POWERTECH™ 13.5 L OEM 6135HF485/HF475 Emissions Diesel Engines

OPERATOR'S MANUAL

13.5 L OEM 6135HF485/HF475 Emissions Diesel Engines

OMRG36873 ISSUE 16DEC10 (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

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

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

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

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

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

SETTING FUEL DELIVERY 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.

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

This manual covers primarily the PowerTech Plus 13.5 L (6135HF485) OEM engines. These engines meet emission standards for EPA Tier 3 and EU Stage III A.

JR74534,00002EA -19-16DEC10-1/1

Engine Owner

John Deere Engine Owner:

Don't wait until you need warranty or other service to meet your local John Deere Engine Distributor or Service Dealer. To register your engine for warranty via the Internet, use the following URL: http://www.johndeere.com/enginewarranty

Learn who your dealer is and where he is. At your first convenience, go meet him. He'll want to get to know you and to learn what your needs might be.

Aux Utilisateurs De Moteurs John Deere:

N'attendez pas d'être obligé d'avoir recours à votre concessionnaire John Deere ou au point de service le plus proche pour vous adresser à lui. Pour enregistrer votre moteur pour la garantie via Internet, utilisez l'adresse suivante: http://www.johndeere.com/enginewarranty

Renseignez-vous dès que possible pour l'identifier et le localiser. A la première occasion, prenez contact avec lui et faites-vous connaître. Il sera lui aussi heureux de faire votre connaissance et de vous proposer ses services le moment venu.

An Den Besitzer Des John Deere Motors:

Warten Sie nicht auf einen evt. Reparaturfall, um den nächstgelegenen John Deere Händler kennen zu lernen. Zur Registrierung Ihres Motors für die Garantie dient folgende Internet-Adresse: http://www.johndeere.com/enginewarranty

Machen Sie sich bei ihm bekannt und nutzen Sie sein "Service Angebot".

Proprietario del motore John Deere:

Non aspetti fino al momento di far valere la garanzia o di chiedere assistenza per fare la conoscenza del distributore dei motori John Deere o del concessionario che fornisce l'assistenza tecnica. Per registrare via Internet la garanzia del suo motore, si collegi al seguente sito URL: http://www.johndeere.com/enginewarranty

Lo identifichi e si informi sulla sua ubicazione. Alla prima occasione utile lo contatti. Egli desidera fare la sua conoscenza e capire quali potrebbero essere le sue necessità.

Propietario De Equipo John Deere:

No espere hasta necesitar servicio de garantía o de otro tipo para conocer a su Distribuidor de Motores John Deere o al Concesionario de Servicio. Registre su motor para la garantía en la siguiente dirección de internet: http://www.johndeere.com/enginewarranty

Aprenda quién es su distribuidor y donde él está situado. Cuando tenga un momento, vaya a visitarlo. A él le gustará conocerlo, y saber cuáles podrían ser sus necesidades.

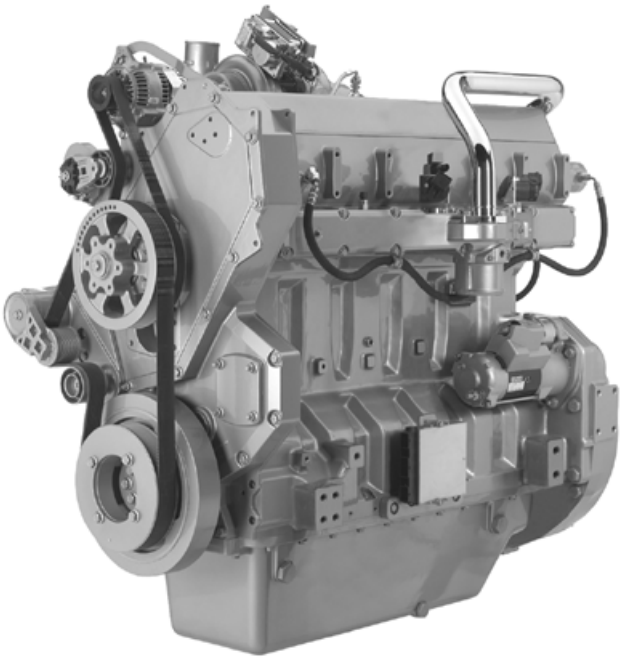
Till ägare av John Deere motorer:

Ta reda på vem din återförsäljare är och besök honom så snart tillfälle ges. Vänta inte tills det är dags för service eller eventuellt garantiarbete. Din motor garantiregistrerar Du via Internet på http://www.johndeere.com/enginewarranty

Din återförsäljare vill mycket gärna träffa dig för att lära känna dina behov och hur bäst han kan hjälpa dig.

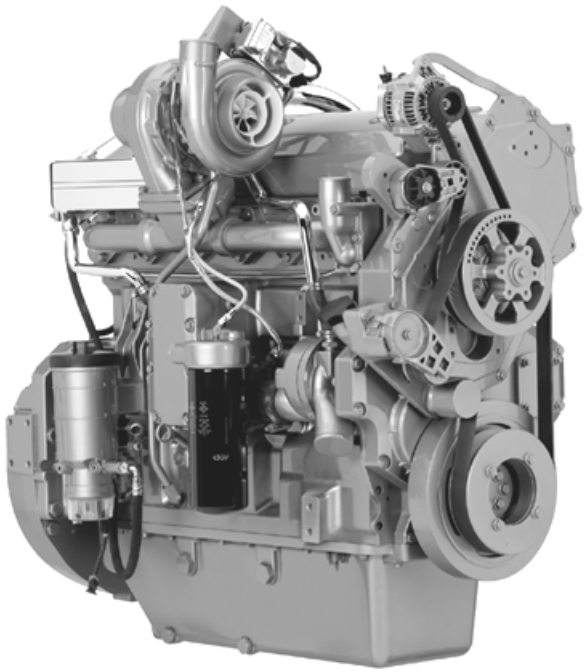
OURGP11,0000251 -19-18SEP07-1/1

Engine Identification Views



RG13885 —UN—19MAY05

13.5L Engine - Left Front View



RG13886 —UN—19MAY05

13.5L Engine - Right Front View

OMRGP15,000011D -19-12SEP06-1/1

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

Record Engine Serial Number

The engine serial number plate (C) is located on the left-hand side of engine block between intake manifold and starter motor.

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

This information is very important for repair parts or warranty information.

Engine Serial Number (A)

_____

Engine Model Number (B)

_____

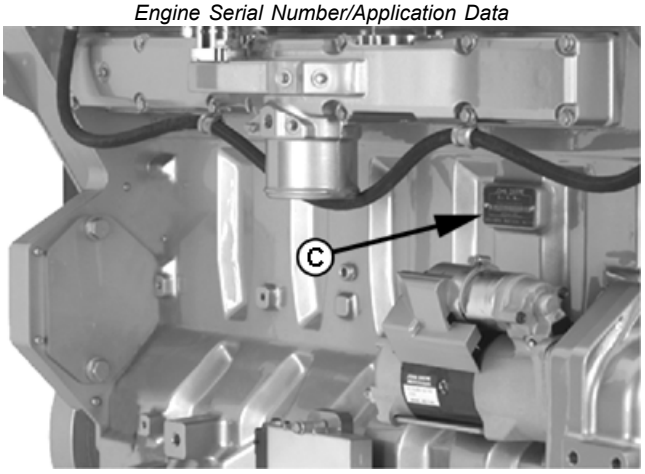
NOTE: On engine serial number (A) the 7th digit shows the emission level as follows:

- *"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*

A—Engine Serial Number
B—Engine Model Number
C—Engine Serial Number Plate

RG14798 —UN—23JUN06

Engine Serial Number/Application Data

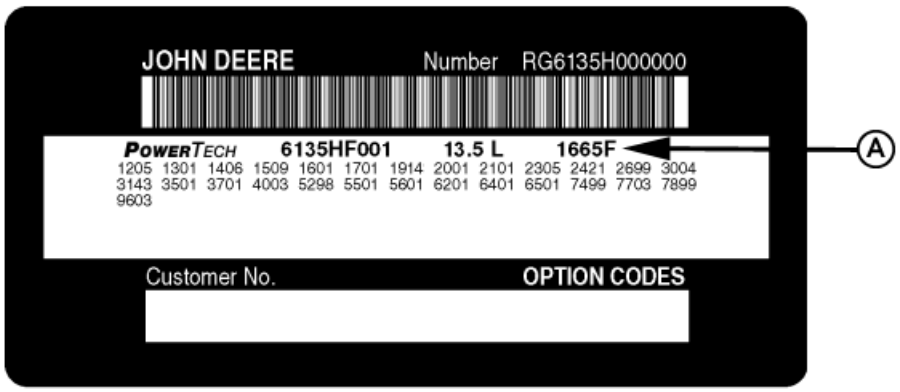


RG13887 —UN—26JUL05

Location of Engine Serial Number Plate

OURGP11,000004B -19-12SEP06-1/1

Engine Option Codes



RG13880 —UN—06JUL05

Option Code Label

A—Base Engine Code

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 label is lost or destroyed, consult your servicing dealer or engine distributor selling the engine for a replacement.

In addition to the serial number plate, OEM engines have an engine option code label affixed to the valve 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 base engine code (A) (1665F, bold print in label above). Record this code along with option codes on following page.

The first two digits of each code identify a specific group, such as alternators. The last two digits of each code identify one specific option provided on your engine, such as a 24-volt, 60-amp alternator.

If an engine is ordered without a particular component, the last two digits of that functional group option code will be 99, 00, or XX. The 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.

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

Option Codes	Description	Option Codes	Description
11_____	Valve Cover	51_____	Cylinder Head With Valves
12_____	Oil Fill Inlet	52_____	Auxiliary Gear Drive
13_____	Crankshaft Pulley/Damper	53_____	Fuel Heater
14_____	Flywheel Housing	54_____	Air Intake for Turbocharger
15_____	Flywheel	55_____	Shipping Stand
16_____	Fuel Injection Pump	56_____	Paint Option
17_____	Air Inlet	57_____	Coolant Pump Inlet
18_____	Air Cleaner	59_____	Oil Cooler
19_____	Oil Pan	60_____	Add-on Auxiliary Drive Pulley
20_____	Coolant Pump	62_____	Alternator Mounting Bracket
21_____	Thermostat Cover	63_____	Low Pressure Fuel Line
22_____	Thermostat	64_____	Exhaust Elbow
23_____	Fan Drive	65_____	Turbocharger
24_____	Fan Belt	66_____	Coolant Temperature Switch
25_____	Fan	67_____	Electronic Sensors (Base Engine)
26_____	Engine Coolant Heater	68_____	Crankshaft Rear Damper
27_____	Radiator	69_____	Engine Serial Number Plate
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

Continued on next page

Option Codes	Description	Option Codes	Description
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

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.

OURGP11,000007F -19-11OCT06-2/2

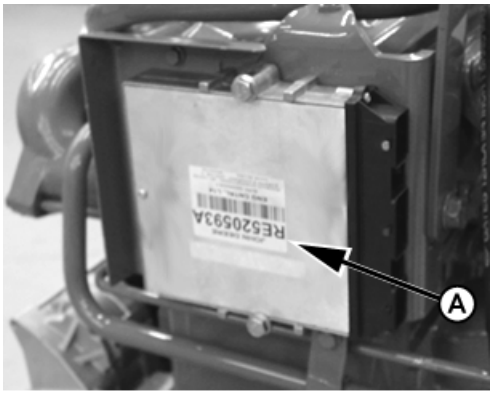
Record Engine Control Unit (ECU) Serial Number

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



RG13891 —UN—14JUN05

Record Engine Control Unit (ECU) Serial Number

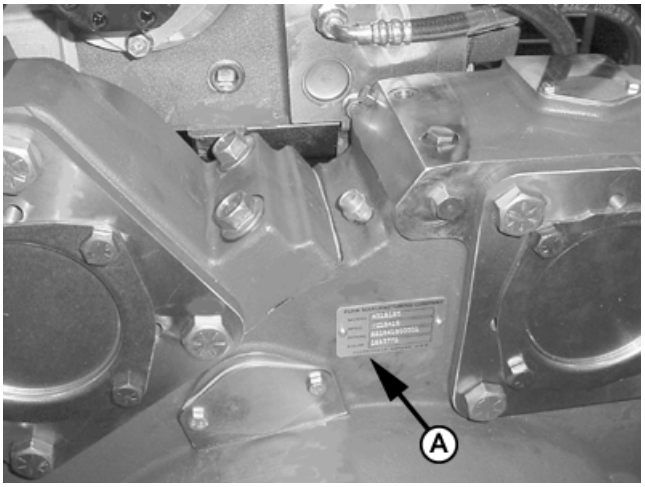
OURGP12,0000125 -19-12SEP06-1/1

Record Rear Power Take-Off (PTO) Serial Number (If Equipped)

Record the rear power take-off (PTO) serial number found on rear PTO serial number plate (A) (if equipped).

Rear PTO Serial Number

_____



Rear PTO Serial Number Plate

OUOD006,0000066 -19-12SEP06-1/1

Recognize Safety Information

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

Follow recommended precautions and safe operating practices.

T81389 —UN—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.

TS187 —19—30SEP88

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

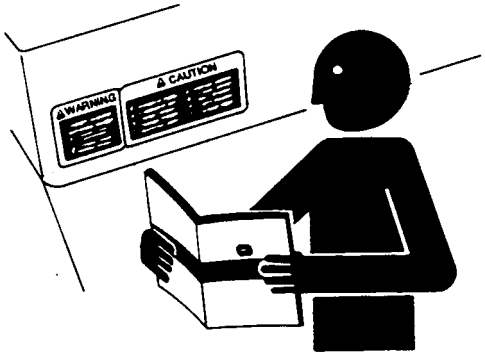
Follow Safety Instructions

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.



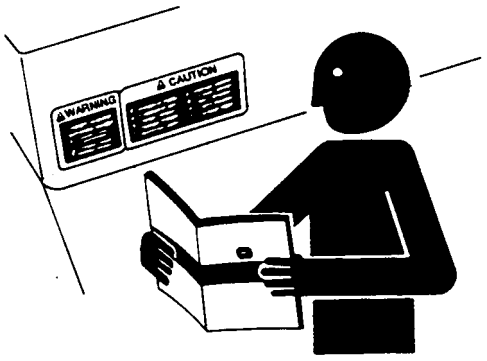
TS201 —UN—23AUG88

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

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

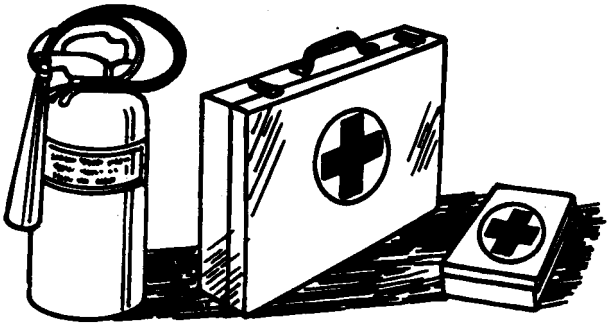
DX,FIRE1 -19-03MAR93-1/1

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.

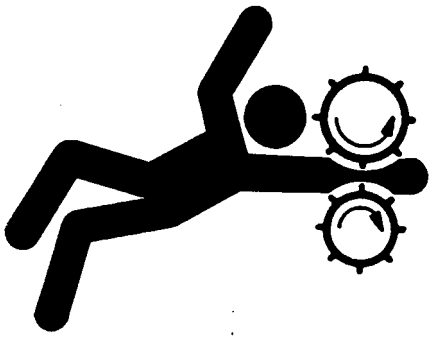
TS227 —UN—23AUG88

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

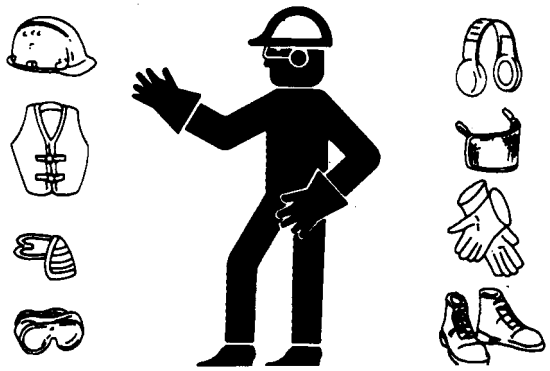
Wear Protective Clothing

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.



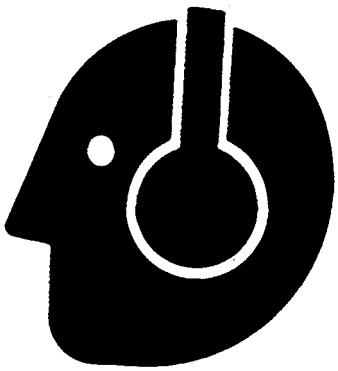
TS206 —UN—23AUG88

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 master shield and driveline shields in place at all times. Make sure rotating shields turn freely.

Wear close-fitting clothing. Stop the engine and be sure PTO driveline is stopped before making adjustments, connections, or performing any type of service on the engine or PTO-driven equipment.

TS1644 —UN—22AUG95

Rotating Drivelines

OUO1004,0000BD8 -19-15OCT07-1/1

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.

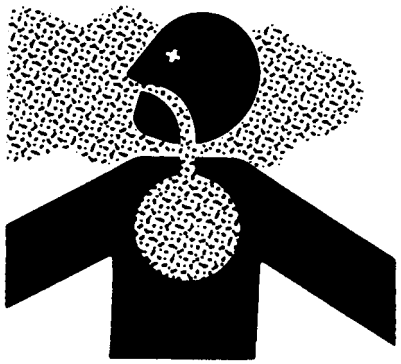
TS218 —UN—23AUG88

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

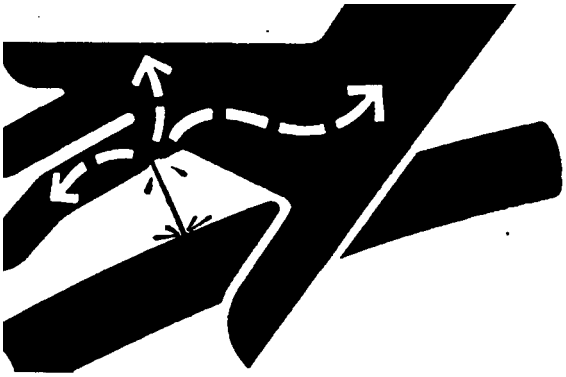
Avoid High-Pressure Fluids

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.

TS953 —UN—15MAY90

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

Remove Paint Before Welding or Heating

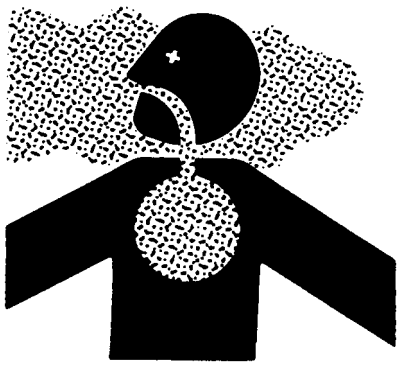
Avoid potentially toxic fumes and dust.

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

Remove paint before heating:

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

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



TS220 —UN—23AUG88

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

Dispose of paint and solvent properly.

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

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.

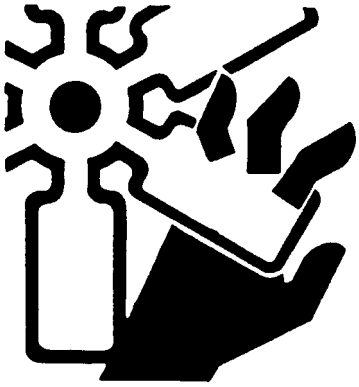
TS281 —UN—23AUG88

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

Install Fan Guards

Rotating cooling system fans can cause serious injury.

Keep fan guards in place at all times during engine operation. Wear close fitting clothes. Stop the engine and be sure fan is stopped before making adjustments or connections, or cleaning near the front of the engine.



Rotating Fan

TS677 —UN—21SEP89

OUOD006,000009D -19-15MAY08-1/1

Avoid Hot Parts

Avoid skin contact with exhaust manifolds, turbochargers and mufflers. Keep flammable materials clear of the turbocharger.

External dry exhaust parts become very hot during operation. Turbochargers and exhaust manifolds may reach temperatures as high as 600°C (1112°F) under full load. This may ignite paper, cloth or wooden materials. Parts on engines that have been at full load and reduced to no load idle will maintain approximately 150°C (302°F).

Hot Surface

TS271 —UN—23AUG88

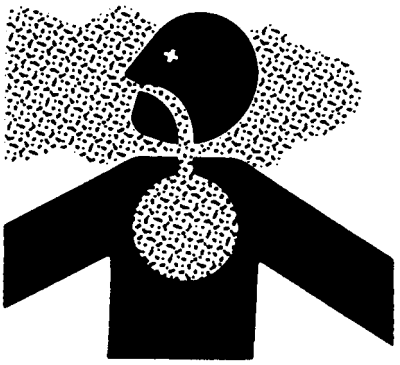
OURGP12,0000135 -19-15OCT07-1/1

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.



TS220 —UN—23AUG88

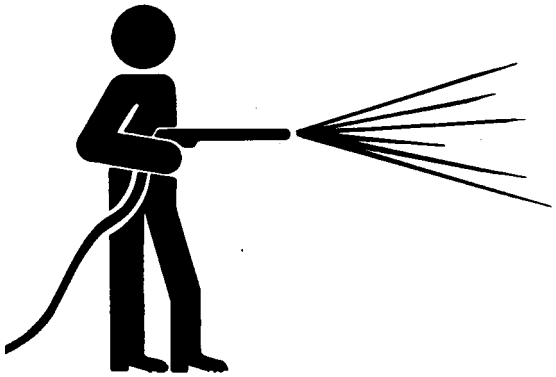
Keep bystanders away from the area.

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

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

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

Handling Batteries Safely

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 (—) battery clamp first and replace it last.

TS204 —UN—23AUG88

Explosion

Continued on next page

DPSG,OUO1004,2758 -19-15OCT07-1/2

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

Avoid the hazard by:

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

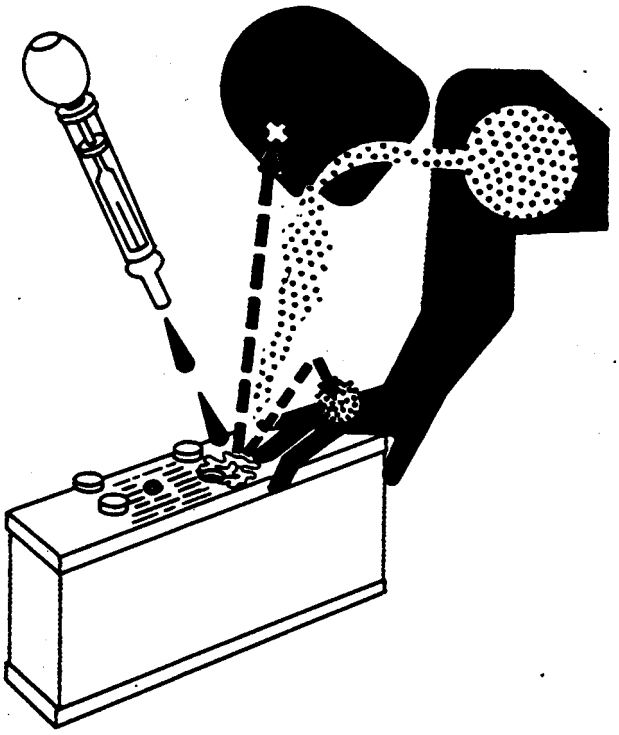
If you spill acid on yourself:

1. **Flush your skin with water.**
2. **Apply baking soda or lime to help neutralize the acid.**
3. **Flush your eyes with water for 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.**



TS203 —UN—23AUG88

Acid

DPSG,OUO1004,2758 -19-15OCT07-2/2

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.

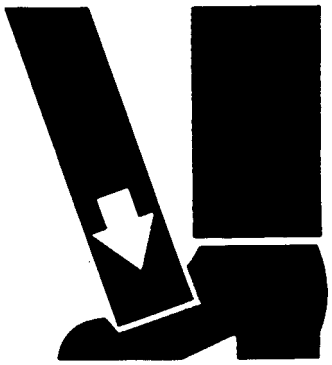
TS1343 —UN—18MAR92

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

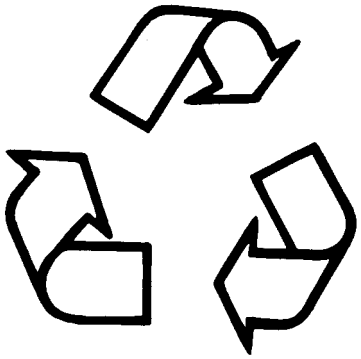
Improperly disposing of waste can threaten the environment and ecology. Potentially harmful waste used with John Deere equipment include such items as oil, fuel, coolant, brake fluid, filters, and batteries.

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

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.

Sulfur Content for Interim Tier 4 and EU Stage IIIB Engines

- Diesel fuel quality and fuel sulfur content must comply with all existing emissions regulations for the area in which the engine operates.
- Use ONLY ultra low sulfur diesel (ULSD) fuel with a maximum of 0.0015% (15 mg/kg) sulfur content.

Sulfur Content for Other Engines

- Diesel fuel quality and fuel sulfur content must comply with all existing emissions regulations for the area in which the engine operates.
- Use of diesel fuel with sulfur content less than 0.10% (1000 mg/kg) is STRONGLY recommended.
- Use of diesel fuel with sulfur content 0.10% (1000 mg/kg) to 0.50% (5000 mg/kg) may result in REDUCED oil and filter change intervals. Refer to table in Diesel Engine Oil and Filter Service Intervals.
- BEFORE using diesel fuel with sulfur content greater than 0.50% (5000 mg/kg), contact your John Deere dealer.

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

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

DX,FUEL1 -19-03AUG09-1/1

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 PREMIUM DIESEL FUEL CONDITIONER (or equivalent) at the specified concentration.

Lubricity of Biodiesel Fuel

Significant improvement in lubricity can occur with biodiesel blends up to B20. The gain in lubricity above a 20% blend is limited.

DX,FUEL5 -19-05OCT07-1/1

Handling and Storing Diesel Fuel

CAUTION: 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 bio-diesel 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 -19-19DEC03-1/1

Testing Diesel Fuel

DIESELSCAN™ is a John Deere fuel analysis program that can be used to monitor the quality of your fuel. The DIESELSCAN analysis verifies fuel type, cleanliness, water content, suitability for cold weather operation, and whether the fuel meets specifications.

Check with your John Deere dealer for availability of DIESELSCAN kits.

DIESELSCAN is a trademark of Deere & Company

DX,FUEL6 -19-14NOV05-1/1

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.

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

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 -19-04OCT07-1/1

Minimizing the Effect of Cold Weather on Diesel Engines

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

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

Use Winter Grade Fuel

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

Cloud point is the temperature at which wax 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 an 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 PREMIUM 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 PREMIUM BIODIESEL 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 -19-03AUG09-1/1

Diesel Engine Break-In Oil

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

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

Change the oil and filter at 100 hours maximum for Break-In™ Oil or 500 hours maximum for Break-In™ Plus Oil during the initial operation of a new or rebuilt engine.

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

If John Deere Break-In™ or Break-In™ Plus Engine Oil is not available, use a 10W-30 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
- ACEA Oil Sequence E2
- ACEA Oil Sequence E1

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

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

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

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

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

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

DX,ENOIL4 -19-03AUG09-1/1

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:

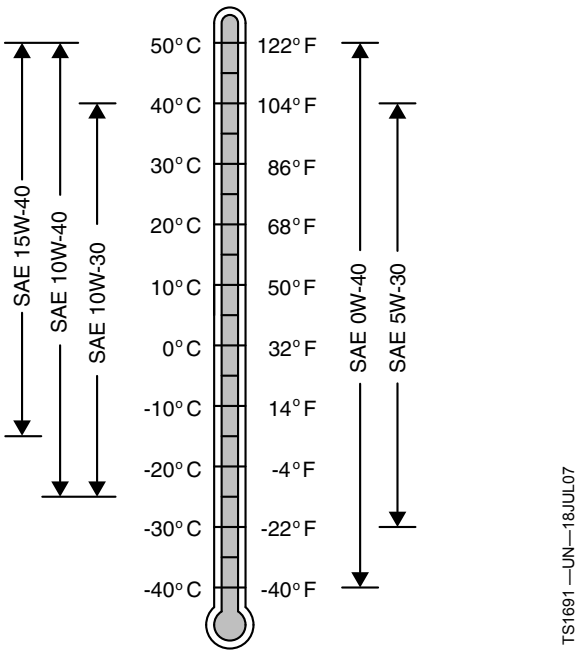
- John Deere Torq-Gard Supreme™
- API Service Category CJ-4
- API Service Category CI-4 PLUS
- API Service Category CI-4
- ACEA Oil Sequence E9
- ACEA Oil Sequence E7
- ACEA Oil Sequence E6
- ACEA Oil Sequence E5
- ACEA Oil Sequence E4

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 1.0% (10 000 mg/kg).

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



Oil Viscosities for Air Temperature Ranges

DX,ENOIL11 -19-03AUG09-1/1

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).

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 U.S. Tier 3 and EU Stage IIIA 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 extended drain interval oil pan.
- Use of diesel fuel with sulfur content less than 0.50% (5000 ppm)
- 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 the approved John Deere oil filter

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 6135 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 frequently your oil and filter should be changed.

Example:

- Engine Model - 6135
- Engine Power - 261kW (350 hp)
- Oil Pan Code - 1917
- Oil Type - Premium
- Oil Filter - John Deere approved
- Fuel Sulfur Level - 0.10-0.20 (1000-2000 ppm)

In the 6135 chart under 261kW Power Rating, select the line for 0.10-0.20 “Fuel Sulfur Content” and move across to column for 1917 “oil pan option code”, select “Prem Oil” and read **500** hour oil change interval.

6135 (13.5 L) Engine Oil and Filter Service Intervals in Hours of Operation

Power Rating		Oil Pans			
kW (hp)	Fuel Sulfur Content [a]	1915, 1917, 1918		1914	
		Interval		Interval	
		Std Oil	Prem Oil	Std Oil	Prem Oil
Industrial Ratings					
261 (350)	Less Than 0.10% (1000 ppm)	250	500	250	500
	0.10% - 0.20% (1000 - 2000 ppm)	250	500	250	500
	0.20% - 0.50% (2000 - 5000 ppm)	200	300	250	500
298-336 (400-451)	Less Than 0.10% (1000 ppm)	250	500	250	500
	0.10% - 0.20% (1000 - 2000 ppm)	200	300	250	500
	0.20% - 0.50% (2000 - 5000 ppm)	150	250	200	300
373-410 (500-550)	Less Than 0.10% (1000 ppm)	250	375	250	500
	0.10% - 0.20% (1000 - 2000 ppm)	200	300	250	500
	0.20% - 0.50% (2000 - 5000 ppm)	150	250	200	300
448 (600)	Less Than 0.10% (1000 ppm)	None	None	250	500

Continued on next page

6135 (13.5 L) Engine Oil and Filter Service Intervals in Hours of Operation					
Power Rating		**Oil Pans**			
kW (hp)	**Fuel Sulfur Content** [a]	**1915, 1917, 1918**		**1914**	
		Interval		**Interval**	
	0.10% - 0.20% (1000 - 2000 ppm)	None	None	200	300
	0.20% - 0.50% (2000 - 5000 ppm)	None	None	150	250
GenSet Ratings					
345-401 (463-538)	Less Than 0.10% (1000 ppm)	250	375	250	500
	0.10% - 0.20% (1000 - 2000 ppm)	200	300	250	500
	0.20% - 0.50% (2000 - 5000 ppm)	150	250	200	300
460 (617)	Less Than 0.10% (1000 ppm)	250	375	250	500
	0.10% - 0.20% (1000 - 2000 ppm)	200	300	200	300
	0.20% - 0.50% (2000 - 5000 ppm)	150	250	150	250
Perform engine oil analysis to determine the actual extended service life of ACEA E7 and ACEA E6 oils.					

[a] *BEFORE using diesel fuel with sulfur content greater than 0.50% (5000 ppm), contact your John Deere dealer. (Dealer to reference DTAC Solution 73203)*

PLUS-50 is a trademark of Deere & Company
TORQ-GARD SUPREME is a trademark of Deere & Company

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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.

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

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

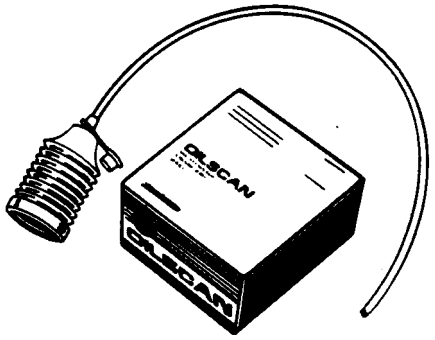
DX,LUBMIX -19-18MAR96-1/1

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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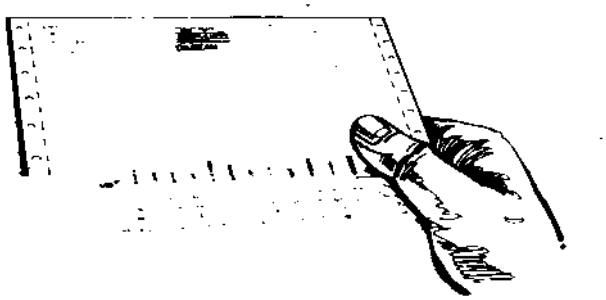

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OILSCAN is a trademark of Deere & Company.
COOLSCAN is a trademark of Deere & Company.

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.

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 oils.

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

Avoid mixing different brands or types of oils. Oil manufacturers blend base stock and additives to create their oils and to meet certain specifications and performance requirements. Mixing different oils can interfere with proper functioning of these formulations and degrade lubricant performance.

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

DX,ALTER -19-11NOV09-1/1

Lubricant Storage

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

Use clean containers to handle all lubricants.

Whenever possible, 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 -19-18MAR96-1/1

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.

John Deere COOL-GARD™ II Premix Coolant is preferred.

John Deere COOL-GARD II Premix is available in a concentration of 50% ethylene glycol.

Additional Recommended Coolants

The following engine coolants are also recommended:

- John Deere COOL-GARD II Concentrate in a 40% to 60% mixture of concentrate with quality water.
- John Deere COOL-GARD Premix (available in a concentration of 50% ethylene glycol).
- John Deere COOL-GARD Concentrate in a 40% to 60% mixture of concentrate with quality water.
- John Deere COOL-GARD PG Premix (available in a concentration of 55% propylene glycol).

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

John Deere COOL-GARD Premix, COOL-GARD Concentrate, and COOL-GARD PG Premix do not require use of supplemental coolant additives, except for periodic replenishment of additives during the drain interval.

Use John Deere COOL-GARD PG Premix when a non-toxic coolant formulation is required.

Other Coolants

It is possible that John Deere COOL-GARD II, COOL-GARD, and COOL-GARD PG coolants are unavailable 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:

- 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% to 60%) heavy duty coolant
- ethylene glycol or propylene glycol base heavy duty coolant concentrate in a 40% to 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.

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DX,COOL3 -19-03NOV08-1/1

Supplemental Coolant Additives

Some coolant additives will gradually deplete during engine operation. For John Deere COOL-GARD™ Premix, COOL-GARD Concentrate, or John Deere COOL-GARD PG Premix, replenish coolant additives between drain intervals by adding a supplemental coolant additive as determined necessary by coolant testing.

John Deere LIQUID COOLANT CONDITIONER is recommended as a supplemental coolant additive for John Deere COOL-GARD Premix, COOL-GARD Concentrate, and COOL-GARD PG Premix.

John Deere LIQUID COOLANT CONDITIONER is not designed for use with COOL-GARD II Premix or COOL-GARD II Concentrate.

IMPORTANT: Do not add a supplemental coolant additive when the cooling system is drained and refilled with any of the following:

- **John Deere COOL-GARD II**
- **John Deere COOL-GARD**
- **John Deere COOL-GARD PG**

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

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

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

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DX,COOL4 -19-03NOV08-1/1

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 and COOL-GARD II Concentrate are maintenance free coolants for up to 6 years or 6000 hours of operation, provided that the cooling system is topped off using only John Deere COOL-GARD II 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.

When John Deere COOL-GARD Premix, COOL-GARD Concentrate or John Deere COOL-GARD PG Premix coolants are used, the drain interval may be extended to 5 years or 5000 hours of operation, provided that the coolant is tested annually AND additives are replenished, as needed, by adding a supplemental coolant additive.

If John Deere COOL-GARD II 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 4 years or 4000 hours of operation. This drain interval only applies to COOL-GARD II coolants that have been maintained within a 40% to 60% mixture of concentrate with quality water.

If John Deere COOL-GARD Premix, COOL-GARD Concentrate, or COOL-GARD PG Premix is used, but the coolant is not tested OR additives are not replenished by adding a supplemental coolant additive, the drain interval is 3 years or 3000 hours of operation. This drain interval only applies to COOL-GARD Premix, COOL-GARD Concentrate, and COOL-GARD PG Premix that have been maintained within a 40% to 60% mixture of concentrate with quality water.

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

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DX,COOL11 -19-08JAN09-1/1

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 and COOL-GARD II Concentrate are maintenance free coolants for up to 6 years or 6000 hours of operation, provided that the cooling system is topped off using only John Deere COOL-GARD II Premix coolant. 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.

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

When Using John Deere COOL-GARD

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.

