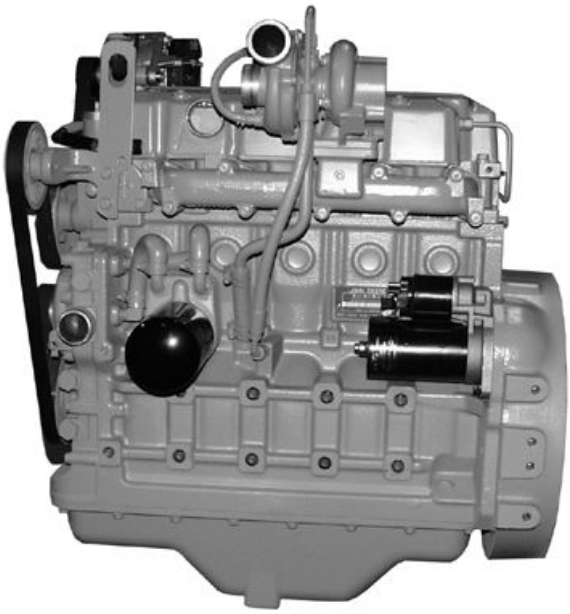
RG12960 —UN—03JUN03

2.4 L Left Side View



RG12962 —UN—03JUN03

3.0 L Right Side View



RG12963 —UN—03JUN03

3.0 L Left Side View

POWERTECH is a trademark of Deere & Company

OUOD006,00000AD -19-05MAR13-1/1

Contents

Continued on next page

Original Instructions. All information, illustrations and specifications in this manual are based on the latest information available at the time of publication. The right is reserved to make changes at any time without notice.

POWERTECH™ Medallion

A medallion is located on the rocker arm cover which identifies each engine as a John Deere ***POWERTECH***™ engine.

RG12685 —UN—12DEC02

RG12684 —UN—12DEC02

POWERTECH *is a trademark of Deere & Company.*

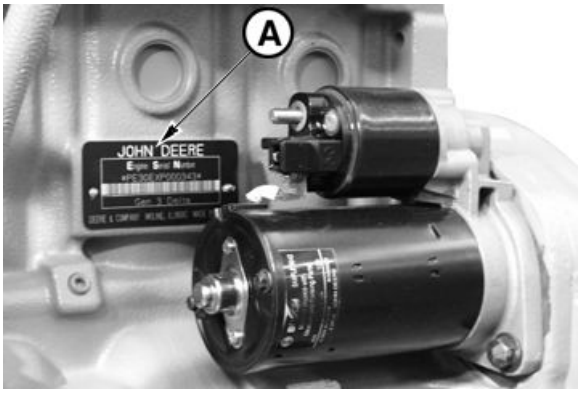
RG41183,0000022 -19-10DEC02-1/1

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.

- "PE" indicates the engine was built in Torreon, Mexico

Your engine's serial number plate (A) is located on the left-hand side of cylinder block behind the starter motor.



13-Digit Engine Serial Number Plate

RG12687 —UN—12DEC02

RG41183,0000025 -19-11DEC02-1/1

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.

Engine Serial Number (B)

_____

Engine Model Number (C)

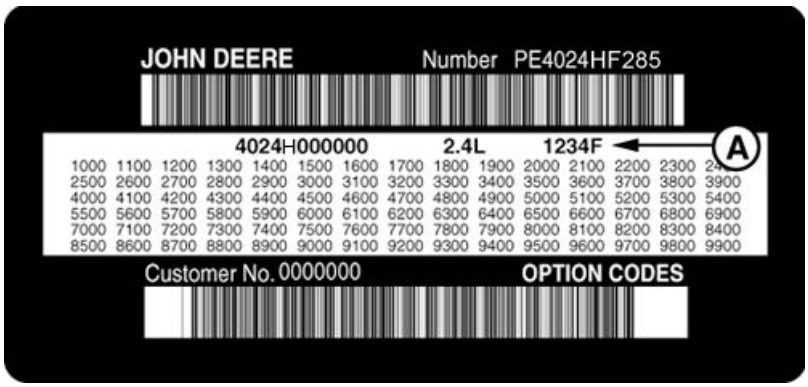
_____

RG15317 —UN—26JUL07

Engine Serial Number Plate

OUOD006,00000AF -19-29JUN07-1/1

Engine Option Codes



RG15318 —UN—26JUL07

Engine Option Codes

In addition to the serial number plate, 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.

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 12-volt, 70-amp alternator.

NOTE: These option codes are based on the latest information available at the time of publication. The right is reserved to make changes at any time without notice.

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 list on the next page 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.

NOTE: 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.

An additional option code label may also be delivered with the engine. Place this sticker or tag, for reference, either on this page or in the engine owner's warranty booklet under OPTION CODES title.

Option Codes	Description	Option Codes	Description
11_____	Rocker Arm Cover	51_____	Cylinder Head With Valves
12_____	Oil Filler	52_____	Auxiliary Gear Drive
13_____	Crankshaft Pulley	53_____	Fuel Heater
14_____	Flywheel Housing	54_____	Air Intake for Turbocharger
15_____	Flywheel	55_____	Shipping Stand
16_____	Fuel Injection System	56_____	Paint Option
17_____	Air Inlet	57_____	Coolant Pump Inlet
18_____	Air Cleaner	59_____	Oil Cooler
19_____	Oil Pan	60_____	Alternator Fan Drive Pulley
20_____	Coolant Pump	62_____	Alternator Mounting
21_____	Thermostat Cover	63_____	Low Pressure Fuel Line
22_____	Thermostat	64_____	Exhaust Elbow
23_____	Fan Drive	65_____	Turbocharger
24_____	Fan Belt	66_____	Coolant Temperature Switch
25_____	Fan	67_____	Speed Sensor
26_____	Engine Coolant Heater	68_____	Crankshaft Rear Damper
27_____	Radiator	69_____	Engine Serial Number Plate
28_____	Exhaust Manifold	71_____	Engine Oil Bypass Filter

Continued on next page

Option Codes	Description	Option Codes	Description
29	Crankcase Vent System	72	ECU Electronic Software Option
30	Starter Motor	74	Air Conditioning (Freon) Compressor
31	Alternator	75	Air Restriction Indicator
32	Instrument Panel	76	Oil Pressure Switch
33	Tachometer	77	Timing Gear Cover
35	Fuel Filter	78	Air Compressor
36	Front Plate	79	Engine Certification
37	Fuel Transfer Pump	81	Primary Fuel Filter and Water Separator
39	Thermostat Housing	83	Electronic Software (Vehicle Option)
40	Oil Dipstick	84	Electrical Wiring Harness
41	Belt-Driven Front Auxiliary Drive	86	Fan Pulley
43	Starting Aids	87	Belt Tensioner
44	Timing Gear Cover	88	Oil Filter
45	Balancer Shafts	92	Test Certificate
46	Cylinder Block and Camshaft	95	Special Equipment (Factory Installed)
47	Crankshaft and Bearings	96	Engine Installation Kit
48	Connecting Rods and Pistons	97	Special Equipment (Field Installed)
49	Valve Actuating Mechanism	98	Lift Straps for Engine
50	Oil Pump	99	Service Only Parts and Kits
			Engine Base Code

OUOD006,00000AE -19-28JUN07-2/2

Understand Signal Words

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 -19-03MAR93-1/1

Recognize Safety Information

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

Follow recommended precautions and safe operating practices.

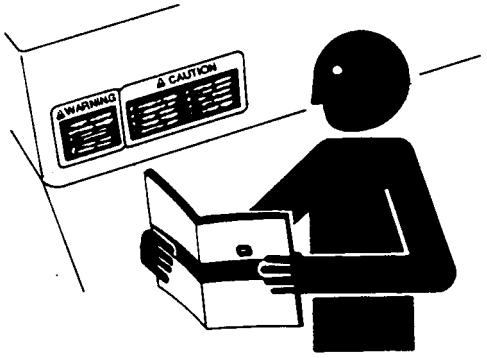
T81389 —UN—28JUN13

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

Replace Safety Signs

Replace missing or damaged safety signs. 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

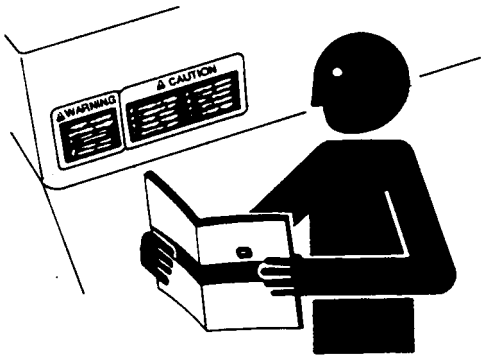
Follow Safety Instructions

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

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

Learn how to operate the machine and how to use controls properly. Do not let anyone operate without instruction.

Keep your machine in proper working condition. Unauthorized modifications to the machine may impair the function and/or safety and affect machine life.



TS201 —UN—15APR13

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

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

California Proposition 65 Warning

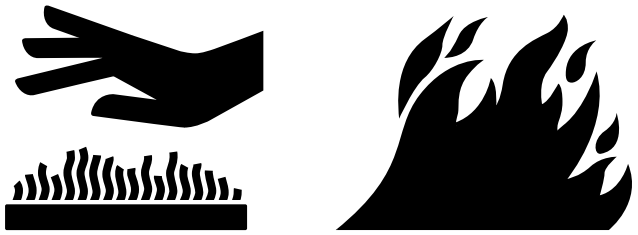
Diesel engine exhaust, some of its constituents, along with certain machine components contain or emit chemicals known to the State of California to cause cancer and birth defects or other reproductive harm. In addition, certain fluids contained in the machine and certain products of component wear contain or emit chemicals known to the State of California to cause cancer and birth defects or other reproductive harm.

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

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.



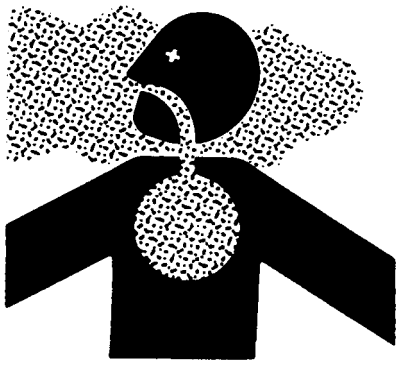
RG17488 —UN—21AUG09

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

Dispose of Waste Properly

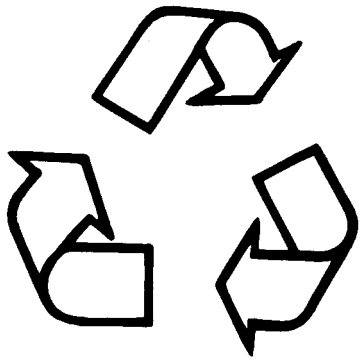
Improperly disposing of waste can threaten the environment and ecology. Potentially harmful waste used with John Deere equipment include such items as oil, fuel, coolant, brake fluid, filters, and batteries.

Use leakproof containers when draining fluids. Do not use food or beverage containers that may mislead someone into drinking from them.

Do not pour waste onto the ground, down a drain, or into any water source.

Air conditioning refrigerants escaping into the air can damage the Earth's atmosphere. Government regulations may require a certified air conditioning service center to recover and recycle used air conditioning refrigerants.

Inquire on the proper way to recycle or dispose of waste from your local environmental or recycling center, or from your John Deere dealer.



TS1133 —UN—15APR13

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

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

Practice Safe Maintenance

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

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

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

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

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

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

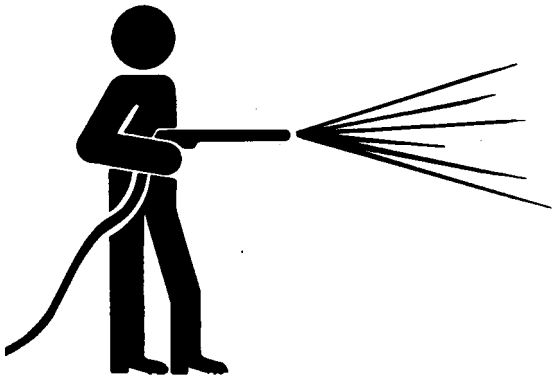
TS218 —UN—23AUG88

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

Work in Clean Area

Before starting a job:

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



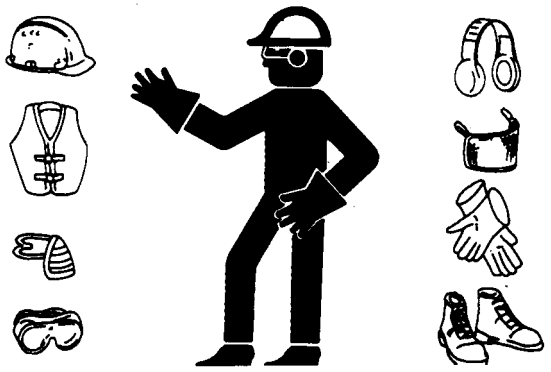
T6642EJ —UN—18OCT88

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

Wear Protective Clothing

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

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



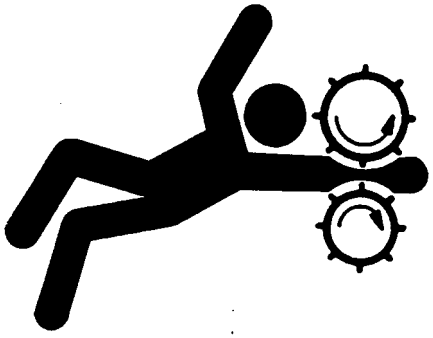
TS206 —UN—15APR13

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

Service Machines Safely

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

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



TS228 —UN—23AUG88

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

Use Proper Tools

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

Use power tools only to loosen threaded parts and fasteners.

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

Use only service parts meeting John Deere specifications.

TS779 —UN—08NOV89

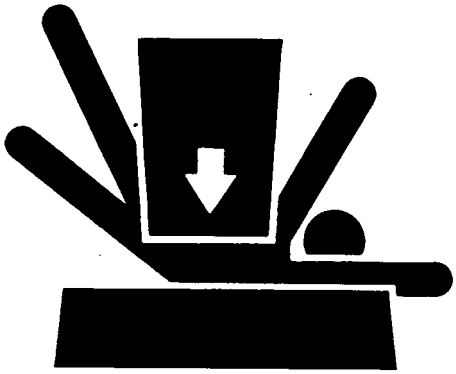
DX,REPAIR -19-17FEB99-1/1

Support Machine Properly

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

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

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



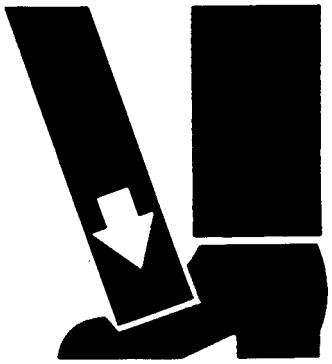
TS229 —UN—23AUG88

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

Use Proper Lifting Equipment

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

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



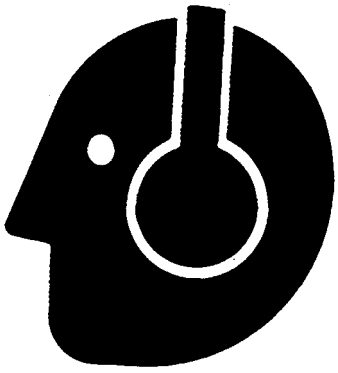
TS226 —UN—23AUG88

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

Protect Against Noise

Prolonged exposure to loud noise can cause impairment or loss of hearing.

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

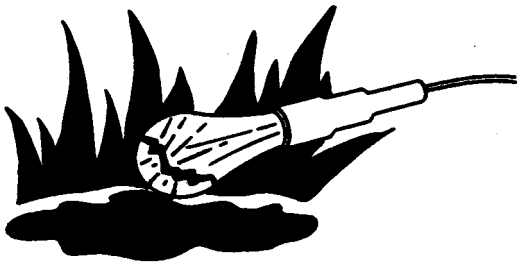


TS207 —UN—23AUG88

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

Illuminate Work Area Safely

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



TS223 —UN—23AUG88

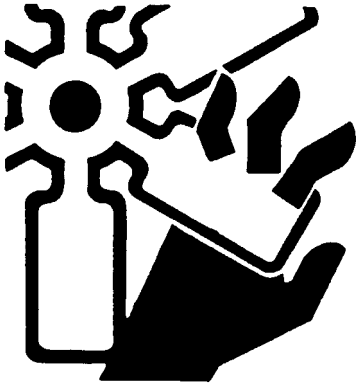
DX,LIGHT -19-04JUN90-1/1

Install All Guards

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

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

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



TS677 —UN—21SEP89

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

Stay Clear of Rotating Drivelines

Entanglement in rotating driveline can cause serious injury or death.

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

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

TS1644 —UN—22AUG95

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

Protect Against High Pressure Spray

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

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

TS1343 —UN—18MAR92

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

Service Cooling System Safely

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

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

TS281 —UN—15APR13

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

Remove Paint Before Welding or Heating

Avoid potentially toxic fumes and dust.

Hazardous fumes can be generated when paint is heated by welding, soldering, or using a torch.

Remove paint before heating:

- Remove paint a minimum of 100 mm (4 in.) from area to be affected by heating. If paint cannot be removed, wear an approved respirator before heating or welding.
- If you sand or grind paint, avoid breathing the dust. Wear an approved respirator.
- If you use solvent or paint stripper, remove stripper with soap and water before welding. Remove solvent or paint stripper containers and other flammable material from area. Allow fumes to disperse at least 15 minutes before welding or heating.

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

TS220 —UN—15APR13

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

Dispose of paint and solvent properly.

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

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

Avoid High-Pressure Fluids

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

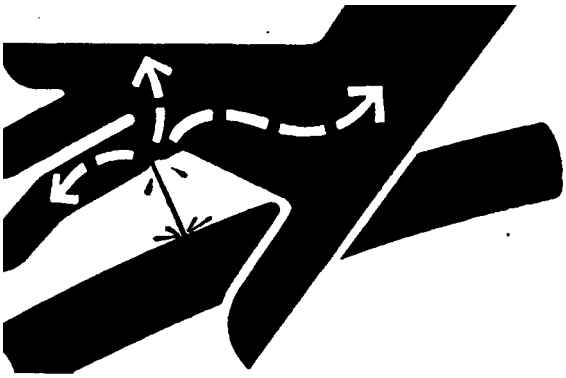
Replace worn or damaged hose assemblies immediately with John Deere approved replacement parts.

Escaping fluid under pressure can penetrate the skin causing serious injury.

Avoid the hazard by relieving pressure before disconnecting hydraulic or other lines. Tighten all connections before applying pressure.

Search for leaks with a piece of cardboard. Protect hands and body from high-pressure fluids.

If an accident occurs, see a doctor immediately. Any fluid injected into the skin must be surgically removed within a few hours or gangrene may result. Doctors unfamiliar with this type of injury should reference a knowledgeable medical source. Such information is available in English from Deere & Company Medical Department in Moline, Illinois, U.S.A., by calling 1-800-822-8262 or +1 309-748-5636.



X9811 —UN—23AUG88

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

Avoid 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.

TS953 —UN—15MAY90

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

Avoid Static Electricity Risk When Refueling

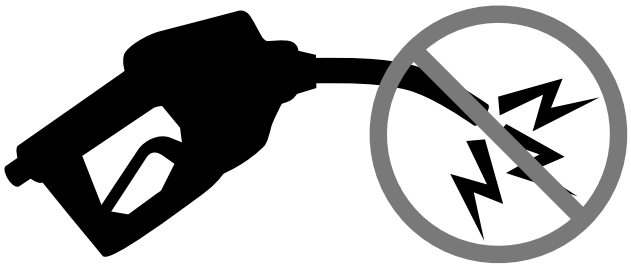
The removal of sulfur and other compounds in Ultra-Low Sulfur Diesel (ULSD) fuel decreases its conductivity and increases its ability to store a static charge.

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—21AUG13



RG21992 —UN—21AUG13

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

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.

TS202 —UN—23AUG88

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

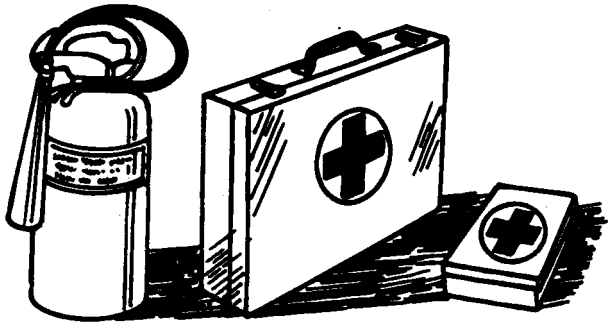
DX,FIRE1 -19-12OCT11-1/1

Prepare for Emergencies

Be prepared if a fire starts.

Keep a first aid kit and fire extinguisher handy.

Keep emergency numbers for doctors, ambulance service, hospital, and fire department near your telephone.



TS291 —UN—15APR13

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

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.

