

PowerTech Plus 4045HF485 and 6068HF485 OEM Diesel Engines

OPERATOR'S MANUAL PowerTech™ Plus 4045 and 6068 OEM Diesel Engines

OMRG36852 ISSUE 8JUL2011 (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

LITHO IN U.S.A.

Introduction

Foreword

THIS MANUAL CONTAINS INFORMATION to operate and service the following **Tier 3 / Stage III A** 6.8 L OEM emission-certified¹ engines:

Saran-built (France) Tier 3 Electronically Controlled Engines:

- CD6068HFC94 (HPCR Fuel System; 4-Valve Head)

Torreon-built (Mexico) Tier 3 Electronically Controlled Engines:

- PE6068HFC94 (HPCR Fuel System; 4-Valve Head)

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

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

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

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

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

WRITE ENGINE SERIAL NUMBERS and option codes in the spaces indicated in the Record Keeping Section.

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

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

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

IMPORTANT: This manual covers only the PowerTech™ Plus Tier 3 / Stage III A emission-certified 6.8 L OEM engines listed. These engines meet Interim Tier 3 / Stage III A emission certification standards. (This is for both the U.S. EPA and European Union Council (EU) standards.) Engines with mechanical controls which are non-emission certified or Tier 1 / Stage I emission certified (U.S. and EU) are covered in a separate operators manual, OMRG25204. Engines which are Tier 2 / Stage II emission-certified are covered in another manual, OMRG33324. Engines which are PowerTech™ Plus Tier 3 / Stage IIIA emission-certified are covered in another manual, OMRG36852. Engines which are PowerTech™ E Tier 3 / Stage IIIA emission-certified are covered in another manual, OMRG37407.

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

Engine Owner

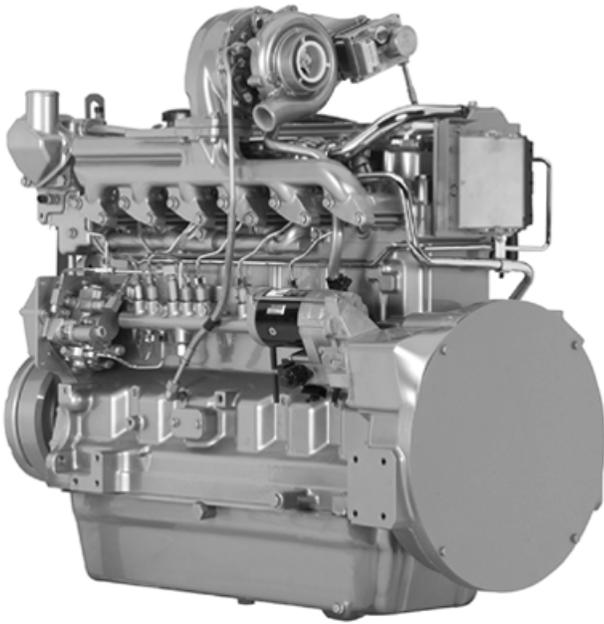
John Deere Engine Owner:

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

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

JR74534,00002F9 -19-10JAN11-1/1

PowerTech Plus 4.5/6.8 L Engines With Electronic Fuel Systems (Tier 3 / Stage IIIA Emission Certified) (Four-Valve Cylinder Head “485” Models)



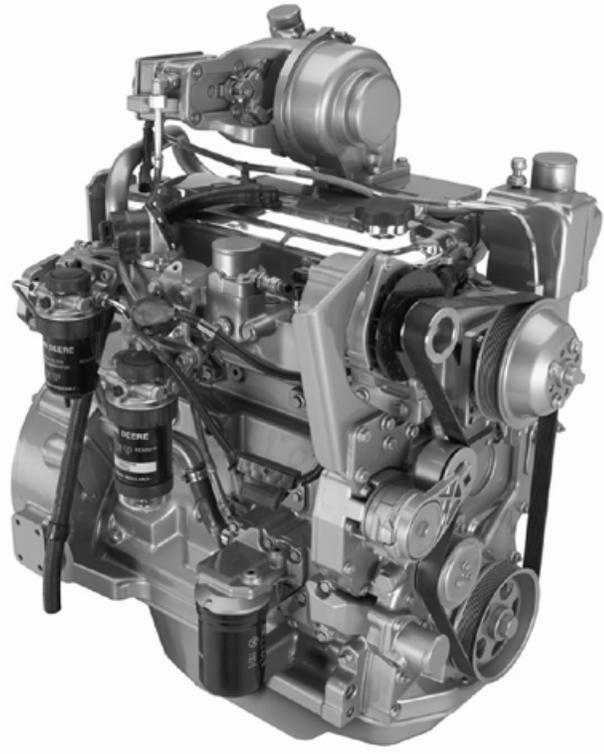
RG13547 —UN—11NOV04

6068HF485 Engine (Electronic Fuel System With Denso High Pressure Common Rail)



RG13546 —UN—11NOV04

6068HF485 Engine - Right Side View



RG14361 —UN—14DEC05

4045HF485 Engine - Right Side View

JR74534.00002F6 -19-10JAN11-1/1

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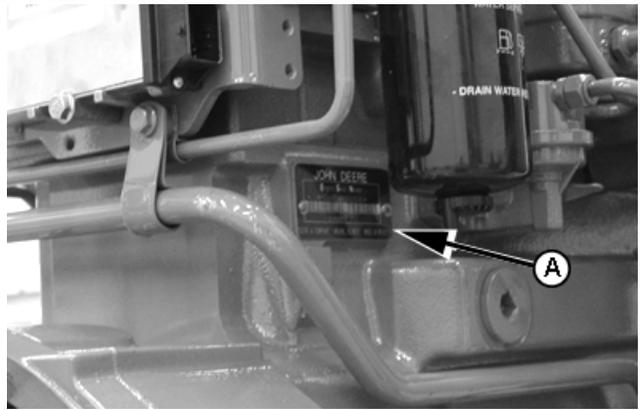
Record Keeping

Engine Serial Number Plate

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

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

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



RG13550 —UN—11NOV04

A—Serial Number Plate

13-Digit Engine Serial Number Plate

OURGP12,00007D -19-15SEP04-1/1

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. Use all 13 digits when providing engine serial number.

Engine Serial Number (B)

Engine Model Number (C)

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

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



RG14627 —UN—13JAN06

Saran Factory Engine Serial Number Plate



RG13716 —UN—23JAN06

Torreon Factory Engine Serial Number Plate

OURGP11,00000AB -19-21FEB06-1/1

Engine Option Codes



RG13717—UN—25JAN05

A—Engine Base Code (Shown on Engine Option Code Label)

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, 55-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
11_____	Rocker Arm Cover
12_____	Oil Fill Inlet
13_____	Crankshaft Pulley/Damper
14_____	Flywheel Housing
15_____	Flywheel
16_____	Fuel Injection Pump
17_____	Air Inlet
18_____	Air Cleaner
19_____	Oil Pan
20_____	Coolant Pump
21_____	Thermostat Cover
22_____	Thermostat
23_____	Fan Drive
24_____	Fan Belt
25_____	Fan
26_____	Engine Coolant Heater
27_____	Radiator

Option Codes	Description
51_____	Cylinder Head With Valves
52_____	Auxiliary Gear Drive
53_____	Fuel Heater
54_____	Air Intake for Turbocharger
55_____	Shipping Stand
56_____	Paint Option
57_____	Coolant Pump Inlet
59_____	Oil Cooler
60_____	Add-on Auxiliary Drive Pulley
62_____	Alternator Mounting Bracket
63_____	Low Pressure Fuel Line
64_____	Exhaust Elbow
65_____	Turbocharger
66_____	Coolant Temperature Switch
67_____	Electronic Sensors (Base Engine)
68_____	Crankshaft Rear Damper
69_____	Engine Serial Number Plate

Continued on next page

OURGP12,000007F -19-15SEP04-1/2

Record Keeping

Option Codes	Description	Option Codes	Description
28_____	Exhaust Manifold	71_____	Engine Oil Bypass Filter
29_____	Crankcase Ventilator System	72_____	ECU Electronic Software Option
30_____	Starter Motor	74_____	Air Conditioning (Freon) Compressor
31_____	Alternator	75_____	Air Restriction Indicator
32_____	Instrument Panel	76_____	Pressure Switches and Sensors
33_____	Tachometer	77_____	Timing Gear Cover
35_____	Fuel Filters	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 Aid	87_____	Belt Tensioner
44_____	Timing Gear Cover With Gears	88_____	Oil Filter
45_____	Balancer Shafts	89_____	Exhaust Gas Recirculating (EGR) System
46_____	Cylinder Block With Liners 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_____	Shipping (Engine Hanger Straps)
50_____	Oil Pump	99_____	Service Only Items

Engine Base Code (See "A" on previous page.)

OURGP12,00007F -19-15SEP04-2/2

Record High-Pressure Fuel Pump Model Number

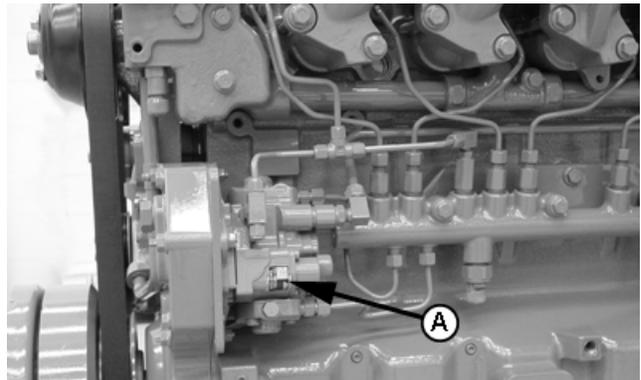
Record the high-pressure fuel pump model and serial number information found on the serial number plate (A).

Model No. _____ RPM _____

Manufacturer's No. _____

Serial No. _____

A—Serial Number Plate



Record High-Pressure Fuel Pump Serial Number

OURGP12,000080 -19-15SEP04-1/1

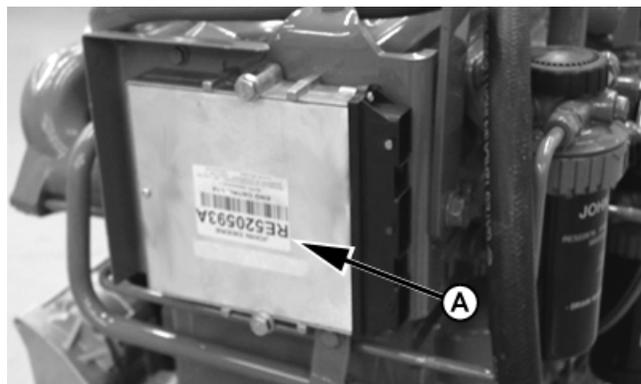
Record Engine Control Unit (ECU) Serial Number

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

Part No. _____

Serial No. _____

A—Serial Number Label



Record Engine Control Unit (ECU) Serial Number

OURGP12,0000AD -19-27JUL06-1/1

Safety

Recognize Safety Information

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

Follow recommended precautions and safe operating practices.



T81389 —UN—07DEC88

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

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.



▲ WARNING

▲ CAUTION

TS187 —19—30SEP88

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

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—23AUG88

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

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

Replace Safety Signs

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



TS201 —UN—23AUG88

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

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

Prevent Bypass Starting

Avoid possible injury or death from engine runaway.

Do not start engine by shorting across starter terminal. Engine will start with PTO engaged if normal circuitry is bypassed.

Start engine only from operator's station with PTO disengaged or in neutral.



Prevent Bypass Starting

RG5419 —UN—28FEB89

RG,RG34710,7508 -19-09JAN07-1/1

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.



TS202 —UN—23AUG88

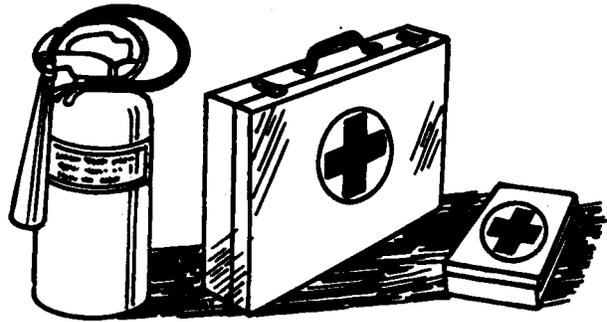
DX,FIRE1 -19-03MAR93-1/1

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—23AUG88

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

Handle Fluids Safely—Avoid Fires

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

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

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

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



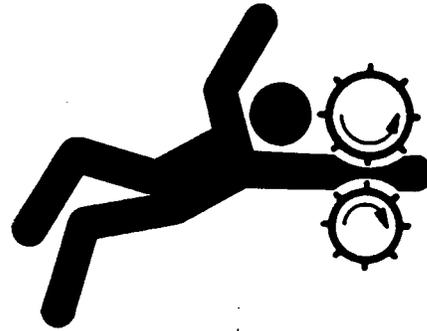
TS227 —UN—23AUG88

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

Service Machines Safely

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

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



TS228 —UN—23AUG88

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

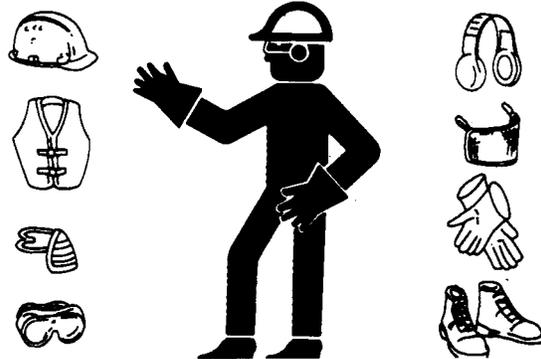
Wear Protective Clothing

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

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

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

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



TS206 —UN—23AUG88

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

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

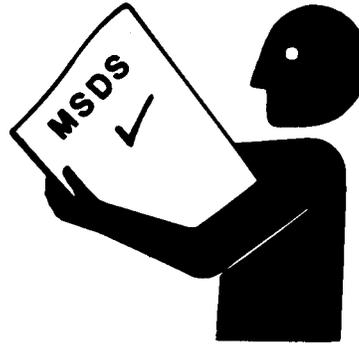
Handle Chemical Products Safely

Direct exposure to hazardous chemicals can cause serious injury. Potentially hazardous chemicals used with John Deere equipment include such items as lubricants, coolants, paints, and adhesives.

A Material Safety Data Sheet (MSDS) provides specific details on chemical products: physical and health hazards, safety procedures, and emergency response techniques.

Check the MSDS before you start any job using a hazardous chemical. That way you will know exactly what the risks are and how to do the job safely. Then follow procedures and recommended equipment.

(See your John Deere dealer for MSDS's on chemical products used with John Deere equipment.)



TS1132 —UN—26NOV90

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

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

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 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—23AUG88

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

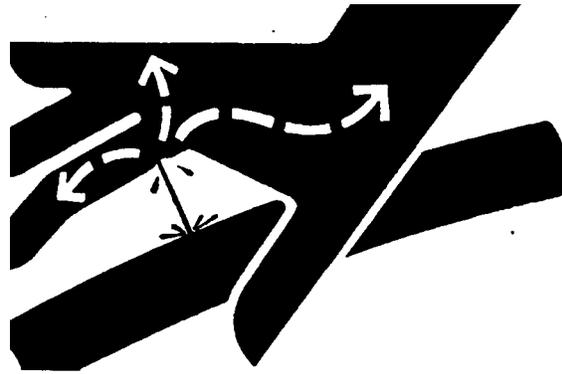
Avoid High-Pressure Fluids

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 -19-20AUG09-1/1

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.



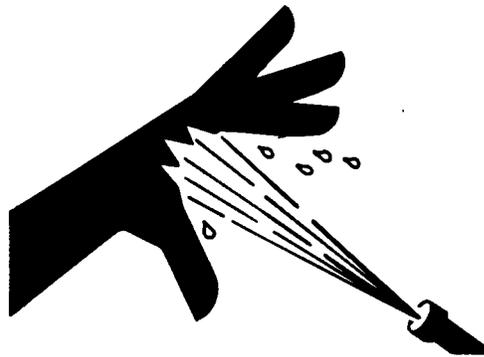
TS963 —UN—15MAY90

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

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

Remove Paint Before Welding or Heating

Avoid potentially toxic fumes and dust.

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

Remove paint before heating:

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

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



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

Dispose of paint and solvent properly.

TS220 —UN—23AUG88

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

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—23AUG88

DX,RCAP -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.



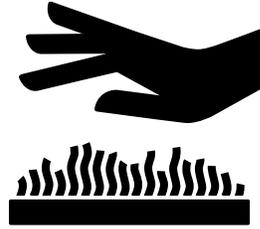
TS677 —UN—21SEP89

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

Avoid Hot Exhaust

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

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



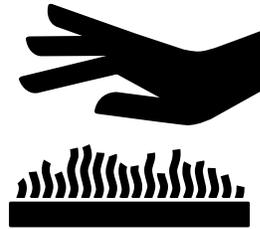
RG17488—UN—21AUG09

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

Exhaust Filter Cleaning

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

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



RG17488—UN—21AUG09

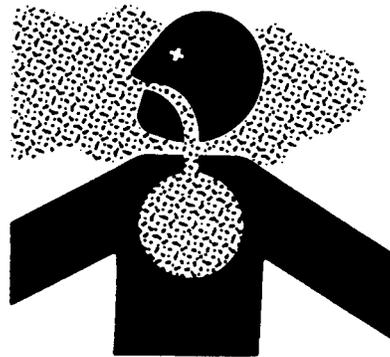
DX,FILTER -19-20JAN10-1/1

Avoid Harmful Asbestos Dust

Avoid breathing dust that may be generated when handling components containing asbestos fibers. Inhaled asbestos fibers may cause lung cancer.

Components in products that may contain asbestos fibers are brake pads, brake band and lining assemblies, clutch plates, and some gaskets. The asbestos used in these components is usually found in a resin or sealed in some way. Normal handling is not hazardous as long as airborne dust containing asbestos is not generated.

Avoid creating dust. Never use compressed air for cleaning. Avoid brushing or grinding material containing asbestos. When servicing, wear an approved respirator. A special vacuum cleaner is recommended to clean asbestos. If not available, apply a mist of oil or water on the material containing asbestos.



Keep bystanders away from the area.

TS220—UN—23AUG88

DX,DUST -19-15MAR91-1/1

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).



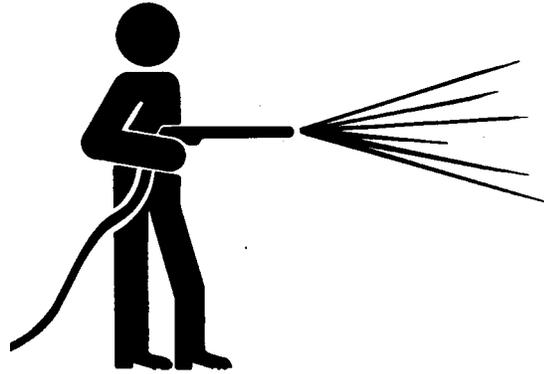
TS204 —UN—23AUG88

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

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.

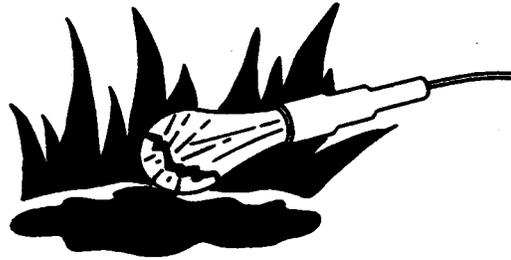


T6642EJ —UN—18OCT88

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

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

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.

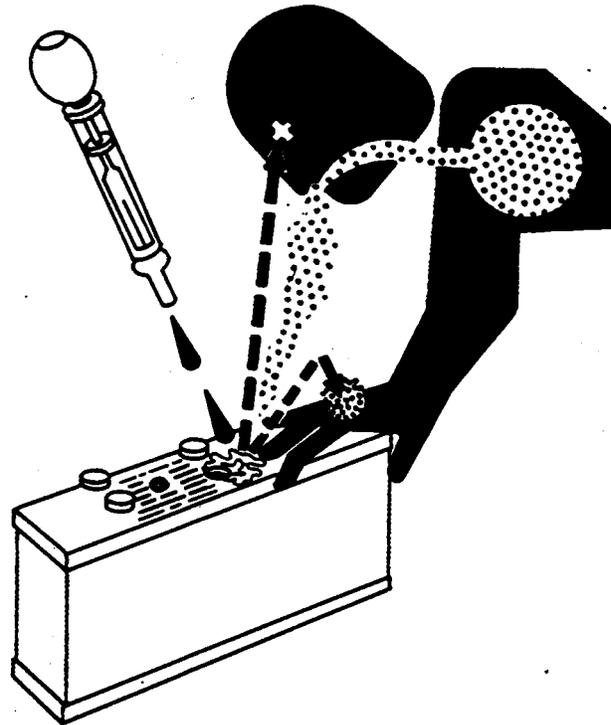
If acid is swallowed:

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—23AUG88



TS203—UN—23AUG88

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

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.



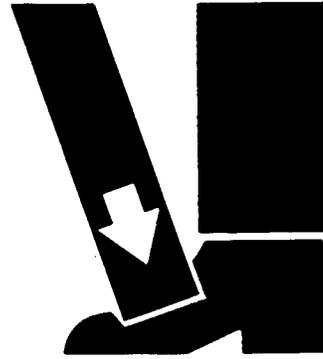
TS1343—UN—18MAR92

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

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

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

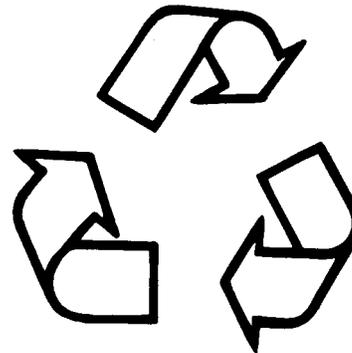
Dispose of Waste Properly

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—26NOV90

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

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

Fuels, Lubricants, and Coolant

Diesel Fuel

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

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

Diesel fuels specified to EN 590 or ASTM D975 are recommended. Renewable diesel fuel produced by hydrotreating animal fats and vegetable oils is basically identical to petroleum diesel fuel. Renewable diesel that meets EN 590 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 0.45 mm as measured by ASTM D6079 or ISO 12156-1.

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

Sulfur content for Interim Tier 4 and Stage III B 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 1000–5000 mg/kg (1000–5000 ppm) REDUCES oil and filter change intervals.
- BEFORE using diesel fuel with sulfur content greater than 5000 mg/kg (5000 ppm), contact your John Deere dealer

Sulfur Content for Tier 2 and Stage II Engines

- Use of diesel fuel with sulfur content less than 500 mg/kg (500 ppm) is RECOMMENDED.
- Use of diesel fuel with sulfur content 500–5000 mg/kg (500–5000 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 intervals.

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

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

DX,FUEL1 -19-11APR11-1/1

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 for recommendations.

DX,FUEL4 -19-14APR11-1/1

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

Biodiesel Fuel

Biodiesel is a fuel 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.

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.bq-9000.org>.

While 5% blends are preferred (B5), biodiesel concentrations up to a 20% blend (B20) in petroleum diesel fuel can be used in all John Deere engines. Biodiesel blends up to B20 can be used ONLY if the biodiesel (100% biodiesel or B100) meets ASTM D6751 (US), EN 14214 (EU), or equivalent specification. Expect a 2% reduction in power and a 3% reduction in fuel economy when using B20.

John Deere approved fuel conditioners containing detergent/dispersant additives are recommended when using lower biodiesel blends, but are required when using blends of B20 or greater.

John Deere engines can also operate on biodiesel blends above B20 (up to 100% biodiesel) ONLY if the biodiesel meets the EN 14214 specification (primarily available in Europe). Engines operating on biodiesel blends above B20 may not fully comply with 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 containing detergent/dispersant additives are required.

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

Biodiesel blends up to B20 must be used within 90 days of the date of biodiesel manufacture. Biodiesel blends from B21 to B100 must be used within 45 days of the date of biodiesel manufacture.

Request a certificate of analysis from your fuel distributor to ensure that the fuel is compliant with the above specifications.

When using biodiesel fuel, the engine oil level must be checked daily. If oil becomes diluted with fuel, shorten oil change intervals. Refer to Diesel Engine Oil and Filter Service Intervals for more details regarding biodiesel and engine oil change intervals.

The following must be considered when using biodiesel blends up to B20:

- Cold weather flow degradation
- Stability and storage issues (moisture absorption, oxidation, 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
- Possible reduction of service life of engine components

The following must also be considered when using biodiesel blends above B20.

- Possible coking and/or blocked injector nozzles, resulting in power loss and engine misfire if John Deere approved fuel conditioners containing detergent/dispersant additives are not used
- Possible crankcase oil dilution, requiring more frequent oil changes
- Possible corrosion of fuel injection equipment
- Possible lacquering and/or seizure of internal components
- Possible formation of sludge and sediments
- Possible thermal oxidation of fuel at elevated temperatures
- Possible elastomer seal and gasket material degradation (primarily an issue with older engines)
- Possible compatibility issues with other materials (including copper, lead, zinc, tin, brass, and bronze) used in fuel systems and fuel handling equipment
- Possible reduction in water separator efficiency
- Potential high acid levels within fuel system
- Possible damage to paint if exposed to biodiesel

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 -19-20APR11-1/1

Aviation (Jet) Fuels

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

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

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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 information below 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 will begin to form in the fuel and 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 -19-20APR11-1/1

Diesel Engine Break-In Oil

New engines are filled at the factory with John Deere ENGINE BREAK-IN OIL. During the break-in period, add John Deere ENGINE BREAK-IN OIL as needed to maintain the specified oil level.

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

Change the oil and filter after the first 100 hours of operation of a new or rebuilt engine.

After engine overhaul, fill the engine with John Deere ENGINE BREAK-IN OIL.

If John Deere ENGINE BREAK-IN OIL is not available, use a diesel engine oil meeting one of the following during the first 100 hours of operation:

- API Service Classification CE
- API Service Classification CD
- API Service Classification CC

PLUS-50 is a trademark of Deere & Company.

- ACEA Oil Sequence E2
- ACEA Oil Sequence E1

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

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

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

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

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Diesel Engine Oil

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:

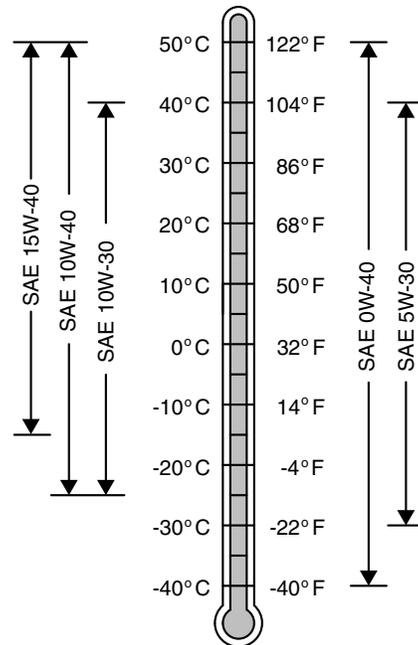
- John Deere Torq-Gard™
- API Service Category CJ-4
- API Service Category CI-4 PLUS
- API Service Category CI-4
- ACEA Oil Sequence E9
- ACEA Oil Sequence E7
- ACEA Oil Sequence E6
- ACEA Oil Sequence E5
- ACEA Oil Sequence E4

Multi-viscosity diesel engine oils are preferred.

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

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

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



Oil Viscosities for Air Temperature Ranges

TS1691 —JUN—18JUL07

DX,ENOIL11 -19-11APR11-1/1

Diesel Engine Oil and Filter Service Intervals

The oil and filter service intervals in the following charts should be used as guidelines. Actual service intervals depend on operation and maintenance practices. Use oil analysis to determine the actual useful life of the oil and to aid in selection of the proper oil and filter service interval.

Oil and filter service intervals are based on a combination of oil pan capacity, type of engine oil and filter used, and sulfur content of the diesel fuel.

Diesel fuel sulfur level will affect engine oil and filter service intervals. Higher fuel sulfur levels reduce oil and filter service intervals as shown in the table:

- Use of diesel fuel with sulfur content less than 0.10% (1000 ppm) is strongly recommended.
- Use of diesel fuel with sulfur content 0.10% (1000 ppm) to 0.50% (5000 ppm) may result in REDUCED oil and filter change intervals as shown in the table.
- BEFORE using diesel fuel with sulfur content greater than 0.50% (5000 ppm), contact your John Deere dealer.
- DO NOT use diesel fuel with sulfur content greater than 1.00% (10 000 ppm).

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

Oil types (premium or standard) in the tables include:

- “Premium Oils” include John Deere PLUS-50™, ACEA E7, or ACEA E6 oils.
- “Standard Oils” include John Deere TORQ-GARD SUPREME™, API CJ-4, API CI-4 PLUS, API CI-4, ACEA E5, or ACEA E4 oils.

Use of lower specification oils in Tier 3 engines may result in premature engine failure.

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

- Engine equipped with an 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 the actual extended service life of ACEA E7 and ACEA E6 oils
- Use of an approved John Deere oil filter
- Use of diesel fuel with sulfur content less than 0.50% (5000 ppm)

Refer to the charts on the following pages to find the proper oil and filter service interval for your engine.

Using Charts to Find Oil and Filter Service Interval

1. Determine your engine model and power rating and find it in the left column of 4045 or 6068 (4.5 L or 6.8 L) chart.
2. Locate your engine oil pan option code (19__) on engine label.
3. In the chart column under your oil pan code, select whether you use premium oil (PLUS-50™ or equivalent) or standard grade oil.
4. Determine the sulfur content of your diesel fuel.
5. Now you can find the proper oil and filter change interval by lining up your power level and fuel sulfur content with oil pan/oil type column. The number indicates how frequent your oil and filter should be changed (example: every 300 hours of operation).

