

# **PowerTech Plus™ 9.0 L 6090HF485 Tier 3/Stage IIIA OEM Diesel Engines**

## **OPERATOR'S MANUAL PowerTech Plus 9.0 L 6090HF485 OEM Diesel Engines**

**OMRG36864 Issue 22Apr05 (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.

# 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.

**IMPORTANT: This manual covers John Deere PowerTech Plus™ 9.0 L OEM diesel engines meeting Tier 3/Stage IIIA<sup>1</sup> emission standards.**

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

*PowerTech Plus is a trademark of Deere & Company*

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

OURGP12,00000BD -19-22DEC04-1/1

## 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>

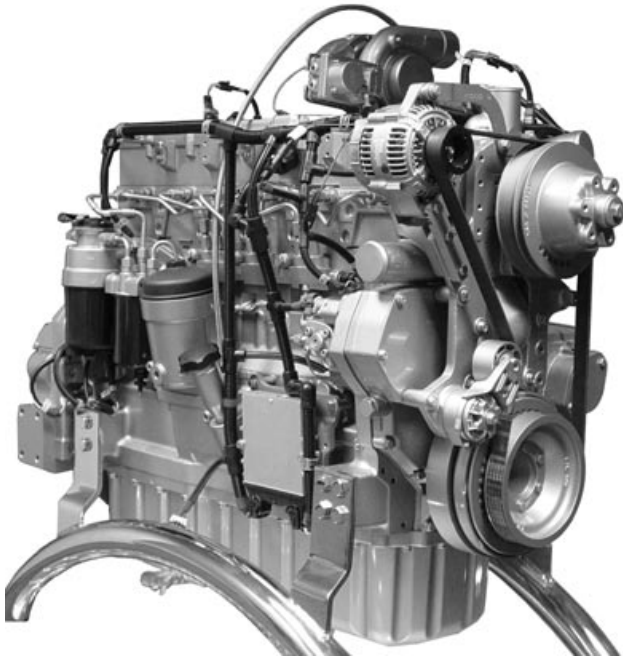
Entérese de quién es, y dónde está situado. Cuando tenga un momento, vaya a visitarlo. A él le gustará conocerlo, y saber cuáles podrían ser sus necesidades.

### 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.

## Identification Views—John Deere Power Tech Plus™ Tier 3/Stage IIIA 9.0 L OEM Diesel Engine



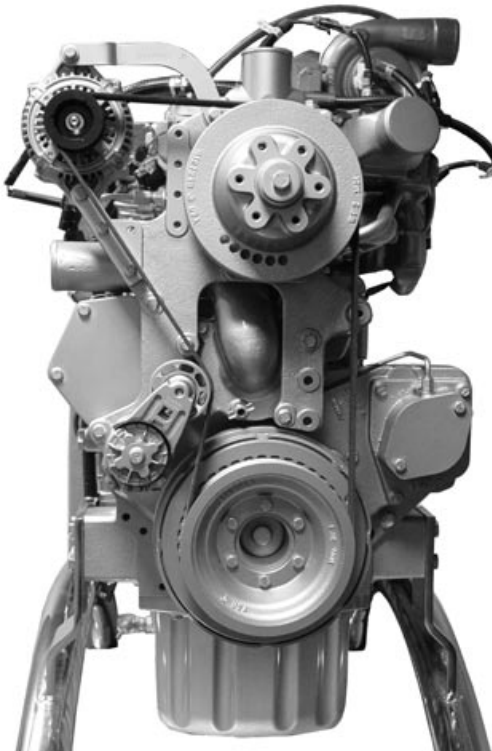
RG13848 —UN-24JAN05

9.0 L Diesel Engine Right Front View



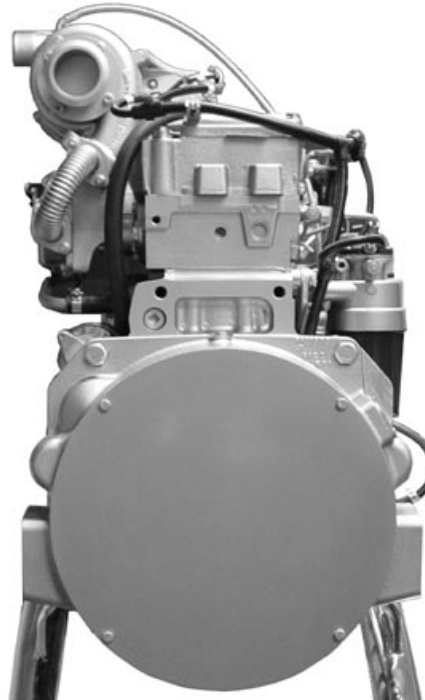
RG13847 —UN-24JAN05

9.0 L Diesel Engine Left Front View



RG13850 —UN-17JAN05

9.0 L Diesel Engine Front View



RG13849 —UN-24JAN05

9.0 L Diesel Engine Rear View

**NOTE:** Engines are Tier 3/Stage IIIA  
emission-certified.

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A John Deere ILLUSTRATION® Manual

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# Record Keeping

## 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)

---

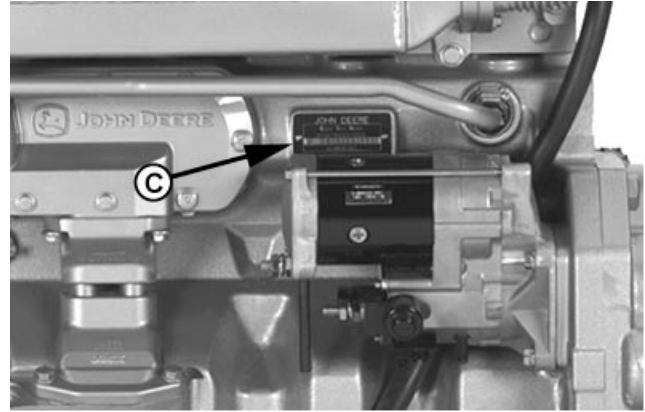
Application Data or Type (B)

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**A—Engine Serial Number**  
**B—Application Data or Type**  
**C—Serial Number Plate**



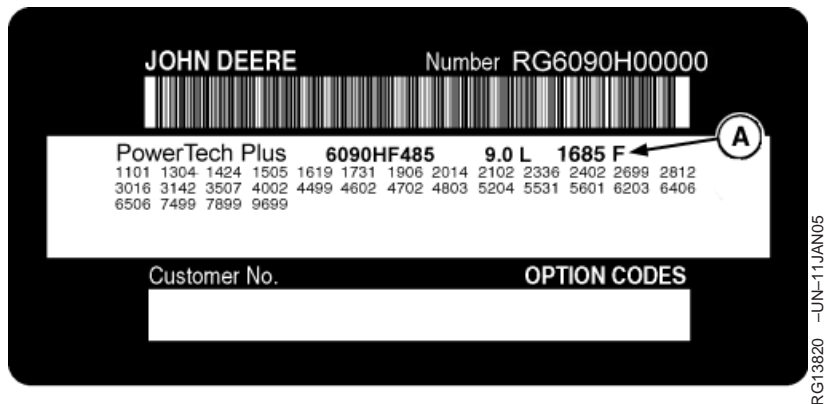
*Engine Serial Number Plate*



*Location of Engine Serial Number Plate*

OURGP11,0000020 -19-20DEC04-1/1

## Engine Option Codes



Option Code Label

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

In addition to the serial number plate, OEM engines have an engine option code label affixed to the side of the cylinder block. These codes indicate which of the engine options were installed on your engine at the factory. When in need of parts or service, furnish your authorized servicing dealer or engine distributor with these numbers.

The engine option code label includes an engine base code (A). This base code must also be recorded along with the option codes.

The first two digits of each option 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, 42-amp alternator.

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

**Engine Base Code (A):**

---



**Engine Option Codes—Continued**

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

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

Option Codes	Description	Option Codes	Description
11_____	Rocker Arm Cover	51_____	Cylinder Head With Valves
12_____	Oil Filter Inlet	52_____	Auxiliary Gear Drive
13_____	Crankshaft Pulley/Damper	53_____	Fuel Heater
14_____	Flywheel Housing	55_____	Shipping Stand
15_____	Flywheel	56_____	Paint Option
16_____	Fuel Injection System	57_____	Coolant Pump Inlet
17_____	Air Intake	59_____	Oil Cooler and Filter
18_____	Air Cleaner	60_____	Add-On Auxiliary Drive Pulley
19_____	Oil Pan	62_____	Alternator Mounting Bracket
20_____	Coolant Pump	63_____	Low Pressure Fuel Line
21_____	Thermostat Cover	64_____	Exhaust Elbow
22_____	Thermostats	65_____	Turbocharger
23_____	Fan Drive	66_____	Temperature Switch
24_____	Fan Belts	67_____	Electronic Sensors (Base Engine)
25_____	Fan	68_____	Crankshaft Rear Damper
26_____	Engine Coolant Heater	69_____	Engine Serial Number Plate
27_____	Radiator	71_____	Engine Oil Bypass Filter
28_____	Exhaust System	72_____	Electronic Software Option
29_____	Ventilator System	74_____	Air Conditioning (A/C) Compressor (Optional)
30_____	Starter Motor	75_____	Air Restriction Indicator
31_____	Alternator	76_____	Switches and Sensors
32_____	Instrument Panel	77_____	Timing Gear Cover
33_____	Tachometer	78_____	Air Compressor (Optional)
35_____	Fuel Filter	79_____	Engine Certification
36_____	Front Plate	81_____	Primary Fuel Filter and Water Separator
37_____	Fuel Transfer Pump	83_____	Electronic Software (Vehicle Option)
38_____	Operator's Manual	84_____	Electrical Wiring Harness
39_____	Outlet Manifold	86_____	Fan Pulley
40_____	Oil Dipstick	87_____	Belt Tensioner
41_____	Belt-Driven Front Auxiliary Drive	88_____	Oil Filter
43_____	Starting Aid	89_____	Exhaust Gas Recirculating (EGR) System
44_____	Timing Gear Cover With Gears	92_____	Accessories (Factory Installed)(Rear PTO)
46_____	Cylinder Block	93_____	Emissions Label
47_____	Crankshaft And Bearings	95_____	Special Equipment (Factory Installed)
48_____	Connecting Rods and Pistons	96_____	Engine Installation Kit
49_____	Valve Actuating Mechanism	97_____	Special Equipment (Field Installed)
50_____	Oil Pump	98_____	Shipping (Engine Hanger Straps)
		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.*

## Record High-Pressure Fuel Pump Model and Serial Numbers

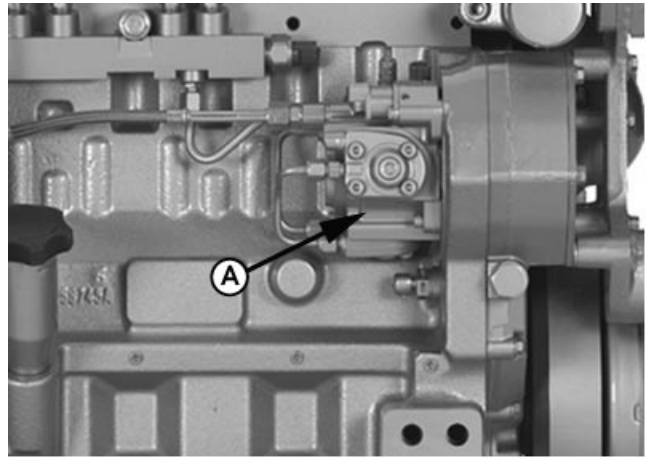
Record the fuel transfer pump model and serial information found on the serial number plate (A).

Model No. \_\_\_\_\_ RPM \_\_\_\_\_

Manufacturer's No. \_\_\_\_\_

Serial No. \_\_\_\_\_

**A—Serial Number Plate**



High Pressure Fuel Pump Serial Number Plate

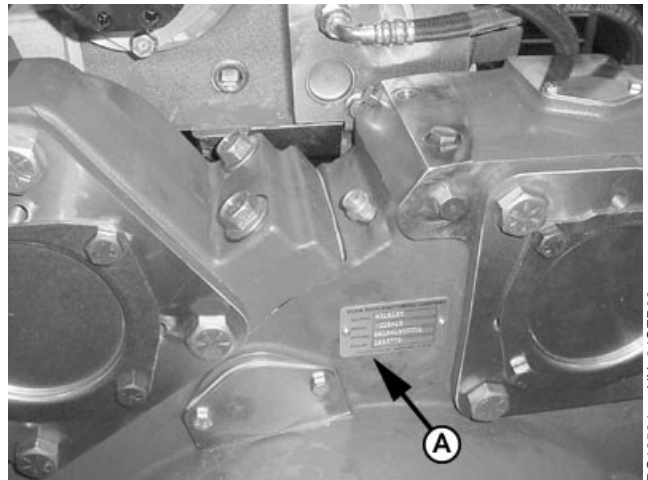
RG13851 -UN-17JAN05

OURGP11,0000022 -19-20DEC04-1/1

## 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

RG12594 -UN-24SEP02

RG, RG34710, 4004 -19-11OCT02-1/1

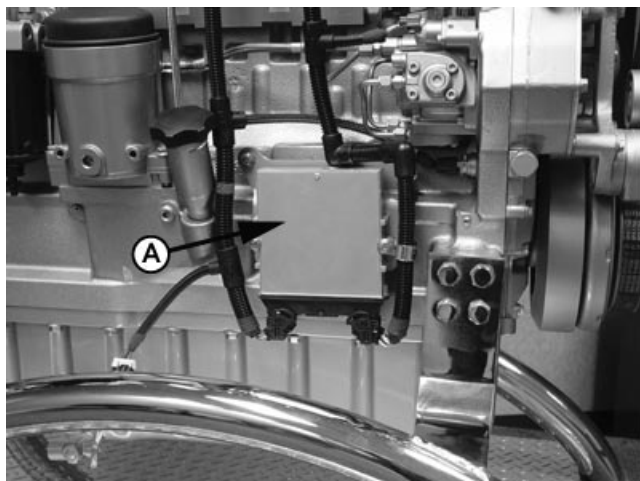
## Record ECU Serial Number

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

Part No. \_\_\_\_\_

Serial No. \_\_\_\_\_

**A—Serial Number Label**



RG13853 -UN-17JAN05

*Record Engine Control Unit (ECU) Serial Number*

OURGP11,000003B -19-14JAN05-1/1

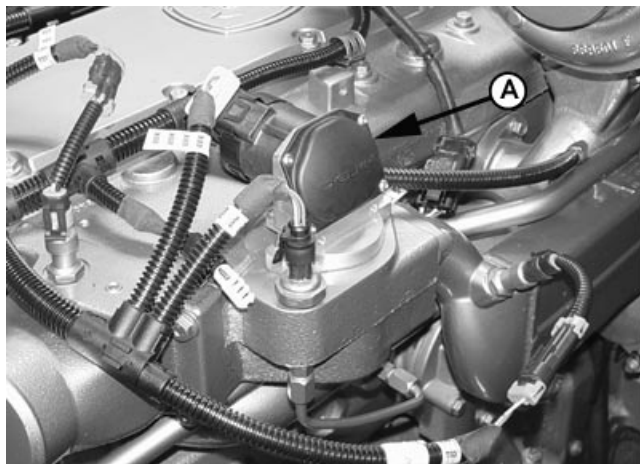
## Record Exhaust Gas Recirculating (EGR) Valve Serial Number

Record the part number and serial number information found on the serial number label on the Exhaust Gas Recirculation (EGR) valve (A). The serial number is also imprinted on the EGR valve housing.