TS1356 —UN—18MAR92

DX,FIRE3 -19-16APR92-1/1

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:

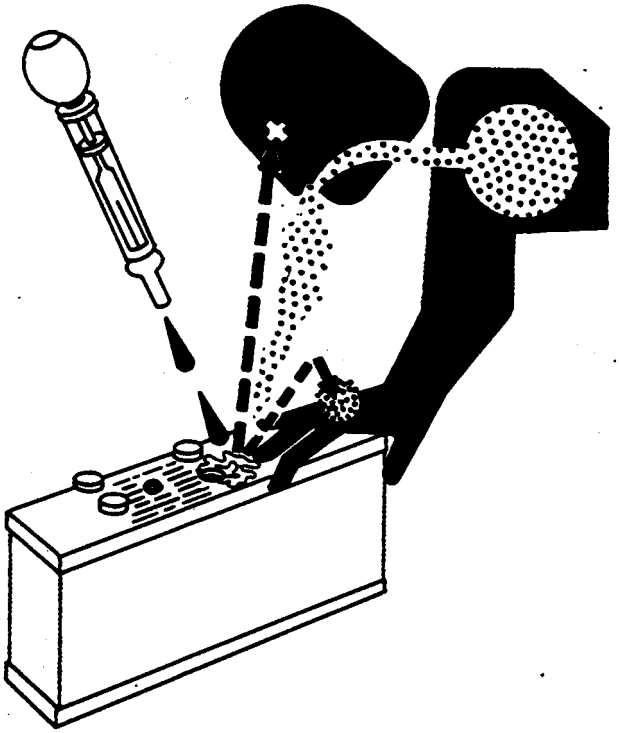
1. Flush skin with water.
2. Apply baking soda or lime to help neutralize the acid.
3. Flush eyes with water for 15—30 minutes. Get medical attention immediately.

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:

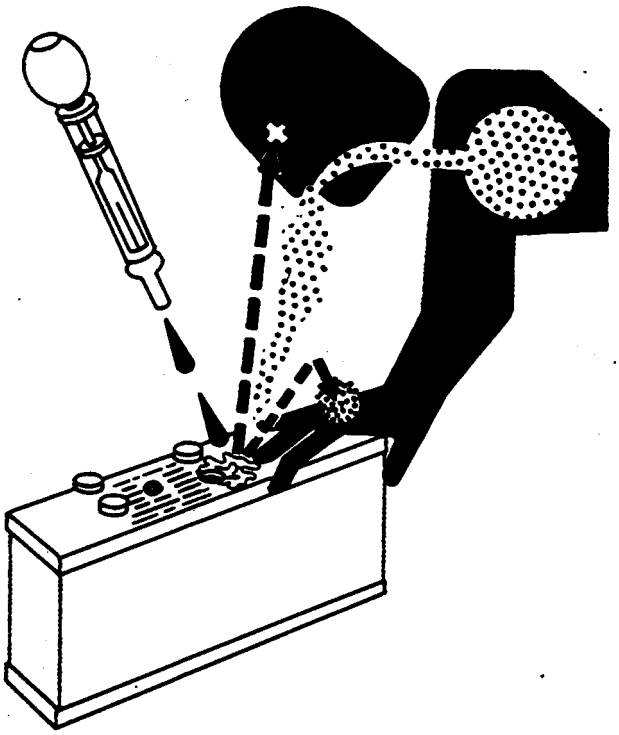
1. Filling batteries in a well-ventilated area.
2. Wearing eye protection and rubber gloves.
3. Avoiding breathing fumes when electrolyte is added.
4. Avoiding spilling or dripping electrolyte.
5. Use proper jump start procedure.

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

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

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

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 or ASTM D975 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 43 minimum. Cetane number greater than 47 is preferred, especially for temperatures below –20 °C (–4 °F) or elevations above 1500 m (5000 ft.).

Cold Filter Plugging Point (CFPP) should be at least 5 °C (9 °F) below the expected lowest temperature or **Cloud Point** below the expected lowest ambient temperature.

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 10000 mg/kg (10000 ppm).

Sulfur content for Interim Tier 4, Final Tier 4, Stage III B, and Stage IV 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.
- 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 -19-17JUN13-1/1

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.

Use of non-John Deere fuel additives can result in fuel system damage, power loss and other reductions in performance, system fouling, and unwarrantable failures. Consult your John Deere dealer or fuel supplier to ensure use of proper fuel additives.

DX,FUEL13 -19-26APR12-1/1

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 0.45 mm as measured by ASTM D6079 or ISO 12156-1.

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 -19-14APR11-1/1

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 practicable 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 and prevent water condensation. Contact your fuel supplier or John Deere dealer for recommendations.

DX,FUEL4 -19-15FEB13-1/1

BioDiesel Fuel

BioDiesel fuel is comprised of mono-alkyl 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.

All John Deere Engines with Exhaust Filter (Released 2011 and After)

While 5% blends (B5) are preferred, BioDiesel concentrations up to a 20% blend (B20) in petroleum diesel fuel can be used. 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 approved fuel conditioners, which contain detergent and dispersant additives, are required when using BioDiesel blends from B10—B20, and are recommended when using lower BioDiesel blends.

All John Deere Engines Excluding Exhaust Filter (Primarily Released Prior to 2012)

While 5% blends (B5) are preferred, BioDiesel concentrations up to a 20% blend (B20) in petroleum diesel fuel can be used. 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 approved fuel conditioners, which contain detergent and dispersant additives, are required when using BioDiesel blends from B10—B20, 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 approved fuel conditioners 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 approved fuel conditioners 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
- Possible compatibility issues with other materials (including copper, lead, zinc, tin, brass, and bronze) used in fuel handling equipment

Continued on next page

DX,FUEL7 -19-15MAY13-1/2

- 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 -19-15MAY13-2/2

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 cetane number, fuel type, sulfur content, water content, appearance, suitability for cold weather operations, bacteria, cloud point, acid number, particulate contamination, and whether the fuel meets specification.

Contact your John Deere dealer for more information on diesel fuel analysis.

DX,FUEL6 -19-14APR11-1/1

Aviation (Jet) Fuels

IMPORTANT: Not all fuels should be considered for regular use. Some fuels that can be used in this engine are for emergency only and can cause premature engine and component wear if used long term. Unless your engine has been specifically designed for prolonged use of aviation fuel, the following fuels should be used for an emergency only fuel alternative.

Aviation (jet) fuels may be used with the following restrictions.

Type	Comments
Jet A	**Not Recommended.**Lower viscosity and density than base No. 2-D diesel fuel. Power loss up to 10% can be expected.
Jet A-1	**Not Recommended.**Lower viscosity and density than base No. 2-D diesel fuel. Power loss up to 10% can be expected. May be used as an emergency fuel only, with the addition of John Deere PREMIUM DIESEL FUEL CONDITIONER (or equivalent) at the specified concentration.
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. May be used as an emergency fuel only, with the addition of John Deere PREMIUM DIESEL FUEL CONDITIONER (or equivalent) at the specified concentration.
JP-4	**Not Recommended.**Lower density and extremely low viscosity compared to base No. 2-D diesel fuel. Power loss up to 14% can be expected. May be used as an emergency fuel only, with the addition of John Deere PREMIUM DIESEL FUEL CONDITIONER (or equivalent) at the specified concentration.
JP-5	**Not Recommended.**Lower viscosity and density than base No. 2-D diesel fuel. Power loss up to 10% can be expected.
JP-7	**Not Recommended.**Lower viscosity and density than base No. 2-D diesel fuel. Power loss up to 10% can be expected.
JP-8	**Not Recommended.**Lower viscosity and density than base No. 2-D diesel fuel. Power loss up to 10% can be expected.

OURGP12,000003F -19-16AUG11-1/1

Burner Fuels

Burner fuels, like kerosene, may be used with the following restrictions.

Type	Comments
No.2	Higher density and specific gravity than base No. 2-D diesel fuel. Power increase up to 3% can be expected.
No.1	Lower viscosity than base No. 2-D diesel fuel. Power loss up to 2% can be expected.

OURGP12,0000040 -19-07JUL04-1/1

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 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) 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 -19-15MAY13-1/1

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

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

DX,ENOIL4 -19-15MAY13-1/1

Diesel Engine Oil — Non-Emissions Certified and Certified Tier 1 and Stage I

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.

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

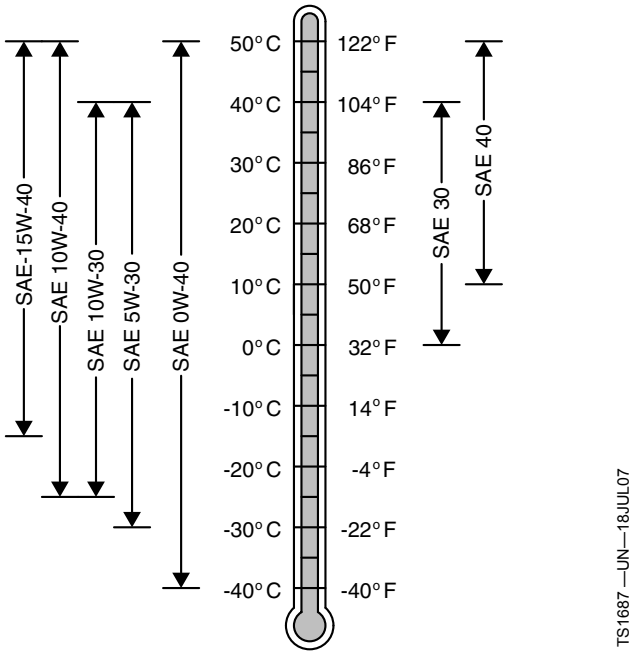
- John Deere Torq-Gard™
- API Service Category CJ-4
- API Service Category CI-4 PLUS
- API Service Category CI-4
- API Service Category CH-4
- API Service Category CG-4
- API Service Category CF-4
- ACEA Oil Sequence E9
- ACEA Oil Sequence E7
- ACEA Oil Sequence E6
- ACEA Oil Sequence E5
- ACEA Oil Sequence E4
- ACEA Oil Sequence E3
- ACEA Oil Sequence E2

If oils meeting API CG-4, API CF-4, or ACEA E2 are used, reduce the service interval by 50%.

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

If diesel fuel with sulfur content greater than 5000 mg/kg (5000 ppm) is used, reduce the service interval by 50%.

DO NOT use diesel fuel with sulfur content greater than 10000 mg/kg (10000 ppm).

DX,ENOIL -19-15JUN10-1/1

Extended Diesel Engine Oil Service Intervals — Non-Emissions Certified and Certified Tier 1 and Stage I

When John Deere Plus-50™ II or John Deere Plus-50™ is used with the specified John Deere filter, the service interval for engine oil and filter changes may be increased by 50% but not to exceed a maximum of 500 hours.

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 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.

When ACEA E9, ACEA E7, ACEA E6, ACEA E5, or ACEA E4 oils are used with specified John Deere filter, use engine oil analysis to determine if the service interval for engine oil and filter changes may be increased by a maximum of 50% but not to exceed 500 hours.

If John Deere Plus-50™ II or John Deere Plus-50™, ACEA E9, ACEA E7, ACEA E6, ACEA E5, or ACEA E4 oils are used with other than the specified John Deere filter, change the engine oil and filter at the normal service interval.

If John Deere Torq-Gard™, API CJ-4, API CI-4 PLUS, API CI-4, API CH-4, or ACEA E3 oils are used, change the engine oil and filter at the normal service interval.

If API CG-4, API CF-4, or ACEA E2 oils are used, change the engine oil and filter at 50% of the normal service interval.

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.**

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

DX,ENOIL6 -19-15JUN10-1/1

Mixing of Lubricants

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

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

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

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 both conventional and synthetic lubricants.

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

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

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)

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:

- Pre-mix coolant meeting ASTM D6210 requirements
- 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
- 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. Distilled, 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.

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.

COOL-GARD is a trademark of Deere & Company

DX,COOL3 -19-15MAY13-1/1

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. Distilled, 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 I 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 -19-15MAY13-1/1

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 -19-15MAY13-1/1

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.

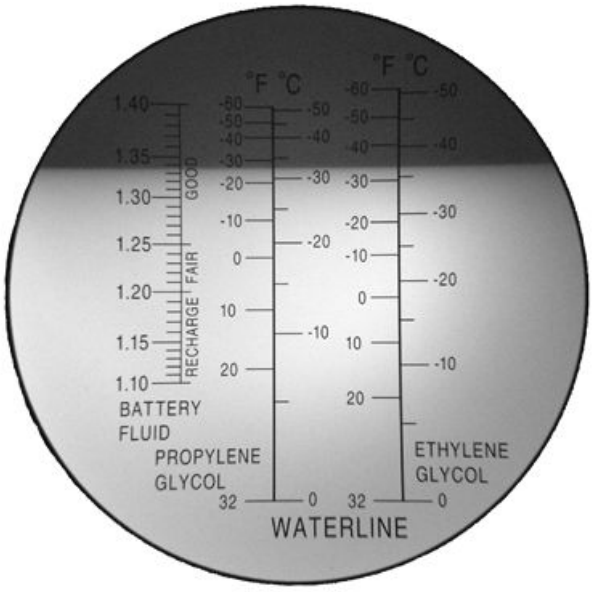
A coolant refractometer is available through your John Deere dealer under the SERVICEGARD™ tool program. Part number 75240 provides an economical solution to accurate freeze point determination in the field.

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.

TS1732 —UN—04SEP13

SERVICEGARD™ Part Number 75240



TS1733 —UN—04SEP13

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

SERVICEGARD is a trademark of Deere & Company

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

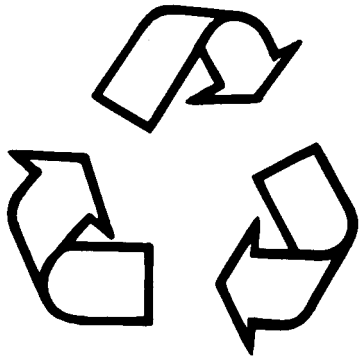
Disposing of Coolant

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.



TS1133 —UN—15APR13

Recycle Waste

RG,RG34710,7543 -19-09JAN07-1/1

Instrument Panel

All controls and gauges are optional equipment for John Deere 2.4 L and 3.0 L OEM Engines. They may be provided by the equipment manufacturer instead of John Deere.

IMPORTANT: Any time an electric gauge or meter does not register correctly, replace it with a new one. Do not attempt to repair it.

Following is a brief description of the components on the John Deere instrument (gauge) panel:

A—Tachometer with Hourmeter (Optional) - The tachometer with hourmeter indicates engine speed in revolutions per minute (rpm) and shows the operating hours of the engine while key switch is in the “ON” position. The hour meter should be used as a guide for scheduling periodic service.

B—Oil Pressure Gauge - The oil pressure gauge indicates engine oil pressure. If the engine oil pressure falls below a safe operating pressure, the engine will shut down.

C—Voltmeter Gauge - The voltmeter indicates system battery voltage.

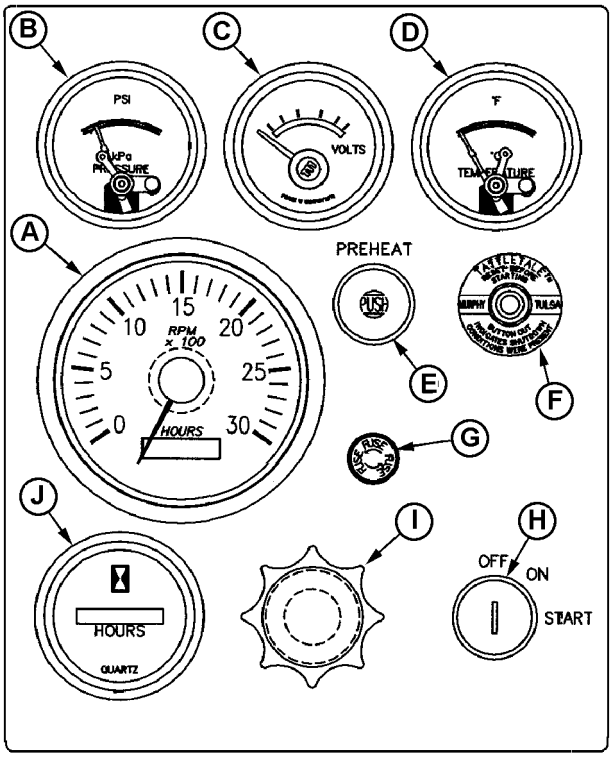
D—Coolant Temperature Gauge - The coolant temperature gauge indicates the engine coolant temperature. If coolant temperature rises above the preset, safe operating temperature, the engine will shut down.

E—Pre-Heat Button - Press button to activate the glow plugs for cold weather starting.

F—Reset (Safety) Switch- Reset button will pop out and shut down the engine if the coolant temperature is too high or oil pressure is too low. Press in and hold while starting engine until oil pressure is at a safe operating level.

G—Fuse Holder - Contains 14 amp fuse.

H—Key Switch - The key switch controls the electrical system. Positions of key switch are marked as follows: OFF, ON, and START.



RG13360 —UN—06FEB04

Instrument Panel and Gauges (Deluxe Version Shown)

A—Tachometer with Hourmeter (Optional)
B—Oil Pressure Gauge
C—Voltmeter Gauge
D—Coolant Temperature Gauge
E—Preheat Button
F—Reset (Safety) Button
G—Fuse Holder
H—Key Switch
I— Throttle with Locking Knob (Optional)
J— Hourmeter (Optional)

I—Throttle with Locking Knob (Optional) - The throttle control is used to control engine speed. The throttle locking knob can be used to lock the throttle at a set speed.

J—Hourmeter (Optional) - The hourmeter indicates the operating hours of the engine while key switch is in the “ON” position. The hour meter should be used as a guide for scheduling periodic service.

OURGP12,00002AD -19-02JAN07-1/1

Normal Engine Operation

Before starting, fill engine with oil and coolant meeting specifications. (See DIESEL ENGINE OIL and DIESEL ENGINE COOLANT SPECIFICATIONS in Fuels, Lubricants, and Coolant section.)

- Observe engine coolant temperature and engine oil pressure. Temperatures and pressures will vary between engines and with changing operating conditions, temperatures, and loads. Refer to GENERAL OEM ENGINE SPECIFICATIONS in the Specifications section.
- If coolant temperature rises above Maximum Coolant Temperature (see Specifications section), reduce load on engine. Unless temperature drops quickly, stop engine and determine cause before resuming operation.
- Operate the engine under a lighter load and at slower than normal speed for first 15 minutes after start-up. DO NOT run engine at slow idle.
- Stop engine immediately if there are any signs of part failure. Symptoms that may be early signs of engine problems are:
  - Sudden drop in oil pressure
  - Abnormal coolant temperatures
  - Unusual noise or vibration
  - Sudden loss of power
  - Excessive black exhaust
  - Excessive fuel consumption
  - Excessive oil consumption
  - Fluid leaks

OUOD006,00000C5 -19-04OCT07-1/1

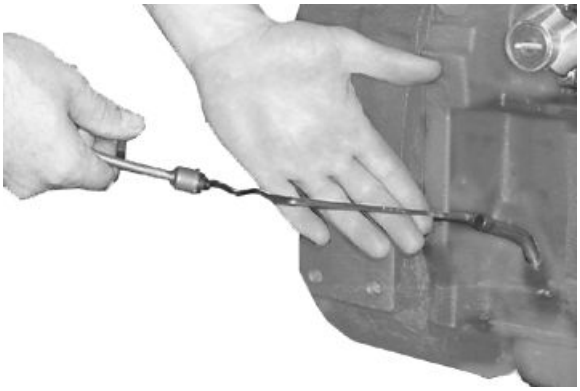
Break-In Service

IMPORTANT: This engine is normally factory-filled with John Deere PLUS-50™ 10W-30 oil, but can be shipped without oil to comply with certain legislations. In this case, fill engine with John Deere PLUS-50™ 10W-30 oil.

NOTE: The use of BREAK-IN oils is not required for this engine. Perform the following steps to break-in your engine properly during the first 100 hours. Factory-fill oil and filter are suitable for extended 500-hour drain interval, provided diesel fuel sulfur content is less than 0.10% (1000 ppm).

Before starting, fill engine with seasonal viscosity grade oil and with coolant meeting specifications. (See DIESEL ENGINE OIL and DIESEL ENGINE COOLANT SPECIFICATIONS in Fuels, Lubricants, and Coolant Section.)

1. During the first 20 hours, avoid prolonged periods of engine idling or sustained maximum load operation. Warm-up engine carefully and operate at normal loads. If engine will idle longer than 5 minutes, stop engine.
2. Check oil level daily or every 10 hours during engine break-in period. If oil must be added during this period, use John Deere PLUS-50 ™ 10W-30 oil. (See DIESEL ENGINE OIL in Fuels, Lubricants, and Coolant section.)
3. Watch oil pressure (A) and coolant temperature (B) closely during break-in period. Also check coolant level daily or every 10 hours and check for leaks.



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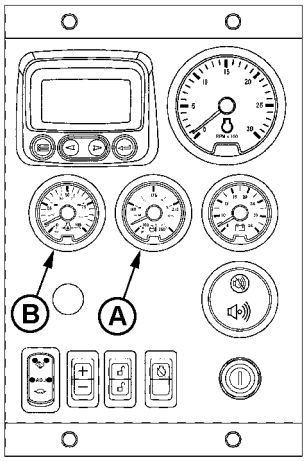
Check Engine Oil Level Daily



RG13720 —UN—11NOV04

Oil Pressure and Coolant Temperature Gauges

A—Oil Pressure **B—Coolant Temperature**

PLUS-50 is a trademark of Deere & Company.