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

Power Rating	Fuel Sulfur Content ^a	Oil Pan Option Codes							
		1903, 19BB		19AE, 19BC		1923, 19BA		1976, 19AZ	
		Interval		Interval		Interval		Interval	
kW (hp)		Std Oil	Prem Oil	Std Oil	Prem Oil	Std Oil	Prem Oil	Std Oil	Prem Oil
111 (149)	Less Than 0.10% (1000 ppm)	250	375	250	500	250	500	250	500
	0.10% - 0.20% (1000 - 2000 ppm)	200	300	200	300	250	500	250	500
	0.20% - 0.50% (2000 - 5000 ppm)	150	250	150	250	200	300	200	300
115 (154)	Less Than 0.10% (1000 ppm)	250	375	250	500	250	500	250	500
	0.10% - 0.20% (1000 - 2000 ppm)	200	300	200	300	200	300	250	500
	0.20% - 0.50% (2000 - 5000 ppm)	150	250	150	250	150	250	200	300
129 (173)	Less Than 0.10% (1000 ppm)	* b	* b	250	375	250	500	250	500
	0.10% - 0.20% (1000 - 2000 ppm)	* b	* b	200	300	200	300	250	500
	0.20% - 0.50% (2000 - 5000 ppm)	* b	* b	150	250	150	250	200	300
147 (197)	Less Than 0.10% (1000 ppm)	* b	* b	250	375	250	375	250	500

Continued on next page

OURGP11,0000054 -19-26JUN08-1/3

Fuels, Lubricants, and Coolant

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

0.10% - 0.20% (1000 - 2000 ppm)	*	*	200	300	200	300	250	500
0.20% - 0.50% (2000 - 5000 ppm)	*	*	150	250	150	250	200	300
	b	b						
	b	b						

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

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

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

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

Power Rating	Fuel Sulfur Content ^a	Oil Pan Option Codes											
		1907, 1908, 1909, 19AS, 19AT		19AQ		1924		19AC, 19AV		1961		19AU	
		Interval		Interval		Interval		Interval		Interval		Interval	
kW (hp)		Std Oil	Prem Oil	Std Oil	Prem Oil	Std Oil	Prem Oil	Std Oil	Prem Oil	Std Oil	Prem Oil	Std Oil	Prem Oil
134-140 (180-188)	Less Than 0.10% (1000 ppm)	250	500	250	500	250	500	250	500	250	500	250	500
	0.10% - 0.20% (1000 - 2000 ppm)	250	500	250	500	250	500	250	500	250	500	250	500
	0.20% - 0.50% (2000 - 5000 ppm)	200	300	200	300	200	300	200	300	250	500	250	500
144 (193)	Less Than 0.10% (1000 ppm)	250	500	250	500	250	500	250	500	250	500	250	500
	0.10% - 0.20% (1000 - 2000 ppm)	200	300	250	500	250	500	250	500	250	500	250	500
	0.20% - 0.50% (2000 - 5000 ppm)	150	250	200	300	200	300	200	300	250	500	250	500
149 (200)	Less Than 0.10% (1000 ppm)	250	500	250	500	250	500	250	500	250	500	250	500
	0.10% - 0.20% (1000 - 2000 ppm)	200	300	200	300	250	500	250	500	250	500	250	500
	0.20% - 0.50% (2000 - 5000 ppm)	150	250	150	250	200	300	200	300	250	500	250	500
155-162 (208-217)	Less Than 0.10% (1000 ppm)	250	500	250	500	250	500	250	500	250	500	250	500
	0.10% - 0.20% (1000 - 2000 ppm)	200	300	200	300	250	500	250	500	250	500	250	500
	0.20% - 0.50% (2000 - 5000 ppm)	150	250	150	250	200	300	200	300	200	300	200	300
168-173 (225-232)	Less Than 0.10% (1000 ppm)	250	375	250	500	250	500	250	500	250	500	250	500
	0.10% - 0.20% (1000 - 2000 ppm)	200	300	200	300	250	500	250	500	250	500	250	500
	0.20% - 0.50% (2000 - 5000 ppm)	150	250	150	250	200	300	200	300	200	300	200	300
175 (235)	Less Than 0.10% (1000 ppm)	250	375	250	375	250	500	250	500	250	500	250	500
	0.10% - 0.20% (1000 - 2000 ppm)	200	300	200	300	250	500	250	500	250	500	250	500
	0.20% - 0.50% (2000 - 5000 ppm)	150	250	150	250	200	300	200	300	200	300	200	300
181-198 (243-266)	Less Than 0.10% (1000 ppm)	250	375	250	375	250	500	250	500	250	500	250	500
	0.10% - 0.20% (1000 - 2000 ppm)	200	300	200	300	200	300	250	500	250	500	250	500
	0.20% - 0.50% (2000 - 5000 ppm)	150	250	150	250	150	250	200	300	200	300	200	300
205 (275)	Less Than 0.10% (1000 ppm)	* b	* b	250	375	250	500	250	500	250	500	250	500
	0.10% - 0.20% (1000 - 2000 ppm)	* b	* b	200	300	200	300	200	300	250	500	250	500
	0.20% - 0.50% (2000 - 5000 ppm)	* b	* b	150	250	150	250	150	250	200	300	200	300

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

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

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

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

Power Rating	Fuel Sulfur Content ^a	Oil Pan Option Codes											
		1907, 1908, 1909, 19AS, 19AT		19AQ		1924		19AC, 19AV		1961		19AU	
		Interval		Interval		Interval		Interval		Interval		Interval	
kW (hp)		Std Oil	Prem Oil	Std Oil	Prem Oil	Std Oil	Prem Oil	Std Oil	Prem Oil	Std Oil	Prem Oil	Std Oil	Prem Oil
212-235 (284-315)	Less Than 0.10% (1000 ppm)	* b	*b	*b	*b	250	375	250	500	250	500	250	500
	0.10% - 0.20% (1000 - 2000 ppm)	* b	* b	* b	* b	200	300	200	300	250	500	250	500
	0.20% - 0.50% (2000 - 5000 ppm)	* b	* b	* b	* b	150	250	150	250	200	300	200	300

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

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

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

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

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

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

practices. Use oil analysis to determine the actual useful life of the oil and to aid in selection of the proper oil and filter service interval. Oil and filter service intervals are based on a combination of oil pan capacity, type of engine oil and filter used, and sulfur content of the fuel.

4045 (4.5 L) Engine Oil and Filter Service Intervals in Hours of Operation					
Power Rating	Fuel Sulfur Content ^a	Oil Pan Option Code		Dosing Element Option Code	
		1976		8196	
		Interval		Interval	
kW (hp)		Std Oil	Prem Oil	Std Oil	Prem Oil
129 (173)	Aviation (Jet) Fuels	250	250	250	250
	Diesel Fuel - Less Than 0.10% (1000 ppm)	250	500	250	250
	Diesel Fuel - 0.10% - 0.20% (1000 - 2000 ppm)	250	500	250	250
	Diesel Fuel - 0.20% - 0.50% (2000 - 5000 ppm)	200	300	250	250

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

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

6068 (6.8 L) Engine Oil and Filter Service Intervals in Hours of Operation					
Power Rating	Fuel Sulfur Content ^a	Oil Pan Option Code		Dosing Element Option Code	
		1946		81AE	
		Interval		Interval	
kW (hp)		Std Oil	Prem Oil	Std Oil	Prem Oil
129 (173)	Aviation (Jet) Fuels	250	250	250	250
	Diesel Fuel - Less Than 0.10% (1000 ppm)	250	500	250	250
	Diesel Fuel - 0.10% - 0.20% (1000 - 2000 ppm)	250	500	250	250
	Diesel Fuel - 0.20% - 0.50% (2000 - 5000 ppm)	200	300	250	250

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

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

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Mixing of Lubricants

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

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

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

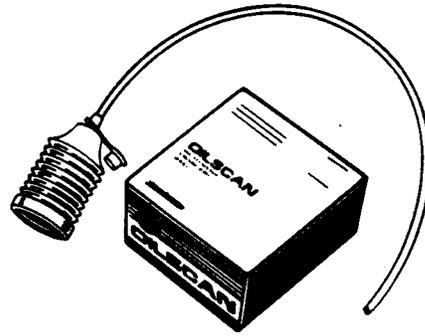
DX,LUBMIX -19-18MAR96-1/1

OILSCAN™ and COOLSCAN™

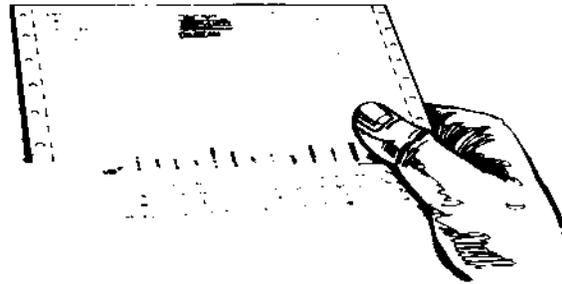
OILSCAN™ and COOLSCAN™ are John Deere sampling programs to help you monitor machine performance and identify potential problems before they cause serious damage.

Oil and coolant samples should be taken from each system prior to its recommended change interval.

Check with your John Deere dealer for the availability of OILSCAN™ and COOLSCAN™ kits.



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DX,OILSCAN -19-02DEC02-1/1

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

Heavy Duty Diesel Engine Coolant

The engine cooling system is filled to provide year-round protection against corrosion and cylinder liner pitting, and winter freeze protection to -37°C (-34°F). If protection at lower temperatures is required, consult your John Deere dealer for recommendations.

The following engine coolants are preferred:

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

Use John Deere COOL-GARD II PG Premix 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.

John Deere COOL-GARD II Premix, COOL-GARD II PG Premix, and COOL-GARD II Concentrate coolants do not require use of supplemental coolant additives.

Other Coolants

John Deere COOL-GARD II and COOL-GARD II PG coolants might not be available in the geographical area where service is performed.

If these coolants are unavailable, use a coolant concentrate or prediluted coolant intended for use with heavy duty diesel engines and with a minimum of the following chemical and physical properties:

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- Is formulated with a quality nitrite-free additive package.
- 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
- Protects the cooling system metals (cast iron, aluminum alloys, and copper alloys such as brass) from corrosion

The additive package must be part of one of the following coolant mixtures:

- ethylene glycol or propylene glycol base prediluted (40—60%) heavy duty coolant
- ethylene glycol or propylene glycol base heavy duty coolant concentrate in a 40—60% mixture of concentrate with quality water

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.

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

Do not mix ethylene glycol and propylene glycol base coolants.

Do not use coolants that contain nitrites.

DX,COOL3 -19-14APR11-1/1

Drain Intervals for Diesel Engine Coolant

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

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.

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If John Deere COOL-GARD™ II Premix, COOL-GARD II PG Premix, or COOL-GARD II Concentrate is used, but the coolant is not tested OR additives are not replenished by adding John Deere COOL-GARD II Coolant Extender, the drain interval is four years or 4000 hours of operation. This drain interval only applies to COOL-GARD II coolants that have been maintained within a 40—60% mixture of concentrate with quality water.

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

DX,COOL11 -19-14APR11-1/1

Additional Information About Diesel Engine Coolants and John Deere LIQUID COOLANT CONDITIONER

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

Coolant Specifications

Some products, including John Deere COOL-GARD™ Premix coolant, are fully formulated coolants that contain all three components in their correct concentrations. Do not add an initial charge of supplemental coolant additives or water to John Deere COOL-GARD Premix.

John Deere COOL-GARD Concentrate contains both ethylene glycol and inhibiting coolant additives. Mix COOL-GARD Concentrate with quality water, but do not add an initial charge of supplemental coolant additives.

Replenish Coolant Additives

Some coolant additives will gradually deplete during engine operation. Periodic replenishment of inhibitors is required, even when John Deere COOL-GARD Premix, COOL-GARD Concentrate, or COOL-GARD PG Premix is used. Follow the recommendations in this manual for the use of supplemental coolant additives.

Why use John Deere LIQUID COOLANT CONDITIONER?

Operating without proper coolant additives will result in increased corrosion, cylinder liner erosion and pitting, and other damage to the engine and cooling system. A simple mixture of ethylene glycol or propylene glycol and water will not give adequate protection.

John Deere LIQUID COOLANT CONDITIONER is an additive system designed to reduce corrosion, erosion, and pitting when used with nitrite-containing diesel engine coolants such as John Deere COOL-GARD Premix, COOL-GARD Concentrate, and COOL-GARD PG Premix. Maintaining John Deere COOL-GARD coolants with John Deere LIQUID COOLANT CONDITIONER provides optimum protection for up to 5 years or 5000 hours of operation.

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Avoid Automotive-type Coolants

Never use automotive-type coolants (such as those meeting ASTM D3306). These coolants do not contain the correct additives to protect heavy-duty diesel engines. They often contain a high concentration of silicates and may damage the engine or cooling system. Do not treat an automotive engine coolant with a supplemental coolant additive because the high concentration of additives can result in additive fallout.

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

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

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,COOL7 -19-03NOV08-1/1

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.

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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

Operating in Warm Temperature Climates

John Deere engines are designed to operate using glycol base engine coolants.

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

John Deere COOL-GARD™ II Premix is available in a concentration of 50% ethylene glycol. However, there are situations in warm temperature climates where a coolant with lower glycol concentration (approximately 20% ethylene glycol) has been approved. In these cases, the low glycol formulation has been modified to provide the same level of corrosion inhibitor as John Deere COOL-GARD II Premix (50/50).

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

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

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

DX,COOL6 -19-03NOV08-1/1

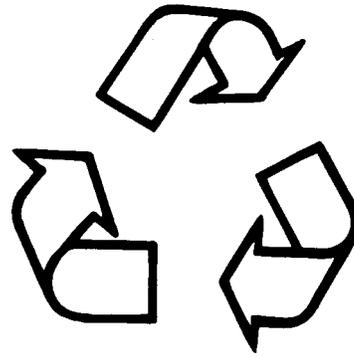
Disposing of Coolant

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

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

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

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



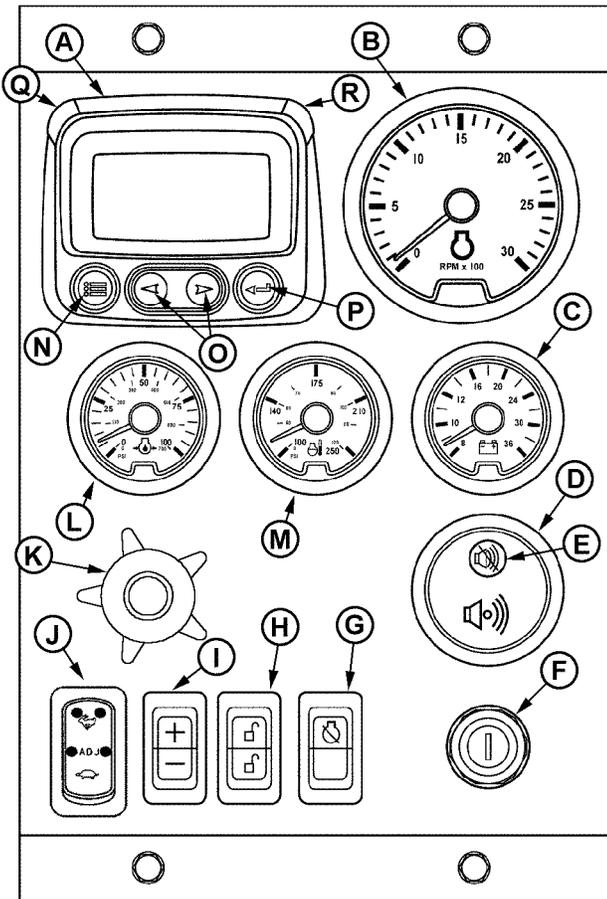
Recycle Waste

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Instrument Panels

Instrument Panels



RG13276—UN—28OCT03

Full-Featured Instrument Panel

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

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

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

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

Instrument Panels (Continued)

A—Diagnostic Gauge/Hour Meter

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

B—Tachometer

Continued on next page

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

C—Voltmeter (Optional)

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

D—Audible Alarm (Optional)

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

E—Audible Alarm Override Button

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

F—Key Start Switch

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

G—Override Shutdown Rocker Switch

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

H—Bump Speed Enable Rocker Switch

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

I—Speed Select Rocker Switch

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

J—High-Low Speed Select Rocker Switch

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

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

How To Select Preset Operating Speeds (Bump Speeds)

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

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

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

K—Analog Throttle Control (Optional)

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

L—Engine Oil Pressure Gauge

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

M—Engine Coolant Temperature Gauge

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

N—Menu Key

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

O—Arrow Keys

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

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

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

P—Enter Key

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

Q—Amber “WARNING” Indicator Light

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

PowerTech is a trademark of Deere & Company

R—Red “STOP ENGINE” Indicator Light

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

JR74534.00002C7 -19-19AUG10-3/3

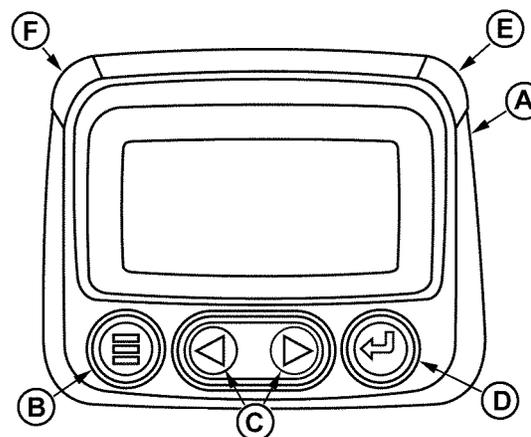
Using Diagnostic Gauge to Access Engine Information

The diagnostic gauge (A) allows the operator to view many readouts of engine functions and trouble codes (DTCs). The gauge is linked to the electronic control system and its sensors. This allows the operator to monitor engine functions and to troubleshoot the engine systems when needed.

Press the menu key (B) to access the various engine functions in sequence. The displays can be selected as either customary English or metric units.

The following menu of engine parameters can be displayed on the diagnostic gauge window:

- Intake Temperature
- Air Filter Diff. Pressure
- Battery Potential Voltage
- Fan Drive
- Engine Desired Op Speed
- Machine Hours
- Exhaust System High Temp Lamp
- Exhaust Filter Clean Status
- % Soot
- Last Exhaust Filter Clean
- Compressor Inlet Temperature
- CAC Outlet Temperature
- Exhaust Filter Outlet Temp
- Fan Drive State
- Fuel Level
- Fuel Temperature
- Fuel Delivery Pressure
- Engine Oil Pressure
- Coolant Pressure
- Coolant Level
- Fuel Rate
- Barometric Pressure
- Boost Pressure
- Intake Temperature
- Accelerator Pedal Position
- Percent Load at Current RPM
- Actual Engine Torque
- Engine Speed
- Total Engine Hours
- Trip Fuel



Diagnostic Gauge

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

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

- Total Fuel Used
- Engine Coolant Temperature
- Fuel Temperature
- % Ash

NOTE: Engine parameters which can be accessed will vary with the engine application. Diagnostic gauge can be set to display readouts in one of the following languages; English, French, German, Italian, and Spanish. Contact your engine distributor or dealer.

The diagnostic gauge includes a graphical backlit Liquid Crystal Display (LCD) screen. The display can show either a single parameter or a quadrant display showing four parameters simultaneously. The diagnostic gauge uses two arrow keys (C) for scrolling through the engine parameter list and viewing the menu list and an enter key (D) for selecting highlighted items. The red (E) and amber (F) lights are used to signal active trouble code received by the diagnostic gauge.

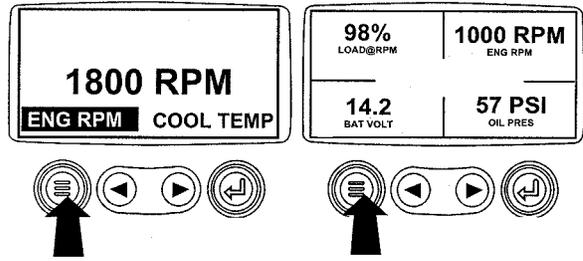
JR74534.00002C8 -19-23AUG10-1/1

RG13132 —UN—09SEP03

Main Menu Navigation

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

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

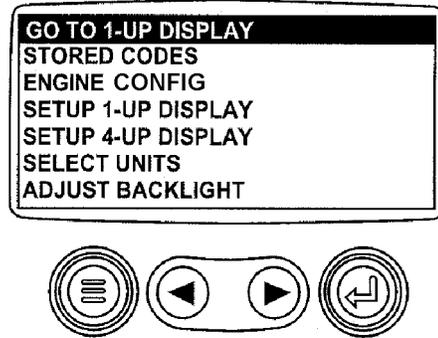


Menu Key

RG13159—UN—26SEP03

OURGP11.00000A9 -19-11OCT06-1/5

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

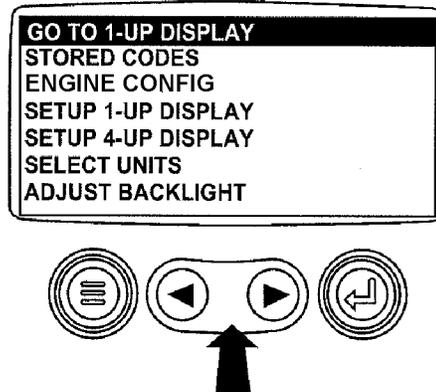


Menu Display

RG13160—UN—02OCT03

OURGP11.00000A9 -19-11OCT06-2/5

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



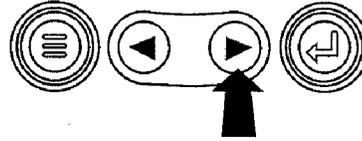
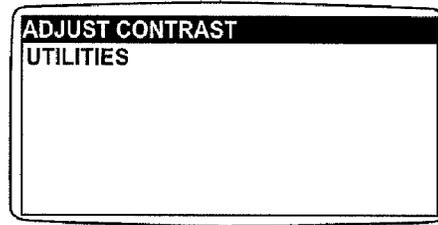
Main Menu Items

RG13161—UN—02OCT03

Continued on next page

OURGP11.00000A9 -19-11OCT06-3/5

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

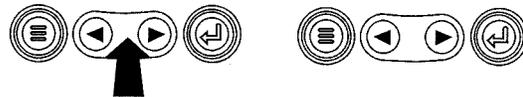
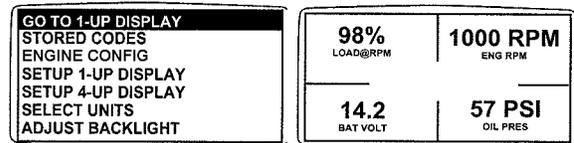


Last Items On Main Menu

OURGP11,0000A9 -19-11OCT06-4/5

RG13162 —UN—26SEP03

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



Use Arrow Buttons To Scroll / Quadrant Display

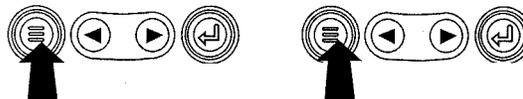
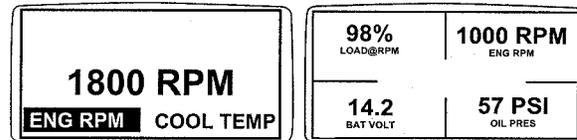
OURGP11,0000A9 -19-11OCT06-5/5

RG13163 —UN—02OCT03

Engine Configuration Data

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

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



Menu Key

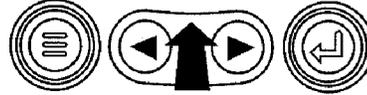
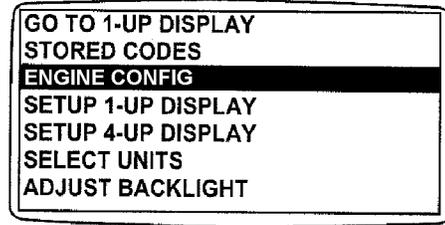
- Turn the key switch to the ON position. Starting at the single or four engine parameter display, press the "Menu" key.

Continued on next page

OURGP11,0000AB -19-11OCT06-1/6

RG13169 —UN—26SEP03

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

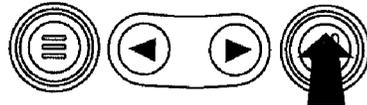
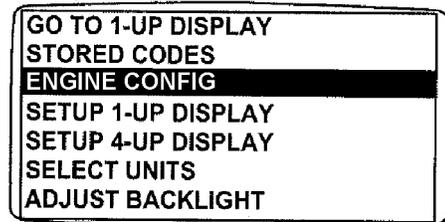


Select Engine Configuration

OURGP11,00000AB -19-11OCT06-2/6

RG13164 —UN—07OCT03

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

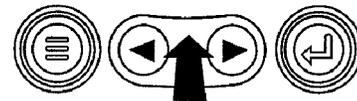


Enter Key

OURGP11,00000AB -19-11OCT06-3/6

RG13165 —UN—02OCT03

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



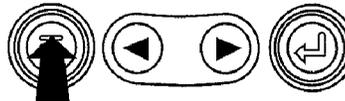
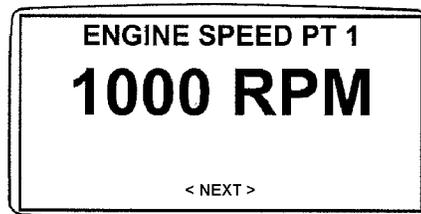
Use Arrow Keys To Scroll

Continued on next page

OURGP11,00000AB -19-11OCT06-4/6

RG13166 —UN—29SEP03

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

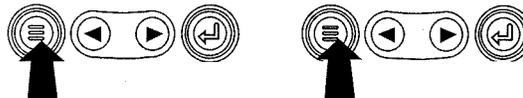
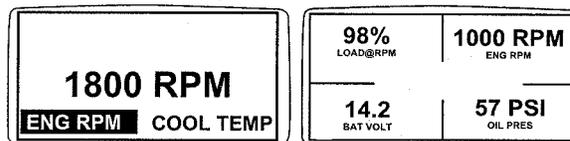


Return To Main Menu

OURGP11,00000AB -19-11OCT06-5/6

RG13167 —UN—29SEP03

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



Exit Main Menu

OURGP11,00000AB -19-11OCT06-6/6

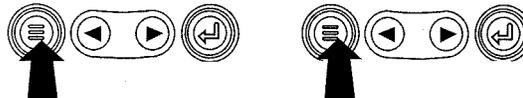
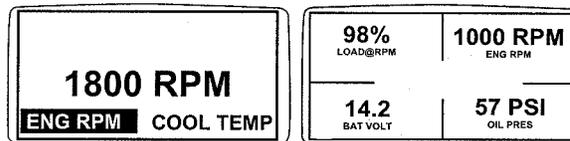
RG13169 —UN—26SEP03

Accessing Stored Trouble Codes

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

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

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



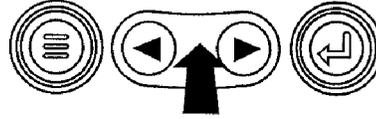
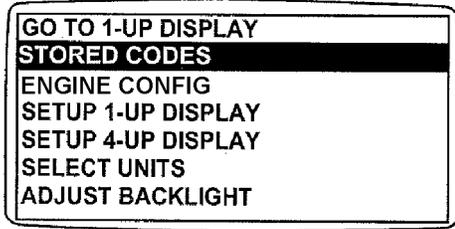
Menu Key

OURGP11,00000AC -19-11OCT06-1/6

RG13169 —UN—26SEP03

Continued on next page

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

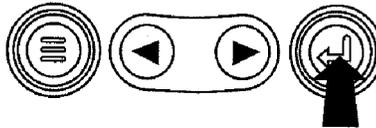
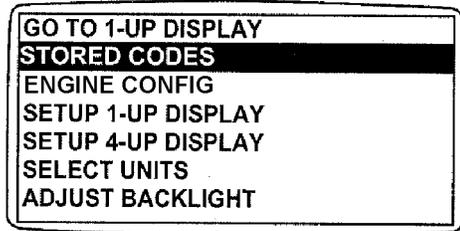


Select Stored Codes

OURGP11,00000AC -19-11OCT06-2/6

RG13168 —UN—02OCT03

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

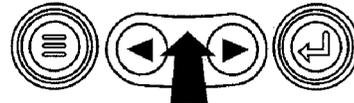
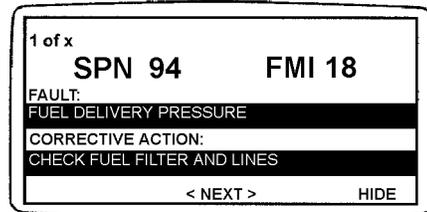


Enter Key

OURGP11,00000AC -19-11OCT06-3/6

RG13169 —UN—02OCT03

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



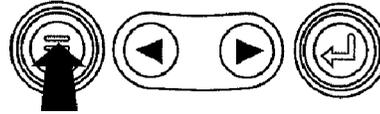
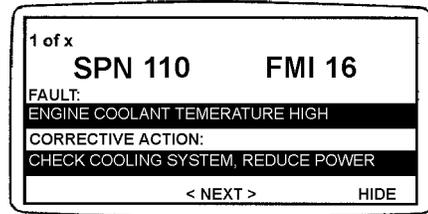
Use Arrow Keys To Scroll

Continued on next page

OURGP11,00000AC -19-11OCT06-4/6

RG13245 —UN—02OCT03

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

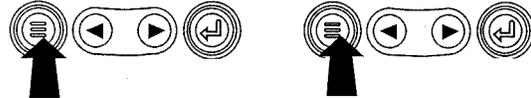
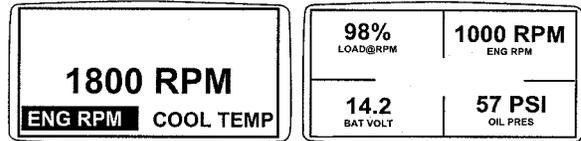


Return To Main Menu

OURGP11,00000AC -19-11OCT06-5/6

RG13246 —UN—02OCT03

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



Exit Main Menu

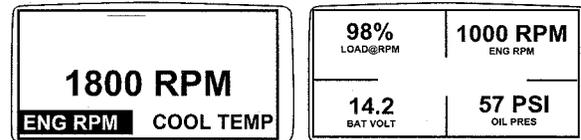
OURGP11,00000AC -19-11OCT06-6/6

RG13159 —UN—26SEP03

Accessing Active Trouble Codes

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

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



Normal Operation

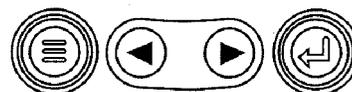
OURGP11,00000AD -19-11OCT06-1/7

RG13172 —UN—26SEP03

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

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

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



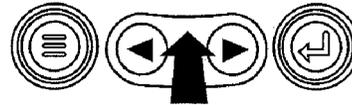
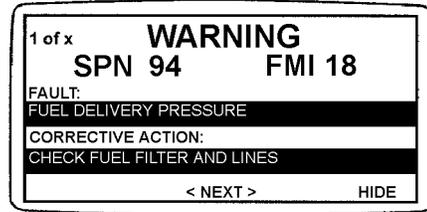
Active Trouble Codes Displayed

Continued on next page

OURGP11,00000AD -19-11OCT06-2/7

RG13240 —UN—30SEP03

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



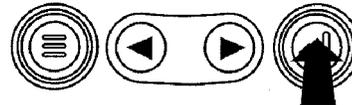
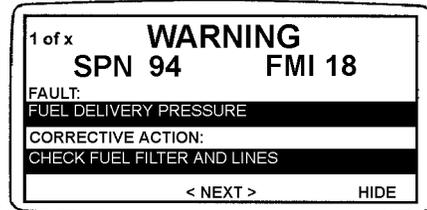
Use Arrow Keys To Scroll

OURGP11,00000AD -19-11OCT06-3/7

RG13241 —UN—30SEP03

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

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

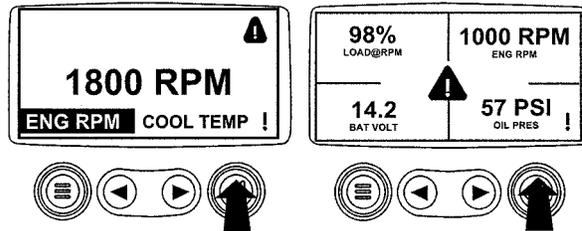


Hide Trouble Codes

OURGP11,00000AD -19-11OCT06-4/7

RG13242 —UN—30SEP03

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



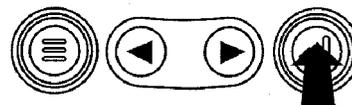
Active Trouble Code Icon

OURGP11,00000AD -19-11OCT06-5/7

RG13176 —UN—26SEP03

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

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



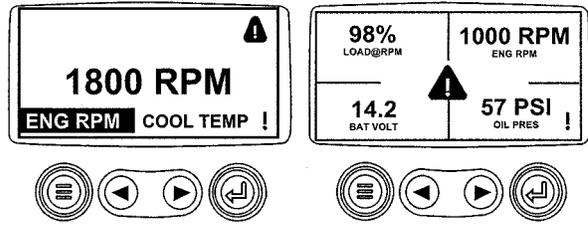
Enter Key

Continued on next page

OURGP11,00000AD -19-11OCT06-6/7

RG13242 —UN—30SEP03

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



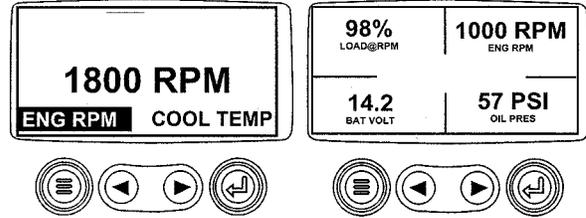
Active Trouble Code Condition

OURGP11,00000AD -19-11OCT06-7/7

RG13243 —UN—01OCT03

Engine Shutdown Codes

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



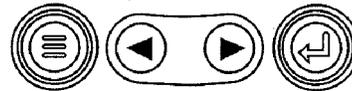
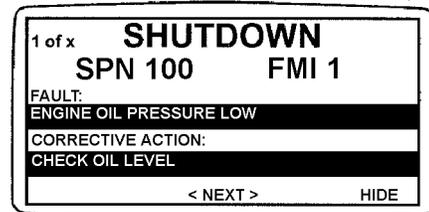
Normal Operation

OURGP11,00000AE -19-11OCT06-1/6

RG13172 —UN—26SEP03

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

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



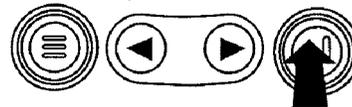
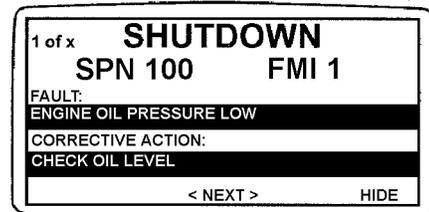
Shutdown Message