CoolScan and CoolScan PLUS

For a more thorough evaluation of your coolant, perform a CoolScan™ or CoolScan PLUS™ analysis, where available. See your John Deere dealer for information.

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

DX,COOL9 -19-03NOV08-1/1

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).

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.

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

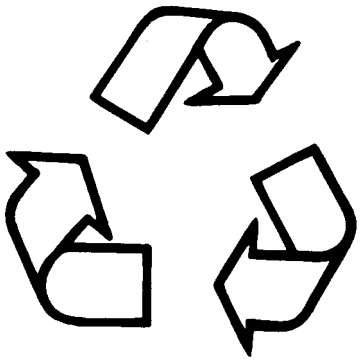
Disposing of Coolant

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.



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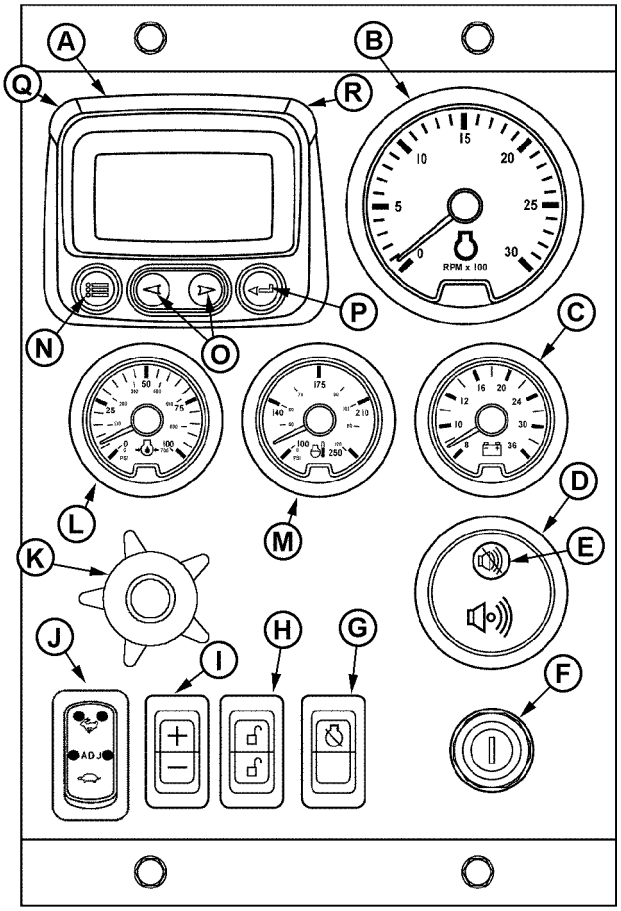
Recycle Waste

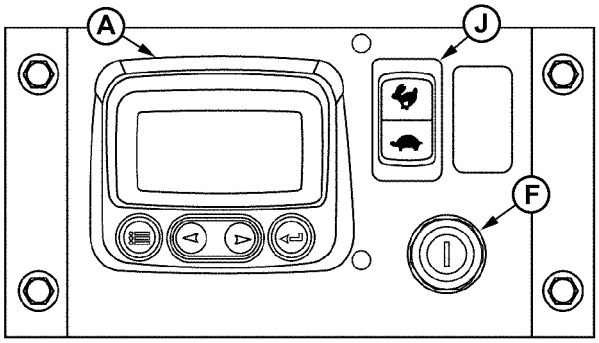
RG,RG34710,7543 -19-09JAN07-1/1

Instrument Panels



RG13276 —UN—28OCT03

Full-Featured Instrument Panel



RG13277 —UN—22OCT03

Basic Instrument Panel

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

John Deere PowerTech Plus™ 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.

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 Panel (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

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

C—Voltmeter (Optional)

Continued on next page

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 any of these abnormal conditions exist: low oil pressure, high coolant temperature, water-in-fuel, high fuel temperature, or high manifold temperatures. 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 controller (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 Speed 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

Continued on next page

When light comes on, an abnormal condition exists. It is not necessary to shutdown engine immediately, but problem should be corrected as soon as possible. Screen on diagnostic gauge will display the problem and the solution needed.

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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.

OMRGP15,0000120 -19-12SEP06-3/3

Using Diagnostic Gauge to Access Engine Information

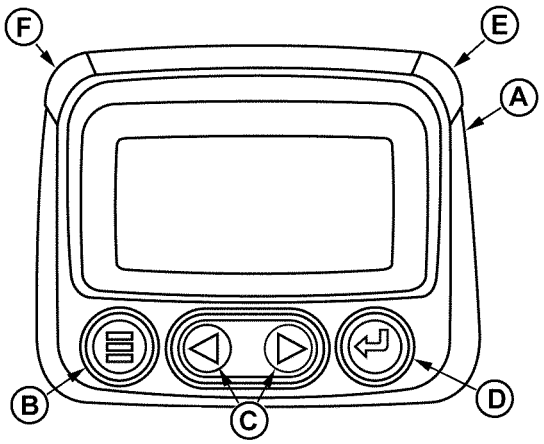
The diagnostic gauge (A) allows the operator to view many readouts of engine functions and trouble codes (DTCs). The gauge is linked to the electronic control system and its sensors. This allows the operator to monitor engine functions and to troubleshoot the engine systems when needed.

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:

- Engine hours
- Engine rpm
- System voltage
- Percent engine load at the current rpm
- Coolant temperature
- Oil pressure
- Throttle position
- Intake manifold temperature
- Exhaust gas temperature
- Turbocharger speed
- Boost Pressure
- Fuel temperature
- Current fuel consumption
- Active service (diagnostic) codes
- Stored service (diagnostic) codes from the engine
- Set the units for display
- View the engine configuration parameters

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



RG13132 —UN—09SEP03

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

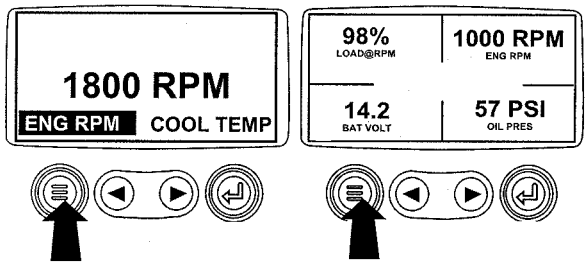
The diagnostic gauge includes a graphical backlit Liquid Crystal Display (LCD) screen. The display can show either a single parameter or a quadrant display showing four parameters simultaneously. The diagnostic gauge uses two arrow keys (C) for scrolling through the engine parameter list and viewing 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.

OURGP11,0000051 -19-12SEP06-1/1

Main Menu Navigation

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

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



RG13159 —UN—26SEP03

Menu Key

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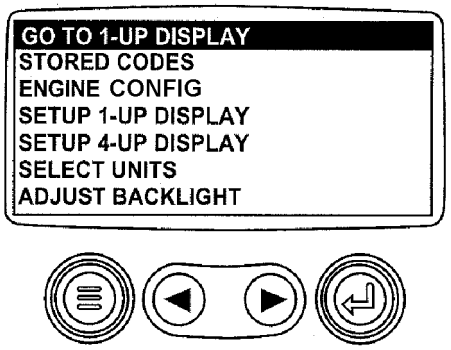
OURGP11,00000A9 -19-11OCT06-1/5

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

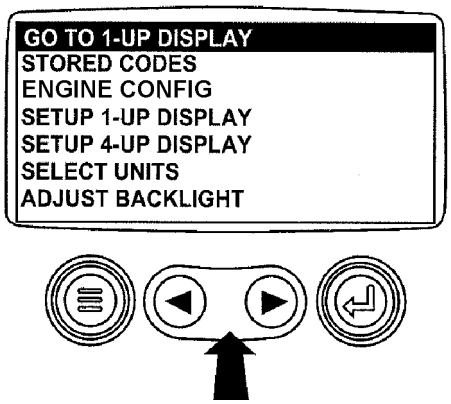


RG13160 —UN—02OCT03

Menu Display

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

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

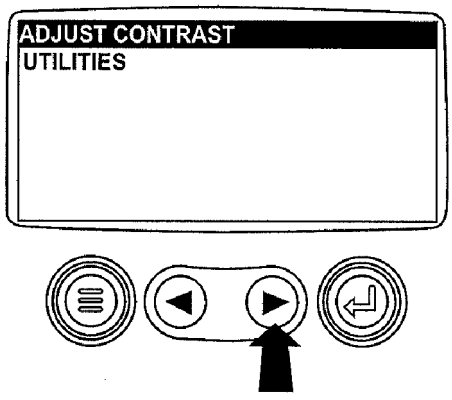


RG13161 —UN—02OCT03

Main Menu Items

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

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



RG13162 —UN—26SEP03

Last Items On Main Menu

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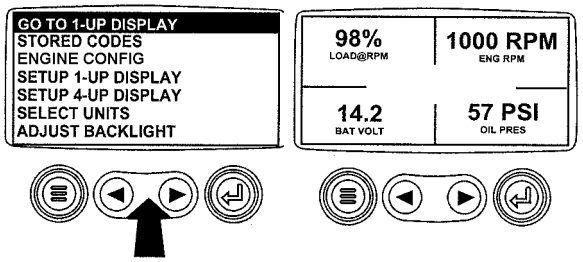
OURGP11,00000A9 -19-11OCT06-4/5

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



Use Arrow Buttons To Scroll / Quadrant Display

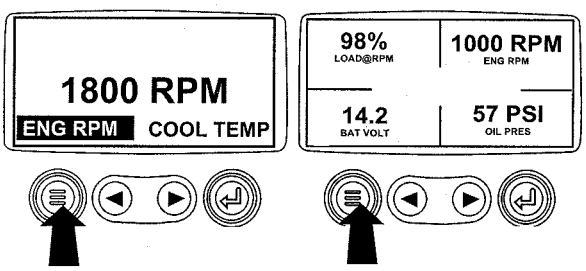
OURGP11,00000A9 -19-11OCT06-5/5

Engine Configuration Data

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

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

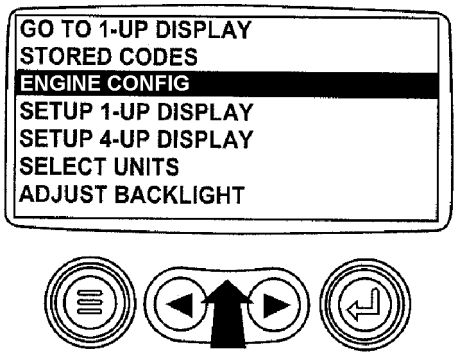
1. Turn the key switch to the ON position. Starting at the single or four engine parameter display, press the "Menu" key.



Menu Key

OURGP11,00000AB -19-12SEP06-1/6

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



Select Engine Configuration

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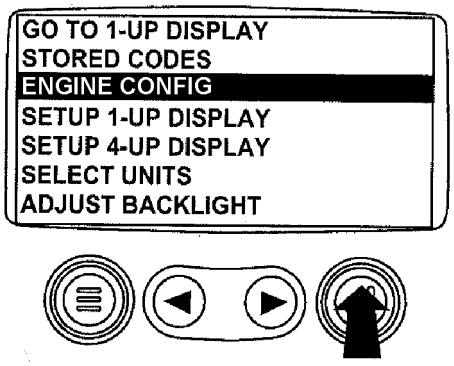
OURGP11,00000AB -19-12SEP06-2/6

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

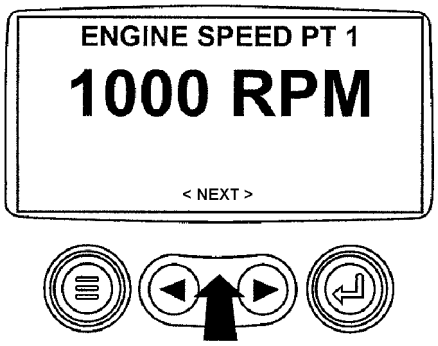


RG13165 —UN—02OCT03

Enter Key

OURGP11,00000AB -19-12SEP06-3/6

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

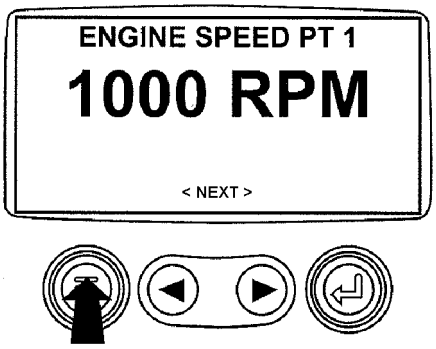


RG13166 —UN—29SEP03

Use Arrow Keys To Scroll

OURGP11,00000AB -19-12SEP06-4/6

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



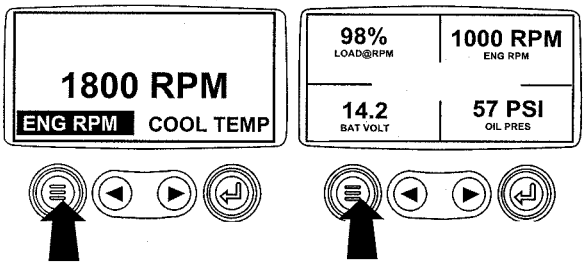
RG13167 —UN—29SEP03

Return To Main Menu

Continued on next page

OURGP11,00000AB -19-12SEP06-5/6

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



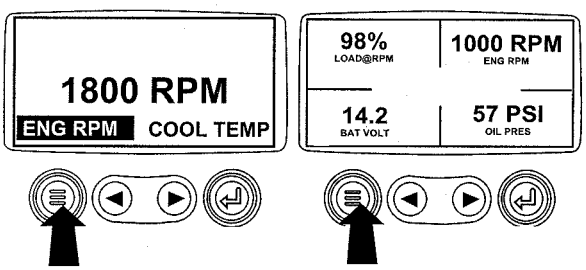
Exit Main Menu

OURGP11,00000AB -19-12SEP06-6/6

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.

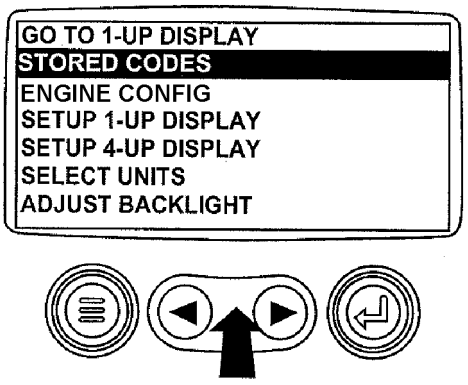


Menu Key

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

OURGP11,00000AC -19-12SEP06-1/6

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

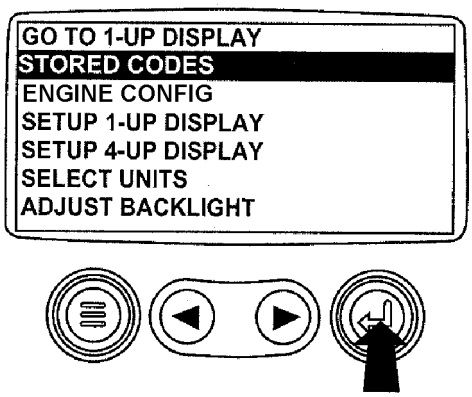


Select Stored Codes

Continued on next page

OURGP11,00000AC -19-12SEP06-2/6

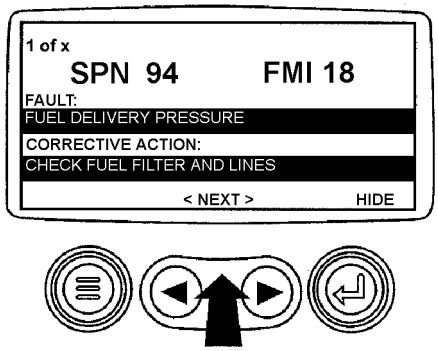
3. Once the "Stored Codes" menu item has been highlighted press the "Enter" key to view the stored codes.



Enter Key

OURGP11,00000AC -19-12SEP06-3/6

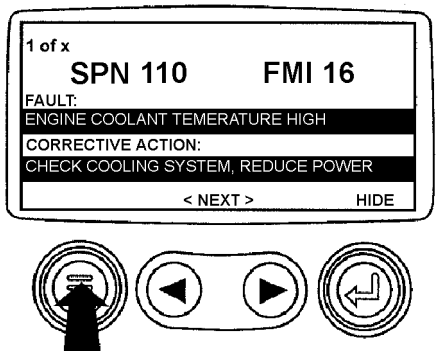
4. If the word "Next" appears above the "Arrow" keys, there are more stored codes that may be viewed. Use the "Arrow" key to scroll to the next stored code.



Use Arrow Keys To Scroll

OURGP11,00000AC -19-12SEP06-4/6

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

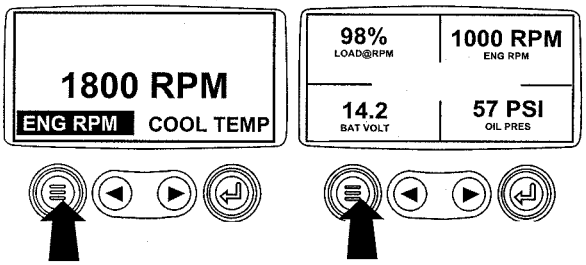


Return To Main Menu

Continued on next page

OURGP11,00000AC -19-12SEP06-5/6

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



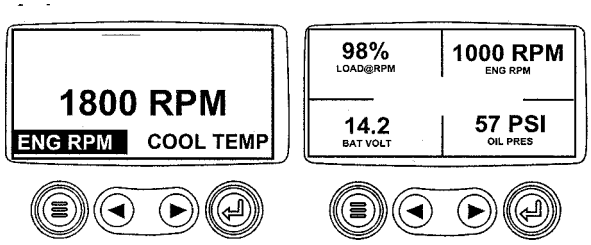
Exit Main Menu

OURGP11,00000AC -19-12SEP06-6/6

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.



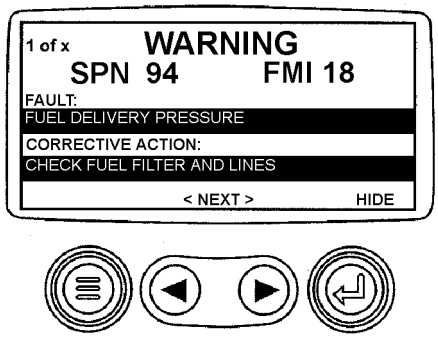
Normal Operation

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

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

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.

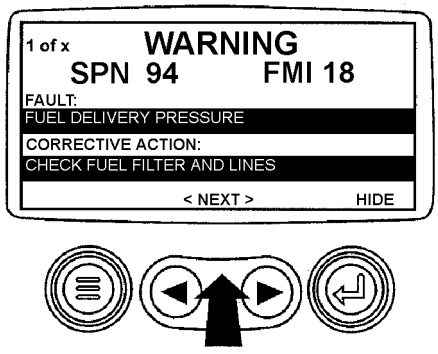
IMPORTANT: Ignoring active trouble codes can result in severe engine damage.



Active Trouble Codes Displayed

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

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



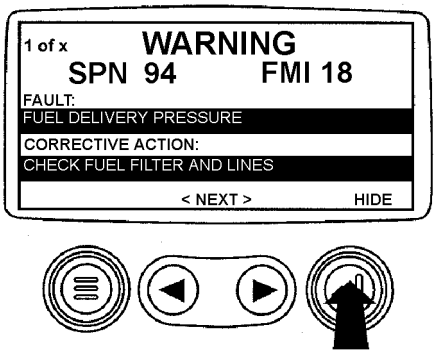
Use Arrow Keys To Scroll

Continued on next page

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

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

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

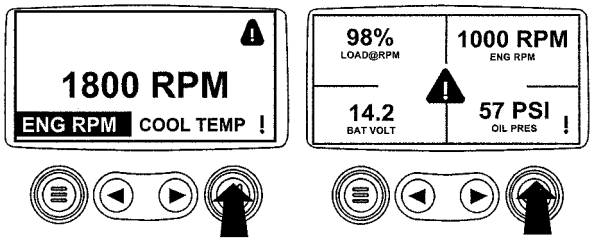


RG13242 —UN—30SEP03

Hide Trouble Codes

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

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



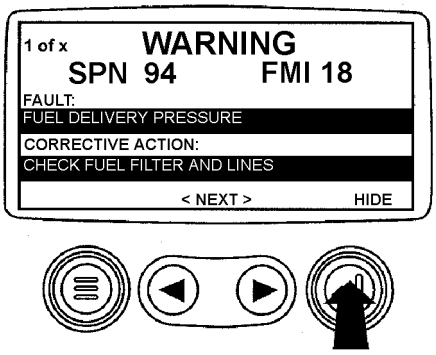
RG13176 —UN—26SEP03

Active Trouble Code Icon

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

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

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

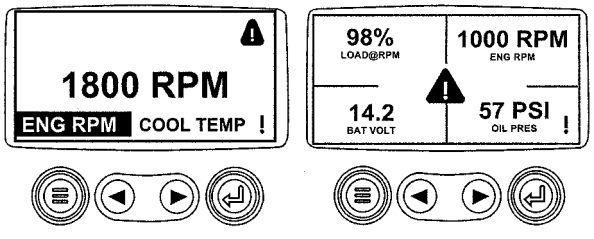


RG13242 —UN—30SEP03

Enter Key

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

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



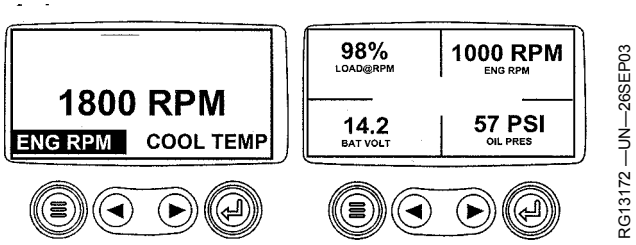
RG13243 —UN—01OCT03

Active Trouble Code Condition

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

Engine Shutdown Codes

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

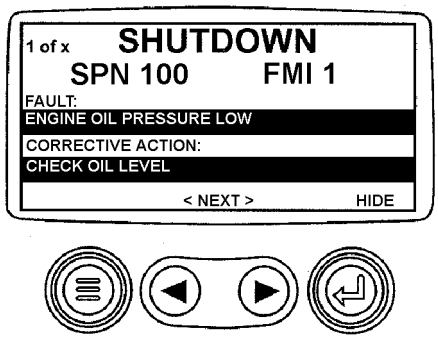


Normal Operation

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

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

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

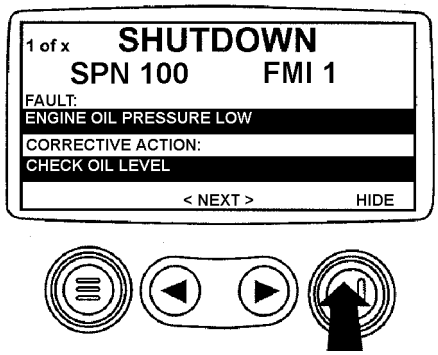


Shutdown Message

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

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

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

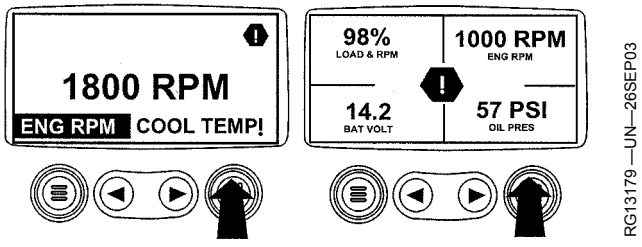


Hide Trouble Code

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

4. 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.

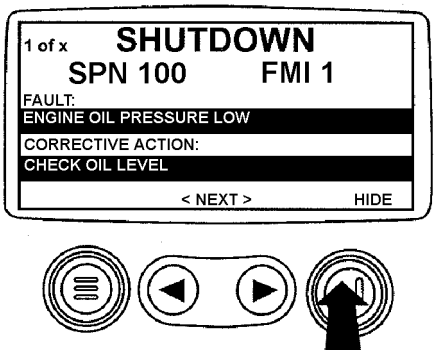


Flashing Shutdown Icon

Continued on next page

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

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



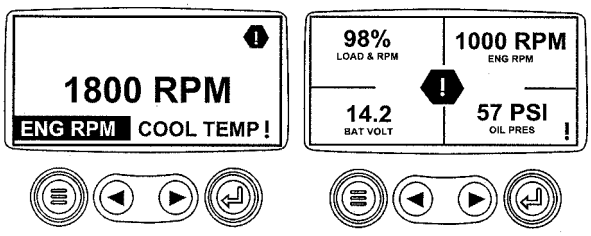
RG13239 —UN—29SEP03

Redisplay Trouble Code

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

6. 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.



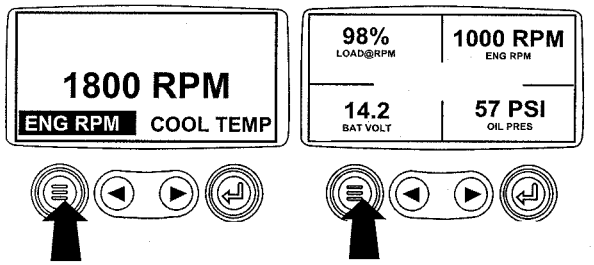
RG13180 —UN—26SEP03

Shutdown Icon

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

Adjusting Backlighting

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

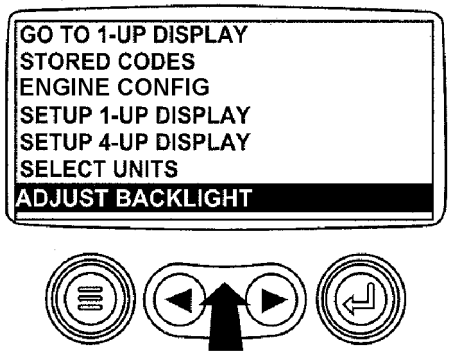


RG13159 —UN—26SEP03

Menu Key

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

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



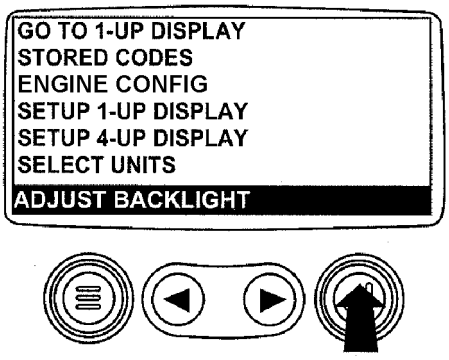
RG13181 —UN—02OCT03

Select Adjust Backlight

Continued on next page

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

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

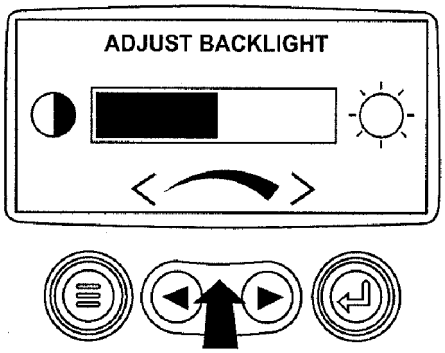


RG13182 —UN—02OCT03

Press Enter Key

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

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

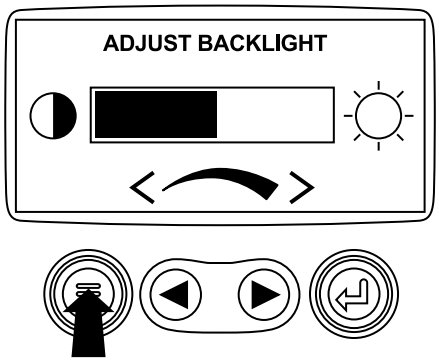


RG13183 —UN—29SEP03

Adjust Backlight Intensity

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

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



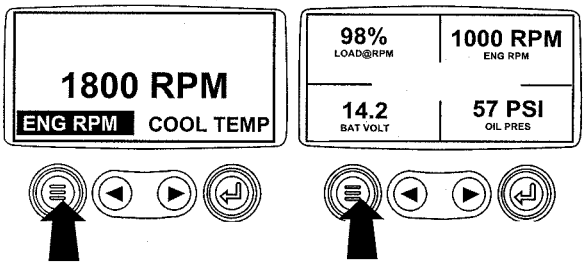
RG19048 —UN—23AUG10

Return to Main Menu

Continued on next page

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

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

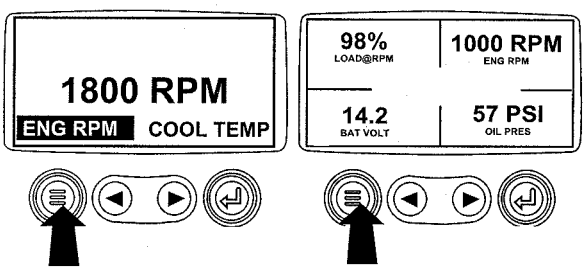


Exit Main Menu

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

Adjusting Contrast

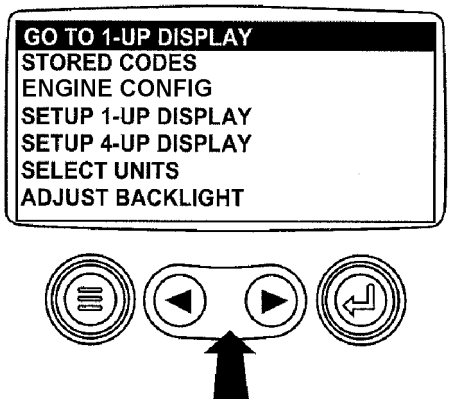
1. Turn the key switch to the ON position. Starting at the single or four engine parameter display press the "Menu" key.



Menu Key

OURGP11,00000AF -19-12SEP06-1/6

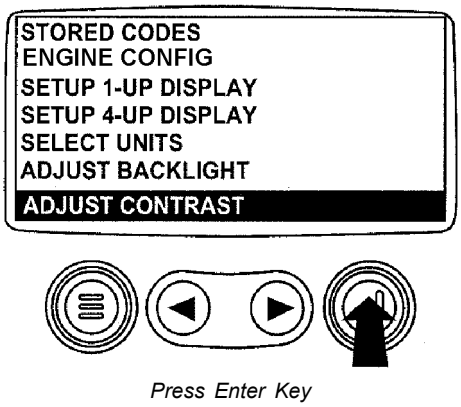
2. The main menu will be displayed. Use the "Arrow" keys to scroll through the menu until "Adjust Contrast" is highlighted.



Select Adjust Contrast

OURGP11,00000AF -19-12SEP06-2/6

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

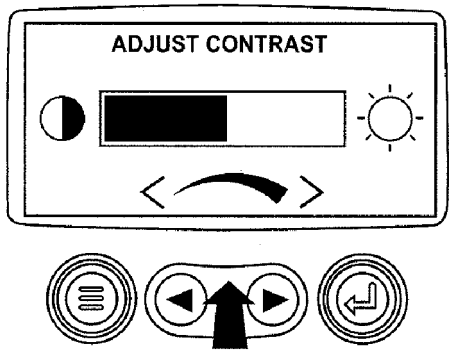


Press Enter Key

Continued on next page

OURGP11,00000AF -19-12SEP06-3/6

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

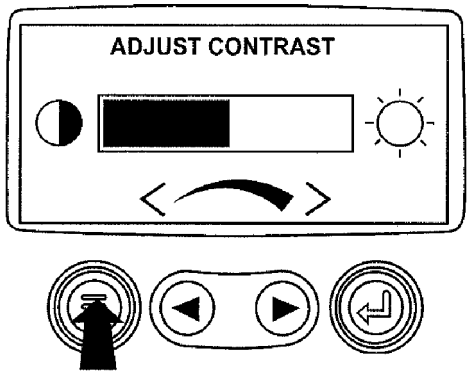


RG13186 —UN—29SEP03

Adjust Contrast Intensity

OURGP11,00000AF -19-12SEP06-4/6

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

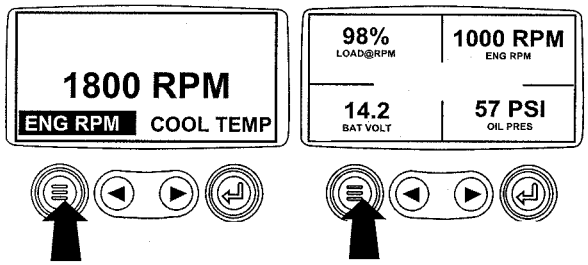


RG13187 —UN—26SEP03

Return To Main Menu

OURGP11,00000AF -19-12SEP06-5/6

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



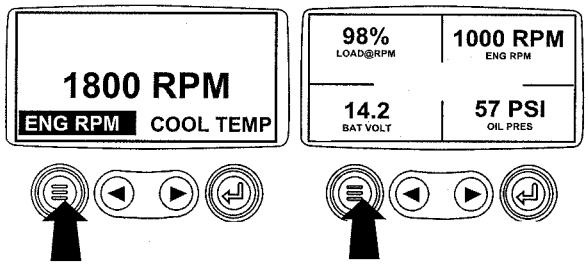
RG13159 —UN—26SEP03

Exit Main Menu

OURGP11,00000AF -19-12SEP06-6/6

Selecting Units Of Measurement

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



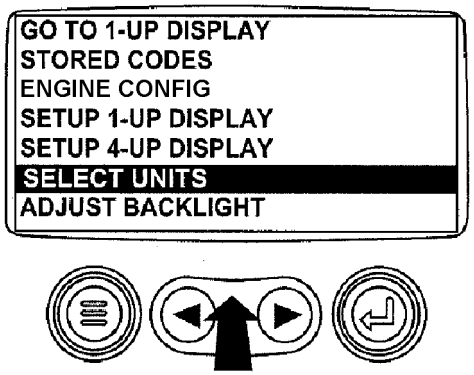
RG13159 —UN—26SEP03

Menu Key

Continued on next page

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

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

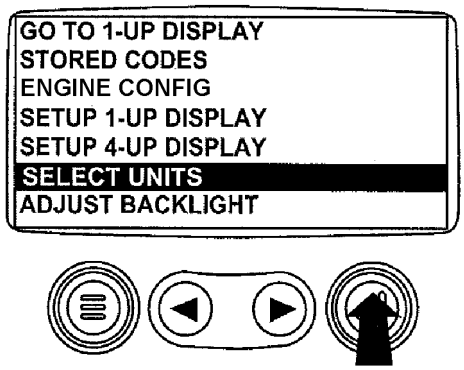


RG13188 —UN—02OCT03

Select Units

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

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



RG13189 —UN—02OCT03

Press Enter Key

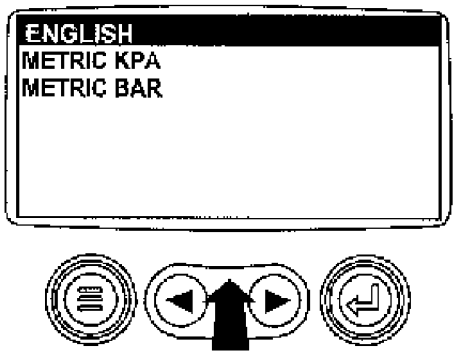
OURGP11,00000B0 -19-11OCT06-3/7

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.



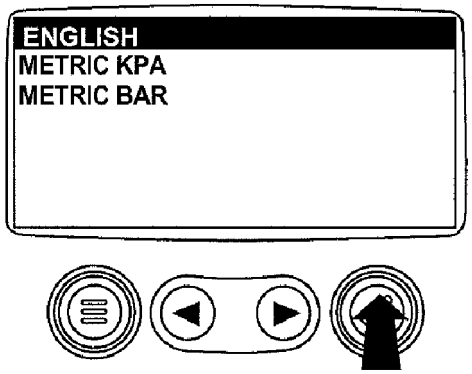
RG13190 —UN—26SEP03

Select Desired Units

Continued on next page

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

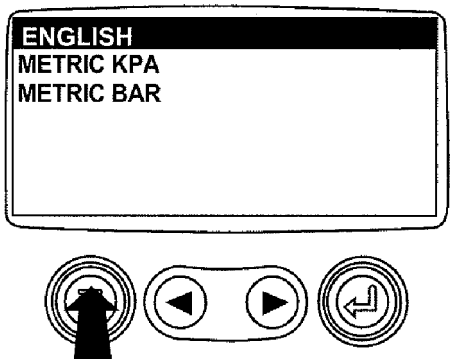
5. Press the "Enter" key to select the highlighted units.



Press Enter Key to Select

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

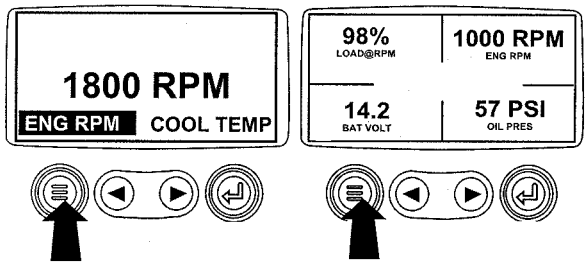
6. Press the "Menu" key to return to the main menu.