Part No. \_\_\_\_\_

Serial No. \_\_\_\_\_

**A—Exhaust Gas Recirculation (EGR) Valve**



RG13852 -UN-17JAN05

*Record Exhaust Gas Recirculation (EGR) Valve Serial Number*

OURGP11,000003C -19-14JAN05-1/1

# Safety

## Recognize Safety Information

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

Follow recommended precautions and safe operating practices.



*Safety-alert symbol*

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.



*Signal Words*

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.

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

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

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



Safety Messages

TS201 -JUN-23AUG88

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

## Replace Safety Signs

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



TS201 -JUN-23AUG88

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

## Prevent Bypass Starting

Avoid possible injury or death from engine runaway.

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

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



*Prevent Bypass Starting*

RG5419 -UN-28FEB89

RG, RG34710, 7508 -19-30JUN97-1/1

## 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.



*Avoid Fires*

TS202 -UN-23AUG88

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

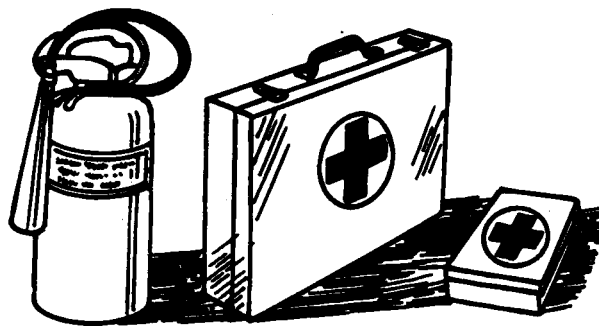


## Prepare for Emergencies

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.



First Aid Kit

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.



Store Safely

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.



*Avoid Fires*

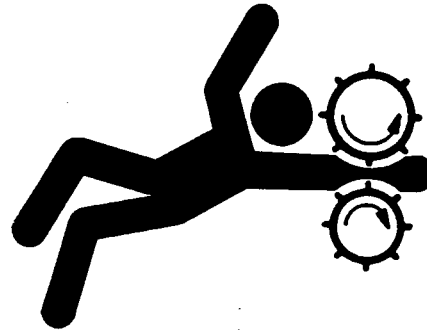
TS227 -JUN-23AUG88

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

## Service Engines 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.



*Moving Parts*

TS228 -JUN-23AUG88

OURGP12,00001DA -19-25FEB03-1/1

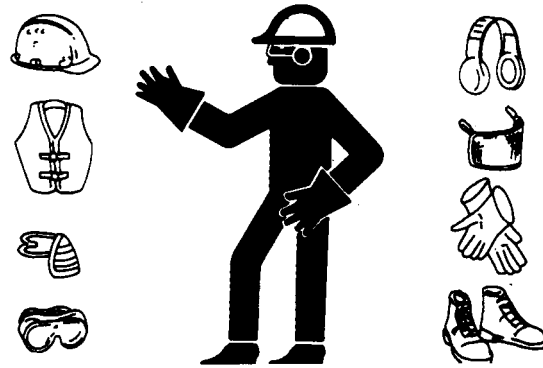
## Wear Protective Clothing

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.



Protective Clothing

TS206 -JUN-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.



Noise Exposure

TS207 -JUN-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.)



*Material Safety Data Sheet*

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.



*Rotating Drivelines*

TS1644 -UN-22AUG95

OUO1004,0000BD8 -19-03NOV00-1/1

## 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.



*Keep Area Clean*

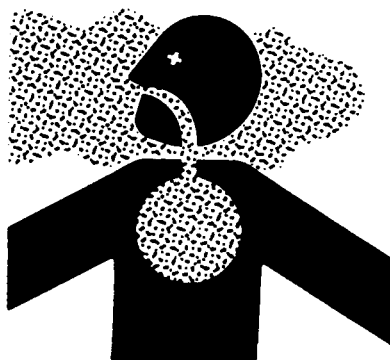
TS218 -UN-23AUG88

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



*Engine exhaust fumes*

TS220 -UN-23AUG88

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

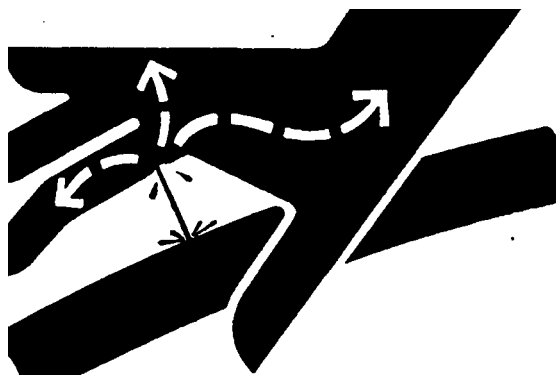
## Avoid High-Pressure Fluids

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 from Deere & Company Medical Department in Moline, Illinois, U.S.A.



*High-Pressure Fluids*

X9811 -UN-23AUG88

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

## 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



## Do Not Open High-Pressure Fuel System

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

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



*High-Pressure Fuel Lines*

TS1343 -UN-18MAR92

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

## Remove Paint Before Welding or Heating

Avoid potentially toxic fumes and dust.

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

Remove paint before heating:

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

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

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

Dispose of paint and solvent properly.



*Toxic Fumes*

TS220 -UN-23AUG88

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

## Service Cooling System Safely

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

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



Cooling System

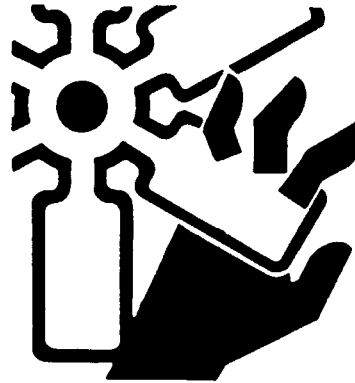
TS281 -JUN-23AUG88

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

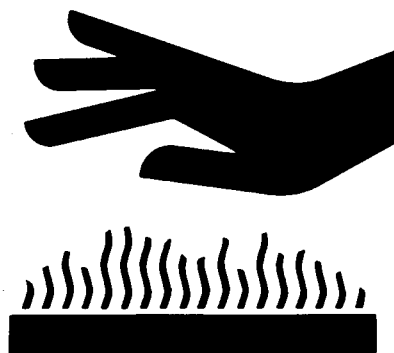
TS677 -JUN-21SEP89

OUOD006,000009D -19-04DEC02-1/1

## 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 may reach temperatures as high as 500°C (932°F) under full load, and naturally aspired exhaust manifolds may reach 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 -JUN-23AUG88

OUOD006,000009E -19-04DEC02-1/1

## Avoid Harmful Asbestos Dust

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

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

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

Keep bystanders away from the area.



*Asbestos Dust*

TS220 -JUN-23AUG88

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

## Prevent Battery Explosions

Keep sparks, lighted matches, and open flame away from the top of battery. Battery gas can explode.

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

Do not charge a frozen battery; it may explode. Warm battery to 16°C (60°F).



*Battery Explosions*

TS204 -JUN-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.



**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:

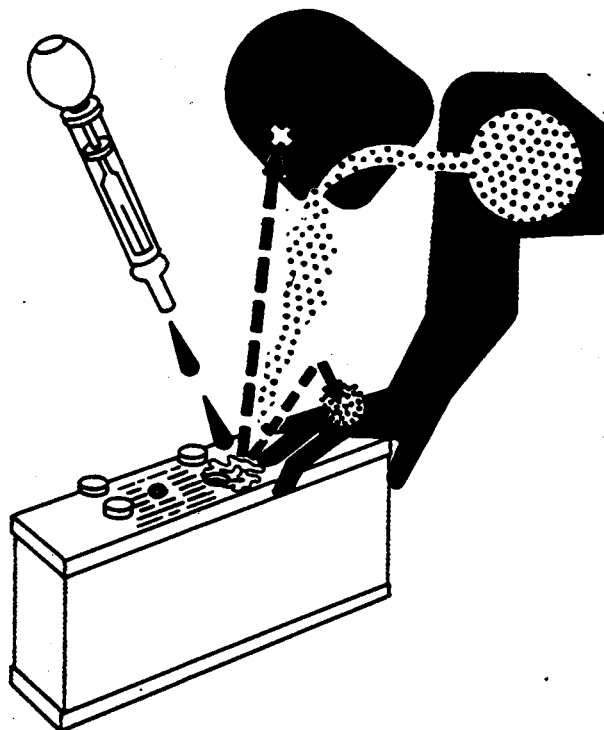
1. Do not induce vomiting.
2. Drink large amounts of water or milk, but do not exceed 2 L (2 qt.).
3. Get medical attention immediately.

**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.**



*Explosion*

TS204 -JUN-23AUG88



*Acid*

TS203 -JUN-23AUG88

## 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.



*High Pressure Spray*

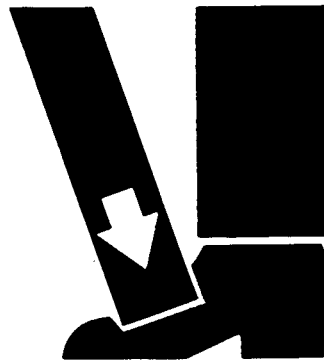
TS1343 -UN-18MAR92

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.



*Proper Lifting Equipment*

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.



*Proper Tools*

TS779 -UN-08NOV89

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

## Dispose of Waste Properly

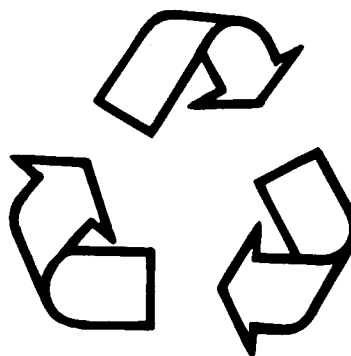
Improperly disposing of waste can threaten the environment and ecology. Potentially harmful waste used with John Deere equipment include such items as oil, fuel, coolant, brake fluid, filters, and batteries.

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.



*Recycle Waste*

TS1133 -UN-26NOV90

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

# Fuels, Lubricants, and Coolant

## Diesel Fuel

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

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

Diesel fuels specified to EN 590 or ASTM D975 are recommended.

### Required fuel properties

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

**Cetane number of 45 minimum.** Cetane number greater than 50 is preferred, especially for temperatures below -20°C (-4°F) or elevations above 1500 m (5000 ft).

**Cold Filter Plugging Point (CFPP)** below the expected low temperature OR **Cloud Point** at least 5°C (9°F) below the expected low temperature.

**Fuel lubricity** should pass a minimum level of 3100 grams as measured by ASTM D6078 or maximum

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

### Sulfur content:

- Diesel fuel quality and fuel sulfur content must comply with all existing emissions regulations for the area in which the engine operates.
- Sulfur content less than 1000 ppm (0.10%) is strongly recommended.
- If diesel fuel with sulfur content greater than 1000 ppm (0.10%) is used, crankcase oil service intervals may be affected. (See recommendation for Diesel Engine Oil and Filter Service Intervals)
- Diesel fuel sulfur content greater than 5000 ppm (0.50%) is **NOT** recommended.
- **DO NOT** use diesel fuel with sulfur content greater than 10,000 ppm (1.00%).

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

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

OURGP11,0000046 -19-28JAN05-1/1

## Lubricity of Diesel Fuel

Diesel fuel must have adequate lubricity to ensure proper operation and durability of fuel injection system components.

Standards for sulfur content of diesel fuel for off-highway use is less than 0.5% (5000 ppm) in the United States and Canada, and less than 0.2% (2000 ppm) in the European Union.

Experience shows that some low sulfur diesel fuels may have inadequate lubricity and their use may reduce performance in fuel injection systems due to inadequate lubrication of injection pump components. The lower concentration of aromatic compounds in these fuels also adversely affects injection pump seals and may result in leaks.

Use of low lubricity diesel fuels may also cause accelerated wear, injection nozzle erosion or corrosion, engine speed instability, hard starting, low power, and engine smoke.

Fuel lubricity should pass a minimum load level of 3100 grams as measured by ASTM D6078 or 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.

OURGP12.00000EB -19-31MAR05-1/1

## 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

## Dieselscan Fuel Analysis

DIESELSCAN™ is a John Deere fuel analysis program that can be used to help monitor the quality of diesel 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 -19-06FEB04-1/1

## Bio-Diesel Fuel

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

Bio-diesel fuels may be used ONLY if the bio-diesel fuel properties meet the latest edition of ASTM D6751, EN 14214, or equivalent specification.

The maximum allowable bio-diesel concentration is a 5% blend (also known as B5) in petroleum diesel fuel. It has been found that bio-diesel fuels may improve lubricity in concentrations up to this 5% blend.

When using a blend of bio-diesel fuel, the engine oil level must be checked daily when the air temperature is -10°C (14°F) or lower. If oil becomes diluted with fuel, shorten oil change intervals accordingly.

**IMPORTANT: Raw pressed vegetable oils are NOT acceptable for use as fuel in any concentration in John Deere engines.**

**These oils do not burn completely, and will cause engine failure by leaving deposits on injectors and in the combustion chamber.**

A major environmental benefit of bio-diesel fuel is its ability to biodegrade. This makes proper storage and handling of bio-diesel fuel especially important. Areas of concern include:

- Quality of new fuel
- Water content of the fuel
- Problems due to aging of the fuel

Potential problems resulting from deficiencies in the above areas when using bio-diesel fuel in concentrations above 5% may lead to the following symptoms:

- Power loss and deterioration of performance
- Fuel leakage
- Corrosion of fuel injection equipment
- Coked and/or blocked injector nozzles, resulting in engine misfire
- Filter plugging
- Lacquering and/or seizure of internal components
- Sludge and sediments
- Reduced service life of engine components

Consult your fuel supplier for additives to improve storage and performance of bio-diesel fuels.

DX,FUEL7 -19-08MAR04-1/1

## 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 information below outlines steps that can minimize the effect that cold weather may have on starting and operation of your engine. See your authorized engine distributor or servicing dealer for additional information and local availability of cold weather aids.