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OUOD006,00000C6 -19-10AUG07-1/2

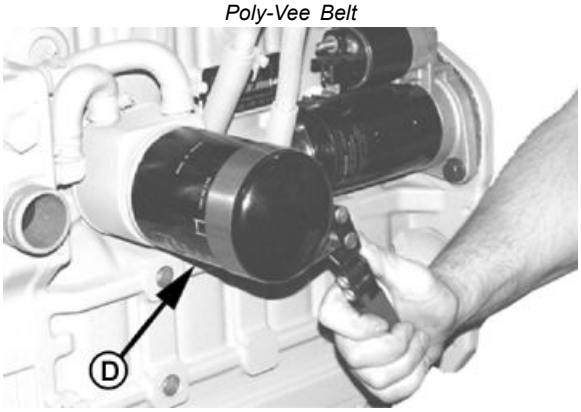
4. Check poly-vee belt (C) for proper alignment and seating in pulley grooves.
5. Change oil and oil filter (D) after first 500 hours/12 months. (See CHANGE ENGINE OIL AND FILTER in Lubrication and Maintenance/500 Hour Section.) Fill crankcase with seasonal viscosity grade oil. (See DIESEL ENGINE OIL, in Fuels, Lubricants, and Coolant Section.)

IMPORTANT: DO NOT operate engine when oil level is below ADD mark on dipstick. Check oil level before starting engine for the first time.

C—Poly-Vee Belt **D—Oil Filter**

RG15340 —UN—04OCT07

Poly-Vee Belt



RG15341 —UN—04OCT07

Engine Oil Filter

OUOD006,00000C6 -19-10AUG07-2/2

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:

- 21kW (28 hp) Continuous Operation at 2800 rpm
- 26kW (35 hp) Intermittent Operation at 2800 rpm

OUOD006,00000F6 -19-04OCT07-1/1

Starting The Engine

The following instructions apply to the optional controls and instruments available on John Deere Industrial and Generator Power Units only. The controls and instruments for your engine may be different from those shown here. Always follow manufacturer's instructions and familiarize yourself with the correct starting procedure.

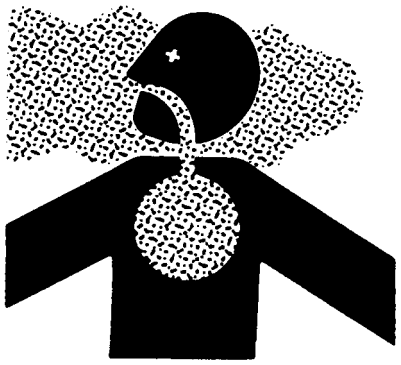
CAUTION: Before starting engine in a confined building, install proper outlet exhaust ventilation equipment. Always use safety approved fuel storage and piping.

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. Disengage engine rear driveline (if equipped) or gen set drive.
3. Open the fuel supply shut-off valve, if equipped.
4. Place the speed control lever in the “START” position, if equipped.

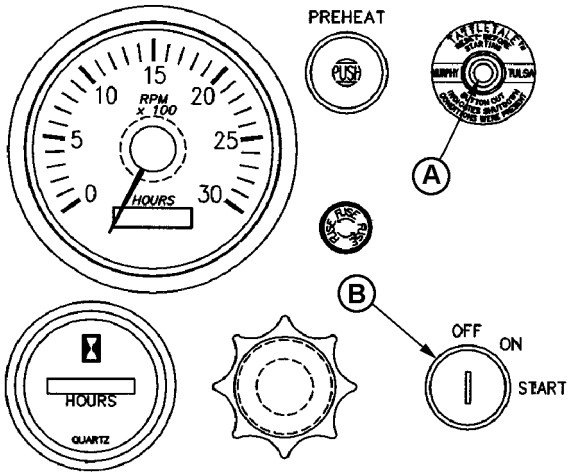
IMPORTANT: Do not operate the starter for more than 30 seconds at a time. To do so may overheat the starter. If the engine does not start the first time, wait at least 2 minutes before trying again. If engine does not start after four attempts, see Troubleshooting Section.

5. Press reset button (A) while turning key switch (B) to “START” position and hold until engine starts. Release key and button once engine starts; key automatically returns to “ON” position and instrument panel gauges start operating.
6. Warm-up engine for at least 5 minutes before applying a load. (See WARMING-UP ENGINE, later in this section.)



TS220 —UN—15APR13

Use Proper Ventilation



RG13366 —UN—12FEB04

Starting Engine Using Reset Button and Key Switch

A—Reset Button **B—Key Switch**

7. Check all gauges for normal operation. If operation is not normal, stop engine immediately and determine cause.

OURGP12,0000101 -19-04JAN07-1/1

Cold Weather Starting

When outside temperatures fall below 0°C (32° F) it may be necessary to consider using cold weather starting aids. Engines are equipped with standard glow plugs, and may also be fitted with a block heater. An increased capacity battery and/or lower viscosity oil may also need to be used.

IMPORTANT: In weather applications:

- **Above 0° C and for continued high load applications 15W-40 oil is recommended**
- **Below 0° C 10W-30 oil is STRONGLY recommended**
- **Below -10° C 10W-30 oil is REQUIRED**

For further information, see DIESEL ENGINE OIL in Fuels, Lubricants, and Coolant section.

⚠ CAUTION: NEVER USE ANY STARTING FLUID as a starting aid with these glow plug-equipped engines as it could cause an explosion and possible personal injury.

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.

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.

NOTE: Glow plugs operate automatically through the ECU. The light, located above the diagnostic gauge, should illuminate when the glow plugs are activated. 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 the engine until light turns off.

2. Follow remaining 5—6 as listed earlier in this section.

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

OUOD006,00000C7 -19-05MAR08-1/1

Warming Engine

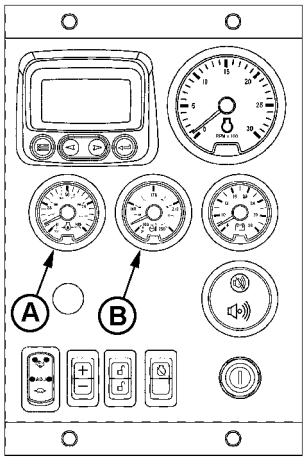
IMPORTANT: To assure proper lubrication, operate engine at or below 1200 rpm with no load for 1–2 minutes. Extend this period 2–4 minutes when operating at temperatures below freezing.

1. Refer to GENERAL OEM ENGINE SPECIFICATIONS in the Specifications section for oil pressure and coolant temperature specifications.
2. Check oil pressure gauge (A) as soon as engine starts. If gauge needle does not rise above the minimum oil pressure specification within 5 seconds, stop the engine and determine the cause. Normal engine oil pressure (see Specifications section) can vary within pressure ranges provided.

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.

3. Watch coolant temperature gauge (B). Do not place engine under full load until it is properly warmed up. See Specifications section for normal engine coolant temperature range.

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.



RG13724 —UN—11NOV04

Oil Pressure and Coolant Temperature Gauges

A—Oil Pressure **B—Coolant Temperature**

OUOD006,00000C8 -19-09OCT07-1/1

Avoid Excessive Engine Idling

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.

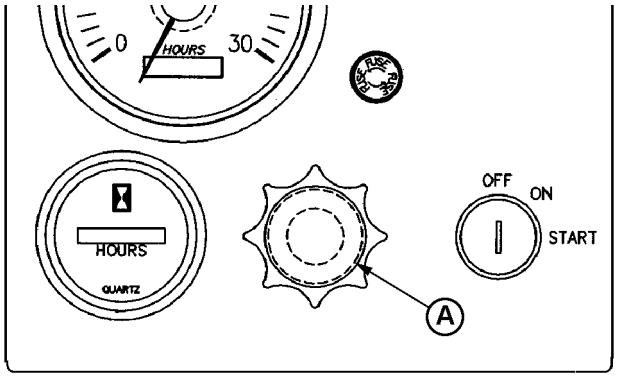
Once an engine is warmed to normal operating temperatures, engine should be idled at slow idle speed. (See ENGINE POWER RATING AND SPEED SPECIFICATIONS in the Specifications Section for slow idle speed information.) If an engine will be idling for more than 5 minutes, stop and restart later.

OURGP12,00000FC -19-04OCT07-1/1

Locking Throttle at Preset Speed

1. Push in/pull out throttle to desired setting.
2. Rotate locking knob (A), at base of throttle, clockwise to lock the throttle in place.

A—Locking Knob



RG13533 —UN—07MAY04

Locking Throttle

OURGP12,00002B2 -19-04MAY04-1/1

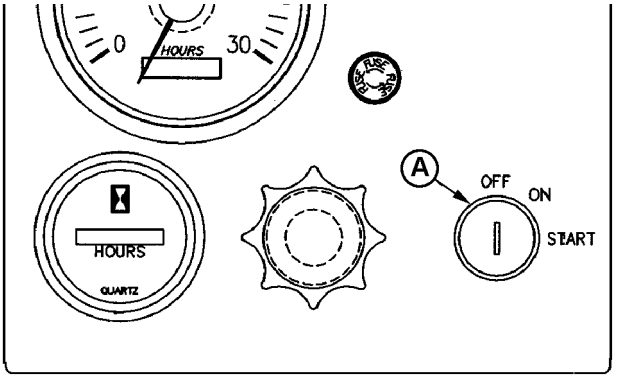
Stopping the Engine

IMPORTANT: Stopping the engine immediately when it has been working under load, can result in overheating and accelerated wear of the engine components. ALWAYS run the engine at slow idle and no load to allow hot engine parts to cool before shutdown (if possible).

On engines with variable speed governors, remove load from engine and run engine for at least 2 minutes Run turbocharged engines for 3 to 5 minutes.

On generator set engines with governors locked at a specific speed, remove electrical load from engine (if possible) and run at fast idle and no load for at least 2 minutes.

1. Drop engine speed to slow idle (variable speed governors only).
2. Turn key switch (A) to "OFF" position to stop the engine. After engine stops, close valve on fuel supply to prevent accidental starting.



RG13362 —UN—06FEB04

Key Switch on Instrument Panel

A—Key Switch

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OURGP12,00002B3 -19-04MAY04-1/2

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

3. Fill fuel tank to minimize possible water condensation problems. Filling tanks at end of day drives out moisture-laden air.

RG10616 —UN—16JUN00

Exhaust Stack Rain Cap

OURGP12,00002B3 -19-04MAY04-2/2

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.

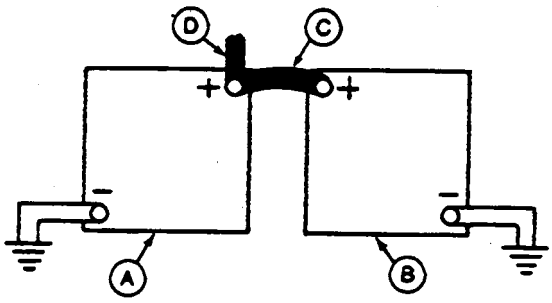
1. Connect booster battery or batteries to produce the required system voltage for your engine application.

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.

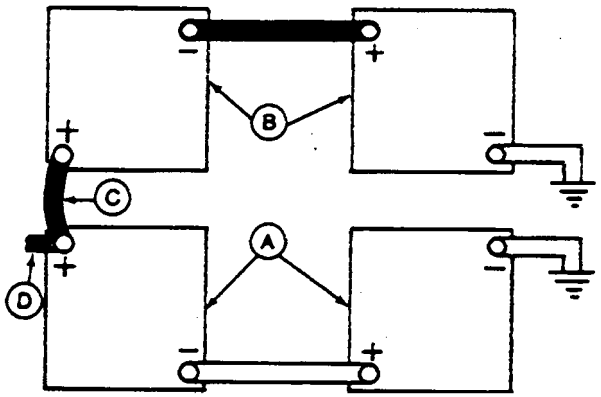
TS204 —UN—15APR13

Exploding Battery



RG4678 —UN—14DEC88

12-Volt System



RG4698 —UN—14DEC88

24-Volt System

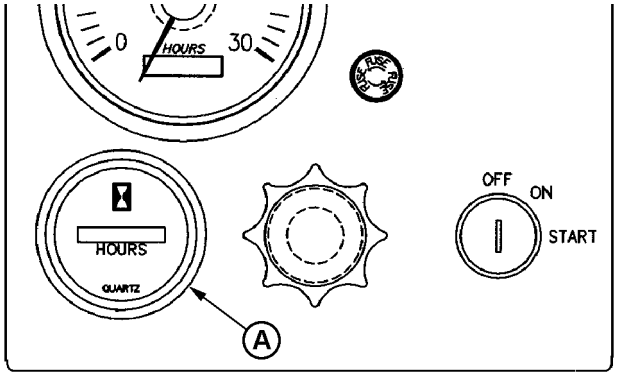
A—12-Volt Machine Battery (ies)
B—12-Volt Booster Battery (ies)
C—Booster Cable
D—Cable to Starting Motor

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

Observe Service Intervals

Using hour meter (A) (if equipped) as 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. Service MORE OFTEN if engine is operated under adverse conditions. Neglecting maintenance can result in failures or permanent damage to the engine.



RG13534 —UN—07MAY04

Instrument Panel with Optional Hour Meter

A—Hour Meter

OURGP12,00002B4 -19-05MAY04-1/1

Use Correct Fuels, Lubricants, and Coolant

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

Consult your John Deere 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.

TS100 —UN—23AUG88

DPSG,OUOE003,20 -19-09OCT07-1/1

Lubrication and Maintenance Service Interval Chart—Standard Industrial Engines

NOTE: The service intervals below are for standard industrial engines. Match service items below to titles in Lubrication and Maintenance Sections for procedures.

	Lubrication and Maintenance Service Intervals			
Item	Daily	500 Hour/ 12 Month	2000 Hour/ 24 Month	As Required
Check Engine Oil and Coolant Level	•			
Check Fuel Filter	•			
Check Air Cleaner Dust Unloader Valve & Indicator[a]	•			
Perform Visual Walkaround Inspection	•			
Changing Engine Oil And Replacing Oil Filter[b]		•		
Replacing Fuel Filter Element		•		
Cleaning Crankcase Vent Tube		•		
Checking Air Intake System		•		
Checking Engine Speeds		•		
Checking Belt Tensioner Spring Tension and Belt Wear		•		
Checking Engine Electrical Ground Connection		•		
Servicing Fire Extinguisher		•		
Checking Engine Mounts		•		
Servicing Battery		•		
Checking Cooling System		•		
Replenishing SCAs as Required		•		
Testing Diesel Engine Coolant		•		
Pressure Testing Cooling System		•		
Checking Crankshaft Vibration Damper (If Equipped)[c]			•	
Flushing Cooling System[d]			•	
Testing Thermostats			•	
Adding Coolant				•
Replacing Air Cleaner Elements				•
Replacing Poly-Vee Belt				•
Checking Fuses				•
Checking Air Compressor (If Equipped)				•
Bleeding Fuel System				•

[a] Replace primary air cleaner element when restriction indicator shows a vacuum of 625 mm (25 in.) H2O.
[b] If PLUS-50 or ACEA - E4/E5/E6/E7 oil is NOT used along with a John Deere oil filter, the oil change interval is reduced to every 250 hours.
[c] Replace crankshaft damper every 4500 hours or 60 months, whichever occurs first.
[d] 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.

OURGP12,00000FD -19-10AUG07-1/1

Lubrication and Maintenance Service Interval Chart—Generator (Standby) Applications

NOTE: Use service intervals listed below for generator (standby) applications. Match service items below to titles in Lubrication and Maintenance Sections for procedures.

	Lubrication and Maintenance Service Intervals			
Item	**Every 2 Weeks**	**500 Hours or 12 Months**	**2000 Hours or 24 Months**	**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	•			
Check Air Cleaner Dust Unloader Valve & Indicator [a]	•			
Perform Visual Walkaround Inspection	•			
Changing Engine Oil And Replacing Oil Filter[b]		•		
Replacing Fuel Filter Element		•		
Cleaning Crankcase Vent Tube		•		
Checking Air Intake System		•		
Checking Engine Speeds		•		
Checking Belt Tensioner Spring Tension and Belt Wear		•		
Checking Engine Electrical Ground Connection		•		
Servicing Fire Extinguisher		•		
Checking Engine Mounts		•		
Servicing Battery		•		
Checking Cooling System		•		
Replenishing SCAs as Required		•		
Testing Diesel Engine Coolant		•		
Pressure Testing Cooling System		•		
Checking Crankshaft Vibration Damper [c]			•	
Flushing Cooling System[d]			•	
Testing Thermostats			•	
Adding Coolant				•
Replacing Air Cleaner Elements				•
Replacing Poly-Vee Belt				•
Checking Fuses				•
Checking Air Compressor (If Equipped)				•
Adjusting Speed Gain				•
Bleeding Fuel System				•

[a]Replace primary air cleaner element when restriction indicator shows a vacuum of 625 mm (25 in.) H2O.
[b]If PLUS-50 or ACEA - E4/E5/E6/E7 oil is NOT used along with a John Deere oil filter, the oil change interval is reduced to every 250 hours.
[c]Replace crankshaft damper every 4500 hours or 60 months, whichever occurs first.
[d]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.

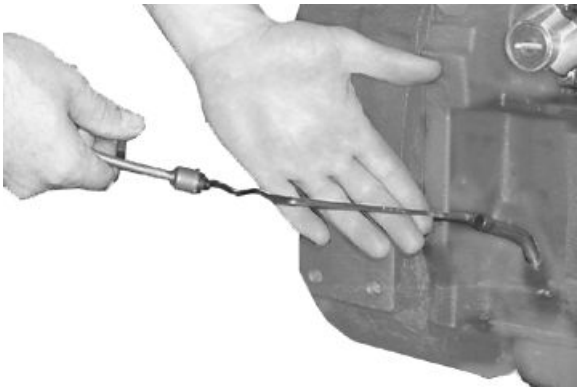
OURGP12,00002B5 -19-02JAN07-1/1

Daily Prestarting Checks

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

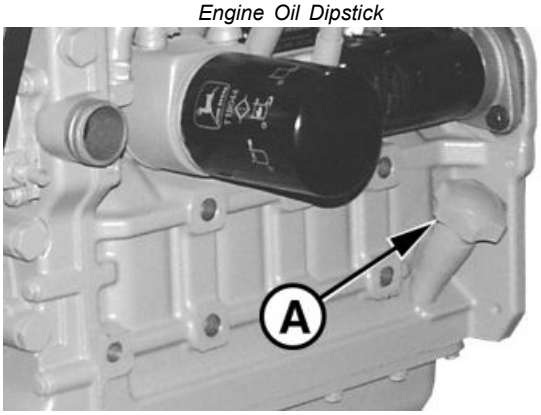
IMPORTANT: DO NOT add makeup oil until the oil level is BELOW the "ADD" mark on dipstick. Do not use break-in oil in this engine.

A—Left Side Oil Filler Cap
B—Rocker Arm Cover Oil Filler Cap
C—Crosshatch on Dipstick



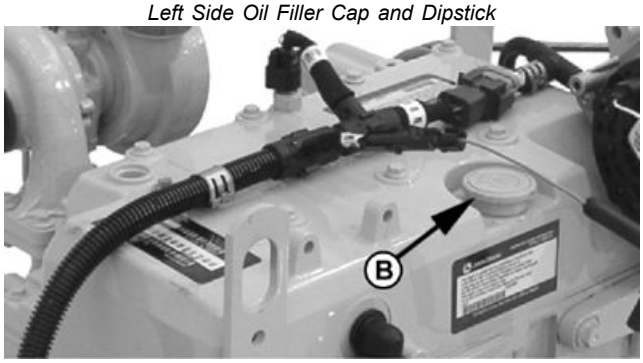
RG12692 —UN—07FEB03

Engine Oil Dipstick



RG12779 —UN—07JAN03

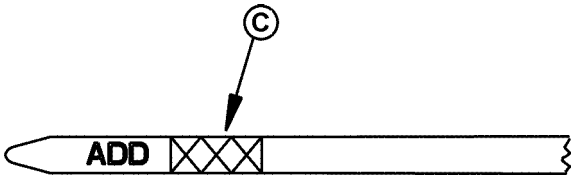
Left Side Oil Filler Cap and Dipstick



RG15337 —UN—04OCT07

Rocker Arm Cover Filler Cap

RG14931 —UN—13JUL06



Crosshatch on Dipstick

Continued on next page

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 left side (A) or rocker arm cover filler cap (B) locations.

   After checking oil, hand tighten dipstick used on left-hand oil fillers.

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

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 filler neck. Fill radiator (A) with proper coolant solution if level is low. (See ADDING COOLANT in Service As Required Section.) Check overall cooling system for leaks.