OURGP11,00000AE -19-11OCT06-2/6

RG13238 —UN—29SEP03

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

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



Hide Trouble Code

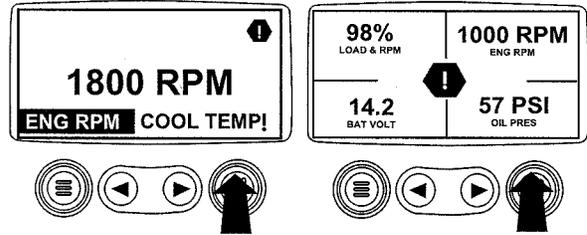
Continued on next page

OURGP11,00000AE -19-11OCT06-3/6

RG13239 —UN—29SEP03

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

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

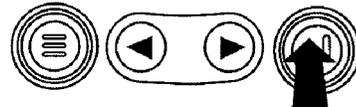
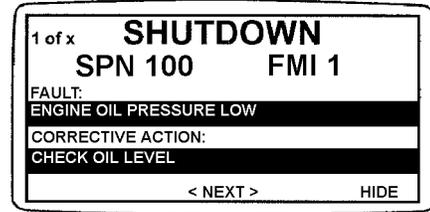


Flashing Shutdown Icon

OURGP11.00000AE -19-11OCT06-4/6

RG13179 —UN—26SEP03

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



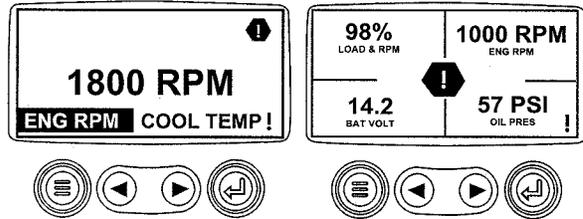
Redisplay Trouble Code

OURGP11.00000AE -19-11OCT06-5/6

RG13239 —UN—29SEP03

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

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



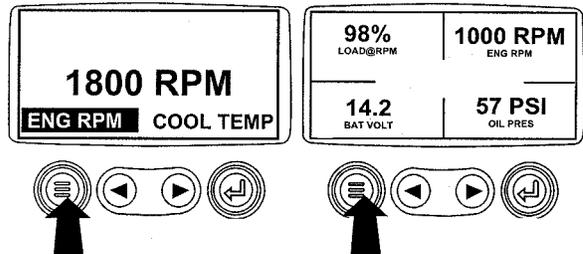
Shutdown Icon

OURGP11.00000AE -19-11OCT06-6/6

RG13180 —UN—26SEP03

Adjusting Backlighting

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



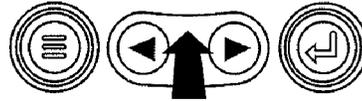
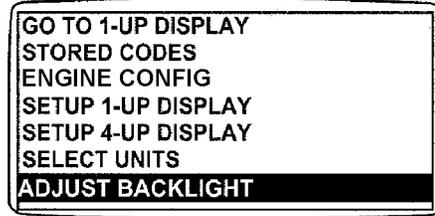
Menu Key

Continued on next page

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

RG13159 —UN—26SEP03

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

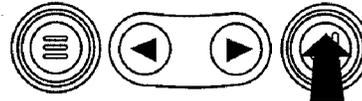
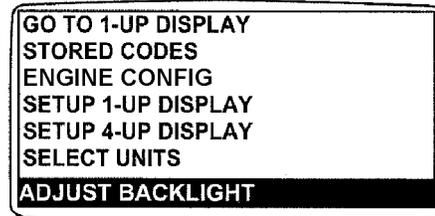


Select Adjust Backlight

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

RG13181 —UN—02OCT03

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

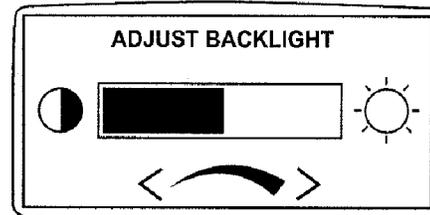


Press Enter Key

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

RG13182 —UN—02OCT03

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



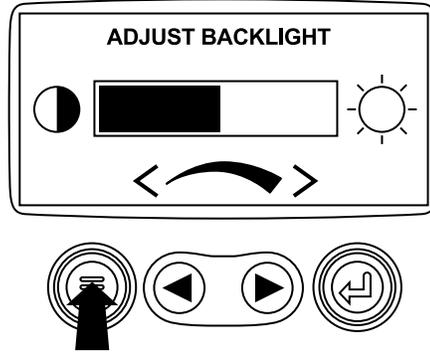
Adjust Backlight Intensity

Continued on next page

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

RG13183 —UN—29SEP03

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

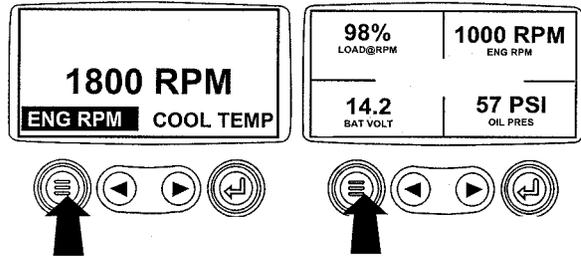


Return to Main Menu

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

RG19048—UN—23AUG10

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



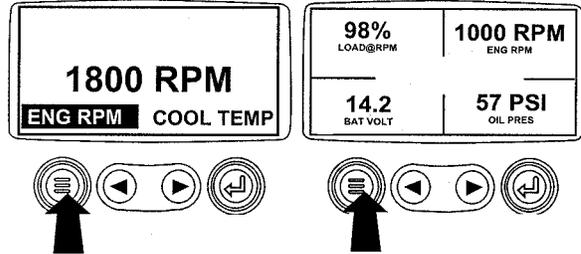
Exit Main Menu

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

RG13159—UN—26SEP03

Adjusting Contrast

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

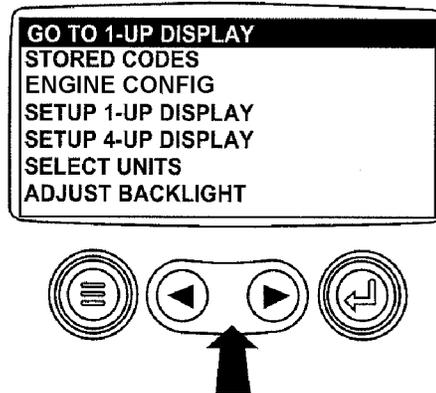


Menu Key

OURGP11,00000AF -19-11OCT06-1/6

RG13159—UN—26SEP03

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



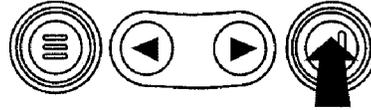
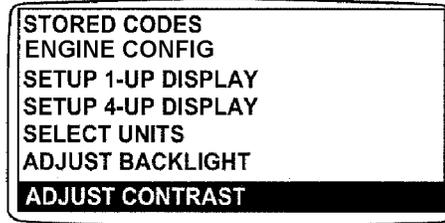
Select Adjust Contrast

Continued on next page

OURGP11,00000AF -19-11OCT06-2/6

RG13161—UN—02OCT03

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

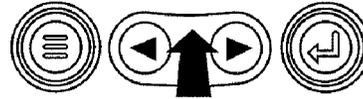
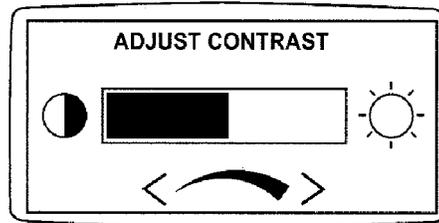


Press Enter Key

OURGP11,00000AF -19-11OCT06-3/6

RG13185 —UN—02OCT03

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

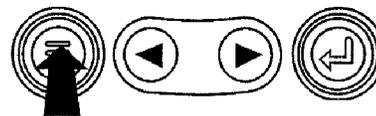
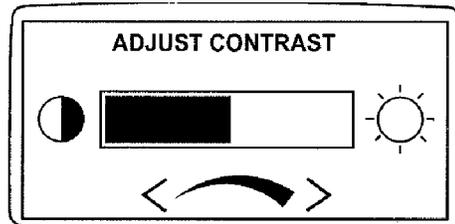


Adjust Contrast Intensity

OURGP11,00000AF -19-11OCT06-4/6

RG13186 —UN—28SEP03

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



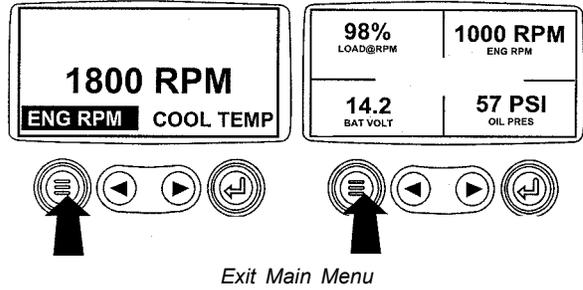
Return To Main Menu

Continued on next page

OURGP11,00000AF -19-11OCT06-5/6

RG13187 —UN—26SEP03

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

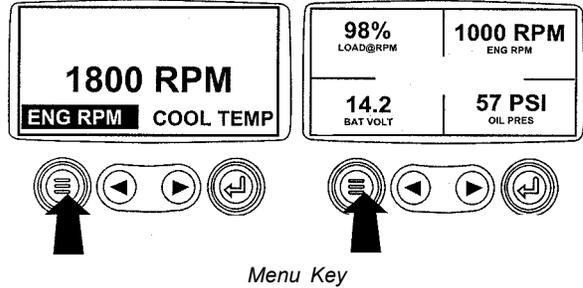


RG13159 —UN—26SEP03

OURGP11,00000AF -19-11OCT06-6/6

Selecting Units Of Measurement

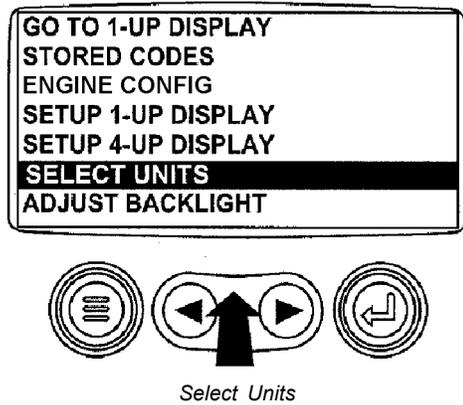
- Turn the key switch to the ON position. Starting at the single or four engine parameter display, press the "Menu" key.



RG13159 —UN—26SEP03

OURGP11,00000B0 -19-11OCT06-1/7

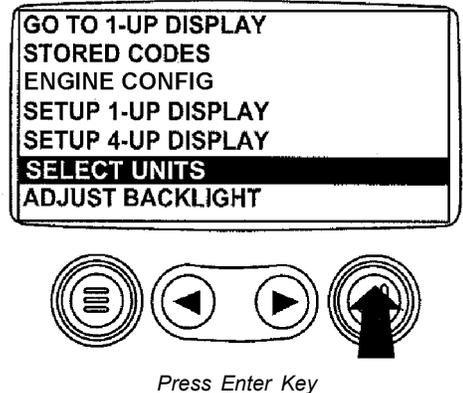
- The main menu will be displayed. Use the "Arrow" keys to scroll through the menu until "Select Units" is highlighted.



RG13188 —UN—02OCT03

OURGP11,00000B0 -19-11OCT06-2/7

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



RG13189 —UN—02OCT03

Continued on next page

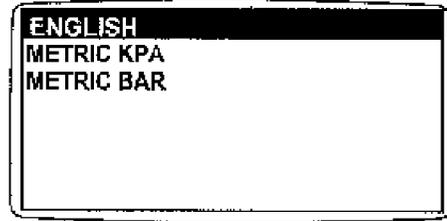
OURGP11,00000B0 -19-11OCT06-3/7

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

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

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

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

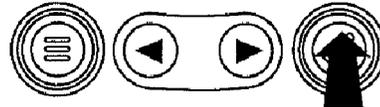
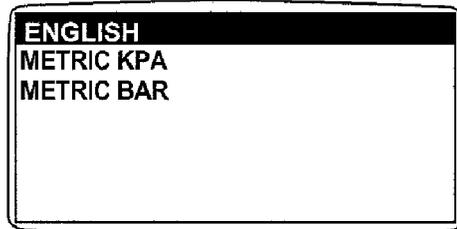


Select Desired Units

OURGP11.00000B0 -19-11OCT06-4/7

RG13190 —UN—26SEP03

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

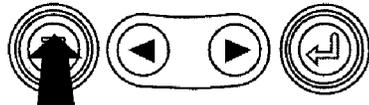
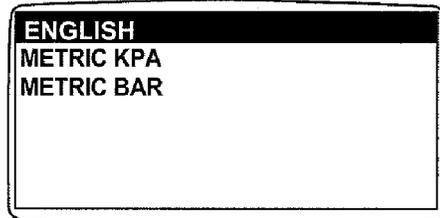


Press Enter Key to Select

OURGP11.00000B0 -19-11OCT06-5/7

RG13191 —UN—30SEP03

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



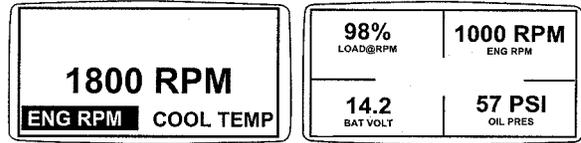
Return To Main Menu

Continued on next page

OURGP11.00000B0 -19-11OCT06-6/7

RG13192 —UN—26SEP03

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



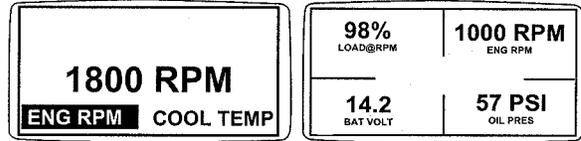
Press Menu Key

OURGP11,00000B0 -19-11OCT06-7/7

RG13159 —UN—26SEP03

Setup 1-Up Display

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

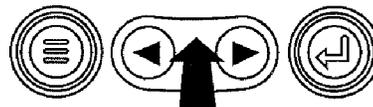
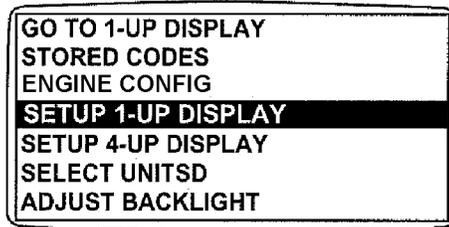


Menu Key

OURGP11,00000B1 -19-11OCT06-1/18

RG13159 —UN—26SEP03

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

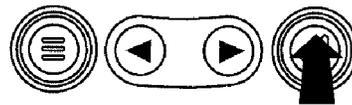
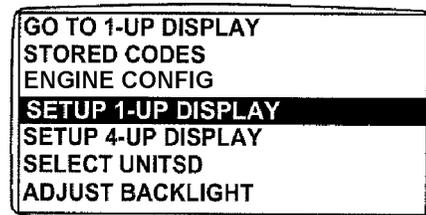


Setup 1-Up Display

OURGP11,00000B1 -19-11OCT06-2/18

RG13193 —UN—02OCT03

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



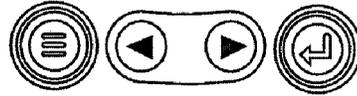
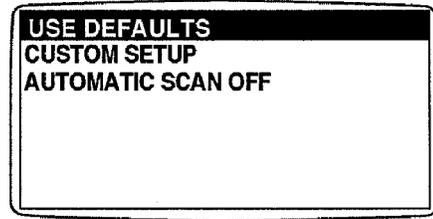
Press Enter Key

OURGP11,00000B1 -19-11OCT06-3/18

RG13194 —UN—02OCT03

Continued on next page

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

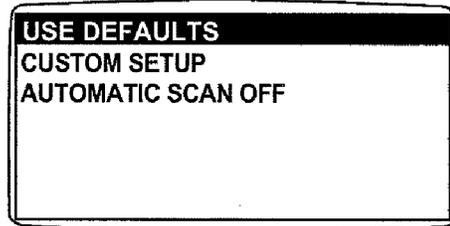


1-Up Display Options

OURGP11,00000B1 -19-11OCT06-4/18

RG13196 —UN—26SEP03

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

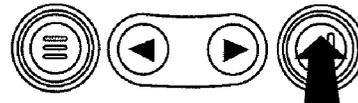
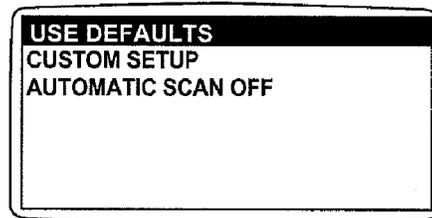


Select Defaults

OURGP11,00000B1 -19-11OCT06-5/18

RG13195 —UN—26SEP03

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



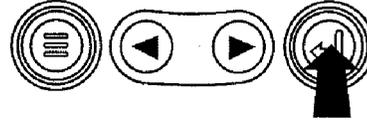
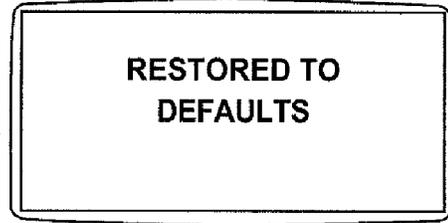
Defaults Selected

Continued on next page

OURGP11,00000B1 -19-11OCT06-6/18

RG13197 —UN—29SEP03

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

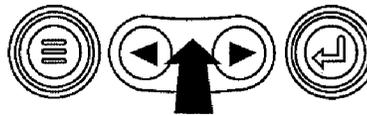
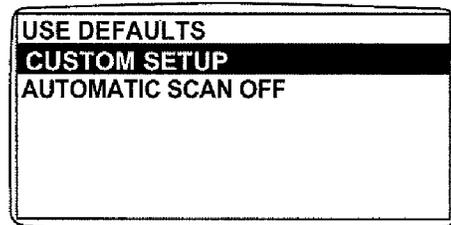


Restored To Defaults

OURGP11,00000B1 -19-11OCT06-7/18

RG13149 —UN—24SEP03

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

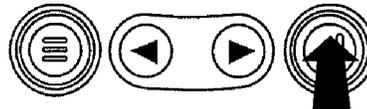
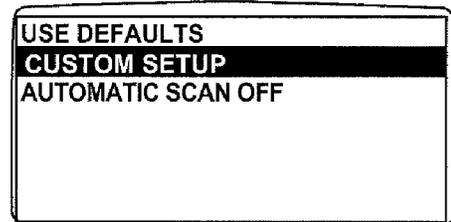


Select Custom Setup

OURGP11,00000B1 -19-11OCT06-8/18

RG13198 —UN—26SEP03

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



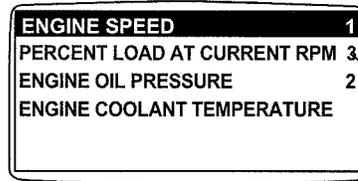
Engine Parameters

Continued on next page

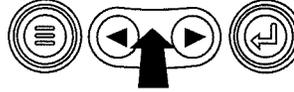
OURGP11,00000B1 -19-11OCT06-9/18

RG13199 —UN—26SEP03

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



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

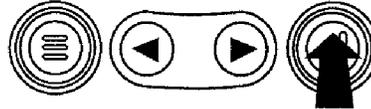
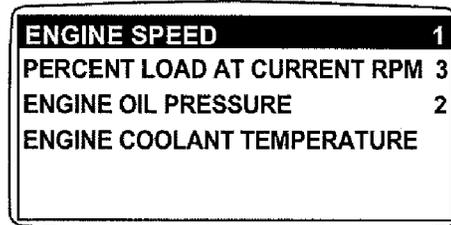


Select Parameters

OURGP11,00000B1 -19-11OCT06-10/18

RG13150 —UN—24SEP03

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

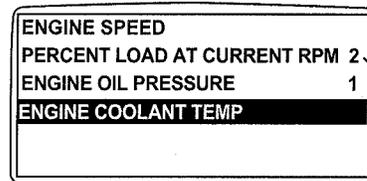


Deselect Parameters

OURGP11,00000B1 -19-11OCT06-11/18

RG13219 —UN—26SEP03

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



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



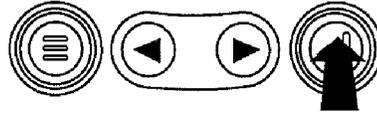
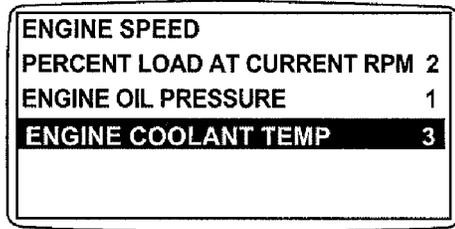
Select Desired Parameters

Continued on next page

OURGP11,00000B1 -19-11OCT06-12/18

RG13151 —UN—24SEP03

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

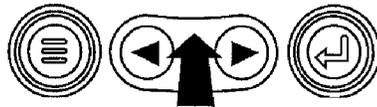
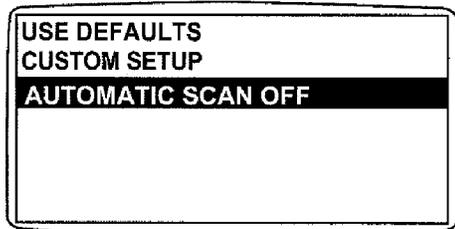


Select Parameters For Display

OURGP11,00000B1 -19-11OCT06-13/18

RG13220 —UN—26SEP03

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

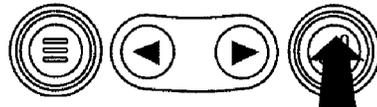
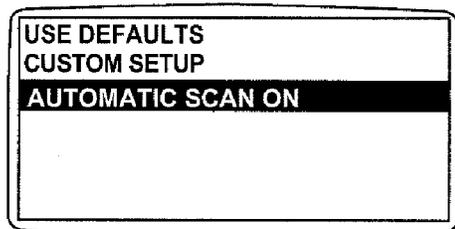


Automatic Scan Off

OURGP11,00000B1 -19-11OCT06-14/18

RG13221 —UN—26SEP03

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



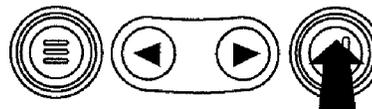
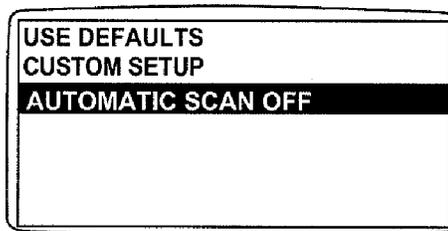
Automatic Scan On

Continued on next page

OURGP11,00000B1 -19-11OCT06-15/18

RG13222 —UN—26SEP03

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

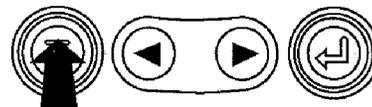
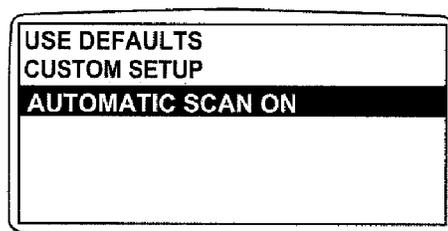


Automatic Scan Off

OURGP11,0000B1 -19-11OCT06-16/18

RG13223 —UN—26SEP03

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

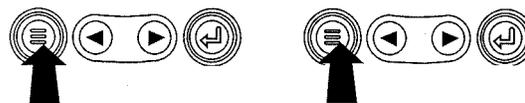
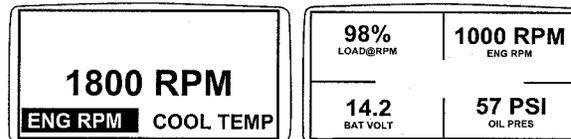


Menu Key

OURGP11,0000B1 -19-11OCT06-17/18

RG13224 —UN—26SEP03

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



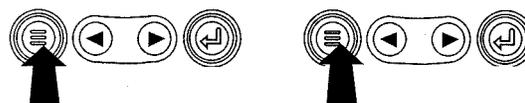
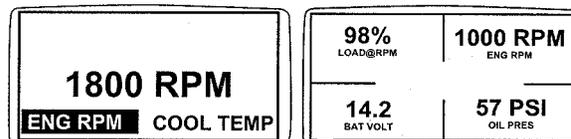
Exit Main Menu

OURGP11,0000B1 -19-11OCT06-18/18

RG13159 —UN—26SEP03

Setup 4-Up Display

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



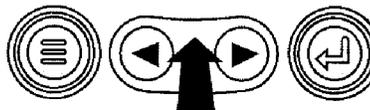
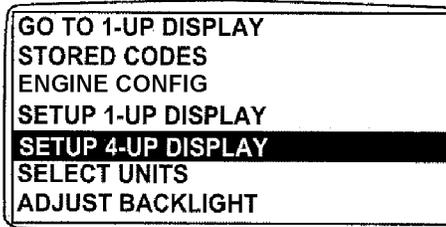
Menu Key

Continued on next page

OURGP11,0000B2 -19-11OCT06-1/14

RG13159 —UN—26SEP03

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

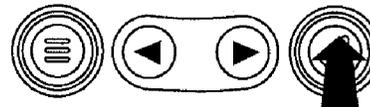
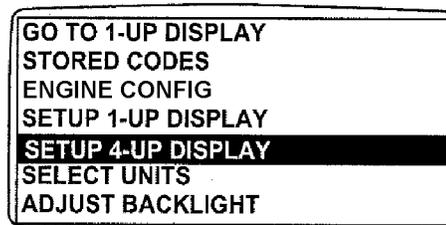


Select Setup 4-Up Display

OURGP11,00000B2 -19-11OCT06-2/14

RG13225 —UN—02OCT03

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



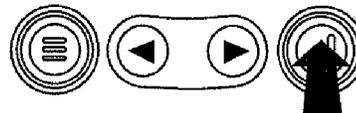
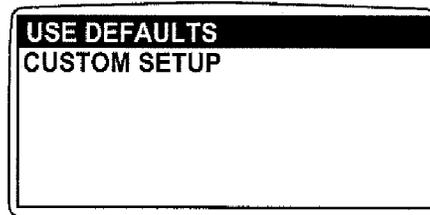
Press Enter Key

OURGP11,00000B2 -19-11OCT06-3/14

RG13226 —UN—02OCT03

4. Two options are available for the 4-Up Display.

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



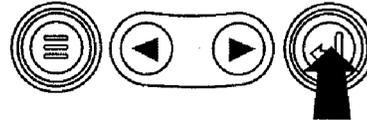
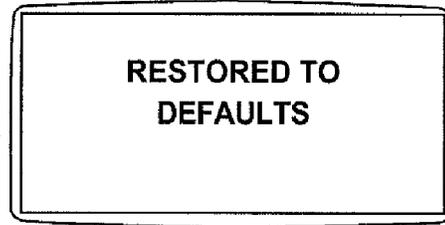
Select Factory Defaults

Continued on next page

OURGP11,00000B2 -19-11OCT06-4/14

RG13244 —UN—02OCT03

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

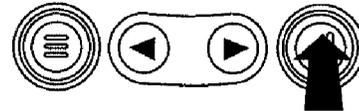
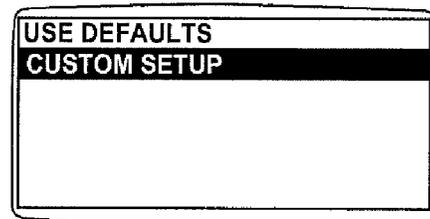


Restored To Defaults

OURGP11,00000B2 -19-11OCT06-5/14

RG13149 —UN—24SEP03

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

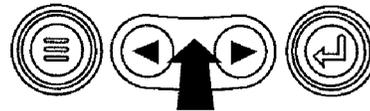
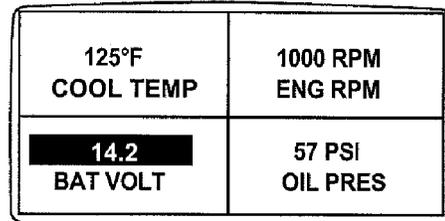


Custom Setup

OURGP11,00000B2 -19-11OCT06-6/14

RG13227 —UN—26SEP03

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



Select Parameters

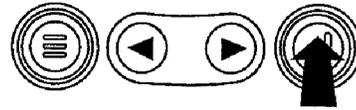
Continued on next page

OURGP11,00000B2 -19-11OCT06-7/14

RG13228 —UN—26SEP03

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

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



List Of Engine Parameters

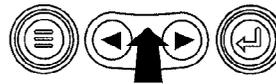
OURGP11,00000B2 -19-11OCT06-8/14

RG13229 —UN—26SEP03

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

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

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



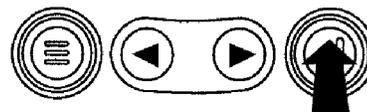
Select Desired Engine Parameter

OURGP11,00000B2 -19-11OCT06-9/14

RG13230 —UN—26SEP03

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

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



Enter Selected Parameter

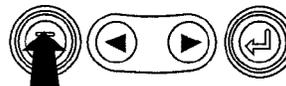
OURGP11,00000B2 -19-11OCT06-10/14

RG13231 —UN—26SEP03

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

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

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



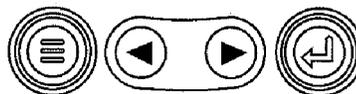
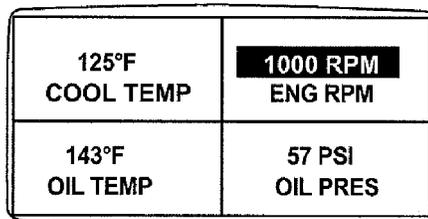
Return To 4-Up Custom Setup

Continued on next page

OURGP11,00000B2 -19-11OCT06-11/14

RG13232 —UN—26SEP03

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

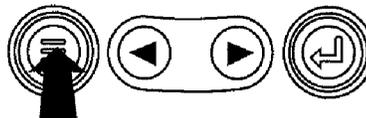
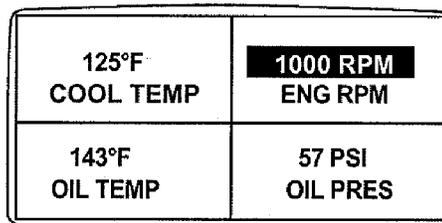


4-Up Display

OURGP11,00000B2 -19-11OCT06-12/14

RG13153 —UN—24SEP03

13. Repeat the parameter selection process until all spaces are as desired.
 14. Press the "Menu" key to return to the main menu.

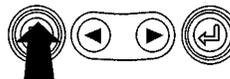
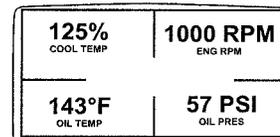
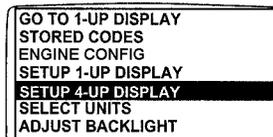


Return To Main Menu

OURGP11,00000B2 -19-11OCT06-13/14

RG13154 —UN—24SEP03

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



Select Remaining Parameters

OURGP11,00000B2 -19-11OCT06-14/14

RG13155 —UN—07OCT03

Engine Operation

Engine Break-In Service

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

1. This engine is factory-filled with John Deere DIESEL ENGINE BREAK-IN OIL (SAE 10W-30). Operate the engine at heavy loads with minimal idling during the break-in period.
2. If the engine has significant operating time at idle, constant speeds, and/or light load usage, or makeup oil is required in the first 100 hour period, a longer break-in period may be required. In these situations, an additional 100 hour break-in period is recommended using a new change of John Deere DIESEL ENGINE BREAK-IN OIL and a new John Deere oil filter.