### Use Grade No. 1-D Fuel

When temperatures fall below 5°C (40°F), Grade No. 1-D fuel is best suited for cold weather operation. Grade No. 1-D 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 temperature at which fuel begins to thicken and becomes more resistant to flow through fuel pumps and lines.

*NOTE: On an average, Grade No. 1-D fuel has a lower BTU (heat content) rating than Grade No. 2-D fuel. When using Grade No. 1-D fuel you may notice a drop in power and fuel efficiency, but should not experience 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 to aid cold weather starting.

**IMPORTANT: Do not use ether when starting with the air intake heater.**

### Ether

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

### Coolant Heaters

Engine block heaters (coolant) are an available option to aid cold weather starting.

### Seasonal Viscosity Oil and Proper Coolant Concentration

Use seasonal grade viscosity engine oil based on 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 later in this section).

### Diesel Fuel Flow Additive

**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.**

Use John Deere Premium Diesel Fuel Conditioner (Winter) or equivalent to treat fuel during the cold weather season. This winter formulation is a combination diesel fuel conditioner and anti-gel additive.

Continued on next page

OURGP11,0000037 -19-05JAN05-1/2

### **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 engine distributor or servicing dealer.

OURGP11,0000037 -19-05JAN05-2/2



## Diesel Engine Break-In Oil

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

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

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

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

- API Service Category CE
- API Service Category CD
- API Service Category CC
- ACEA Oil Sequence E2
- ACEA Oil Sequence E1

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

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

API 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.**

*PLUS-50 is a trademark of Deere & Company*

OURGP12.00000B7 -19-19NOV04-1/1

## Diesel Engine Oil

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

**John Deere PLUS-50™ oil is preferred.**

Oils meeting one of the following specifications are also recommended

- ACEA Oil Sequence E6
- ACEA Oil Sequence E7

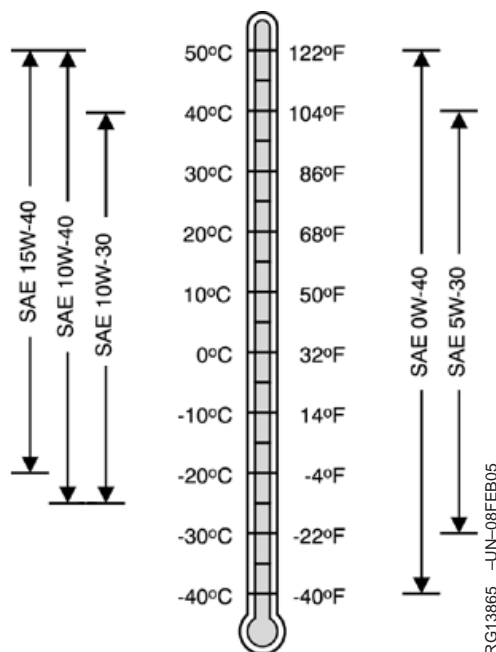
Extended service intervals may apply when John Deere PLUS-50, ACEA E6, or ACEA E7 engine oils are used. Consult table in following block for more information.

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

- John Deere TORQ-GARD SUPREME™
- API Service Category CI-4 PLUS or CI-4
- ACEA Oil Sequence E4 or E5

**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.



Oil Viscosities for Various Air Temperatures

*PLUS-50 is a trademark of Deere & Company*

*TORQ-GARD SUPREME is a trademark of Deere & Company*

OURGP12,00000E3 -19-04FEB05-1/1

## Diesel Engine Oil and Filter Service Intervals

The oil and filter service intervals in the table below should be used as guidelines because actual service intervals also depend on operation and maintenance practices. It is suggested that oil analysis be used prior to each oil change to be certain the proper oil and filter service interval is selected.

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

Refer to the following table for oil and filter service intervals.

Oil and Filter Service Intervals		
	Standard Oil Pan <sup>a</sup>	Extended Drain Oil Pan <sup>b</sup>
<b>Fuel Sulfur Level</b>	Less than 1000 ppm (0.10%)	
With Standard Oil	250 hours	250 hours
With Premium Oil	375 hours	500 hours
<b>Fuel Sulfur Level</b>	1000 to 5000 ppm (0.10 to 0.50%)	
With Standard Oil	150 hours	150 hours
With Premium Oil	250 hours	250 hours
<b>Fuel Sulfur Level</b>	5000 to 10,000 ppm (0.50 to 1.00%)	
With Standard Oil	100 hours	100 hours
With Premium Oil	150 hours	150 hours
<sup>a</sup> Oil Pans with Option Codes 1909, 1914, 1915 or 1916 (lower power levels)		
<sup>b</sup> Oil Pans with Option Codes 1911 or 1916 (higher power levels)		

**Fuel sulfur level** will affect oil and filter service intervals. Higher fuel sulfur levels reduce oil service intervals as shown in the table.

- Use of diesel fuel with sulfur content less than 1000 ppm (0.10%) is strongly recommended.
- Use of diesel fuel with sulfur content greater than 5000 ppm (0.50%) is **NOT** recommended.
- **DO NOT** use diesel fuel with sulfur content greater than 10,000 ppm (1.00%).

**Oil types** (premium or standard) in table are as follows:

- “Premium Oils” include John Deere PLUS-50™, ACEA E6, or ACEA E7 oils, and assume the use of a specified John Deere oil filter.
- “Standard Oils” include John Deere TORQ-GARD SUPREME™, API CI-4 PLUS, API CI-4, ACEA E4, or ACEA E5 oils.

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

OURGP11,0000047 -19-28JAN05-1/1

## Mixing of Lubricants

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

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

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

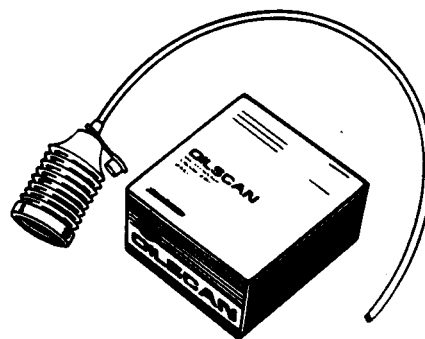
DX,LUBMIX -19-18MAR96-1/1

## OILSCAN™ and COOLSCAN™

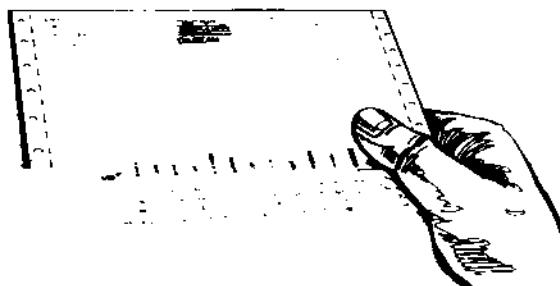
OILSCAN™ and COOLSCAN™ are John Deere sampling programs to help you monitor machine performance and identify potential problems before they cause serious damage.

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.



T6828AB -UN-15JUN89



T6829AB -UN-18OCT88

*OILSCAN is a registered 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.

Consult your John Deere dealer to obtain information and recommendations.

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

The temperature limits and service intervals shown in this manual apply to both conventional and synthetic oils.

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

DX,ALTER -19-15JUN00-1/1

## **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

## 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™ Prediluted Coolant is preferred for service.**

John Deere COOL-GARD Prediluted Coolant is available in a concentration of either 50% ethylene glycol or 55% propylene glycol.

### Additional recommended coolants

The following engine coolant is also recommended:

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

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

### Other fully formulated coolants

Other fully formulated low silicate ethylene or propylene glycol base coolants for heavy-duty engines may be used if they meet one of the following specifications:

- ASTM D6210 prediluted (50%) coolant
- ASTM D6210 coolant concentrate in a 40% to 60% mixture of concentrate with quality water

Coolants meeting ASTM D6210 do not require use of supplemental coolant additives, except for periodic replenishment of additives during the drain interval.

### Coolants requiring supplemental coolant additives

Other low silicate ethylene glycol base coolants for heavy-duty engines may also be used if they meet one of the following specifications:

- ASTM D4985 ethylene glycol base prediluted (50%) coolant
- ASTM D4985 ethylene glycol base coolant concentrate in a 40% to 60% mixture of concentrate with quality water

Coolants meeting ASTM D4985 require an initial charge of supplemental coolant additives, formulated for protection of heavy duty diesel engines against corrosion and cylinder liner erosion and pitting. They also require periodic replenishment of additives during the drain interval.

### Other coolants

If a coolant known to meet the requirements of coolant specifications shown in this manual is not available, use either:

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

The coolant concentrate or prediluted coolant shall be of a quality that provides cavitation protection to cast iron and aluminum parts in the cooling system.

### 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.**

**IMPORTANT: Do not mix ethylene glycol and propylene glycol base coolants.**

DX,COOL3 -19-19DEC03-2/2

## Drain Intervals for Diesel Engine Coolant

Drain the factory fill engine coolant, flush the cooling system, and refill with new coolant after the first 3 years or 3000 hours of operation.

Subsequent drain intervals are determined by the coolant used for service. At each interval, drain the coolant, flush the cooling system, and refill with new coolant.

When John Deere COOL-GARD™ is 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 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

If COOL-GARD is not used, the drain interval is reduced to 2 years or 2000 hours of operation.

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DX,COOL11 -19-19DEC03-1/1

## Additional Information About Diesel Engine Coolants and Supplemental Coolant Additives

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™ Prediluted Coolant, are fully formulated coolants that contain all three components in their correct concentrations. Do not add an initial charge of supplemental coolant additives to these fully formulated products.

Coolants meeting ASTM D6210 do not require an initial charge of supplemental coolant additives.

Some coolant concentrates, including John Deere COOL-GARD Coolant Concentrate, contain both glycol antifreeze and inhibiting coolant additives. Mix these products with quality water, but do not add an initial charge of supplemental coolant additives.

Coolants meeting ASTM D4985 require an initial charge of supplemental coolant additives.

### Replenish coolant additives

The concentration of coolant additives is gradually depleted during engine operation. Periodic replenishment of inhibitors is required, even when John Deere COOL-GARD or another fully formulated coolant is used. Follow the recommendations in this manual for the use of supplemental coolant additives.

### Why use supplemental coolant additives?

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.

Use of supplemental coolant additives reduces corrosion, erosion, and pitting. These chemicals reduce the number of vapor bubbles in the coolant and help form a protective film on cylinder liner surfaces. This film acts as a barrier against the harmful effects of collapsing vapor bubbles.

### 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.

### 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 -19-19DEC03-2/2

## Supplemental Coolant Additives

The concentration of coolant additives is gradually depleted during engine operation. For all recommended coolants, replenish additives between drain intervals by adding a supplemental coolant additive every 12 months or as determined necessary by coolant testing.

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

**IMPORTANT:** Do not add a supplemental coolant additive when the cooling system is drained and refilled with John DeereCOOL-GARD™.

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 -19-07NOV03-1/1

## Testing Diesel Engine Coolant

### 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.

Compare the results to the supplemental coolant additive (SCA) chart to determine the amount of inhibiting additives in your coolant and whether more John Deere COOLANT CONDITIONER should be added.

### 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 PLUS is a trademark of Deere & Company*

DX,COOL9 -19-19DEC03-1/1

## 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.

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

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

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

DX,COOL6 -19-18MAR96-1/1

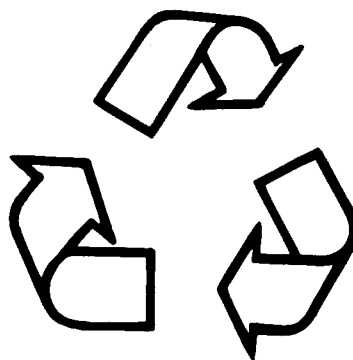
## Disposing of Coolant

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

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

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

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



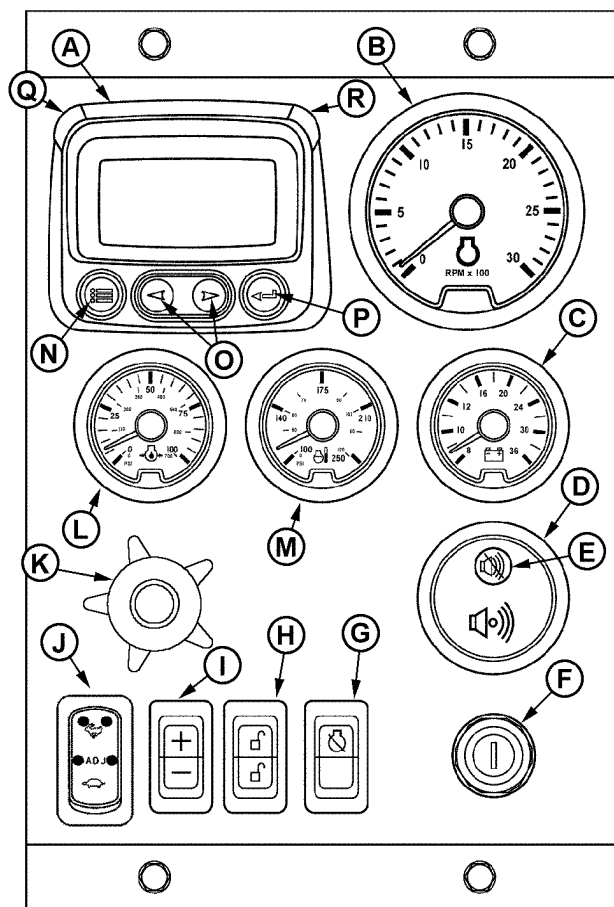
*Recycle Waste*

TS1133 -UN-26NOV90

RG, RG34710, 7543 -19-24JAN03-1/1

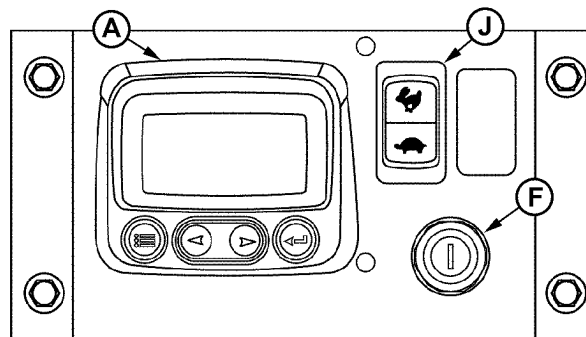
# Instrument Panels

## Instrument Panels



Full-Featured Instrument Panel

RG13276 -UN-28OCT03



Basic Instrument Panel

RG13277 -UN-22OCT03

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

Tier 3 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.