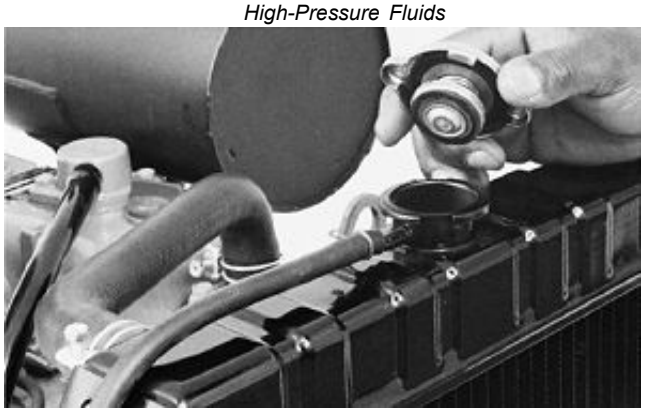
NOTE: Refer to your vehicle's operator's manual for recommendations for non-John Deere supplied accessories.

IMPORTANT: Drain water from filter bowl daily to avoid premature failure of unit injection pump.

When using BIODIESEL blends, monitor water quantity in fuel filter element more closely. Water in the separator may need to be drained more frequently.

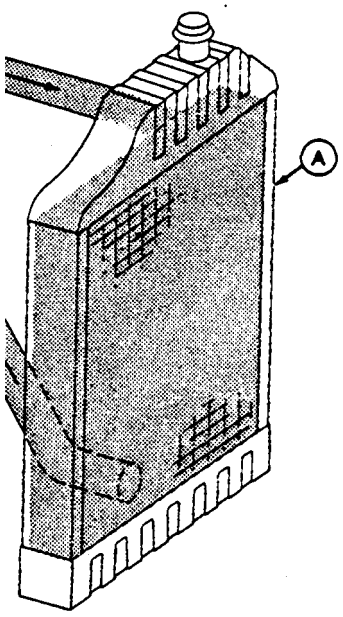
High-Pressure Fluids

TS281 —UN—15APR13



Check Coolant Level in Radiator

RG6576 —UN—20JAN93



Fill Radiator

RG4675 —UN—14DEC88

A—Fill Radiator

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3. Check the fuel filter (A) 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 plug (B) at bottom of fuel filter or bowl, if equipped, two or three turns.

b. Loosen air bleed plug (C) two full turns on fuel filter mounting and drain water from bottom until fuel starts to drain out.

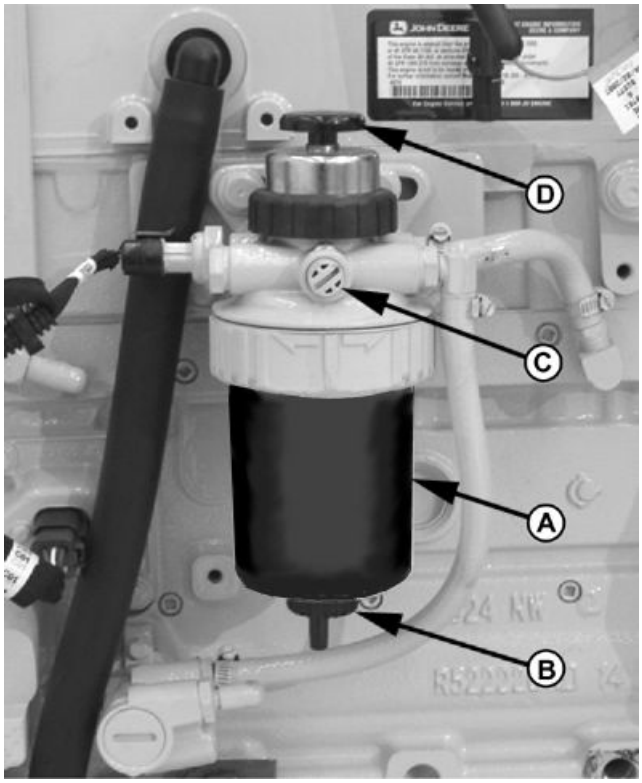
c. When fuel starts to drain out, tighten drain plug securely.

After draining water from the fuel filter, the filter must be primed. Once the filter has been primed, fuel system will purge itself when starter is cranked.

a. Operate hand primer (D) on the fuel filter header until fuel flow is free from air bubbles.

b. Tighten bleed plug securely.

A—Fuel Filter
B—Drain Plug
C—Air Bleed Plug
D—Hand Primer



RG15334A —UN—11OCT07

Fuel Transfer Pump and Filter

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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.

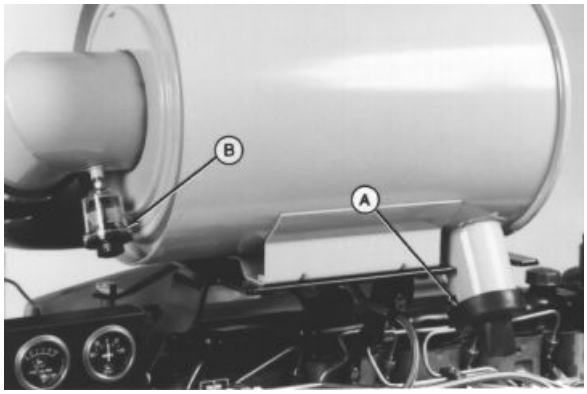
IMPORTANT: Maximum air intake restriction is 6.25 kPa (0.06 bar) (1.0 psi) (25 in. H_2O). A clogged air cleaner element will cause excessive intake restriction and a reduced air supply to the engine.

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.



RG7332A —UN—22JAN99

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. Contact your engine distributor or servicing dealer for repairs.

OUOD006,00000C2 -19-03AUG07-4/4

Changing Engine Oil and Replacing Filter

IMPORTANT: Changing engine oil and filter every 500 hours or 12 months depends on the following requirements:

- **Engine equipped with oil pan that allows capacity for this extended drain interval.**
- **Use of premium oil: John Deere PLUS-50™, ACEA E7 or ACEA E6.**
- **Perform engine oil analysis to determine actual extended service life of ACEA E7 and ACEA E6 oils.**
- **Use of approved John Deere oil filter.**
- **Use of diesel fuel with sulfur content less than 0.50% (5000 ppm).**

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

IMPORTANT: If using BIODIESEL blends greater than B20, reduce oil change interval to half the recommended service interval, or monitor engine oil using OILSCAN to ensure fuel dilution does not exceed 5%.

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

NOTE: Service intervals depend on sulfur content of the diesel fuel, oil pan capacity, and the oil and filter used. (See DIESEL ENGINE OIL and DIESEL ENGINE OIL AND FILTER SERVICE INTERVALS in the "Fuels, Lubricants, and Coolant" section.

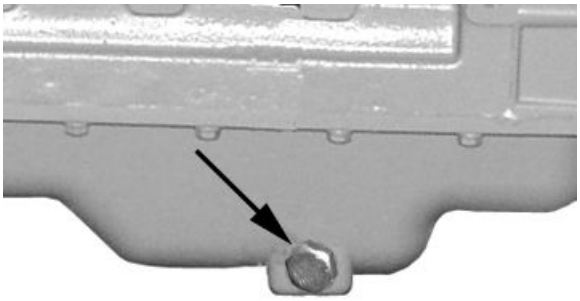
OILSCAN™ or OILSCAN PLUS™ is a John Deere sampling program to help you monitor machine performance and identify potential problems before they cause serious damage. OILSCAN™ and OILSCAN PLUS™ kits are available from your John Deere engine distributor or servicing dealer. Oil samples should be taken prior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

CAUTION: Metal surfaces of oil pan and drain plug maybe hot to the touch. Use care to prevent burns.

To change engine oil and oil filter:

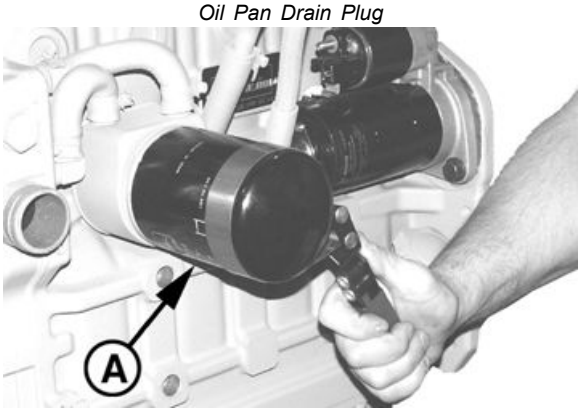
1. Run engine approximately 5 minutes to warm up oil. Shut engine off.
2. Remove oil pan drain plug (arrow).
3. Drain crankcase oil from engine while warm.
4. Turn filter element (A) counterclockwise using a suitable filter wrench to remove. Discard oil filter element.

NOTE: Depending on engine application, oil filter may have either a vertical or horizontal mounting.



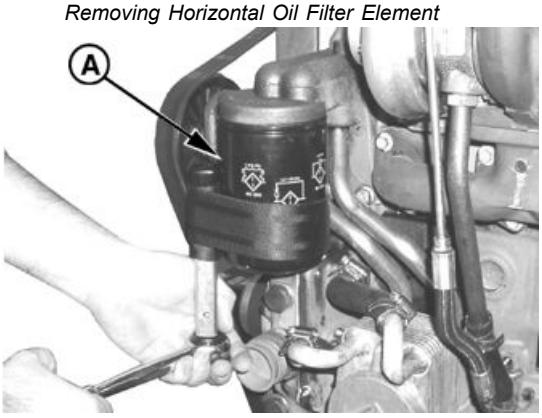
RG12783 —UN—18FEB03

Oil Pan Drain Plug



RG12693 —UN—07FEB03

Removing Horizontal Oil Filter Element



RG12822 —UN—09FEB03

Removing Optional Vertical Oil Filter Element

A—Oil Filter Element

5. Remove oil filter packing and clean filter mounting pad.

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

NOTE: Apply a thin coat of engine oil to the entire filter packing. DO NOT use grease.

Continued on next page

6. Oil new packing and install new filter element. Hand tighten element according to values printed on filter element. If values are not provided, tighten element by hand approximately 3/4 — 1-1/4 turn after packing contacts filter housing. DO NOT overtighten filter element. If a filter wrench is used, be sure it is padded to avoid damaging element.
7. Install oil pan drain plug with O-ring. If O-ring is damaged, replace it.
8. Tighten drain plug to specifications.

Specification	
Oil Pan Drain Plug With O-Ring—Torque	35 N·m (26 lb ft)

PLUS-50 is a trademark of Deere & Company.
OILSCAN is a trademark of Deere & Company.
OILSCAN PLUS is a trademark of Deere & Company.

OUOD006,00000C9 -19-10AUG07-2/3

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

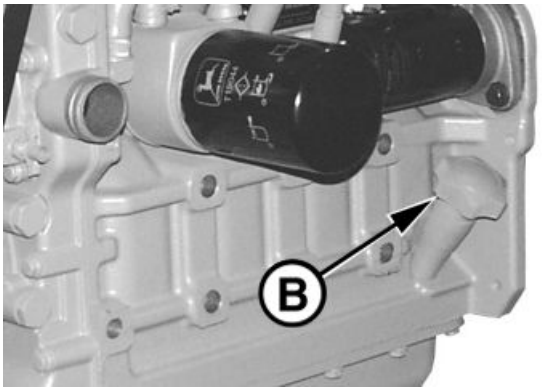
   To determine the correct oil fill quantity for your engine, see ENGINE CRANKCASE OIL CAPACITIES in the Specifications Section of this manual.

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 to within crosshatch marks (D) on dipstick. DO NOT overfill.

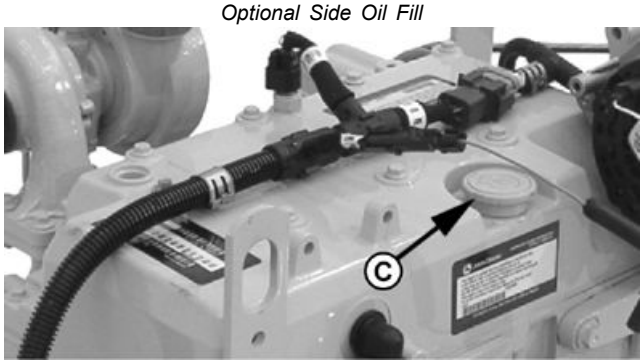
10. Start engine and run to check for possible leaks.
11. Stop engine and check oil level after 10 minutes. Oil level reading should be within crosshatch marks (D) on dipstick.

B—Optional Side Oil Fill
C—Rocker Arm Cover Oil Fill
D—Crosshatch Marks on Dipstick



RG12779A —UN—07JAN03

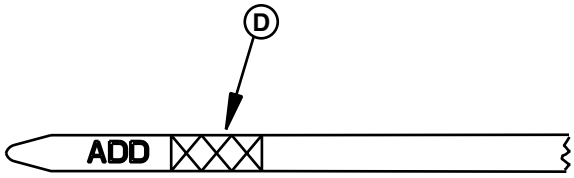
Optional Side Oil Fill



RG15338 —UN—04OCT07

Rocker Arm Cover Oil Fill

RG12781 —UN—17FEB03



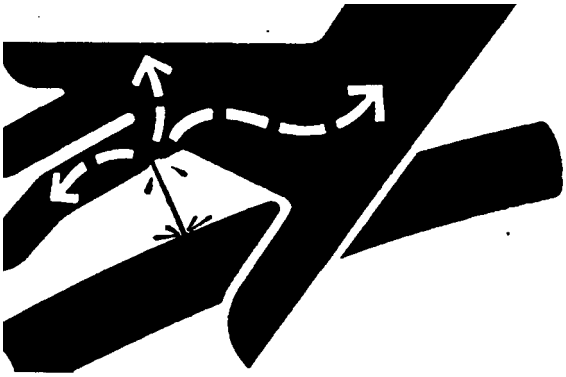
Crosshatch Marks on Dipstick

OUOD006,00000C9 -19-10AUG07-3/3

Replacing Fuel Filter Element

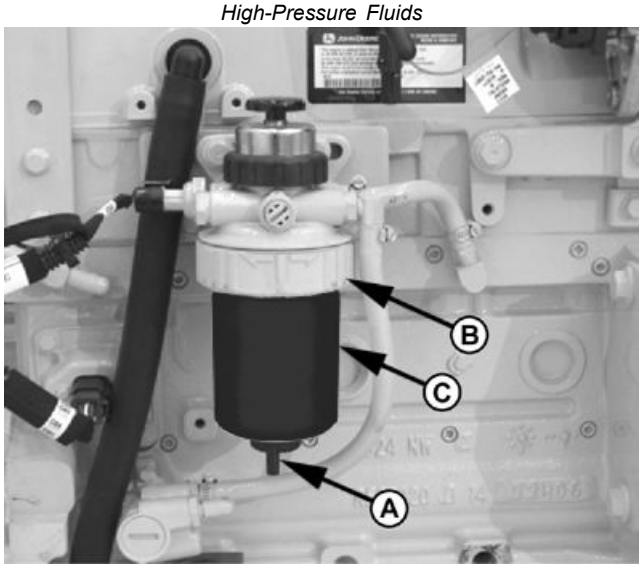
CAUTION: Escaping fluid under pressure can penetrate the skin causing serious injury. Relieve pressure before disconnecting fuel or other lines. Tighten all connections before applying pressure. Keep hands and body away from pinholes and nozzles which eject fluids under high pressure. Use a piece of 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.



X9811 —UN—23AUG88

High-Pressure Fluids



RG15479 —UN—19OCT07

Fuel Filter

A—Drain Plug
B—Retaining Ring
C—Filter Element

1. Close fuel shut-off valve, if equipped.
2. Thoroughly clean fuel filter assembly and surrounding area.
3. Disconnect water sensor wiring (if equipped).
4. Loosen drain plug (A) and drain fuel into a suitable container.

NOTE: Lifting up on retaining ring while rotating the ring helps in clearing raised locators.

5. Firmly grasp retaining ring (B) and rotate it counterclockwise 1/4 turn (as viewed from top). Remove ring with filter element (C).
6. 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.

7. Install new filter element onto mounting base. Be sure element is properly indexed and firmly seated on base. It may be necessary to rotate filter for correct alignment.

   If equipped with water separator bowl, remove filter element from separator bowl. Drain and clean separator bowl. Dry with compressed air. Install bowl onto new element. Tighten securely.
8. Align keys on filter element with slots in filter base.
9. 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.

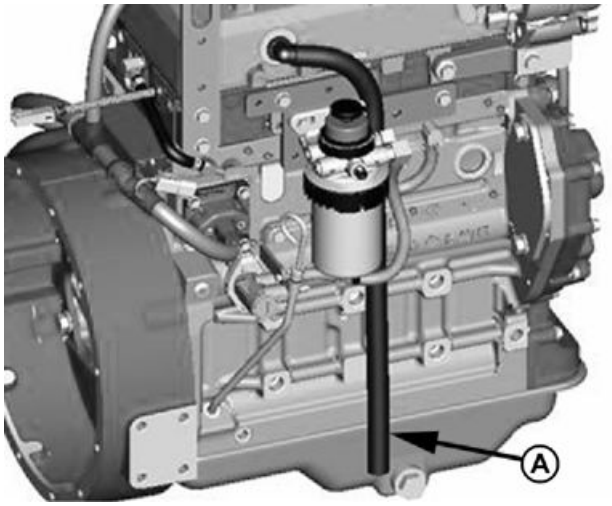
10. Reconnect water sensor wiring (if equipped).
11. Open fuel shut-off valve and prime the fuel filter. (See PRIMING THE FUEL FILTER in Service As Required Section.)

OUOD006,00000C3 -19-17OCT07-1/1

Cleaning Crankcase Vent Tube

If you operate the engine in dusty conditions, clean the tube at shorter intervals.

1. Remove and clean crankcase vent tube (A).
2. Install the vent tube.



RG15634 —UN—19OCT07

Crankcase Vent Tube

OUOD006,00000CA -19-10AUG07-1/1

Checking Air Intake System

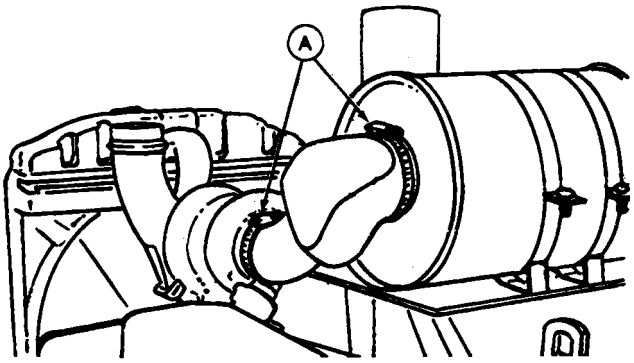
IMPORTANT: The air intake system must not leak. Any leak, no matter how small, may result in internal engine damage due to abrasive dirt and dust entering the intake system.

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. H_2O), is torn, or visibly dirty. See REPLACING AIR CLEANER ELEMENT later in Service As Required section.

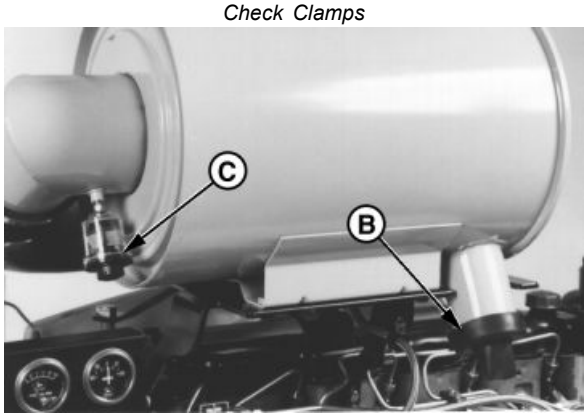
4. Test air restriction indicator (C) for proper operation. Replace indicator as necessary.

IMPORTANT: If not equipped with air restriction indicator, replace air cleaner elements at 500 Hours or 12 Months, whichever occurs first.



RG4689 —UN—20DEC88

Check Clamps



RG7332B —UN—22JAN99

Unloader Valve and Air Restriction Indicator

A—Clamps
B—Dust Unloader Valve
C—Air Restriction Indicator

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Check Engine Speeds

Observe tachometer reading (if equipped) and check speeds per specification (See correct speeds listed in ENGINE POWER RATINGS). If speeds require adjustment, contact your John Deere dealer or distributor.

RG41183,000003E -19-31JAN07-1/1

Checking Belt Tensioner Spring Tension and Belt Wear

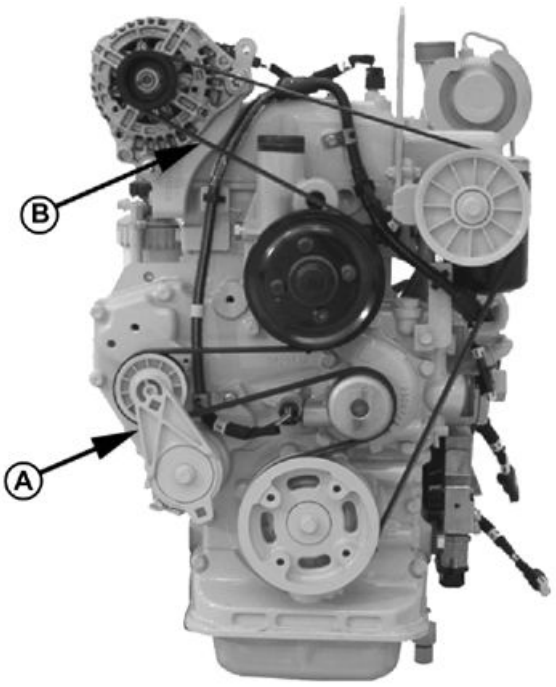
Belt drive systems equipped with an automatic (spring) belt tensioner cannot be adjusted or repaired. The automatic belt tensioner is designed to maintain proper belt tension over the life of the belt. If tensioner spring tension is not within specification, replace tensioner assembly.