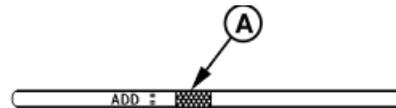
Check Engine Oil

RG13719 —UN—11NOV04

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

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

RG8028A —UN—15JAN99



Crosshatch Pattern On Dipstick

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

A—Crosshatch Pattern On Dipstick

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

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

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

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

Continued on next page

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

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



Engine Oil Filter

A—Engine Oil Filter

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

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

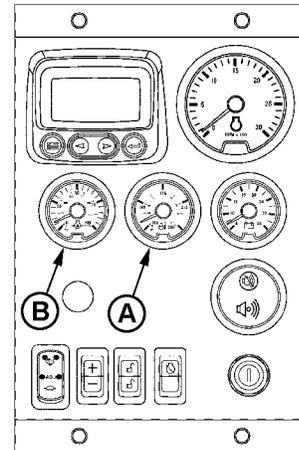
If air temperature is below -10°C (14°F), use an engine block heater.

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

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

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

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



Watch Coolant Temperature and Oil Pressure on Panel

A—Engine Coolant Temperature Gauge

B—Oil Pressure Gauge

Specification

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

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

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

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

Starting the Engine

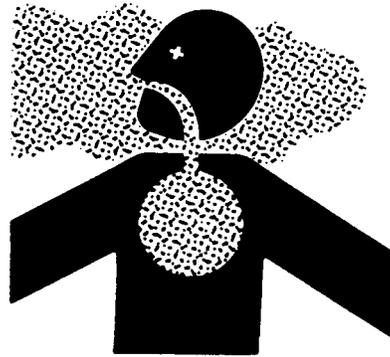
The following instructions apply to the optional controls and instruments available through the John Deere Parts Distribution Network. The controls and instruments for your engine may be different from those shown here; always follow manufacturer's instructions.

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

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

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

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



Use Proper Ventilation

TS220—UN—23AUG88

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

4. Set slow idle as follows:

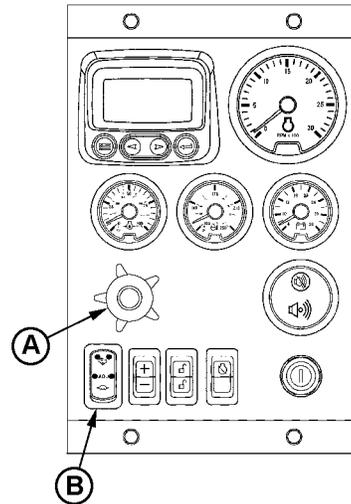
Panels with high-low speed select rocker switch (B) only: Set slow speed by pressing lower half of switch.

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

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

A—Analog Throttle Control (Optional)

B—Speed Select Rocker Switch



Analog Throttle Control and Speed Select Switch

RG13722—UN—11NOV04

Continued on next page

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

- Turn the key start switch (A) clockwise to the "ON" position. Wait until the Engine Preheater Indicator light turns off, then turn the key start switch clockwise "START" position to crank the engine. (In cold weather, preheater indicator light remains on longer while engine is warmed. See COLD WEATHER OPERATION later in this section.) When the engine starts, release the key switch so that it returns to the "ON" position.

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

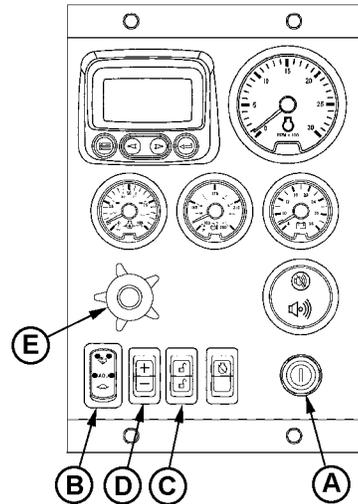
- After engine starts, idle engine at not more than 1200 rpm until warm. (See WARMING ENGINE later in this section).

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

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

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

- Check all gauges for normal engine operation. If operation is not normal, stop the engine and



Start And Idle Engine Controls On Instrument Panel

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

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

RG13723 —UN—11NOV04

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

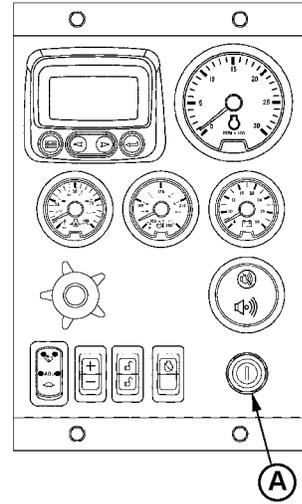
Restarting Engine After Emergency Shutdown

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

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

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

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



Restarting the Engine

A—Key Start Switch

RG13738—UN—11NOV04

OURGP12,0000085 -19-20AUG10-1/1

Normal Engine Operation

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

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

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

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

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

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

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

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

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

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

Warming Engine

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

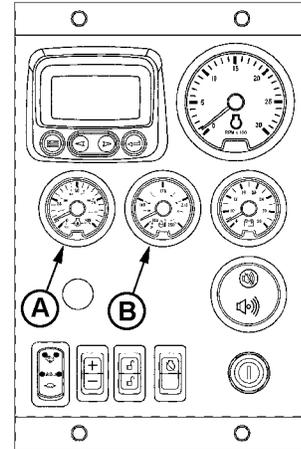
IMPORTANT: To assure proper lubrication, operate engine at or below 1200 rpm with no load for 1–2 minutes. Extend this period 2–4 minutes when operating at temperatures below freezing.

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

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

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

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



Oil Pressure and Coolant Temperature Gauges On Panel

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

The normal engine coolant temperature range is 82°—94°C (180°—202°F).

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

RG13724 —UN—11NOV04

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

Cold Weather Operation

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

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

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

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

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

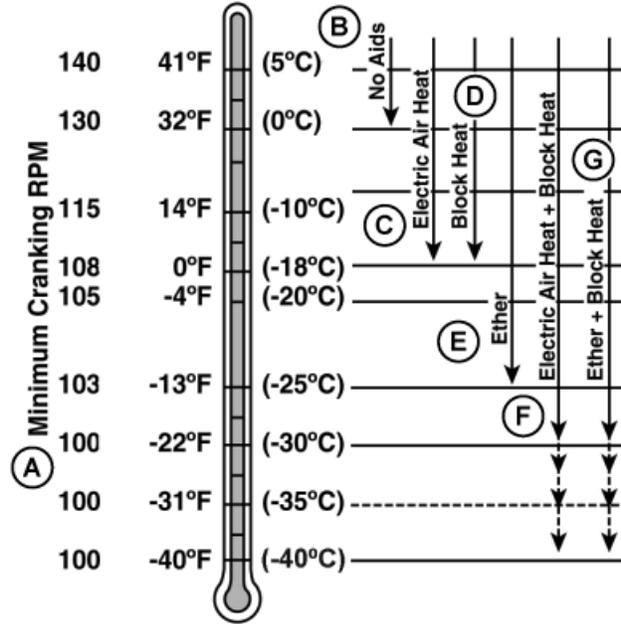
Synthetic oils have improved flow at low temperatures, especially in arctic conditions.

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

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



Handle Starting Fluid with Care



Cold Weather Starting Guidelines

- A—Minimum Cranking RPM
- B—No Aids
- C—Electric Air Heat
- D—Block Heat
- E—Ether (See Caution)
- F—Electric Air Heat and Block Heat
- G—Ether and Block Heat (See Caution)

Continued on next page

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

TS1356 —UN—18MAR92

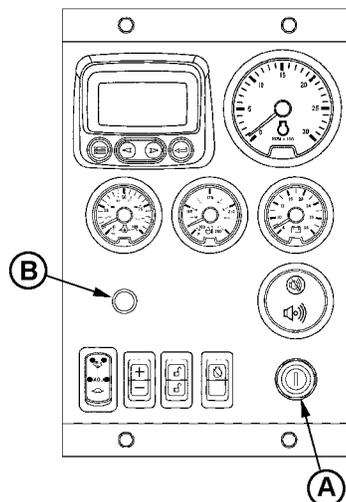
RG19813 —UN—15DEC10

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

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

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

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



Activating Glow Plugs (if applicable) with Key Start Switch

A—Key Start Switch

RG13864 —UN—28JAN05

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

Using a Booster Battery or Charger

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

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

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

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

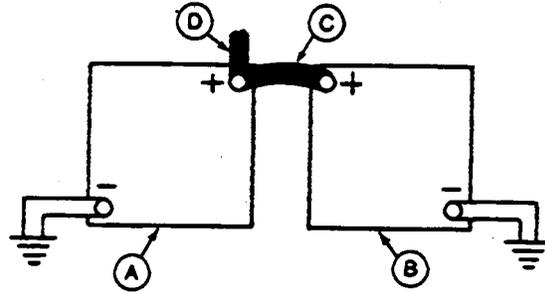
1. Connect booster battery or batteries to produce the required system voltage for your engine application.

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

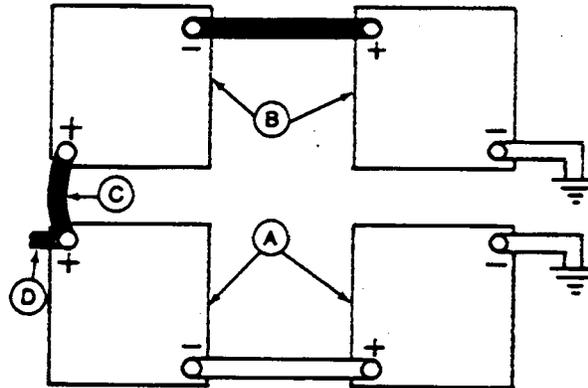
2. Connect one end of jumper cable to the POSITIVE (+) post of the booster battery.
3. Connect the other end of the jumper cable to the POSITIVE (+) post of battery connected to starter.
4. Connect one end of the other jumper cable to the NEGATIVE (-) post of the booster battery.
5. ALWAYS complete the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



Exploding Battery



12-Volt System



24-Volt System

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

TS204 —UN—23AUG88

RG4678 —UN—14DEC88

RG4698 —UN—14DEC88

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

Avoid Excessive Engine Idling

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

Once an engine is warmed to normal operating temperatures, engine should be idled at slow idle speed.

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

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

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

Changing Engine Speed

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

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

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

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

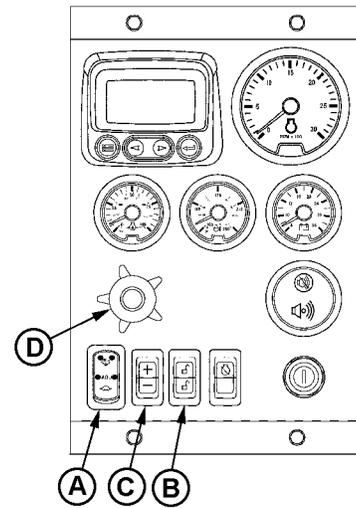
1. Select middle position (ADJ) or slow (turtle) position on the optional Adjustable Three-State Speed Select Rocker Switch (A).
2. Press and hold top or bottom half of Bump Speed Enable Rocker Switch (B) while using Speed Select Rocker Switch (C).
3. Use Speed Select Rocker Switch (C) to bump engine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

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

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

Changing engine speed using optional analog throttle (D)

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



Changing Engine Speed with Full-Featured Panel

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

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

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

Continued on next page

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

RG13725—UN—11NOV04

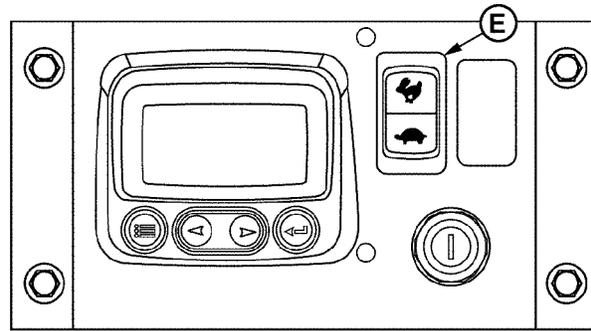
Changing engine speeds on engines equipped with the Basic Instrument Panel

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

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

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

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



Changing Engine Speed With Basic Panel

E—High-Low Speed Select Rocker Switch

RG13289 —UN—30OCT03

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

Stopping The Engine

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

IMPORTANT: Before stopping an engine that has been operating at working load, idle engine at least 2 minutes at 1000—1200 rpm to cool hot engine parts.

Engines in generator set applications where the ECU is locked at a specified speed and no slow idle function is available, run engine for at least 2 minutes at fast idle and no load.

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

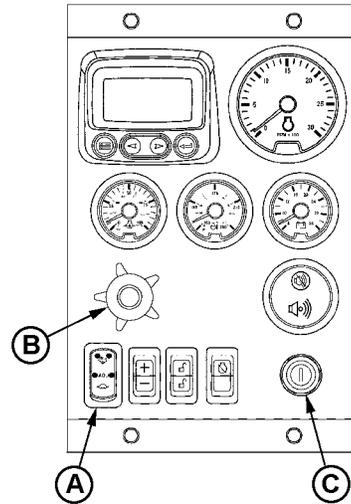
3. Set either High-Low Speed Select Rocker Switch (A) or Analog Throttle (B) to low idle, and set desired speed with remaining control.

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

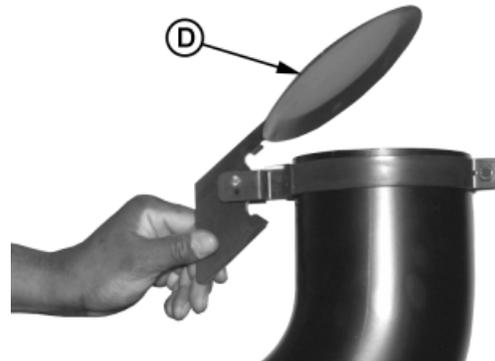
4. Push in on analog throttle potentiometer handle (if equipped) so that engine goes to slow idle, or set slow speed with High-Low Speed Select Rocker Switch.

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

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



Stopping the Engine



Exhaust Stack Rain Cap

A—High-Low Speed Select Rocker Switch
 B—Analog Throttle (Optional)
 C—Key Switch
 D—Exhaust Stack Rain Cap

RG13726 —UN—11NOV04

RG13727 —UN—11NOV04

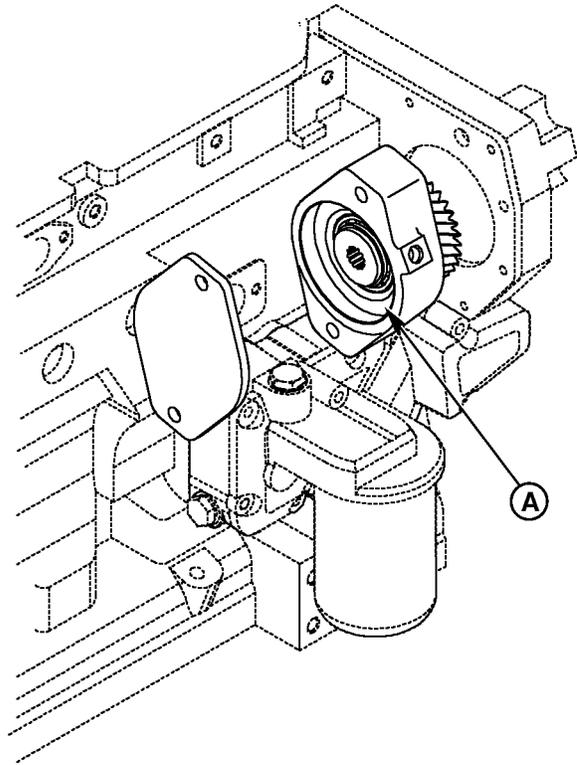
OURGP12,000008B -19-22SEP04-1/1

Auxiliary Gear Drive Limitations

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

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

A—Auxiliary Gear Drive



Auxiliary Gear Drive

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

RG7634A —UN—22JAN99

Generator Set (Standby) Applications

To assure that your engine will deliver efficient standby operation when needed, start engine and run at rated

speed (with 50%—70% load) for 30 minutes every 2 weeks. DO NOT allow engine to run extended period of time with no load.

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

Lubrication and Maintenance

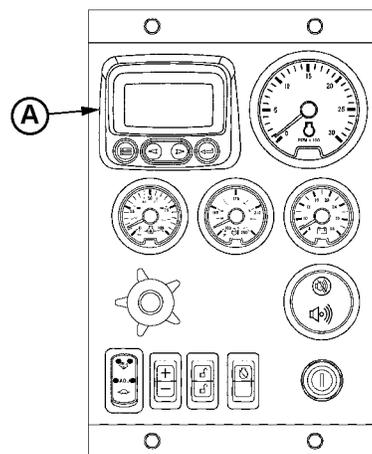
Observe Service Intervals

A repair shop or person of the owner's choosing may maintain, replace, or repair emission control devices and systems. However, warranty service must be performed by an authorized John Deere service facility except in the case of emergency.

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

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

IMPORTANT: Recommended service intervals are for normal operating conditions. Perform maintenance at interval which occurs first, for example, either at 500 hours of operation or every 12 months. Service more often if



Hour Meter On Instrument Panel

A—Hour Meter

engine operated under adverse conditions. Neglecting maintenance can result in failures or permanent damage to the engine.

OURGP11,0000059 -19-12JAN10-1/1

RG13728 —UN—11NOV04

Use Correct Fuels, Lubricants, and Coolant

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

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



John Deere Parts Network

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

TS100 —UN—23AUG88

Lubrication and Maintenance Service Interval Chart—Standard Industrial Engines

NOTE: The service intervals below are for standard industrial engines. See details in Sections which follow these charts.

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

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

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

^c Service intervals depend on sulfur content of the diesel fuel, oil pan capacity, and the oil and filter used. (See DIESEL ENGINE OIL AND FILTER SERVICE INTERVALS, in Fuels, Lubricants, and Coolant Section.)

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

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

OURGP11,000005A -19-19FEB08-1/1

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.

Item	Lubrication and Maintenance Service Intervals			
	Every 2 Weeks	500 Hours of Operation/or Every 12 Months	2000 Hours of Operation/or Every 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/Water Bowl	•			
Check Air Cleaner Dust Unloader Valve & Restriction Indicator Gauge ^a	•			
Visual Walk Around Inspection	•			
Service Fire Extinguisher		•		
Check Engine Mounts		•		
Service Battery		•		
Change Engine Oil And Replace Oil Filter ^{b .c}		•		
Check Crankcase Vent System		•		
Check Air Intake Hoses, Connections, & System		•		
Replace Fuel Filter Elements		•		
Check Automatic Belt Tensioner and Belt Wear		•		
Check Engine Electrical Ground Connection		•		
Check Cooling System		•		
Coolant Solution Analysis-Add SCAs as required		•		
Pressure Test Cooling System		•		
Check Engine Speeds		•		
Check Crankshaft Vibration Damper (6.8 L Engines) ^d			•	
Flush and Refill Cooling System ^e			•	
Test Thermostats			•	
Check and Adjust Engine Valve Clearance			•	
Test Glow Plugs			•	
Add Coolant				•
Replace Air Cleaner Elements				•
Replace Fan and Alternator Belts				•
Check Fuses				•
Check Air Compressor (If Equipped)				•
Bleed Fuel System				•

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

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

^c Service intervals depend on sulfur content of the diesel fuel, oil pan capacity, and the oil and filter used. (See DIESEL ENGINE OIL AND FILTER SERVICE INTERVALS, in Fuels, Lubricants, and Coolant Section.)

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

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

Lubrication and Maintenance Service Interval Chart—Jet Fuel Capable Engines

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

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

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

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

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

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

Lubrication & Maintenance/Daily

Daily Prestarting Checks

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

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

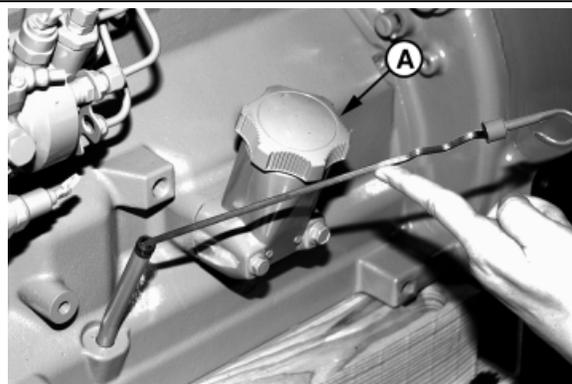
1. Check engine oil level on dipstick. Add as required, using seasonal viscosity grade oil. (See DIESEL ENGINE OIL in Fuels, Lubricants, and Coolant Section for oil specifications.)

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

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

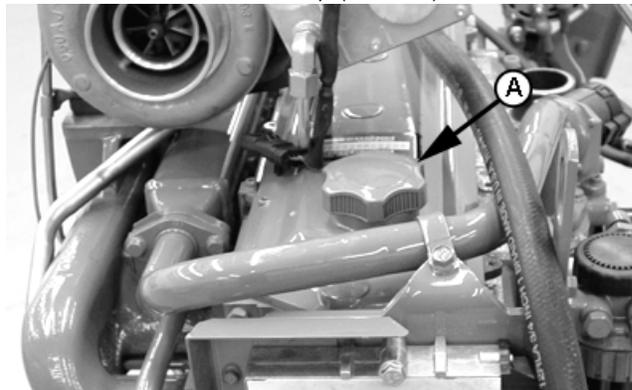
A—Oil Filler Cap

B—Crosshatch Marks On Dipstick



Oil Filler Cap (Left Side)

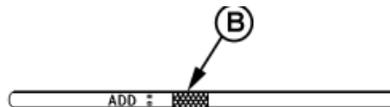
RG8009A —UN—16JUN00



Oil Filler Cap (Rocker Arm Cover)

RG13730 —UN—11NOV04

RG13731 —UN—11NOV04



Crosshatch on Dipstick

Continued on next page

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

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

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

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

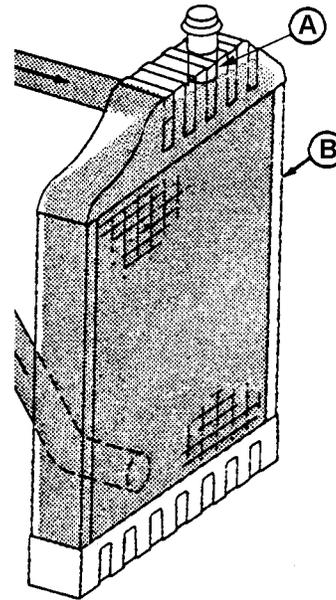
NOTE: Refer to your vehicle's operator's manual for recommendations for non-John Deere supplied accessories.

A—Radiator Filler Neck

B—Radiator



High-Pressure Fluids



Fill Radiator

Continued on next page

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

TS281 —UN—23AUG88

RG13295 —UN—20NOV03

Lube & Maint. 500 Hour/12 Month - Jet Fuel 250 Hour

Servicing Fire Extinguisher

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

Read and follow the instructions which are packaged with it. The extinguisher should be inspected at least every 500 hours of engine operation or every 12 months. Once extinguisher is operated, no matter how long, it must be recharged. Keep record of inspections on the tag which comes with the extinguisher instruction booklet.



Fire Extinguisher

A—Fire Extinguisher

RW4918—UN—15DEC88

OURGP12,0000B9 -19-11OCT06-1/1

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 brackets, vibration isolators, and mounting bolts on support frame and engine block for tightness. Tighten as necessary.
2. Inspect overall condition of vibration isolators, if equipped. Replace isolators, as necessary, if rubber has deteriorated or mounts have collapsed.

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

Servicing Battery

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

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

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

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

1. On regular batteries, check electrolyte level. Fill each cell to bottom of filler neck with distilled water.

NOTE: Low-maintenance or maintenance-free batteries should require little additional service. However, electrolyte level can be checked by cutting the center section of decal on dash-line, and removing cell plugs. Fill each cell to bottom of filler neck with distilled water.

2. Keep batteries clean by wiping them with a damp cloth. Keep all connections clean and tight. Remove



Exploding Battery

any corrosion, and wash terminals with a solution of 1 part baking soda and 4 parts water. Tighten all connections securely.

NOTE: Coat battery terminals and connectors with a mixture of petroleum jelly and baking soda to retard corrosion.

3. Keep battery fully charged, especially during cold weather. If a battery charger is used, turn charger off before connecting charger to battery(ies). Attach **POSITIVE (+)** battery charger lead to **POSITIVE (+)** battery post. Then attach **NEGATIVE (-)** battery charger lead to a good ground.

Continued on next page

OURGP12,0000DE -19-04JAN05-1/2

T5204—UN—23AUG88

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

Avoid the hazard by:

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

If you spill acid on yourself:

1. Flush your skin with water.
2. Apply baking soda or lime to help neutralize the acid.
3. Flush your eyes with water for 10–15 minutes. Get medical attention immediately.

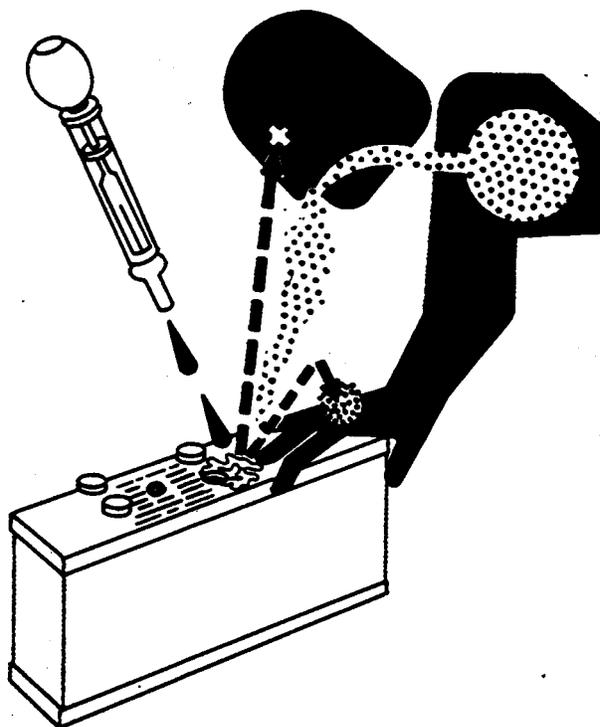
If acid is swallowed:

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

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

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

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



Sulfuric Acid

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

TS203 —UN—23AUG88

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

Changing Engine Oil and Replacing Filter

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

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

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

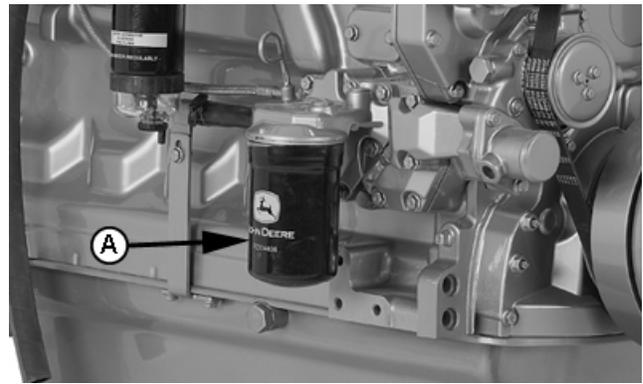
NOTE: During **break-in**, change engine oil and filter for the first time before **100 hours** maximum of operation.

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

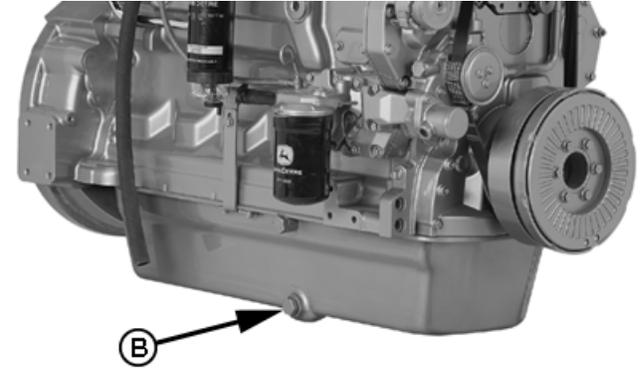
To change engine oil and oil filter:

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

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



Special Oil Filter



Oil Pan Drain Plug

A—Oil Filter

B—Oil Pan Drain Plug

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

Continued on next page

OURGP11,00005C -19-30JUN08-1/3

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

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

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

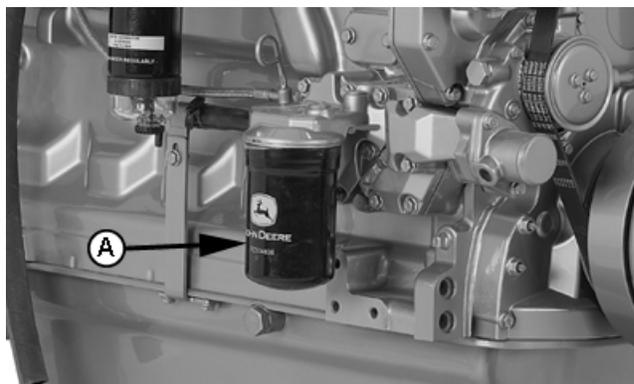
- Apply clean engine oil to the new filter at the inner (B) and outer (C) seals and to filter threads.
- Wipe both sealing surfaces of the header (D, E) with a clean rag. Ensure notches in dust seal (F) are properly installed in the slots in the housing. Replace dust seal if damaged.

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

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

Specification

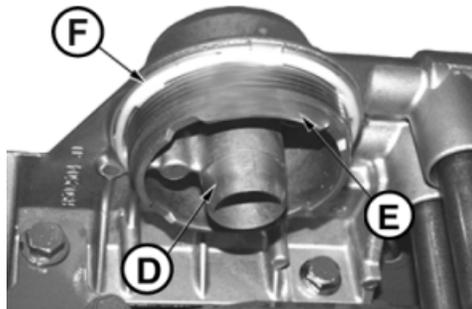
Oil Pan Drain Plug With Copper Washer—Torque.....	70 Nm (52 lb ft)
Oil Pan Drain Plug With O-Ring—Torque.....	50 Nm (37 lb ft)
Oil Pan Drain Plug With Packing (6068 Engine Code 1961, Steel Oil Pan)—Torque.....	40 Nm (29 lb ft)
Bi-Material Oil Pan Drain Plug—Torque.....	30 Nm (22 lb ft)



Oil Filter And Mounting Header



Oil Filter Seals



Filter And Mounting Header

- | | |
|-----------------------------|------------------------------------|
| A—Oil Filter Element | D—Sealing Surface On Header |
| B—Inner Seal | E—Sealing Surface On Header |
| C—Outer Seal | F—Dust Seal |

Continued on next page

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

RG13721 —UN—11NOV04

RG11617 —UN—24OCT01

RG11618 —UN—24OCT01

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

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

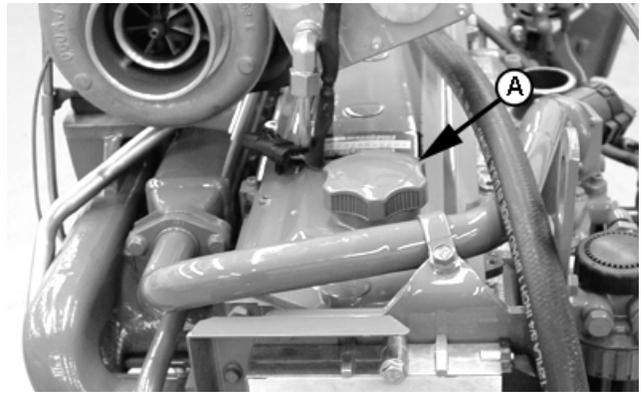
IMPORTANT: Immediately after completing any oil change, crank engine for 30 seconds without permitting engine to start. This will help insure adequate lubrication to engine components before engine starts.

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

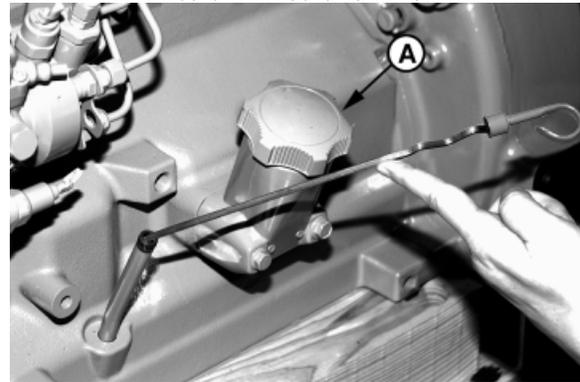
- Start engine and run to check for possible leaks.
- Stop engine and check oil level after 10 minutes. Oil level reading should be within crosshatch marks (B) on dipstick.