**NOTE:** Section 20 following covers operation of engine with these controls.

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

**Instrument Panels (Continued)****A—Diagnostic Gauge/Hour Meter**

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

**B—Tachometer**

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

**C—Voltmeter (Optional)**

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

**D—Audible Alarm (Optional)**

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

**E—Audible Alarm Override Button**

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

**F—Key Start Switch**

The three-position key start switch (F) controls the engine electrical system. When the key switch is turned clockwise to "START", the engine will crank.

When the engine starts, the key is released and returns to the "ON" (RUN) position.

**G—Override Shutdown Rocker Switch**

Switch will be present, but may not be active, depending on engine 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 Speeds in Section 20.

## How To Select Preset Operating Speeds (Bump Speeds)

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

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

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

## K—Analog Throttle Control (Optional)

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

## L—Engine Oil Pressure Gauge

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

## M—Engine Coolant Temperature Gauge

The engine coolant temperature gauge (M) indicates engine coolant temperature. An audible alarm (D)

warns the operator if coolant temperature rises above the preset safe operating temperature.

## N—Menu Key

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

## O—Arrow Keys

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

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

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

## P—Enter Key

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

## Q—Amber "WARNING" Indicator Light

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

## 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.

OURGP12,0000081 -19-15SEP04-3/3

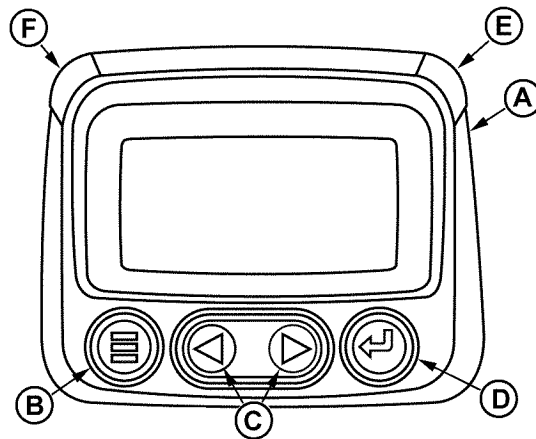
## Using Diagnostic Gauge to Access Engine Information

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
- 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



*Diagnostic Gauge*

- A—Diagnostic Gauge
- B—Menu Key
- C—Arrow Keys
- D—Enter Key
- E—Red “STOP ENGINE” Indicator Light
- F—Amber “WARNING” Indicator Light

RG13132 -UN-09SEP03

Continued on next page

OURGP11,0000051 -19-28FEB05-1/2

**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 and Portuguese. Contact your engine distributor or dealer.

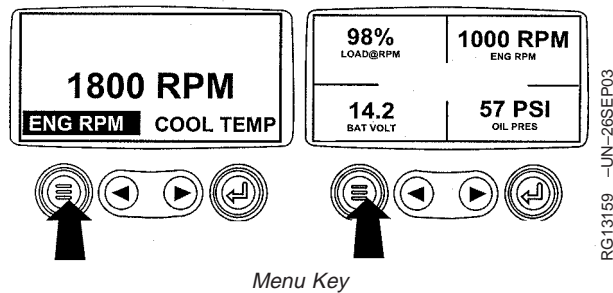
The diagnostic gauge includes a graphical backlit Liquid Crystal Display (LCD) screen. The display can show either a single parameter or a quadrant display showing four parameters simultaneously. The diagnostic gauge uses two arrow keys (C) for scrolling through the engine parameter list and viewing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

OURGP11,0000051 -19-28FEB05-2/2

## Main Menu Navigation

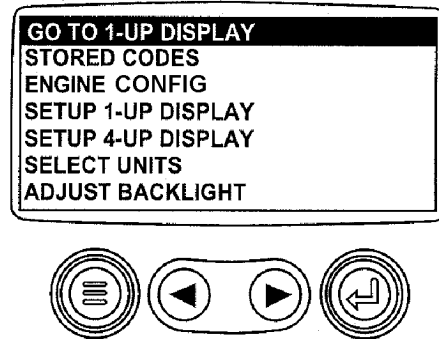
**NOTE:** The engine does not need to be running to navigate the diagnostic gauge screens. If engine start up is desired, See *Starting The Engine*. All of the engine values illustrated on the diagnostic gauge indicate the engine is running.

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



OURGP11,00000A9 -19-03SEP03-1/5

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

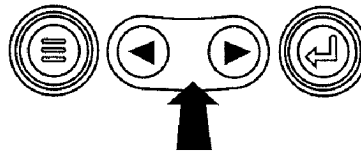
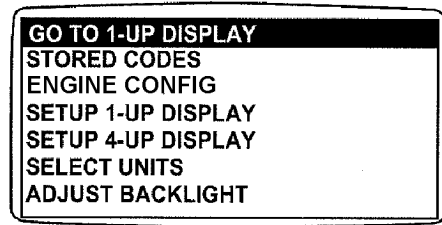


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OURGP11,00000A9 -19-03SEP03-2/5



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

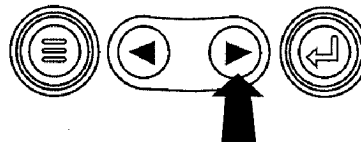
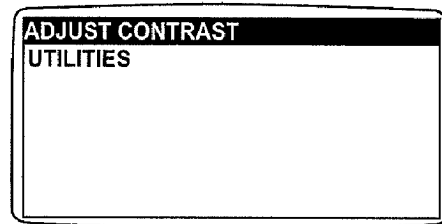


Main Menu Items

RG13161 -UN-02OCT03

OURGP11,00000A9 -19-03SEP03-3/5

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

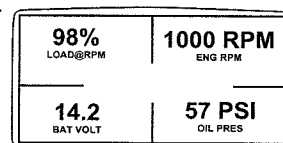
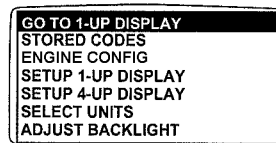


Last Items On Main Menu

RG13162 -UN-26SEP03

OURGP11,00000A9 -19-03SEP03-4/5

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

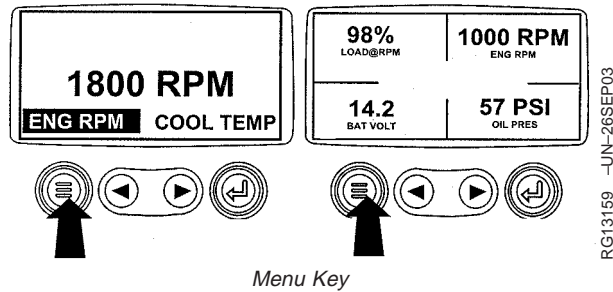
RG13163 -UN-02OCT03

OURGP11,00000A9 -19-03SEP03-5/5

## 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.

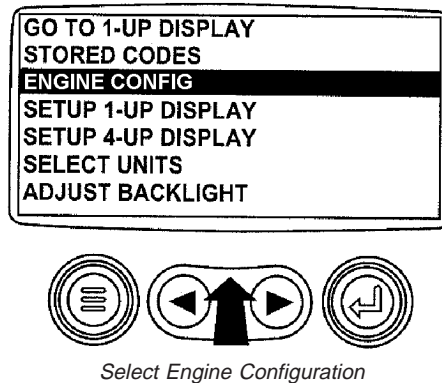


RG13159 -UN-26SEP03

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

OURGP11,00000AB -19-03SEP03-1/6

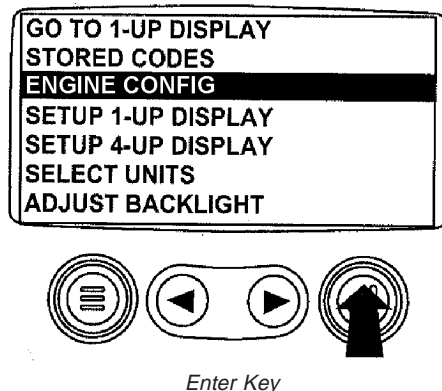
2. The main menu will be displayed. Use the "Arrow" keys to scroll through the menu until "Engine Config" is highlighted.



RG13164 -UN-07OCT03

OURGP11,00000AB -19-03SEP03-2/6

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

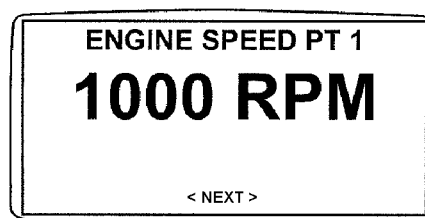


RG13165 -UN-02OCT03

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OURGP11,00000AB -19-03SEP03-3/6

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

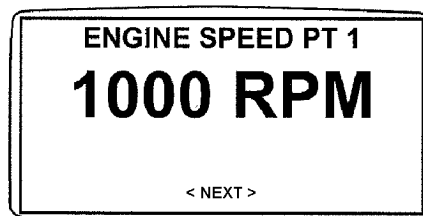


Use Arrow Keys To Scroll

RG13166 -UN-29SEP03

OURGP11,00000AB -19-03SEP03-4/6

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

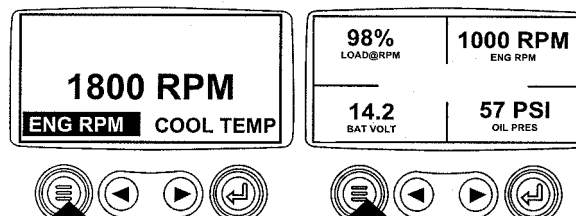


Return To Main Menu

RG13167 -UN-29SEP03

OURGP11,00000AB -19-03SEP03-5/6

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



Exit Main Menu

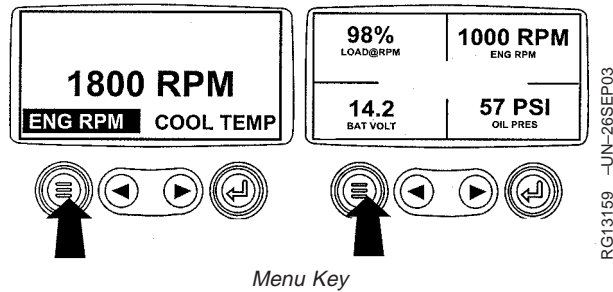
RG13159 -UN-26SEP03

OURGP11,00000AB -19-03SEP03-6/6

## 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.

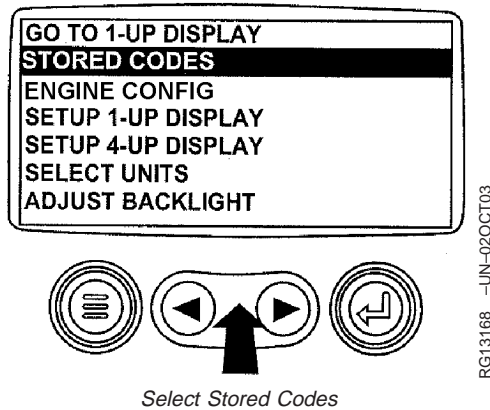
For description of trouble codes, see chart in *Troubleshooting Section*.



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

OURGP11,00000AC -19-03SEP03-1/6

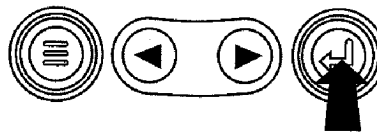
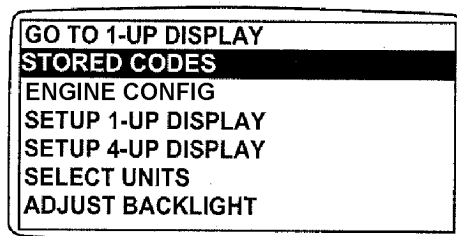
2. The main menu will be displayed. Use the "Arrow" keys to scroll through the menu until "Stored Codes" is highlighted.



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OURGP11,00000AC -19-03SEP03-2/6

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

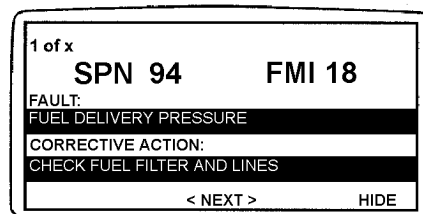


Enter Key

RG13169 -UN-02OCT03

OURGP11,00000AC -19-03SEP03-3/6

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.

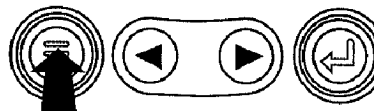
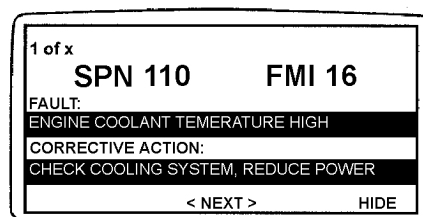


Use Arrow Keys To Scroll

RG13245 -UN-02OCT03

OURGP11,00000AC -19-03SEP03-4/6

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



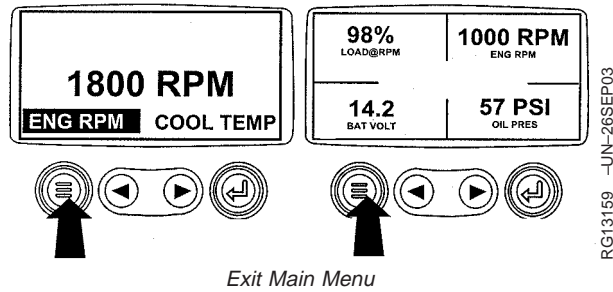
Return To Main Menu

RG13246 -UN-02OCT03

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OURGP11,00000AC -19-03SEP03-5/6

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

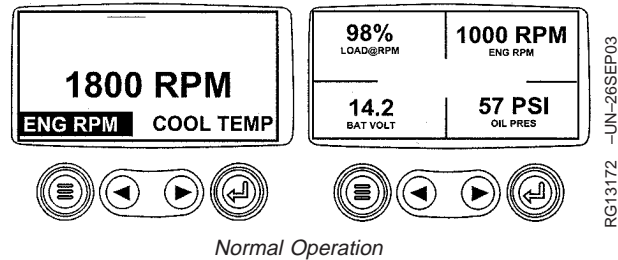


OURGP11.00000AC -19-03SEP03-6/6

## 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.

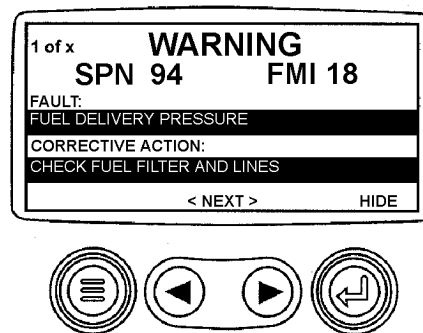


1. During normal operation the single or four parameter screen will be displayed.

OURGP11.00000AD -19-03SEP03-1/7

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.

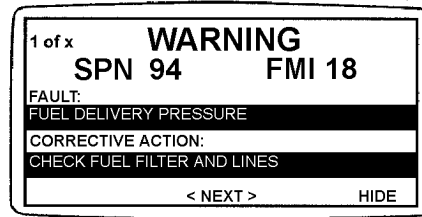
**IMPORTANT:** Ignoring active trouble codes can result in severe engine damage.