Return To Main Menu

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

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

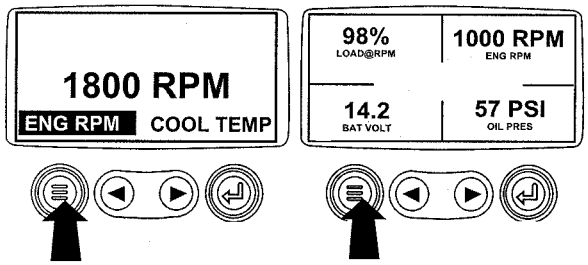


Press Menu Key

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

Setup 1-Up Display

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

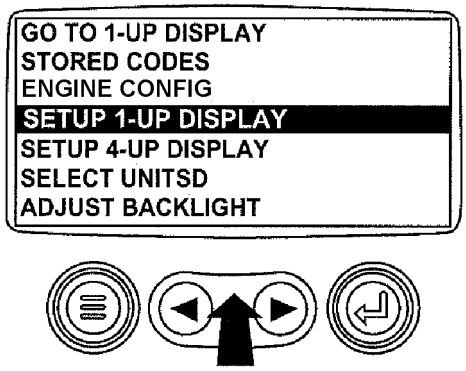


Menu Key

Continued on next page

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

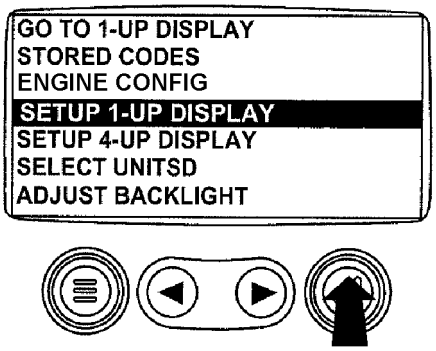
2. Use the "Arrow" keys to scroll through the menu until "Setup 1-Up Display" is highlighted.



Setup 1-Up Display

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

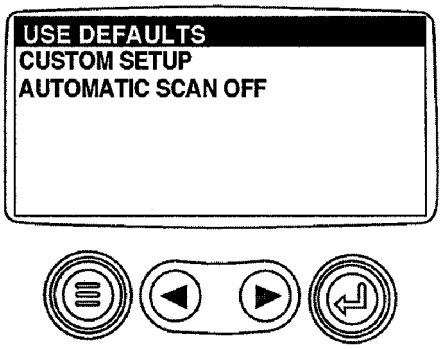
3. Once "Setup 1-Up Display" menu item has been highlighted press the "Enter" key to access the "Setup 1-Up Display" function.



Press Enter Key

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

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.

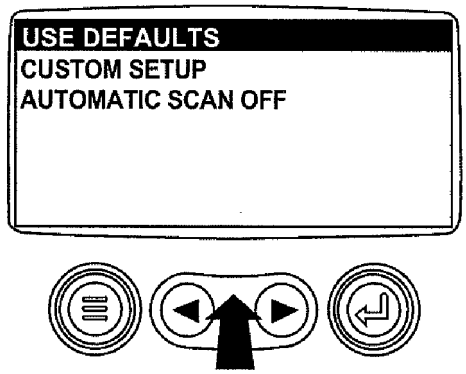


1-Up Display Options

Continued on next page

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

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

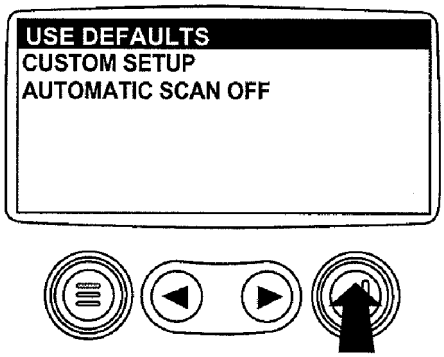


RG13195 —UN—26SEP03

Select Defaults

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

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

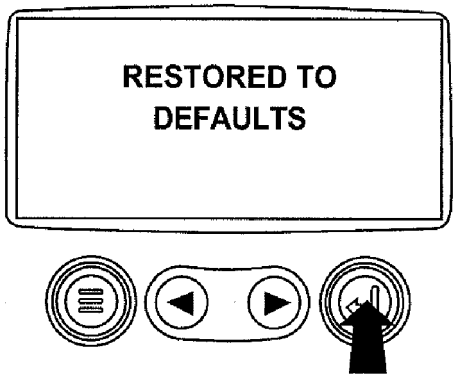


RG13197 —UN—29SEP03

Defaults Selected

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

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



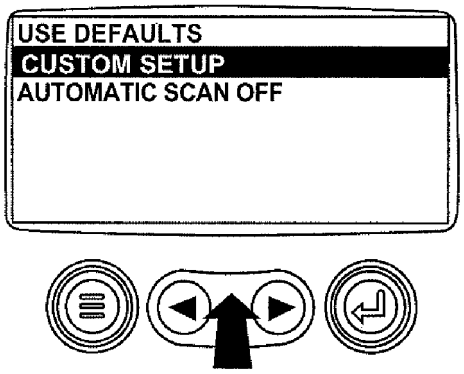
RG13149 —UN—24SEP03

Restored To Defaults

Continued on next page

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

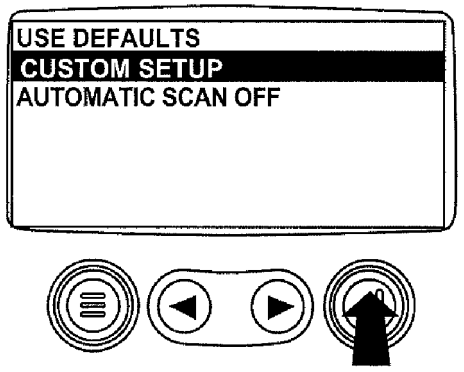
8. **Custom Setup** - To perform a custom setup of the 1-Up Display, use the arrow buttons to scroll to and highlight "Custom Setup" on the display.



Select Custom Setup

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

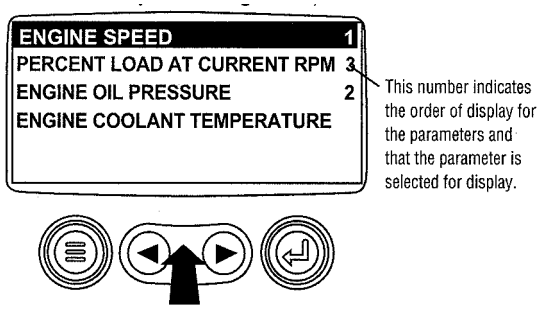
9. Press the "Enter" key to display a list of engine parameters.



Engine Parameters

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

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

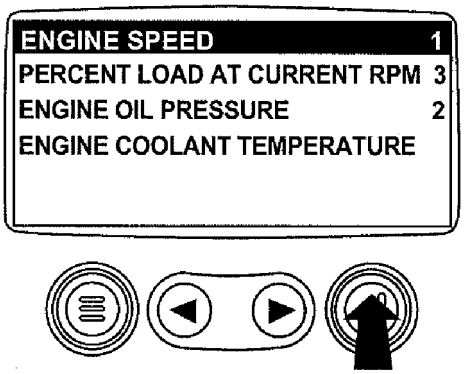


Select Parameters

Continued on next page

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

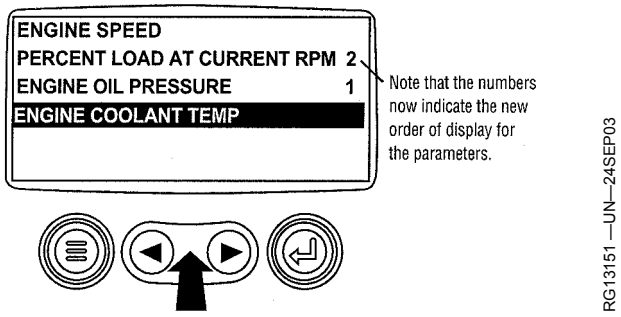
11. Press the "Enter" key to deselect the selected parameter, removing it from the list of parameters being displayed on the 1-Up Display.



Deselect Parameters

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

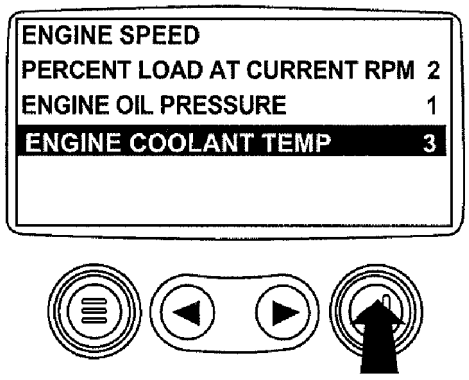
12. Use the "Arrow" keys to scroll and highlight the desired parameter that has not been selected for display (parameter without a number to right of it).



Select Desired Parameters

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

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.

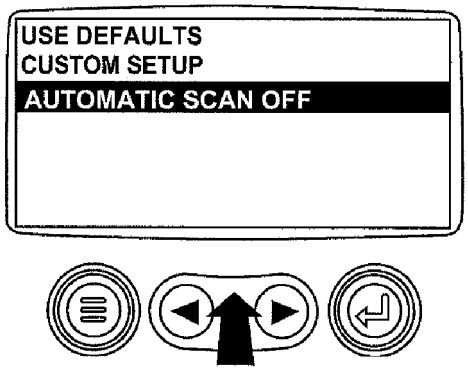


Select Parameters For Display

Continued on next page

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

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.

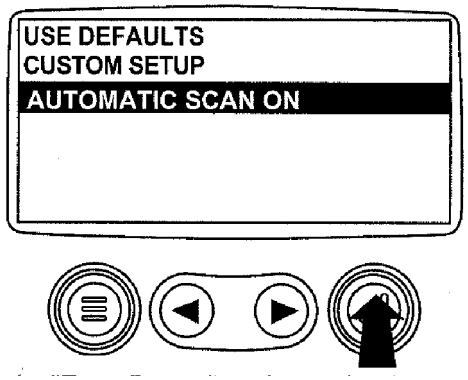


RG13221 —UN—26SEP03

Automatic Scan Off

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

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

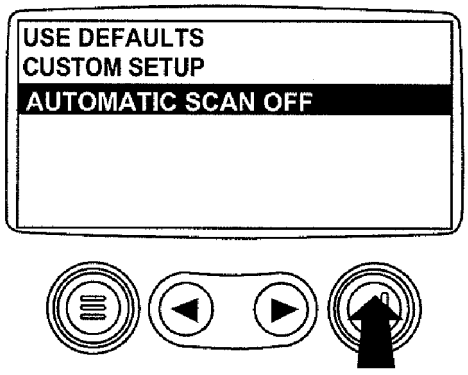


RG13222 —UN—26SEP03

Automatic Scan On

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

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



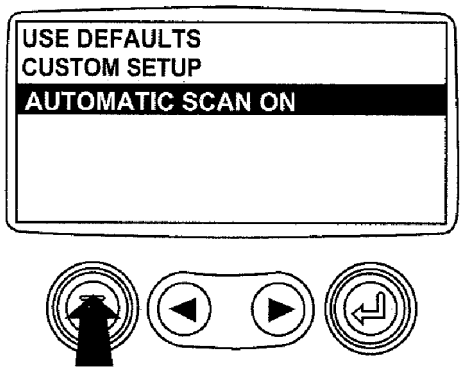
RG13223 —UN—26SEP03

Automatic Scan Off

Continued on next page

OURGP11,00000B1 -19-11OCT06-16/18

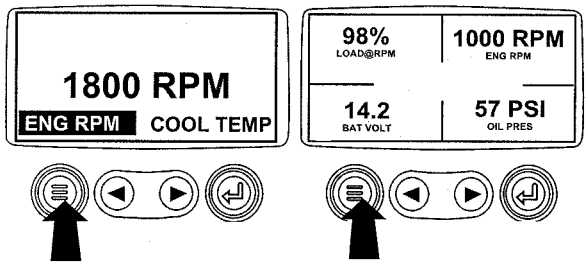
18. Once the "Use Defaults", "Custom Setup" and "Automatic Scan" functions have been set, press the "Menu" key to return to the main menu.



Menu Key

OURGP11,00000B1 -19-11OCT06-17/18

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

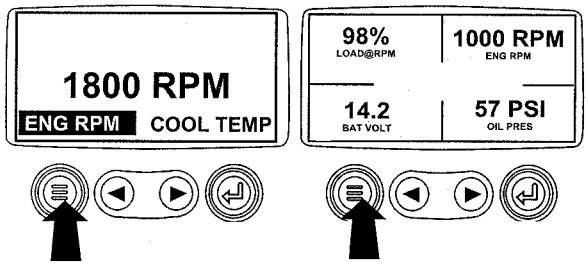


Exit Main Menu

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

Setup 4-Up Display

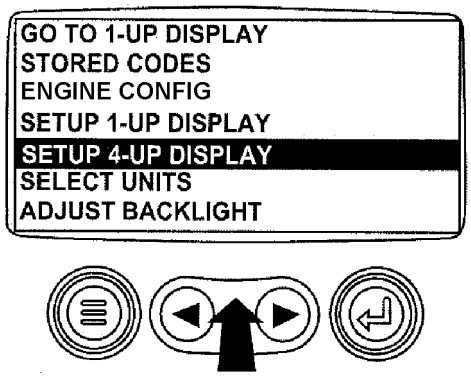
1. Turn the key switch to the ON position. From the single or four engine parameter display, press the "Menu" key.



Menu Key

OURGP11,00000B2 -19-12SEP06-1/14

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

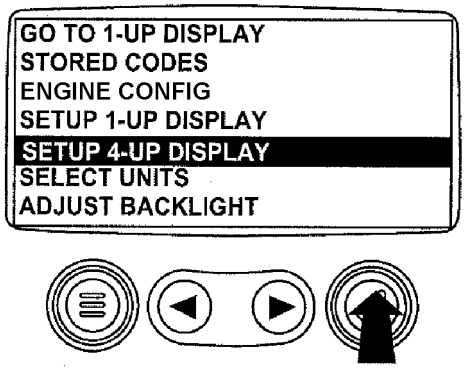


Select Setup 4-Up Display

Continued on next page

OURGP11,00000B2 -19-12SEP06-2/14

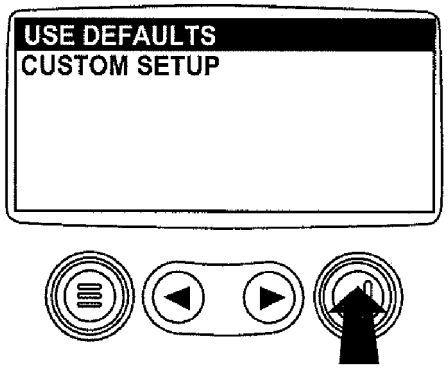
3. Once the "Setup 4-Up Display" menu item has been highlighted, press the "Enter" key to activate the "Setup 4-Up Display" menu.



Press Enter Key

OURGP11,00000B2 -19-12SEP06-3/14

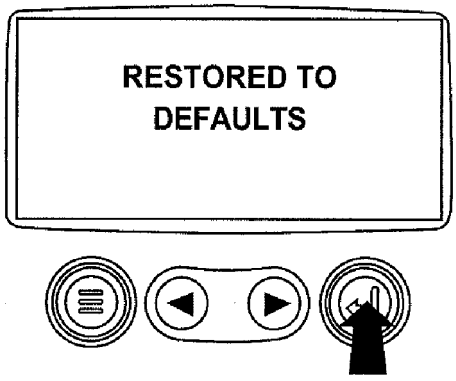
4. Two options are available for the 4-Up Display.
   a. **Use Defaults** – This option contains the following engine parameters for display: Engine Speed, Battery Voltage, Coolant Temperature and Oil Pressure.
   b. **Custom Setup** – This option contains a list of engine parameters. Engine parameters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



Select Factory Defaults

OURGP11,00000B2 -19-12SEP06-4/14

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.

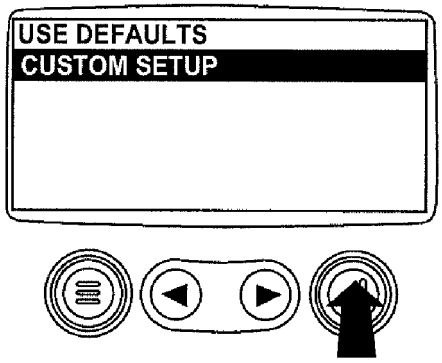


Restored To Defaults

Continued on next page

OURGP11,00000B2 -19-12SEP06-5/14

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.

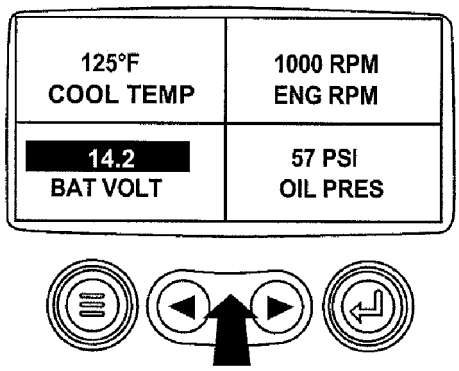


RG13227 —UN—26SEP03

Custom Setup

OURGP11,00000B2 -19-12SEP06-6/14

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.

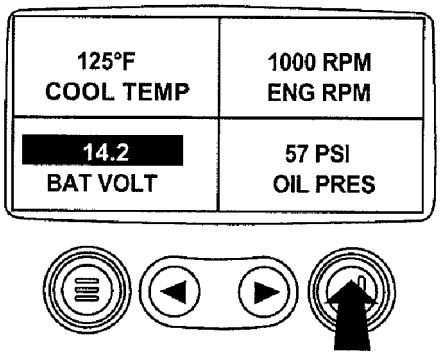


RG13228 —UN—26SEP03

Select Parameters

OURGP11,00000B2 -19-12SEP06-7/14

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



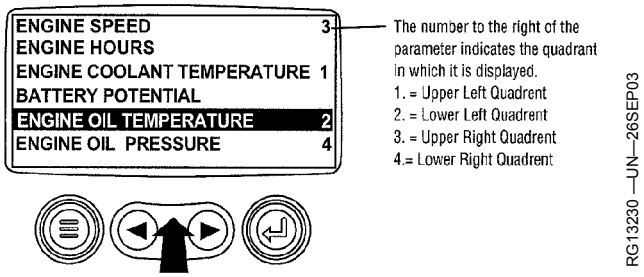
RG13229 —UN—26SEP03

List Of Engine Parameters

Continued on next page

OURGP11,00000B2 -19-12SEP06-8/14

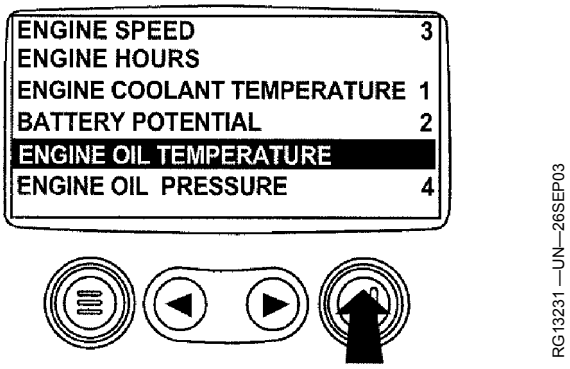
9. The parameter that is highlighted is the selected parameter for the screen. Use the "arrow" keys to highlight the new parameter to be placed in the "4-Up Display".



Select Desired Engine Parameter

OURGP11,00000B2 -19-12SEP06-9/14

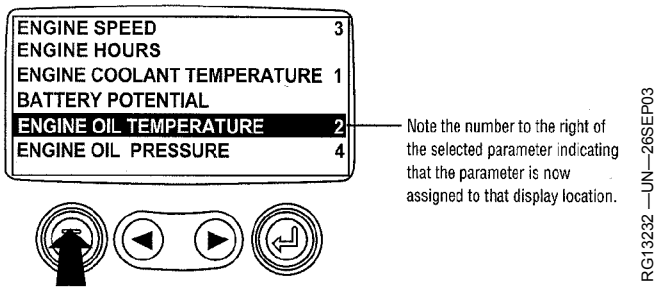
10. Press the "Enter" key to change the selected parameter in the quadrant to the new parameter.



Enter Selected Parameter

OURGP11,00000B2 -19-12SEP06-10/14

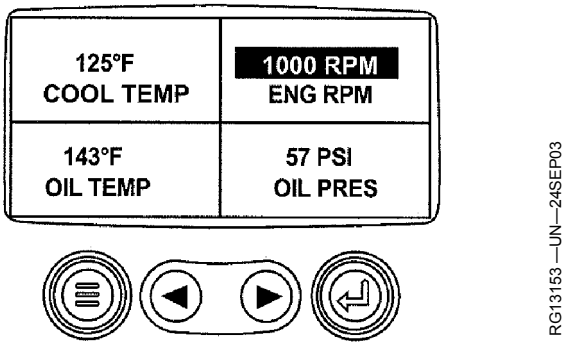
11. Use the "Menu" keys to return to the "4-Up Custom Setup" screen.



Return To 4-Up Custom Setup

OURGP11,00000B2 -19-12SEP06-11/14

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

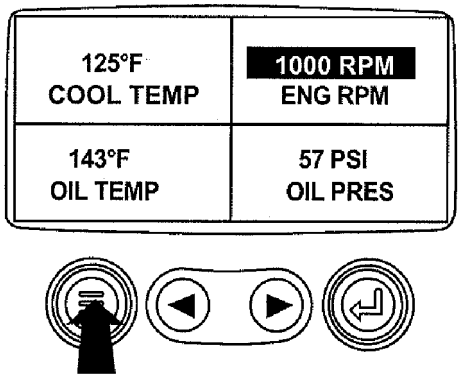


4-Up Display

Continued on next page

OURGP11,00000B2 -19-12SEP06-12/14

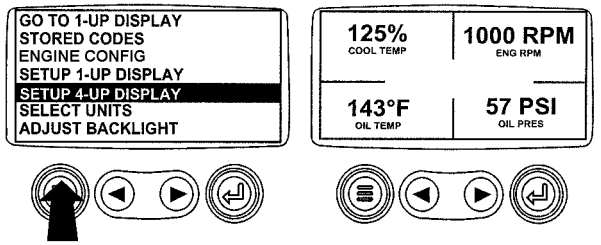
13. Repeat the parameter selection process until all spaces are as desired.
14. Press the "Menu" key to return to the main menu.



Return To Main Menu

OURGP11,00000B2 -19-12SEP06-13/14

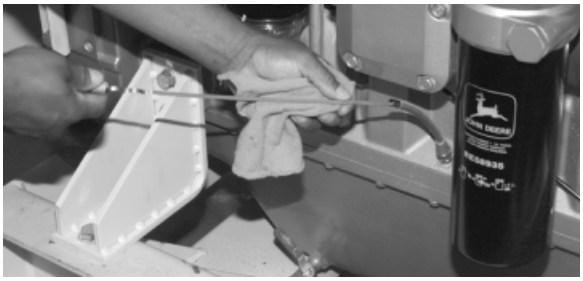
15. Press the "Menu" key to exit the main menu and return to the engine parameter display.



Select Remaining Parameters

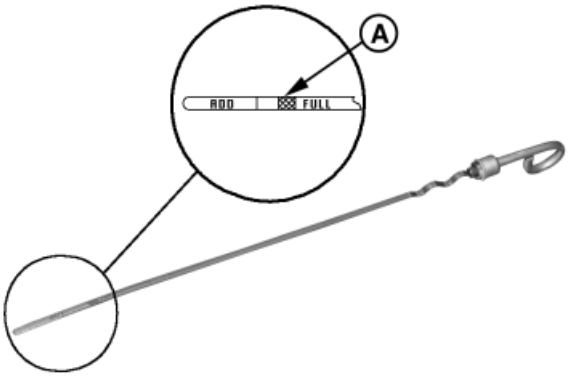
OURGP11,00000B2 -19-12SEP06-14/14

Engine Break-In Service



RG9924 —UN—17NOV99

Check Engine Oil



RG8707A —UN—03SEP99

Crosshatch Pattern on Dipstick

A—Crosshatch Pattern

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.

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

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

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

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

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.

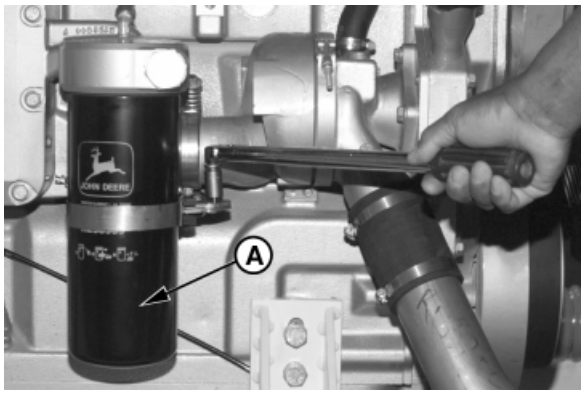
Continued on next page

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. At low idle, engine should have an oil pressure of at least 138 kPa (1.38 bar) (20 psi).
5. Before the first 100 hours (maximum), change engine oil and replace engine oil filter (A). (See CHANGING ENGINE OIL AND REPLACING FILTER in Lubrication and Maintenance/500 Hour/12 Month Section.) Fill crankcase with the normal seasonal viscosity grade oil. (See DIESEL ENGINE OIL, in Fuels, Lubricants, and Coolant Section.)

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

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

If air temperature is below -25°C (-13°F), use an engine block heater.



RG8709A —UN—03SEP99

Replace Engine Oil Filter

A—Oil Filter

OURGP11,0000070 -19-19SEP06-2/3

6. Watch coolant temperature gauge (A) closely. If coolant temperature rises above 100°C (212°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 112°C (234°F), the engine will shutdown automatically, if equipped with safety controls.

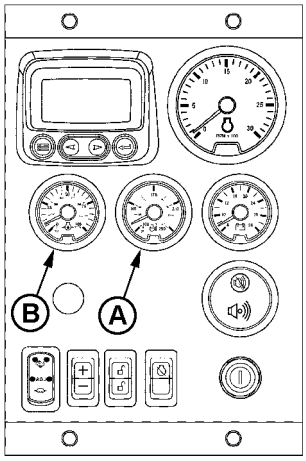
7. Watch oil pressure gauge (B) for pressure within specification.

Specification

Engine Oil Pressure[1]—Full Load Rated Speed.....310±103 kPa (3.10±1.03 bar) (45±15 psi)
Engine Oil Pressure—Low Idle..... 138 kPa (1.38 bar) (20 psi) (minimum)
Engine Coolant Temperature Range—Temperature..... 82°—92°C (180°—197°F)

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

[1] At normal operating sump temperature of 115°C (240°F) and at speeds of 1500—2100 rpm).



RG13720 —UN—11NOV04

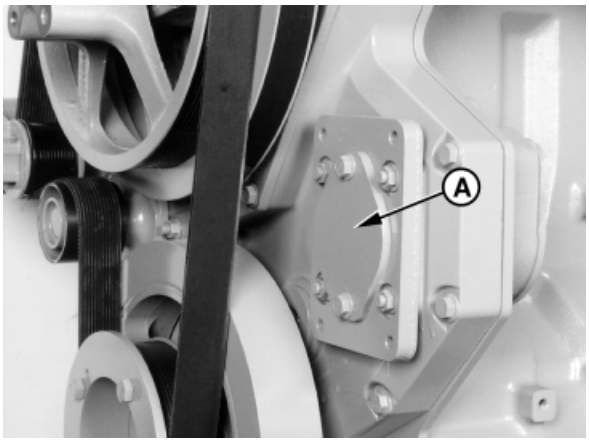
Watch Coolant Temperature and Oil Pressure on Panel

A—Engine Coolant Temperature Gauge

B—Oil Pressure Gauge

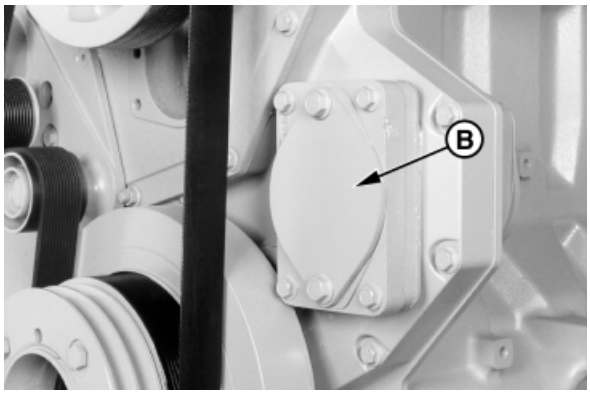
OURGP11,0000070 -19-19SEP06-3/3

Auxiliary Gear Drive Limitations



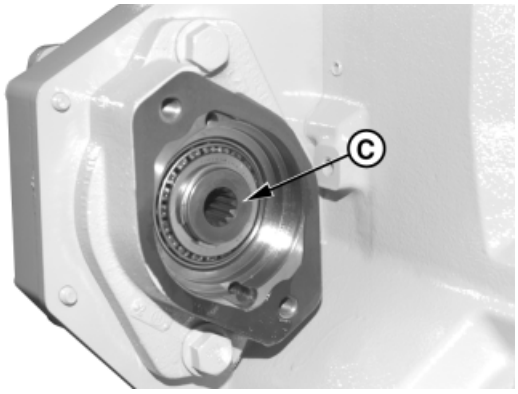
RG8715 —UN—03SEP99

SAE Drive "A"



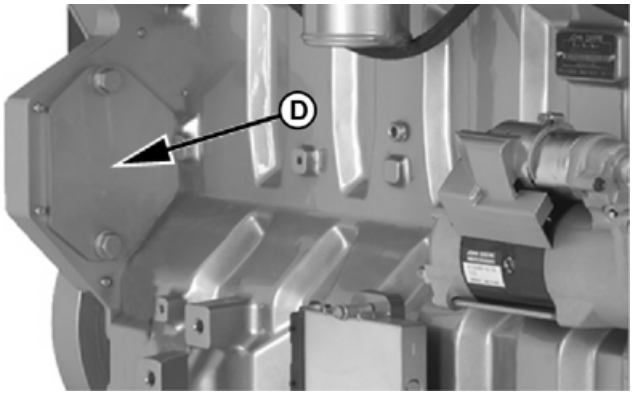
RG8750 —UN—03SEP99

SAE Drive "B" Front



RG10429A —UN—30NOV99

SAE Drive "B" Rear



RG13888 —UN—19MAY05

SAE Drive "C"

A—SAE "A" **B—SAE "B" Front** **C—SAE "B" Rear** **D—SAE "C"**

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

SAE Drive	Continuous Power (Maximum)	Intermittent Power (Maximum)
A	26 kW (35 hp)	30 kW (40 hp)
B or (A + B) or (B + B)	52 kW (70 hp)	60 kW (80 hp)
C	52 kW (70 hp)	60 kW (80 hp)

OURGP12,0000122 -19-12SEP06-1/1

Generator Set (Standby) Applications

To ensure 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 for an extended period of time with no load.

RG,RG34710,7549 -19-12SEP06-1/1

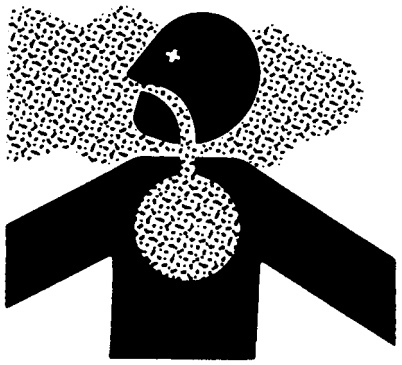
Starting the Engine

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 in this group.)

1. Perform all prestarting checks outlined in Lubrication and Maintenance/Daily section later in this manual.



TS220 —UN—23AUG88

Use Proper Ventilation

2. Open the fuel supply shut-off valve, if equipped.
3. Disengage power to any engine drivelines.

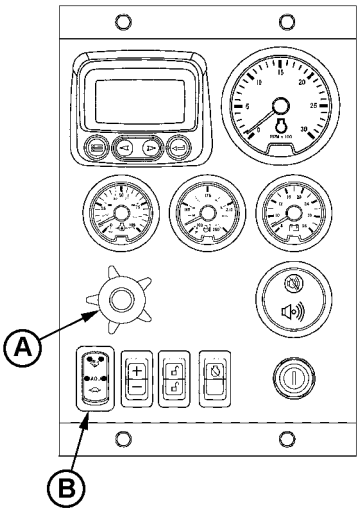
OMRGP15,0000122 -19-12SEP06-1/3

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.



RG13722 —UN—11NOV04

A—Analog Throttle Control (Optional)

B—Speed Select Rocker Switch

Analog Throttle Control and Speed Select Switch

Continued on next page

OMRGP15,0000122 -19-12SEP06-2/3

5. **All Engines** - Turn the key switch to the ON position. The "Wait To Start Preheating" message will be displayed when ambient temperatures require preheating (for engines with preheating options). The timer will display minutes and seconds, counting down to zero. Once the timer has reach 0:00 and the "Wait to Start" message is no longer displayed, you may start the engine.

   Turn the key start switch (A) clockwise to crank the engine. When the engine starts, release the key switch so that it returns to the “ON” position.

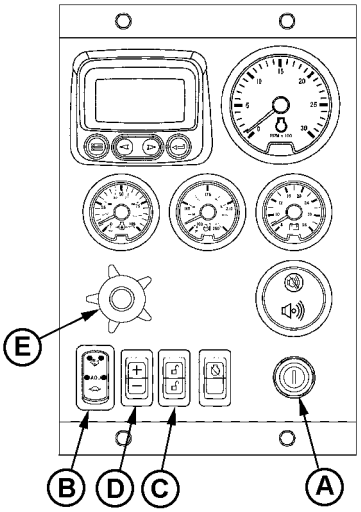
IMPORTANT: If the key switch is released before the engine starts, wait until the starter and the engine stop turning before trying again. This will prevent possible damage to the starter and/or flywheel.

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

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

   Panels with optional analog throttle (E): Set either high-low speed select switch (B) or analog throttle (E) to slow speed, and set desired speed with remaining control.

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



RG13723 —UN—11NOV04

Start And Idle On Panel

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

7. Check all gauges for normal engine operation. If operation is not normal, stop the engine and determine the cause. (For normal gauge pressures and temperatures, see BREAK-IN SERVICE earlier in this section.)

OMRGP15,0000122 -19-12SEP06-3/3

Restarting Engine Which Has Run Out Of Fuel

Fill the fuel tank and then bleed the fuel system before restarting engine (refer to Service as Required section, BLEEDING FUEL SYSTEM).

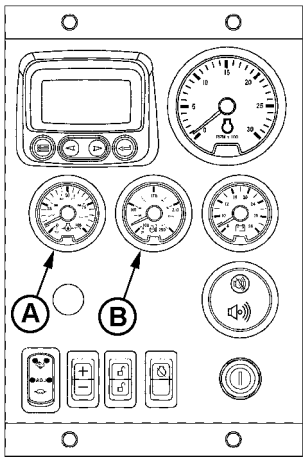
OURGP11,000004E -19-12SEP06-1/1

Warming Engine

IMPORTANT: To ensure 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 ECU is programmed to lock engine 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 to minimum oil pressure of 138 kPa (1.38 bar) (20 psi) within 5 seconds, stop the engine and determine the cause. Normal engine oil pressure is 310 ± 103 kPa (3.10 ± 1.03 bar) (45 ± 15 psi) at rated full-load speed (1500—2100 rpm) with oil at normal operating temperature of 115°C (240°F).
2. Watch coolant temperature gauge (B). Do not place engine under full load until it is properly warmed up. The normal engine coolant temperature range is 82°—92°C (180°—197°F).



RG13724 —UN—11NOV04

Oil Pressure and Coolant Temperature Gauges On Panel

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

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.

OMRGP15,0000124 -19-12SEP06-1/1

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°—92°C (180°—197°F). If coolant temperature rises above 100°C (212°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 138 kPa (20 psi) and should rise to 310 kPa (45 psi) at rated speed.

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.

OURGP11,000004F -19-19SEP06-1/1

Cold Weather Operation

CAUTION: Ether injector starting fluid is highly flammable. DO NOT use starting fluid on engines equipped with air intake heaters.

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

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

Engines may be equipped with coolant heaters or ether injectors as cold weather starting aids.

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

Using correct grade 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.

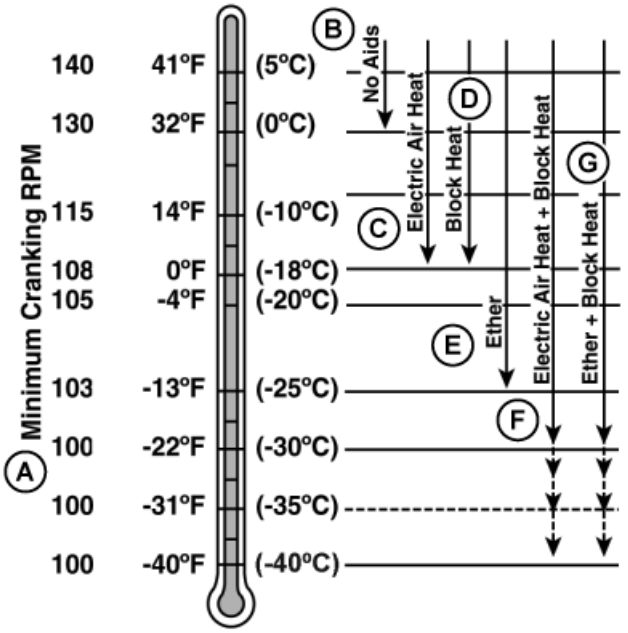
Other cold weather starting aids are required at temperatures below -25°C (-13°F) or at altitudes above 1500 m (5000 ft).

1. Follow steps 1—4 as listed under STARTING THE ENGINE, earlier in this section, then proceed as follows according to the instrument (gauge) panel on your engine.
2. Use cold weather starting aids as needed. Follow supplier instructions for starting aid provided on your engine. A booster battery can be connected if needed (see USING A BOOSTER BATTERY OR CHARGER, later in this section).
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.