Checking Belt Wear

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

Visually inspect poly-vee belt (B) for excessive wear and cracks. See Replacing Fan and Alternator Belt in Section 45.

A—Belt Tensioner **B—Poly-Vee Belt**



RG15339 —UN—04OCT07

Belt Wear Inspection

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OUOD006,000010E -19-10OCT07-1/2

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:

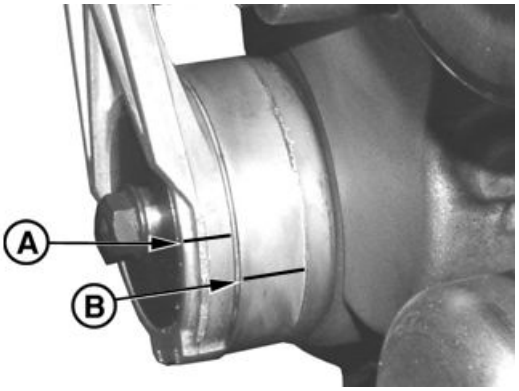
1. Release tension on belt using a breaker bar and socket on tension arm. Remove belt from pulleys.
2. Release tension on tension arm and remove breaker bar.
3. Put a mark (A) on swing arm of tensioner as shown.
4. Measure 21 mm (0.83 in.) from (A) and put a mark (B) on tensioner mounting base.
5. Install torque wrench (C) so that it is aligned with center of pulley and tensioner. Rotate the swing arm with the 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)

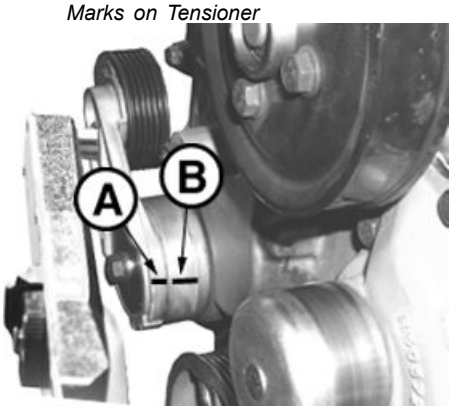
NOTE: Threads on belt tensioner roller cap screw are LEFT-HAND threads

A—Mark On Swing Arm
B—Mark On Tensioner Mounting Base
C—Torque Wrench



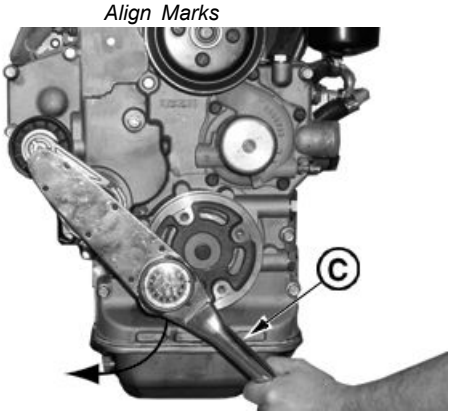
RG12825 —UN—19FEB03

Marks on Tensioner



RG12824 —UN—19FEB03

Align Marks



RG12971 —UN—04JUN03

Align Torque Wrench With Pulley And Tensioner

OUOD006,000010E -19-10OCT07-2/2

Checking Engine Electrical Ground Connections

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

RG41183,0000049 -19-08JAN03-1/1

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 once a month. 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

RW4918 —UN—15DEC88

Fire Extinguisher

RG,RG34710,5567 -19-02JAN07-1/1

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 bracket, 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 if rubber has deteriorated or mounts have collapsed, as necessary.

DPSG,RG34710,111 -19-07JAN02-1/1

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. If necessary, add clean, soft water to bring level to bottom of filler neck.

2. Keep batteries clean by wiping them with a damp cloth. Keep all connections clean and tight. Remove any corrosion, and wash terminals with a solution of 1 part baking soda and 4 parts water. Tighten all connections securely.

TS204 —UN—15APR13

Exploding Battery

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

RG,RG34710,5568 -19-20MAY96-1/2

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.**

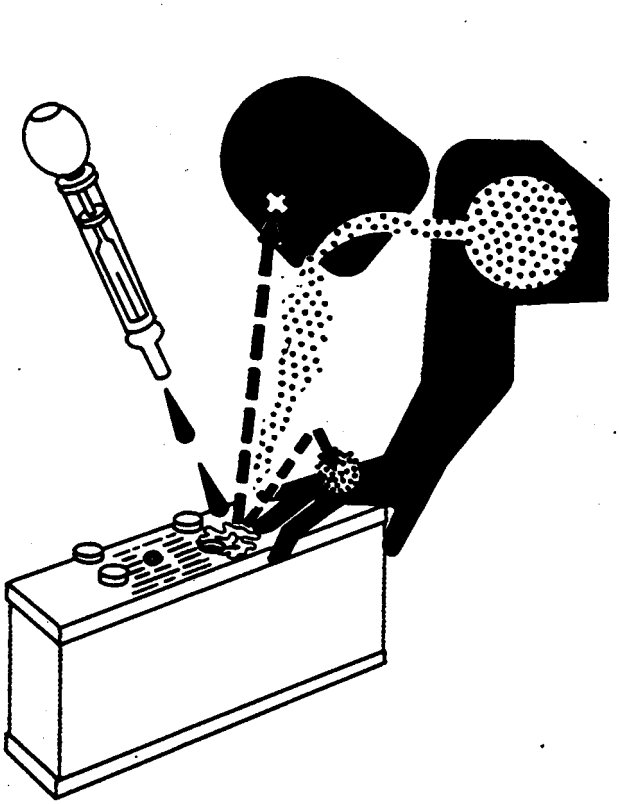
If acid is swallowed:

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
24 Volt Standard Duty Starter—Cold Cranking Amps	570



TS203 —UN—23AUG88

Sulfuric Acid

RG,RG34710,5568 -19-20MAY96-2/2

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.

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

TS281 —UN—15APR13

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.

RG,RG34710,5580 -19-20MAY96-1/1

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.

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.

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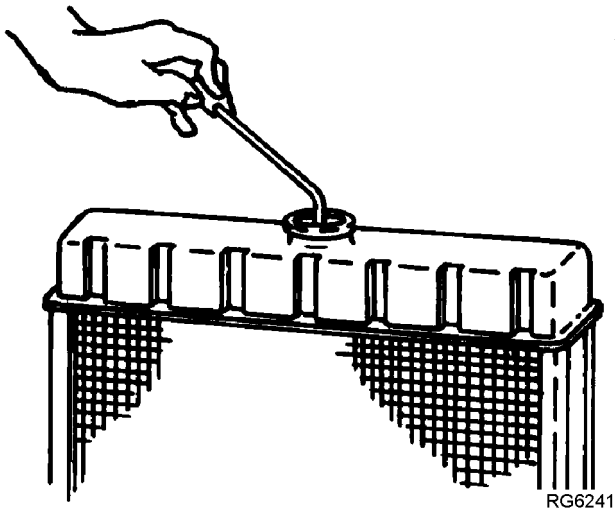
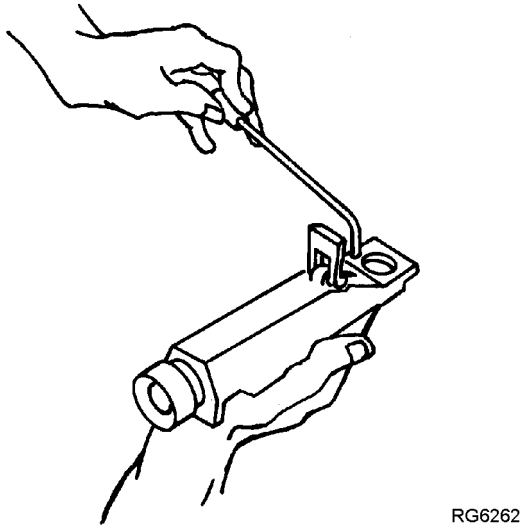
COOLSCAN is a trademark of Deere & Company
COOLSCAN PLUS is a trademark of Deere & Company
COOLSCAN PLUS is a trademark of Deere & Company



Radiator Coolant Check



JT07298 Coolant/Battery Tester

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.

DPSG,OUOD002,1921 -19-27JUL06-1/1

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.

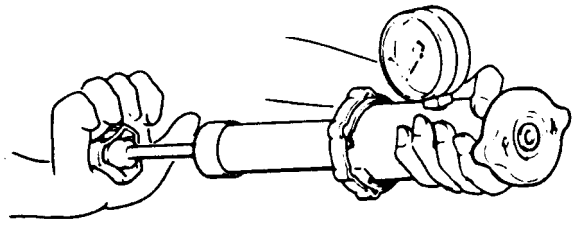
Coolant Analysis

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.

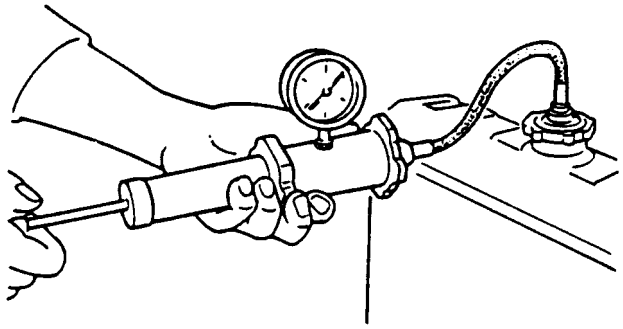
Contact your John Deere dealer for more information on coolant analysis.

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

Pressure Testing Cooling System



Test Radiator Cap



RG6557 —UN—20JAN93

RG6558 —UN—20JAN93

Test Cooling System

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

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

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 within the normal range if cap is acceptable.

   If gauge does not hold pressure, replace radiator cap.

Specification	
Radiator Cap Holding Pressure (Not Opening For 10 Seconds)—Pressure	70 kPa (0.7 bar) (10 psi) minimum

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.

RG,RG34710,5586 -19-07JAN02-1/1

Checking Crankshaft Vibration Damper (If Equipped)

1. Grasp vibration damper with both hands and attempt to turn it in both directions. If rotation is felt, damper is defective and should be replaced.

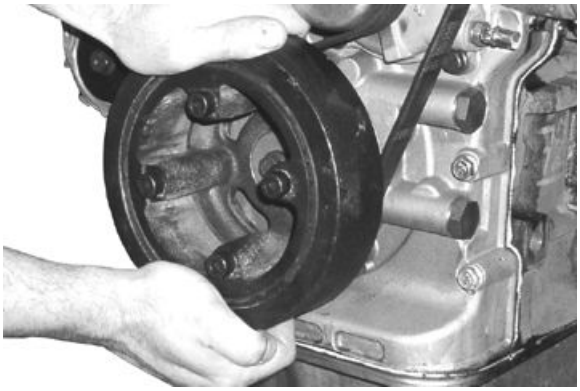
IMPORTANT: The vibration damper assembly is not repairable and should be replaced every 4500 hours or 60 months, whichever occurs first.

2. Check vibration damper radial runout by positioning a dial indicator so probe contacts damper outer diameter.
3. Remove starter motor.
4. Rotate crankshaft using JDG1704 or JDG10221 Flywheel Turning Tool as shown. This tool is available from your John Deere dealer or distributor.
5. Note dial indicator reading. If runout exceeds specifications given below, replace vibration damper.

Specification	
Vibration Damper—Maximum Radial Runout	1.00 mm (0.040 in.)

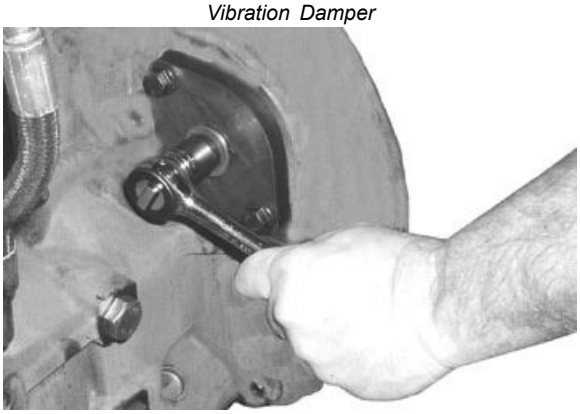
6. Remove tool and reinstall starter motor. Connect wiring and tighten mounting cap screws to specifications.

Specification	
Starter Motor Mounting Cap Screws—Torque	80 N·m (59 lb-ft)



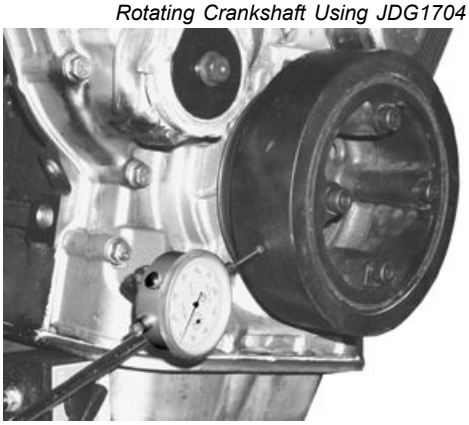
RG12917 —UN—16MAY03

Vibration Damper



RG12788 —UN—21JAN03

Rotating Crankshaft Using JDG1704



RG12918 —UN—16MAY03

Vibration Damper Radial (Concentricity)

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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)****.*

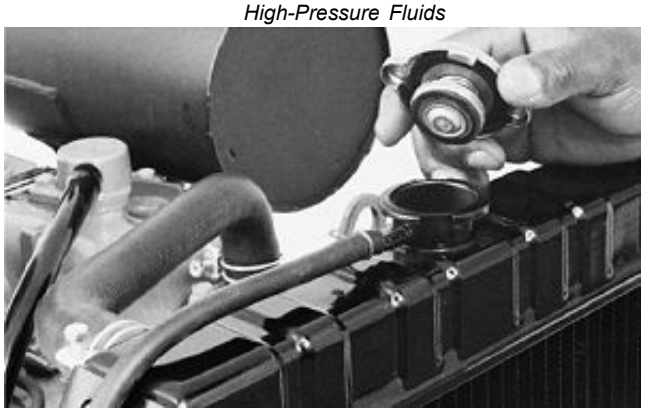
If COOL-GARD is not used, the flushing interval is 2000 hours or 24 months of operation.

Drain old coolant, flush the entire cooling system, test thermostats, and fill with recommended clean coolant as follows:

1. Pressure test entire cooling system and pressure cap if not previously done. (See PRESSURE TESTING COOLING SYSTEM, in the Lubrication and Maintenance/500 Hour/12 Month Section.)
2. Slowly open the engine cooling system filler cap or radiator cap to relieve pressure and allow coolant to drain faster.
3. Open engine block drain valve (A) on right side of coolant pump on engine front cover. Drain all coolant from engine block.
4. Open radiator drain valve. Drain all coolant from radiator.
5. Remove coolant hose and thermostat at this time, if not previously done. (See TESTING THERMOSTATS OPENING TEMPERATURE later in this section.)
6. Close all drain valves after coolant has drained.

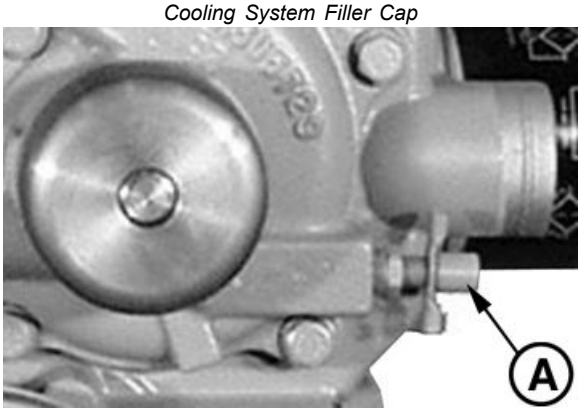
High-Pressure Fluids

TS281 —UN—15APR13



Cooling System Filler Cap

RG6576 —UN—20JAN93



Engine Coolant Drain Valve

RG12534 —UN—12DEC02

A—Engine Coolant Drain Valve

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OURGP12,00002B8 -19-03AUG07-1/2

CAUTION: Do not run engine longer than 10 minutes. Doing so may cause engine to overheat which may cause burns when radiator water is draining.

7. Fill the cooling system with clean water. Run the engine about 10 minutes to stir up possible rust or sediment.
8. Stop engine, pull off lower radiator hose and remove radiator cap. Immediately drain the water from system before rust and sediment settle.
9. 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™. These products may be available from your John Deere dealer. Follow manufacturer's directions on label.
10. 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.
11. Close all drain valves on coolant pump and radiator. Install thermostat. Reinstall radiator hose and tighten clamps securely.

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 after filling cooling system.

12. Refill system with fresh coolant at radiator until coolant touches bottom of filler neck. See specification for capacity. (See ADDING COOLANT in Service As Required Section.) Install radiator cap.

RG6576 —UN—20JAN93

Radiator Cap

Specification

2.4 L and 3.0 L Industrial Engine— Coolant Capacity	2.6 L (2.7 qt)
2.4 L and 3.0 L Gen Set Engine—Coolant Capacity	2.9 L (3.1 qt)

13. Run engine until it reaches operating temperature. This mixes the solution uniformly and circulates it through the entire system. See GENERAL ENGINE SPECIFICATIONS in Specification Section for normal coolant temperature specification for your engine.
14. After running engine, check coolant level and entire cooling system for leaks.

Fleetguard is a trademark of Cummins Engine Company, Inc.
RESTORE is a trademark of Fleetguard.
RESTORE PLUS is a trademark of Fleetguard.

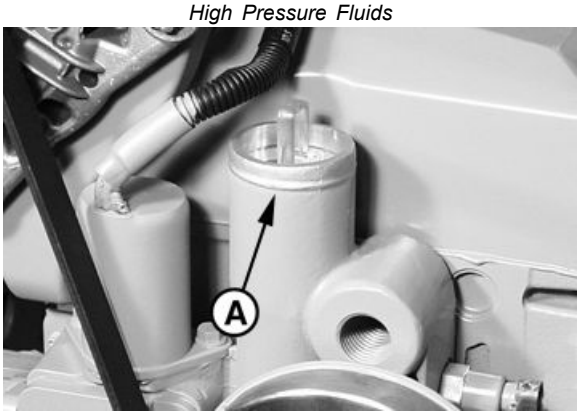
OURGP12,00002B8 -19-03AUG07-2/2

Testing Thermostats Opening Temperature-Earlier Engines

A—Thermostat Hose Connection

TS281 —UN—15APR13

High Pressure Fluids



RG12789 —UN—21JAN03

Coolant Hose to Thermostat Housing (Earlier Engine Shown)

RG41183,0000050 -19-02JAN07-1/4

To Remove Thermostat (Earlier Engines)

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 on top of engine timing gear cover for leaks.
2. Remove radiator pressure cap and partially drain cooling system.
3. Remove coolant hose (shown removed) from thermostat housing.
4. Remove thermostat from thermostat housing by squeezing handle to release from grooves inside bore and pull out.

RG12790 —UN—21JAN03

Removing Thermostat from Housing (Earlier Engine Shown)

5. Clean and check thermostat housing for cracks or damage.

Continued on next page

RG41183,0000050 -19-02JAN07-2/4

Testing Thermostats Opening Temperature (Earlier Engines)

1. Remove thermostat(s).
2. Visually inspect thermostat(s) for corrosion or damage. If dual thermostats, replace as a matched set as necessary.

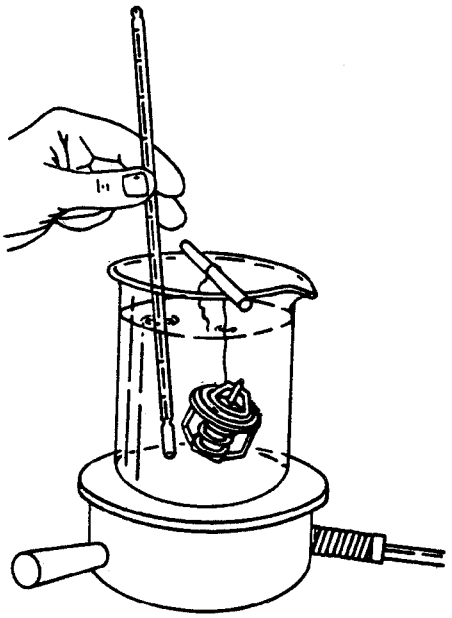
CAUTION: DO NOT allow thermostat or thermometer to rest against the side or bottom of container when heating water. Either may rupture if overheated.