Continued on next page

OURGP11.00000AD -19-03SEP03-2/7

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.



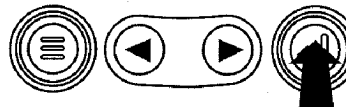
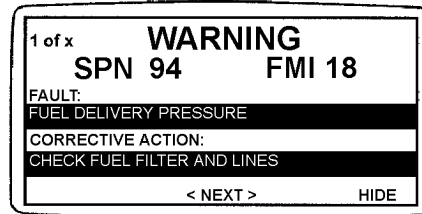
Use Arrow Keys To Scroll

RG13241 -UN-30SEP03

OURGP11,00000AD -19-03SEP03-3/7

**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.

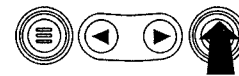
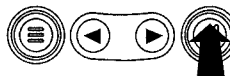
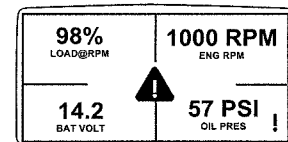
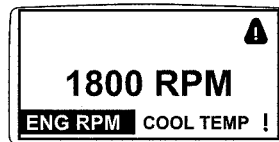


Hide Trouble Codes

RG13242 -UN-30SEP03

OURGP11,00000AD -19-03SEP03-4/7

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.



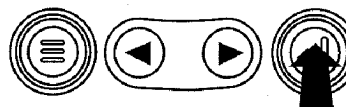
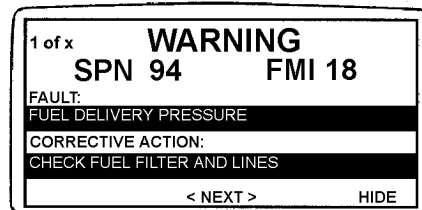
Active Trouble Code Icon

RG13176 -UN-26SEP03

OURGP11,00000AD -19-03SEP03-5/7

**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.



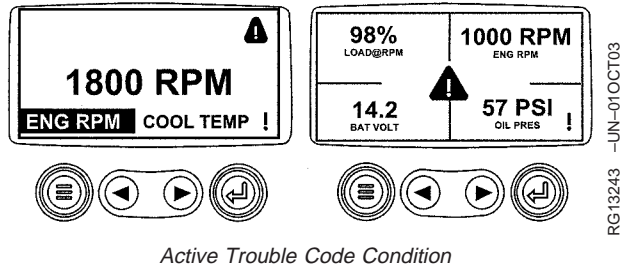
Enter Key

RG13242 -UN-30SEP03

Continued on next page

OURGP11,00000AD -19-03SEP03-6/7

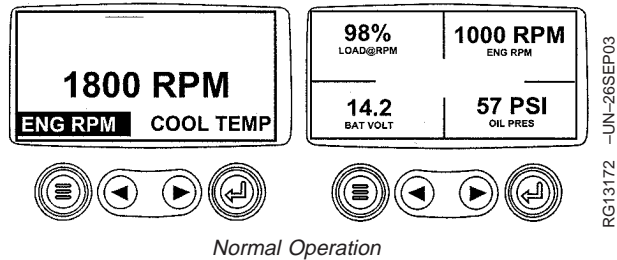
- The single or four parameter screen will display the warning icon until the trouble code condition is corrected.



OURGP11,00000AD -19-03SEP03-7/7

## Engine Shutdown Codes

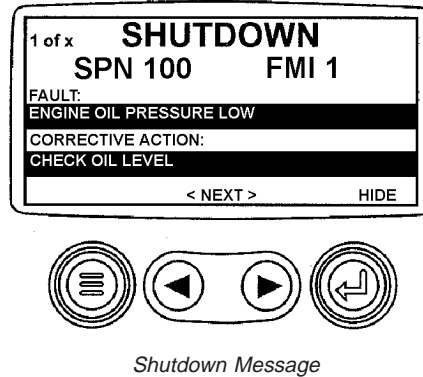
- During normal operation the single or four parameter screen will be displayed.



OURGP11,00000AE -19-03SEP03-1/6

- 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.

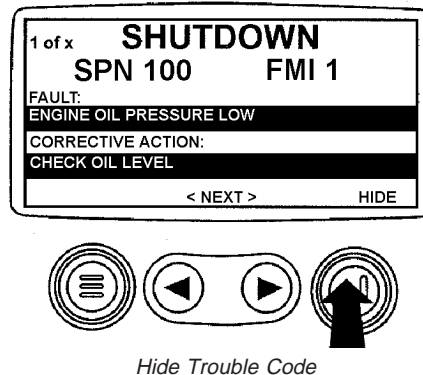
If the word "Next" appears above the arrow keys, there are more trouble codes that can be viewed by using the arrow keys to scroll to the next trouble code.



OURGP11,00000AE -19-03SEP03-2/6

- 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.



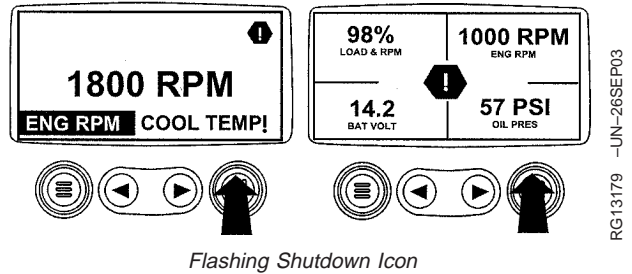
Continued on next page

OURGP11,00000AE -19-03SEP03-3/6



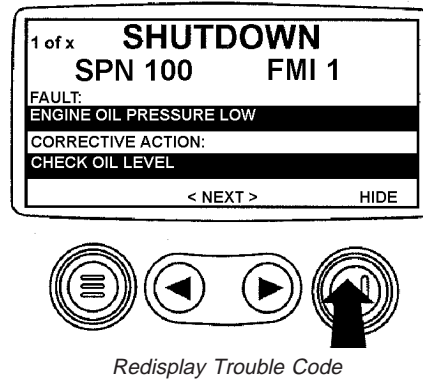
4. The display will return to the single or four parameter display, but the display will contain the "Shutdown" icon. Pressing the "Enter" key will redisplay the hidden trouble code.

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



OURGP11,00000AE -19-03SEP03-4/6

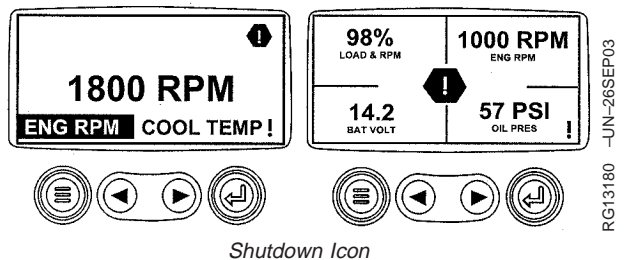
5. Pressing the "Enter" key once again will hide the trouble code and return the screen to the single or four parameter display.



OURGP11,00000AE -19-03SEP03-5/6

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

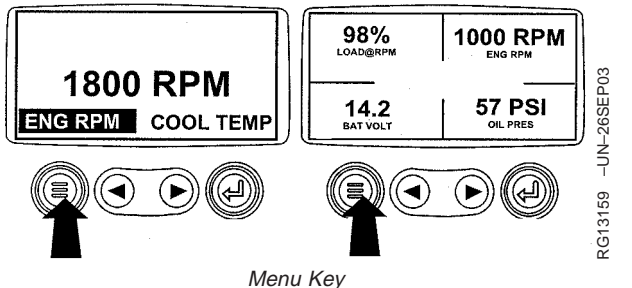
**IMPORTANT: Ignoring the shutdown message can result in severe engine damage.**



OURGP11,00000AE -19-03SEP03-6/6

## Adjusting Backlighting

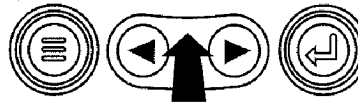
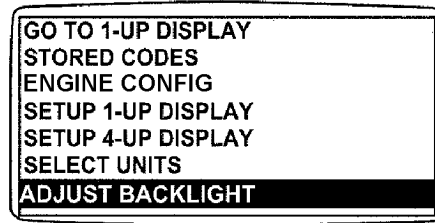
1. Turn the key switch to the ON position. Starting at the single or four engine parameter display, press the "Menu" key.



Continued on next page

OURGP11,0000237 -19-21OCT03-1/6

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

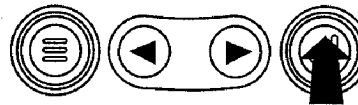
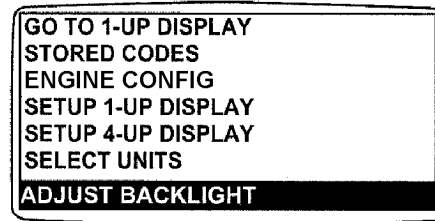


Select Adjust Backlight

RG13181 -UN-02OCT03

OURGP11,0000237 -19-21OCT03-2/6

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

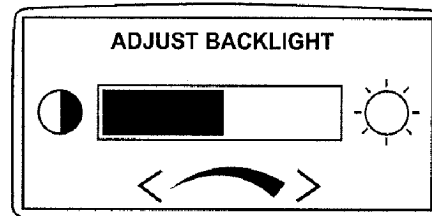


Press Enter Key

RG13182 -UN-02OCT03

OURGP11,0000237 -19-21OCT03-3/6

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



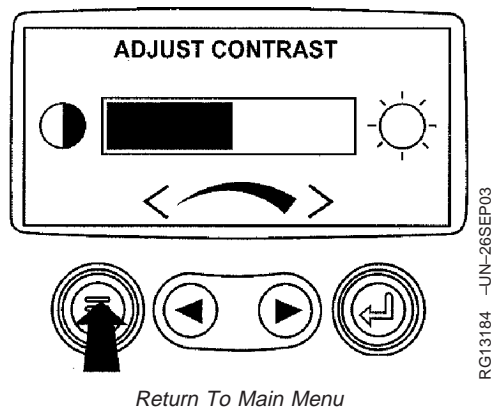
Adjust Backlight Intensity

RG13183 -UN-29SEP03

Continued on next page

OURGP11,0000237 -19-21OCT03-4/6

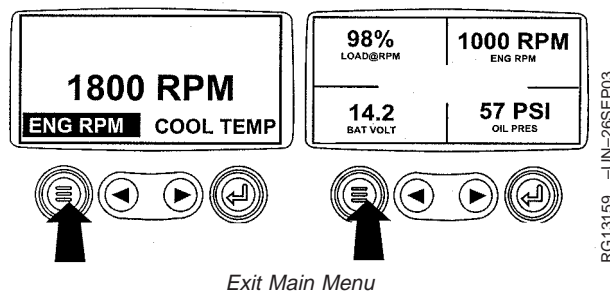
5. Press the "Menu" key to return to the main menu.



Return To Main Menu

OURGP11,0000237 -19-21OCT03-5/6

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

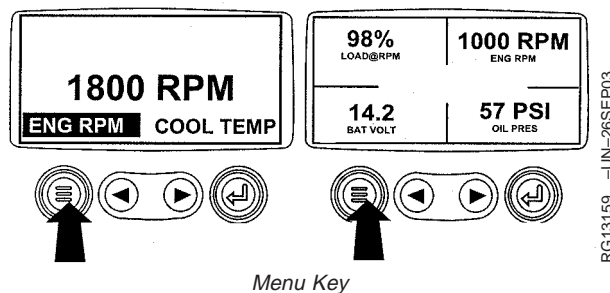


Exit Main Menu

OURGP11,0000237 -19-21OCT03-6/6

## Adjusting Contrast

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

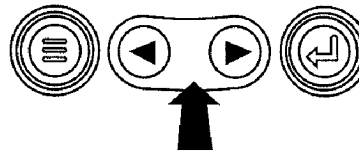
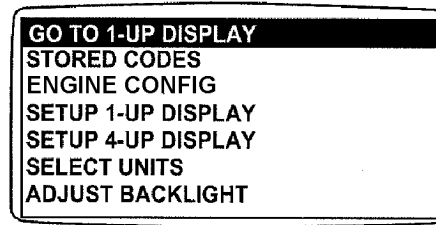


Menu Key

Continued on next page

OURGP11,00000AF -19-03SEP03-1/6

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

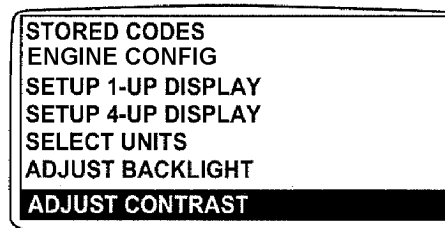


Select Adjust Contrast

RG13161 -UN-02OCT03

OURGP11,00000AF -19-03SEP03-2/6

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

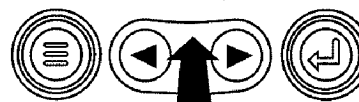
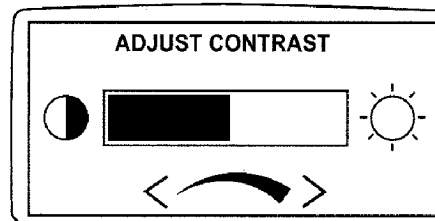


Press Enter Key

RG13185 -UN-02OCT03

OURGP11,00000AF -19-03SEP03-3/6

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



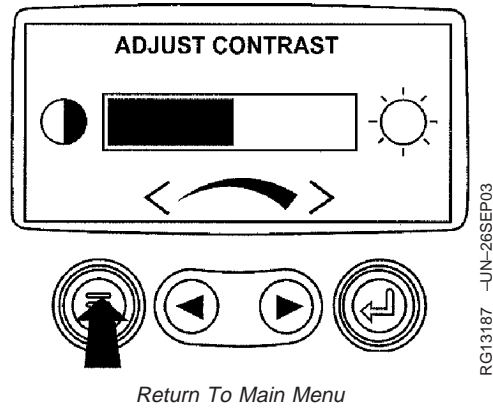
Adjust Contrast Intensity

Continued on next page

RG13186 -UN-29SEP03

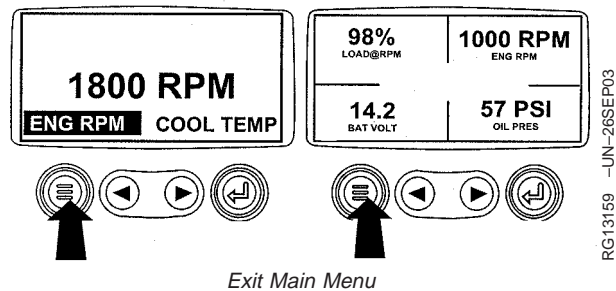
OURGP11,00000AF -19-03SEP03-4/6

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



OURGP11,00000AF -19-03SEP03-5/6

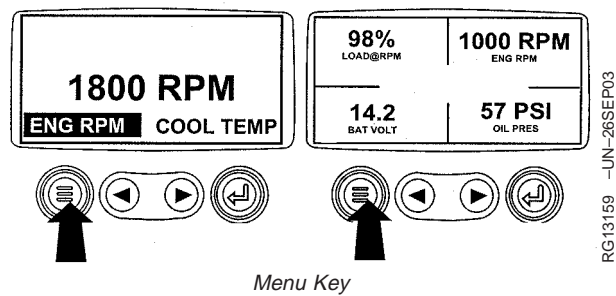
6. Press the "Menu" key to exit the main menu and return to the engine parameter display.