TS1356 —UN—18MAR92

Handle Starting Fluid with Care



RG19813 —UN—15DEC10

Cold Weather Starting Guidelines

A—Minimum Cranking RPM
B—No Aids
C—Electric Air Heat
D—Block Heat
E—Ether
F—Electric Air Heat and Block Heat
G—Ether and Block Heat

OURGP11,0000051 -19-16DEC10-1/1

Changing Engine Speed

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

Changing from slow to fast speed using Standard High-Low Speed Select Rocker Switch (A) (If Equipped):

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

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

1. *Select fast (rabbit) or slow (turtle) position on High-Low 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 (-).*

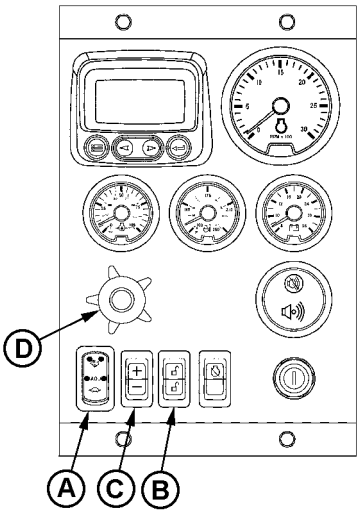
NOTE: Once the speed has been set, the Bump Speed Enable Switch (B) must be pressed and released three times within two seconds to commit the new slow or fast speed to memory. If not done, the engine's new slow or fast speed will only be effective until the key switch is shut off. Then the speed will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

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

Instrument 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:



RG13725 —UN—11NOV04

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. *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.

Continued on next page

OMRGP15,0000126 -19-12SEP06-1/3

Changing engine speed using optional analog throttle control (D)

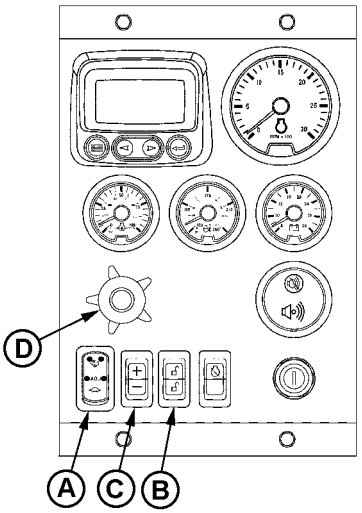
NOTE: Pushing in on analog throttle will immediately take engine to slow idle speed.

1. Set High-Low Speed Select Rocker Switch (A) to low speed position.

2. Turn analog throttle 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.

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



RG13725 —UN—11NOV04

Changing Engine Speed with Full-Featured Panel

OMRGP15,0000126 -19-12SEP06-2/3

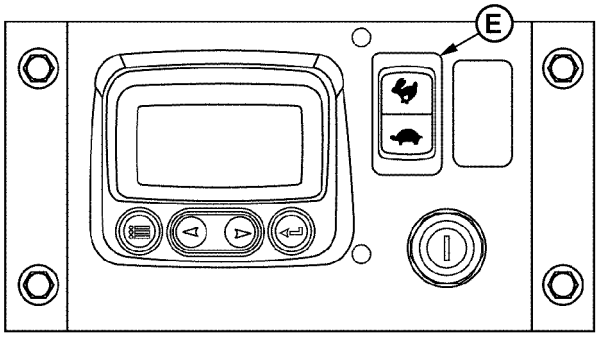
Changing engine speeds on engines equipped with the Basic Instrument Panel

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.



RG13289 —UN—30OCT03

Changing Engine Speed With Basic Panel

E—High-Low Speed Select Rocker Switch

OMRGP15,0000126 -19-12SEP06-3/3

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 850 rpm at factory. If an engine will be idling for more than 5 minutes, stop and restart later.

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

RG,RG34710,7554 -19-12SEP06-1/1

Stopping the Engine

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

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.

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

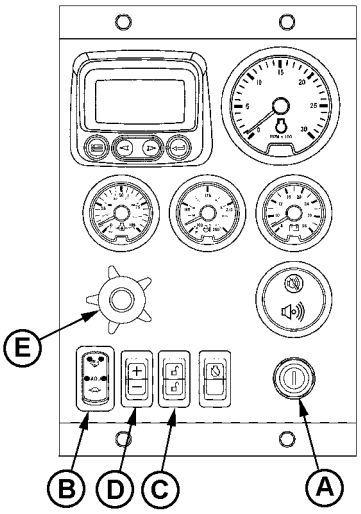
   Panels with optional analog throttle (E): Set either high-low speed select switch (B) or analog throttle control (E) to slow idle, and set desired speed with remaining control.

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

3. Push in on analog throttle control handle (if equipped) so that engine goes to slow idle, or set slow speed with high-low speed select rocker switch.

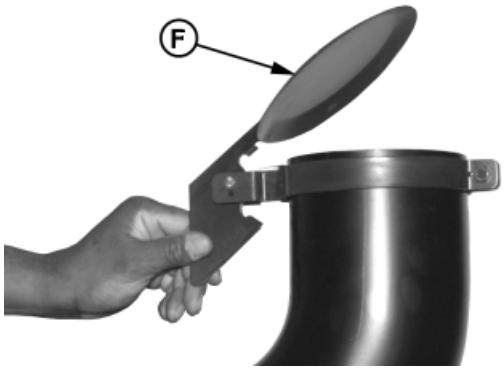
4. Turn key start switch (A) to “OFF” position to stop the engine. Remove ignition key.

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



RG13723 —UN—11NOV04

Stopping the Engine (Full-Featured Panel Shown)



RG9933 —UN—18NOV99

Exhaust Stack Rain Cap

A—Key Start Switch
B—High-Low Speed Select Rocker Switch
C—Bump Speed Enable Rocker Switch
D—Speed Select Rocker Switch
E—Analog Throttle Control (Optional)
F—Exhaust Stack Rain Cap

OMRGP15,0000127 -19-12SEP06-1/1

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.

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.

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.**

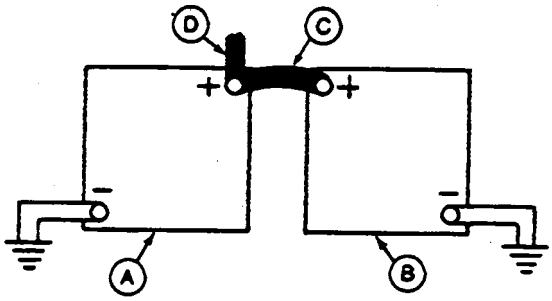
1. Connect booster battery or batteries to produce the required system voltage for your engine application.

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

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

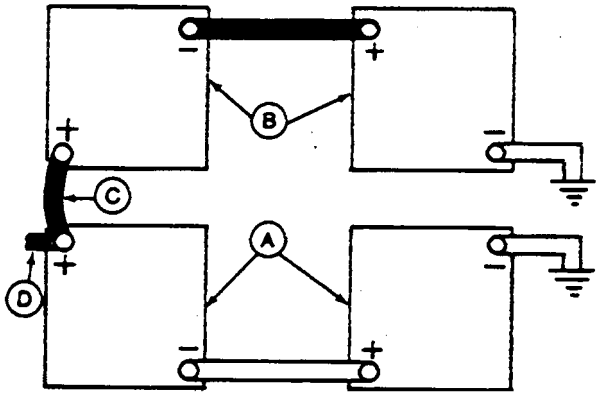
TS204 —UN—23AUG88

Exploding Battery



RG4678 —UN—14DEC88

12-Volt System



RG4698 —UN—14DEC88

24-Volt System

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

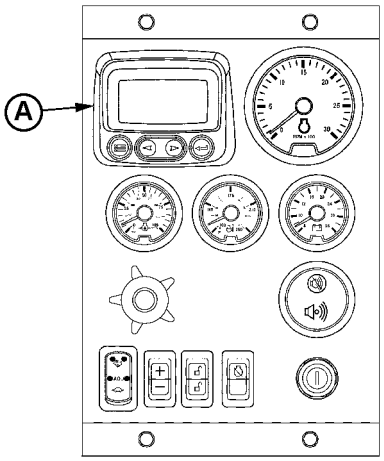
RG,RG34710,7556 -19-12SEP06-1/1

Observe Service Intervals

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

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

A—Hour Meter



RG13728 —UN—11NOV04

Hour Meter On Panel

OURGP12,0000136 -19-11OCT06-1/1

Use Correct Fuels, Lubricants, and Coolant

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

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

TS100 —UN—23AUG88

John Deere Parts Network

RG,RG34710,7558 -19-12SEP06-1/1

Lubrication and Maintenance Service Interval Chart—Industrial Unit and Generator (Prime Power)

	Lubrication and Maintenance Service Intervals				
Item	Daily	500 Hours of Operation/or Every 12 Months	2000 Hours of Operation/or Every 24 Months	2500 Hours of Operation	As Required
Check Engine Oil and Coolant Level	•				
Check Fuel Filter/Water Separator Bowl	•				
Check Air Cleaner Dust Unloader Valve & Restriction Indicator Gauge [a]	•				
Visual Walkaround Inspection	•				
Service Fire Extinguisher		•			
Service Battery		•			
Change Engine Oil and Replace Oil Filter [b,c]		•			
Check Coolant Pump Weep Hole Foam Filter		•			
Replace Fuel Filters/Clean Water Separator [d]		•			
Check Engine Speeds		•			
Check Engine Mounts		•			
Clean Crankcase Vent Hose and Valve		•			
Check Air Intake Hoses, Connections, & System		•			
Check Engine Ground Connection		•			
Check Automatic Belt Tensioners and Belt Wear		•			
Check Cooling System		•			
Coolant Solution Analysis; Add SCAs as Required		•			
Pressure Test Cooling System		•			
Check Crankshaft Vibration Damper [e]			•		
Flush and Refill Cooling System [f]			•		
Test Thermostats			•		
Adjust Engine Valve Clearance & EUI Preload [g]				•	
Replace Air Cleaner Elements					•
Bleed Fuel System					•
Replace Alternator and Fan Belts					•
Check Fuses					•
Check Air Compressors (If Equipped)					•
Check Rear Power Take-Off (PTO) (If Equipped)					•

[a] Replace primary air cleaner element when restriction indicator shows a vacuum of 625 mm (25 in.) H2O.
[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 fuel filters when audible alarm sounds and trouble codes indicate plugged fuel filter (low fuel pressure). If no alarm sounds during a 12 month interval, replace fuel filters at that time, or after every 500 hours of operation.
[e] Replace crankshaft damper at 4500 hours or 60 months, whichever occurs first. Damper cannot be repaired.
[f] If John Deere COOL-GARD is used, the flushing interval may be extended to 3000 hours of operation or every 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 of operation or every 60 months, whichever occurs first.
[g] This one-time adjustment is required after first 2500 hours of operation for all new and overhauled engines.

OURGP11,0000052 -19-11OCT06-1/1

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

NOTE: The service intervals in the Lubrication and Maintenance sections that follow reflect standard engines. Use service intervals listed below for generator (standby) applications. Match service items below to titles in Lubrication and Maintenance sections for procedures.

	Lubrication and Maintenance Service Intervals				
Item	Every 2 Weeks	500 Hours of Operation/or Every 12 Months	2000 Hours of Operation/or Every 24 Months	2500 Hours of Operation	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 Separator Bowl	•				
Check Air Cleaner Dust Unloader Valve & Restriction Indicator Gauge [a]	•				
Visual Walkaround Inspection	•				
Service Fire Extinguisher		•			
Service Battery		•			
Change Engine Oil and Replace Oil Filter [b,c]		•			
Check Coolant Pump Weep Hole Foam Filter		•			
Check Engine Mounts		•			
Replace Fuel Filters/Clean Water Separator [d]		•			
Check Engine Ground Connection		•			
Clean Crankcase Vent Hose and Valve		•			
Check Air Intake Hoses, Connections, & System		•			
Check Engine Ground Connection		•			
Check Automatic Belt Tensioners and Belt Wear		•			
Check Cooling System		•			
Coolant Solution Analysis; Add SCAs as Required		•			
Pressure Test Cooling System		•			
Check Crankshaft Vibration Damper [e]			•		
Flush and Refill Cooling System [f]			•		
Test Thermostats			•		
Adjust Engine Valve Clearance and EUI Preload [g]				•	
Replace Air Cleaner Elements					•
Bleed Fuel System					•
Replace Alternator and Fan Belts					•
Check Fuses					•
Check Air Compressors (If Equipped)					•
Check Rear Power Take-Off (PTO) (If Equipped)					•

[a] Replace primary air cleaner element when restriction indicator shows a vacuum of 625 mm (25 in.) H2O.
[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 fuel filters when audible alarm sounds and trouble codes indicate plugged fuel filter (low fuel pressure). If no alarm sounds during a 12 month interval, replace fuel filters at that time, or after every 500 hours of operation.
[e] Replace crankshaft damper at 4500 hours or 60 months, whichever occurs first. Damper cannot be repaired.
[f] If John Deere COOL-GARD is used, the flushing interval may be extended to 3000 hours of operation or every 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 of operation or every 60 months, whichever occurs first.
[g] This one-time adjustment is required after first 2500 hours of operation for all new and overhauled engines.

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Daily Prestarting Checks

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

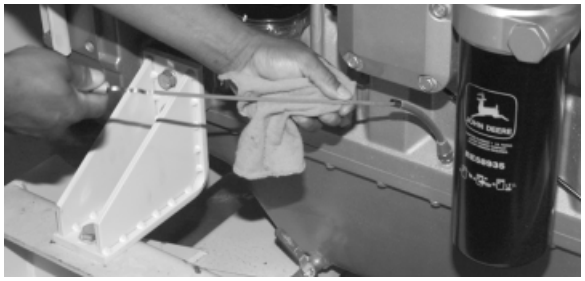
IMPORTANT: DO NOT add makeup oil until the oil level is BELOW the ADD mark.

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.)

   Oil may be added at timing gear cover filler cap (A) or oil pan filler adapter ports (B), if equipped.

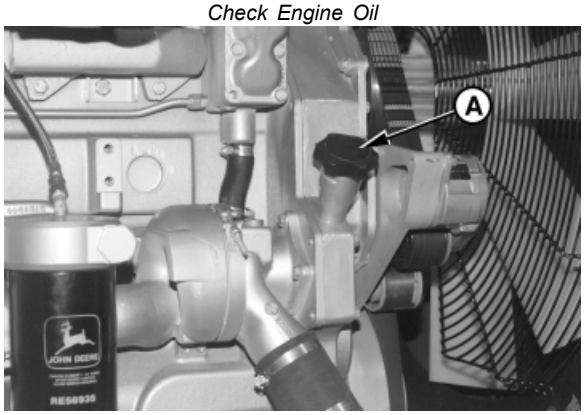
IMPORTANT: DO NOT fill above the top of crosshatch area (C) on the dipstick. Oil levels anywhere within crosshatch are considered in the acceptable operating range.

A—Timing Cover Filler Cap
B—Oil Pan Filler Adapter Port
C—Crosshatch Area of Dipstick



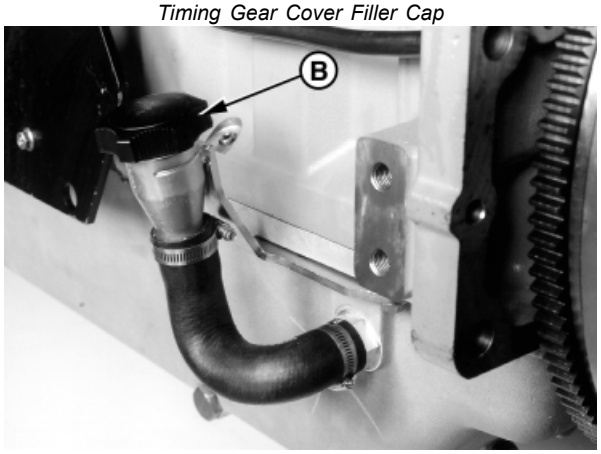
RG9924 —UN—17NOV99

Check Engine Oil



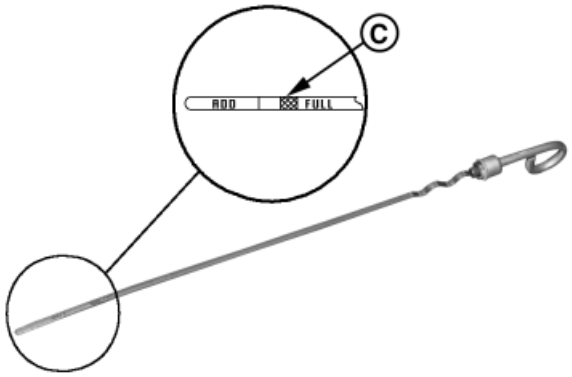
RG8724 —UN—03SEP99

Timing Gear Cover Filler Cap



RG8751 —UN—03SEP99

Oil Pan Filler Adapter Ports



RG8707B —UN—03SEP99

Do Not Fill Above Top Mark

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RG,RG34710,7561 -19-12SEP06-1/4

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.

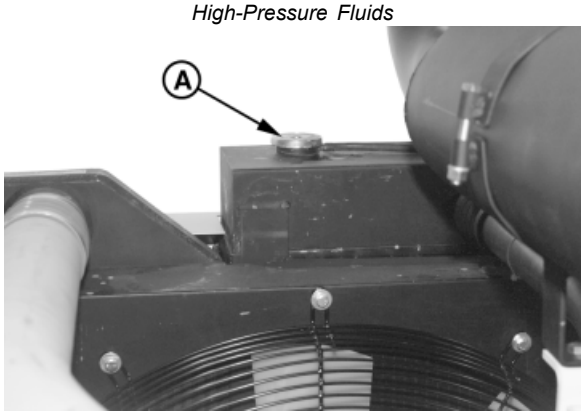
2. Check the coolant level when engine is cold. Coolant level should be at bottom of filler neck. Fill radiator (A) with proper coolant solution if level is low. (See ADDING COOLANT in Service as Required section.) Check overall cooling system for leaks.

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

A—Radiator

TS281 —UN—23AUG88

High-Pressure Fluids



RG8735A —UN—03SEP99

Fill Radiator

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RG,RG34710,7561 -19-12SEP06-2/4

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

IMPORTANT: Do not exceed maximum air intake restriction. A clogged air cleaner element will cause excessive intake restriction and a reduced air supply to the engine.

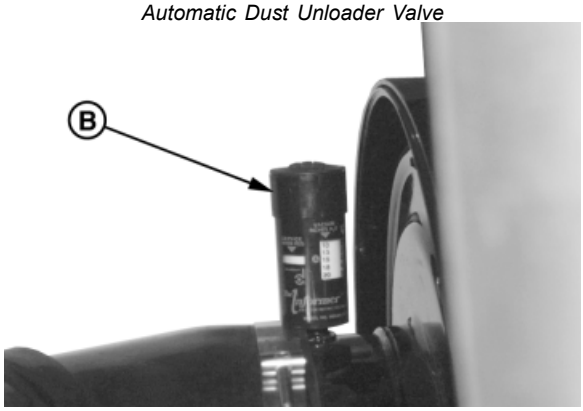
If equipped with air intake restriction indicator gauge (B), check gauge and service air cleaner if air intake restriction exceeds specifications.

Specification	
Maximum Air Intake Restriction—Vacuum	25 in. (625 mm) H_2O (6.25 kPa) (0.06 bar) (1.0 psi)

A—Dust Unloader Valve **B—Restriction Indicator Gauge**

RG8717A —UN—12JUL99

Automatic Dust Unloader Valve



RG8719A —UN—12JUL99

Air Intake Restriction Indicator Gauge

RG,RG34710,7561 -19-12SEP06-3/4

NOTE: Amber warning indicator on instrument panel diagnostic gauge will flash if amount of water in fuel filter sediment bowl is excessive.

4. Loosen thumb screw (C) and drain water and debris from bowl into a suitable container, as needed.

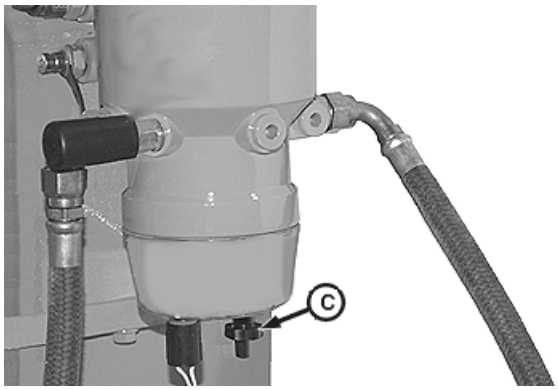
   Dispose of water and debris in an environmentally safe manner.

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

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

Inspect:

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



RG12773 —UN—23JAN03

Draining Water Separator Bowl

C—Drain Valve

- Coolant pump for coolant leaks.

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

RG,RG34710,7561 -19-12SEP06-4/4

Servicing Fire Extinguisher

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

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

A—Fire Extinguisher

RW4918 —UN—15DEC88

Fire Extinguisher

OURGP12,00000B9 -19-12SEP06-1/1

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.

TS204 —UN—23AUG88

Exploding Battery

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

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

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

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

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

OURGP11,0000054 -19-12SEP06-1/2

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

Avoid the hazard by:

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

If you spill acid on yourself:

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

If acid is swallowed:

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

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

Replacement battery(ies) must meet or exceed the following recommended capacities[1] at —18°C (0°F):

Specification	
12-Volt System—Minimum Battery Capacity—Cold Cranking Amps	1900 Minimum
Reserve Capacity (Minutes)	350 Minimum
24-Volt System—Minimum Battery Capacity—Cold Cranking Amps	925 Minimum
Reserve Capacity (Minutes)	275 Minimum

[1] Total recommended capacity based on batteries connected in series or parallel.

TS203 —UN—23AUG88

Sulfuric Acid

OURGP11,0000054 -19-12SEP06-2/2

Changing Engine Oil and Replacing Oil Filter

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

- **Engine equipped with an extended drain interval oil pan.**
- **Use of diesel fuel with sulfur content less than 0.50% (5000 ppm) is strongly recommended.**
- **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 the approved John Deere oil filter.**

The oil and filter change interval is reduced if ANY of the above listed requirements are not followed. (Refer to DIESEL 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® and OILSCAN PLUS® are John Deere sampling programs 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 dealer. Oil samples should be taken prior to the oil change. Refer to instructions provided with kit.

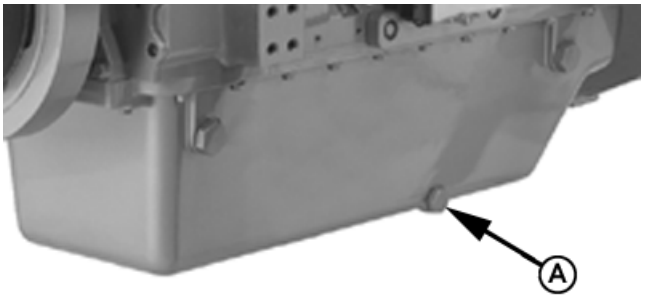
CAUTION: Metal surfaces of engine may be hot to the touch after shutdown.

Change engine oil as follows:

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

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

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



RG13884 —UN—19MAY05

Engine Oil Drain Plug

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

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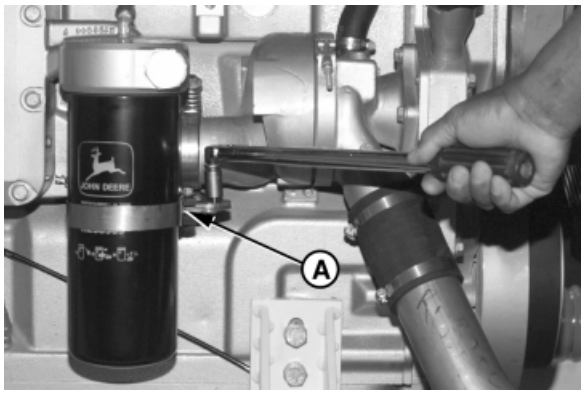
OURGP11,0000055 -19-13OCT06-1/3

4. Remove and discard oil filter element using a suitable filter wrench (A).
5. Remove oil filter packing and clean filter mounting pad.

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

6. Oil new packing and install new filter element onto filter housing. Hand tighten element according to values printed on filter element. If values are not provided, tighten element approximately 1/2—3/4 turn after packing contacts filter housing. DO NOT overtighten filter element.



RG8709B —UN—03SEP99

Remove Filter Element Using Wrench

A—Filter Wrench

OURGP11,0000055 -19-13OCT06-2/3

7. Inspect drain plug O-ring. Replace if necessary.
8. Install oil pan drain plug. Torque plug to specifications.

Specification	
Oil drain plug (1-1/4 in.)—Torque	46 N·m (34 lb-ft)
Oil drain plug (1-1/2 in.)—Torque	64 N·m (47 lb-ft)

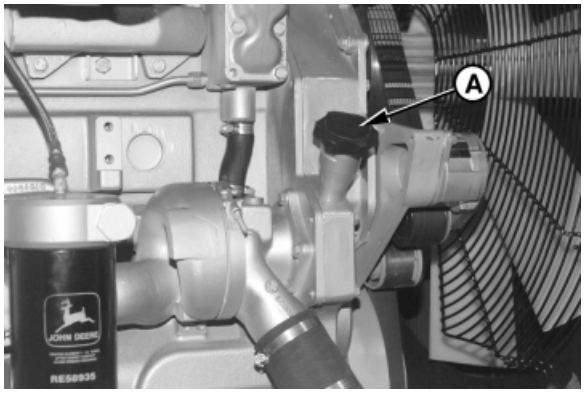
9. Fill engine crankcase with correct John Deere engine oil through timing gear cover fill port (A) or oil pan fill port (B) depending on engine application. (See DIESEL ENGINE OIL in Fuels, Lubricants, and Coolant section for determining correct engine oil.)

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

NOTE: Crankcase oil capacity may vary slightly. ALWAYS fill crankcase to full mark or within crosshatch on dipstick, whichever is present. DO NOT overfill.

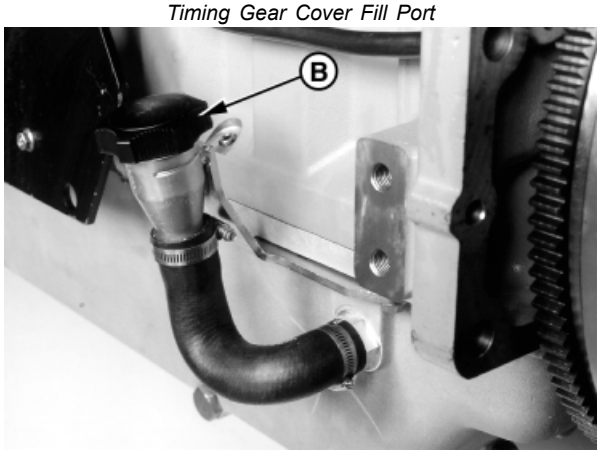
IMPORTANT: Immediately after completing any oil change, crank engine for 30 seconds without permitting engine to start. This will help ensure adequate lubrication to engine components before engine starts.

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



RG8724 —UN—03SEP99

Timing Gear Cover Fill Port



RG8751 —UN—03SEP99

Oil Pan Adapter Fill Port

A—Timing Cover Fill Port **B—Oil Pan Adapter Fill Port**

OURGP11,0000055 -19-13OCT06-3/3

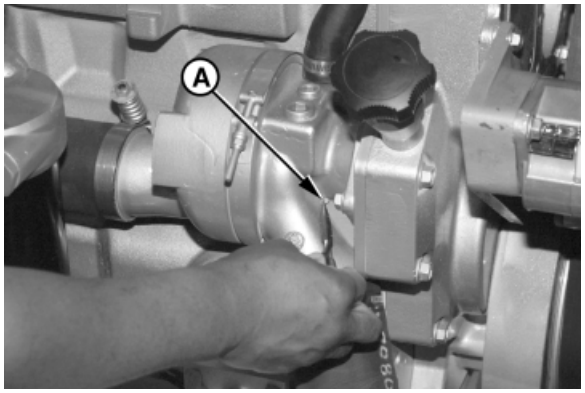
Visually Inspecting Coolant Pump

Inspect Weep Hole

1. Remove foam filter (if equipped) from coolant pump weep hole (A) as shown.
2. Inspect weep hole for oil or coolant leakage.
   - Oil leakage indicates a damaged rear seal.
   - Coolant leakage indicates a damaged front seal.

   Repair or replace complete coolant pump assembly if leakage is detected.

A—Weep Hole



RG8718A —UN—12JUL99

Coolant Pump Weep Hole

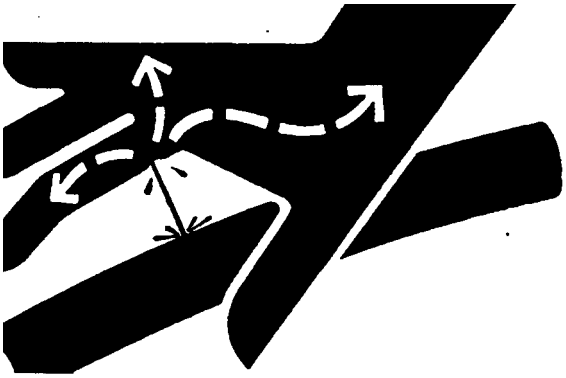
OURGP11,0000080 -19-11OCT06-1/1

Replacing Fuel Filters/Cleaning Water Separator (Earlier Engines)

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.

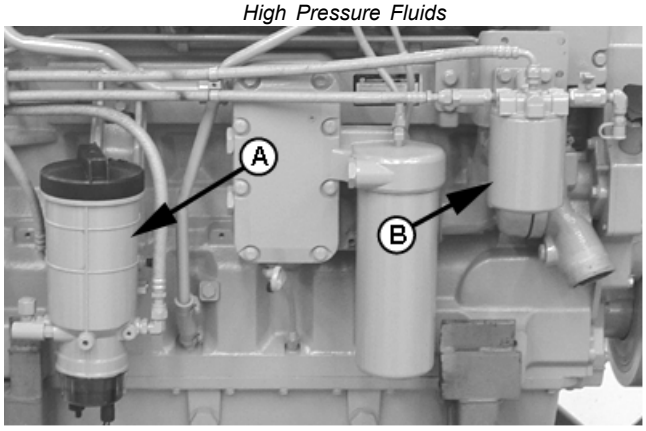
If any fluid is injected into the skin, it must be surgically removed within a few hours by a doctor familiar with this type injury or gangrene may result. Doctors unfamiliar with this type of injury may call the Deere & Company Medical Department in Moline, Illinois, or other knowledgeable medical source.

IMPORTANT: Primary fuel filter (A) and final fuel filter (B) must both be replaced whenever audible alarm sounds and trouble code indicates plugged filter (fuel supply pressure moderately/extremely low). Replace both fuel filters at 12 month intervals (or every 500 hours) if no alarm/code indications occur.



X9811 —UN—23AUG88

High Pressure Fluids



RG13899 —UN—14JUN05

Primary and Final Fuel Filters (Earlier Engines)

A—Primary Fuel Filter **B—Final Fuel Filter**

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OURGP12,000011B -19-26FEB08-1/7

Remove Primary Fuel Filter Element (Earlier Engines)

⚠ CAUTION: If engine has been running, engine and fuel filter housing may be hot.

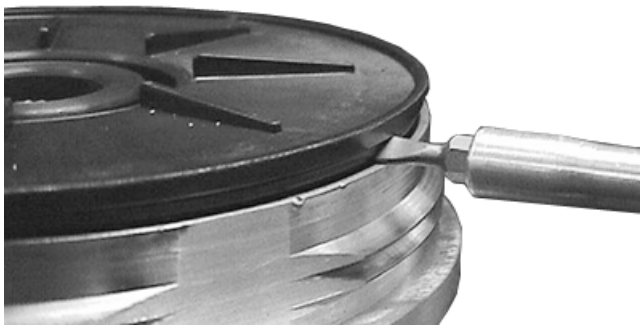
1. Close fuel shut-off valve (if equipped).
2. Clean entire area surrounding fuel filter assembly to keep debris from entering fuel system.
3. Remove cap from fuel filter housing by turning counterclockwise by hand.

RG10302 —UN—27MAY04

Remove Primary Fuel Filter

OURGP12,000011B -19-26FEB08-2/7

4. Relieve vacuum in filter housing by operating hand primer until fuel filter “pops-up”. If filter does not “pop-up” after about 30 strokes of primer, a small screwdriver may be used as shown to **carefully** pry under filter flange to relieve vacuum in the housing.



RG10303 —UN—27MAY04

Relieve Vacuum

OURGP12,000011B -19-26FEB08-3/7

5. Lift filter element up in housing until filter seal clears inlet tube inside housing. Continue to hold filter suspended straight up in top of housing to drain fuel from filter.
6. Allow fuel to drain completely from filter into housing. Carefully begin rotating filter from housing as shown until completely upside down to ensure minimum leakage from fuel filter.
7. Place filter in container suitable for diesel fuel.

IMPORTANT: Reusing fuel filter once removed from housing may result in trapped air in the filter. This may cause fuel to overflow from the filter housing during insertion of filter element, and/or cause the engine to stall and not restart without additional system purging.

RG10304 —UN—02SEP99

Remove Filter Element

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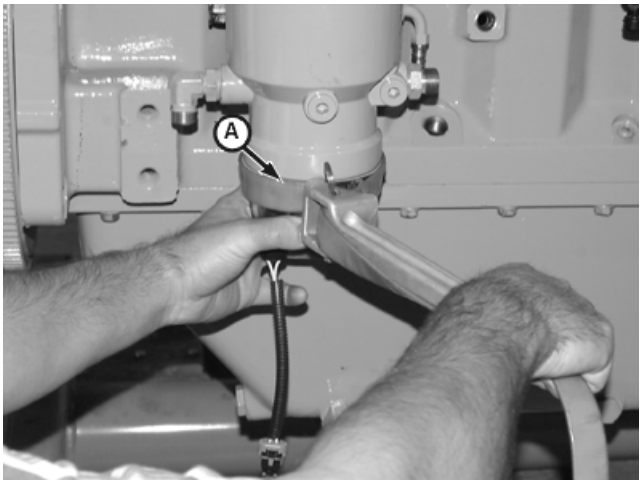
OURGP12,000011B -19-26FEB08-4/7

Remove And Clean Water Separator Bowl (Earlier Engines)

1. Disconnect wiring connector from water-in-fuel sensor.
2. Drain fuel from separator bowl.
3. Position a strap wrench (A) as close as possible to top edge of separator bowl. While applying pressure with strap wrench, grip bowl and twist with other hand as shown to remove bowl.
4. Clean separator bowl and dry it.
5. Install separator bowl and tighten by hand until seal makes contact. Hand tighten to the following specification:

Specification	
Water Separator Bowl-To-Filter Housing—Torque	5 N·m (44 lb-in.)

6. Connect wiring to water-in-fuel sensor.



Removing Water Separator Bowl

A—Strap Wrench

OURGP12,000011B -19-26FEB08-5/7

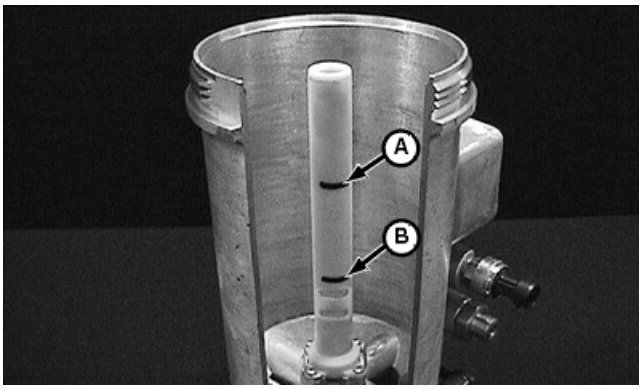
Install New Primary Fuel Filter Element (Earlier Engines)

1. Check to ensure that the fuel level in the filter housing is between the MIN (B) and MAX (A) fuel levels indicated on the outside of the housing and on the corresponding marks on the center tube. If the fuel is below the MIN level, then carefully open the fuel supply shut-off valve a small amount (if equipped) to add fuel.

   Operate the hand primer to add more fuel if required or if the unit is not equipped with a fuel supply shut-off valve.

IMPORTANT: Fuel level below the MIN indication may result in trapped air in the filter causing the engine to stall and not restart without additional system purging. Fuel level above the MAX indication may cause fuel to overflow from the filter housing during insertion of filter element.

2. Insert new (dry) fuel filter into filter housing.
3. Reinstall fuel filter cap and tighten to “handtight” condition.



Fuel Level In Filter Housing

A—Maximum Level (2 1/2 Inches from Top of Housing)

B—Minimum Level (5 Inches from Top of Housing)

Continued on next page

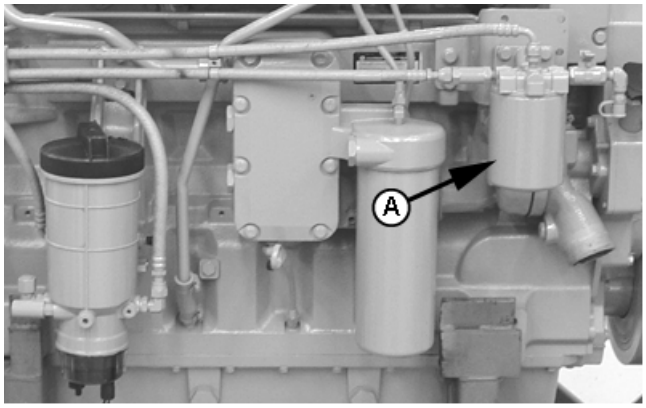
OURGP12,000011B -19-26FEB08-6/7

Replace Final Fuel Filter (Earlier Engines)

IMPORTANT: Always replace both filters at the same time.

1. Clean entire area surrounding fuel filter assembly to keep debris from entering fuel system.
2. Remove final fuel filter using a suitable filter wrench.
3. Lubricate packing on new final fuel filter with diesel fuel, and install filter onto base. Tighten 1/2 turn after packing contacts base.
4. Open fuel supply shut-off valve (if equipped).
5. Restart engine and allow to run for five minutes minimum.