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 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)



RG5971 —UN—23NOV97

Testing Thermostat Opening Temperature

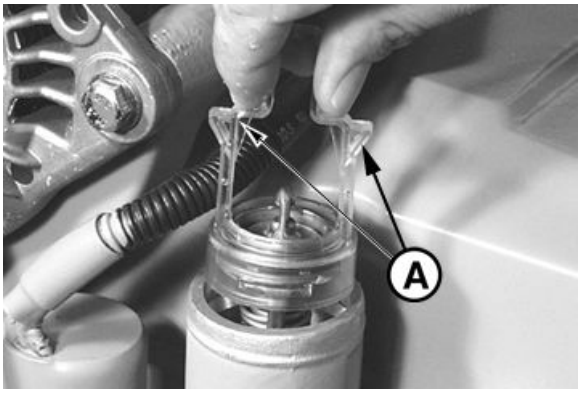
5. Remove thermostat and observe its closing action as it cools. In ambient air the thermostat should close completely. Closing action should be smooth and slow.
6. Replace any defective thermostat.

RG41183,0000050 -19-02JAN07-3/4

To Install Thermostats (Earlier Engines)

1. Insert thermostat in housing as shown until both tabs (A) are fully engaged in the groove in the housing bore.
2. Install coolant hose to thermostat cover. Tighten clamp.
3. If not already done, fill cooling system and check for leaks.

IMPORTANT: Air must be expelled from cooling system when filling. Loosen temperature sending unit fitting at rear of cylinder head or plug in thermostat housing to allow air to escape when filling system. Tighten fitting or plug when all air has been expelled.



RG12791 —UN—21JAN03

Installing Thermostat (Earlier Engine Shown)

RG41183,0000050 -19-02JAN07-4/4

Testing Thermostats Opening Temperature

To Remove Thermostat

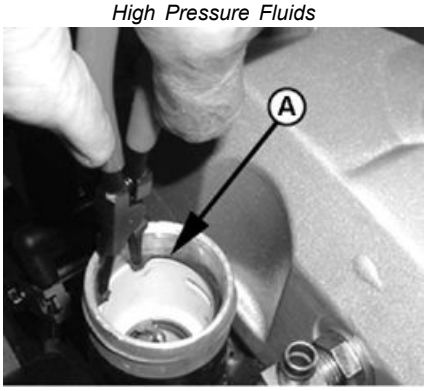
CAUTION: Explosive release of fluids from pressurized cooling system can cause serious burns. DO NOT drain coolant until it has cooled below operating temperature. Always loosen radiator pressure cap or drain valve slowly to relieve pressure.

1. Visually inspect area around thermostat housing on top of engine timing gear cover for leaks.
2. Remove radiator pressure cap and partially drain cooling system.
3. Remove coolant hose (shown removed) from thermostat housing.
4. Remove snap ring (A) from thermostat housing.
5. Remove thermostat (B) from thermostat housing.
6. Clean and check thermostat housing for cracks or damage.

A—Snap Ring **B—Thermostat**

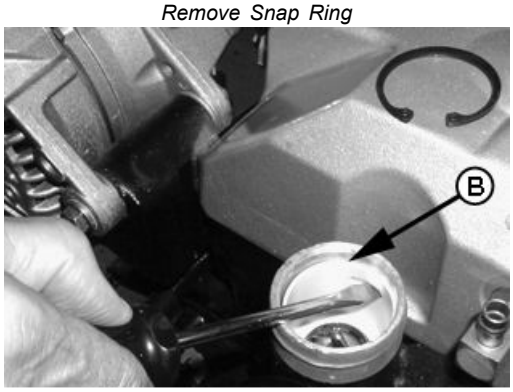
High Pressure Fluids

TS281 —UN—15APR13



Remove Snap Ring

RG14940 —UN—03JAN07



Remove Thermostat

RG14941 —UN—03JAN07

Continued on next page

OUOD006,00000C1 -19-03AUG07-1/3

Testing Thermostats Opening Temperature

1. Remove thermostat(s).
2. Visually inspect thermostat(s) for corrosion or damage. If dual thermostats, replace as a matched set as necessary.

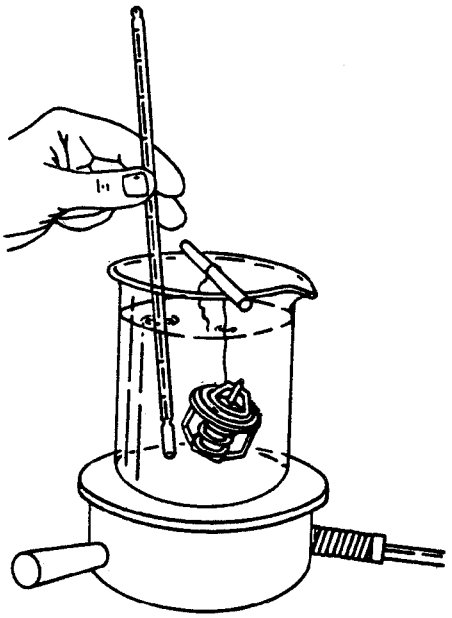
CAUTION: DO NOT allow thermostat or thermometer to rest against the side or bottom of container when heating water. Either may rupture if overheated.

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 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)



RG5971 —UN—23NOV97

Testing Thermostat Opening Temperature

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. Replace any defective thermostat.

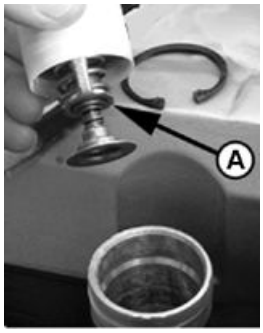
Continued on next page

To Install Thermostats

1. Insert thermostat (A) in housing.
2. Install snap ring (B) in groove.
3. Install coolant hose to thermostat cover. Tighten clamp.
4. If not already done, fill cooling system and check for leaks.

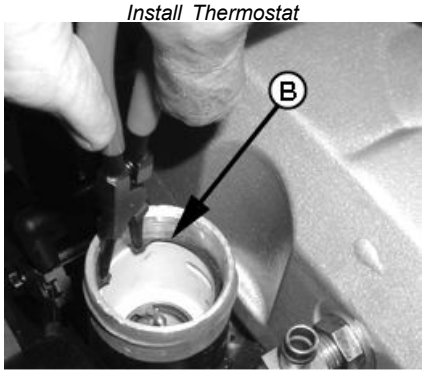
IMPORTANT: Air must be expelled from cooling system when filling. Loosen temperature sending unit fitting at rear of cylinder head or plug in thermostat housing to allow air to escape when filling system. Tighten fitting or plug when all air has been expelled.

A—Thermostat **B—Snap Ring**



RG14942 —UN—03JAN07

Install Thermostat



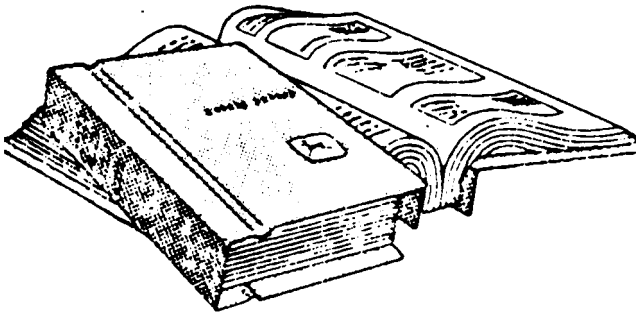
RG14943 —UN—03JAN07

Install Snap Ring

OUOD006,00000C1 -19-03AUG07-3/3

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.



RG4624 —UN—15DEC88

Component Technical Manuals

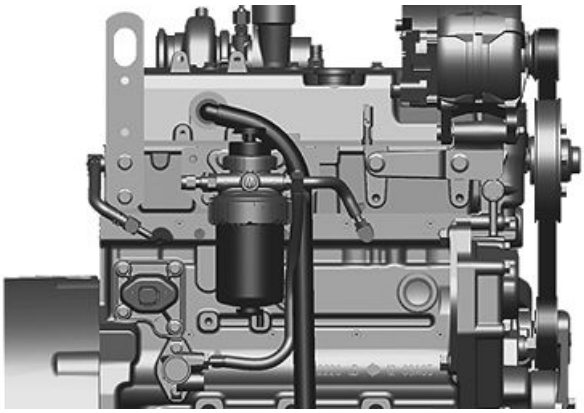
OURGP11,0000048 -19-23AUG10-1/1

Do Not Modify Fuel System

IMPORTANT: Modification or alteration of the fuel injection system, 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 injectors yourself. Special training and special tools are required. (See your authorized servicing dealer or engine distributor.)



RG15478 —UN—19OCT07

Fuel System

OUOD006,000011D -19-19OCT07-1/1

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 on a temporary or emergency basis only. DO NOT use any other stop-leak additives in the system. Leaks should be permanently repaired as soon as possible.

Air must be expelled from cooling system when coolant is added.

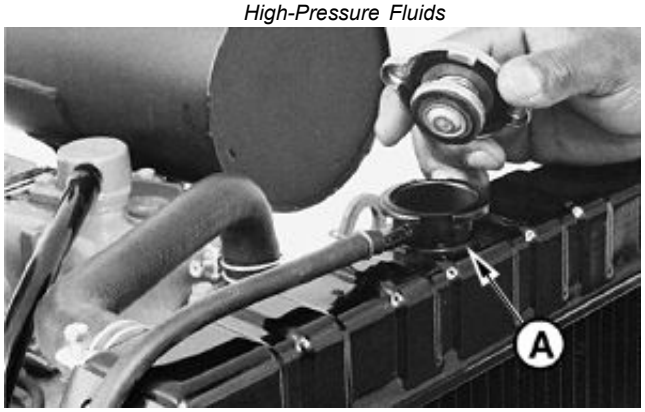
1. Loosen temperature sending unit fitting at rear of cylinder head or plug in side of thermostat housing to allow air to escape when filling system.

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.

TS281 —UN—15APR13

High-Pressure Fluids



RG6576A —UN—04JUN03

Radiator Filler Neck

2. Remove radiator cap and fill until coolant level touches bottom of radiator filler neck (A).
3. Tighten plugs and fittings when air has been expelled from system.
4. Run engine until it reaches operating temperature.

OUOD006,0000070 -19-03JAN07-1/1

Pre-Start Cleaning Guide

IMPORTANT: Before cleaning machine, allow ample time for hot surfaces to cool.

IMPORTANT: Do not direct high-pressure spray from hose output directly at or close to electrical connections and sensors.

Rigorous 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 any 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 after hydraulic and other fluid leaks.
- Fuel Lines — Check for leaks, cracks, and kinks that require service before use.
- 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.
- Handle transmission and power steering fluids with care. Immediately clean up any spills, especially around fill points.
- 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, and poor connections.

ZE59858,0000009 -19-20MAY13-1/1

Replacing Single Stage Air Cleaner Element

IMPORTANT: ALWAYS REPLACE air cleaner when air restriction indicator shows a vacuum greater than 625 mm (25 in.) H_2O, is torn, or visibly dirty.

NOTE: Refer to manufacturers' instructions for servicing air cleaners not supplied by John Deere. If engine is NOT equipped with an air restriction indicator, replace air filter element every 500 hours of operation or every 12 months, whichever occurs first.

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.

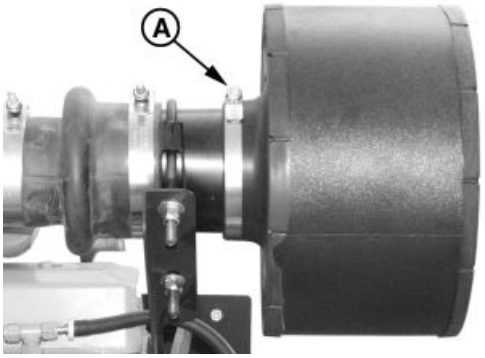
Specification	
Air Cleaner Neck Clamp—Torque	6.8 N·m (60 lb-in.)

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.

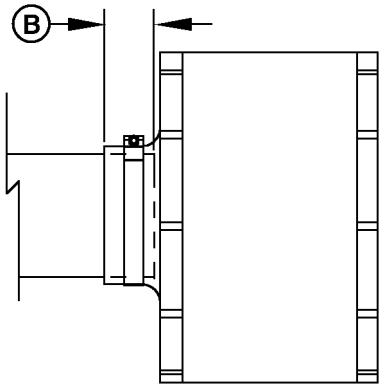
IMPORTANT: Whenever the air cleaner has been serviced or removed, ALWAYS fully depress the air restriction indicator reset button (if equipped) to assure accurate readings.

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



Single Stage Air Filter

RG11319A —UN—06SEP00



Installation of Single Stage Air Cleaner

RG11320 —UN—07SEP00

A—Outlet Neck Clamp **B—Filter to Engine Overlap**

RG41183,0000053 -19-03JAN07-1/1

Replacing Axial Seal Air Cleaner Filter Element

IMPORTANT: ALWAYS REPLACE primary air cleaner element when air restriction indicator shows a vacuum greater than 625 mm (25 in.) H_2O, is torn, or visibly dirty.

NOTE: Refer to manufacturers' instructions for servicing air cleaners not supplied by John Deere. If engine is NOT equipped with an air restriction indicator, replace air filter element every 500 hours of operation or every 12 months, whichever occurs first.

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.

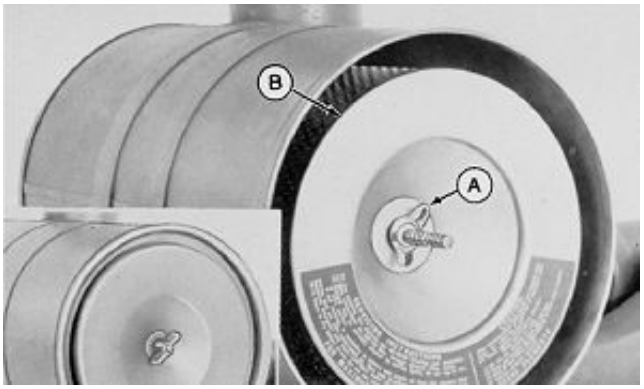
NOTE: Some engines may have a dust unloader valve (C) on the air cleaner. If equipped, squeeze valve tip to release any trapped dirt particles.

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

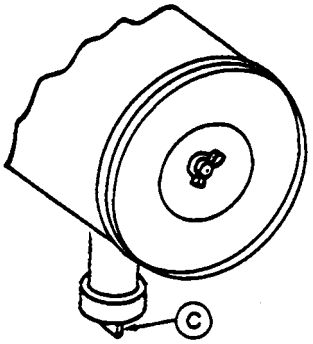
IMPORTANT: Whenever the air cleaner has been serviced or had cover removed, ALWAYS fully depress the air restriction indicator reset button (if equipped) to assure accurate readings.

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



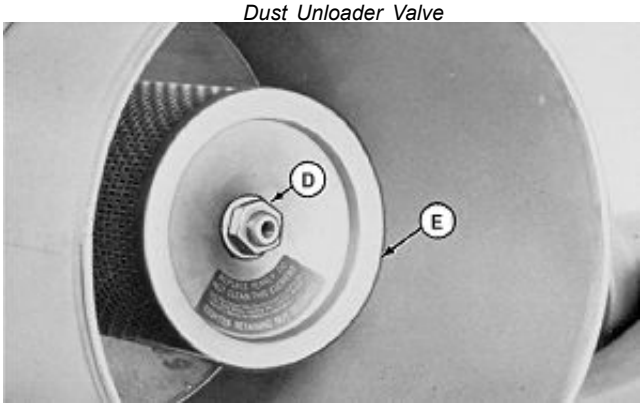
RG4686 —UN—20DEC88

Wing Nut and Primary Element



RG4687 —UN—20DEC88

Dust Unloader Valve



RG11068 —UN—26JUN00

Retaining Nut and Secondary Element

A—Wing Nut
B—Primary Element
C—Dust Unloader Valve
D—Retaining Nut
E—Secondary Element

RG41183,0000054 -19-03JAN07-1/1

Replacing Radial Seal Air Cleaner Filter Element

IMPORTANT: ALWAYS REPLACE primary air cleaner element when air restriction indicator shows a vacuum greater than 625 mm (25 in.) H_2O, is torn, or visibly dirty.

NOTE: Refer to manufacturers' instructions for servicing air cleaners not supplied by John Deere. If engine is NOT equipped with an air restriction indicator, replace air filter element every 500 hours of operation or every 12 months, whichever occurs first.

1. Unlatch and remove dust cup/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.

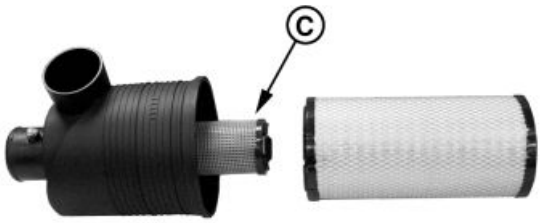
8. If equipped, fully depress air restriction indicator reset button and release to reset indicator.

RG11321A —UN—08SEP00

Dust Cup/Cover

RG11322A —UN—08SEP00

Primary Filter Element



RG11327A —UN—08SEP00

Secondary Filter Element

A—Dust Cap/Cover
B—Primary Filter Element
C—Secondary Filter Element

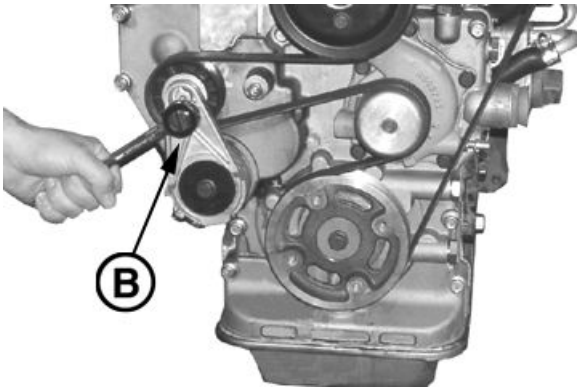
RG41183,0000055 -19-03JAN07-1/1

Replacing Fan and Alternator Belt

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.

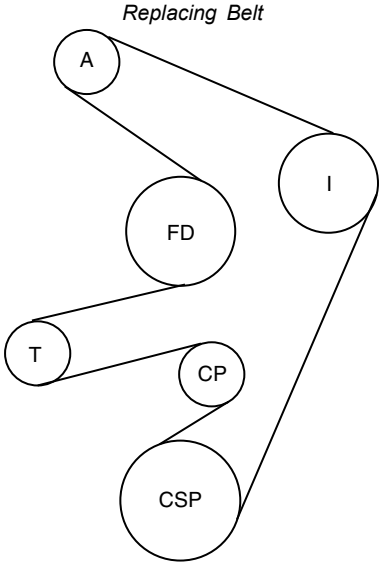
1. Inspect belts for cracks, fraying, or stretched out areas. Replace if necessary.
2. To replace belt, release tension on belt using a 3/8-inch drive arm (B) on tension arm.
3. Remove poly-vee belt from pulleys and discard belt.
4. Install new belt, making sure belt is correctly seated in all pulley grooves. Refer to belt routing at right for your application.
5. Best method to install belt is:
   Back-wrap it around the fan pulley (FD), route it over the alternator (A), over top of the idler pulley (I), then down and around the crankshaft pulley (CSP). Finally, use a 3/8-inch drive arm to rotate the tensioner (T) to the tensioned position and slip the belt (back-wrap) over the coolant pump pulley (CP), then release the tensioner.
6. Apply tension to belt with tensioner. Remove drive arm.
7. Start engine and check belt alignment.

A—Alternator
CSP—Crankshaft Pulley
FD—Fan Drive
I— Idler Pulley
T—Tensioner
CP—Coolant Pump



Replacing Belt

RG12800 —UN—21JAN03



Belt Routing

RG12799 —UN—21JAN03

RG41183,0000056 -19-03JAN07-1/1

Checking Fuses

Check fuses for electrical system and replace if defective. Refer to manufactures instructions and wiring diagrams for location and types of fuses.

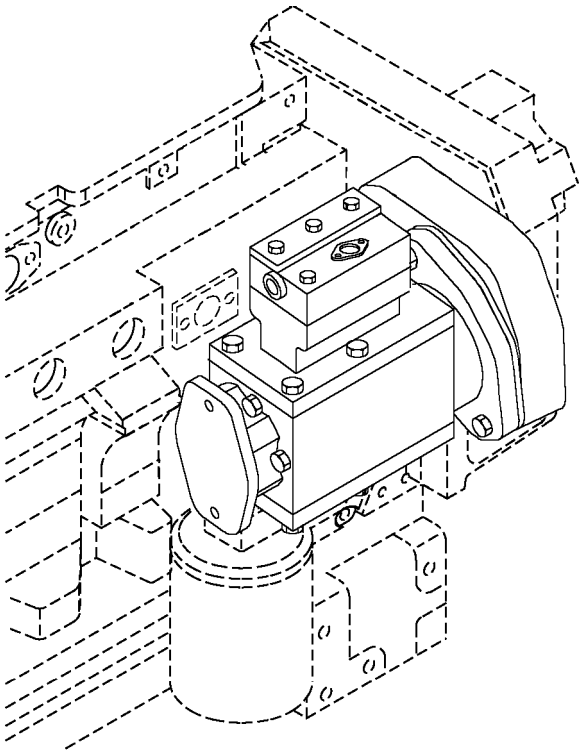
OUOD006,0000111 -19-11OCT07-1/1

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.