OURGP11,00000AF -19-03SEP03-6/6

## Selecting Units Of Measurement

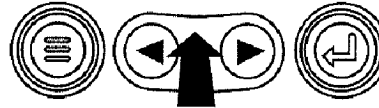
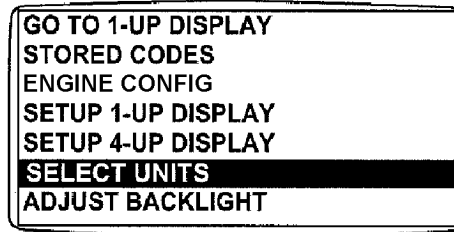
1. Turn the key switch to the ON position. Starting at the single or four engine parameter display, press the "Menu" key.



Continued on next page

OURGP11,00000B0 -19-03SEP03-1/7

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

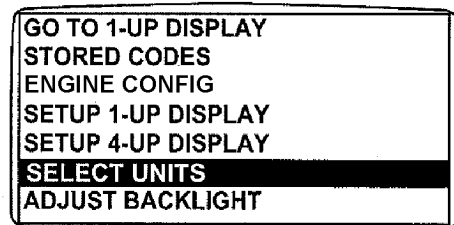


Select Units

RG13188 -UN-02OCT03

OURGP11,00000B0 -19-03SEP03-2/7

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



Press Enter Key

RG13188 -UN-02OCT03

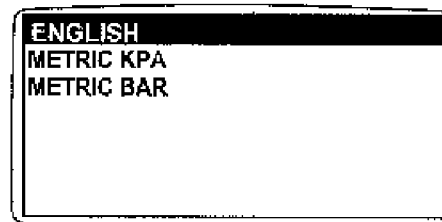
OURGP11,00000B0 -19-03SEP03-3/7

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

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

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

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



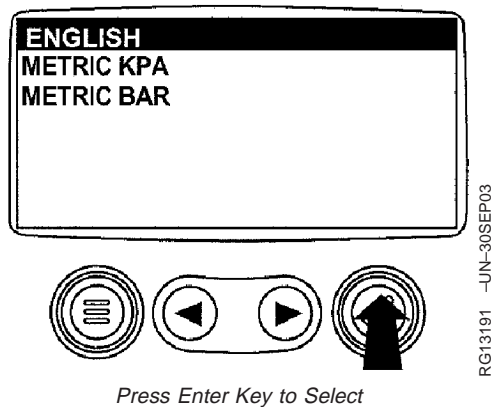
Select Desired Units

RG13190 -UN-26SEP03

Continued on next page

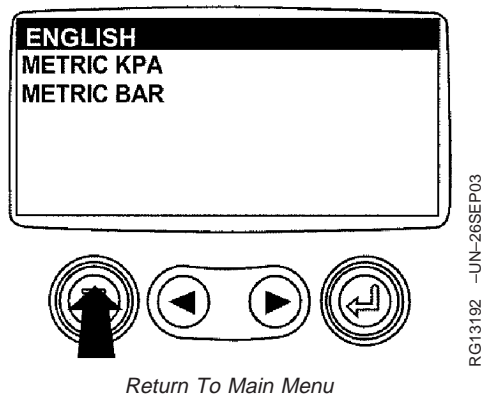
OURGP11,00000B0 -19-03SEP03-4/7

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



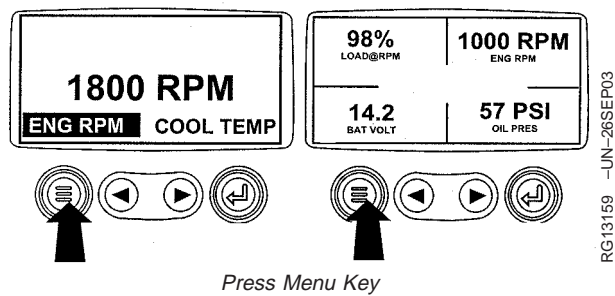
OURGP11,00000B0 -19-03SEP03-5/7

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



OURGP11,00000B0 -19-03SEP03-6/7

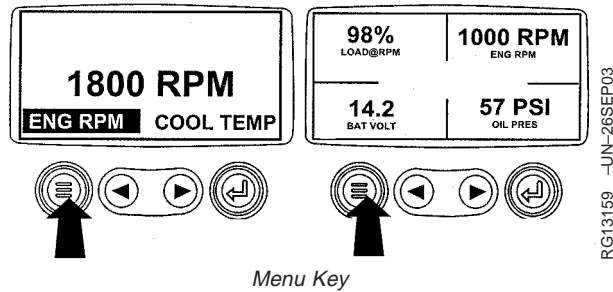
7. Press the "Menu" key to return to the engine parameter display.



OURGP11,00000B0 -19-03SEP03-7/7

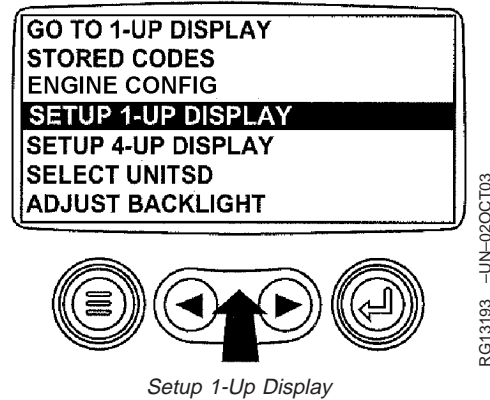
## Setup 1-Up Display

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



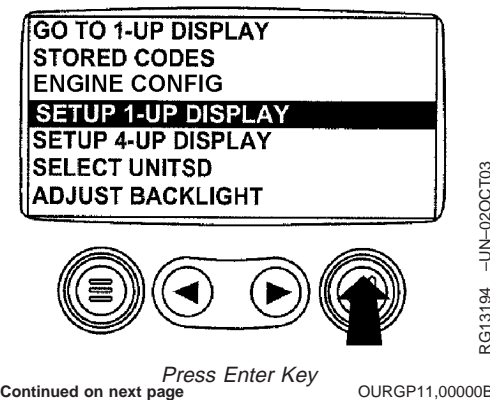
OURGP11,00000B1 -19-03SEP03-1/18

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



OURGP11,00000B1 -19-03SEP03-2/18

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



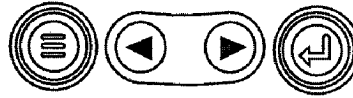
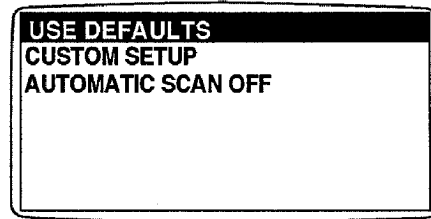
Continued on next page

OURGP11,00000B1 -19-03SEP03-3/18



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.

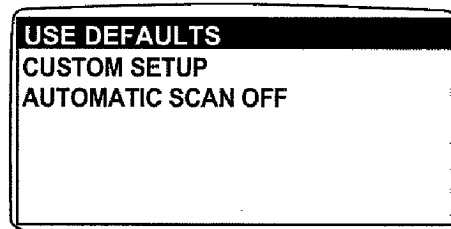


1-Up Display Options

RG13196 –UN–26SEP03

OURGP11,00000B1 –19–03SEP03–4/18

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



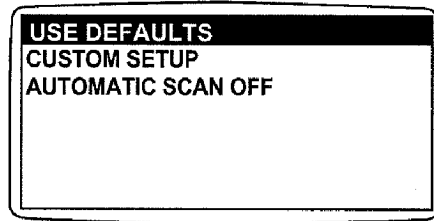
Select Defaults

RG13195 –UN–26SEP03

Continued on next page

OURGP11,00000B1 –19–03SEP03–5/18

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

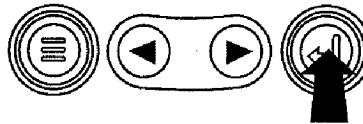
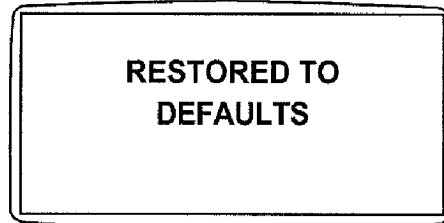


Defaults Selected

RG13197 -UN-29SEP03

OURGP11,00000B1 -19-03SEP03-6/18

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

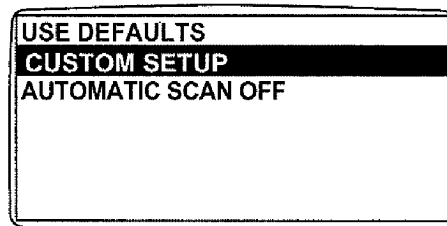


Restored To Defaults

RG13149 -UN-24SEP03

OURGP11,00000B1 -19-03SEP03-7/18

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.



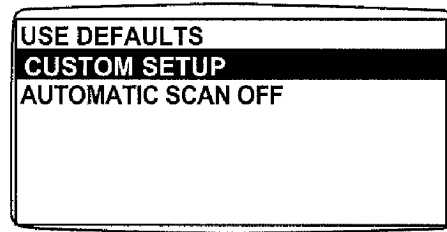
Select Custom Setup

RG13198 -UN-26SEP03

Continued on next page

OURGP11,00000B1 -19-03SEP03-8/18

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

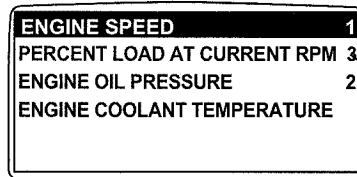


Engine Parameters

RG13199 -UN-26SEP03

OURGP11,00000B1 -19-03SEP03-9/18

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



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

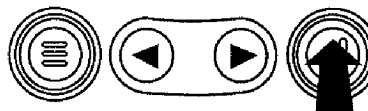
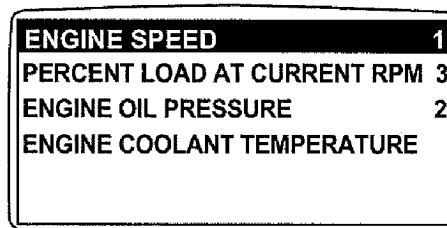


Select Parameters

RG13150 -UN-24SEP03

OURGP11,00000B1 -19-03SEP03-10/18

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



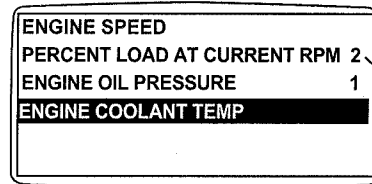
Deselect Parameters

RG13219 -UN-26SEP03

Continued on next page

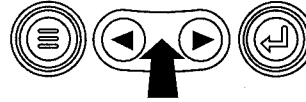
OURGP11,00000B1 -19-03SEP03-11/18

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).



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

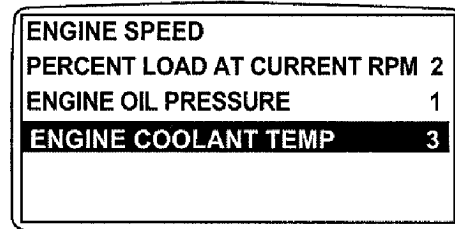
RG13151 -UN-24SEP03



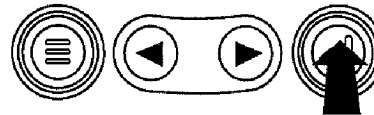
Select Desired Parameters

OURGP11.00000B1 -19-03SEP03-12/18

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.



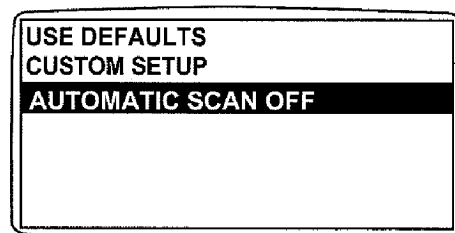
RG13220 -UN-26SEP03



Select Parameters For Display

OURGP11.00000B1 -19-03SEP03-13/18

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

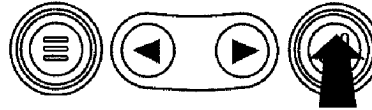
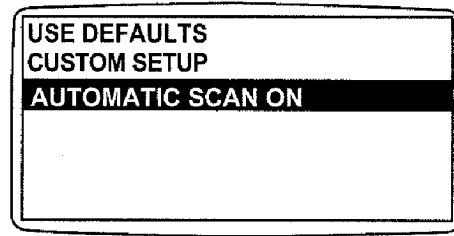


Automatic Scan Off

Continued on next page

OURGP11.00000B1 -19-03SEP03-14/18

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

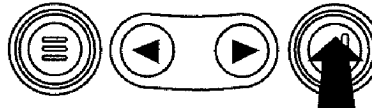
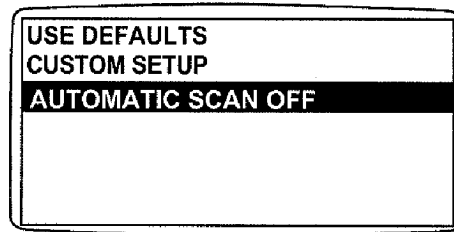


Automatic Scan On

RG13222 -UN-26SEP03

OURGP11,00000B1 -19-03SEP03-15/18

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



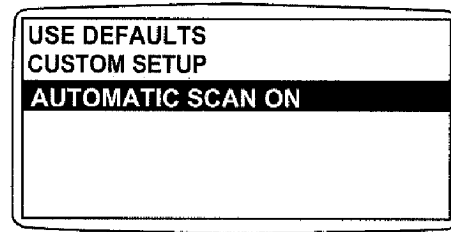
Automatic Scan Off

RG13223 -UN-26SEP03

Continued on next page

OURGP11,00000B1 -19-03SEP03-16/18

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

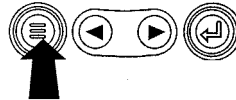
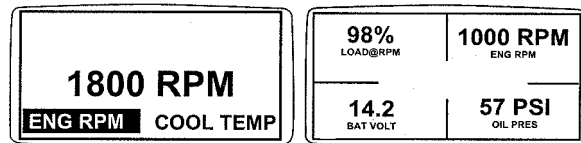