A—Oil Filler Cap

B—Crosshatch Marks on Dipstick

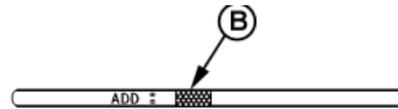


Rocker Arm Cover Oil Filler



Left Side Oil Filler

RG13730 —UN—11NOV04



Crosshatch Marks on Dipstick

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

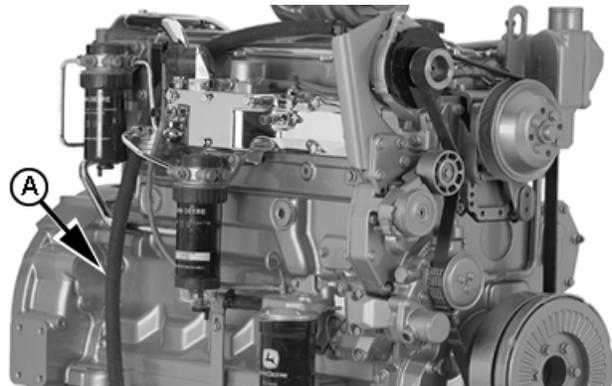
Checking Crankcase Vent System

Crankcase Vent Tube (If Equipped)

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

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

A—Crankcase Vent Tube



Crankcase Vent Tube

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

Checking Air Intake System

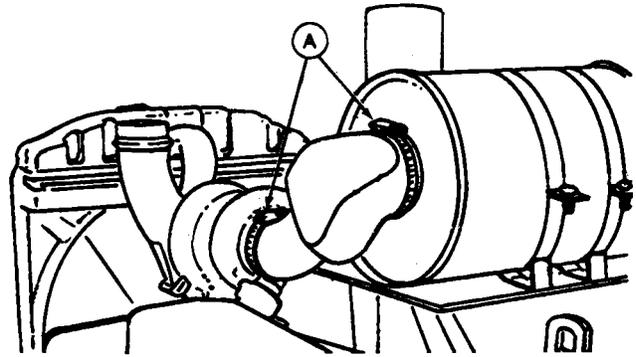
IMPORTANT: The air intake system must not leak. Any leak, no matter how small, may result in internal engine damage due to abrasive dirt and dust entering the intake system.

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

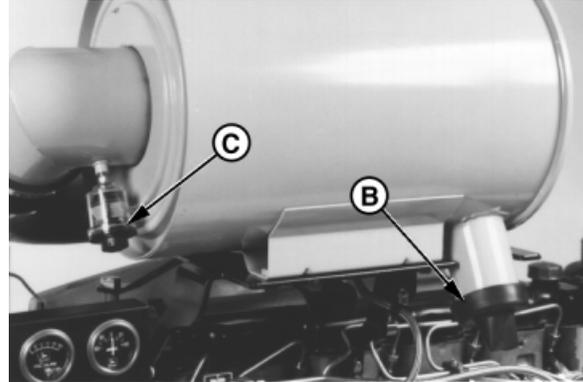
IMPORTANT: ALWAYS REPLACE primary air cleaner element when air restriction indicator shows a vacuum of 625 mm (25 in.) H₂O, is torn, or visibly dirty.

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

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



Check Clamps



Unloader Valve and Air Restriction Indicator

A—Clamps
B—Dust Unloader Valve

C—Air Restriction Indicator

OURGP12,0000BA -19-26JUN08-1/1

RG4689 —UN—20DEC08

RG7332B —UN—22JAN99

Replacing Fuel Filter Elements (Diesel Fuel)

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

CAUTION: Escaping fluid under pressure can penetrate the skin causing serious injury. Relieve pressure before disconnecting fuel or other lines. Tighten all connections before applying pressure. Keep hands and body away from pinholes and nozzles which eject fluids under high pressure. Use a piece of cardboard or paper to search for leaks. Do not use your hand.

If any fluid is injected into the skin, it must be surgically removed within a few hours by a doctor familiar with this type injury or gangrene may result. Doctors unfamiliar with this type of injury may call the Deere & Company Medical Department in Moline, Illinois, or other knowledgeable medical source.

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

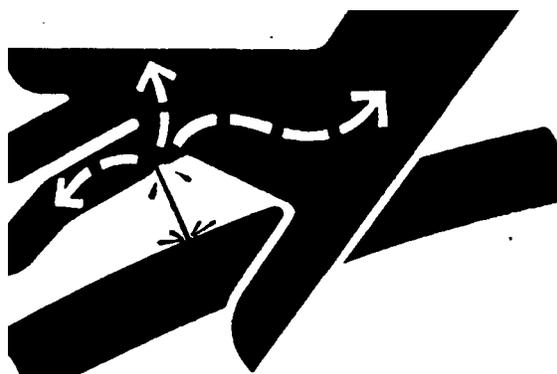
1. Close fuel shut-off valve, if equipped.
2. Thoroughly clean fuel filter assemblies and surrounding areas.
3. Disconnect water sensor wiring from primary fuel filter.
4. Loosen drain plugs (C) and drain fuel into a suitable container.

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

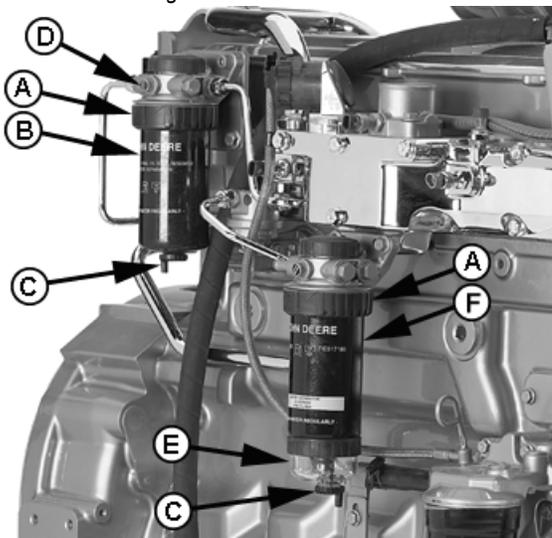
5. Firmly grasp the retaining rings (A) and rotate them clockwise 1/4 turn (when viewed from the top). Remove ring with final fuel filter element (B) and with primary fuel filter element (F).
6. Loosen ring and remove water separator bowl (E) with primary fuel filter element. Drain and clean bowl. Dry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

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

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



High-Pressure Fluids



Fuel Filters

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

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

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

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

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

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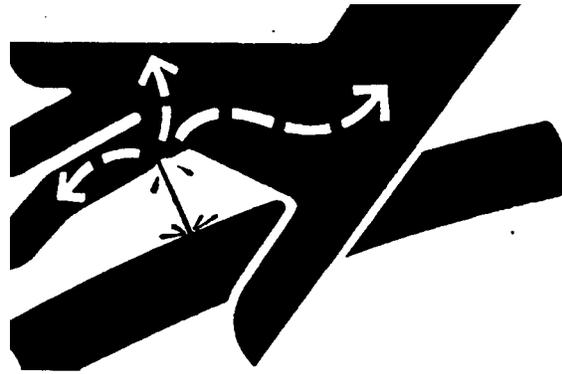
RG13807 —UN—02DEC04

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

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

CAUTION: Escaping fluid under pressure can penetrate the skin causing serious injury. Relieve pressure before disconnecting fuel or other lines. Tighten all connections before applying pressure. Keep hands and body away from pinholes and nozzles which eject fluids under high pressure. Use a piece of cardboard or paper to search for leaks. Do not use your hand.

If any fluid is injected into the skin, it must be surgically removed within a few hours by a doctor familiar with this type injury or gangrene may result. Doctors unfamiliar with this type of injury may call the Deere & Company Medical Department in Moline, Illinois, or other knowledgeable medical source.



High-Pressure Fluids

IMPORTANT: Replace fuel filter elements anytime audible alarm sounds and trouble codes indicate plugged fuel filters (low fuel pressure). If no alarm sounds during the 12 month service interval, replace elements at that time, or after 250 hours operation, whichever comes first.

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

Continued on next page

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X9811 —UN—23AUG88

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

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

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

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

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

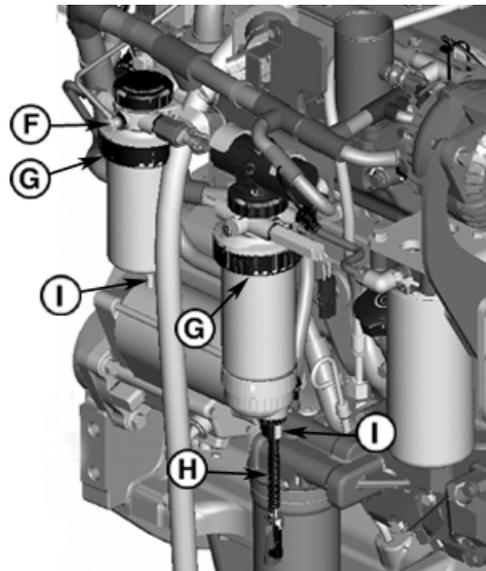
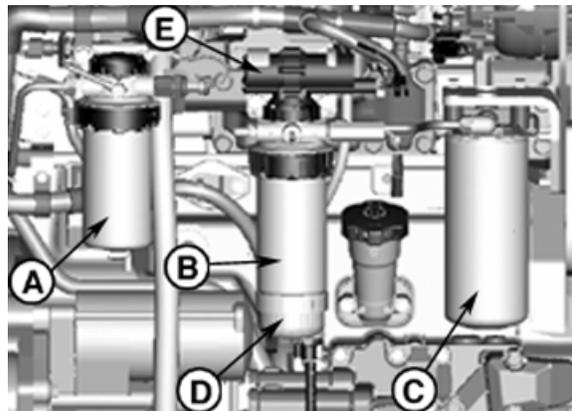
NOTE: *The proper installation is indicated when a "click" is heard and a release of the retaining ring is felt.*

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

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

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

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



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

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

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

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

RG15342—UN—25JUN07

RG15405—UN—29JUN07

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

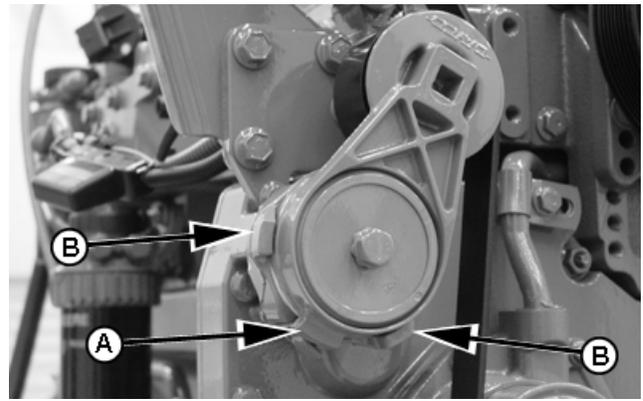
Belt drive systems equipped with automatic (spring) belt tensioners cannot be adjusted or repaired. The automatic belt tensioner is designed to maintain proper belt tension over the life of the belt. If tensioner spring tension is not within specification, replace tensioner assembly.

Checking Belt Wear

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

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

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



Cast Stops

A—Tensioner Cast Stop

B—Fixed Cast Stop

Continued on next page

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

RG13744 —JUN—11NOV04

Checking Tensioner Spring Tension

A belt tension gauge will not give an accurate measure of the belt tension when automatic spring tensioner is used. Measure tensioner spring tension using a torque wrench and procedure outlined below:

1. Release tension on belt using a long handled 1/2 inch drive tool in square hole in tensioner arm. Remove belt from pulleys.

NOTE: While belt is removed, inspect pulleys and bearings. Rotate and feel for hard turning or any unusual sounds. If pulleys or bearings need replacement, see your John Deere dealer.

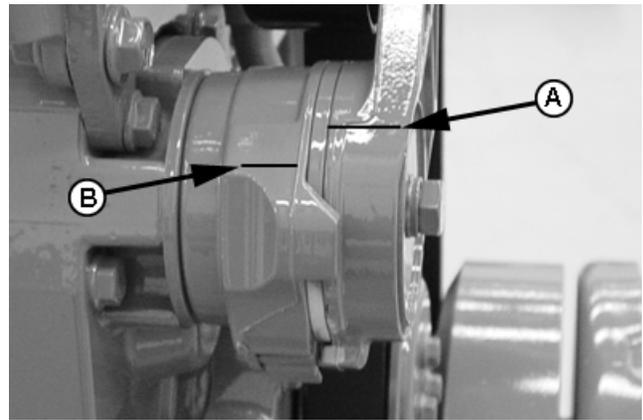
2. Release tension on tension arm and remove drive tool.
3. Put a mark (A) on swing arm of tensioner as shown.
4. Measure 21 mm (0.83 in.) from (A) and put a mark (B) on tensioner mounting base.
5. Install torque wrench (C) so that it is aligned with centers of pulley and tensioner. Rotate the swing arm using a torque wrench until marks (A and B) are aligned.
6. Record torque wrench measurement and compare with specification below. Replace tensioner assembly as required.

Specification

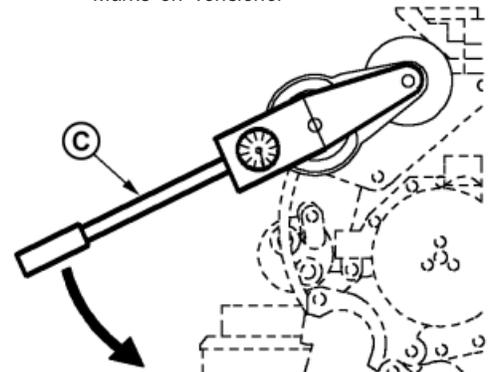
Spring Tension—Torque..... 18-22 N·m (13-16 lb-ft)

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

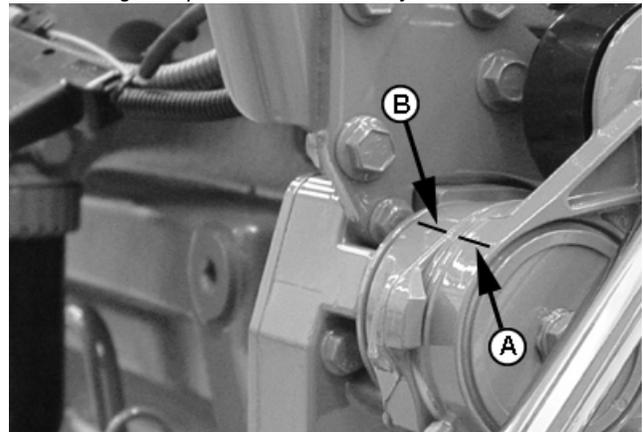
- A—Mark On Swing Arm
- B—Mark On Tensioner Mounting Base
- C—Torque Wrench



Marks on Tensioner



Align Torque Wrench With Pulley and Tensioner



Align Marks

OURGP11,00005D -19-07DEC05-2/2

Checking Engine Electrical Ground Connections

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

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

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Checking Cooling System

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

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

IMPORTANT: Air must be expelled from cooling system when system is refilled. Loosen temperature sending unit fitting at rear of cylinder head or plug in thermostat housing to allow air to escape when filling system. Retighten fitting or plug when all the air has been expelled. Cooling system must be free of air by the time the engine coolant temperature reaches 80°C (176°F) or damage to EGR cooler may result.

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



High-Pressure Fluids

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

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OURGP11,00005E -19-07DEC05-1/1

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.

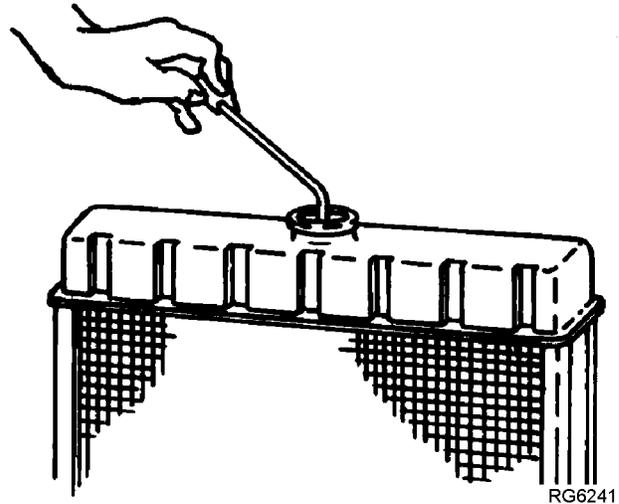
IMPORTANT: ALWAYS maintain coolant at correct level and concentration. DO NOT operate engine without coolant even for a few minutes as this can severely damage the EGR cooler tank (if equipped).

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

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

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

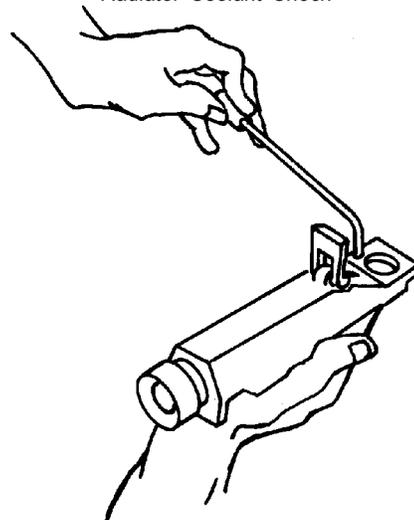
*COOL-GARD is a trademark of Deere & Company
COOLSCAN is a trademark of Deere & Company
COOLSCAN PLUS is a trademark of Deere & Company
COOLSCAN PLUS is a trademark of Deere & Company*



Radiator Coolant Check

RG6241

RG6261 —UN—08DEC97



JT07298 Coolant/Battery Tester

RG6262

RG6262 —UN—05DEC97

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

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

Testing Diesel Engine Coolant

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

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

Coolant Test Strips

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

When Using John Deere COOL-GARD II

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

COOL-GARD is a trademark of Deere & Company

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

When Using Nitrite-Containing Coolants

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

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

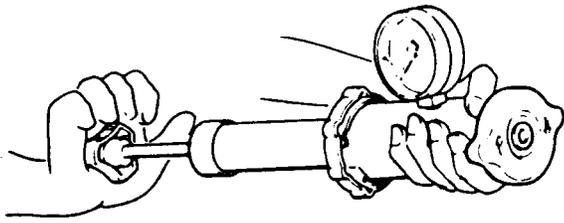
Coolant Analysis

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

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

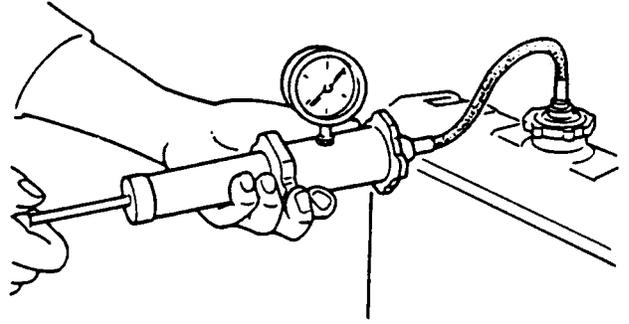
DX,COOL9 -19-11APR11-1/1

Pressure Testing Cooling System



Test Radiator Cap

RG6557 —UN—20JAN93



Test Cooling System

RG6558 —UN—20JAN93

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

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

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

Test Radiator Cap

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

If gauge does not hold pressure, replace radiator cap.

Specification

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

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

Test Cooling System

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

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

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

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

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

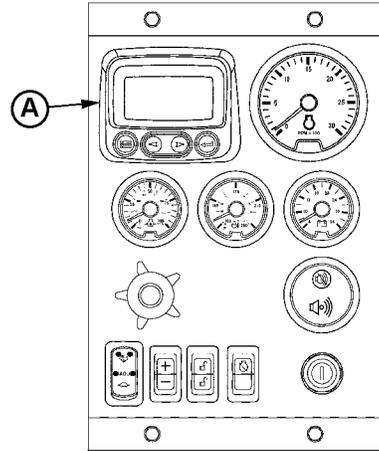
If no leakage is detected, but the gauge indicated a drop in pressure, coolant may be leaking internally within the system or at the block-to-head gasket. Have your engine distributor or servicing dealer correct this problem immediately.

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Checking and Adjusting Engine Speeds

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

A—Tachometer



Using Tachometer to Check Engine Speeds

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

RG13728 —UN—11NOV04

Lubrication & Maint./2000 Hour/24 Month

Checking Crankshaft Vibration Damper (6-Cylinder Engine Only)

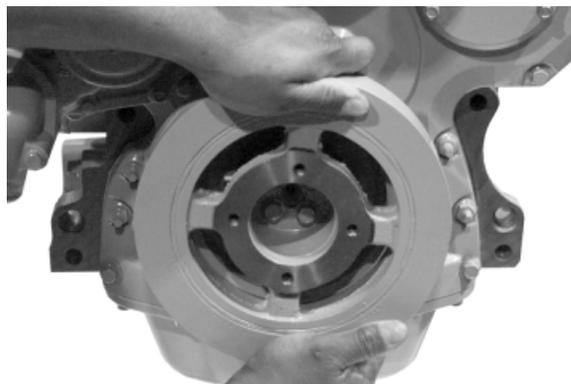
1. Remove belts (shown removed).
2. Grasp vibration damper with both hands and attempt to turn it in both directions. If rotation is felt, damper is defective and should be replaced.

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

3. Check vibration damper radial runout by positioning a dial indicator (A) so probe contacts damper outer diameter.
4. With engine at operating temperature, rotate crankshaft using either JD281A, JDE81-4, or JDE83 Flywheel Turning Tool.
5. Note dial indicator reading. If runout exceeds specifications given below, replace vibration damper.

Specification

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



Grasp Vibration Damper



Check Runout

RG8018—UN—15JAN99

RG7508—UN—23NOV97

RG, RG34710, 5585 -19-12NOV01-1/1

Flushing and Refilling Cooling System

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

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

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

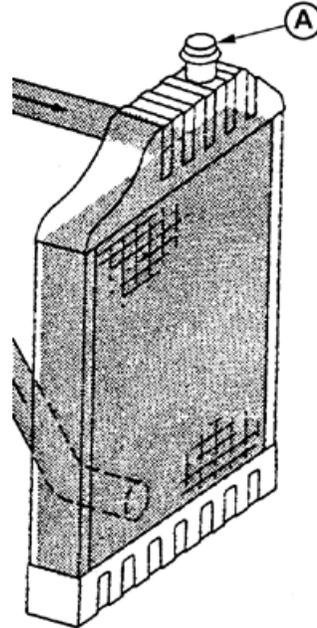
If COOL-GARD is not used, the flushing interval is 2000 hours or 24 months of operation.

Drain old coolant, flush the entire cooling system, test thermostats, and fill with recommended clean coolant per the following procedure.

1. Pressure test entire cooling system and pressure cap if not previously done. (See PRESSURE TESTING COOLING SYSTEM, in the Lubrication and Maintenance 250 Hour (Jet Fuel Capable Engine) /500 Hour/12 Month Section.)
2. Slowly open the engine cooling system filler cap or radiator cap (A) to relieve pressure and allow coolant to drain faster.



High-Pressure Fluids



Radiator Cap

Continued on next page

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

TS281 —UN—23AUG88

RG12833 —UN—13FEB03

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

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

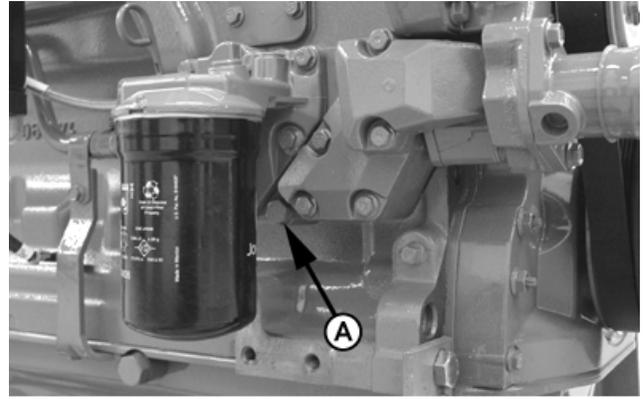
Specification

Thermostat Cover Cap
Screw—Torque..... 66—80 N·m (49—59 lb·ft)

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

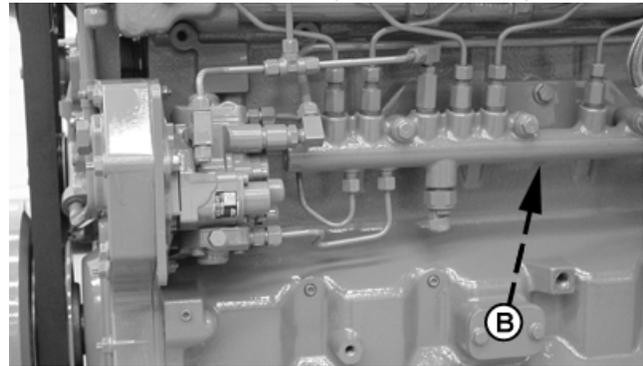
⚠ CAUTION: Do not run engine longer than 10 minutes. Doing so may cause engine to overheat which may cause burns when radiator water is draining.

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



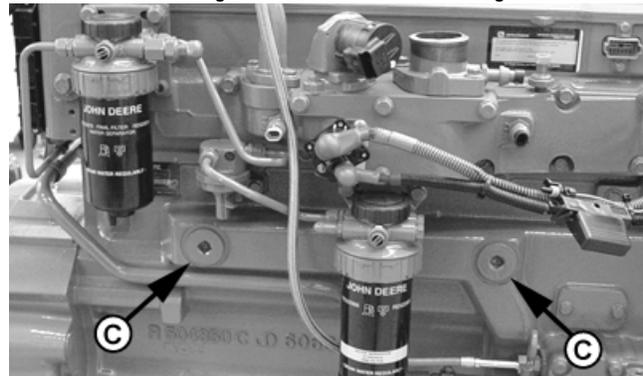
Oil Cooler Housing Coolant Drain Plug

RG13734 —UN—18NOV04



Engine Block Coolant Drain Plug

RG13800 —UN—18NOV04



Block Heater Ports

RG13801 —UN—18NOV04

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

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

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

Specification

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

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

14. Run engine until it reaches operating temperature. This mixes the solution uniformly and circulates it through the entire system. The normal engine coolant temperature range is 82°—94°C (180°—202°F).

15. After running engine, check coolant level and entire cooling system for leaks.

16. Inspect the fan belt for wear and check belt tension. (See Checking Belt Tensioner Spring Tension and Belt Wear in Lubrication and Maintenance 250 Hour (Jet Fuel Engine) or 500 Hour/12 Month section.

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

Testing Thermostats Opening Temperature

To Remove Thermostats

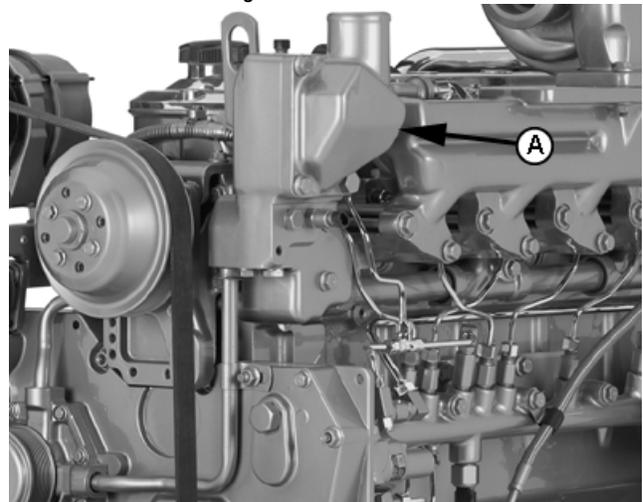
⚠ CAUTION: Explosive release of fluids from pressurized cooling system can cause serious burns. DO NOT drain coolant until it has cooled below operating temperature. Always loosen radiator pressure cap or drain valve slowly to relieve pressure.

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

A — Thermostat Cover



High Pressure Fluids



Thermostat Cover

Continued on next page

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

TS281 —JUN—23AUG88

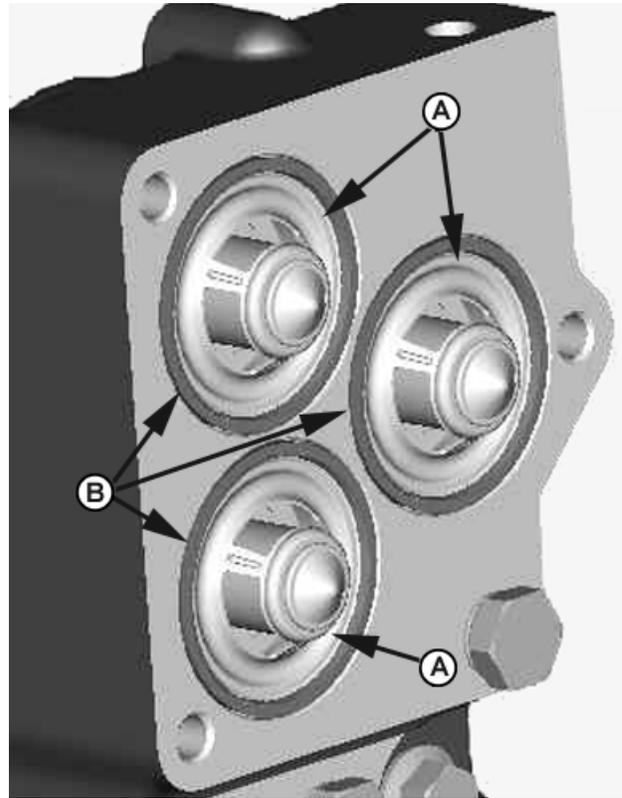
RG13737 —JUN—11NOV04

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

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

A—Thermostats

B—Rubber Seal



Thermostats

RG14362 —UN—06JAN06

Continued on next page

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

Testing Thermostats Opening Temperature

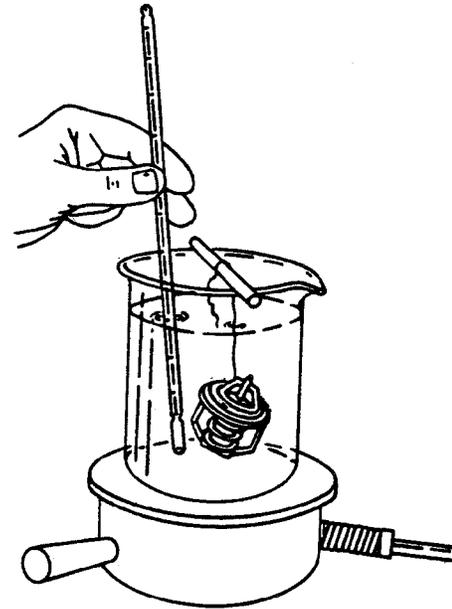
NOTE: Perform the following test for the two blocking thermostats as well as for the non-blocking thermostat.

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

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

3. Suspend thermostat and a thermometer in a container of water.
4. Stir the water as it heats. Observe opening action of thermostat and compare temperatures with the specification given in chart below.

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



Testing Thermostat Opening Temperature

RG5971—UN—23NOV97

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)

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

Continued on next page

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

To Install Thermostats

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

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

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

Specification

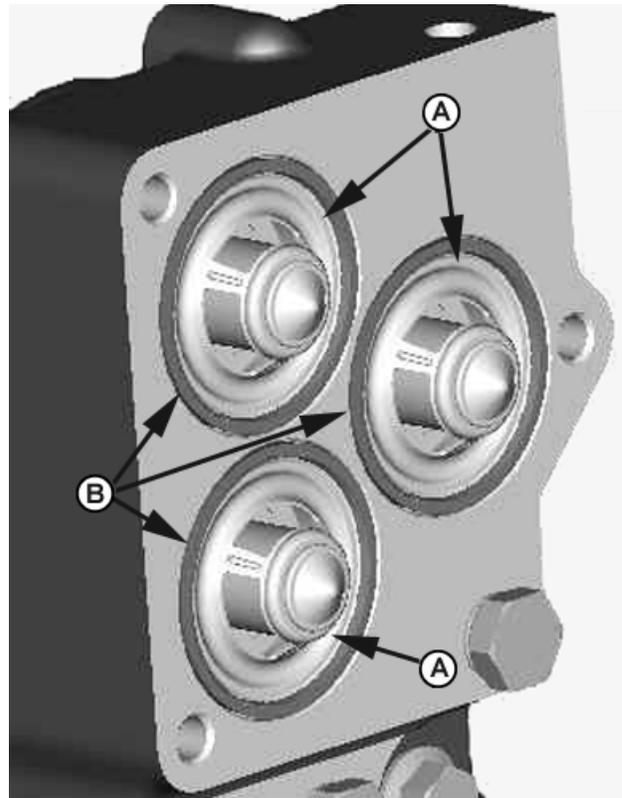
Thermostat Cover Cap
Screw—Torque..... 73 N·m (55 lb·ft)

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

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

A—Thermostats

B—Rubber Seal



Installing Thermostats

RG14362 —UN—06JAN06

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

Checking and Adjusting Valve Clearance

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

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

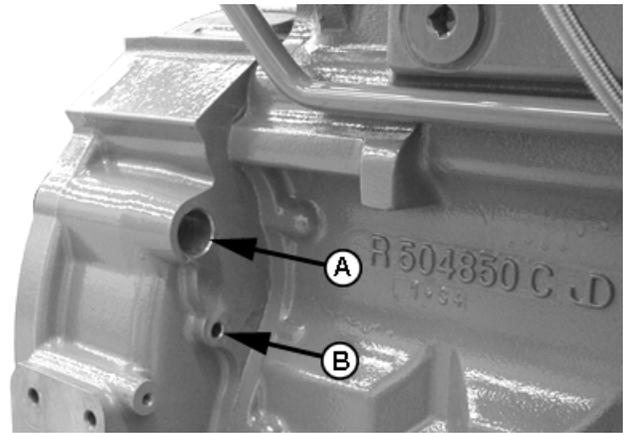
1. Remove rocker arm cover and crankcase ventilator tube.