NOTE: Under normal conditions, fuel system bleeding is not required. Priming system with hand primer is normally sufficient. If necessary to bleed the system, see BLEEDING FUEL SYSTEM in Service as Required section.



RG13900 —UN—14JUN05

Final Fuel Filter (Earlier Engines)

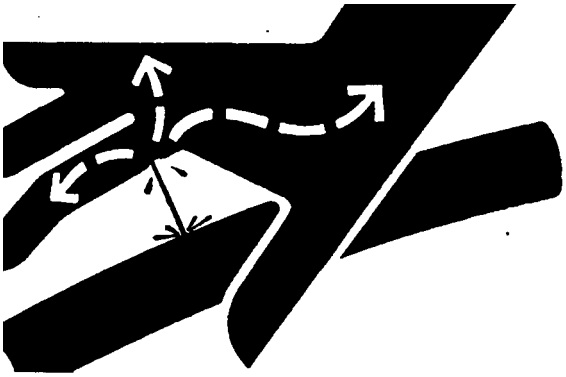
A—Final Fuel Filter

OURGP12,000011B -19-26FEB08-7/7

Replacing Fuel Filters/Cleaning Water Separator (Later Engines)

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

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

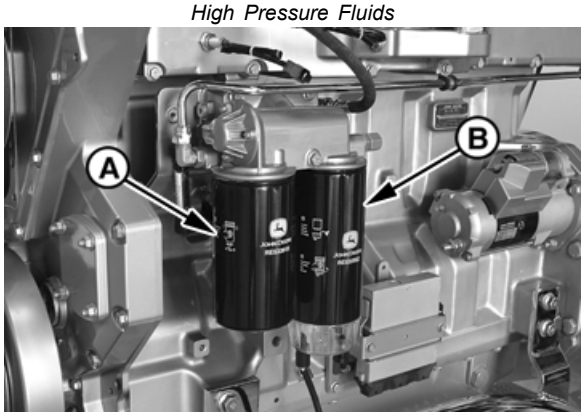


X9811 —UN—23AUG88

High Pressure Fluids

IMPORTANT: Primary fuel filter (B) and final fuel filter (A) must both be replaced whenever audible alarm sounds and trouble code indicates plugged filter (fuel supply pressure moderately/extremely low). Replace both fuel filters at 12 month intervals (or every 500 hours) if no alarm/code indications occur.

NOTE: The "ship away" final fuel filter that the engine is shipped with may be shorter compared to the "service" final fuel filter. The shorter filter is required to provide clearance during manufacturing.



RG15746 —UN—25FEB08

A—Final Fuel Filter **B—Primary Fuel Filter**

Remove Primary Fuel Filter (Later Engines)

CAUTION: If engine has been running, engine and fuel filter housing may be hot.

1. Close fuel shut-off valve (if equipped).
2. Clean entire area surrounding fuel filter assembly to keep debris from entering fuel system.
3. Disconnect wiring connector from water-in-fuel sensor.
4. Drain fuel from separator bowl into suitable container.
5. Remove primary fuel filter by turning counterclockwise by hand or using suitable filter wrench.

Continued on next page

BK34394,00000E1 -19-29FEB08-1/2

Remove And Clean Water Separator Bowl (Later Engines)

1. Remove water separator bowl from primary fuel filter by turning counterclockwise by hand or using a suitable strap wrench.
2. Clean separator bowl and dry it.
3. Lubricate new water separator bowl seal with thin film of oil or fuel, and hand tighten to primary fuel filter.

Specification	
Water Separator Bowl-To-Primary Fuel Filter—Torque	Hand Tighten to Primary Fuel Filter

Install New Primary Fuel Filter (Later Engines)

1. Lubricate new primary fuel filter seal with thin film of oil or fuel.
2. Screw filter into header by turning clockwise until the seal contacts the header.
3. When seal contacts the header, tighten clockwise to the following specification:

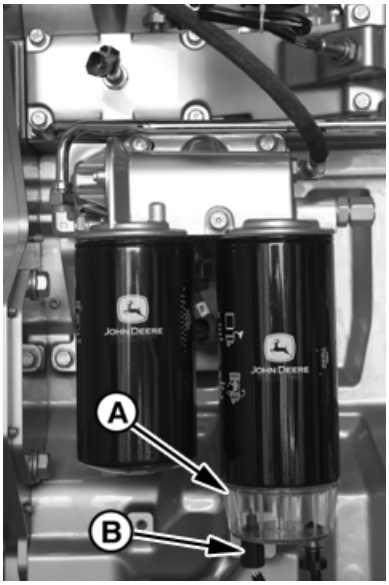
Specification	
Primary Fuel Filter—Torque	Seal Contact + 1/2 to 3/4 Turn, Lubricated with Oil or Fuel

4. Connect water-in-fuel sensor connector.

Replace Final Fuel Filter (Later Engines)

IMPORTANT: Always replace both filters at the same time.

1. Clean entire area surrounding fuel filter assembly to keep debris from entering fuel system.
2. Remove final fuel filter using a suitable filter wrench.
3. Lubricate new final fuel filter seal with thin film of oil or fuel, and screw filter into header by turning clockwise until the seal contacts the header.
4. When seal contacts the header, tighten clockwise to the following specification:



RG15747 —UN—26FEB08

A—Water Separator Bowl **B—Water-In-Fuel Sensor**

Specification	
Final Fuel Filter—Torque	Seal Contact + 1 Turn, Lubricated with Oil or Fuel

5. Open fuel supply shut-off valve (if equipped).
6. Turn ignition key to the ON position for 120 seconds to allow the system to prime itself.
7. Restart engine and allow to run for five minutes minimum.

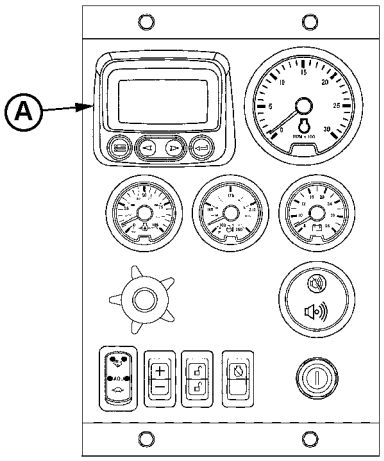
NOTE: Under normal conditions, fuel system bleeding is not required. The auto prime feature is normally sufficient. If necessary to bleed the system, see BLEEDING FUEL SYSTEM in Service as Required section.

BK34394,00000E1 -19-29FEB08-2/2

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—Diagnostic Gauge



RG13728 —UN—11NOV04

Using Tachometer to Check Engine Speeds

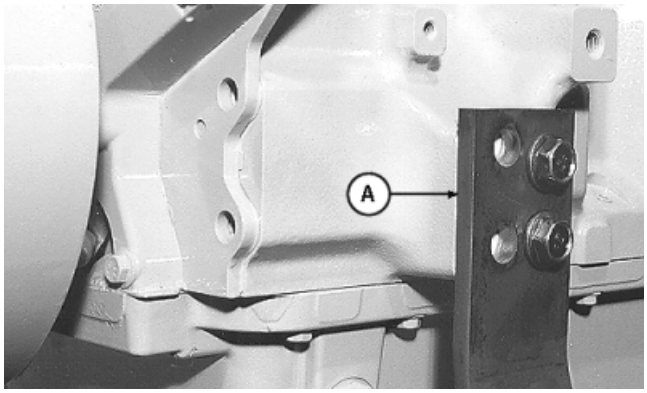
OURGP12,0000090 -19-12SEP06-1/1

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



RG9905 —UN—06JAN99

Engine Mounting

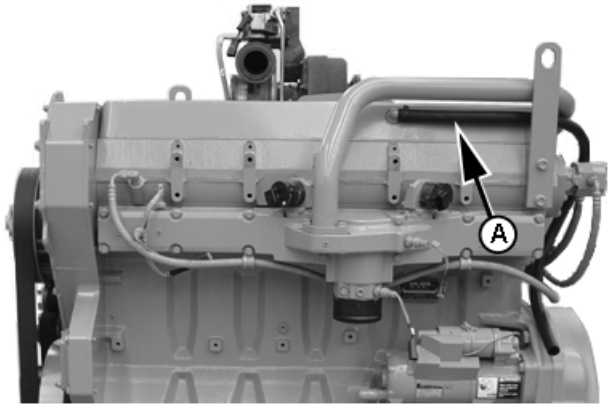
A—Mounting Bracket

OURGP11,0000110 -19-11OCT06-1/1

Checking Crankcase Vent Tube and Valve

1. Loosen clamp on crankcase vent hose (A).
2. Remove crankcase vent valve (not shown) from rocker arm cover.
3. Remove crankcase vent valve from crankcase vent hose and clean hose. Ensure hose is not plugged.
4. Shake crankcase vent valve. If free movement of valve is heard while shaking, valve can be reused. Replace valve if rattle is not heard.
5. Install the valve and vent hose. Attach valve with two screws. Tighten hose clamp securely.

A—Crankcase Vent Tube



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Crankcase Vent Tube

OURGP11,0000056 -19-11OCT06-1/1

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 on piping which connect the air cleaner to the engine. 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 (A), inspect the valve on bottom of air cleaner for cracks or plugging. Replace as necessary.

RG8717A —UN—12JUL99

Rubber Dust Unloader Valve

A—Dust Unloader Valve

RG,RG34710,7569 -19-12SEP06-1/2

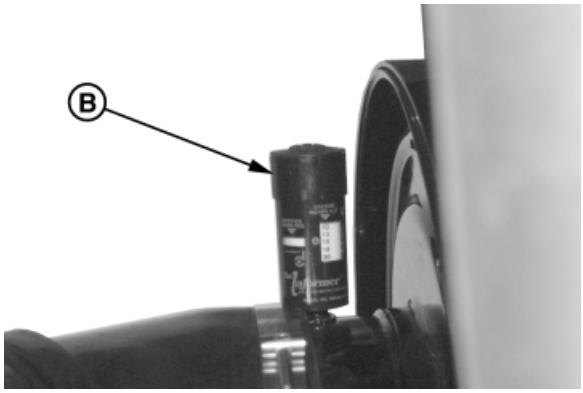
4. Test air restriction indicator (B) for proper operation. Replace indicator as necessary.

IMPORTANT: ALWAYS REPLACE primary air cleaner element when air restriction indicator is torn or visibly dirty, or when it exceeds specifications or service interval. A clogged air cleaner element will cause excessive intake restriction and a reduced air supply to the engine.

5. Remove and inspect primary air cleaner element. Service as necessary. (See REPLACING AIR CLEANER FILTER ELEMENTS in Service as Required section.)

   If equipped with air intake restriction indicator gauge (B), check gauge and service air cleaner if it exceeds specifications.

Specification	
Maximum Air Intake Restriction—Vacuum	25 in. (625 mm) H_2O (6.25 kPa) (0.06 bar) (1.0 psi)



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Air Restriction Indicator

B—Air Restriction Indicator

If not equipped with air restriction indicator, replace air cleaner elements at 500 hours or 12 months, whichever occurs first.

RG,RG34710,7569 -19-12SEP06-2/2

Check Engine Electrical Ground Connection

Check engine ground connection to ensure it is tight and clean. See ELECTRICAL SYSTEM LAYOUT in Troubleshooting Section for ground location.

This inspection is necessary to prevent electrical arc, which can result in engine damage.

OURGP11,0000111 -19-12SEP06-1/1

Checking Belt Tensioner Spring Tension and Belt Wear

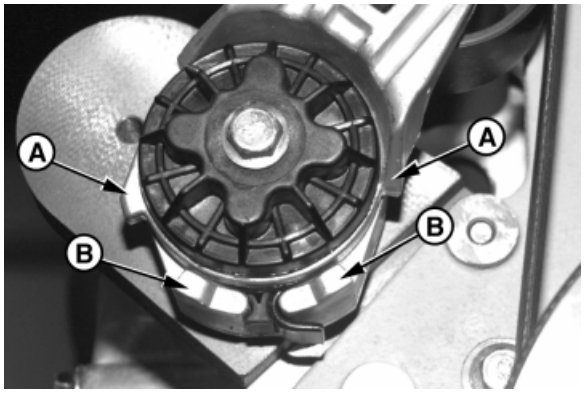
Belt drive systems equipped with automatic (spring) belt tensioners cannot be adjusted or repaired. The automatic belt tensioners are designed to maintain proper belt tension over the life of the belt. If tensioner spring tension is not within specification, replace tensioner assembly.

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 stop on swing arm (A) is hitting the fixed stop (B), check mounting brackets (alternator, belt tensioner, idler pulley, etc.) and the belt length. Replace belt as needed (see REPLACING FAN/ALTERNATOR V-BELTS in Service as Required section).



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Upper Tensioner Shown, Lower Tensioner Similar

A—Swing Arm Cast Stops **B—Fixed Cast Stops**

OURGP12,000013B -19-12SEP06-1/3

Checking Upper Tensioner Spring Tension

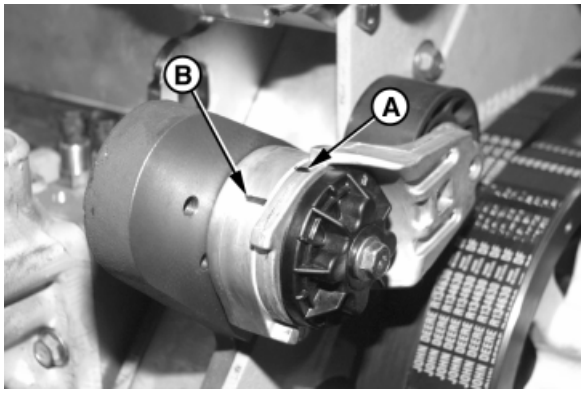
NOTE: While belt is loosened, inspect pulleys and bearings. Rotate and feel for hard turning or any unusual sounds. If pulleys or bearings need replacement, see your John Deere dealer.

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-in. drive tool in square hole in end of tensioner arm. Remove belt from pulleys.
2. Release tension on tensioner arm and remove drive tool.
3. Put a mark (A) on swing arm of tensioner as shown.
4. Measure 21 mm (0.83 in.) from first mark (A) and put a second mark (B) on tensioner mounting base.
5. Rotate the swing arm using a torque wrench until marks (A and B) are aligned.
6. Record torque wrench measurement and compare with specification below. Replace tensioner assembly as required.

Specification

Upper Spring Tension—Torque..... 18–23 N·m (13–17 lb-ft)



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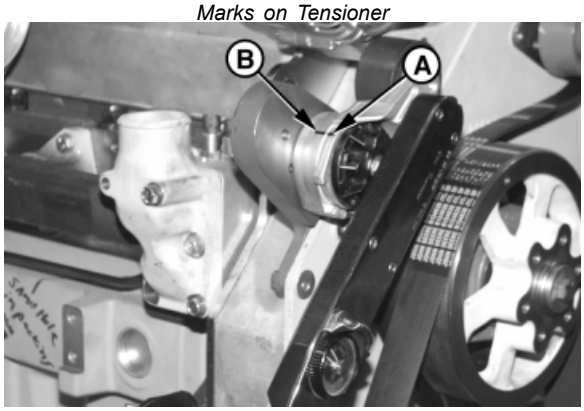
Marks on Tensioner



RG8726 —UN—10DEC97

Align Marks

A—Mark on Swing Arm **B—Mark on Tensioner Mounting Base**

Continued on next page

OURGP12,000013B -19-12SEP06-2/3

Checking Lower 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:

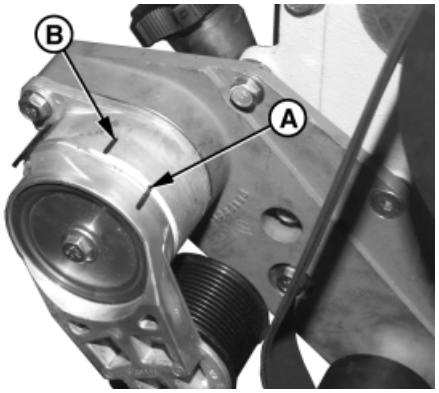
1. Release tension on belt using a long-handled 3/4-in. drive tool in tensioner arm. Remove belt from pulleys.
2. Release tension on tensioner arm and remove drive tool.
3. Put a mark (A) on swing arm of tensioner as shown.
4. Measure 25 mm (1.0 in.) from first mark (A) and put a second mark (B) on tensioner mounting base.
5. Rotate the swing arm using a torque wrench until marks (A and B) are aligned.
6. Record torque wrench measurement and compare with specification below. Replace tensioner assembly as required.

Specification

Lower Spring
Tension—Torque..... 81–99 N·m (60–73 lb-ft)

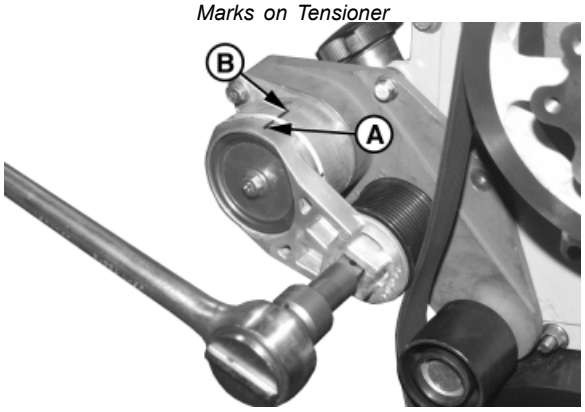
A—Mark on Swing Arm

B—Mark on Tensioner Mounting Base



RG8728 —UN—10DEC97

Marks on Tensioner



RG8729 —UN—10DEC97

Align Marks

OURGP12,000013B -19-12SEP06-3/3

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 or plug in thermostat housing to allow air to escape when filling system. Retighten fitting or plug when all the air has been expelled. Cooling system must be free of air by time engine coolant temperature reaches 80°C (176°F) or damage to EGR cooler may result.

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

TS281 —UN—23AUG88

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.

OURGP11,0000057 -19-12SEP06-1/1

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 and COOL-GARD II Concentrate are maintenance free coolants for up to 6 years or 6000 hours of operation, provided that the cooling system is topped off using only John Deere COOL-GARD II Premix coolant. 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.

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

When Using John Deere COOL-GARD

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.

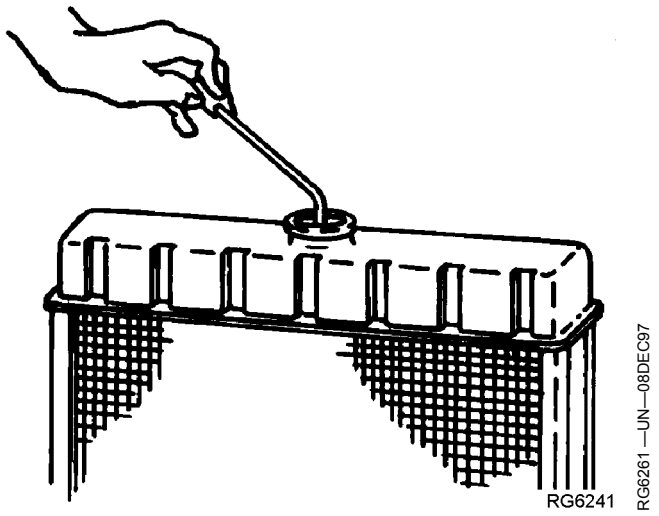
Add only the recommended concentration of John Deere LIQUID COOLANT CONDITIONER. DO NOT add more than the recommended amount.

CoolScan and CoolScan PLUS

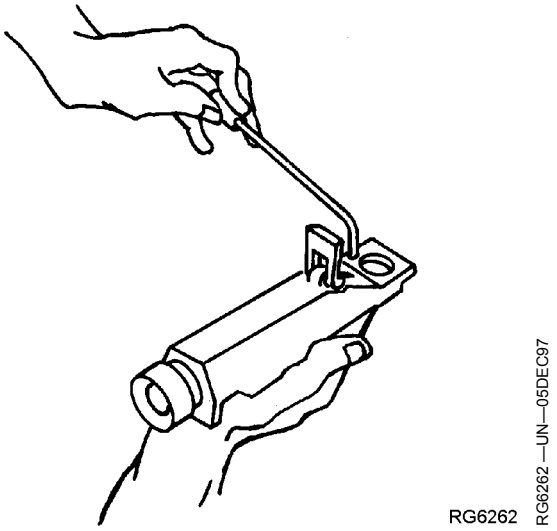
For a more thorough evaluation of your coolant, perform a CoolScan™ or CoolScan PLUS™ analysis, where available. See your John Deere dealer for information.

DX,COOL9 -19-03NOV08-1/1

Replenishing Supplemental Coolant Additives (SCAs) Between Coolant Changes



Radiator Coolant Check



JT07298 Coolant/Battery Tester

IMPORTANT: Do not add supplemental coolant additives when the cooling system is drained and refilled with John Deere ANTIFREEZE/SUMMER COOLANT or John Deere COOL-GARD®.

NOTE: If a 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 ANTIFREEZE/SUMMER COOLANT 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 ® analysis. If a COOLSCAN ® analysis is not available, recharge 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 for even a few minutes.

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

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.

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

See DIESEL ENGINE COOLANT and additional information on coolant additives in Fuels, Lubricants and Coolants earlier in this manual for proper mixing of coolant ingredients before adding to the cooling system.

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COOLSCAN is a registered trademark of Deere & Company.

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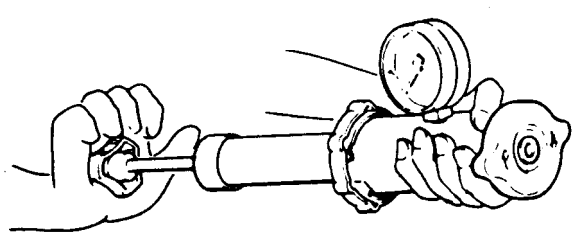
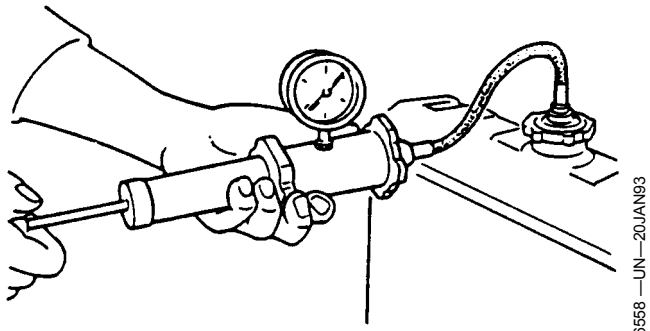
Pressure Testing Cooling System



RG6557 —UN—20JAN93

D05104ST Tester



RG6558 —UN—20JAN93

Connect Gauge and Adapter to Filler Neck

A pressurized cooling system is required to protect engine from cavitation and oxidizing of 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.

Test Radiator Cap

1. Remove radiator cap and attach to D05104ST Tester as shown.
2. Pressurize cap to following specifications.[1]

Specification	
Radiator Cap—Test Pressure	103 kPa (1.03 bar) (15 psi)

Gauge should hold pressure for 10 seconds within the normal range if cap is acceptable. If gauge does not hold pressure, replace radiator cap.

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

[1]Test pressures recommended are for Deere OEM cooling system for 13.5 L engines. On specific vehicle applications, test cooling system and pressure cap according to the recommended pressure for that vehicle.

Test Cooling System

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

1. Allow engine to cool; carefully remove radiator cap.
2. Fill radiator with coolant to 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 filler neck. Pressurize cooling system to the following specifications.[1]

Specification	
Cooling System—Test Pressure	103 kPa (1.03 bar) (15 psi)

4. With pressure applied, check all cooling system hose connections, radiator, and 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, contact your engine distributor or servicing dealer for further diagnostics.

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Checking Crankshaft Vibration Damper

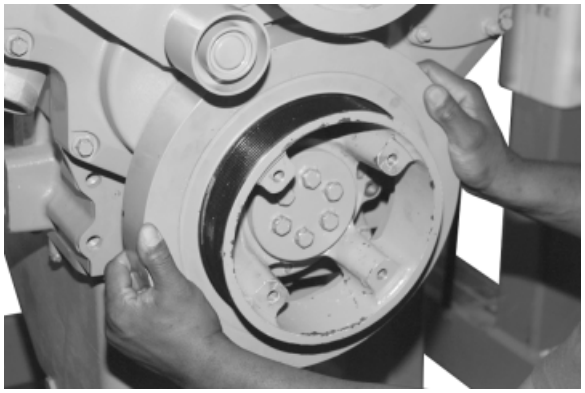
1. Remove belts (shown removed).

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

ALWAYS replace vibration damper whenever crankshaft is replaced and at major engine overhaul. Also replace damper when a short block, complete block, or reman basic engine is installed.

2. Carefully inspect vibration damper for torn or split rubber protruding from front and back of assembly.
3. 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.
4. Check vibration damper radial runout by positioning a dial indicator so probe (A) contacts damper outer diameter.
5. With engine at operating temperature, rotate crankshaft using JDG820 Flywheel Rotation Tool (available from your servicing dealer).
6. Note dial indicator reading. Replace vibration damper if radial runout exceeds 0.76 mm (0.030 in.).

Specification	
Vibration Damper—Maximum Radial Runout	0.76 mm (0.030 in.)



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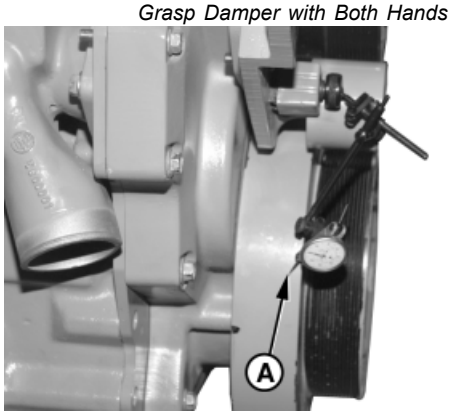
Grasp Damper with Both Hands



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Probe Contacts Damper Outer Diameter

A—Dial Indicator Probe

OURGP12,000013C -19-12SEP06-1/1

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).**

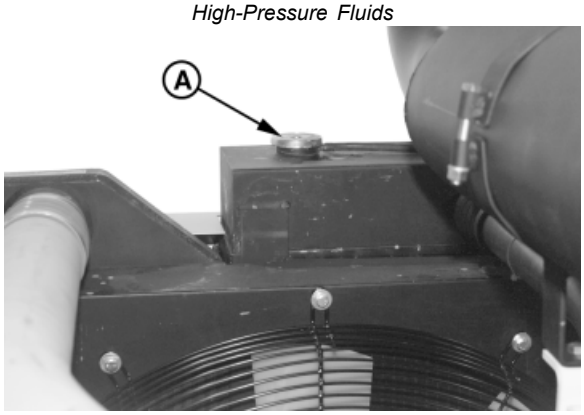
If COOL-GARD is not used, the flushing interval remains at 2000 hours or 24 months of operation.

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

1. Pressure test entire cooling system and pressure cap if not previously done. (See PRESSURE TESTING COOLING SYSTEM, in Lubrication and Maintenance/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.

TS281 —UN—23AUG88

High-Pressure Fluids



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Radiator Cap

A—Radiator Cap

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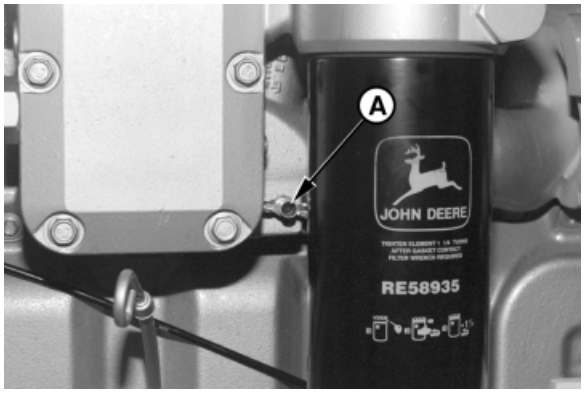
3. Open oil cooler housing drain valve (A) on right side of engine. Drain all coolant from engine block.

A—Drain Valve



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Oil Cooler Housing Drain Valve

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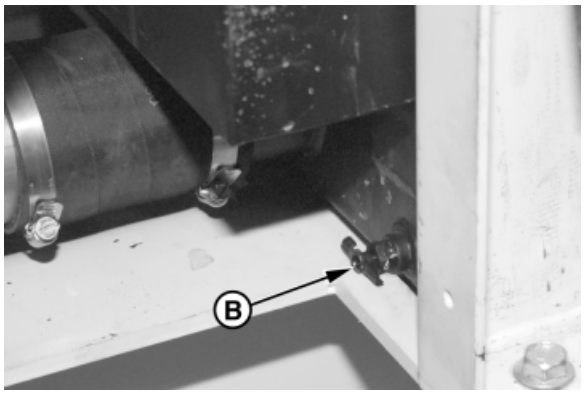
OURGP11,0000058 -19-12SEP06-2/5

4. Open radiator drain valve (B) and drain all coolant from radiator.

B—Drain Valve



RG8730 —UN—03SEP99

Radiator Drain Valve

OURGP11,0000058 -19-12SEP06-3/5

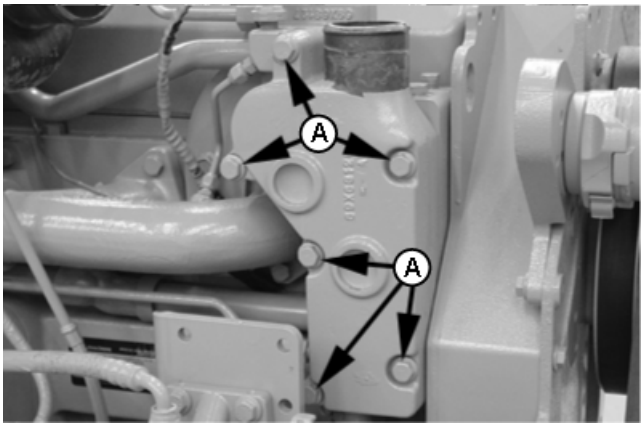
5. Remove six cap screws (A) from thermostat housing and remove housing. Remove three thermostats. Install housing (without thermostats) using old gasket and tighten cap screws to specifications.

Specification	
Thermostat Cover Cap Screws—Torque	50±10 N·m (37±7 lb-ft)

6. Test thermostat opening temperature. (See TESTING THERMOSTATS OPENING TEMPERATURE later in this 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, then drain out flushing water.



RG14338 —UN—05JUL05

Remove Thermostats

A—Cap Screws

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

Continued on next page

OURGP11,0000058 -19-12SEP06-4/5

12. Close all drain valves on engine and radiator. Reinstall radiator hose and tighten clamps securely. Install thermostats using a new gasket.

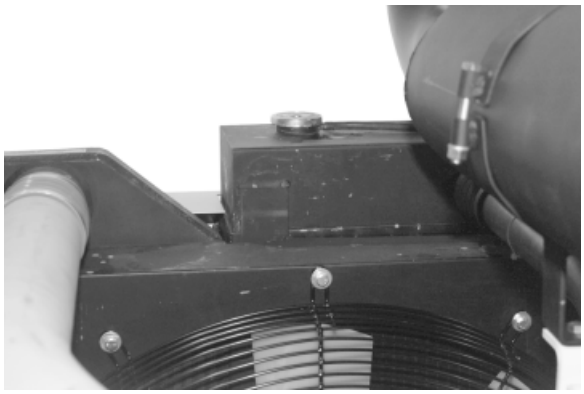
IMPORTANT: Air must be expelled from cooling system when system is refilled. Loosen temperature sending unit fitting or plug in thermostat housing to allow air to escape when filling system. Retighten fitting or plug after filling cooling system. Cooling system must be free of air by time engine coolant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

13. Refill cooling system with fresh coolant until coolant touches bottom of filler neck. (See following specification for cooling system capacity.) Install radiator cap.

Specification

6135HF—Capacity..... 18.3 L (19.3 qt)

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°—92°C (180°—197°F).



RG8735 —UN—03SEP99

Flush Cooling System

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

16. Inspect fan belt for wear and check belt tension (See Checking Belt Tensioner in Lubrication And Maintenance 500 Hour/12 Months.

OURGP11,0000058 -19-12SEP06-5/5

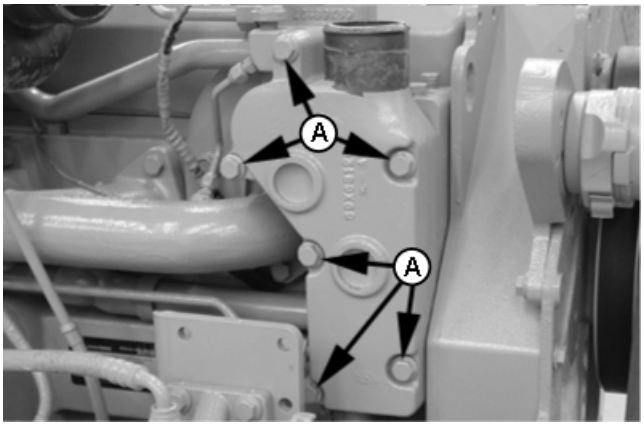
Testing Thermostats Opening Temperature

To Remove Thermostats

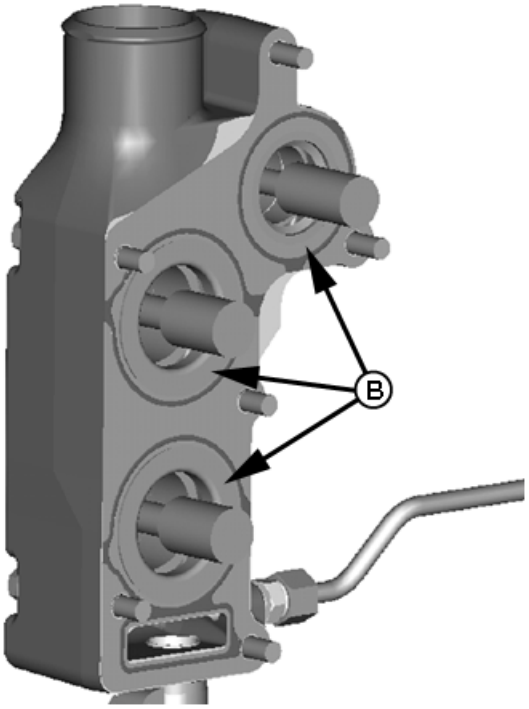
CAUTION: Explosive release of fluids from pressurized cooling system can cause serious burns. DO NOT drain coolant until it has cooled below operating temperature. Always loosen radiator pressure cap or drain valve slowly to relieve pressure.

1. Visually inspect area around thermostat housing for leaks.
2. Remove radiator pressure cap and partially drain cooling system.
3. Remove six cap screws (A) from thermostat housing and remove housing (if not previously done).
4. Remove gasket and remove thermostats (B).
5. Test each thermostat for proper opening temperature.

A—Cap Screws **B—Thermostats**



Remove Thermostat Housing



Remove Gasket and Thermostats

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OURGP12,0000127 -19-29FEB08-1/3

Testing Thermostats Opening Temperature

1. Remove thermostats.
2. Visually inspect thermostats for corrosion or damage. Replace thermostats as a matched set as necessary.
3. Inspect thermostat with ball valve in vent notch. If ball valve movement is restricted, and cleaning does not free ball valve, replace thermostat.

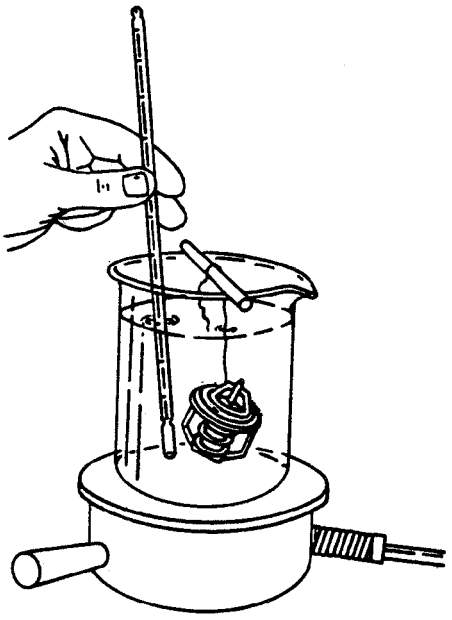
CAUTION: DO NOT allow thermostat or thermometer to rest against the side or bottom of container when heating water. Either may rupture if overheated.

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

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

ENGINE/EGR THERMOSTAT TEST SPECIFICATIONS

Rating	Initial Opening (EGR/Engine)	Full Open (Nominal)
82°C (180°F)	80—83°C (176—182°F)/ 80—84°C (176—183°F)	92°C (197°F)



RG5971 —UN—23NOV97

Thermostat and Thermometer in Water

6. 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.
7. If any one thermostat is defective, replace all thermostats.

Continued on next page

OURGP12,0000127 -19-29FEB08-2/3

To Install Thermostats

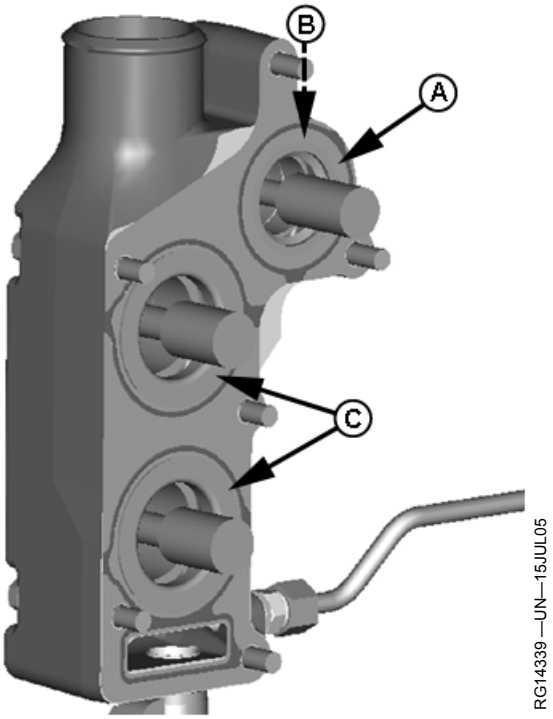
IMPORTANT: Top thermostat has a vent notch with ball valve for air bleeding. Ball valve MUST BE installed at 12 o'clock position.