Menu Key

RG13224 -UN-26SEP03

OURGP11,00000B1 -19-03SEP03-17/18

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



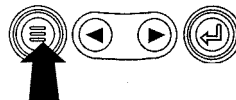
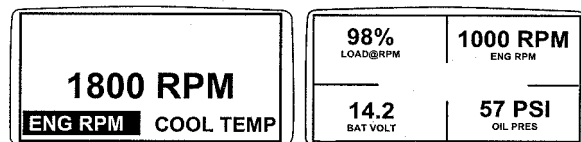
Exit Main Menu

RG13159 -UN-26SEP03

OURGP11,00000B1 -19-03SEP03-18/18

## 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.



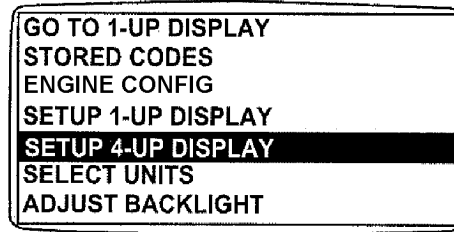
Menu Key

RG13159 -UN-26SEP03

Continued on next page

OURGP11,00000B2 -19-03SEP03-1/14

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

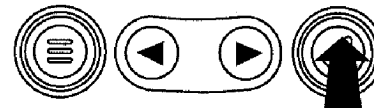
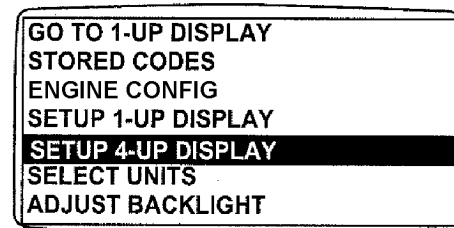


Select Setup 4-Up Display

RG13225 -UN-02OCT03

OURGP11,00000B2 -19-03SEP03-2/14

- 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

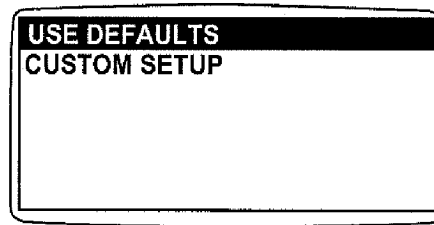
RG13226 -UN-02OCT03

Continued on next page

OURGP11,00000B2 -19-03SEP03-3/14

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.

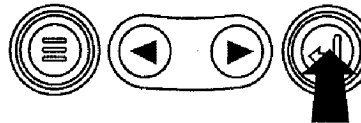
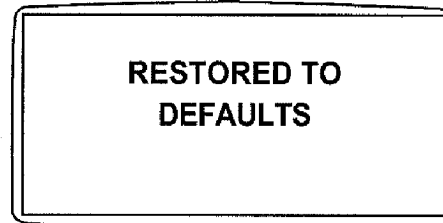


Select Factory Defaults

RG13244 –UN-02OCT03

OURGP11,00000B2 –19-03SEP03-4/14

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.

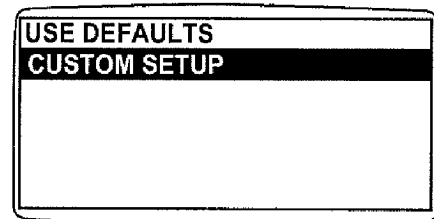


Restored To Defaults

RG13149 –UN-24SEP03

OURGP11,00000B2 –19-03SEP03-5/14

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.



Custom Setup

RG13227 –UN-26SEP03

Continued on next page

OURGP11,00000B2 –19-03SEP03-6/14



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.

125°F COOL TEMP	1000 RPM ENG RPM
<b>14.2</b> BAT VOLT	57 PSI OIL PRES



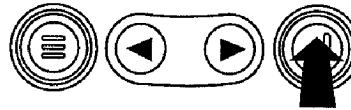
Select Parameters

RG13228 -UN-26SEP03

OURGP11,00000B2 -19-03SEP03-7/14

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

125°F COOL TEMP	1000 RPM ENG RPM
<b>14.2</b> BAT VOLT	57 PSI OIL PRES



List Of Engine Parameters

RG13229 -UN-26SEP03

OURGP11,00000B2 -19-03SEP03-8/14

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".

ENGINE SPEED	3
ENGINE HOURS	
ENGINE COOLANT TEMPERATURE	1
BATTERY POTENTIAL	
<b>ENGINE OIL TEMPERATURE</b>	<b>2</b>
ENGINE OIL PRESSURE	4

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



Select Desired Engine Parameter

RG13230 -UN-26SEP03

Continued on next page

OURGP11,00000B2 -19-03SEP03-9/14

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

ENGINE SPEED	3
ENGINE HOURS	
ENGINE COOLANT TEMPERATURE	1
BATTERY POTENTIAL	2
<b>ENGINE OIL TEMPERATURE</b>	
ENGINE OIL PRESSURE	4



Enter Selected Parameter

RG13231 -UN-26SEP03

OURGP11,00000B2 -19-03SEP03-10/14

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

ENGINE SPEED	3
ENGINE HOURS	
ENGINE COOLANT TEMPERATURE	1
BATTERY POTENTIAL	
<b>ENGINE OIL TEMPERATURE</b>	2
ENGINE OIL PRESSURE	4

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



Return To 4-Up Custom Setup

RG13232 -UN-26SEP03

OURGP11,00000B2 -19-03SEP03-11/14

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

125°F COOL TEMP	<b>1000 RPM</b> ENG RPM
143°F OIL TEMP	57 PSI OIL PRES



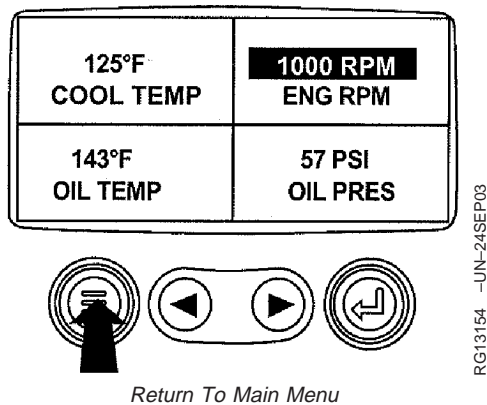
4-Up Display

RG13153 -UN-24SEP03

Continued on next page

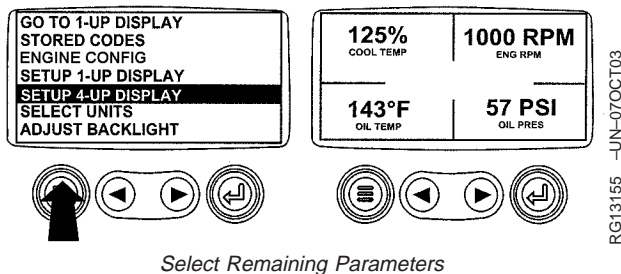
OURGP11,00000B2 -19-03SEP03-12/14

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



OURGP11,00000B2 -19-03SEP03-13/14

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



OURGP11,00000B2 -19-03SEP03-14/14

# Engine Operation

## Break-In Service

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

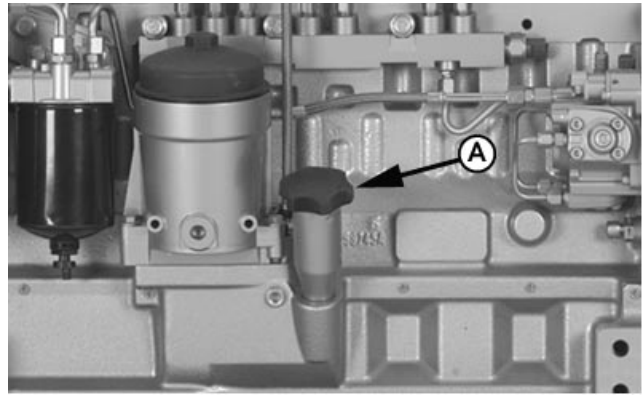
1. This engine is factory-filled with John Deere Engine Break-in Oil. Operate the engine at heavy loads with minimal idling during the break-in period.
2. If the engine has significant operating time at idle, constant speeds, and/or light load usage, or make-up oil is required in the first 100 hour period,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

**IMPORTANT:** Do not add makeup oil until the oil level is **BELOW** the add mark on dipstick. If make-up oil is required during the break-in period, an additional 100 hour break-in period is required. John Deere Engine Break-In Oil (TY22041) should be used to make up any oil consumed during the break-in period.

**IMPORTANT:** Do not use PLUS-50 oil or engine oils meeting any of the following during the first 250 hours of operation of a new or rebuilt engine:

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.



Check Engine Oil Level



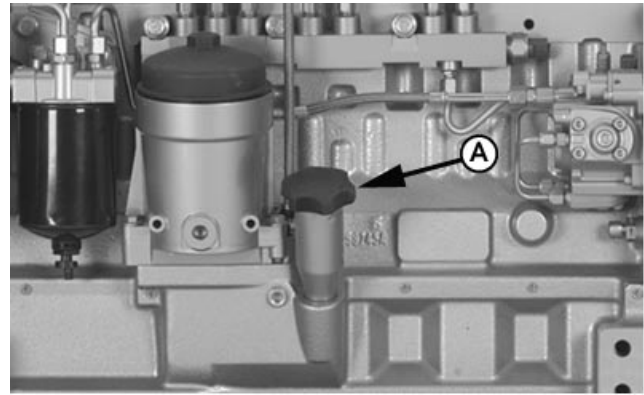
Engine Oil Level Dipstick

A—Oil Fill Cap/Dipstick

3. Check oil by unscrewing and pulling out oil fill cap/dipstick (A). Oil fill cap/dipstick may be located on left or right side of engine, depending on application. Check oil more frequently during engine break-in period. If oil must be added during this period, John Deere Engine Break-In Oil is preferred. See ENGINE BREAK-IN OIL, in Fuels, Lubricants, and Coolant Section for other oils allowed.

**IMPORTANT: DO NOT fill above the top of the crosshatch pattern or the FULL mark, whichever is present. Oil levels anywhere within crosshatch are considered in the acceptable operating range.**

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



Oil Fill Cap/Dipstick

A—Oil Fill Cap/Dipstick

RG13815 —UN-11JAN05

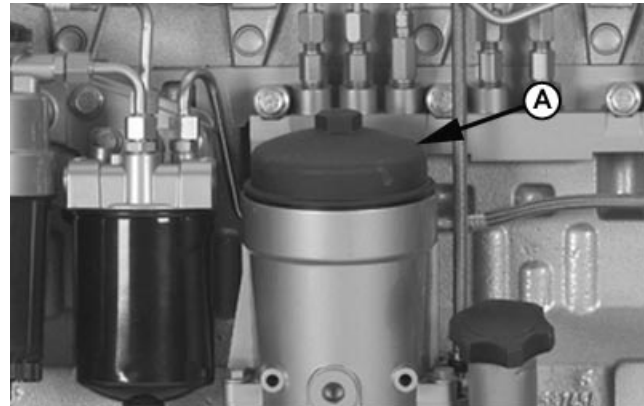
OURGP11,0000043 —19-21JAN05-2/4

6. After the first 100 hours maximum, change engine oil and replace engine oil filter (A). (Top-load oil filter illustrated.)(See CHANGING ENGINE OIL AND REPLACING FILTER in Lubrication and Maintenance/500 Hour Section.) Fill crankcase with seasonal viscosity grade oil. (See DIESEL ENGINE OIL, in Fuels, Lubricants, and Coolant Section.)

**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 0° C (32° F), use an engine block heater.*



Replacing Engine Oil Filter

A—Oil Filter

RG13854 —UN-17JAN05

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OURGP11,0000043 —19-21JAN05-3/4

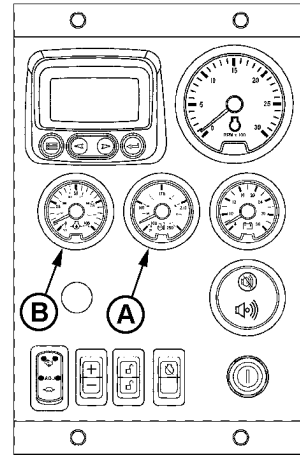
7. Watch coolant temperature gauge (A) closely during engine operation. Normal temperature range at full load rated speed is 82—94° C (180—202° F). If coolant temperature rises above 111° C (231° F), the engine will reduce power automatically. Unless temperature drops quickly, stop the engine and determine the cause before resuming operation.

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

#### Specification

Engine<sup>1</sup>—Oil Pressure at Full  
Load Rated Speed ..... 290 ± 103 kPa (2.9 ± 1.03 bar)  
(42 ± 15 psi)  
Minimum Oil Pressure at Low Idle..... 138 kPa (1.4 bar) (20 psi)  
Coolant Temperature Range..... 82°–94°C (180°–202°F)

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



Watch Coolant Temperature and Oil Pressure on Panel

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

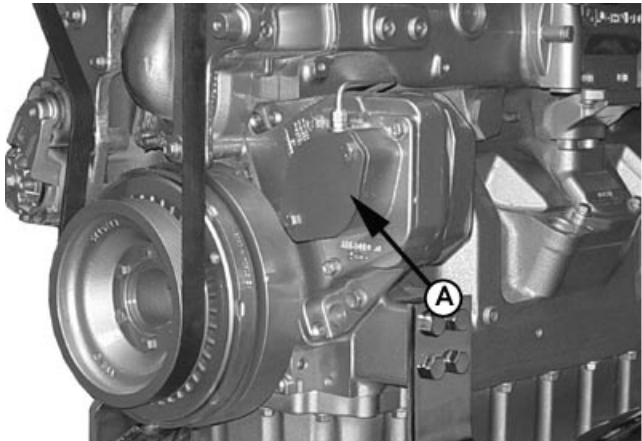
<sup>1</sup>At normal operating temperature of 115° C (240° F) oil sump.