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

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

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

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



Flywheel Housing Timing Holes

A—Timing/Rotation Hole

B—Timing Pin Hole

3. Using JDE83 or JDG820 Flywheel Turning Tool, rotate engine flywheel in running direction (clockwise viewed from front) until No. 1 (front) cylinder is at TDC compression stroke. Insert JDG1571 or JDE81-4 Timing Pin in flywheel.

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

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

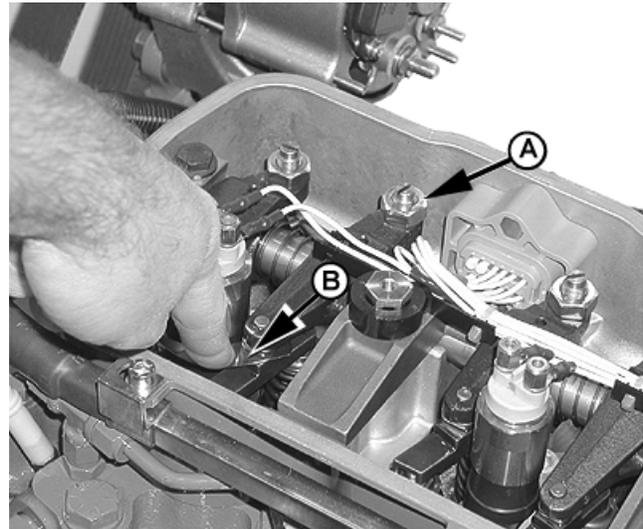
OURGP12,0000092 -19-28SEP04-1/4

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

Specification

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

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



Adjusting Valves

A—Adjusting Screw Jam Nut

B—Feeler Gauge

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

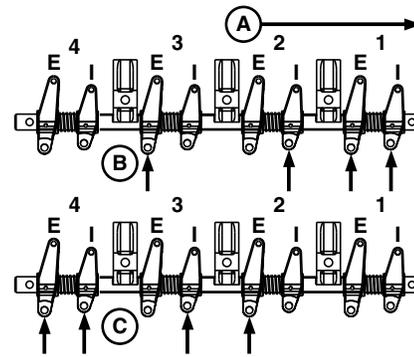
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OURGP12,0000092 -19-28SEP04-2/4

4-Cylinder Engine:

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

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



4-Cylinder Valve Adjustment

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

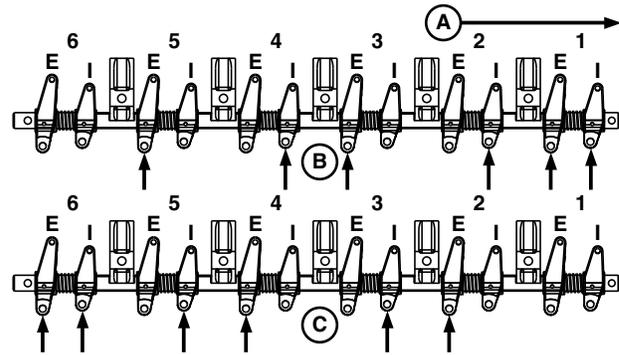
OURGP12,0000092 -19-28SEP04-3/4

RG12357 —UN—29MAY02

6-Cylinder Engine:

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

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



6-Cylinder Valve Adjustment

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

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

RG12170 —UN—21MAY02

Testing Glow Plugs for Continuity (If Applicable)

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

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

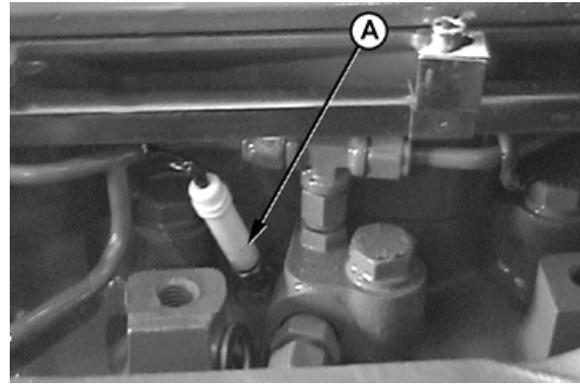
Check continuity between glow plug and ground on cylinder head. If resistance is infinite (no current), the glow plug is damaged and must be replaced.

Install new glow plugs and torque to specifications.

Specification

Glow Plug—Torque.....15 Nm (11 lb-ft)

Reinstall rocker arm cover and crankcase ventilator tube.



Testing Glow Plugs for Continuity

A—Glow Plug

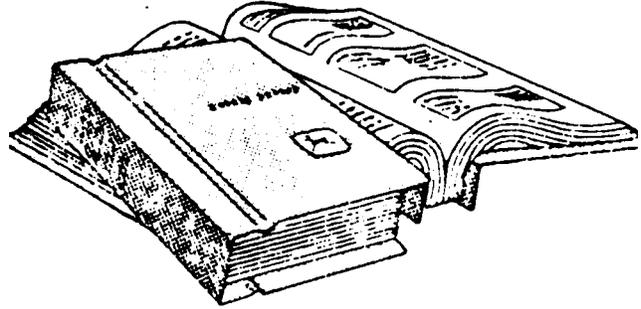
RG13802 —UN—18NOV04

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

Service as Required

Additional Service Information

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



Component Technical Manuals

RG4624 —UN—15DEC88

OURGP11,000048 -19-23AUG10-1/1

Do Not Modify Fuel System

CAUTION: Do not open high-pressure fuel system.

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

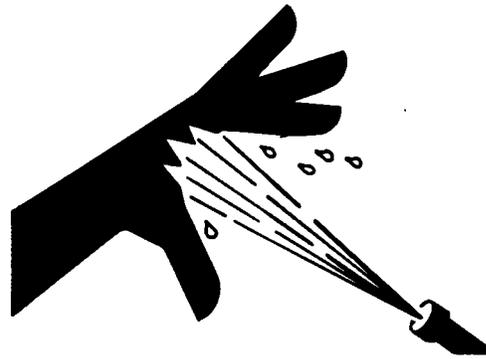
Only technicians familiar with this type of system can perform repairs. (See your John Deere dealer.)

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

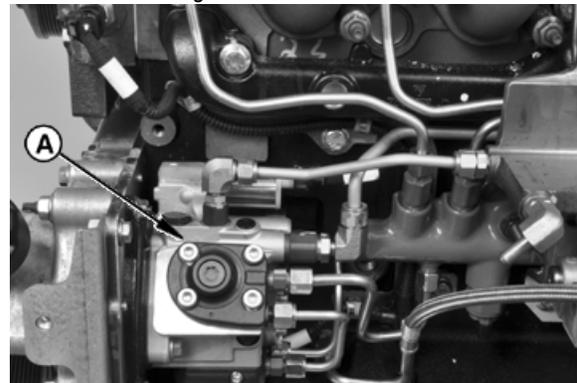
Modification or alteration of the high-pressure fuel pump (A), the injection timing, or the fuel injectors in ways not recommended by the manufacturer will terminate the warranty obligation to the purchaser.

In addition, tampering with fuel system which alters emission-related equipment on engines may result in fines or other penalties, per EPA regulations or other local emission laws.

Do not attempt to service fuel pump, fuel rail, or fuel injectors yourself. Special training and special tools are required. (See your authorized servicing dealer or engine distributor.)



High-Pressure Fuel Lines



High-Pressure Fuel Pump

A—High-Pressure Fuel Pump

TS1343 —UN—18MAR92

RG18331 —UN—16APR10

OURGP12,000095 -19-16APR10-1/1

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

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

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

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

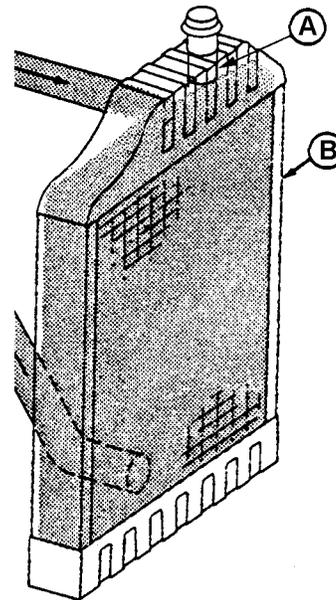
IMPORTANT: When adding coolant to the system, use the appropriate coolant solution. (See **ENGINE COOLANT SPECIFICATIONS** in Fuels, Lubricants, and Coolant Section for mixing of coolant ingredients before adding to cooling system.)

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

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



High-Pressure Fluids



Radiator and Coolant

A—Radiator Filler Neck

B—Radiator

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

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

TS281 —UN—23AUG88

RG13295 —UN—20NOV03

Replacing Single Stage Air Cleaner

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

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

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

Specification

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

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

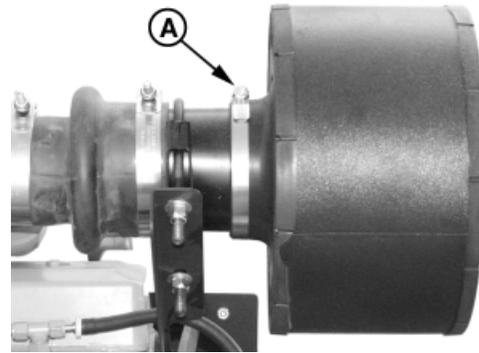
Specification

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

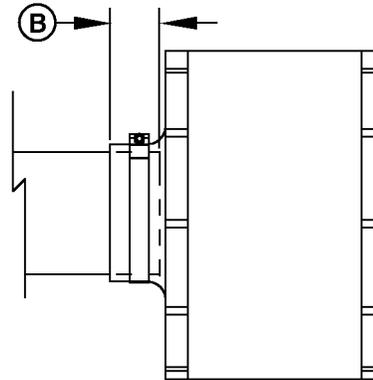
IMPORTANT: Do NOT overtighten body clamp. Overtightening may cause crushing of air cleaner body. Tighten body clamp only until snug.

6. If equipped, tighten body clamp until snug.

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.



Single Stage Air Filter



Installation of Single Stage Air Cleaner

A—Outlet Neck Clamp

B—Filter to Engine Overlap

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

RG, RG34710, 5594 -19-27JUL06-1/1

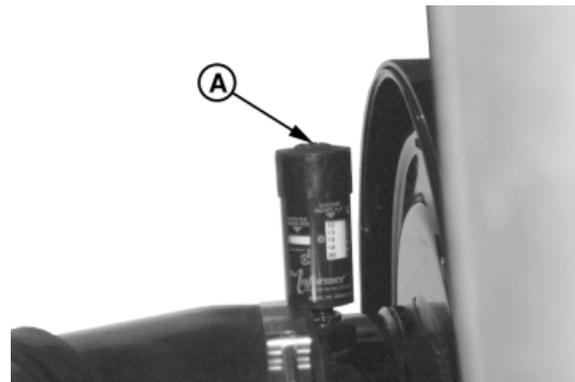
RG11319A—UN—06SEP00

RG11320—UN—07SEP00

Replacing Axial Seal Air Cleaner Filter Element

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

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



Air restriction Indicator

Continued on next page

OURGP11,000013A -19-23AUG10-1/2

RG8719B—UN—03SEP99

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.

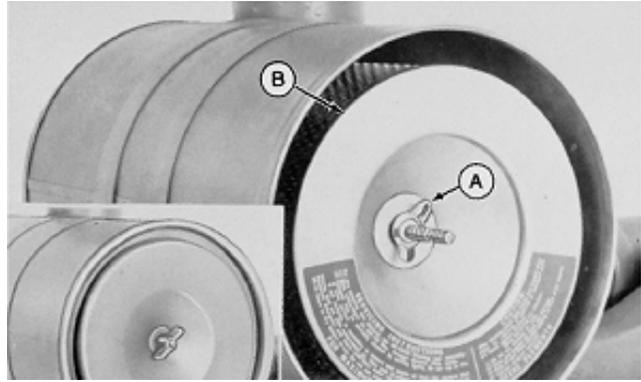
4. To replace secondary element, remove retaining nut (D) and secondary element (E). Immediately replace secondary element with new element to prevent dust from entering air intake system.
5. Install new primary element and tighten wing nut securely. Install cover assembly and tighten retaining wing 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.

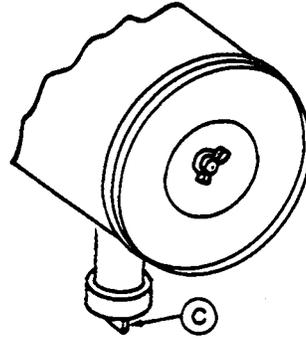
6. If equipped, fully depress air restriction indicator reset button and release to reset indicator.

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

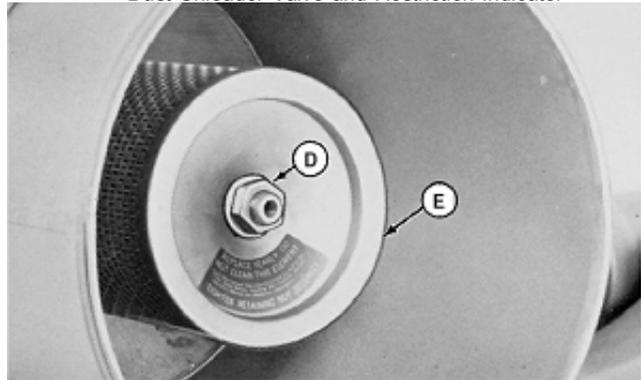
D—Retaining Nut
E—Secondary Element



Wing Nut and Primary Element



Dust Unloader Valve and Restriction Indicator



Retaining Nut and Secondary Element

RG4686 —UN—20DEC88

RG4687 —UN—20DEC88

RG11068 —UN—26JUN00

OURGP11.000013A -19-23AUG10-2/2

Replacing Radial Seal Air Cleaner Filter Element

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

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

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

IMPORTANT: Remove secondary (safety) element (C) ONLY for replacement. DO NOT attempt to clean, wash, or reuse secondary element. Replacement of secondary element is usually necessary ONLY when primary element has a hole in it.

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

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

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

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

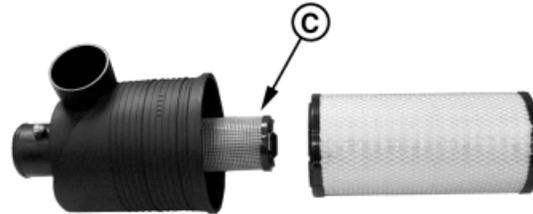
8. If equipped, fully depress air restriction indicator reset button and release to reset indicator.



Dust Cap/Cover



Primary Filter Element



Secondary Filter Element

A—Dust Cap/Cover
B—Primary Filter Element

C—Secondary Filter Element

RG11321A—UN—08SEP00

RG11322A—UN—08SEP00

RG11327A—UN—08SEP00

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

Replacing Fan and Alternator Belts

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

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

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

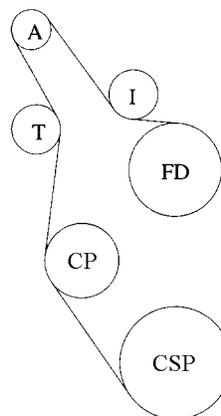
3. Remove poly-vee belt from pulleys and discard belt.

NOTE: While belt is removed, inspect pulleys and bearings. Rotate and feel for hard turning or any unusual sounds. If pulleys or bearings need replacement, see your John Deere dealer.

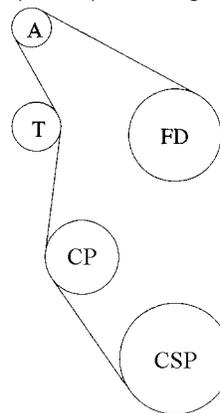
4. Install new belt, making sure belt is correctly seated in all pulley grooves. Refer to belt routing at right for your application.
5. Apply tension to belt with tensioner. Remove drive tool.
6. Install fan guard if removed.
7. Start engine and check belt alignment.

*Measured from crank centerline to fan drive center.

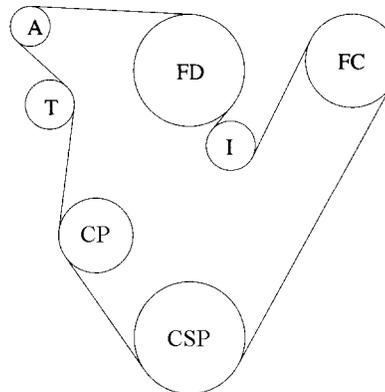
A—Alternator	I— Idler Pulley
CSP—Crankshaft Pulley	T— Tensioner
FC—Freon (A/C) Compressor	CP—Coolant Pump
FD—Fan Drive	



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



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



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

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

RG11950—UN—07NOV01

RG11951—UN—07NOV01

RG11952—UN—07NOV01

Checking Fuses

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

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

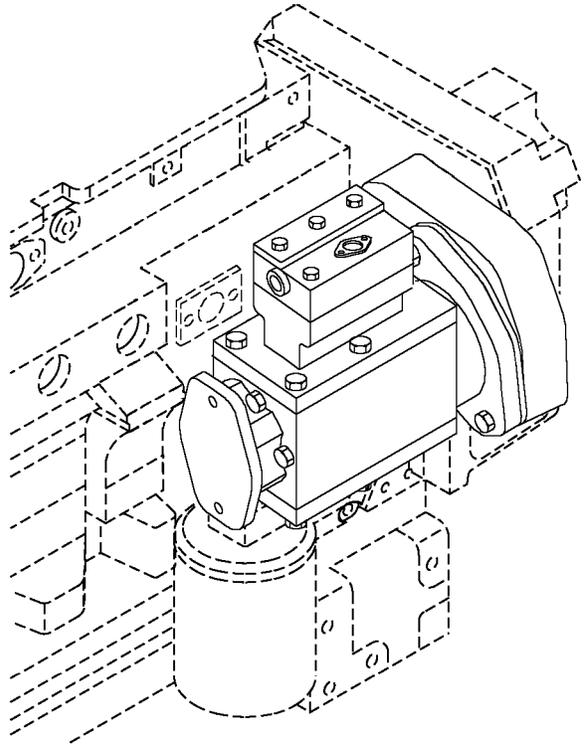
OURGP11,0000062 -19-08DEC05-1/1

Checking Air Compressors (If Equipped)

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

Air compressors are engine-driven piston types. They are either air cooled or cooled with engine coolant. The compressors are lubricated with engine oil. The compressor runs continuously as gear or spline driven by the auxiliary drive of the engine but has "loaded" and "unloaded" operating modes. This is controlled by the vehicle's air system (refer to vehicle technical manual for complete air system checks and services).

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



Air Compressor (Optional)

RG12836 —UN—27FEB03

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Bleeding Fuel System

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

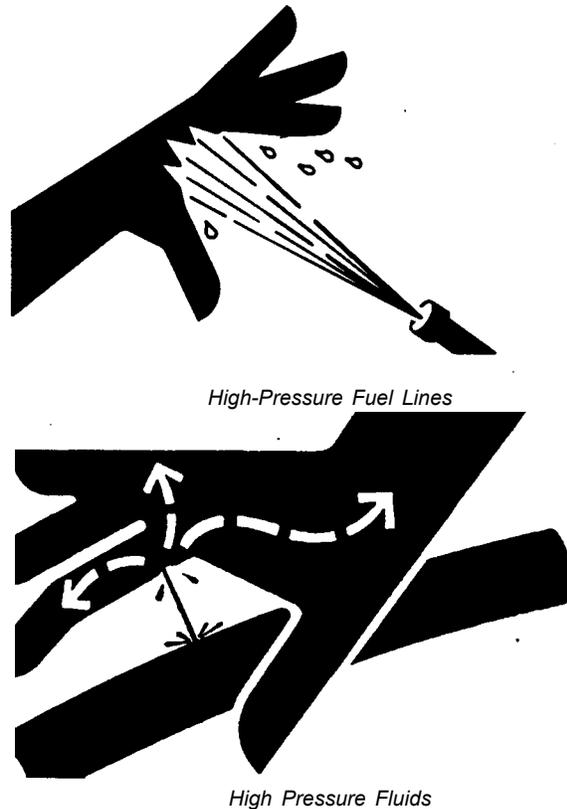
Escaping fluid under pressure can penetrate the skin causing serious injury. Avoid hazards by relieving pressure before disconnecting hydraulic or other lines. Tighten all connections before applying pressure. Search for leaks with a piece of cardboard. Protect hands and body from high pressure fluids.

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

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

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

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



TS1343 —UN—18MAR92

X9811 —UN—23AUG88

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

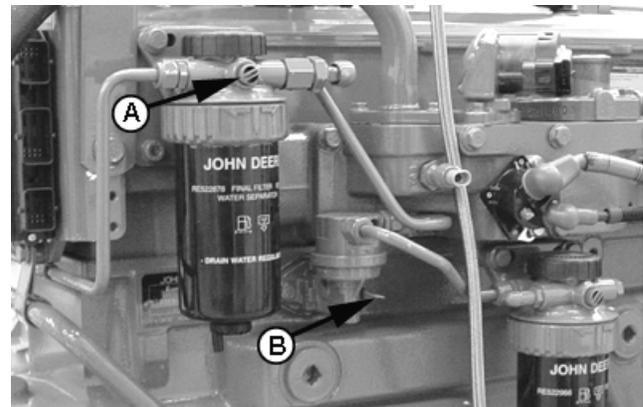
OURGP12,0000098 -19-07MAY08-1/2

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

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

A—Bleed Vent Screw

B—Primer Lever



Bleeding Fuel System

RG13798 —UN—12NOV04

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

Troubleshooting

General Troubleshooting Information

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

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

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

- Know the engine and all related systems.
- Study the problem thoroughly.
- Relate the symptoms to your knowledge of engine and systems.
- Diagnose the problem starting with the easiest things first.

- Double-check before beginning the disassembly.
- Determine cause and make a thorough repair.
- After making repairs, operate the engine under normal conditions to verify that the problem and cause was corrected.

NOTE: All engines have electronic control systems which may send diagnostic trouble codes to signal problems (see DISPLAYING OF DIAGNOSTIC TROUBLE CODES, later in this section).

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

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Instrument Panel Method for Retrieving Diagnostic Trouble Codes

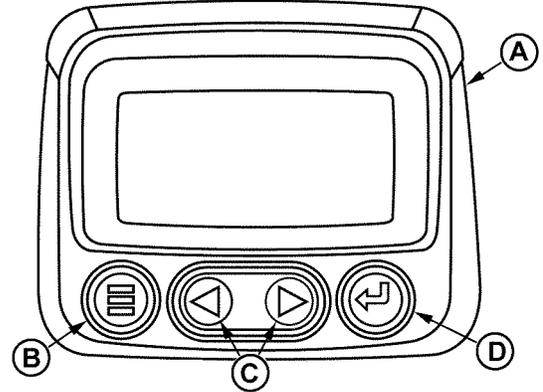
IMPORTANT: Care should be used during diagnostic procedures to avoid damaging the terminals of connectors, sensors, and actuators. Probes should not be poked into or around the terminals or damage will result. Probes should only be touched against the terminals to make measurements.

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

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

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

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



Trouble Code Display On Instrument Panel

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

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

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

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Displaying Of Diagnostic Trouble Codes (DTCs)

SPN/FMI CODES

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

The first part is a Suspect Parameter Number (SPN) followed by a Failure Mode Identifier (FMI) code. In order to determine the exact failure, both parts (SPN and FMI) of the code are needed.

The SPN identifies the system or the component that has the failure; for example SPN 000110 indicates a failure in the engine coolant temperature circuit.

The FMI identifies the type of failure that has occurred; for example FMI 03 indicates value above normal. Combining SPN 000110 with FMI 03 yields a fault code "engine coolant temperature input voltage too high". A corrective action will also be displayed, "check sensor and wiring". If this check does not solve the engine fault, contact your servicing dealer.

Always contact your servicing dealer for help in correcting unsolved diagnostic trouble codes which are displayed for your engine.

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Listing of Diagnostic Trouble Codes (DTCs)

NOTE: If the corrective actions below do not solve the engine fault, contact your servicing dealer.

NOTE: Not all of these codes are used on all OEM engine applications

Fault Codes

SPN	FMI	Description of Fault	Corrective Action
000028	03	Throttle #3 Voltage Out of Range High	Check Sensor and Wiring
	04	Throttle #3 Voltage Out of Range Low	Check Sensor and Wiring
	14	Throttle #3 Voltage Out of Range	Contact Servicing Dealer
000029	03	Throttle #2 Voltage Out of Range High	Check Sensor and Wiring
	04	Throttle #2 Voltage Out of Range Low	Check Sensor and Wiring
	14	Throttle #2 Voltage Out of Range	Contact Servicing Dealer
000091	03	Throttle Voltage Out of Range High	Check Switch and Wiring
	04	Throttle Voltage Out of Range Low	Check Switch and Wiring
	14	Throttle Voltage Out of Range	Check Sensor and Wiring
00094	03	Fuel Pressure Voltage Out of range High	Check Sensor and Wiring
	04	Fuel Pressure Voltage Out of Range Low	Check Sensor and Wiring
000097	03	Water in Fuel Voltage Out of Range High	Check Sensor and Wiring
	04	Water in Fuel Voltage Out of Range Low	Check Sensor and Wiring
	16	Water in Fuel Detected	Stop and Drain Water Separator
000100	01	Engine Oil Pressure Low-Most Severe	Check Oil Level
	03	Engine Oil Pressure Voltage Out of Range High	Check Sensor and Wiring
	04	Engine Oil Pressure Voltage Out of Range Low	Check Sensor and Wiring
	18	Engine Oil Pressure Low-Moderately Severe	Check Oil Level
	31	Oil Pressure Detected with Zero Engine Speed	Contact Servicing Dealer
000102	02	Manifold Air Pressure Sensor In-Range Failure	Contact Servicing Dealer
	03	Manifold Air Pressure Voltage Out of Range High	Contact Servicing Dealer
	04	Manifold Air Pressure Voltage Out of Range Low	Contact Servicing Dealer
000103	00	Turbocharger Speed High-Most Severe	Contact Servicing Dealer
	02	Turbocharger Speed Data Incorrect	Contact Servicing Dealer
	05	Turbocharger Harness Open Circuit	Contact Servicing Dealer
	06	Turbocharger Harness Shorted To Ground	Contact Servicing Dealer
	08	Turbocharger Speed Signal In-Range Failure	Contact Servicing Dealer
	31	Turbocharger Speed Signal Missing	Contact Servicing Dealer
000105	00	Exhaust Gas Recirculation Air Temperature High-Most Severe	Check Air Cleaner, Aftercooler, or Room Temperature
	03	Exhaust Gas Recirculation Air Temperature Input Voltage Out of Range High	Check Sensor and Wiring
	04	Exhaust Gas Recirculation Air Temperature Input Voltage Out of Range Low	Check Sensor and Wiring
	15	Exhaust Gas Recirculation Air Temperature High-Least Severe	Check Air Cleaner, Aftercooler, or Room Temperature
	16	Exhaust Gas Recirculation Air Temperature High-Moderately Severe	Check Air Cleaner, Aftercooler, or Room Temperature
000108	02	Barometric Air Pressure Sensor Signal Invalid	Contact Servicing Dealer
	31	Barometric Air Pressure Sensor Signal Invalid	Contact Servicing Dealer
000110	00	Engine Coolant Temperature High-Most Severe	Check Cooling System, Reduce Power
000110	03	Engine Coolant Temperature Input Voltage Out of Range High	Check Sensor and Wiring
	04	Engine Coolant Temperature Input Voltage Out of Range Low	Check Sensor and Wiring
	15	Engine Coolant Temperature High-Least Severe	Check Cooling System, Reduce Power
	16	Engine Coolant Temperature High-Moderately Severe	Check Cooling System, Reduce Power
	17	Engine Coolant Temperature Low-Least Severe	Check Cooling System

Continued on next page

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Troubleshooting

SPN	FMI	Description of Fault	Corrective Action
000111	01	Coolant Level Low	Check Operator's Manual
000157	03	Fuel Rail Pressure Voltage Out of Range High	Contact Servicing Dealer
	04	Fuel Rail Pressure Voltage Out of Range Low	Contact Servicing Dealer
	10	Fuel Rail Pressure Drops Too Fast	Contact Servicing Dealer
	17	Fuel Rail Pressure Not Developed	Contact Servicing Dealer
000158	17	Keyswitch Circuit Problem	Contact Servicing Dealer
000174	00	Fuel Temperature High-Most Severe	Add Fuel or Switch Fuel Tanks
	03	Fuel Temperature Voltage Out of Range High	Check Sensor and Wiring
	04	Fuel Temperature Voltage Out of Range Low	Check Sensor and Wiring
	16	Fuel Temperature High-Moderately Severe	Add Fuel or Switch Fuel Tanks
000189	00	Engine Speed Derate	Check Fault Codes or Contact Servicing Dealer
000190	00	Engine Speed High-Most Severe	Reduce Engine Speed
	16	Engine Speed High-Moderately Severe	Reduce Engine Speed
000412	00	Exhaust Gas Recirculation Temperature Input Voltage High-Most Severe	Contact Servicing Dealer
	03	Exhaust Gas Recirculation Temperature Voltage Out of Range High	Contact Servicing Dealer
	04	Exhaust Gas Recirculation Temperature Voltage Out of Range Low	Contact Servicing Dealer
	16	Exhaust Gas Recirculation Temperature Moderately Severe	Contact Servicing Dealer
000611	03	Electronic Injector Wiring Shorted to Power Source	Check Wiring
	04	Electronic Injector Wiring Shorted to Ground	Check Wiring
000620	03	5V Sensor Supply Voltage Out of Range High	Check Wiring
	04	5V Sensor Supply Voltage Out of Range Low	Check Wiring
000627	01	Electronic Injector Supply Voltage Low	Check Battery Voltage and Wiring
	16	ECU Power Supply Voltage High	Contact Servicing Dealer
	18	ECU Power Supply Voltage Low	Contact Servicing Dealer
000628	12	ECU Programming Error	Contact Servicing Dealer
000629	12	ECU Programming Error	Contact Servicing Dealer
	13	ECU Error	Contact Service Dealer
000636	02	Engine Position Sensor Noise	Check Sensor and Wiring
	05	Engine Position Sensor Current Low or Open Circuit	Contact Servicing Dealer
	06	Engine Position Sensor Current High or Grounded Circuit	Contact Servicing Dealer
	08	Engine Position Sensor Input Missing	Check Sensor and Wiring
	10	Engine Position Sensor Pattern Error	Check Sensor and Wiring
000637	02	Timing (Crank) Position Sensor Noise	Check Sensor and Wiring
	05	Timing (Crank) Position Sensor Current Low or Open Circuit	Contact Servicing Dealer
	06	Timing (Crank) Position Sensor Current High or Grounded Circuit	Contact Servicing Dealer
	07	Crank/Camshaft Positions Out of Sync	Check Sensor and Wiring
	08	Crank Position Input Missing	Check Sensor and Wiring
	10	Crank Position Input Pattern Error	Check Sensor and Wiring
000640	31	External Engine Protection Signal Not Recognized	Engine External Protection Unknown. Check Installation
000641	04	Turbocharger Actuator Disabled	Contact Servicing Dealer
	05	Turbocharger Actuator Current Low or Open Circuit	Contact Servicing Dealer
	12	Turbocharger Actuator Communication Error	Contact Servicing Dealer
	13	Turbocharger Learn Error	Contact Servicing Dealer
	16	Turbocharger Temperature High-Moderately Severe	Contact Servicing Dealer
000651	02	Cylinder #1 Injector Part Number Not Recognized	Contact Servicing Dealer
	05	Cylinder #1 Electronic Injector Circuit Open	Check Injector Wiring or Injector Solenoid
	06	Cylinder #1 Electronic Injector Circuit Shorted	Check Injector Wiring or Injector Solenoid
	07	Cylinder #1 Electronic Injector Fuel Flow Low	Injector Failed or Flow Limiter Closed