1. Clean all gasket material from thermostat housing and housing mounting surfaces.
2. Install smaller (EGR) thermostat (A) in top position with ball valve at 12 o'clock position (B). Install two larger (engine) thermostats (C) in lower positions.
3. Install a **new** gasket on thermostat housing.
4. Install thermostat housing using cap screws (D) and tighten to specifications.

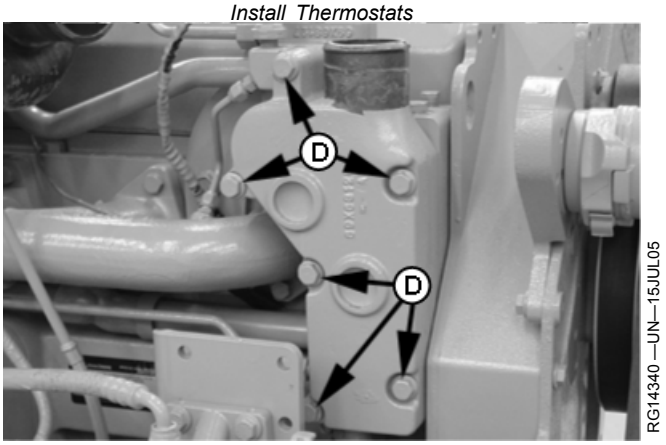
Specification	
Thermostat Housing Cap Screws—Torque	85±9 N·m (63±7 lb-ft)

5. Pressure test the cooling system a second time to be sure thermostat cover gasket is sealing properly (See Pressure Test Cooling System in Lubrication And Maintenance 500 Hour/12 Months).

A—Smaller (EGR) Thermostat
B—Ball Valve at 12 O'Clock Position
C—Larger (Engine) Thermostats
D—Cap Screws



Install Thermostats



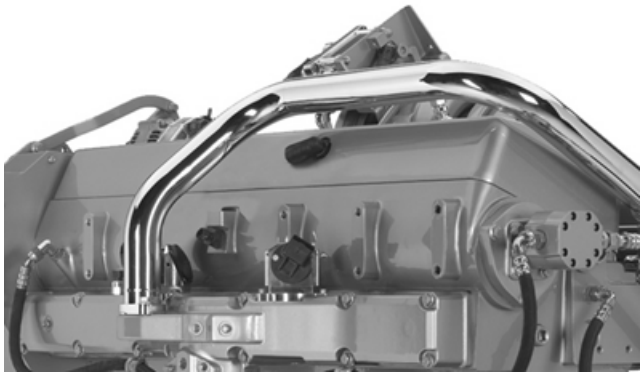
Install Thermostat Housing

OURGP12,0000127 -19-29FEB08-3/3

Checking and Adjusting Engine Valve Clearance and Electronic Unit Injector Preload

Have your John Deere engine distributor or servicing dealer adjust intake and exhaust valve clearance and electronic unit injector (EUI) preload.

This **one-time adjustment** is required for all new and overhauled 13.5L PowerTech Plus™ OEM engines after first 2500 hours of operation.



Check Valve Clearance

PowerTech Plus is a trademark of Deere & Company

OMRGP15,0000131 -19-12SEP06-1/1

Do Not Modify Fuel System

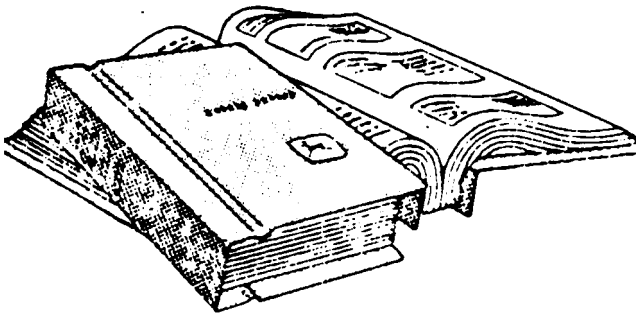
IMPORTANT: Modification or alteration of the unit fuel injectors in ways not recommended by the manufacturer will terminate the warranty obligation to the purchaser.

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.

OMRGP15,0000132 -19-29OCT10-1/1

Additional Service Information

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



RG4624 —UN—15DEC88

Component Technical Manuals

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

Adding Coolant

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

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

IMPORTANT: Never pour cold liquid into a hot engine, as it may crack cylinder head or block. DO NOT operate engine without coolant for even a few minutes.

John Deere Cooling System Sealer may be added to the radiator to stop leaks on a temporary or emergency basis only. DO NOT use any other stop-leak additives in the cooling system. Leaks should be permanently repaired as quickly as possible.

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

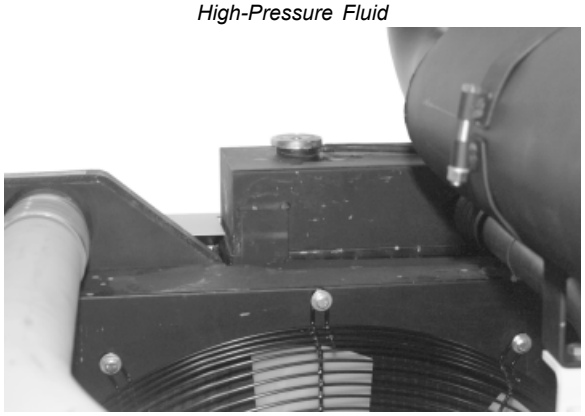
1. Loosen temperature sending unit fitting or plug in thermostat housing to allow air to escape when filling system.

IMPORTANT: When adding coolant to the system, use the appropriate coolant solution. (See DIESEL ENGINE COOLANTS, SUPPLEMENTAL ADDITIVE INFORMATION in Fuels, Lubricants, and Coolant section for mixing of coolant ingredients before adding to cooling system.)

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

TS281 —UN—23AUG88

High-Pressure Fluid



RG8735 —UN—03SEP99

Fill Cooling System

2. Fill until coolant level touches bottom of radiator filler neck or to “FULL HOT” mark on coolant recovery tank..
3. Check freeze temperature protection.
4. Tighten plugs and fittings after filling cooling system.
5. Run engine for 10 minutes to remove any air from system. Top off coolant level if required.

OURGP11,000005A -19-12OCT06-1/1

Replacing Air Cleaner Filter Elements

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

NOTE: This procedure applies to John Deere air cleaner kits. Refer to manufacturer's instructions for servicing air cleaners not supplied by John Deere.

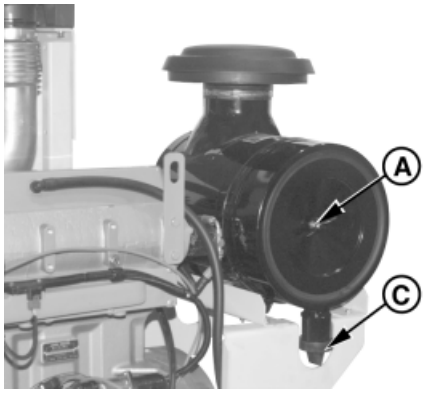
1. Remove wing nut (A) and remove canister cover and primary filter assembly (B) from canister.

IMPORTANT: Remove secondary (safety) air cleaner element (E) ONLY for replacement. DO NOT attempt to clean, wash, or reuse secondary element. Replacement of secondary element is usually necessary ONLY when primary element has a hole in it or restriction indicator green dot (•) has disappeared from window.

2. Thoroughly clean all dirt from inside canister.
3. Squeeze dust unloader valve (C) on canister to remove all dust.
4. Observe secondary (safety) element restriction indicator/retaining nut (D). If green dot (•) has disappeared from window, replace secondary element.
5. To replace secondary element, remove restriction indicator/retaining nut and secondary element. Immediately replace secondary element with new element to prevent dust from entering air intake system. Tighten restriction indicator/retaining nut to specifications.

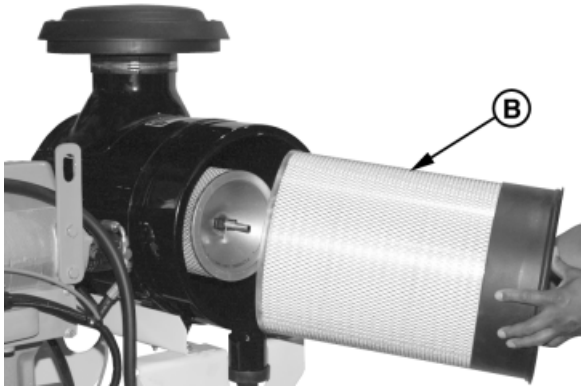
Specification	
Air Filter Restriction Indicator/Retaining Nut—Torque	14 N·m (10 lb-ft)

A—Wing Nut
B—Primary Filter Assembly
C—Unloader Valve
D—Restriction Indicator/Retaining Nut
E—Secondary Air Cleaner Element



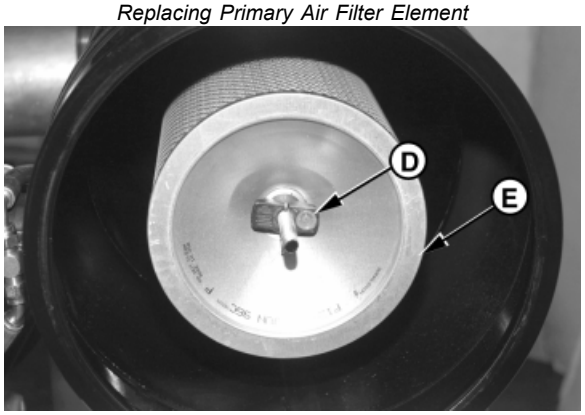
RG8731 —UN—03SEP99

Wing Nut and Unloader Valve



RG8732 —UN—03SEP99

Replacing Primary Air Filter Element



RG8733 —UN—03SEP99

Indicator/Retaining Nut for Replacing Secondary Air Filter Element

Continued on next page

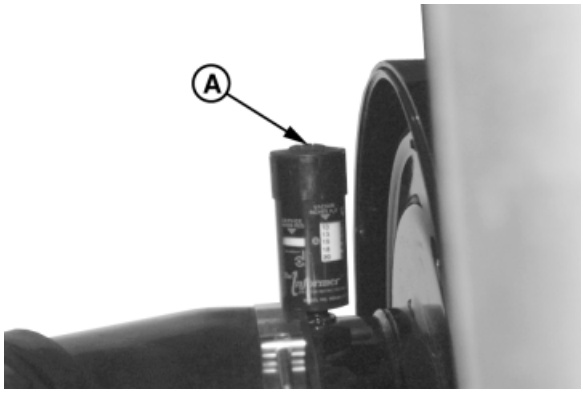
RG,RG34710,7591 -19-12SEP06-1/2

6. Install new primary assembly element and tighten 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.

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

A—Air Restriction Indicator Reset Button



RG8719B —UN—03SEP99

Air Restriction Indicator Reset Button

RG,RG34710,7591 -19-12SEP06-2/2

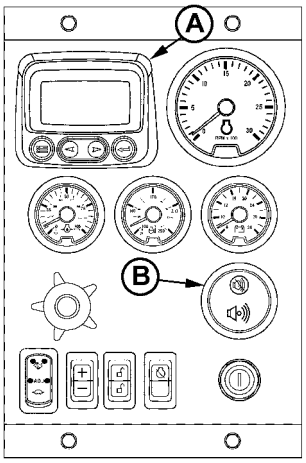
Draining Fuel Filter Water Separator Bowl

Your engine is equipped with a sensor that detects the presence of water in separator bowl mounted below fuel filter. This sensor will illuminate the red “STOP ENGINE” warning light (A) on instrument panel and also sound an audible alarm (B). A diagnostic trouble code (DTC) displayed on the diagnostic gauge will indicate that there is water in the fuel bowl (see LISTING OF DIAGNOSTIC TROUBLE CODES in Section 55).

ALWAYS STOP ENGINE IMMEDIATELY and drain water separator bowl when these warnings occur.

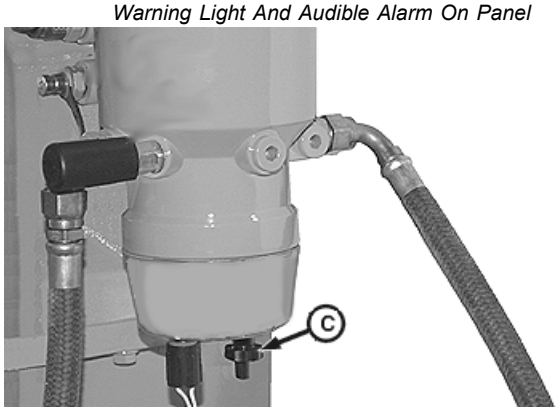
1. Drain water and contaminants from water separator sediment bowl by opening drain valve (C) and operating primer until fuel is clear of water.
2. Close drain valve.

A—Warning Light
B—Audible Alarm
C—Drain Valve



RG13882 —UN—06MAY05

Warning Light And Audible Alarm On Panel



RG12773 —UN—23JAN03

Draining Fuel Sediment Bowl (Earlier Engines shown)

OMRGP15,0000133 -19-29FEB08-1/1

Bleeding Fuel System (Earlier Engines)

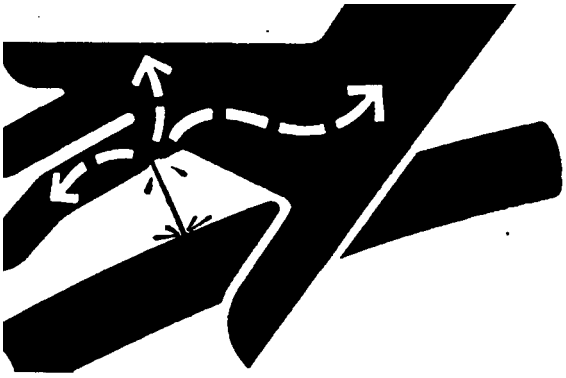
CAUTION: Escaping fluid under pressure can penetrate the skin causing serious injury. Relieve pressure before disconnecting fuel or other lines. Tighten all connections before applying pressure. Keep hands and body away from pinholes and nozzles which eject fluids under high pressure. Use a piece of 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: Fuel filter must be replaced whenever audible alarm sounds and trouble code indicates plugged filter (fuel supply pressure moderately/extremely low). Replace fuel filter at 12 month intervals (or every 500 hours) if no alarm/code indications occur.

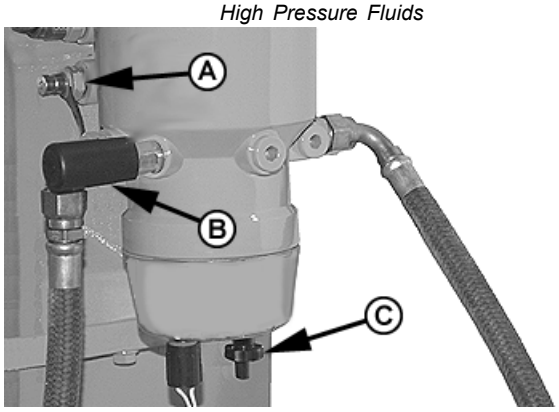
NOTE: Under normal conditions, fuel system bleeding is not required. Priming system with hand primer (B) is normally sufficient. If necessary to bleed the system, use the following procedure.

1. Drain water and contaminants from water separator sediment bowl by opening drain valve (C) and operating primer (B) until fuel is clear of water.
2. Attach an open line to diagnostic port (A) and place end of line in suitable container for diesel fuel.
3. Pump hand primer (B) until a steady flow of fuel (without bubbles) comes out of line.



X9811 —UN—23AUG88

High Pressure Fluids



RG12829 —UN—24JAN03

Bleeding Fuel System

A—Diagnostic Port
B—Hand Primer
C—Water Drain Valve

4. Disconnect line from diagnostic port.
5. Start engine and run for five minutes.

NOTE: If engine will not start after bleeding, contact your servicing dealer for an air bleed kit.

OURGP11,000005C -19-12SEP06-1/1

Bleeding Fuel System (Later Engines)

NOTE: Normally, the fuel system on these engines is self-priming and self-bleeding, and does not require a bleeding procedure by the operator.

If engine will not start after filter changes, turn ignition key ON for 60 seconds to prime the fuel system. It may be necessary to turn the key off and on again to reprime the system before starting.

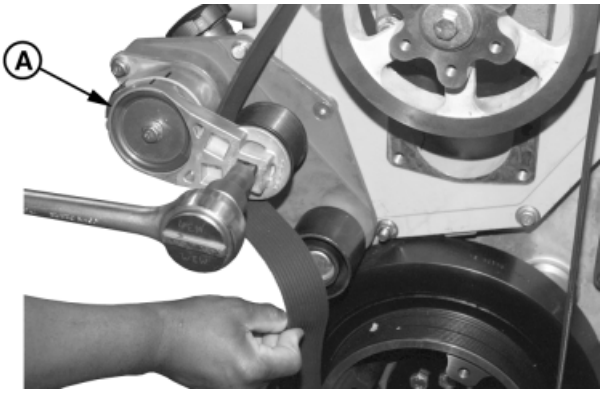
OURGP11,000005D -19-11OCT06-1/1

Replacing Fan/Alternator V-Belts

Refer to CHECKING BELT TENSIONER SPRING TENSION AND BELT WEAR in Lubrication and Maintenance/500 Hour/12 Month section to determine if V-belts need replacing.

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.

NOTE: This engine is equipped with automatic belt tensioners which do not require adjustment.



RG8743 —UN—03SEP99

Lower Tensioner

A—Lower Tensioner Arm

To Replace Lower V-Belt

IMPORTANT: ALWAYS replace belts as a matched set.

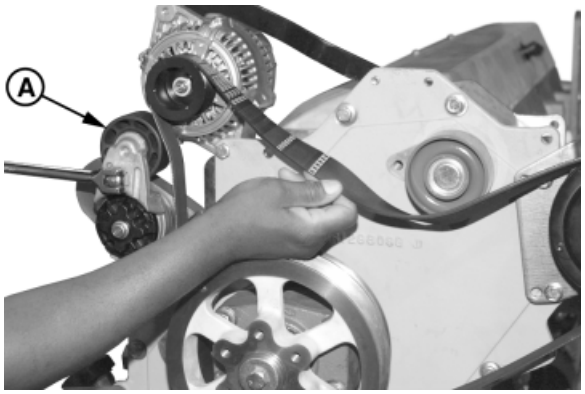
1. Release tension on lower belt using a 3/4-in. drive tool in square hole in end of lower tensioner arm (A).
2. Remove V-belt from pulleys and discard belt.
3. Install new belt; be sure that belt is correctly seated in all pulley grooves. (See V-BELT ROUTING, later in this section.)
4. Release belt tensioner to apply tension to belt. Remove drive tool.
5. Visually check belt alignment before starting engine.
6. Start engine and visually check belt alignment.

OURGP12,000013D -19-12SEP06-1/2

To Replace Upper V-Belt

IMPORTANT: ALWAYS replace belts as a matched set.

1. Remove lower V-belt as detailed earlier.
2. Release tension on upper V-belt using a 1/2-in. drive tool in upper tensioner arm (A).
3. Remove V-belt from pulleys and discard belt.
4. Install new belt; be sure that belt is correctly seated in all pulley grooves. (See V-BELT ROUTING, later in this section.)
5. Slowly release belt tensioner to apply tension to belt. Remove drive tool.
6. Check belt alignment before starting engine.
7. Install lower V-belt as detailed earlier.
8. Start engine and visually check belt alignment.



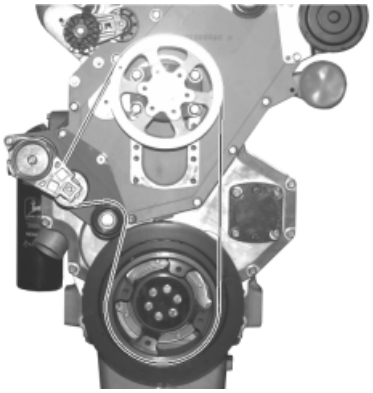
RG8744 —UN—03SEP99

Upper Tensioner

A—Upper Tensioner Arm

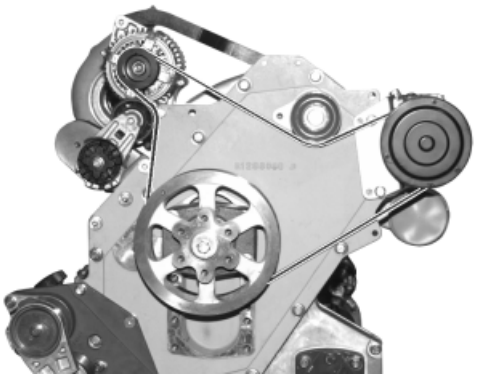
OURGP12,000013D -19-12SEP06-2/2

V-Belt Routing



RG8745 —UN—03SEP99

Lower V-Belt



RG8746 —UN—03SEP99

Upper V-Belt

Lower V-belt MUST BE removed before removing upper V-belt. Reverse sequence for V-belt installation.

RG,RG34710,7595 -19-12SEP06-1/1

Checking Fuses

The main system fuse is located in the engine wiring harness. See ENGINE WIRING DIAGRAM in Troubleshooting section.

1. Open fuse holder in wiring harness.
2. Check fuse and replace as necessary with appropriate fuse.

Fuses are also provided in wiring for engine control unit (ECU) (20-amp) and fuel filters (15-amp). (See ENGINE WIRING DIAGRAM in Troubleshooting Section.)

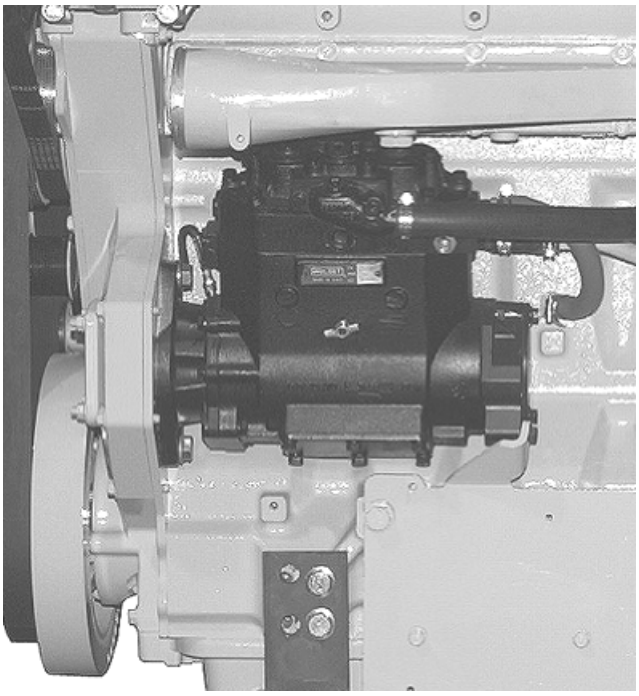
OMRGP15,0000134 -19-08NOV10-1/1

Air Compressors

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.



RG9530 —UN—24MAR99

Air Compressor (Optional)

DPSG,RG34710,104 -19-12SEP06-1/1

Rear Power Take-Off (PTO)

CAUTION: Entanglement in rotating driveline can cause serious injury or death. Keep shield on PTO driveshaft between clutch housing and the engine driven equipment at all times during engine operation. Wear close fitting clothing. Stop the engine and be sure PTO driveline is stopped before making adjustments.

If option 9201 or 9207 is ordered to make the rear PTO compatible with other manufacturer's drivelines, be sure that proper shielding is in place before operation.

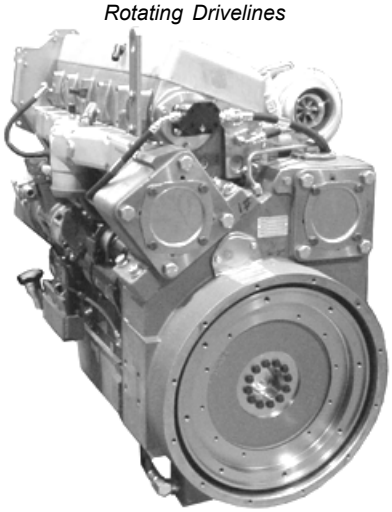
TS1644 —UN—22AUG95

Rotating Drivelines

CAUTION: Metal surfaces of PTO housing may be hot to the touch during operation or at shutdown.

The optional engine rear power take-off (PTO) from John Deere transfers engine power to auxiliary equipment or moving components which may be mounted on the vehicle or trailed behind. It is an engine-driven PTO which operates whenever the engine is running.

IMPORTANT: An additional 4.0 L (4.2 qt.) of oil must be added to the crankcase for lubrication of the rear PTO option. (See ENGINE CRANKCASE OIL FILL QUANTITIES in the Specifications section.)



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John Deere Rear PTO (Optional)

Proper performance of the power take-off unit will be related to the care it is given. Periodically check for any oil leaks that may occur.

If the power take-off does not work properly, contact your authorized servicing dealer or engine distributor.

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General Troubleshooting Information

Troubleshooting engine problems can be difficult. A list of possible engine problems that may be encountered is provided in this section accompanied by possible causes and corrections.

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

The engine control unit (ECU) has the ability to detect problems internally and in the electronic control system. This includes determining if any of the sensor input voltages are too high or too low, if the camshaft and crankshaft position sensor inputs are valid, and if the unit injector solenoids are responding properly.

If the ECU detects a problem with the electronic control system a diagnostic trouble code (DTC) specific to the failed system will be stored in the ECU's memory.

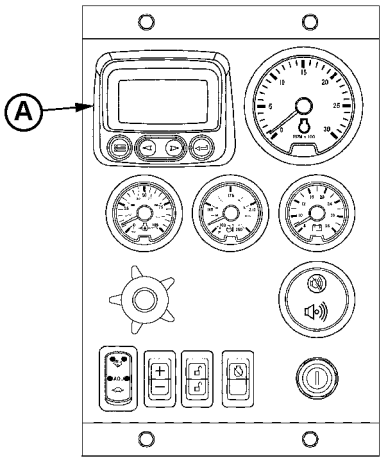
There are two types of DTC's:

- Active
- Inactive (stored)

Active DTCs indicate that the failure is occurring. These type of failures are sometimes called "hard" failures. They can be accessed on the diagnostic gauge (A) on the instrument panel.

Inactive DTCs indicate that a failure has occurred in the past, but is not currently occurring. This type of "stored" DTC can be caused by an "intermittent" failure. These could be problems such as a bad connection or a wire intermittently shorting to ground.

If a sensor or wiring fails and a DTC is active for the sensor, the ECU will use a substitute "limp home" value in its calculations to continue engine operation.



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Diagnostic Gauge On Panel

A—Diagnostic Gauge

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).

To access DTC's with the diagnostic gauge, see Section 15 of this manual.

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.*

OMRGP15,0000135 -19-12SEP06-1/1

Instrument Panel Method for Retrieving Diagnostic Trouble Codes

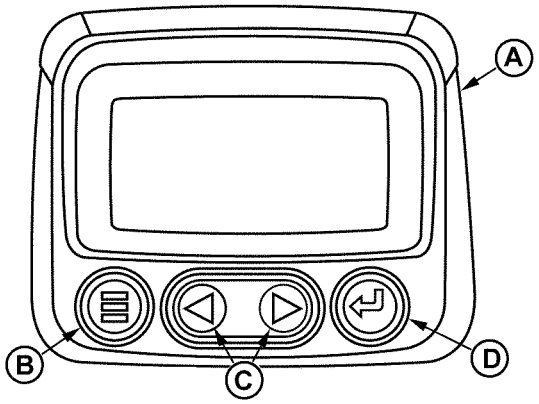
IMPORTANT: Care should be used during diagnostic procedures to avoid damaging the terminals of connectors, sensors, and actuators. Probes should not be poked into or around the terminals or damage will result. Probes should only be touched against the terminals to make measurements.

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

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

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

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



Trouble Code Display On Instrument Panel

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

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

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

OURGP12,000013E -19-12SEP06-1/1

Displaying Of Diagnostic Trouble Codes (DTCs)

SPN/FMI CODES

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

The first part is a Suspect Parameter Number (SPN) followed by a Failure Mode Identifier (FMI) code. In order to determine the exact failure, both parts (SPN and FMI) of the code are needed.

The SPN identifies the system or the component that has the failure; for example SPN 000110 indicates a failure in the engine coolant temperature circuit.

The FMI identifies the type of failure that has occurred; for example FMI 03 indicates value above normal. Combining SPN 000110 with FMI 03 yields a fault code “engine coolant temperature input voltage too high”. A corrective action will also be displayed, “check sensor and wiring”. If this check does not solve the engine fault, contact your servicing dealer.

Always contact your servicing dealer for help in correcting unsolved diagnostic trouble codes which are displayed for your engine.

OURGP12,00000F0 -19-24AUG10-1/1

Listing of Diagnostic Trouble Codes (DTCs)

NOTE: Not all of these codes are used in all engine applications.

NOTE: If the corrective actions below do not solve the engine fault, contact your servicing dealer.

SPN	FMI	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
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
000091	03	Throttle #1 Signal Out of Range High	Check Sensor and Wiring
	04	Throttle #1 Signal Out of Range Low	Check Sensor and Wiring
	09	Throttle #1 Communication Signal Erratic	Check Sensor and Wiring
000094	01	Fuel Pressure Voltage Out of Range-Most Low	Check Sensor and Wiring
	03	Low Pressure Fuel Signal Out of Range High	Check Sensor and Wiring
	04	Low Pressure Fuel Signal Out of Range Low	Check Sensor and Wiring
	10	When The Engine Is Motoring And The High Pressure Pump Is Off, The Rail Pressure Drops Too Fast	Check Sensor and Wiring
	13	Rail Pressure Test Has Failed	Check Sensor and Wiring
	17	Low Fuel Pressure Signal Slightly Low	Check Fuel Supply and Prime System
000097	03	Water in Fuel Signal Out Of Range High	Check Sensor and Wiring
	04	Water in Fuel Signal Out Of Range Low	Check Sensor and Wiring
	16	Water in Fuel Detected	Stop and Drain Water Separator
000100	01	Engine Oil Pressure Extremely Low	Check Oil Level
	03	Engine Oil Pressure Signal Out of Range High	Check Sensor and Wiring
	04	Engine Oil Pressure Signal Out of Range Low	Check Sensor and Wiring
	18	Engine Oil Pressure Signal Moderately Low	Check Oil Level
	31	Engine Oil Pressure Invalid	Contact Servicing Dealer
000102	02	Intake Manifold Pressure Signal Invalid	Check Sensor and Wiring
	03	Intake Manifold Pressure Signal Out of Range	Check Sensor and Wiring
	04	Intake Manifold Pressure Signal Out of Range Low	Check Sensor and Wiring
000103	00	Turbocharger Speed Signal Extremely High	Check Sensor and Wiring
	05	Turbocharger Speed Sensor Circuit Has High Resistance	Check Sensor and Wiring
	08	Turbocharger Speed Missing	Check Sensor and Wiring
	31	Turbocharger Speed Signal Missing	Check Sensor and Wiring
000105	00	Intake Manifold Air Temperature Signal Extremely High	Check Air Cleaner, Aftercooler, or Ambient Temperature
	03	Intake Manifold Air Temperature Signal Out Of Range High	Check Sensor and Wiring
	04	Intake Manifold Air Temperature Signal Out Of Range Low	Check Sensor and Wiring
	15	Intake Manifold Air Temperature Signal Slightly High	Check Sensor and Wiring
	16	Intake Manifold Air Temperature Signal Moderately High	Check Air Cleaner, Aftercooler, or Ambient Temperature
000107	00	Air Filter Pressure Differential Extremely High	Check for Plugged Air Filter
000108	02	Barometric Pressure Signal Invalid	Check for Plugged Air Filter
000110	00	Engine Coolant Temperature Signal Extremely High	Check Cooling System, Reduce Power
	03	Engine Coolant Temperature Signal Out Of Range High	Check Sensor and Wiring
	04	Engine Coolant Temperature Signal Out Of Range Low	Check Sensor and Wiring
	15	Engine Coolant Temperature Signal Slightly High	Check Cooling System, Reduce Power
	16	Engine Coolant Temperature Signal Moderately High	Check Cooling System, Reduce Power
	17	Engine Coolant Temperature Signal Slightly Low	Check Cooling System
000111	01	Loss Of Coolant Detected	Check Operator's Manual
000157	01	Low-Pressure Fuel Pressure Low - Most Severe Level	Check Sensor and Wiring
	03	Fuel Rail Pressure Signal Out of Range High	Check Sensor and Wiring
	04	Fuel Rail Pressure Signal Out of Range Low	Check Sensor and Wiring
	16	Low-Pressure Fuel Pressure High	Check Sensor and Wiring

Continued on next page

SPN	FMI	Fault	Corrective Action
	18	Low-Pressure Fuel Pressure Low - Moderately Severe Level	Check Sensor and Wiring
000158	17	ECU Power Down Error	Contact Servicing Dealer
000174	00	Fuel Temperature Signal Extremely High	Add Fuel or Switch Fuel Tanks
	03	Fuel Temperature Signal Out of Range High	Check Sensor and Wiring
	04	Fuel Temperature Signal Out of Range Low	Check Sensor and Wiring
	16	Fuel Temperature Signal Moderately High	Check Sensor and Wiring
000189	31	Engine Speed Derate Condition Exists	Contact Servicing Dealer
000190	00	Engine Speed Extremely High	Reduce Engine Speed
000237	02	VIN Security Data Invalid	Contact Servicing Dealer
	13	VIN Option Code Security Data Conflict	Contact Servicing Dealer
	31	VIN Security Data Missing	Contact Servicing Dealer
000412	00	EGR Temperature Signal Extremely High	Check Sensor and Wiring
	03	EGR Temperature Signal Out of Range High	Check Sensor and Wiring
	04	EGR Temperature Signal Out of Range Low	Check Sensor and Wiring
	15	EGR Temperature Signal Slightly High	Check Sensor and Wiring
	16	EGR Temperature Signal Moderately High	Check Sensor and Wiring
000611	03	Injector Shorted to Power	Check Wiring
	04	Injector Shorted to Ground	Check Wiring
000629	13	ECU Programming Error	Contact Servicing Dealer
	19	ECU Failure	Contact Servicing Dealer
000632	02	Fuel Shutoff Valve Error	Check Sensor and Wiring
	05	Fuel Shutoff Valve Failure	Check Sensor and Wiring
	11	Fuel Shutoff Valve Open or Shorted	Check Sensor and Wiring
000636	02	Engine Position Sensor Signal Invalid	Check Sensor and Wiring
	05	Engine Position Sensor Circuit Has High Resistance	Check Sensor and Wiring
	06	Engine Position Sensor Circuit Has Low Resistance	Check Sensor and Wiring
	08	Engine Position Sensor Signal Missing	Check Sensor and Wiring
	10	Engine Position Sensor Signal Rate Of Charge Abnormal	Check Sensor and Wiring
000637	02	Engine Timing Sensor Signal Invalid	Check Sensor and Wiring
	05	Engine Position Sensor Circuit Has High Resistance	Check Sensor and Wiring
	06	Engine Position Sensor Circuit Has Low Resistance	Check Sensor and Wiring
	07	Engine Timing And Position Signals Out Of Sync	Check Sensor and Wiring
	08	Engine Timing Sensor Signal Missing	Check Sensor and Wiring
	10	Crank Position Input Pattern Error	Check Sensor and Wiring
000639	13	CAN Bus Failure	Check Sensor and Wiring
000640	11	External Engine Protection Input	Check Sensor and Wiring
	13	External Derate Commanded	Check Sensor and Wiring
000641	04	VGT Actuator Supply Voltage Out of Range Low	Check Sensor and Wiring
	12	VGT Actuator Communication Error	Check Sensor and Wiring
	13	VGT Actuator Learn Error	Check Sensor and Wiring
	16	Turbo Actuator Temperature Moderately High	Check Sensor and Wiring
000644	02	External Speed Command Output	Check Sensor and Wiring
000651	05	Injector #1 Circuit Has High Resistance	Check Injector Wiring or Injector Solenoid
	06	Injector #1 Has Low Resistance	Check Injector Wiring or Injector Solenoid
	07	The Injector Fuel Flow At Cylinder #1 Is Lower Than Expected.	Injector Failed or Flow Limiter Closed
	13	Injector #1 Calibration Fault	Check Injector Wiring or Injector Solenoid
000652	05	Injector #2 Circuit Has High Resistance	Check Injector Wiring or Injector Solenoid
	06	Injector #2 Has Low Resistance	Check Injector Wiring or Injector Solenoid
	07	The Injector Fuel Flow At Cylinder #2 Is Lower Than Expected.	Injector Failed or Flow Limiter Closed
	13	Injector #2 Calibration Fault	Check Injector Wiring or Injector Solenoid