RG12836 —UN—27FEB03

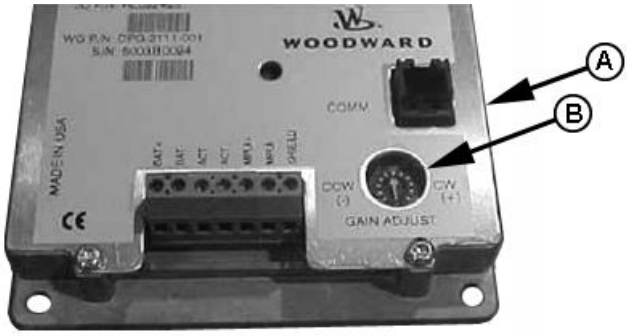
Air Compressor (Optional)

OURGP12,00001E0 -19-26FEB03-1/1

Adjusting Speed Gain (Generator Sets)

An electronic governor is standard equipment for all generator set applications. The Engine Control Unit (ECU) (A) is set to maintain a specific speed during engine operation. It adjusts the amount of fuel being delivered in order to maintain that engine speed when load changes occur. The adjustment range of the gain potentiometer (B) is ±20% of the nominal gain value for the rated speed of the generator set. See your John Deere distributor or servicing dealer for any additional adjustments to the ECU, or for diagnostic and troubleshooting information.

IMPORTANT: Under NO circumstances should the Engine Control Unit (ECU) be opened.



RG13537 —UN—07MAY04

Engine Control Unit

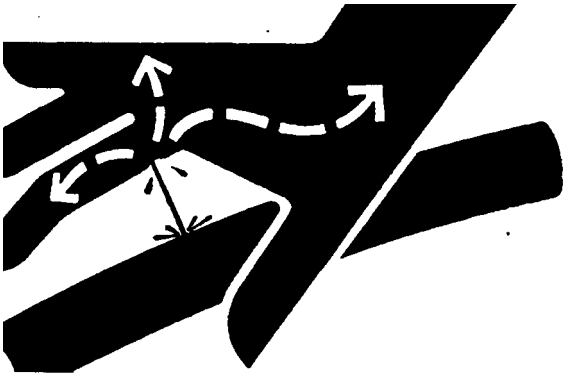
A—Engine Control Unit **B—Gain Potentiometer**

OURGP12,00002BC -19-05MAY04-1/1

Priming the Fuel Filter

CAUTION: 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.



X9811 —UN—23AUG88

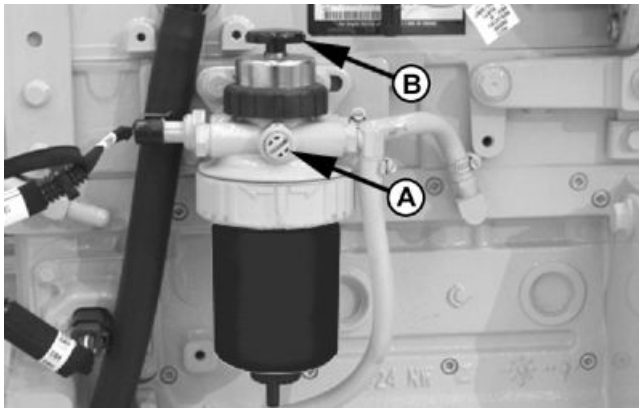
High Pressure Fluids

Any time the fuel system has been opened up for service (lines disconnected or filter removed), it will be necessary to prime the fuel filter. Once the fuel filter has been primed, the fuel system will purge itself while cranking the starter.

OUOD006,00000C4 -19-19OCT07-1/2

1. Open air bleed plug (A) two full turns by hand.
2. Pump the hand primer (B) on filter mounting base, or (if equipped) the hand primer on fuel transfer pump, until a noticeable amount of fuel and air comes out of vent opening. Continue pumping and close vent screw when fuel starts to flow.

A—Air Bleed Plug **B—Hand Primer**



RG15630 —UN—19OCT07

Fuel Filter Air Bleed Plug and Hand Primer

OUOD006,00000C4 -19-19OCT07-2/2

General Troubleshooting Information

Troubleshooting engine problems can be difficult. An engine wiring diagram is provided in this section to help isolate electrical problems.

Refer to manufactures literature and diagrams for electrical systems not provided by John Deere.

Later in this section is a list of possible engine problems along with 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.

RG41183,0000058 -19-16JAN03-1/1

Precautions for Welding

Remove paint before welding or heating (see Safety Section in this manual for more information on paint removal and high-pressure lines).

CAUTION: Avoid potentially toxic fumes and dust. Hazardous fumes can be generated when paint is heated by welding, soldering, or using a torch. Do all work outside or in a well ventilated area. Dispose of paint and solvent properly. If you sand or grind paint, avoid breathing the dust by wearing an approved respirator. If you use solvent or paint stripper, remove with soap and water before welding. Remove solvent or paint stripper containers and other flammable material from area before welding. Allow fumes to disperse at least 15 minutes before welding or heating.

IMPORTANT: Welding on the engine is NOT ALLOWED. If welding must be performed on the machine, follow these precautions.

IMPORTANT: High currents or electrostatic discharge into electronic components from welding may cause permanent damage.

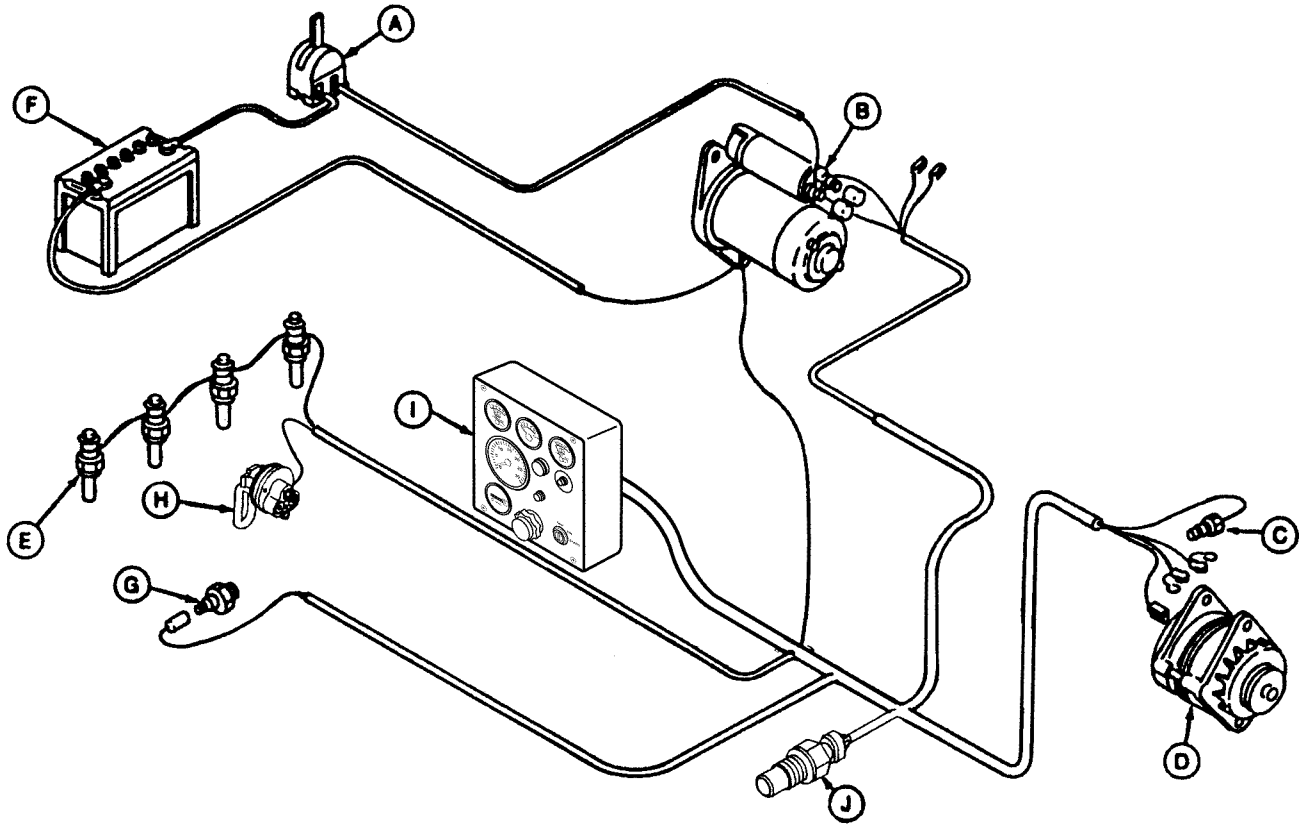
1. Remove paint from the area to be welded and ground cable clamp location.

TS953 —UN—15MAY90

2. Disconnect the negative (-) battery cable(s) or open battery (-) switch if equipped.
3. Disconnect the positive (+) battery cable(s) or open battery (+) switch if equipped.
4. Clear or move any wiring harness sections away from the welding area.
5. Welding on engine components is not allowed.
6. Never connect the welder ground to any engine component or engine driven components that may be connected to the engine.
7. After welding, reverse steps 2—3.

DX,WELDING,PRECAUTIONS -19-06DEC10-1/1

Electrical System Schematic



RG13538 —UN—10JUN04

A—Battery Disconnect Switch (Optional)
B—Starter Motor
C—Coolant Temperature Sensor
D—Alternator
E—Glow Plugs
F—Battery
G—Oil Pressure Sensor
H—Block Heater (Optional)
I— Instrument (Gauge) Panel
J— Speed Sensor

OURGP12,00002BB -19-04OCT07-1/1

Engine Troubleshooting

Symptom	Problem	Solution
NOTE: If using BIODIESEL blends above B20, the possibility of some of the symptoms listed below, such as power loss, could increase.	Incorrect starting procedure.	Verify correct starting procedure.
Engine cranks but will not start		
	No fuel.	Check fuel in tank and manual shut-off valve.
	Exhaust restricted.	Check and correct exhaust restriction.
	Fuel filter plugged or full of water.	Replace fuel filter or drain water from filter.
	Unit injection pumps not getting fuel /or air in fuel system.	Check fuel flow at transfer pump or bleed fuel system.
	Faulty injection pumps or nozzles.	Consult authorized diesel repair station for repair or replacement.
Engine hard to start or will not start	Engine starting under load.	Disengage driveline.
	Improper starting procedure.	Review starting procedure.
	No fuel.	Check fuel tank.
	Air in fuel line.	Bleed fuel line.
	Cold weather.	Activate glow plugs.
	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.
	Injection shut-off not reset.	Turn key switch to “OFF” then to “ON”.
Engine overspeeds at startup (Generator set engines)	Low gain on electronic governor.	Increase governor speed gain.
Sluggish response to load changes (Generator set engines)	Low gain on electronic governor.	Increase governor speed gain.

Continued on next page

Symptom	Problem	Solution
Engine knocks	Low engine oil level.	Add oil to engine crankcase.
	Unit injection pumps out of time.	See your authorized servicing dealer or engine distributor.
	Hydraulic valve lifters.	See your authorized servicing dealer or engine distributor.
	Low coolant temperature.	Remove and check thermostat.
	Engine overheating.	See “Engine Overheats”.
Engine runs irregularly or stalls frequently	Low coolant temperature.	Remove and check thermostat.
	Clogged fuel filter.	Replace fuel filter element.
	Water, dirt, or air in fuel system.	Drain, flush, fill, and bleed system.
	Dirty or faulty injectors.	Have authorized servicing dealer or engine distributor check injectors.
Below normal engine temperature	Defective thermostat.	Remove and check thermostat.
	Defective temperature gauge or sender.	Check gauge, sender, and connections.
Lack of power	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 injectors.	Have authorized servicing dealer or engine distributor check injectors.
	Injector tip deposits.	Use John Deere approved biodiesel fuel conditioners containing detergents.
	Unit injection pumps out of time	See your authorized servicing dealer or engine distributor.

Continued on next page

Symptom	Problem	Solution
	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.
	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.
	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 fuel injectors.	See your authorized servicing dealer or engine distributor.
	Engine out of time.	See your authorized servicing dealer or engine distributor.
Engine emits black or gray exhaust smoke	Improper type of fuel.	Use proper fuel.
	Clogged or dirty air cleaner.	Service air cleaner.
	Engine overloaded.	Reduce load.
	Fuel injectors dirty.	Use John Deere approved Biodiesel or diesel fuel conditioners. If no improvement is seen, see your authorized servicing dealer or engine distributor.
	Engine out of time.	See your authorized servicing dealer or engine distributor.

Continued on next page

Symptom	Problem	Solution
	Turbocharger not functioning.	See your authorized servicing dealer or engine distributor.
Engine overheats	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 serviceman 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 water 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.
	Injector tip deposits.	Use John Deere approved biodiesel fuel conditioners containing detergents.
	Fuel injectors dirty.	See your authorized servicing dealer or engine distributor.
	Engine out of time.	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.

Continued on next page

Symptom	Problem	Solution
	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 or tighten connections as necessary.
	Defective battery.	Test battery.
	Defective alternator.	Test charging system.
Battery uses too much water	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	Engine driveline engaged.	Disengage engine driveline.
	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.
	Blown main system fuse.	Replace electrical system fuse.
Starter cranks slowly	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.
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 electrical system fuse.

OUOD006,00000CB -19-19OCT07-5/5

Storage

Engine Storage Guidelines

1. John Deere engines can be stored outside for up to three (3) months with no long term preparation IF COVERED BY 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 (3) months with no long term preparation.
3. John Deere engines can be stored inside for up to six (6) months with no long term preparation.
4. John Deere engines expected to be stored more than six (6) months MUST have long term storage preparation. (See PREPARING ENGINE FOR LONG TERM STORAGE, later in this section.)
5. Long term storage includes the use of a stabilized rust preventive oil to protect internal metal components of the engine. This oil should be an SAE 10 oil with 1-4 percent morpholine or equivalent vapor corrosion inhibitor. These rust preventive oils are available from area distributors.

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

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: DO NOT USE BIODIESEL DURING MACHINE STORAGE. When using biodiesel blends, switch to petroleum diesel for long-term storage. Before storage, operate engine on at least one complete tank of petroleum diesel fuel to purge the fuel system. Follow normal storage procedures once the fuel system has been purged.

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 10 oil with 1%-4% morpholine or equivalent vapor corrosion inhibitor, such as NOX RUST VCI-10 OIL from Daubert Chemical Company, Inc.
2. Ensure that the machine fuel tank is filled with high-quality petroleum diesel fuel. Filling the tank completely will ensure that water does not build up due to condensation. For storage of more than one year, use John Deere premium fuel conditioner (or equivalent) at the specified concentration.
3. Replace air cleaner.
4. 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.
5. 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.
6. 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.
7. 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.
8. Remove temporary lines installed in Step 6 above, and replace any lines or plugs previously removed.
9. Loosen (or remove) and store fan and alternator poly-vee belt.
10. Remove and clean batteries. Store them in a cool, dry place and keep them fully charged.
11. Disengage the clutch for any driveline.
12. Clean the exterior of the engine with salt-free water and touch up any scratched or chipped painted surfaces with a good quality paint.
13. Coat all exposed bare metal surfaces with grease or corrosion inhibitor if not feasible to paint.
14. Seal all openings on engine with plastic bags and tape.
15. Store the engine in a dry protected place. If engine must be stored outside, cover it with a waterproof canvas or other suitable protective material and use a strong waterproof tape.

OUOD006,00000FC -19-24OCT13-1/1

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 for correct readings 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 readings.

RG,RG34710,5613 -19-20MAY96-1/1

General OEM Engine Specifications

ITEM	UNIT OF MEASURE	4024HF	5030HF
Number of Cylinders	—	4	5
Bore	mm (in.)	86 (3.39)	86 (3.39)
Stroke	mm (in.)	105 (4.13)	105 (4.13)
Displacement	L (cu. in.)	2.44 (149)	3.05 (186)
Compression Ratio[a]	—	18.2:1	18.2:1
Max. Crank Pressure	kPa (in. H_2O)	0.5 (2)	0.5 (2)
Oil Pressure At Rated Speed - 2800 rpm - Gen (Prime) - Gen (Standby) - HF295, 2400 rpm - 2800 rpm, 62 kW (82 hp) - 2800 rpm, 74 kW (99 hp) - 2400 rpm, 57 kW (76 hp) - 2400 rpm, 62 kW (82 hp) - 2400 rpm, 68 kW (91 hp)	kPa (psi)	 380 (55) 273 (40) 273 (40) 320 (46)	 273 (40) 276 (40) 340 (49) 360 (52) 320 (46) 320 (46) 325 (47)
Oil Pressure At Low Idle	kPa (psi)	250 (36)	250 (36)
Coolant Temperature- Range - Industrial - Gen	°C (°F)	 82—94 (180—201) 82—94 (180—201)	 89—100 (192—212) 82—94 (180—201)
Coolant Temperature- Maximum - Industrial - Gen	°C (°F)	 105 (221) 110 (230)	 110 (230) 110 (230)
Cooling System Capacity	L (qt)	2.6 (2.7)	2.9 (3.1)
Length	mm (in.)	662 (26.1)	799 (31.5)
Width	mm (in.)	566 (22.3)	566 (22.3)
Height	mm (in.)	772 (30.4)	800 (31.5)
Weight	kg (lb)	251 (554)	287 (633)

NOTE: Engines with suffix "H" are turbocharged and aftercooled.

[a] *Piston compression ratio may vary based on production date.*

OUOD006,00000B0 -19-08JUL08-1/1

Engine Power Rating and Speed Specifications

NOTE: Specifications are subject to change without notice.

Engine speeds listed are as preset to factory specification. In some cases, slow idle speed will be reset depending upon specific vehicle application requirements. Refer to your machine technical manual for engine speeds that are different from those preset at the factory.

Power ratings specify flywheel power for a bare engine without the drag effect of a cooling fan or other accessories like an air compressor.

POWER RATINGS ON DYNAMOMETER FOR OEM ENGINES

Engine Model	Fuel System Option Code or Hz Rating	Engine Application	Slow Idle (rpm)	Fast Idle (rpm)	Rated Speed at Full Load (rpm)	Power Rating kW (HP)[a]
4024TF220	50 Hz	Gen Set	1400	1560	1500	21 (28)
	50 Hz	Gen Set	1400	1560	1500	31 (42)
	60 Hz	Gen Set	1400	1870	1800	36 (48)
	1602, 1608, 1657	Industrial	900	3000	2800	37 (49)
	1615	Industrial	900	2550	2400	42 (57)
	1601, 1654	Industrial	900	3000	2800	45 (60)
	1601, 1603, 1654	Industrial	900	3000	2800	49 (66)
4024TF281	60 Hz	Gen Set			1800	36 (49)
	1632, 1657	Industrial	900		2800	36 (48)
5030HF220	50 Hz	Gen Set	1400	1560	1500	62 (84)
	60 Hz	Gen Set	1400	1870	1800	72 (96)
	1606	Industrial	900	3000	2800	74 (99)
5030TF220	50 Hz	Gen Set	1400	1560	1500	41 (56)
	1604, 1655	Industrial	900	3000	2800	56 (75)
	60 Hz	Gen Set	1400	1870	1800	60 (80)
	1605, 1656	Industrial	900	3000	2800	63 (84)

[a]*Power rating is under full load and at rated speed listed. Gen set power ratings are standby power.*

JR74534,0000460 -19-28MAY13-1/1

Engine Crankcase Oil Capacities

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 approximate engine crankcase oil capacities for each “19__” option code for these engines.

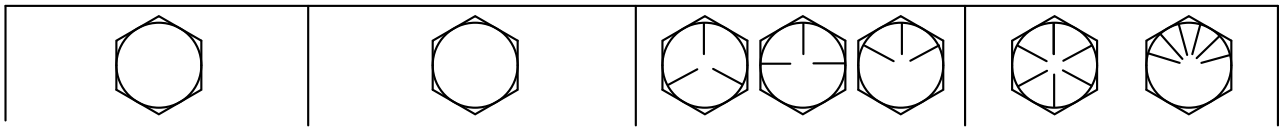
NOTE: Crankcase oil capacity may vary slightly. ALWAYS fill crankcase to within crosshatch marks on dipstick. DO NOT overfill.

Engine Model	Option Code	Crankcase Oil Capacity L (qt)
4024	1901	8 (8.5)
4024	1909	8 (8.5)
4024	1911	8 (8.5)
4024	1912	8 (8.5)
4024	1921	8 (8.5)
4024	1924	8 (8.5)
4024	1925	8 (8.5)
4024	1926	8 (8.5)
5030	1902	11 (11.5)
5030	1910	11 (11.5)
5030	1913	11 (11.5)
5030	1914	11 (11.5)

JR74534,0000461 -19-09JAN12-1/1

Unified Inch Bolt and Screw Torque Values

TS1671 —UN—01MAY03



Bolt or Screw Size	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]	
	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
													N·m	lb.-ft.	N·m	lb.-ft.
5/16	7.7	68	9.8	86	12	106	15.5	137	19.5	172	25	221	28	20.5	35	26
									N·m	lb.-ft.	N·m	lb.-ft.				
3/8	13.5	120	17.5	155	22	194	27	240	35	26	44	32.5	49	36	63	46
			N·m	lb.-ft.	N·m	lb.-ft.	N·m	lb.-ft.								
7/16	22	194	28	20.5	35	26	44	32.5	56	41	70	52	80	59	100	74
	N·m	lb.-ft.														
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.