Continued on next page

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Troubleshooting

SPN	FMI	Description of Fault	Corrective Action
	13	Cylinder #1 Injector QR Code String Error	Contact Servicing Dealer
000652	02	Cylinder #2 Injector Part Number Not Recognized	Contact Servicing Dealer
	05	Cylinder #2 Electronic Injector Circuit Open	Check Injector Wiring or Injector Solenoid
	06	Cylinder #2 Electronic Injector Circuit Shorted	Check Injector Wiring or Injector Solenoid
	07	Cylinder #2 Electronic Injector Fuel Flow Low	Injector Failed or Flow Limiter Closed
	13	Cylinder #2 Injector QR Code String Error	Contact Servicing Dealer
000653	02	Cylinder #3 Injector Part Number Not Recognized	Contact Servicing Dealer
	05	Cylinder #3 Electronic Injector Circuit Open	Check Injector Wiring or Injector Solenoid
	06	Cylinder #3 Electronic Injector Circuit Shorted	Check Injector Wiring or Injector Solenoid
	07	Cylinder #3 Electronic Injector Fuel Flow Low	Injector Failed or Flow Limiter Closed
	13	Cylinder #3 Injector QR Code String Error	Contact Servicing Dealer
000654	02	Cylinder #4 Injector Part Number Not Recognized	Contact Servicing Dealer
	05	Cylinder #4 Electronic Injector Circuit Open	Check Injector Wiring or Injector Solenoid
	06	Cylinder #4 Electronic Injector Circuit Shorted	Check Injector Wiring or Injector Solenoid
	07	Cylinder #4 Electronic Injector Fuel Flow Low	Injector Failed or Flow Limiter Closed
	13	Cylinder #4 Injector QR Code String Error	Contact Servicing Dealer
000655	02	Cylinder #5 Injector Part Number Not Recognized	Contact Servicing Dealer
	05	Cylinder #5 Electronic Injector Circuit Open	Check Injector Wiring or Injector Solenoid
	06	Cylinder #5 Electronic Injector Circuit Shorted	Check Injector Wiring or Injector Solenoid
	07	Cylinder #5 Electronic Injector Fuel Flow Low	Injector Failed or Flow Limiter Closed
	13	Cylinder #5 Injector QR Code String Error	Contact Servicing Dealer
000656	02	Cylinder #6 Injector Part Number Not Recognized	Contact Servicing Dealer
	05	Cylinder #6 Electronic Injector Circuit Open	Check Injector Wiring or Injector Solenoid
	06	Cylinder #6 Electronic Injector Circuit Shorted	Check Injector Wiring or Injector Solenoid
	07	Cylinder #6 Electronic Injector Fuel Flow Low	Injector Failed or Flow Limiter Closed
	13	Cylinder #6 Injector QR Code String Error	Contact Servicing Dealer
000676	03	Glow Plug Relay Voltage High	Check Relay and Wiring
	04	Glow Plug Relay Voltage Low	Check Relay and Wiring
000898	09	Vehicle Speed or Torque Message Invalid	Contact Servicing Dealer
000970	31	Auxiliary Engine Shutdown Signal	Non Engine Fault. Check Other Shutdown Devices
000971	31	Auxiliary Engine Derate Signal	Non Engine Fault. Check Other Shutdown Devices
001079	03	Sensor Supply Voltage 3 Out of Range High	Check Wiring
	04	Sensor Supply Voltage 3 Out of Range Low	Check Wiring
001080	03	Fuel Rail Pressure Sensor Supply Voltage 2 Out of Range High	Check Wiring
	04	Fuel Rail Pressure Sensor Supply Voltage 2 Out of Range Low	Check Wiring
001109	31	Engine Protection System Approaching Shutdown	Check Fault Codes
001110	31	Engine Protection System Shutdown Engine	Check Fault Codes
001136	00	ECU Temperature High-Most Severe	Contact Servicing Dealer
	16	ECU Temperature High-Moderately Severe	Contact Servicing Dealer
001172	03	Turbo Compressor Inlet Temperature Input Voltage Out of Range High	Contact Servicing Dealer
	04	Turbo Compressor Inlet Temperature Input Voltage Out of Range Low	Contact Servicing Dealer
	16	Turbo Compressor Inlet Temperature High-Moderately Severe	Contact Servicing Dealer
001180	00	Turbo Turbine Inlet Temperature High-Most Severe	Contact Servicing Dealer
	16	Turbo Turbine Inlet Temperature High-Moderately Severe	Contact Servicing Dealer
001209	02	Exhaust Pressure Incorrect	Contact Servicing Dealer
	03	Exhaust Pressure Sensor Voltage Out of Range High	Contact Servicing Dealer
	04	Exhaust Pressure Sensor Voltage Out of Range Low	Contact Servicing Dealer
001347	03	Fuel Pump Pressurizing Assembly #1 Sensor Voltage High	Contact Servicing Dealer

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Troubleshooting

SPN	FMI	Description of Fault	Corrective Action
	05	Fuel Pump Pressurizing Assembly #1 Sensor Circuit Open, Shorted to Ground, or Overloaded	Check Pump Wiring
	07	Fuel Pump Assembly #1 Rail Pressure Control Mismatch	Check Fuel Filter and Lines
001569	31	Engine Protection Derate	Check Fault Codes
002630	00	Exhaust Gas Recirculation Fresh Air Temperature High-Most Severe	Contact Servicing Dealer
	03	Exhaust Gas Recirculation Fresh Air Temperature Voltage Out of Range High	Contact Servicing Dealer
	04	Exhaust Gas Recirculation Fresh Air Temperature Voltage Out of Range Low	Contact Servicing Dealer
	15	Exhaust Gas Recirculation Fresh Air Temperature High-Least Severe	Contact Servicing Dealer
	16	Exhaust Gas Recirculation Fresh Air Temperature High-Moderately Severe	Contact Servicing Dealer
002659	02	Exhaust Gas Recirculation Flow/Temperature Mismatch	Contact Servicing Dealer
	15	Exhaust Gas Recirculation Flow Rate Above Normal	Contact Servicing Dealer
	17	Exhaust Gas Recirculation Flow Rate Below Normal	Contact Servicing Dealer
002790	16	Turbocharger Compressor Outlet Temperature High-Most Severe	Contact Servicing Dealer
002791	02	Exhaust Gas Recirculation Valve Sensor Voltage Mismatch	Contact Servicing Dealer
	03	Exhaust Gas Recirculation Valve Sensor Voltage Out of Range High	Contact Servicing Dealer
	04	Exhaust Gas Recirculation Valve Sensor Voltage Out of Range Low	Contact Servicing Dealer
	05	Exhaust Gas Recirculation Valve Current Low or Open Circuit ..	Contact Servicing Dealer
	06	Exhaust Gas Recirculation Valve Current High or Grounded Circuit	Contact Servicing Dealer
	07	Exhaust Gas Recirculation Valve Not Responding or Out of Adjustment	Contact Servicing Dealer
	13	Exhaust Gas Recirculation Valve Out of Calibration	Contact Servicing Dealer
	14	Exhaust Gas Recirculation Valve Off	Contact Servicing Dealer
	31	Exhaust Gas Recirculation Valve Position Error	Contact Servicing Dealer
002795	07	Turbocharger Actuator Not Responding or Out Of Adjustment ..	Contact Servicing Dealer
	12	Turbocharger Actuator Bad Intelligent Device Or Component...	Contact Servicing Dealer
523222	03	Sensor Supply Voltage #5 Out of Range High	Contact Servicing Dealer
	04	Sensor Supply Voltage #5 Out of Range Low	Contact Servicing Dealer
523229	03	Sensor Supply Voltage #4 Out of Range High	Contact Servicing Dealer
	04	Sensor Supply Voltage #4 Out of Range Low	Contact Servicing Dealer

Fault Code Listing in Ascending SPN/FMI Codes

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Intermittent Fault Diagnostics (With Electronic Controls)

Intermittent faults are problems that periodically “go away”. A problem such as a terminal that intermittently doesn’t make contact can cause an intermittent fault. Other intermittent may be set only under certain operating conditions such as heavy load, extended idle, etc. When diagnosing intermittent faults, take special note of the condition of wiring and connectors, since a high percentage of intermittent problems originate here. Check for loose, dirty or disconnected connectors. Inspect the wiring routing, looking for possible shorts caused by contact with external parts (for example, rubbing against sharp sheet metal edges). Inspect the connector vicinity, looking for wires that have pulled out of connectors, poorly positioned terminals, damaged connectors and corroded or damaged splices and terminals. Look for broken wires, damaged splices, and wire-to-wire shorts. Use good judgement if component replacement is thought to be required.

NOTE: The engine control unit (ECU) is the component **LEAST** likely to fail.

Suggestions for diagnosing intermittent faults:

- If the problem is intermittent, try to reproduce the operating conditions that were present when the diagnostic trouble code (DTC) set.
- If a faulty connection or wire is suspected to be the cause of the intermittent problem: clear DTCs, then check the connection or wire by wiggling it while watching the diagnostic gauge to see if the fault resets.

Possible causes of intermittent faults:

- Faulty connection between sensor or actuator harness.
- Faulty contact between terminals in connector.
- Faulty terminal/wire connection.
- Electromagnetic interference (EMI) from an improperly installed 2-way radio, etc., can cause faulty signals to be sent to the ECU.

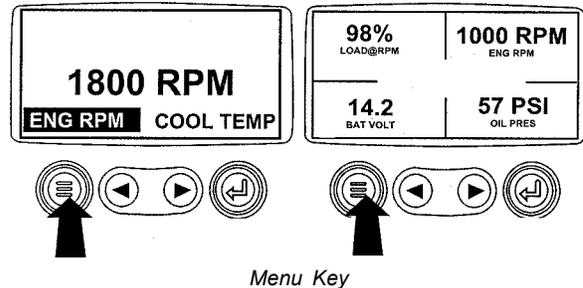
NOTE: Refer to wiring diagrams earlier in this section as a guide to connection and wiring.

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Displaying Diagnostic Gauge Software

NOTE: The following steps can be used to display the software version of the diagnostic gauge if needed by your dealer for troubleshooting. This is a read only function.

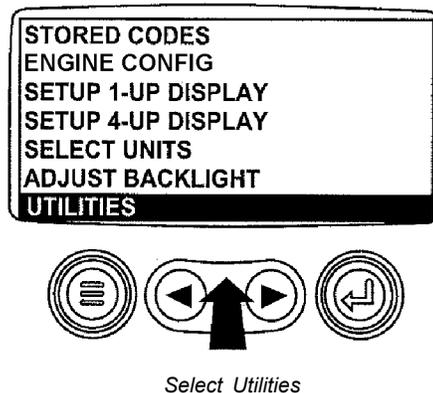
1. Starting at the single or four engine parameter display, press the "Menu" key.



RG13159 —UN—26SEP03

OURGP12,000009F -19-28SEP04-1/4

2. The main menu will be displayed. Use the "Arrow" key to scroll through the menu until "Utilities" is highlighted.

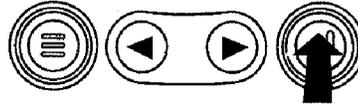
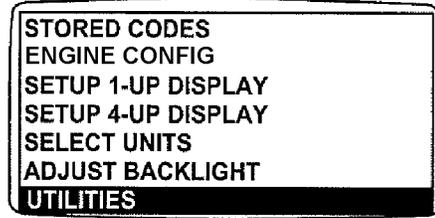


RG13234 —UN—22OCT03

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OURGP12,000009F -19-28SEP04-2/4

3. Once "Utilities" is highlighted, press "Enter" to activate the utilities function.

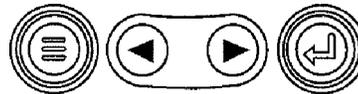


Select Utilities

RG13237 —UN—22OCT03

OURGP12,000009F -19-28SEP04-3/4

4. Scroll to the "Software Version". Press "Enter" to view the software version. Press the menu button twice to return to the main menu.



Software Version

RG13236 —UN—13OCT03

OURGP12,000009F -19-28SEP04-4/4

Engine Troubleshooting

NOTE: Before troubleshooting the engine, first retrieve any fault codes on the diagnostic gauge display

and perform the corrective actions. (See earlier in this section.) If any problems remain, use the following charts to solve engine problems.

Symptom	Problem	Solution
Engine cranks but will not start	Incorrect starting procedure.	Verify correct starting procedure.
	No fuel.	Check fuel in tank.
	Fuel filter plugged or full of water.	Replace fuel filter or drain water from filter.
	Exhaust restricted.	Check and correct exhaust restriction.
	Injection pump not getting fuel or air in fuel system.	Check fuel flow at supply pump or bleed fuel system.
	Faulty injection pump or nozzles.	Consult authorized diesel repair station for repair or replacement.
Engine hard to start or will not start	Engine starting under load.	Disengage PTO.
	Improper starting procedure.	Review starting procedure.
	No fuel.	Check fuel tank.
	Air in fuel line.	Bleed fuel line.
	Cold weather.	Use cold weather starting aids.
	Slow starter speed.	See "Starter Cranks Slowly".
	Crankcase oil too heavy.	Use oil of proper viscosity.
	Improper type of fuel.	Consult fuel supplier; use proper type fuel for operating conditions.
	Water, dirt, or air in fuel system.	Drain, flush, fill, and bleed system.
	Clogged fuel filter.	Replace filter element.
	Dirty or faulty injection nozzles.	Have authorized servicing dealer or engine distributor check injectors.
	Defective glow plugs (Cold weather starting)	Test glow plugs (See 3000 hour/36 month maintenance section)
	Electronic fuel system problem (if equipped)	See your John Deere distributor or servicing dealer.
Engine knocks	Low engine oil level.	Add oil to engine crankcase.
	Low coolant temperature.	Remove and check thermostat.

Continued on next page

OURGP12.00000F7 -19-24AUG10-1/6

Symptom	Problem	Solution
	Engine overheating.	See "Engine Overheats".
	Engine cold	Wrong or defective thermostat. Remove and check thermostat.
<p>Abnormal Engine Noise</p> <p><i>NOTE: Variable geometry turbocharger recycles after starting engine, causing a momentary revving sound in the engine. This is normal.</i></p> <p><i>Do not confuse the whine heard during turbocharger run down with noise which indicates a bearing failure. The whine heard during turbocharger run down is normal.</i></p>	Turbocharger bearings not lubricated (insufficient oil pressure)	Determine cause of lack of lubrication; repair as required. See your John Deere engine distributor or servicing dealer.
	Worn timing gears or excess backlash	Check timing gear back lash. See your John Deere engine distributor or servicing dealer.
	Excessive valve clearance	Check and adjust valve clearance. See CHECKING AND ADJUSTING VALVE CLEARANCE in the "Lubrication and Maintenance/3000 Hour/36 Month" section earlier in this manual.
	Worn main or connecting rod bearings	Determine bearing clearance. See your John Deere engine distributor or servicing dealer.
	Excessive crankshaft end play	Check crankshaft end play. See your John Deere engine distributor or servicing dealer.
	Loose main bearing caps	Check bearing clearance; replace bearings and bearing cap screws as required. See your John Deere engine distributor or servicing dealer.
	Worn connecting rod bushings and piston pins	Inspect piston pins and bushings. See your John Deere engine distributor or servicing dealer.
	Scored pistons	Inspect pistons. See your John Deere engine distributor or servicing dealer.
	Worn camshaft lobes	Inspect camshaft. See your John Deere engine distributor or servicing dealer.

Continued on next page

OURGP12,00000F7 -19-24AUG10-2/6

Symptom	Problem	Solution
	Worn rocker arm shaft(s)	Inspect rocker arm shafts. See your John Deere engine distributor or servicing dealer.
Engine runs irregularly or stalls frequently	Clogged fuel filter.	Replace fuel filter element.
	Water, dirt, or air in fuel system.	Drain, flush, fill, and bleed system.
	Low coolant temperature.	Remove and check thermostat.
	Dirty or faulty injection nozzles.	Have authorized servicing dealer or engine distributor check injectors.
	Electronic fuel system problem	See your John Deere distributor or servicing dealer.
Below normal engine temperature	Defective thermostat.	Remove and check thermostat.
	Defective temperature gauge or sender.	Check gauge, sender, and connections.
	Poor quality fuel	Change to better quality fuel.
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 injection nozzles.	Have authorized servicing dealer or engine distributor check injectors.
	Injection pump out of time.	See your authorized servicing dealer or engine distributor.
	Electronic fuel system problem	See your John Deere distributor or servicing dealer.
	Turbocharger not functioning.	See your authorized servicing dealer or engine distributor.
	Leaking exhaust manifold gasket.	See your authorized servicing dealer or engine distributor.

Continued on next page

OURGP12,00000F7 -19-24AUG10-3/6

Symptom	Problem	Solution
	Restricted fuel hose.	Clean or replace fuel hose.
	Low fast idle speed.	See your authorized servicing dealer or engine distributor.
Low oil pressure	Low oil level.	Add oil.
	Restricted crankcase vent tube.	Clean vent tube, verify crankcase oil level is not too high.
	Improper type of oil.	Drain, fill crankcase with oil of proper viscosity and quality.
High oil consumption	Crankcase oil too light.	Use proper viscosity oil.
	Oil leaks.	Check for leaks in lines, gaskets, and drain plug.
	Restricted crankcase vent tube.	Clean vent tube, verify crankcase oil level is not too high.
	Defective turbocharger.	See your authorized servicing dealer or engine distributor.
Engine emits white smoke	Improper type of fuel.	Use proper fuel.
	Low engine temperature.	Warm up engine to normal operating temperature.
	Defective thermostat.	Remove and check thermostat.
	Defective injection nozzles.	See your authorized servicing dealer or engine distributor.
	Defective glow plugs.	Test glow plugs. (See 3000 hour/36 month maintenance section.)
Engine emits black or gray exhaust smoke	Improper type of fuel.	Use proper fuel.
	Clogged or dirty air cleaner.	Service air cleaner.
	Engine overloaded.	Reduce load.
	Injection nozzles dirty.	See your authorized servicing dealer or engine distributor.
	Electronic fuel system problem	See your authorized servicing dealer or engine distributor.
	Turbocharger not functioning.	See your authorized servicing dealer or engine distributor.

Continued on next page

OURGP12,0000F7 -19-24AUG10-4/6

Symptom	Problem	Solution
Engine overheats	Coolant stays at high temperature	Check for debris in front of cooling package
	Engine overloaded.	Reduce load.
	Low coolant level.	Fill radiator to proper level, check radiator and hoses for loose connections or leaks.
	Faulty radiator cap.	Have technician check.
	Stretched poly-vee belt or defective belt tensioner.	Check automatic belt tensioner and check belts for stretching. Replace as required.
	Low engine oil level.	Check oil level. Add oil as required.
	Cooling system needs flushing.	Flush cooling system.
	Defective thermostat.	Remove and check thermostat.
	Defective temperature gauge or sender.	Check coolant temperature with thermometer and replace, if necessary.
	Incorrect grade of fuel.	Use correct grade of fuel.
High fuel consumption	Improper type of fuel.	Use proper type of fuel.
	Clogged or dirty air cleaner.	Service air cleaner.
	Engine overloaded.	Reduce load.
	Improper valve clearance.	See your authorized servicing dealer or engine distributor.
	Injection nozzles dirty.	See your authorized servicing dealer or engine distributor.
	Electronic fuel system problem	See your authorized servicing dealer or engine distributor.
	Defective turbocharger.	See your authorized servicing dealer or engine distributor.
	Low engine temperature.	Check thermostat.
	Undercharged electrical system	Excessive electrical load from added accessories.
Excessive engine idling.		Increase engine rpm when heavy electrical load is used.

Continued on next page

OURGP12,00000F7 -19-24AUG10-5/6

Symptom	Problem	Solution
Battery uses too much water	Poor electrical connections on battery, ground strap, starter, or alternator.	Inspect and clean as necessary.
	Defective battery.	Test battery.
	Defective alternator.	Test charging system.
	Cracked battery case.	Check for moisture and replace as necessary.
Batteries will not charge	Defective battery.	Test battery.
	Battery charging rate too high.	Test charging system.
	Loose or corroded connections.	Clean and tighten connections.
Starter will not crank	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.
	PTO engaged (if equipped).	Disengage PTO.
	Loose or corroded connections.	Clean and tighten loose connections.
	Low battery output voltage.	See your authorized servicing dealer or engine distributor.
	Faulty start circuit relay.	See your authorized servicing dealer or engine distributor.
	Blown main system fuse.	Replace 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.
Starter and hour meter functions; rest of electrical system does not function Entire electrical system does not function	Blown fuse.	Replace fuse.
	Faulty battery connection.	Clean and tighten connections.
	Sulfated or worn-out batteries.	See your authorized servicing dealer or engine distributor.
	Blown main system fuse.	Replace fuse.

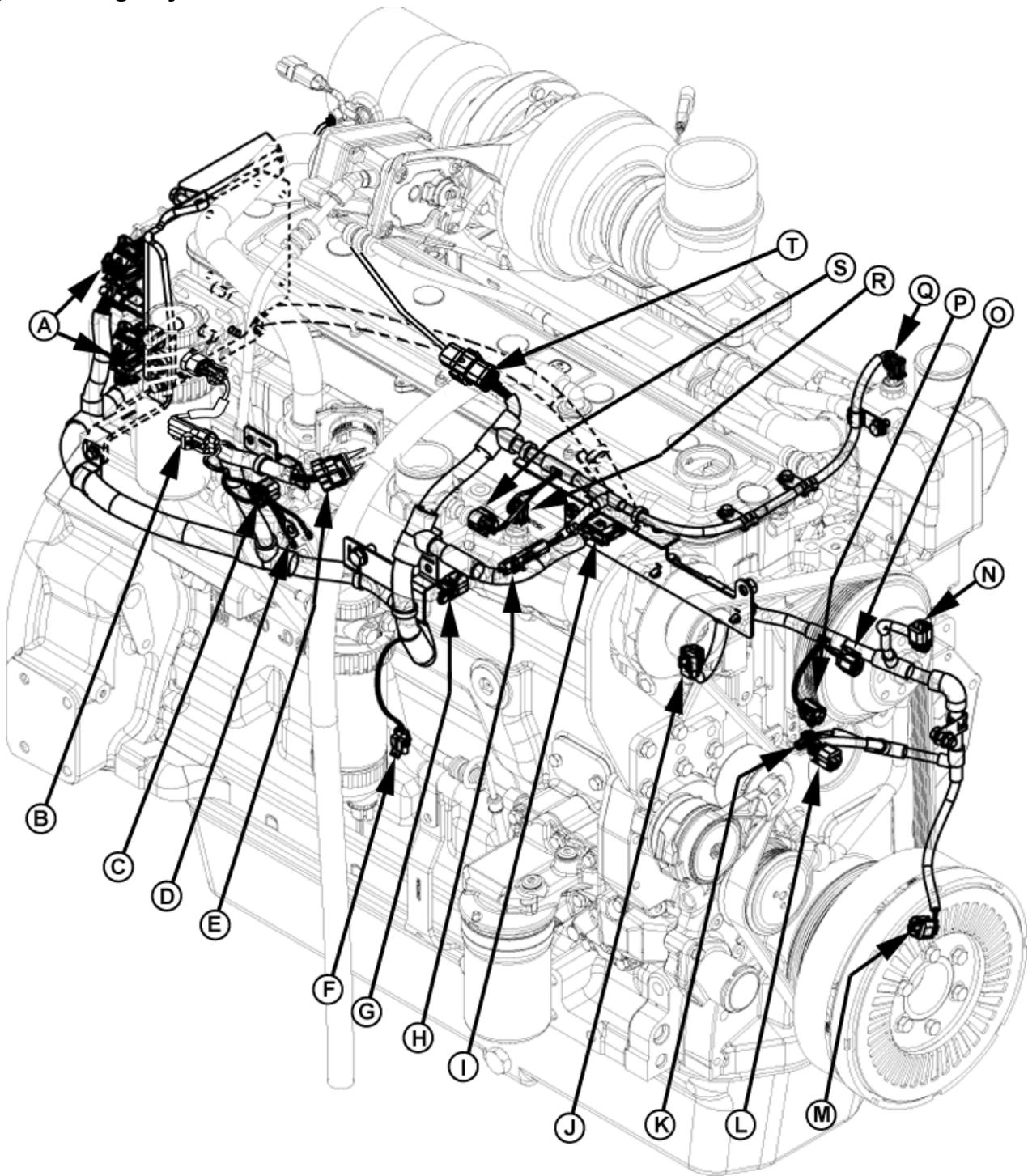
OURGP12,00000F7 -19-24AUG10-6/6

**Precautions for Electrical System When
Steam Cleaning Engine**

IMPORTANT: Do not steam clean any electrical or
electronic components while steam cleaning the
engine as it could damage sensitive parts.

OURGP11,000012A -19-24AUG10-1/1

Engine Wiring Layout



Engine Wiring Layout

RG13862—UN—25JAN05

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OURGP12,0000099 -19-28SEP04-1/2

A—Engine Control Unit (ECU) Connector	F—Water-In-Fuel Sensor Connector	K—Oil Pressure Sensor Connector	P—Fuel Temperature Sensor Connector
B—Fuel Pressure Sensor Jumper Connector	G—Exhaust Gas Recirculation (EGR) Mixed Air Temperature Sensor Connector	L—Camshaft Position Sensor Connector	Q—Exhaust Pressure Sensor Connector
C—Exhaust Gas Recirculation (EGR) Exhaust Temperature Sensor Connector	H—Alternator Excitation Connector	M—Crankshaft Speed Sensor Connector	R—Manifold Air Pressure Sensor Connector
D—Glow Plug Relay Connectors (3)	I—Fuel Injector Connector	N—Coolant Temperature Sensor Connector	S—Exhaust Gas Recirculation (EGR) Fresh Air Sensor Connector
E—Exhaust Gas Recirculation (EGR) Valve Sensor Connector	J—Rail Pressure Sensor Connector	O—Pump Control Valve Connector	T—Turbocharger Sensor Jumper Connector

OURGP12.0000099 -19-28SEP04-2/2

Precautions For Welding

IMPORTANT: Welding on an engine is not recommended. If welding must be performed, follow the following precautions.

IMPORTANT: ALWAYS disconnect Engine Control Unit (ECU) connectors and battery before welding on engine or machine. High currents or electro-static discharge in electronic components from welding may cause permanent damage. Remove battery or flammable liquid lines if welding near those items.

1. Disconnect connectors from ECU.
2. Disconnect battery cables from battery.
3. If necessary, disconnect flammable liquid lines or battery.
4. Connect welder ground to same engine component as the welding point and be sure ECU or other electronic components are not in ground path.

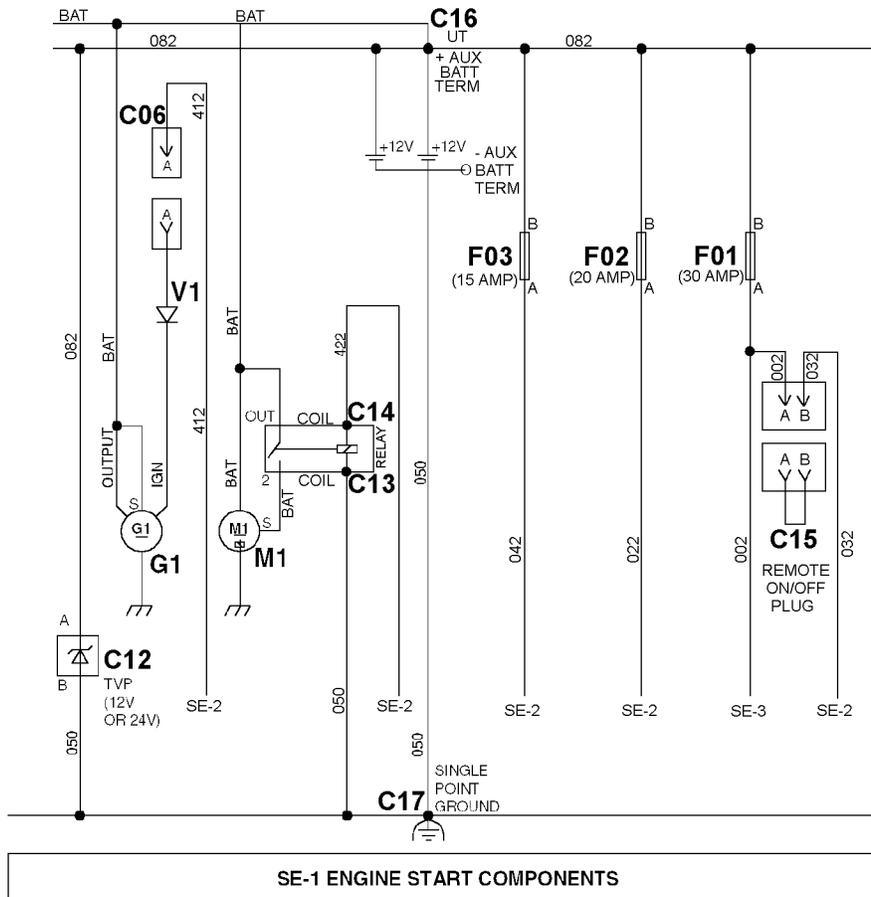


TS953 —UN—15MAY90

5. Never connect welder ground to crankshaft damper or pulley, engine flywheel, or any driveline components. Be sure that engine bearings are not in ground path, as this can create bearing damage.