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SPN	FMI	Fault	Corrective Action
000653	05	Injector #3 Circuit Has High Resistance	Check Injector Wiring or Injector Solenoid
	06	Injector #3 Has Low Resistance	Check Injector Wiring or Injector Solenoid
	07	The Injector Fuel Flow At Cylinder #3 Is Lower Than Expected.	Injector Failed or Flow Limiter Closed
	13	Injector #3 Calibration Fault	Check Injector Wiring or Injector Solenoid
000654	05	Injector #4 Circuit Has High Resistance	Check Injector Wiring or Injector Solenoid
	06	Injector #4 Has Low Resistance	Check Injector Wiring or Injector Solenoid
	07	The Injector Fuel Flow At Cylinder #4 Is Lower Than Expected.	Injector Failed or Flow Limiter Closed
	13	Injector #4 Calibration Fault	Check Injector Wiring or Injector Solenoid
000655	05	Injector #5 Circuit Has High Resistance	Check Injector Wiring or Injector Solenoid
	06	Injector #5 Has Low Resistance	Check Injector Wiring or Injector Solenoid
	07	The Injector Fuel Flow At Cylinder #5 Is Lower Than Expected.	Injector Failed or Flow Limiter Closed
	13	Injector #5 Calibration Fault	Check Injector Wiring or Injector Solenoid
000656	05	Injector #6 Circuit Has High Resistance	Check Injector Wiring or Injector Solenoid
	06	Injector #6 Has Low Resistance	Check Injector Wiring or Injector Solenoid
	07	The Injector Fuel Flow At Cylinder #6 Is Lower Than Expected.	Injector Failed or Flow Limiter Closed
	13	Injector #6 Calibration Fault	Check Injector Wiring or Injector Solenoid
000676	03	Glow Plug Relay	Contact Servicing Dealer
	05	Glow Plug Relay	Contact Servicing Dealer
000729	03	Inlet Air Heater Signal Received When Not Expected	Contact Servicing Dealer
	04	Inlet Air Heater Signal Not Received When Expected	Contact Servicing Dealer
000833	02	Rack Position Sensor Error	Contact Servicing Dealer
	03	Rack Position Sensor Voltage High	Contact Servicing Dealer
	04	Rack Position Sensor Voltage Low	Contact Servicing Dealer
000834	02	Rack Actuator Error	Contact Servicing Dealer
	03	Rack Actuator Voltage High	Contact Servicing Dealer
	05	Rack Actuator Voltage Open	Contact Servicing Dealer
	06	Rack Actuator Voltage Grounded	Contact Servicing Dealer
	07	Rack Actuator Position Error	Contact Servicing Dealer
000970	02	Auxiliary Engine Shutdown Switch Signal Invalid	Check Switch And Wiring
	11	External Engine Protection Shutdown Switch Signal Active	Check Switch And Wiring
	31	External Shutdown Commanded	Check Switch And Wiring
000971	31	External Derate Commanded	Check Switch And Wiring
001041	02	Start Signal Indicator Failure	Check Switch And Wiring
	03	Start Signal Indicator Active	Check Switch And Wiring
001075	05	Low Pressure Fuel Pump Circuit Has High Resistance	Contact Servicing Dealer
	06	Fuel Transfer Pump Current High or Grounded Circuit (Racor Fuel Pump Only)	Contact Servicing Dealer
	08	Fuel Transfer Pump Failure	Contact Servicing Dealer
	12	Low Pressure Fuel Pump Error Detected	Contact Servicing Dealer
001076	00	Fuel Injection Pump Control Error	Contact Servicing Dealer
	01	Fuel Injection Pump Control Error	Contact Servicing Dealer
	02	Fuel Injection Pump Control Error	Contact Servicing Dealer
	03	Fuel Injection Pump Control Error	Contact Servicing Dealer
	05	Fuel Injection Pump Control Error	Contact Servicing Dealer
	06	Fuel Injection Pump Control Error	Contact Servicing Dealer
	07	Fuel Injection Pump Control Error	Contact Servicing Dealer
	10	Fuel Injection Pump Control Error	Contact Servicing Dealer
	13	Fuel Injection Pump Control Error	Contact Servicing Dealer
001077	07	Fuel Injection Pump Controller	Contact Servicing Dealer

Continued on next page

SPN	FMI	Fault	Corrective Action
	11	Fuel Injection Pump Controller	Contact Servicing Dealer
	12	Fuel Injection Pump Controller	Contact Servicing Dealer
	19	Fuel Injection Pump Controller	Contact Servicing Dealer
	31	Fuel Injection Pump Controller	Contact Servicing Dealer
001078	07	Fuel Injection Pump Speed/Position Sensor Error	Contact Servicing Dealer
	11	Fuel Injection Pump Speed/Position Sensor Error	Contact Servicing Dealer
	31	Fuel Injection Pump Speed/Position Sensor Failure	Contact Servicing Dealer
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	The Sensor Supply Voltage To The Rail Pressure Sensor Is Too High	Check Wiring
	04	The Sensor Supply Voltage To The Rail Pressure Sensor Is Too Low	Check Wiring
001109	31	Engine Not Available or Condition Exists	Check Fault Codes
001110	31	Engine Protection Shutdown	Check Fault Codes
001136	00	ECU Temperature Signal Extremely High	Check Sensor and Wiring
	16	ECU Temperature Signal Moderately High	Check Sensor and Wiring
001172	03	Compressor Inlet Temperature Signal Out of Range High	Check Sensor and Wiring
	04	Compressor Inlet Temperature Signal Out of Range Low	Check Sensor and Wiring
001180	00	Turbine Inlet Temperature Signal Extremely High	Contact Servicing Dealer
	16	Turbine Inlet Temperature Signal Moderately High	Contact Servicing Dealer
001347	05	The Circuit To Pump Solenoid #1 Is Open, Shorted To Ground, Or Overloaded	Check Pump Wiring
	07	High Pressure Fuel Pump Not Able to Meet Required Rail Pressure	Check Fuel Filter and Lines
	10	Pump Element #1 Is Not Delivering Expected Fuel Flow	Check Fuel Filter and Lines
001348	05	The Circuit To Pump Solenoid #2Is Open, Shorted To Ground, Or Overloaded	Contact Servicing Dealer
	10	Pump Element #2 Is Not Delivering Expected Fuel Flow	Check Fuel Filter and Lines
001485	02	ECU Main Relay Pump Error	Contact Servicing Dealer
001568	02	Requested Torque Curve Signal Unreliable	Contact Servicing Dealer
001569	31	Engine In Derate Condition	Check Fault Codes
001639	01	Fan Speed Signal Missing	Contact Servicing Dealer
	16	Fan Speed Moderately High	Contact Servicing Dealer
	18	Fan Speed Moderately Low	Contact Servicing Dealer
002000	06	Fuel Injection Pump Control Valve Error	Contact Servicing Dealer
	13	Security Violation Controller Not Installed	Contact Servicing Dealer
002005	09	ACU Message Missing	Contact Servicing Dealer
	14	Communication Error	Contact Servicing Dealer
002030	09	VLC Message Missing	Contact Servicing Dealer
002071	09	CCU Message Missing	Contact Servicing Dealer
002630	00	Charge Air Cooler Outlet Temperature Signal Extremely High	Check Sensor and Wiring
	03	Charge Air Cooler Outlet Temperature Signal Out of Range High	Check Sensor and Wiring
	04	Charge Air Cooler Outlet Temperature Signal Out of Range Low	Check Sensor and Wiring
	15	Charge Air Cooler Outlet Temperature Signal Slightly High	Check Sensor and Wiring
	16	Charge Air Cooler Outlet Temperature Signal Moderately High	Check Sensor and Wiring
002659	02	EGR Mass Flow Rate Data Invalid	Contact Servicing Dealer
	15	EGR Mass Flow Rate Data Slightly High	Contact Servicing Dealer
	17	EGR Mass Flow Rate Data Slightly Low	Contact Servicing Dealer
002790	16	Calculated Turbine Outlet Temperature Moderately High	Contact Servicing Dealer

Continued on next page

SPN	FMI	Fault	Corrective Action
002791	02	EGR Valve Position Signal Invalid	Contact Servicing Dealer
	03	EGR Valve Position Signal Out of Range High	Check Sensor and Wiring
	04	EGR Valve Position Signal Out of Range Low	Check Sensor and Wiring
	07	EGR Valve Not Reaching Expected Position	Contact Servicing Dealer
	13	ERG Valve Calibration Change Error	Contact Servicing Dealer
	31	EGR Valve Calibration Change Over A Long Time	Contact Servicing Dealer
002795	07	VGT Actuator Not Reaching Expected Position	Contact Servicing Dealer
003509	03	Sensor Supply #1 Voltage Out of Range High	Check Sensor and Wiring
	04	Sensor Supply #1 Voltage Out of Range Low	Check Sensor and Wiring
003510	03	Sensor Supply #2 Voltage Out of Range High	Check Sensor and Wiring
	04	Sensor Supply #2 Voltage Out of Range Low	Check Sensor and Wiring
003511	03	Sensor Supply #3 Voltage Out of Range High	Check Sensor and Wiring
	04	Sensor Supply #3 Voltage Out of Range Low	Check Sensor and Wiring
003512	03	Sensor Supply #4 Voltage Out of Range High	Check Sensor and Wiring
	04	Sensor Supply #4 Voltage Out of Range Low	Check Sensor and Wiring
003513	03	Sensor Supply #5 Voltage Out of Range High	Check Sensor and Wiring
	04	Sensor Supply #5 Voltage Out of Range Low	Check Sensor and Wiring
003822	02	EGR Valve Position Signal Invalid	Check Sensor and Wiring
	03	Valve Position Signal Out of Range High	Check Sensor and Wiring
	04	EGR Valve Position Signal Out of Range Low	Check Sensor and Wiring
	07	EGR Valve Not Reaching Expected Position	Contact Servicing Dealer
	13	ERG Valve Calibration Change Error	Contact Servicing Dealer
	31	EGR Valve Calibration Change Over A Long Time	Contact Servicing Dealer
064981	02	EGR Valve Sensor] Voltage (Second)-Error	Check Wiring
	03	EGR Valve Sensor Voltage (Second)-High	Check Wiring
	04	EGR Valve Sensor Voltage (Second)-Low	Check Wiring
	05	EGR Valve Sensor Current (Second)-Low or Open Circuit	Check Wiring
	06	EGR Valve Sensor Voltage (Second)-Low or Grounded Circuit	Check Wiring
	07	EGR Valve (Second)-Error	Check Wiring
	13	EGR Valve Out of Calibration (Second)	Check Wiring
	14	EGR Valve Drive Current (Second)-High	Check Wiring
	31	EGR Valve Position (Second)-Error	Check Wiring

NOTE: Diagnostic gauge on instrument panel may also display text for communication faults, for example, "CAN BUS FAILURE". Contact your servicing dealer.

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Intermittent Fault Diagnostics

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 faults 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 connector terminals, damaged connectors, poorly positioned terminals, and corroded or damaged 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 diagnostic charts on preceding pages indicate that 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:

1. Faulty connection between sensor or actuator and harness.
2. Faulty contact between terminals in connector.
3. 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 later in this section as a guide to connections and wires.

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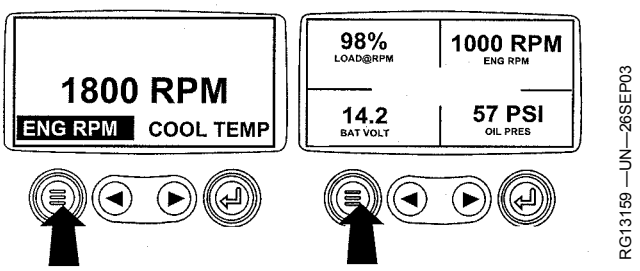
Displaying Diagnostic Gauge Software

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.

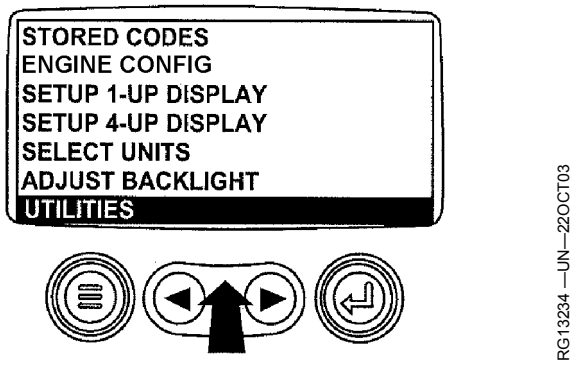
1. Starting at the single or four engine parameter display, press the "Menu" key.



Menu Key

OMRGP15,000013F -19-12NOV10-1/4

2. The main menu will be displayed. Use the "Arrow" key to scroll through the menu until "Utilities" is highlighted.



Select Utilities

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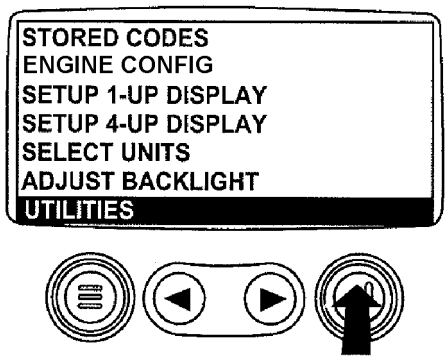
3. Once "Utilities" is highlighted, press "Enter" to activate the utilities function.



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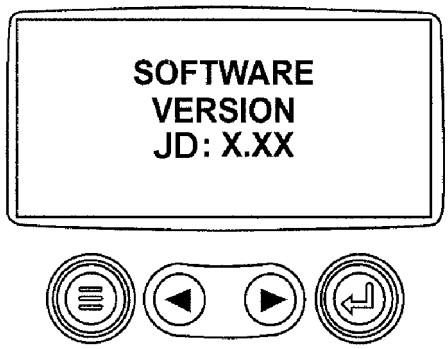
Select Utilities

OMRGP15,000013F -19-12NOV10-3/4

4. Scroll to the "Software Version". Press "Enter" to view the software version. Press the menu button twice to return to the main menu.



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Software Version

OMRGP15,000013F -19-12NOV10-4/4

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 Will Not Crank	Weak battery	Replace battery.
	Corroded or loose battery connections	Clean battery terminals and connections.
	Defective main switch or start safety switch	Repair switch as required.
	Starter solenoid defective	Replace solenoid.
	Starter defective	Replace starter.
Hard to Start or Will Not Start	Poor fuel quality	Drain fuel and replace with quality fuel of the proper grade.
	Slow cranking speed	Check for problem in the charging/starting system.
	Too high viscosity crankcase oil	Drain crankcase oil and replace with correct viscosity oil.
	Electronic control system problem or basic engine problem	See your John Deere engine distributor or servicing dealer.
Engine Misfiring or Runs Irregularly	Electronic control system problem or basic engine problem	See your John Deere engine distributor or servicing dealer.
Lack of Engine Power	Poor fuel quality	Drain fuel and replace with quality fuel of the proper grade.
	Plugged fuel filter	Replace fuel filters.
	Engine overloaded	Reduce engine load.
	Improper crankcase oil	Drain crankcase oil and replace with correct viscosity oil.
	Electronic control system problem or basic engine problem	See your John Deere engine distributor or servicing dealer.
	Poor EGR valve (if equipped) wiring harness connection	Check EGR valve wiring harness for good connection (make sure it clicks).
Black or Gray Exhaust Smoke	Engine overloaded	Reduce engine load.
	Engine burning oil	See LUBRICATION SYSTEM TROUBLESHOOTING, later in this section.

Continued on next page

Symptom	Problem	Solution
	Air cleaner restricted or dirty	Replace air cleaner element as required.
	Defective muffler/exhaust piping (causing back-pressure)	Replace muffler or defective piping.
	Electronic control system problem or basic engine problem	See your John Deere engine distributor or servicing dealer.
White Exhaust Smoke	Engine compression too low	Determine cause of low compression and repair as required. See your John Deere engine distributor or servicing dealer.
	Defective thermostat(s) (does not close)	Test thermostats; replace thermostats as required. (See Service as Required section.)
	Coolant entering combustion chamber (failed cylinder head gasket or cracked cylinder head)	Repair or replace as required. See your John Deere engine distributor or servicing dealer.
Engine Idles Poorly	Poor fuel quality	Drain fuel and replace with quality fuel of the proper grade.
	Air leak on suction side of air intake system	Check hose and pipe connections for tightness; repair as required.
	Electronic control system problem or basic engine problem	See your John Deere engine distributor or servicing dealer.

OURGP11,0000073 -19-29FEB08-2/2

Engine Troubleshooting (Continued)

Symptom	Problem	Solution
Excessive Fuel Consumption	Poor fuel quality	Drain fuel and replace with quality fuel of the proper grade.
	Engine overloaded	Reduce engine load.
	Air cleaner restricted or dirty	Replace air cleaner element as required.
	Compression too low	Determine cause of low compression and repair as required.
	Leaks in fuel supply system	Locate source of leak and repair as required.
Abnormal Engine Noise	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 timing gears or excess backlash	Check timing gear backlash. See your John Deere engine distributor or servicing dealer.
	Excessive valve clearance	Check and adjust valve clearance. See your John Deere engine distributor or servicing dealer.

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OMRGP15,000013A -19-11NOV10-1/2

Symptom	Problem	Solution
Abnormal Engine Noise *NOTE: Variable geometry turbocharger recycles after starting engine, causing a momentary revving sound in the engine. This is normal.* *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.*	Worn camshaft lobes	Inspect camshaft. See your John Deere engine distributor or servicing dealer.
	Worn rocker arm shaft(s)	Inspect rocker arm shafts. See your John Deere engine distributor or servicing dealer.
	Insufficient engine lubrication	See LUBRICATION SYSTEM TROUBLESHOOTING, later in this section.
	Turbocharger noise	See AIR INTAKE SYSTEM TROUBLESHOOTING, later in this section.

OMRGP15,000013A -19-11NOV10-2/2

Electrical Troubleshooting

Symptom	Problem	Solution
Undercharged system	Excessive electrical load from added accessories.	Remove accessories or install higher output alternator.
	Excessive engine idling.	Increase engine rpm when heavy electrical load is used.
	Poor electrical connections on battery, ground strap, starter, or alternator.	Inspect and clean as necessary.
	Defective battery.	Test batteries.
	Defective alternator.	Test charging system.
Battery used too much water	Cracked battery case.	Check for moisture and replace as necessary.
	Battery charging rate too high.	Test charging system.
Batteries will not charge	Loose or corroded connections.	Clean and tighten connections.
	Sulfated or worn-out batteries.	See your authorized servicing dealer or engine distributor.
	Stretched belt or defective belt tensioner.	Adjust belt tension or replace belts.
Starter will not crank	Engine drivelines engaged.	Disengage engine drivelines.
	Loose or corroded connections.	Clean and tighten loose connections.
	Low battery output voltage or discharged battery.	Charge or replace batteries.
	Faulty start circuit relay.	See your authorized servicing dealer or engine distributor.
	Blown fuse.	Replace fuse.
		Clean battery terminals and connections.
	Defective main switch or start safety switch	Repair switch as required.
	Starter solenoid defective	Replace solenoid.
	Starter defective	Replace starter.
Starter cranks slowly	Low battery output.	Charge batteries.
	Crankcase oil too heavy.	Use proper viscosity oil.
	Loose or corroded connections.	Clean and tighten loose connections.

Continued on next page

Symptom	Problem	Solution
Starter and hour meter functions; rest of electrical system does not function	Blown fuse on magnetic switch.	Replace fuse.
Entire electrical system does not function	Faulty battery connection.	Clean and tighten connections.
	Sulfated or worn-out batteries.	Replace batteries.
	Blown fuse.	Replace fuse.

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Lubrication System Troubleshooting

Symptom	Problem	Solution
Low Oil Pressure	Low crankcase oil level	Fill crankcase to proper oil level.
	Crankcase oil level too high	Fill crankcase to proper oil level.
	Faulty pressure sensor	Replace sensor. See your John Deere engine distributor or servicing dealer.
	Clogged oil cooler or filter	Remove and inspect oil cooler. See your John Deere engine distributor or servicing dealer.
	Excessive oil temperature	Remove and inspect oil cooler. See your John Deere engine distributor or servicing dealer.
	Defective oil pump	Remove and inspect oil pump. See your John Deere engine distributor or servicing dealer.
	Incorrect oil	Drain crankcase and refill with correct oil.
	Oil pressure regulating valve failure	Remove and inspect oil pressure regulating valve. See your John Deere engine distributor or servicing dealer.
	Broken piston spray nozzle	Replace piston spray nozzle. See your John Deere engine distributor or servicing dealer.
	Clogged oil pump screen or cracked pick-up tube	Remove oil pan and clean screen/replace pick-up tube.
	Excessive main or connecting rod bearing clearance	Determine bearing clearance. See your John Deere engine distributor or servicing dealer.
High Oil Pressure	Improper oil classification	Drain crankcase and refill with correct oil.
	Faulty pressure sensor	Replace sensor. See your John Deere engine distributor or servicing dealer.
	Oil pressure regulating valve bushing loose (wanders)	Remove and inspect oil pressure regulating valve. See your John Deere engine distributor or servicing dealer.
	Improperly operating regulating valve	Remove and inspect oil pressure regulating valve. See your John Deere engine distributor or servicing dealer.

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Symptom	Problem	Solution
	Plugged piston spray nozzle	Replace piston spray nozzle. See your John Deere engine distributor or servicing dealer.
	Stuck or damaged filter bypass valve	Remove and inspect filter bypass valve. See your John Deere engine distributor or servicing dealer.
	Stuck or damaged oil cooler bypass valve	Remove and inspect oil cooler bypass valve. See your John Deere engine distributor or servicing dealer.
Excessive Oil Consumption	Too low viscosity crankcase oil	Drain crankcase and refill with correct viscosity oil.
	Crankcase oil level too high	Drain oil until oil level is correct.
	External oil leak(s)	Determine source of oil leak(s) and repair as required.
	Oil control rings not seated	See your John Deere engine distributor or servicing dealer.
	Oil control rings worn or broken	Replace piston rings. See your John Deere engine distributor or servicing dealer.
	Scored cylinder liners or pistons	Remove and inspect cylinders and liners; replace as required. See your John Deere engine distributor or servicing dealer.
	Worn valve guides or stems	Inspect and measure valve stems and valve guides; repair as required. See your John Deere engine distributor or servicing dealer.
	Excessive oil pressure	See High Oil Pressure above.
	Piston ring grooves excessively worn	Remove and inspect pistons. See your John Deere engine distributor or servicing dealer.
	Piston rings sticking in ring grooves	Remove and inspect pistons. See your John Deere engine distributor or servicing dealer.
	Insufficient piston ring tension	Remove and inspect pistons. See your John Deere engine distributor or servicing dealer.
	Piston ring gaps not staggered	Remove and inspect pistons. See your John Deere engine distributor or servicing dealer.

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Symptom	Problem	Solution
	Front and/or rear crankshaft oil seal faulty	Replace oil seals. See your John Deere engine distributor or servicing dealer. See LOW PRESSURE FUEL SYSTEM TROUBLESHOOTING later in this section.
Fuel in Oil		See LOW PRESSURE FUEL SYSTEM TROUBLESHOOTING later in this section.
Coolant in Oil		See COOLING SYSTEM TROUBLESHOOTING later in this section.

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Cooling System Troubleshooting

Symptom	Problem	Solution
Engine Overheats	Lack of coolant in cooling system	Fill cooling system to proper level.
	Radiator core and/or side screens dirty	Clean radiator as required.
	Engine overloaded	Reduce engine load.
	Too low crankcase oil level	Fill crankcase to proper oil level.
	Loose or defective fan belt	Replace fan belt as required. Check belt tensioner. (See Lubrication and Maintenance 500 Hour/12 Month section.)
	Defective thermostat(s)	Test thermostat opening temperature; replace thermostats as required. (See Lubrication and Maintenance 2000 Hour/24 Month section.)
	Damaged cylinder head gasket	Replace cylinder head gasket. See your John Deere engine distributor or servicing dealer.
	Defective coolant pump	Replace coolant pump. See your John Deere engine distributor or servicing dealer.
	Defective radiator cap	Replace radiator cap as required.
Coolant in Crankcase	Cylinder head gasket defective	Replace cylinder head gasket. See your John Deere engine distributor or servicing dealer.
	Cylinder head or block cracked	Locate crack, repair/replace components as required.
	Cylinder liner seals leaking	Remove and inspect cylinder liners. See your John Deere engine distributor or servicing dealer.
	Leaking oil cooler	Pressure test oil cooler; repair/replace as required. See your John Deere engine distributor or servicing dealer.
	Defective oil cooler O-rings	Remove and inspect oil cooler O-rings; replace as required. See your John Deere engine distributor or servicing dealer.
	Faulty coolant pump seal; weep hole plugged; coolant leaking through bearing	Replace coolant pump seals. See your John Deere engine distributor or servicing dealer.

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Symptom	Problem	Solution
	Faulty injector sleeve O-ring and EUI O-rings faulty	Remove suspected EUI; replace O-rings as required. See your John Deere engine distributor or servicing dealer.
Coolant Temperature Below Normal	Defective thermostat(s)	Test thermostats; replace thermostats as required. (See Service as Required section.)

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Air Intake and Exhaust System Troubleshooting

If turbocharger requires replacement, determine what caused the failure of the defective unit, and correct the condition. This will prevent an immediate repeat failure of the replacement unit.

Symptom	Problem	Solution
Hard to Start or Will Not Start		See ENGINE TROUBLESHOOTING earlier in this section.
Engine Misfiring or Runs Irregularly		See ENGINE TROUBLESHOOTING earlier in this section.
Black or Grey Exhaust Smoke		See ENGINE TROUBLESHOOTING earlier in this section.
Lack of Engine Power		See ENGINE TROUBLESHOOTING earlier in this section.
Turbocharger "Screams"	Air leak in intake manifold.	Check intake manifold gasket and manifold; repair as required. See your John Deere engine distributor or servicing dealer.
Turbocharger Noise or Vibration *NOTE: Variable geometry turbocharger recycles after starting engine, causing a momentary revving sound in the engine. This is normal.* *Do not confuse the whine heard during run down with noise which indicates a bearing failure.*	Bearings not lubricated (insufficient oil pressure)	Determine cause of lack of lubrication; repair as required. See your John Deere engine distributor or servicing dealer.
	Air leak in engine intake or exhaust manifold	Check intake and exhaust manifold gaskets and manifolds; repair as required. See your John Deere engine distributor or servicing dealer.
	Improper clearance between turbine wheel and turbine housing	Inspect turbocharger; repair/replace as required. See your John Deere engine distributor or servicing dealer.
	Broken blades (or other wheel failures)	Inspect turbocharger; repair/replace as required. See your John Deere engine distributor or servicing dealer.
Oil on Turbocharger Compressor Wheel or in Compressor Housing (Oil Being Pushed or Pulled through Center Housing)	Excessive crankcase pressure.	Determine cause of excessive crankcase pressure; repair as required. See your John Deere engine distributor or servicing dealer.
	Air intake restriction	Determine cause of intake restriction; repair as required. See your John Deere engine distributor or servicing dealer.

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Symptom	Problem	Solution
	Drain tube restriction	Determine cause of drain tube restriction; repair as required. See your John Deere engine distributor or servicing dealer.
Oil in Intake Manifold or Dripping from Turbocharger Housing	Excessive crankcase pressure	Determine cause of excessive crankcase pressure; repair as required. See your John Deere engine distributor or servicing dealer.
	Air intake restriction	Determine cause of intake restriction; repair as required. See your John Deere engine distributor or servicing dealer.
	Drain tube restriction	Determine cause of drain tube restriction; repair as required. See your John Deere engine distributor or servicing dealer.
	Damaged or worn housing bearings	Inspect turbocharger; repair/replace as required. See your John Deere engine distributor or servicing dealer.
	Unbalance of rotating assembly	Inspect turbocharger; repair/replace as required. See your John Deere engine distributor or servicing dealer.
	Damage to turbine or compressor wheel or blade	Inspect turbocharger; repair/replace as required. See your John Deere engine distributor or servicing dealer.
	Dirt or carbon build-up on wheel or blade	Check for air intake leaks (post air filter). Inspect turbocharger; repair/replace as required. See your John Deere engine distributor or servicing dealer.
	Bearing wear	Inspect turbocharger; repair/replace as required. See your John Deere engine distributor or servicing dealer.
	Oil starvation or insufficient lubrication	Determine cause of lack of lubrication; repair as required. See your John Deere engine distributor or servicing dealer.
	Shaft seals worn	Inspect turbocharger; repair/replace as required. See your John Deere engine distributor or servicing dealer.
Turbocharger Turbine Wheel Drag	Carbon build-up behind turbine wheel caused by coked oil or combustion deposits	Inspect turbocharger; repair/replace as required. See your John Deere engine distributor or servicing dealer.

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Symptom	Problem	Solution
	Dirt build-up behind compressor wheel caused by air intake leaks	Inspect turbocharger; repair/replace as required. See your John Deere engine distributor or servicing dealer.
	Bearing seizure or dirty, worn bearings	Inspect turbocharger; repair/replace as required. See your John Deere engine distributor or servicing dealer.

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Low Pressure Fuel System Troubleshooting

Symptom	Problem	Solution
Fuel in Oil	Cracked or worn electronic unit injector (EUI) O-ring	Remove suspected EUI; replace EUI O-ring as required. See your John Deere engine distributor or servicing dealer.
	Cracked cylinder head	Locate crack; repair/replace components as required. See your John Deere engine distributor or servicing dealer.
Fuel Aeration	EUI hold-down clamp loose	Tighten hold-down clamp cap screw to proper torque. See your John Deere engine distributor or servicing dealer.
	Cracked or worn electronic unit injector (EUI) O-ring	Remove suspected EUI; replace EUI O-ring as required. See your John Deere engine distributor or servicing dealer.
Fuel Pressure Low	Plugged fuel filter	Replace fuel filter.
	Restricted fuel line	Locate restriction; repair as required.
	Faulty fuel transfer pump	Remove fuel transfer pump; repair/replace pump as required. See your John Deere engine distributor or servicing dealer.

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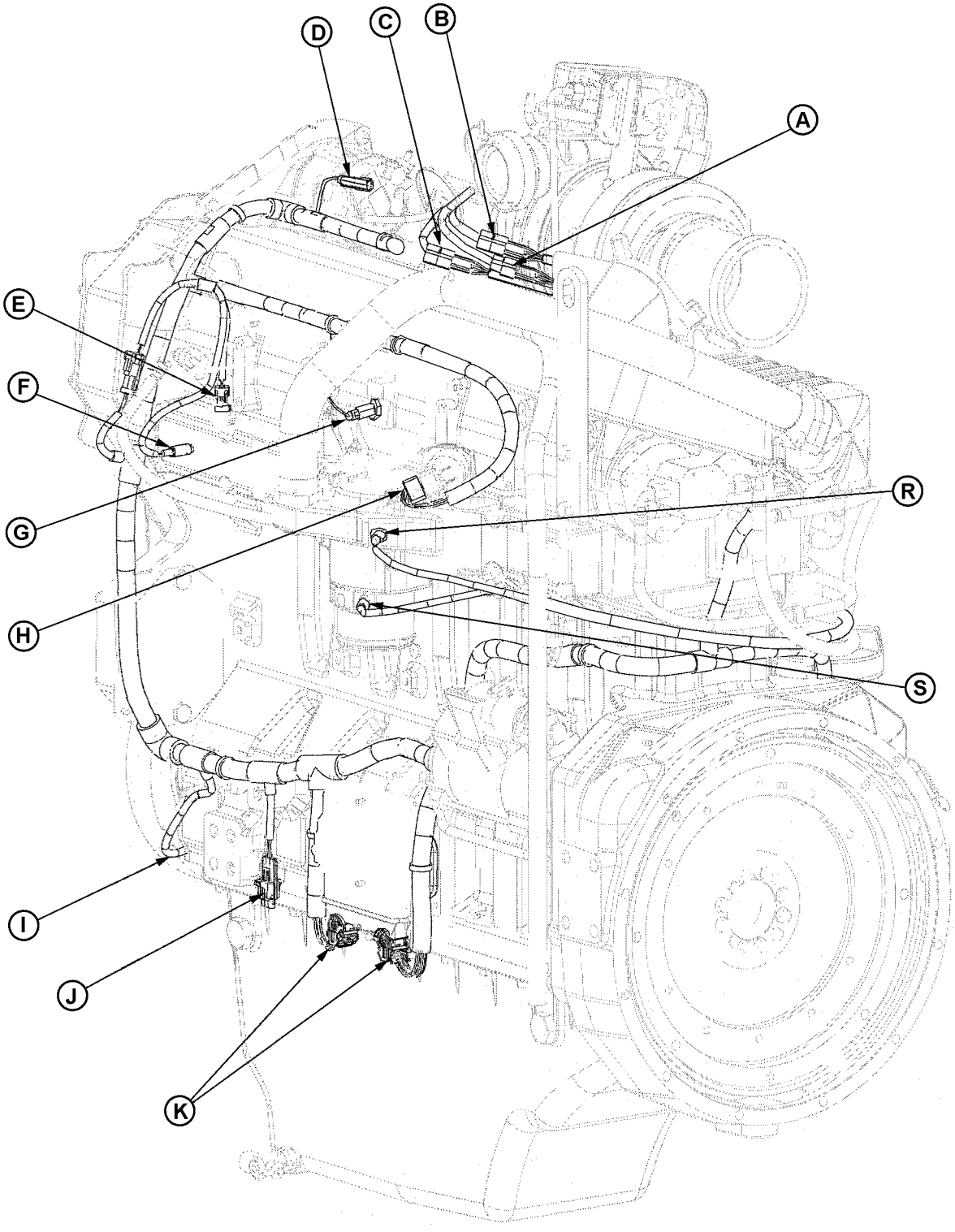
Electrical System Layout



Electrical System Layout- Left Side

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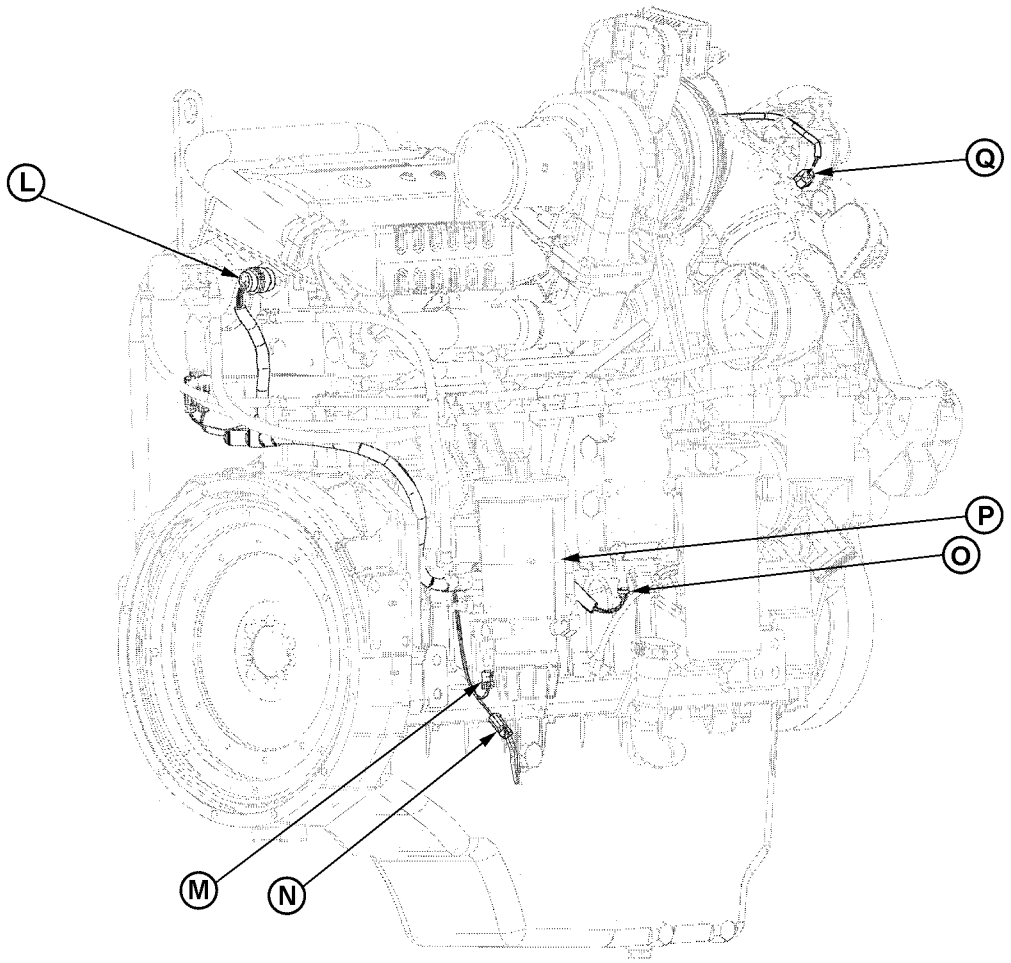
Electrical System Layout- Continued



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Electrical System Layout- Right Side

A—Turbocharger Air Inlet Temperature Sensor Lead
B—Turbocharger Actuator Connector Lead
C—Turbocharger Speed Sensor Lead
D—Alternator Connector
E—Manifold Air Pressure (MAP) Sensor
F—EGR Temperature Sensor
G—Engine Position (Cam) Sensor
H—Rear EGR Valve Connector
I— Timing (Crank) Sensor
J—Auxiliary Connector
K—Engine Control Unit (ECU) Connectors
L—Unit Injection Connector
M—Fuel Temperature Sensor
N—Water-In-Fuel Sensor
O—Oil Pressure Sensor
P—Fuel Pressure Sensor
Q—Coolant Temperature Sensor
R—Exhaust Air Temperature Sensor
S—Manifold Inlet Air Sensor

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Precautions for Welding on Vehicles Equipped with Electronic Engine Control Unit (ECU)

IMPORTANT: ALWAYS disconnect engine control unit (ECU) connectors and engine control system-to-vehicle ground before welding. High currents or electrostatic discharge in electronic components from welding may cause permanent damage.