[a]Grade 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.

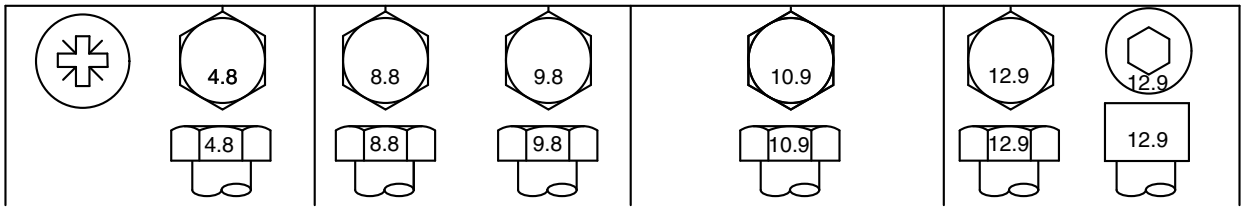
[b]"Lubricated" means coated with a lubricant such as engine oil, fasteners with phosphate and oil coatings, or 7/8 in. and larger fasteners with JDM F13C, F13F or F13J zinc flake coating.

[c]"Dry" means plain or zinc plated without any lubrication, or 1/4 to 3/4 in. fasteners with JDM F13B, F13E or F13H zinc flake coating.

DX,TORQ1 -19-12JAN11-1/1

Metric Bolt and Screw Torque Values

TS1670 —UN—01MAY03



Bolt or Screw Size	Class 4.8				Class 8.8 or 9.8				Class 10.9				Class 12.9			
	Lubricated[a]		Dry[b]		Lubricated[a]		Dry[b]		Lubricated[a]		Dry[b]		Lubricated[a]		Dry[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	4.7	42	6	53	8.9	79	11.3	100	13	115	16.5	146	15.5	137	19.5	172
									N·m	lb.-ft.	N·m	lb.-ft.	N·m	lb.-ft.	N·m	lb.-ft.
M8	11.5	102	14.5	128	22	194	27.5	243	32	23.5	40	29.5	37	27.5	47	35
			N·m	lb.-ft.	N·m	lb.-ft.	N·m	lb.-ft.								
M10	23	204	29	21	43	32	55	40	63	46	80	59	75	55	95	70
	N·m	lb.-ft.														
M12	40	29.5	50	37	75	55	95	70	110	80	140	105	130	95	165	120
M14	63	46	80	59	120	88	150	110	175	130	220	165	205	150	260	190
M16	100	74	125	92	190	140	240	175	275	200	350	255	320	235	400	300
M18	135	100	170	125	265	195	330	245	375	275	475	350	440	325	560	410
M20	190	140	245	180	375	275	475	350	530	390	675	500	625	460	790	580
M22	265	195	330	245	510	375	650	480	725	535	920	680	850	625	1080	800
M24	330	245	425	315	650	480	820	600	920	680	1150	850	1080	800	1350	1000
M27	490	360	625	460	950	700	1200	885	1350	1000	1700	1250	1580	1160	2000	1475
M30	660	490	850	625	1290	950	1630	1200	1850	1350	2300	1700	2140	1580	2700	2000
M33	900	665	1150	850	1750	1300	2200	1625	2500	1850	3150	2325	2900	2150	3700	2730
M36	1150	850	1450	1075	2250	1650	2850	2100	3200	2350	4050	3000	3750	2770	4750	3500

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 stainless steel fasteners or for nuts on U-bolts, see the tightening instructions for the specific application. Tighten plastic insert or crimped steel type lock nuts by turning the nut to the dry torque shown in the chart, unless different instructions are given for the specific application.

Shear bolts are designed to fail under predetermined loads. Always replace shear bolts with identical property class. 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 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.

[a] *"Lubricated" means coated with a lubricant such as engine oil, fasteners with phosphate and oil coatings, or M20 and larger fasteners with JDM F13C, F13F or F13J zinc flake coating.*

[b] *"Dry" means plain or zinc plated without any lubrication, or M6 to M18 fasteners with JDM F13B, F13E or F13H zinc flake coating.*

DX,TORQ2 -19-12JAN11-1/1

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 or other accessories not supplied by Deere.

RG,RG34710,5620 -19-20MAY96-1/1

Daily (Prestarting) Service

- Check engine oil level.
- Check coolant level.

IMPORTANT: Drain water by loosening drain plug on fuel/water separator bowl. Premature unit injection pump failure may occur if water is not drained daily.

- Check fuel filter/water separator bowl.
- Check air cleaner dust unloader valve and air restriction indicator, if equipped.
- Visual walkaround inspection.

RG41183,000006B -19-21JAN03-1/1

500 Hour/12 Month Service

- Change engine oil and filter.[1]
- Replace fuel filter element.
- Clean crankcase vent tube.
- Check air intake system.
- Check engine speeds
- Check belt tensioner and belt wear.
- Check engine electrical ground connection.
- Service fire extinguisher.
- Check engine mounts.
- Service battery.
- Check cooling system.
- Replenish SCAs as needed.
- Test diesel engine coolant.
- Pressure test cooling system.

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[1]If John Deere PLUS-50 or ACEA - E4/E5/E6/E7 oil is NOT used along with a John Deere oil filter, the oil and filter change interval is reduced by 50 percent to every 250 hours.

OUOD006,0000072 -19-03JAN07-1/1

2000 Hour/24 Month Service

- Check crankshaft vibration damper (If equipped). (5030 Engines only).
- Flush cooling system.[1]
- Test thermostats.

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[1]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.

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Service as Required

- Add coolant
- Replace air cleaner.
- Replace poly-vee belt.
- Check fuses
- Check air compressor (if equipped)
- Adjust speed gain (Generator sets)
- Bleed fuel system

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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 April 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 Limited 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 your engine online at https://www.johndeere.com/enginewarranty

or

Mail or FAX the registration form found in this manual to John Deere as indicated on the form.

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.johndeere.com/ (click on "Dealer Locator").

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 will provide the service required, maintaining a purchaser-dealer relationship of mutual respect from the beginning is always helpful.

Privacy Notice

At John Deere your privacy is important to us. We collect, use, and disclose your personal information in accordance with the John Deere privacy statement. For instance, we collect, use, and disclose your personal information to provide you with the products and services that you request; to communicate with you as our 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 your information. For complete details on your privacy rights and to obtain a copy of the John Deere Privacy Statement, please visit our website at https://www.johndeere.com/.

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 will be 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 April 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 required, 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 above.)

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.johndeere.com/ (Click on "Dealer Locator".)

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At the time of requesting warranty service, the purchaser must be prepared to present evidence of the date of delivery of the engine.

John Deere reimburses authorized service outlets for limited travel expenses incurred in making warranty service repairs in non-John Deere applications when travel is actually 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 shall not apply to components and accessories which are not furnished or installed by John Deere, nor to failures caused by such items, except as required by law.

Purchaser's Responsibilities

The cost of normal maintenance and depreciation.

Periodic cleaning of the diesel particulate filter (DPF).

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 above warranty fails to correct purchaser's performance problems caused by defects in workmanship and/or materials, purchaser's exclusive remedy shall be limited to payment by John Deere of actual damages in an amount not to exceed the 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.

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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.

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 1-319-292-5844, 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 1-319-292-5844; 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 need to 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 below 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.

Record below all of the four-digit code numbers as they appear on the option code label on the rocker arm cover of your engine. (Not all blanks below will be needed.)

Should there be a question about a code, note the engine serial number and call 1-800-JDENGINE from the U.S.A. or Canada, or fax U.S.A. number 1-319-292-5844; 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 very 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.

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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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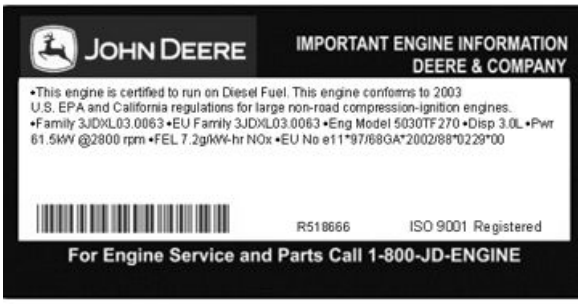
Emissions Control System Certification Label

CAUTION: Statutes providing severe penalties for tampering with emissions controls may apply to the user or dealer.

The emissions warranty described below applies only 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. 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 in the third line of the label signifies that the engine has been certified with the European Union countries per Directive 97/68/EC. The emissions warranty does not apply to the EU countries.

NOTE: The hp/kW rating on the engine emissions certification label specifies the gross engine hp/kW, which is flywheel power without fan. In most applications this will not be the same rating as the advertised vehicle hp/kW rating.



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Emissions Label

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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.

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JOHN DEERE

U.S. AND CANADA EMISSION CONTROL WARRANTY STATEMENT
YOUR WARRANTY RIGHTS AND OBLIGATIONS

To determine if the John Deere engine qualifies for the additional warranties set forth below, look for the "Emissions Control Information" label located on the engine. If the engine is operated in the United States or Canada and the Emissions Control information label states: "This engine complies with US EPA regulations for nonroad and stationary diesel engines", or "This engine conforms to US EPA nonroad compression-ignition regulations", refer to the "U.S. and Canada Emission Control Warranty Statement." If the engine is operated in California, and the label states: "This engine complies with US EPA and CARB regulations for nonroad diesel engines", or "This engine conforms to US EPA and California nonroad compression-ignition emission regulations", also refer to the "California Emission Control Warranty Statement."

Warranties stated on this certificate refer only to emissions-related parts and components of your engine. The complete engine warranty, less emissions-related parts and components, is provided separately. If you have any questions about your warranty rights and responsibilities, you should contact John Deere at 1-319-292-5400.

JOHN DEERE'S WARRANTY RESPONSIBILITY

John Deere warrants to the ultimate purchaser and each subsequent purchaser that this off-road diesel engine including all parts of its emission-control system was designed, built and equipped so as to conform at the time of the sale with Section 213 of the Clean Air Act and is free from defects in materials and workmanship which would cause the engine to fail to conform with applicable US EPA regulations for a period of five years from the date the engine is placed into service or 3,000 hours of operation, whichever first occurs.

Where a warrantable condition exists, John Deere will repair or replace, as it elects, any part or component with a defect in materials or workmanship that would increase the engine's emissions of any regulated pollutant within the stated warranty period at no cost to you, including expenses related to diagnosing and repairing or replacing emission-related parts. Warranty coverage is subject to the limitations and exclusions set forth herein. Emission- related components include engine parts developed to control emissions related to the following:

Air-Induction System
Fuel System
Ignition System
Exhaust Gas Recirculation Systems
Aftertreatment Devices
Crankcase Ventilation Valves
Sensors
Engine Electronic Control Units

EMISSION WARRANTY EXCLUSIONS

John Deere may deny warranty claims for malfunctions or failures caused by:

- Non-performance of maintenance requirements listed in the Operator's Manual
- The use of the engine/equipment in a manner for which it was not designed
- Abuse, neglect, improper maintenance or unapproved modifications or alterations
- Accidents for which it does not have responsibility or by acts of God

The off-road diesel engine is designed to operate on diesel fuel as specified in the Fuels, Lubricants and Coolants section in the Operators Manual. Use of any other fuel can harm the emissions control system of the engine/equipment and is not approved for use.

To the extent permitted by law John Deere is not liable for damage to other engine components caused by a failure of an emission-related part, unless otherwise covered by standard warranty.

THIS WARRANTY IS EXPRESSLY IN LIEU OF ANY OTHER WARRANTIES, EXPRESS OR IMPLIED, INCLUDING ANY WARRANTY OF MERCHANTABILITY OR FITNESS FOR A PARTICULAR PURPOSE. REMEDIES UNDER THIS WARRANTY ARE LIMITED TO THE PROVISIONS OF MATERIAL AND SERVICES AS SPECIFIED HEREIN. WHERE PERMITTED BY LAW, NEITHER JOHN DEERE NOR ANY AUTHORIZED JOHN DEERE ENGINE DISTRIBUTOR, DEALER, OR REPAIR FACILITY OR ANY COMPANY AFFILIATED WITH JOHN DEERE WILL BE LIABLE FOR INCIDENTAL OR CONSEQUENTIAL DAMAGES.

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DX,EMISSIONS,EPA -19-12DEC12-2/2

CARB Non-road Emissions Control Warranty Statement—Compression Ignition

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JOHN DEERE

CALIFORNIA EMISSIONS CONTROL WARRANTY STATEMENT
YOUR WARRANTY RIGHTS AND OBLIGATIONS

To determine if the John Deere engine qualifies for the additional warranties set forth below, look for the “Emission Control Information” label located on the engine. If the engine is operated in the United States or Canada and the engine label states: “This engine complies with US EPA regulations for nonroad and stationary diesel engines”, or “This engine complies with US EPA regulations for stationary emergency diesel engines”, refer to the “U.S. and Canada Emission Control Warranty Statement.” If the engine is operated in California, and the engine label states: “This engine complies with US EPA and 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 2013 through 2015 off-road diesel engines. In California, new off-road engines must be designed, built and equipped to meet the State’s stringent anti-smog standards. John Deere must warrant the emission control system on your engine for the periods of time listed below provided there has been no abuse, neglect or improper maintenance of your engine.

Your emission control system may include parts such as the fuel injection system and the air induction system. Also included may be hoses, belts, connectors and other emission-related assemblies.

John Deere warrants to the ultimate purchaser and each subsequent purchaser that this off-road diesel engine was designed, built, and equipped so as to conform at the time of sale with all applicable regulations adopted by CARB and is free from defects in materials and workmanship which would cause the failure of a warranted part to be identical in all material respects to the part as described in John Deere's application for certification for a period of five years from the date the engine is delivered to an ultimate purchaser or 3,000 hours of operation, whichever occurs first for all engines rated at 19 kW and greater. In the absence of a device to measure hours of use, the engine shall be warranted for a period of five years.

EMISSIONS WARRANTY EXCLUSIONS:

John Deere may deny warranty claims for failures caused by the use of an add-on or modified part which has not been exempted by the CARB. A modified part is an aftermarket part intended to replace an original emission-related part which is not functionally identical in all respects and which in any way affects emissions. An add-on part is any aftermarket part which is not a modified part or a replacement part.

In no event will John Deere, any authorized engine distributor, dealer, or repair facility, or any company affiliated with John Deere be liable for incidental or consequential damage.

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JOHN DEERE'S WARRANTY RESPONSIBILITY:

Where a warrantable condition exists, John Deere will repair or replace, as it elects, your off-road diesel engine at no cost to you, including diagnosis, parts 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.

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JOHN DEERE

CALIFORNIA EMISSIONS CONTROL WARRANTY STATEMENT
YOUR WARRANTY RIGHTS AND OBLIGATIONS

To determine if the John Deere engine qualifies for the additional warranties set forth below, look for the "Emission Control Information" label located on the engine. If the engine is operated in the United States or Canada and the engine label states: "This engine complies with US EPA regulations for nonroad and stationary diesel engines", or "This engine complies with US EPA regulations for stationary emergency diesel engines", refer to the "U.S. and Canada Emission Control Warranty Statement." If the engine is operated in California, and the engine label states: "This engine complies with US EPA and 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 2013 through 2015 off-road diesel engines. In California, new off-road engines must be designed, built and equipped to meet the State's stringent anti-smog standards. John Deere must warrant the emission control system on your engine for the periods of time listed below provided there has been no abuse, neglect or improper maintenance of your engine.

Your emission control system may include parts such as the fuel injection system and the air induction system. Also included may be hoses, belts, connectors and other emission-related assemblies.

John Deere warrants to the ultimate purchaser and each subsequent purchaser that this off-road diesel engine was designed, built, and equipped so as to conform at the time of sale with all applicable regulations adopted by CARB and is free from defects in materials and workmanship which would cause the failure of a warranted part to be identical in all material respects to the part as described in John Deere's application for certification for a period of five years from the date the engine is delivered to an ultimate purchaser or 3,000 hours of operation, whichever occurs first for all engines rated at 19 kW and greater. In the absence of a device to measure hours of use, the engine shall be warranted for a period of five years.

EMISSIONS WARRANTY EXCLUSIONS:

John Deere may deny warranty claims for failures caused by the use of an add-on or modified part which has not been exempted by the CARB. A modified part is an aftermarket part intended to replace an original emission-related part which is not functionally identical in all respects and which in any way affects emissions. An add-on part is any aftermarket part which is not a modified part or a replacement part.

In no event will John Deere, any authorized engine distributor, dealer, or repair facility, or any company affiliated with John Deere be liable for incidental or consequential damage.

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JOHN DEERE'S WARRANTY RESPONSIBILITY:

Where a warrantable condition exists, John Deere will repair or replace, as it elects, your off-road diesel engine at no cost to you, including diagnosis, parts 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 (19Sep12)

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John Deere Service Literature Available

Technical Information

Technical information can be purchased from John Deere. Some of this information is available in electronic media, such as CD-ROM disks, and in printed form. There are many ways to order. Contact your John Deere dealer. Call **1-800-522-7448** to order using a credit card. Search online from http://www.JohnDeere.com. Please have available the model number, serial number, and name of the product.

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.
- OPERATOR'S MANUALS providing safety, operating, maintenance, and service information. These manuals and safety signs on your machine may also be available in other languages.
- OPERATOR'S VIDEO TAPES showing highlights of safety, operating, maintenance, and service information. These tapes may be available in multiple languages and formats.
- 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 separate component technical manuals
- FUNDAMENTAL MANUALS detailing basic information regardless of manufacturer:
  - Agricultural Primer series covers technology in farming and ranching, featuring subjects like computers, the Internet, and precision farming.
  - 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.

TS189 —UN—17JAN89

TS191 —UN—02DEC88

TS224 —UN—17JAN89

TS1663 —UN—10OCT97

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Engine Registration

OEM Engine and Drivetrain Warranty Registration

Why registering your OEM engine or drivetrain product is a really smart idea:[1]

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.

NOTE: A mail-in registration form is located at the back of this manual.

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

[1]*Register your OEM engine or drivetrain product online and select an authorized John Deere service location. If available in your region, you'll receive information regarding new products and current money-saving offers from John Deere. Limit one money-saving offer per engine warranty registration. Not transferable. Not valid with any other offer. Offer ends 90 days from the date of issue. Some restrictions apply. See your John Deere service location for complete details.*

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Scan this code to register your OEM engine online now and learn of current money-saving offers available to you.[1] You can also visit us directly at JohnDeere.com/warranty.

Equipment operators can't afford downtime or unexpected repairs. That's why we offer a 2-year/2,000-hour warranty, with unlimited hours in the first year, on our OEM industrial and marine engines. This warranty takes effect the date that the engine is delivered to the first retail purchaser. In addition, 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. Be sure to register your engine or drivetrain product and take full advantage of the John Deere service and support network.

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 JohnDeere.com/dealer to find the authorized engine or drivetrain service location nearest you. For complete warranty details visit JohnDeere.com/warrantystatements to view, download, or print the warranty statement for your engine or drivetrain product.

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Mail-In Registration

OEM Engine and Drivetrain Warranty Registration

Register your OEM engine or drivetrain product online at JohnDeere.com/warranty or fax this from to John Deere at 319-292-5844.

PURCHASER INFORMATION*: Type or print in BLOCK letters

Company Name: _____

First Name: _____

Last Name: _____

Email: _____

Telephone: _____

Country: _____

Street Address: _____

City / State / Prov: _____

Zip / Postal Code: _____

PURCHASER TYPE:

- □ Commercial
- □ Federal Government
- □ State / Province
- □ County
- □ City / Town / Village
- □ Armed Forces
- □ National Account
- □ Residential
- □ Farm
- □ Very Large Fleet (>74)
- □ Large Fleet (25-74)
- □ Medium Fleet (10-24)
- □ Small Fleet (<10)

EQUIPMENT TYPE:

- □ Agriculture
- □ Earth Moving
- □ Forestry
- □ Generator Set (Industrial / Marine)
- □ Industrial Moveable
- □ Marine Propulsion
- □ Material Handling
- □ Municipal / Utility Commercial
- □ On-Highway
- □ Road and Miscellaneous Construction
- □ Rail Maintenance
- □ Other

Purchase's Signature: _____

PRODUCT AND EQUIPMENT INFORMATION

Product Serial Number: _____

Date Delivered: _____

Amount of Use: (Hours / Miles) _____

New or Used: _____

* Use of Information: All personal information obtained with this registration is subject to the John Deere privacy policy. It will be used for the purpose of offer fulfillment and may be used to provide you with additional information about John Deere products and services. For complete details on your privacy rights and to obtain a copy of the John Deere Privacy Statement, visit www.JohnDeere.com/privacy.

Cut out to mail in registration card

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Mail-In Registration

MAILING INFORMATION
(Return Address)

_____
_____
_____
_____

John Deere Power Systems
P.O. Box 5100
Waterloo, IA 50704-5100
USA

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