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Engine Wiring Diagram (Engines With Full-Featured Instrument Panel)

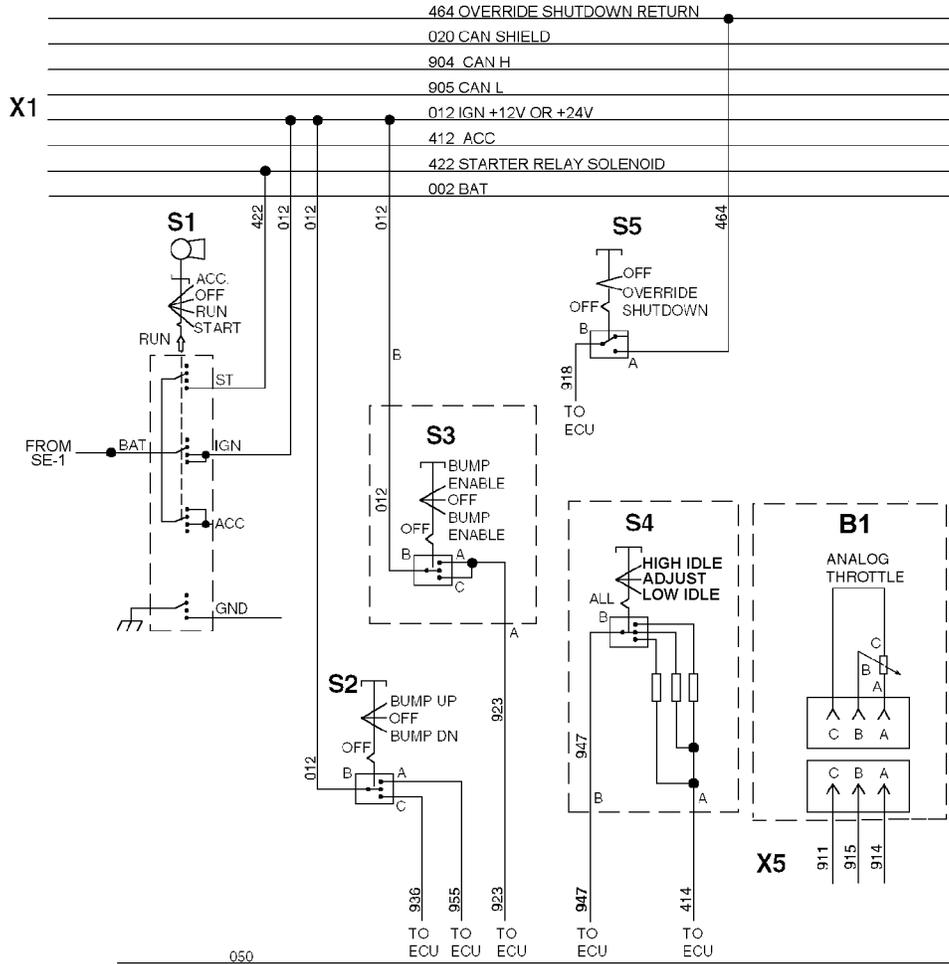


- | | | | |
|-----------------------------------|---------------------------------|------------------------------------|---|
| B1—Analog Throttle | C17— Single Point Ground | P2—Optional Gauge | S3—Bump Enable Switch (Momentary) |
| C06— Alternator Harness Connector | F01— Fuse (30 Amp)(System) | P3—Oil Pressure Gauge | S4—High-Low Speed Select Switch |
| C12— Transient Voltage Protector | F02— Fuse (20 Amp)(ECU) | P4—Coolant Temperature Gauge | S5—Override Shutdown Switch (Momentary) |
| C13— Starter Relay | F03— Fuse (15 Amp)(Fuel Filter) | P5—Tachometer Display | V1—Diode |
| C14— Starter Relay | G1—Alternator | P6—Hour Meter/Diagnostic Gauge | X1—Vehicle Harness Connector |
| C15— Remote On/Off | M1—Starter Motor | S1—Ignition Key Switch | X4—CAN Terminator |
| C16— Battery | P1—Optional Gauge | S2—Speed Select Switch (Momentary) | X5—Analog Throttle Connector |

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Engine Wiring Diagram (Engines With Full-Featured Instrument Panel) (Continued)



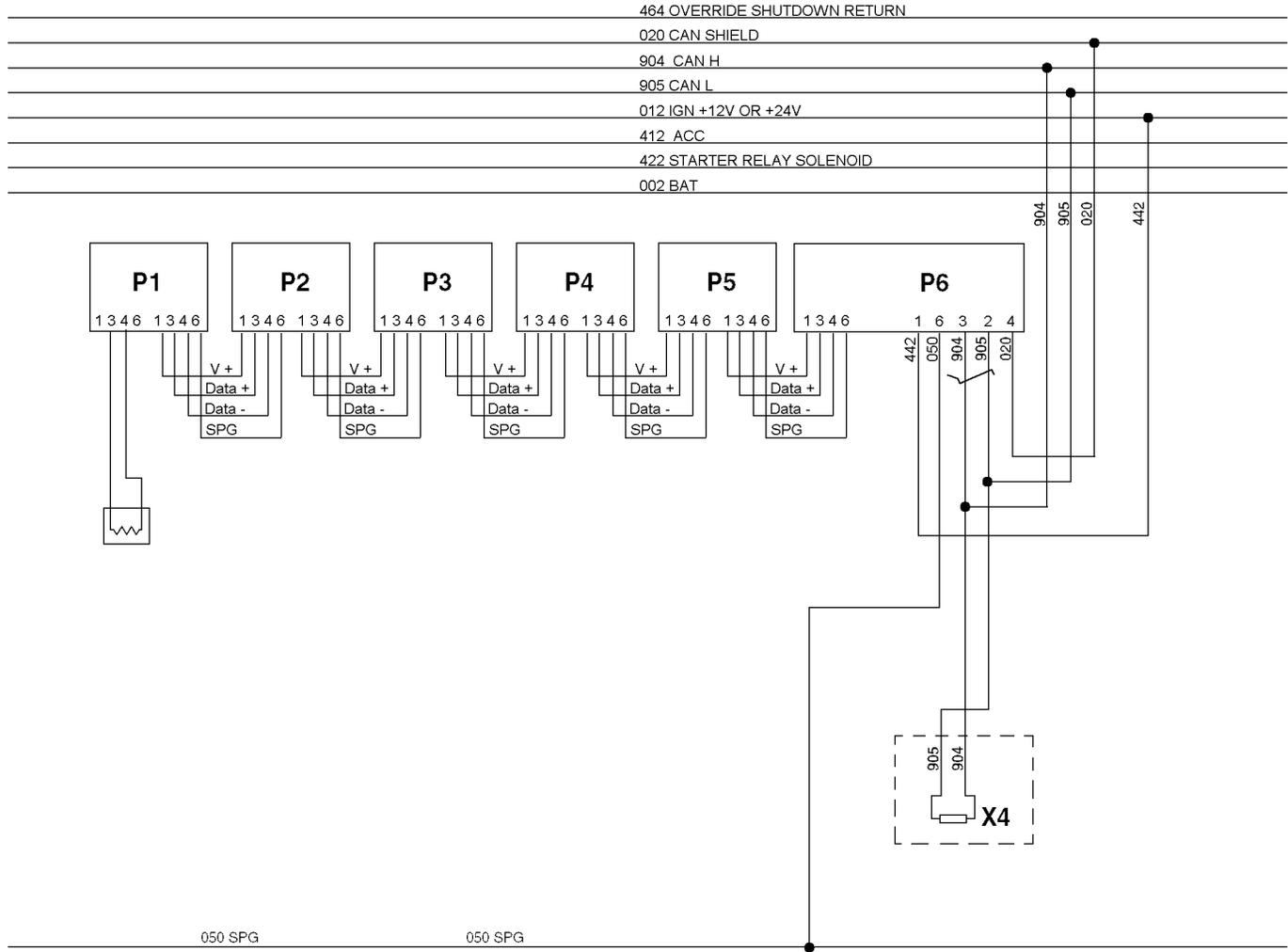
SE-2 INSTRUMENT PANEL (CONTINUED NEXT PAGE)

- | | | | |
|-----------------------------------|---------------------------------|------------------------------------|---|
| B1—Analog Throttle | C17— Single Point Ground | P2—Optional Gauge | S3—Bump Enable Switch (Momentary) |
| C06— Alternator Harness Connector | F01— Fuse (30 Amp)(System) | P3—Oil Pressure Gauge | S4—High-Low Speed Select Switch |
| C12— Transient Voltage Protector | F02— Fuse (20 Amp)(ECU) | P4—Coolant Temperature Gauge | S5—Override Shutdown Switch (Momentary) |
| C13— Starter Relay | F03— Fuse (15 Amp)(Fuel Filter) | P5—Tachometer Display | V1—Diode |
| C14— Starter Relay | G1—Alternator | P6—Hour Meter/Diagnostic Gauge | X1—Vehicle Harness Connector |
| C15— Remote On/Off | M1—Starter Motor | S1—Ignition Key Switch | X4—CAN Terminator |
| C16— Battery | P1—Optional Gauge | S2—Speed Select Switch (Momentary) | X5—Analog Throttle Connector |

OURGP12.00000ED -19-08APR05-1/1

RG-13873—UN—08APR05

Engine Wiring Diagram (Engines With Full-Featured Instrument Panel) (Continued)



SE-2 INSTRUMENT PANEL (CONTINUED)

- | | | | |
|-----------------------------------|---------------------------------|------------------------------------|---|
| B1—Analog Throttle | C17— Single Point Ground | P2—Optional Gauge | S3—Bump Enable Switch (Momentary) |
| C06— Alternator Harness Connector | F01— Fuse (30 Amp)(System) | P3—Oil Pressure Gauge | S4—High-Low Speed Select Switch |
| C12— Transient Voltage Protector | F02— Fuse (20 Amp)(ECU) | P4—Coolant Temperature Gauge | S5—Override Shutdown Switch (Momentary) |
| C13— Starter Relay | F03— Fuse (15 Amp)(Fuel Filter) | P5—Tachometer Display | V1—Diode |
| C14— Starter Relay | G1—Alternator | P6—Hour Meter/Diagnostic Gauge | X1—Vehicle Harness Connector |
| C15— Remote On/Off | M1—Starter Motor | S1—Ignition Key Switch | X4— CAN Terminator |
| C16— Battery | P1—Optional Gauge | S2—Speed Select Switch (Momentary) | X5— Analog Throttle Connector |

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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

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.

IMPORTANT: Any time your engine will not be used for over six (6) months, the following recommendations for storing it and removing it from storage will help 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.

1. Change engine oil and replace filter. (See CHANGE ENGINE OIL AND FILTER in Lubrication and Maintenance/500 Hour Section.) Used oil will not give adequate protection. Add one (1) ounce of rust preventive oil to the engine crankcase for every quart of oil. This rust preventive oil should be an SAE 10 oil with 1-4 percent morpholine or equivalent vapor corrosion inhibitor.
 2. Ensure 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 DIESEL FUEL CONDITIONER (or equivalent) at the specified concentration.
 3. Service air cleaner. (See REPLACING AIR CLEANER FILTER ELEMENTS in Service As Required Section.)
 4. Draining and flushing of cooling system is not necessary if engine is to be stored only for several months. 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 RECOMMENDED ENGINE COOLANT in Fuels, Lubricants, and Coolant Section and ADDING COOLANT in Service As Required Section.)
 5. Prepare a tank with a solution of diesel fuel and rust preventive oil, at ten (10) ounces of rust preventive oil per gallon of diesel fuel.
 6. Remove existing lines/plugs as required, and run a temporary line from the tank to the engine fuel intake, and another temporary line from the fuel return manifold to the tank, so rust preventive oil solution is circulated through the injection system during cranking.
 7. Crank the engine several revolutions with starter (do not allow the engine to start). This will allow rust preventive oil solution to circulate.
 8. Remove temporary lines installed in Step 6 above, and replace any lines/plugs previously removed.
- NOTE: One gallon of fuel/oil solution can be used to treat 100 engines; two gallons to treat 200 engines, etc. The oil could then be replenished by adding an additional five (5) ounces of rust preventive oil per gallon of solution. However, starting over with a new solution is recommended to dispose of any water or other impurities.*
9. Loosen, or remove and store, fan/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 (machined) 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.

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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.)
6. Crank engine for 20 seconds with starter (do not allow the engine to start). Wait 2 minutes and crank engine an additional 20 seconds to assure bearing surfaces are adequately lubricated.
7. Start engine and run at low idle and no load for several minutes. Warm up carefully and check all gauges before placing engine under load.
8. On the first day of operation after storage, check overall engine for leaks and check all gauges for correct operation.

NOTE: If using BIODIESEL blends after long term storage, frequency of fuel filter plugging may increase initially.

IMPORTANT: DO NOT operate starter more than 30 seconds at a time. Wait at least 2 minutes for starter to cool before trying again.

OUOD006,00000FD -19-02OCT07-1/1

Specifications

General OEM Engine Specifications

ITEM	4045 (4.5L)	6068 (6.8L)
Number of Cylinders	4	6
Bore	106 mm (4.19 in.)	106 mm (4.19 in.)
Stroke	127 mm (5.0 in.)	127 mm (5.0 in.)
Displacement	4.5 L (276 cu in.)	6.8 L (414 cu in.)
Compression Ratio	17.0:1	17.0:1
Aspiration	Air-To-Air Intercooled, Turbocharged	Air-To-Air Intercooled, Turbocharged
Engine Firing Order	1-3-4-2	1-5-3-6-2-4
Valves Per Cylinder	2 Intake 2 Exhaust	2 Intake 2 Exhaust
Valve Clearance (Cold)		
Intake Valves	0.36 mm (0.014 in.)	0.36 mm (0.014 in.)
Exhaust Valves	0.46 mm (0.018 in.)	0.46 mm (0.018 in.)
Max. Crank Pressure	0.5 kPa (2 H ₂ O)	0.5 kPa (2 H ₂ O)
Vibration Damper Maximum Radial Runout	1.50 mm (0.060 in.)	1.50 mm (0.060 in.)
Battery Capacities (CCA)		
12-Volt System	800	800
24-Volt System	570	570
Governor Regulation (Industrial)	7—10 %	7—10 %
Governor Regulation (Generator)	5%	5%
Thermostat Start To Open Temperature	82°C (180°F)	82°C (180°F)
Thermostat Fully Open Temperature	94°C (202°F)	94°C (202°F)
Coolant Capacity ^a	8.5 L (9 qt)	11.8 L (12.5 qt)
Recommended Radiator Pressure Cap	100 kPa (14.5 psi)	100 kPa (14.5 psi)
Crankcase Oil Fill Capacity	See "Engine Crankcase Oil Fill Quantities" later in this section.	
Oil Pressure At Rated Speed, Full Load With Oil Warmed to 105°C (220°F)	345 ± 103 kPa (3.45 ± 1.03 bar) (50 ± 15 psi)	345 ± 103 kPa (3.45 ± 1.03 bar) (50 ± 15 psi)
Oil Pressure At Low Idle (Minimum)	105 kPa (15 psi)	105 kPa (15 psi)
Length	860 mm (33.9 in.)	1165 mm (45.9 in.)
Width	612 mm (24.1 in.)	597 mm (23.5 in.)
Height	994 mm (39.1 in.)	1046 mm (41.2 in.)
Weight	451 kg (993 lb)	678 kg (1495 lb)

^aCoolant capacity may vary with different engine applications.

OURGP11,0000064 -19-07MAY08-1/1

Engine Power Ratings And Fuel System Specifications

NOTE: Power ratings are for bare engines without drag effect of cooling fan or accessories like air compressors.

NOTE: Engine speeds listed are preset to factory specification. Slow idle speed may be reset depending upon specific vehicle application requirements. Refer to your machine operator's manual for engine speeds that are different from those preset at the factory.

Engine Model	Fuel System Option Codes	Electronic Software Option Codes	System Voltage	Power Rating @ Rated Speed kW (hp)	Rated Speed (rpm)	Slow Idle (rpm)	Fast Idle (rpm)
4045 (4.5 L) (4-Valve Head)	169D	72LN	12V	111 (149)	2000	800	2200
	169D	72LP	24V	111 (149)	2000	800	2200
	169D	72LL	12V	115 (154)	2200	800	2400
	169D	72LM	24V	115 (154)	2200	800	2400
	169D	72LJ	12V	115 (154)	2400	800	2600
	169D	72LK	24V	115 (154)	2400	800	2600
	169D	72LG	12V	129 (173)	2400	800	2600
	169D	72LH	24V	129 (173)	2400	800	2600
	169D	72LQ	12V	147 (197)	1800	1400	1870
	169D	72LR	24V	147 (197)	1800	1400	1870
	16P2	72WL	24V	129 (173)	2400	800	2600
	16W3	7253	12V	101 (135)	2100	800	2600
6068 (6.8 L) 4-Valve Head)	167W	72JJ	12V	134 (180)	2200	800	2400
	167W	72JK	24V	134 (180)	2200	800	2400
	167W	72JC	12V	138 (185)	2400	800	2600
	167W	72JD	24V	138 (185)	2400	800	2600
	167W	72JE	12V	138 (185)	2200	800	2400
	167W	72JF	24V	138 (185)	2200	800	2400
	167W	72JG	12V	138 (185)	2200	800	2400
	167W	72JH	24V	138 (185)	2200	800	2400
	167W	72HY	12V	144 (193)	2000	800	2100
	167W	72HZ	24V	144 (193)	2000	800	2100
	167W	72JA	12V	144 (193)	2000	800	2100
	167W	72JB	24V	144 (193)	2000	800	2100
	167W	72HS	12V	149 (200)	2400	800	2600
	167W	72HT	24V	149 (200)	2400	800	2600
	167W	72HU	12V	149 (200)	2200	800	2400
	167W	72HV	24V	149 (200)	2200	800	2400
	167W	72HW	12V	149 (200)	2200	800	2400
	167W	72HX	24V	149 (200)	2200	800	2400
	167W	72HN	12V	162 (217)	2000	800	2100
	167W	72HP	24V	162 (217)	2000	800	2100
	167W	72HQ	12V	162 (217)	2000	800	2100
	167W	72HR	24V	162 (217)	2000	800	2100
	167W	72HG	12V	168 (225)	2400	800	2600
	167W	72HH	24V	168 (225)	2400	800	2600
	167W	72HJ	12V	168 (225)	2200	800	2400
	167W	72HK	24V	168 (225)	2200	800	2400
	167W	72HL	12V	168 (225)	2200	800	2400
	167W	72HM	24V	168 (225)	2200	800	2400
167W	72HE	12V	181 (243)	2000	800	2100	

Continued on next page

BK34394.0000128 -19-02MAR10-1/2

Specifications

Engine Model	Fuel System Option Codes	Electronic Software Option Codes	System Voltage	Power Rating @ Rated Speed kW (hp)	Rated Speed (rpm)	Slow Idle (rpm)	Fast Idle (rpm)
167W		72HF	24V	181 (243)	2000	800	2100
167W		72HA	12V	187 (250)	2400	800	2600
167W		72HB	24V	187 (250)	2400	800	2600
167W		72HC	12V	187 (250)	2200	800	2400
167W		72HD	24V	187 (250)	2200	800	2400
167W		72GY	12V	205 (275)	2400	800	2600
167W		72GZ	24V	205 (275)	2400	800	2600
167W		72SZ	12V	212 (284)	1800	1400	1870
167W		72TA	24V	212 (284)	1800	1400	1870
167W		72JL	12V	235 (315)	1800	1400	1870
167W		72JM	24V	235 (315)	1800	1400	1870
16S4		72VG	24V	129 (173)	2250	800	2400

BK34394.0000128 -19-02MAR10-2/2

Engine Crankcase Oil Fill Quantities

To determine the option code for the oil fill quantity of your engine, refer to the engine option code label affixed to the rocker arm cover. The first two digits of the code (19) identify the oil pan option group. The last two digits of each code identify the specific oil pan on your engine.

The following table lists engine crankcase oil fill quantities:

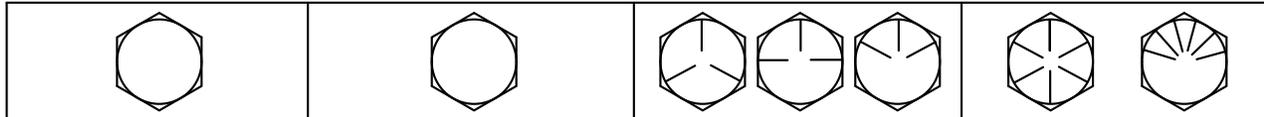
Engine Model	Oil Pan Option Code(s)	Crankcase Oil Capacity L (qt)
4045 (4.5 L)	1903	13.0 (13.7)
	1923	15.0 (15.8)
	1976	20.5 (21.6)
	19AE	14.7 (15.5)
	19AZ	20.5 (21.6)
	19BA	15.0 (15.8)
	19BB	13.0 (13.7)
	19BC	14.7 (15.5)
	6068 (6.8 L)	1907
1908		19.0 (20.1)
1909		19.0 (20.1)
1924		24.2 (25.6)
1961		33.0 (34.9)
1968		33.0 (34.9)
19AC		28.0 (29.6)
19AQ		19.5 (20.6)
19AS		19.0 (20.1)
19AT		19.0 (20.1)
19AU		33.0 (34.9)
19AV		28.0 (29.6)
19CM		32.0 (33.8)
19CN		32.0 (33.8)
19CP		32.0 (33.8)
19CQ		27.0 (28.5)

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

JR74534.0000378 -19-20APR11-1/1

Unified Inch Bolt and Screw Torque Values

TS1671 —UN—01MAY03



Bolt or Screw	SAE Grade 1				SAE Grade 2 ^a				SAE Grade 5, 5.1 or 5.2				SAE Grade 8 or 8.2			
	Lubricated ^b		Dry ^c		Lubricated ^b		Dry ^c		Lubricated ^b		Dry ^c		Lubricated ^b		Dry ^c	
Size	N·m	lb-in	N·m	lb-in	N·m	lb-in	N·m	lb-in	N·m	lb-in	N·m	lb-in	N·m	lb-in	N·m	lb-in
1/4	3.7	33	4.7	42	6	53	7.5	66	9.5	84	12	106	13.5	120	17	150
5/16	7.7	68	9.8	86	12	106	15.5	137	19.5	172	25	221	28	20.5	35	26
3/8	13.5	120	17.5	155	22	194	27	240	35	26	44	32.5	49	36	63	46
7/16	22	194	28	20.5	35	26	44	32.5	56	41	70	52	80	59	100	74
1/2	34	25	42	31	53	39	67	49	85	63	110	80	120	88	155	115
9/16	48	35.5	60	45	76	56	95	70	125	92	155	115	175	130	220	165
5/8	67	49	85	63	105	77	135	100	170	125	215	160	240	175	305	225
3/4	120	88	150	110	190	140	240	175	300	220	380	280	425	315	540	400
7/8	190	140	240	175	190	140	240	175	490	360	615	455	690	510	870	640
1	285	210	360	265	285	210	360	265	730	540	920	680	1030	760	1300	960
1-1/8	400	300	510	375	400	300	510	375	910	670	1150	850	1450	1075	1850	1350
1-1/4	570	420	725	535	570	420	725	535	1280	945	1630	1200	2050	1500	2600	1920
1-3/8	750	550	950	700	750	550	950	700	1700	1250	2140	1580	2700	2000	3400	2500
1-1/2	990	730	1250	930	990	730	1250	930	2250	1650	2850	2100	3600	2650	4550	3350

Torque values listed are for general use only, based on the strength of the bolt or screw. DO NOT use these values if a different torque value or tightening procedure is given for a specific application. For plastic insert or crimped steel type lock nuts, for stainless steel fasteners, or for nuts on U-bolts, see the tightening instructions for the specific application. Shear bolts are designed to fail under predetermined loads. Always replace shear bolts with identical grade.

Replace fasteners with the same or higher grade. If higher grade fasteners are used, tighten these to the strength of the original. Make sure fastener threads are clean and that you properly start thread engagement. When possible, lubricate plain or zinc plated fasteners other than lock nuts, wheel bolts or wheel nuts, unless different instructions are given for the specific application.

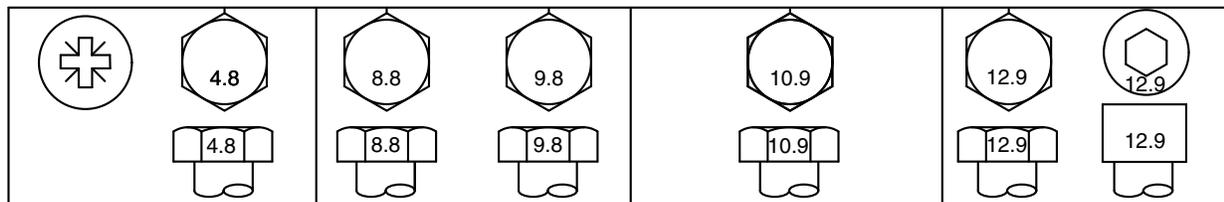
^aGrade 2 applies for hex cap screws (not hex bolts) up to 6 in. (152 mm) long. Grade 1 applies for hex cap screws over 6 in. (152 mm) long, and for all other types of bolts and screws of any length.

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

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

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.												
M6	4.7	42	6	53	8.9	79	11.3	100	13	115	16.5	146	15.5	137	19.5	172
M8	11.5	102	14.5	128	22	194	27.5	243	32	23.5	40	29.5	37	27.5	47	35
M10	23	204	29	21	43	32	55	40	63	46	80	59	75	55	95	70
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.

Lubrication and Maintenance Records

Using Lubrication and Maintenance Records

Refer to specific Lubrication and Maintenance Section for detailed service procedures.

1. Keep a record of the number of hours you operate your engine by regular observation of hour meter.
2. Check your record regularly to learn when your engine needs service.
3. DO ALL the services within an interval section. Write the number of hours (from your service records) and

the date in the spaces provided. For a complete listing of all items to be performed and the service intervals required, refer to the quick-reference chart near the front of the Lubrication and Maintenance Section.

IMPORTANT: The service recommendations covered in this manual are for the accessories that are provided by John Deere. Follow manufacturer's service recommendations for servicing engine driven equipment not supplied by Deere.

RG, RG34710, 5620 -19-24AUG10-1/1

Daily (Prestarting) Service

- Check engine oil level.
- Check coolant level.
- Check fuel filters/water bowls.
- Check air cleaner dust unloader valve and air restriction indicator, if equipped.
- Perform visual walkaround inspection.

RG, RG34710, 5621 -19-24AUG10-1/1

250 Hour/12 Month Service (Jet Fuel Capable Engines)

- Change engine oil and filter.¹
- Replace fuel filter elements.
- Replace dosing element

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¹Service intervals depend on sulfur content of the fuel, oil pan capacity, and the oil and filter used. (See ENGINE OIL AND FILTER SERVICE INTERVALS (JET FUEL CAPABLE ENGINES ONLY), in Fuels, Lubricants, and Coolant Section.)

AS60879, 00000E2 -19-30JUN08-1/1

500 Hour/12 Month Service

- Service fire extinguisher.
- Check engine mounts.
- Service battery.
- Change engine oil and filter.¹
- Check crankcase vent system.
- Check air intake hoses, connections, and system.
- Replace fuel filter elements.
- Check automatic belt tensioner and belt wear.
- Check engine electrical ground connection.
- Check cooling system.
- Coolant solution analysis – add SCAs as needed.
- Pressure test cooling system.
- Check engine speeds.

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¹Service intervals depend on sulfur content of the diesel fuel, oil pan capacity, and the oil and filter used. (See DIESEL ENGINE OIL AND FILTER SERVICE INTERVALS, in Fuels, Lubricants, and Coolant Section.)

2000 Hour/24 Month Service

- Check crankshaft vibration damper (6-cylinder only).
- Flush and refill cooling system.¹
- Test thermostats.
- Check and adjust valve clearance.
- Test glow plugs

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¹If John Deere COOL-GARD is used, the flushing interval may be extended to 3000 hours, or 36 months. If John Deere COOL-GARD is used and the coolant is tested annually AND additives are replenished as needed by adding a supplemental coolant additive, the flushing interval may be extended to 5000 hours or 60 months, whichever occurs first.

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Service as Required

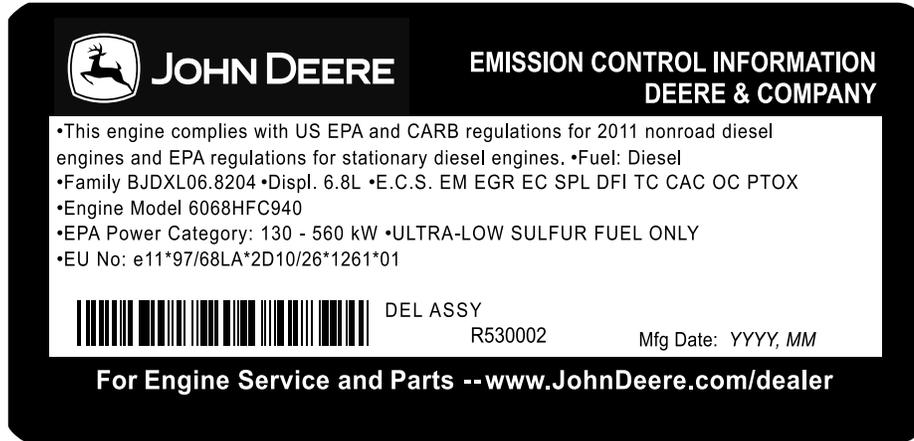
- Add coolant
- Service air cleaner.
- Replace poly-vee belts.
- Check fuses
- Check air compressor (if equipped)
- Bleed fuel system

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RG, RG34710,5627 -19-11MAR03-1/1

Emission System Warranty

Emissions Control System Certification Label



RG19588—UN—15OCT10

Emissions Label

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

The emissions warranty applies to those engines marketed by John Deere that have been certified by the United States Environmental Protection Agency (EPA) and/or California Air Resources Board (CARB); and used in the United States and Canada in Non-road equipment. The presence of an emissions label like the one shown signifies that the engine has been certified with the EPA and/or CARB. The EPA and CARB warranties only apply to new engines having the certification label affixed to the engine and sold as stated above in the geographic areas. The presence of an EU number 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 EPA and/or CARB emissions warranties do not apply to the EU countries.

Emission Control System(s) Laws

The U.S. EPA and California ARB prohibit the removal or rendering inoperative of any device or element of design installed on or in engines/equipment in compliance with applicable emission regulations prior to or after the sale and delivery of the engines/equipment to the ultimate purchaser.

JR74534.00002D9 -19-15OCT10-1/1

EPA Non-road Emissions Control Warranty Statement—Compression Ignition

DXLOGOV1 —UN—28APR09



JOHN DEERE

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

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

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

JOHN DEERE'S WARRANTY RESPONSIBILITY

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

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

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

EMISSION WARRANTY EXCLUSIONS

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

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

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

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

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

Emission_CI_EPA (18Dec09)

DX,EMISSIONS,EPA -19-09MAR10-1/1

CARB Non-road Emissions Control Warranty Statement—Compression Ignition

DXLOGOV1 —UN—28APR09



JOHN DEERE

CALIFORNIA EMISSIONS CONTROL WARRANTY STATEMENT YOUR WARRANTY RIGHTS AND OBLIGATIONS

To determine if the John Deere engine qualifies for the additional warranties set forth below, look for the "Engine 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 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 engine 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.

CALIFORNIA EMISSIONS CONTROL WARRANTY STATEMENT:

The California Air Resources Board (CARB) is pleased to explain the emission-control system warranty on your off-road diesel engine. In California, new heavy-duty 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.

Continued on next page

DX,EMISSIONS,CARB -19-09MAR10-1/2

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:

<p>Air Induction System</p> <ul style="list-style-type: none"> • Intake manifold • Turbocharger • Charge air cooler <p>Fuel Metering system</p> <ul style="list-style-type: none"> • Fuel injection system <p>Exhaust Gas Recirculation</p> <ul style="list-style-type: none"> • EGR valve <p>Catalyst or Thermal Reactor Systems</p> <ul style="list-style-type: none"> • Catalytic converter • Exhaust manifold 	<p>Emission control labels</p> <p>Particulate Controls</p> <ul style="list-style-type: none"> • Any device used to capture particulate emissions • Any device used in the regeneration of the capturing system • Enclosures and manifolding • Smoke Puff Limiters <p>Positive Crankcase Ventilation (PCV) System</p> <ul style="list-style-type: none"> • PCV valve • Oil filler cap 	<p>Advanced Oxides of Nitrogen (NOx) Controls</p> <ul style="list-style-type: none"> • NOx absorbers and catalysts <p>SCR systems and urea containers/dispensing systems</p> <p>Miscellaneous Items used in Above Systems</p> <ul style="list-style-type: none"> • Electronic control units, sensors, actuators, wiring harnesses, hoses, connectors, clamps, fittings, gasket, mounting hardware
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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 Operator's 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 required. As a result, John Deere is NOT liable for travel or mileage on emissions warranty service calls.

Emission_CI_CARB (17Feb10)

DX,EMISSIONS,CARB -19-09MAR10-2/2

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:

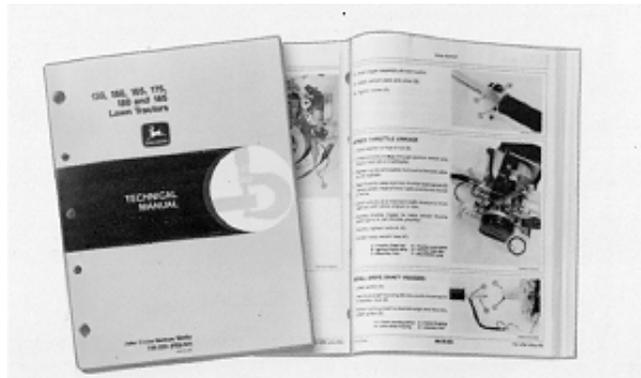
- **PARTS CATALOGS** list service parts available for your machine with exploded view illustrations to help you identify the correct parts. It is also useful in assembling and disassembling.
- **OPERATOR'S MANUALS** providing safety, operating, maintenance, and service information. These manuals and 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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