1. Remove the ground connection for the engine control system-to-vehicle frame.
2. Disconnect the connectors from the ECU.
3. Connect the welder ground close to the welding point and be sure ECU or other electronic components are not in the ground path.

Welding Precautions

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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.

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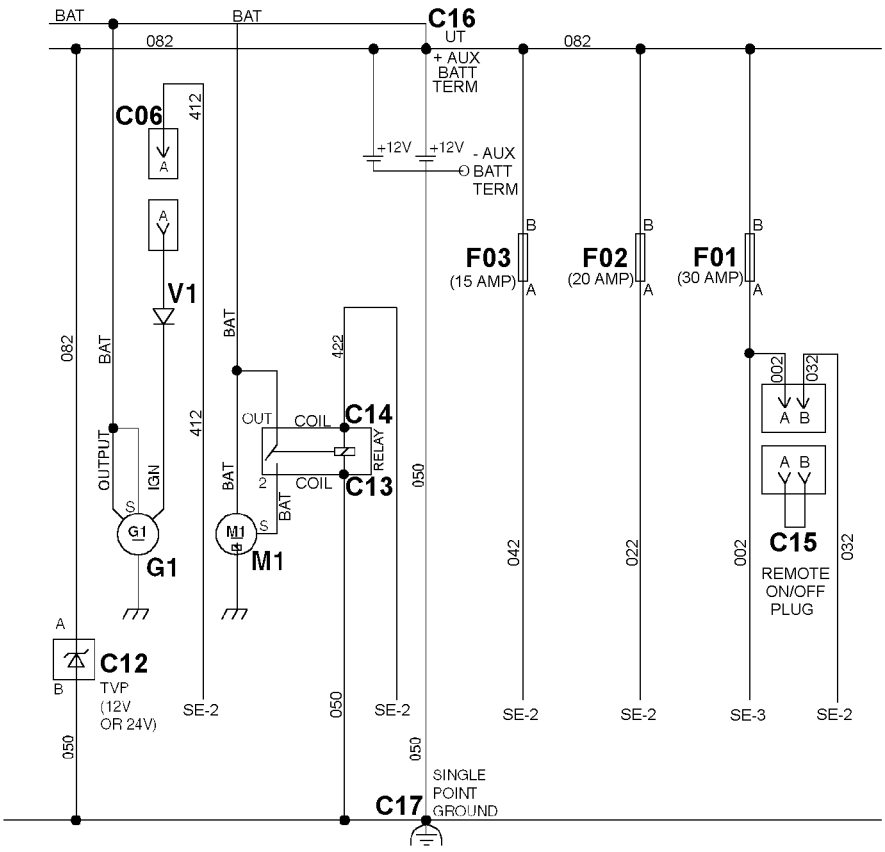
Engine Wiring Diagram (Engines With Full-Featured Instrument Panel)



SE-1 ENGINE START COMPONENTS

RG13874 —UN—08APR05

B1—Analog Throttle
C06— Alternator Harness Connector
C12— Transient Voltage Protector
C13— Starter Relay
C14— Starter Relay
C15— Remote On/Off
C16— Battery
C17— Single Point Ground
F01— Fuse (30 Amp)(System)
F02— Fuse (20 Amp)(ECU)
F03— Fuse (15 Amp)(Fuel Filter)
G1—Alternator
M1—Starter Motor
P1—Optional Gauge
P2—Optional Gauge
P3—Oil Pressure Gauge
P4—Coolant Temperature Gauge
P5—Tachometer Display
P6—Hour Meter/Diagnostic Gauge
S1—Ignition Key Switch
S2—Speed Select Switch (Momentary)
S3—Bump Enable Switch (Momentary)
S4—High-Low Speed Select Switch
S5—Override Shutdown Switch (Momentary)
V1—Diode
X1—Vehicle Harness Connector
X4—CAN Terminator
X5—Analog Throttle Connector

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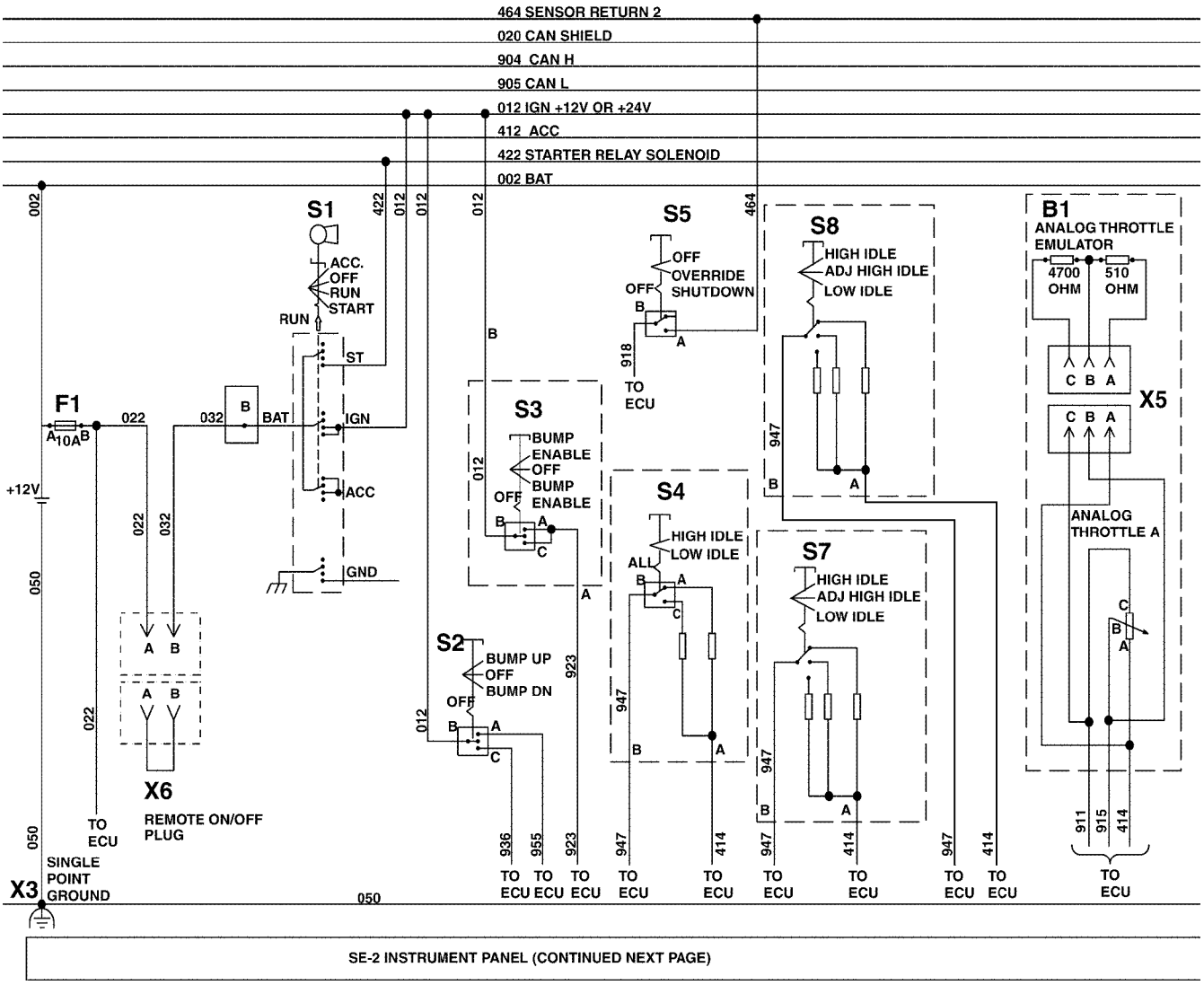
Engine Wiring Diagram (Engines With Full-Featured Instrument Panel) (Continued)



B1—Analog Throttle Emulator
F1—Fuse (10 Amp)
F2—Fuse (5 Amp)
S1—Ignition Key Switch
S2—Speed Select Switch (Momentary)
S3—Bump Enable Switch (Momentary
S4—Dual State Throttle Switch
S5—Override Shutdown Switch (Momentary)
S7—Tri-state Throttle Switch
S8—Ramp Throttle Switch
X3—Single Point Ground
X5—Analog Throttle Connector
X6—Remote On/Off Plug

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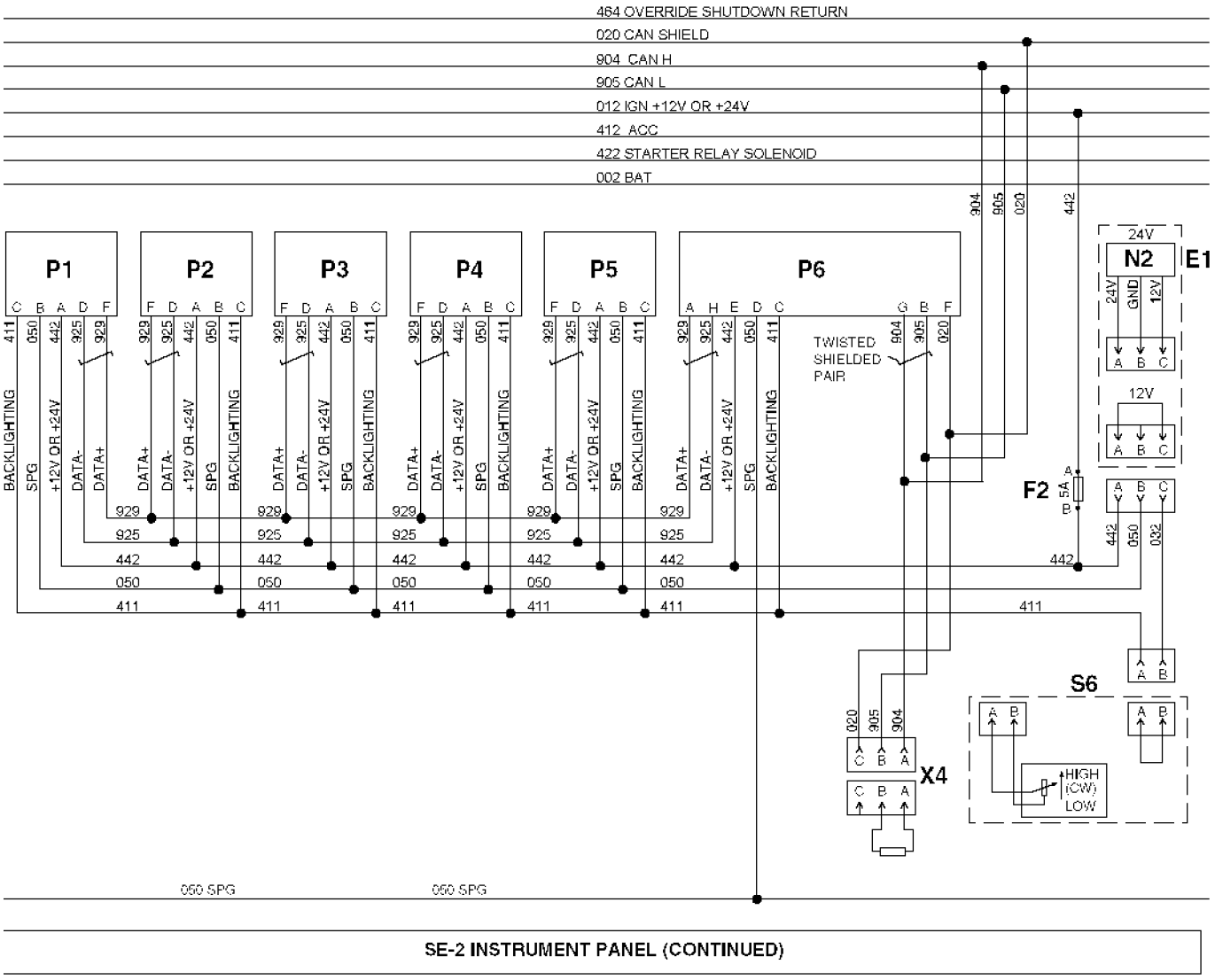
Engine Wiring Diagram (Engines With Full-Featured Instrument Panel) (Continued)



E1—Back Light Regulator (24V) or Plug (12V)
F2—Fuse (5 Amp)
N2—Voltage Regulator (for 24V Operation)
P1—Optional Gauge
P2—Optional Gauge
P3—Oil Pressure Gauge
P4—Coolant Temperature Gauge
P5—Tachometer Display
P6—Hourmeter/Diagnostic Meter
S5—Override Shutdown Switch (Momentary)
S6—Dimmer Control or Jumper Plug
X4—CAN Terminator

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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.

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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.

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. Service air cleaner. (See REPLACING AIR CLEANER FILTER ELEMENTS in Service As Required Section.)
3. 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.)
4. Pour three (3) ounces of rust preventive oil into the turbocharger intake. (It may be necessary to temporarily install a short intake elbow on the turbocharger inlet to receive the oil.)
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 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 belts if removed.
4. Fill fuel tank.
5. Perform all appropriate prestarting checks. (See DAILY PRESTARTING CHECKS in Engine Operating Guidelines Section.)

IMPORTANT: DO NOT operate starter more than 30 seconds at a time. Wait at least 2 minutes for starter to cool before trying again.

6. Crank engine for 20 seconds with starter (do not allow the engine to start). Wait 2 minutes and crank engine an additional 20 seconds to assure bearing surfaces are adequately lubricated.
7. Start engine and run at low idle and no load for several minutes. Warm up carefully and check all gauges before placing engine under load.
8. On the first day of operation after storage, check overall engine for leaks and check all gauges for correct operation.

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General OEM Engine Specifications

ITEM	6135HF485 (13.5L)
Number of Cylinders	6
Bore	132 mm (5.2 in.)
Stroke	165 mm (6.5 in.)
Displacement	13.5 L (824 cu in.)
Compression Ratio	17.5:1 (Low Power Engines) 16.0:1 (High Power Engines)
Aspiration	Turbocharged
Engine Firing Order	1-5-3-6-2-4
Valves Per Cylinder	2 Intake 2 Exhaust
Battery 12-Volt System Capacity 12-Volt System Reserve 24-Volt System Capacity 24-Volt System Reserve	 1900 CCA 250 Minutes 925 CCA 275 CCA
Thermostat Start To Open Temperature	80°C (176°F)
Thermostat Fully Open Temperature	92°C (197°F)
Coolant Capacity[a]	18 L (19 qt)
Recommended Radiator Pressure Cap	103 kPa (15 psi)
Crankcase Oil Fill Capacity	See “Engine Crankcase Oil Fill Quantities” later in this section.
Oil Pressure At Rated Speed With Oil Warmed to 105°C (220°F)	310 kPa (3.1 bar) (45 psi)
Oil Pressure At Low Idle (Minimum)	138 kPa (1.4 bar) (20 psi)
Length	1334 mm (52.5 in.)
Width	775 mm (30.5 in.)
Height	1350 mm (53.1 in.)
Weight (dry)	3292 kg (1493 lb)
ITEM	**6090HF475 (13.5L)**
Number of Cylinders	6
Bore	132 mm (5.2 in.)
Stroke	165 mm (6.5 in.)
Displacement	13.5 L (824 cu in.)
Compression Ratio	16.0:1
Aspiration	Turbocharged
Engine Firing Order	1-5-3-6-2-4
Valves Per Cylinder	2 Intake 2 Exhaust
Battery 12-Volt System Capacity 12-Volt System Reserve 24-Volt System Capacity 24-Volt System Reserve	 1900 CCA 250 Minutes 925 CCA 275 CCA

Continued on next page

ITEM	6090HF475 (13.5L)
Thermostat Start To Open Temperature	80°C (176°F)
Thermostat Fully Open Temperature	92°C (197°F)
Coolant Capacity[a]	18 L (19 qt)
Recommended Radiator Pressure Cap	103 kPa (15 psi)
Crankcase Oil Fill Capacity	See “Engine Crankcase Oil Fill Quantities” later in this section.
Oil Pressure At Rated Speed With Oil Warmed to 105°C (220°F)	250 kPa (2.5 bar) (36 psi)
Oil Pressure At Low Idle (Minimum)	138 kPa (1.4 bar) (20 psi)
Length	1334 mm (52.5 in.)
Width	877 mm (34.5 in.)
Height	1512 mm (59.5 in.)
Weight (dry)	1493 kg (3292 lb)

[a]*Coolant capacity may vary with different engine applications.*

OMRGP15,0000141 -19-10DEC10-2/2

Engine Power Ratings[1] And Fuel System Specifications[2]For Mechanical Fuel Primer System (Earlier Engines)

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)
6135HF485 Industrial	1669	7219	12V	448 (600)	2100	900	2300
	1669	7220	24V	448 (600)	2100	900	2300
	1669	7221	12V	410 (550)	2100	900	2300
	1669	7222	24V	410 (550)	2100	900	2300
	1669	7223	12V	410 (550) [a]	2100	900	2300
	1669	7224	24V	410 (550) [a]	2100	900	2300
	1669	7225	12V	392 (525) [a]	2100	900	2300
	1669	7226	24V	392 (525) [a]	2100	900	2300
	1669	7227	12V	373 (500)	2100	900	2300
	1669	7228	24V	373 (500)	2100	900	2300
	1669	7229	12V	373 (500) [a]	2100	900	2300
	1669	7230	24V	373 (500) [a]	2100	900	2300
	1669	7231	12V	373 (500) [a]	1900	900	2100
	1669	7232	24V	373 (500) [a]	1900	900	2100
	1669	7233	12V	336 (450)	2100	900	2300
	1669	7234	24V	336 (450)	2100	900	2300
	1669	7235	12V	336 (450) [a]	2100	900	2300
	1669	7236	24V	336 (450) [a]	2100	900	2300
	1669	7237	12V	336 (450) [a]	1900	900	2100
	1669	7238	24V	336 (450) [a]	1900	900	2100
	1669	7239	12V	317 (425) [a]	2100	900	2300
	1669	7240	24V	317 (425) [a]	2100	900	2300
	1669	7241	12V	298 (400)	2100	900	2300
	1669	7242	24V	298 (400)	2100	900	2300
	1669	7243	12V	298 (400) [a]	2100	900	2300
	1669	7244	24V	298 (400) [a]	2100	900	2300
	1669	7245	12V	298 (400) [a]	1900	900	2100
	1669	7246	24V	298 (400) [a]	1900	900	2100
	1669	7247	12V	261 (350)	2100	900	2300
	1669	7248	24V	261 (350)	2100	900	2300
	1669	7249	12V	261 (350) [a]	2100	900	2300
	1669	7250	24V	261 (350) [a]	2100	900	2300
	1669	7251	12V	261 (350) [a]	1900	900	2100
	1669	7252	24V	261 (350) [a]	1900	900	2100
6135HF485 GenSet	1669	7253	12V	401 (538)	1800	900	1850
	1669	7254	24V	401 (538)	1800	900	1850
	1669	7255	12V	460 (617)	1800	900	1850
	1669	7256	24V	460 (617)	1800	900	1850
	1669	7266	12V	345 (463)	1800	900	1850
	1669	7267	24V	345 (463)	1800	900	1850
6135HF475 GenSet	1676	7268	12V	475 (354)	1500	1000	N/A
	1676	7269	24V	475 (354)	1500	1000	N/A
	1676	7270	12V	543 (405)	1500	1000	N/A

Continued on next page

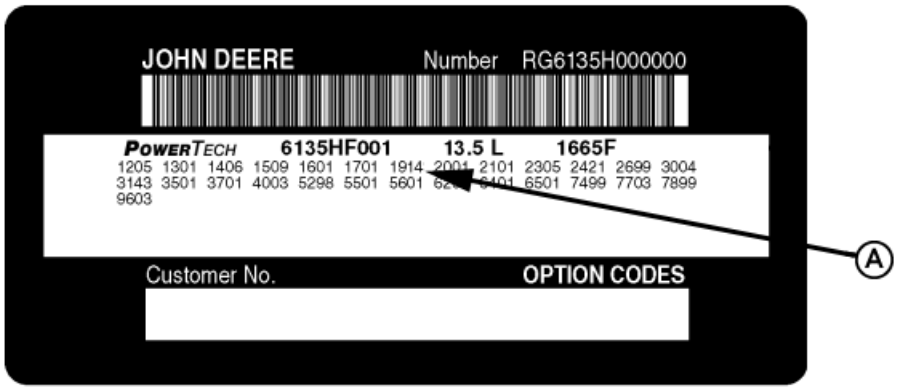
Engine Model	Fuel System Option Codes	Electronic Software Option Codes	System Voltage	Power Rating @ Rated Speed kW (hp)	Rated Speed (rpm)	Slow Idle (rpm)	Fast Idle (rpm)
	1676	7271	24V	543 (405)	1500	1000	N/A
	1676	7272	12V	611 (456)	1500	1000	N/A
	1676	7273	24V	611 (456)	1500	1000	N/A
	1676	72DA	12V	443 (330)	1800	1000	N/A
	1676	72DB	24V	443 (330)	1800	1000	N/A
	1676	72DC	12V	483 (360)	1800	1000	N/A
	1676	72DD	24V	483 (360)	1800	1000	N/A
	1676	72DE	12V	563 (420)	1800	1000	N/A
	1676	72DF	24V	563 (420)	1800	1000	N/A
	1676	72DG	12V	617 (460)	1800	1000	N/A
	1676	72DH	24V	617 (460)	1800	1000	N/A

[a] These industrial engines have a power bulge which allows for INTERMITTENT operation above rated power.

[1]Power ratings are for bare engines without drag effect of cooling fan or accessories like air compressors.
[2]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.

JR74534,00002D8 -19-27SEP10-2/2

Engine Crankcase Oil Fill Quantities



RG14341 —UN—26JUL05

Option Code Label

To determine the crankcase oil fill quantity for your engine, refer to the oil pan option code (A) located on the engine option code label affixed to the valve cover. The first two digits of the code (19) identify the oil pan group. The last two digits of each code identify the specific oil pan on your engine.

Listed below are engine crankcase oil fill quantities with filter change for each oil pan option code and PTO configuration:

Engine Model	Oil Pan Option Codes	Crankcase Oil Capacity [a]
6135HF (Without John Deere Rear PTO)	1915, 1917, 1918 1914	40.0 L (42.3 qt.) 60.0 L (63.4 qt.)

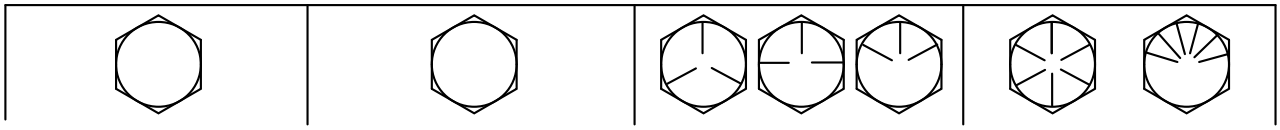
[a] Crankcase oil capacity may vary slightly from amount shown. ALWAYS fill crankcase to within crosshatch area on dipstick. DO NOT overfill.

NOTE: If engine is equipped with John Deere PTO, add an additional 4 L (4.2 qt) of oil to lubricate PTO gear train.

OMRGP15,0000144 -19-09DEC10-1/1

Unified Inch Bolt and Screw Torque Values

TS1671 —UN—01MAY03



Bolt or	SAE Grade 1				SAE Grade 2[a]				SAE Grade 5, 5.1 or 5.2				SAE Grade 8 or 8.2			
Screw	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
													N·m	lb.-ft.	N·m	lb.-ft.
5/16	7.7	68	9.8	86	12	106	15.5	137	19.5	172	25	221	28	20.5	35	26
									N·m	lb.-ft.	N·m	lb.-ft.				
3/8	13.5	120	17.5	155	22	194	27	240	35	26	44	32.5	49	36	63	46
			N·m	lb.-ft.	N·m	lb.-ft.	N·m	lb.-ft.								
7/16	22	194	28	20.5	35	26	44	32.5	56	41	70	52	80	59	100	74
	N·m	lb.-ft.														
1/2	34	25	42	31	53	39	67	49	85	63	110	80	120	88	155	115
9/16	48	35.5	60	45	76	56	95	70	125	92	155	115	175	130	220	165
5/8	67	49	85	63	105	77	135	100	170	125	215	160	240	175	305	225
3/4	120	88	150	110	190	140	240	175	300	220	380	280	425	315	540	400
7/8	190	140	240	175	190	140	240	175	490	360	615	455	690	510	870	640
1	285	210	360	265	285	210	360	265	730	540	920	680	1030	760	1300	960
1-1/8	400	300	510	375	400	300	510	375	910	670	1150	850	1450	1075	1850	1350
1-1/4	570	420	725	535	570	420	725	535	1280	945	1630	1200	2050	1500	2600	1920
1-3/8	750	550	950	700	750	550	950	700	1700	1250	2140	1580	2700	2000	3400	2500
1-1/2	990	730	1250	930	990	730	1250	930	2250	1650	2850	2100	3600	2650	4550	3350

Torque values listed are for general use only, based on the strength of the bolt or screw. DO NOT use these values if a different torque value or tightening procedure is given for a specific application. For plastic insert or crimped steel type lock nuts, for stainless steel fasteners, or for nuts on U-bolts, see the tightening instructions for the specific application. Shear bolts are designed to fail under predetermined loads. Always replace shear bolts with identical grade.

Replace fasteners with the same or higher grade. If higher grade fasteners are used, tighten these to the strength of the original. Make sure fastener threads are clean and that you properly start thread engagement. When possible, lubricate plain or zinc plated fasteners other than lock nuts, wheel bolts or wheel nuts, unless different instructions are given for the specific application.

[a] Grade 2 applies for hex cap screws (not hex bolts) up to 6. in (152 mm) long. Grade 1 applies for hex cap screws over 6 in. (152 mm) long, and for all other types of bolts and screws of any length.

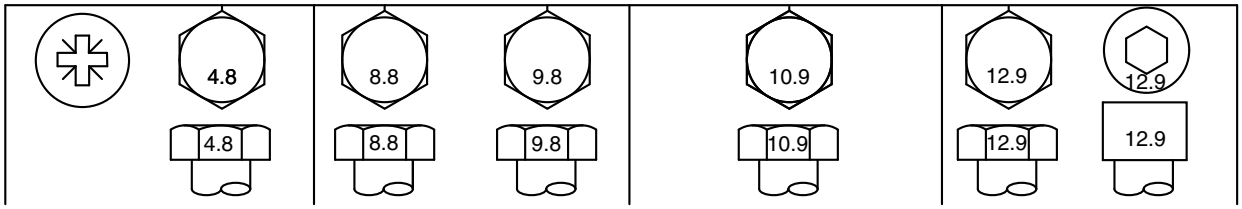
[b] "Lubricated" means coated with a lubricant such as engine oil, fasteners with phosphate and oil coatings, or 7/8 in. and larger fasteners with JDM F13C zinc flake coating.

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

DX,TORQ1 -19-08DEC09-1/1

Metric Bolt and Screw Torque Values

TS1670 —UN—01MAY03



Bolt or	Class 4.8				Class 8.8 or 9.8				Class 10.9				Class 12.9			
Screw	Lubricated[a]		Dry[b]		Lubricated[a]		Dry[b]		Lubricated[a]		Dry[b]		Lubricated[a]		Dry[b]	
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.
M6	4.7	42	6	53	8.9	79	11.3	100	13	115	16.5	146	15.5	137	19.5	172
									N·m	lb.-ft.	N·m	lb.-ft.	N·m	lb.-ft.	N·m	lb.-ft.
M8	11.5	102	14.5	128	22	194	27.5	243	32	23.5	40	29.5	37	27.5	47	35
			N·m	lb.-ft.	N·m	lb.-ft.	N·m	lb.-ft.								
M10	23	204	29	21	43	32	55	40	63	46	80	59	75	55	95	70
	N·m	lb.-ft.														
M12	40	29.5	50	37	75	55	95	70	110	80	140	105	130	95	165	120
M14	63	46	80	59	120	88	150	110	175	130	220	165	205	150	260	190
M16	100	74	125	92	190	140	240	175	275	200	350	255	320	235	400	300
M18	135	100	170	125	265	195	330	245	375	275	475	350	440	325	560	410
M20	190	140	245	180	375	275	475	350	530	390	675	500	625	460	790	580
M22	265	195	330	245	510	375	650	480	725	535	920	680	850	625	1080	800
M24	330	245	425	315	650	480	820	600	920	680	1150	850	1080	800	1350	1000
M27	490	360	625	460	950	700	1200	885	1350	1000	1700	1250	1580	1160	2000	1475
M30	660	490	850	625	1290	950	1630	1200	1850	1350	2300	1700	2140	1580	2700	2000
M33	900	665	1150	850	1750	1300	2200	1625	2500	1850	3150	2325	2900	2150	3700	2730
M36	1150	850	1450	1075	2250	1650	2850	2100	3200	2350	4050	3000	3750	2770	4750	3500

Torque values listed are for general use only, based on the strength of the bolt or screw. DO NOT use these values if a different torque value or tightening procedure is given for a specific application. For stainless steel fasteners or for nuts on U-bolts, see the tightening instructions for the specific application. Tighten plastic insert or crimped steel type lock nuts by turning the nut to the dry torque shown in the chart, unless different instructions are given for the specific application.

Shear bolts are designed to fail under predetermined loads. Always replace shear bolts with identical property class. Replace fasteners with the same or higher property class. If higher property class fasteners are used, tighten these to the strength of the original. Make sure fastener threads are clean and that you properly start thread engagement. When possible, lubricate plain or zinc plated fasteners other than lock nuts, wheel bolts or wheel nuts, unless different instructions are given for the specific application.

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

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

DX,TORQ2 -19-08DEC09-1/1

Lubrication and Maintenance Records

Using Lubrication and Maintenance Records

Refer to specific Lubrication and Maintenance section for detailed service procedures.

1. Keep a record of the number of hours you operate your engine by regular observation of hour meter.
2. Check your record regularly to learn when your engine needs service.
3. DO ALL the services within an interval section. Write the number of hours (from your service records) and the date in the spaces provided. For a complete listing of all items to be performed and the service intervals required, refer to the quick-reference chart near the front of the Lubrication and Maintenance section.

IMPORTANT: The service recommendations covered in this manual are for the accessories that are provided by John Deere. Follow manufacturer's service recommendations for servicing engine-driven equipment not supplied by Deere.

RG,RG34710,7621 -19-12SEP06-1/1

Daily (Prestarting) Service

NOTE: Refer to DAILY PRESTARTING CHECKS in Lubrication and Maintenance/Daily section.

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

RG,RG34710,7622 -19-30SEP10-1/1

500 Hours of Operation/or 12 Months Service

- Service fire extinguisher.
- Service battery.
- Change engine oil and oil filter.[12]
- Check coolant pump weep hole.
- Replace fuel filters.
- Check and adjust engine speeds.
- Check engine mounts.
- Clean crankcase vent hose and valve.
- Check air intake hoses, connections, and system.
- Check engine ground connection.
- Check automatic belt tensioner and belt wear.
- Check cooling system.
- Coolant solution analysis—add SCAs as needed.
- Pressure test overall cooling system and radiator cap.

Hours									
Date									
Hours									
Date									
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Date									
Hours									
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Hours									
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[1]During engine break-in, change the oil and filter for the first time after a minumum of 100 hours of operation (500 hours maximum).
[2] Service intervals depend on sulfur content of the diesel fuel, oil pan capacity, and the oil and filter used. (See DIESEL ENGINE OIL AND FILTER SERVICE INTERVALS, in Fuels, Lubricants, and Coolant Section.)

OURGP11,0000066 -19-15OCT10-1/1

2000 Hours of Operation/or 24 Months Service

- Check crankshaft vibration damper.
- Flush and refill cooling system.[1]
- Test thermostats.

Hours									
Date									
Hours									
Date									
Hours									
Date									
Hours									
Date									
Hours									
Date									

[1] When John Deere COOL-GARD is used, the flushing 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.

OURGP11,0000067 -19-30SEP10-1/1

2500 Hours of Operation Service

- Have your authorized servicing dealer or engine distributor check and adjust valve clearance and electronic unit injector (EUI) preload. (This is a one-time service on a new or overhauled engine.)

Hours									
Date									
Hours									
Date									
Hours									
Date									
Hours									
Date									

RG,RG34710,7626 -19-30SEP10-1/1

Service as Required

- Add coolant.
- Replace air cleaner filter elements.
- Clean fuel filter water separator bowl.
- Bleed fuel system.
- Replace fan/alternator V-belts.
- Check fuses.
- Service air compressor. (See your John Deere dealer.)
- Service rear PTO (See your John Deere dealer.)

Hours									
Date									
Hours									
Date									
Hours									
Date									
Hours									
Date									

OURGP11,0000125 -19-12SEP06-1/1

Emission System Warranty

U.S. EPA Emissions Control Warranty Statement

Emissions control-related parts and components are warranted by John Deere for five years or 3000 hours of operation, whichever occurs first. John Deere further warrants that the engine covered by this warranty was designed, built, and equipped so as to conform at the time of sale with all U.S. emissions standards at the time of manufacture, and that it is free of defects in materials and workmanship which would cause it not to meet these standards within the period of five years or 3000 hours of operation, whichever occurs first.

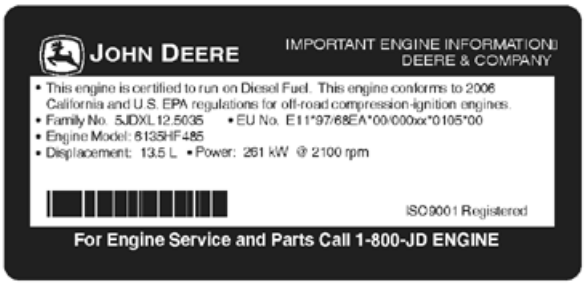
Warranties stated in this manual refer only to emissions-related parts and components of your engine. The complete engine warranty, less emissions-related parts and components, is provided separately as the "John Deere New Off-Highway Engine Warranty".

OURGP11,0000069 -19-11OCT06-1/1

Emissions Control System Certification Label

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

The emissions warranty described above applies only to those engines marketed by John Deere that have been certified by the United States Environmental Protection Agency (EPA) and/or California Air Resources Board (CARB), and used in the United States and Canada. The presence of an emissions label like the one shown signifies that the engine has been certified with the EPA and/or CARB. The EPA and CARB warranties only apply to new engines having the certification label affixed to the engine and sold as stated above in the geographic areas. The presence of an EU number in the third line of the label signifies that the engine has been certified with the European Union countries per Directive 97/68/EC. The emissions warranty does not apply to the EU countries.



RG14939 —UN—11OCT06

Emissions Label

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

OURGP11,0000068 -19-12SEP06-1/1

Technical Information

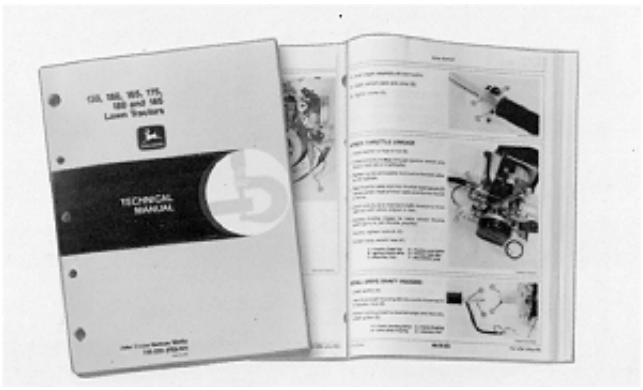
Technical information can be purchased from John Deere. Some of this information is available in electronic media, such as CD-ROM disks, and in printed form. There are many ways to order. Contact your John Deere dealer. Call **1-800-522-7448** to order using a credit card. Search online from http://www.JohnDeere.com.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

DX,SERVLIT -19-31JUL03-1/1

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John Deere Service Keeps You on the Job

John Deere Parts

We help minimize downtime by putting genuine John Deere parts in your hands in a hurry.

That's why we maintain a large and varied inventory—to stay a jump ahead of your needs.

TS100 —UN—23AUG88

DX,IBC,A -19-04JUN90-1/1

The Right Tools

Precision tools and testing equipment enable our Service Department to locate and correct troubles quickly . . . to save you time and money.

TS101 —UN—23AUG88

DX,IBC,B -19-04JUN90-1/1

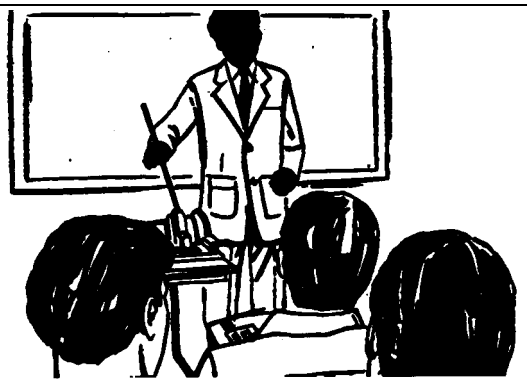
Well-Trained Technicians

School is never out for John Deere service technicians.

Training schools are held regularly to be sure our personnel know your equipment and how to maintain it.

Result?

Experience you can count on!



TS102 —UN—23AUG88

DX,IBC,C -19-04JUN90-1/1

Prompt Service

Our goal is to provide prompt, efficient care when you want it and where you want it.

We can make repairs at your place or at ours, depending on the circumstances: see us, depend on us.

JOHN DEERE SERVICE SUPERIORITY: We'll be around when you need us.

TS103 —UN—23AUG88

DX,IBC,D -19-04JUN90-1/1