### Auxiliary Gear Drive Limitations

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

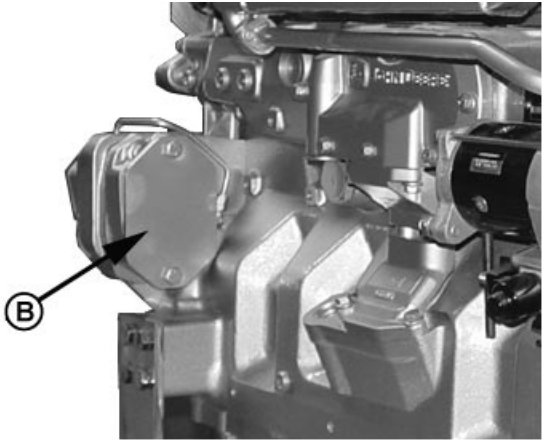
SAE Drive	Continuous Power (Maximum)	Intermittent Power (Maximum)
A .....	19 kW (25 hp) .....	22.5 kW (30 hp)
B or (A + B) .....	37 kW (50 hp) .....	45 kW (60 hp)

A—SAE Drive, Front  
B—SAE Drive, Rear



SAE Drive, Front

RG13855 -UN-17JAN05



SAE Drive, Rear

RG13856 -UN-17JAN05

RG, RG34710, 4051 -19-08OCT02-1/1

### Generator Set (Standby) Applications

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

RG, RG34710, 4052 -19-01JAN96-1/1

## Starting the Engine

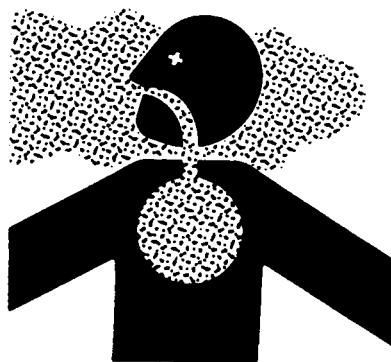
The following instructions apply to the optional controls and instruments available through the John Deere Parts Distribution Network. The controls and instruments for your engine may be different from those shown here; always follow manufacturer's instructions.



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



Use Proper Ventilation

TS220 -JUN-23AUG88

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OURGP11,0000024 -19-20DEC04-1/3

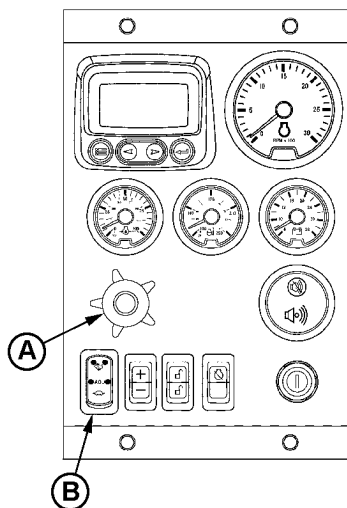


4. Set slow idle as follows:

**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.



*Analog Throttle Control and Speed Select Switch*

A—Analog Throttle Control (Optional)  
B—Speed Select Rocker Switch

RG13722 -UN-11NOV04

Continued on next page

OURGP11,0000024 -19-20DEC04-2/3

5. Turn key start switch (A) 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 reached 0:00 and the "Wait to Start" message is no longer displayed, you may start the engine.

Turn key start switch (A) clockwise to the START position to crank the engine. When the engine starts, release the key switch so 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.

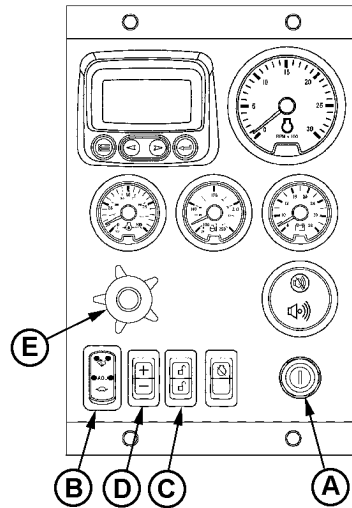
6. After engine starts, idle engine at not more than 1200 rpm until warm. (See WARMING ENGINE later in this section).

**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.

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.)



Start And Idle Engine Controls On Instrument 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)

RG13723 -JUN-11NOV04

OURGP11,0000024 -19-20DEC04-3/3

## Normal Engine Operation

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

Normal engine coolant operating temperature range is 82°–94° C (180°–202° F). If coolant temperature rises above 111° C (231° F), engine will reduce power automatically. Unless temperature drops quickly, stop engine and determine cause before resuming operation.

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

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

- Sudden drop in oil pressure
- Abnormal coolant temperatures
- Unusual noise or vibration
- Sudden loss of power
- Excessive 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. Also, the exhaust gas recirculation valve will cycle periodically with a momentary loss of engine rpm. This is also normal.*

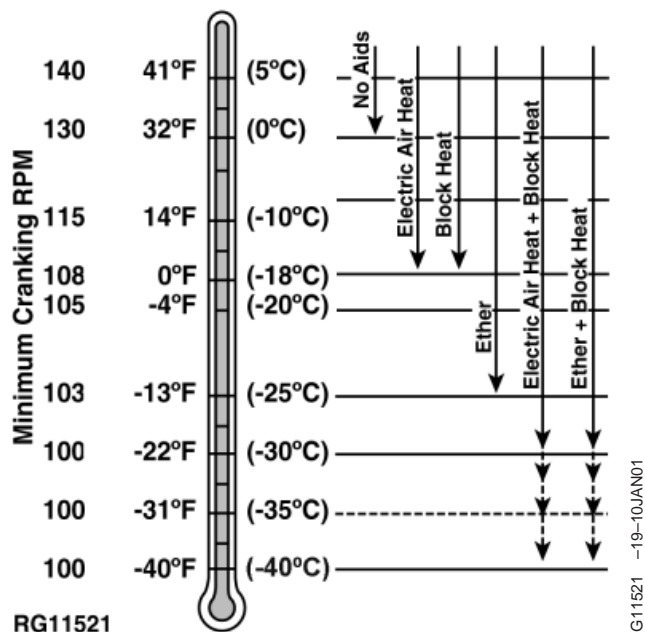
OURGP12,00000BF -19-22DEC04-1/1

## Cold Weather Operation



Starting Fluid is Flammable

TS1356 -UN-18MAR92



Cold Weather Starting Guidelines



**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 a block heater, coolant heater or fuel heater as cold weather starting aids.

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

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

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 (control) panel on your engine.

2. Use cold weather starting aids as needed. Follow supplier instructions for starting aid provided on your engine.

3. Engines With Air Intake Heaters: Turn key ON but do not crank engine until Engine Preheat Indicator goes off.

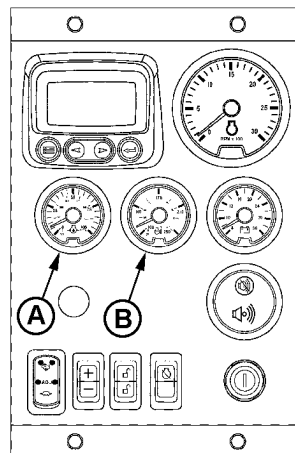
4. Follow remaining steps 5—7 as listed under STARTING THE ENGINE earlier in this section.

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

## Warming Engine

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

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



Oil Pressure and Coolant Temperature Gauges On Panel

A—Engine Oil Pressure Gauge

B—Engine Coolant Temperature Gauge

1. Check oil pressure gauge (A) as soon as engine starts. If gauge needle does not rise above minimum oil pressure specification of 200 kPa (2.0 bar) (29 psi) within 5 seconds, stop the engine and determine the cause. Normal engine oil pressure is  $290 \pm 103$  kPa ( $2.9 \pm 1.03$  bar) ( $42 \pm 15$  psi) at rated full load speed (1800–2500 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°–94° C (180°–202° F).

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

RG13724 –UN–11NOV04

OURGP12,00000C2 –19–22DEC04–1/1

## Idling Engine

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 set at the factory at 800 rpm for standard industrial engines and at 850 rpm for generator sets. If an engine will be idling for more than 5 minutes, stop and restart later.

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

RG, RG34710, 4058 -19-14NOV02-1/1

## 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:

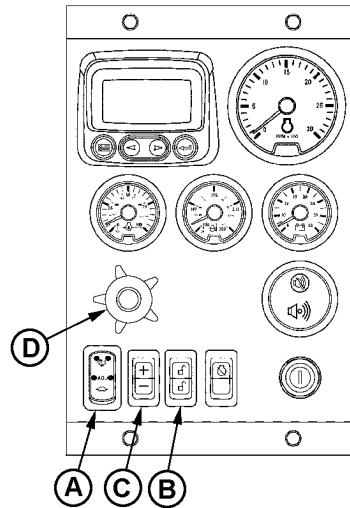
1. Select fast (rabbit) or slow (turtle) position on High-Low Speed Select Rocker Switch (A).
2. Press and hold top or bottom half of Bump Speed Enable Rocker Switch (B) while using Speed Select Rocker Switch (C).
3. Use Speed Select Rocker Switch (C) to bump engine speed up (+) or down (-).

**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):

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).



Changing Engine Speed On Panel

- 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

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

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

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

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

#### **Changing engine speed using optional analog throttle (D)**

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

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

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

Continued on next page

OURGP12,00000C1 -19-22DEC04-2/3



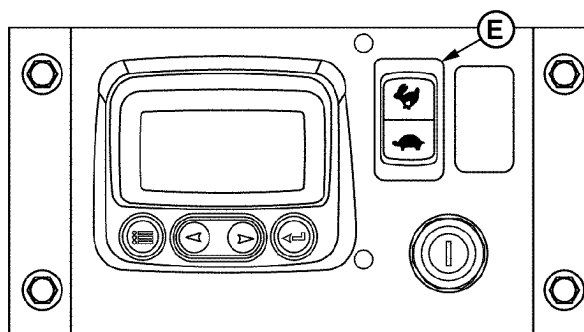
### Changing engine speeds on engines equipped with the Basic Instrument Panel

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, so steps above must be repeated for each speed change.



RG13289 -UN-30OCT03

*Changing Engine Speed With Basic Panel*

**E—High-Low Speed Select Rocker Switch**

OURGP12,00000C1 -19-22DEC04-3/3

## 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.

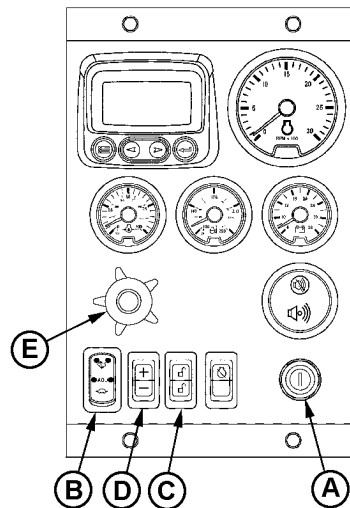
**Panels with high-low speed select rocker switch (B) only:** Set rpm using bump speed enable switch (C) with speed select rocker switch (D).

**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.

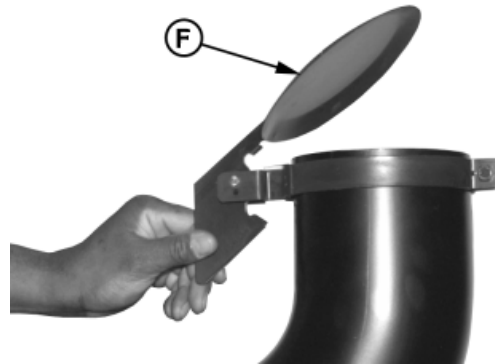
**NOTE:** Engine control unit (ECU) reads the higher of the high-low speed select rocker switch or the analog throttle speed settings.

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.



Stopping the Engine Using Panel Controls (Full-Featured Panel Shown)



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

RG13723 -UN-11NOV04

RG9933 -UN-18NOV99

## Using a Booster Battery or Charger

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

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

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

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

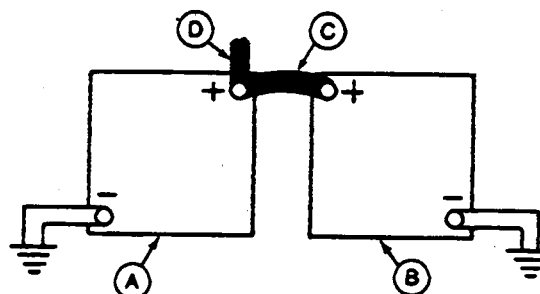
1. Connect booster battery or batteries to produce the required system voltage for your engine application.

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

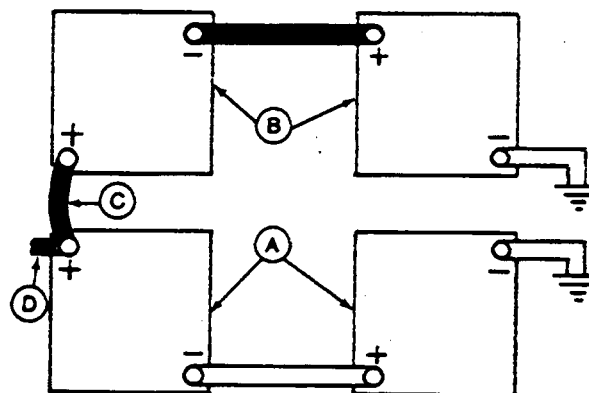
2. Connect one end of jumper cable to the **POSITIVE (+)** post of the booster battery.
3. Connect the other end of the jumper cable to the **POSITIVE (+)** post of battery connected to starter.
4. Connect one end of the other jumper cable to the **NEGATIVE (-)** post of the booster battery.
5. ALWAYS complete the hook-up by making the last connection of the **NEGATIVE (-)** cable to a good ground on the engine frame and away from the battery(ies).



Exploding Battery



12-Volt System



24-Volt System

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

TS204 -JUN-23AUG88

RG4678 -JUN-14DEC88

RG4698 -JUN-14DEC88

6. Start the engine. Disconnect jumper cables immediately after engine starts. Always disconnect NEGATIVE (–) cable first.

RG, RG34710, 4060 –19–01JAN96–2/2

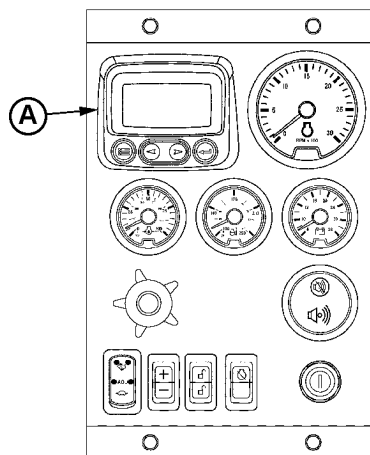
# Lubrication and Maintenance

## 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. 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



Hour Meter On Panel

RG13728 —UN-11NOV04

OURGP12,00000C4 —19-22DEC04-1/1

## Use Correct Fuels, Lubricants, and Coolant

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

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



John Deere Parts Network

TS100 —UN-23AUG88

RG, RG34710, 4062 —19-01JAN96-1/1

## Lubrication and Maintenance Service Interval Chart—Standard Industrial Engines

Item	Lubrication and Maintenance Service Intervals			
	Daily	500 Hour/12 Month	2000 Hour/24 Month	As Required
Check Engine Oil and Coolant Level	•			
Drain Water From Fuel Filters	•			
Check Air Cleaner Dust Valve Restriction Indicator Gauge <sup>a</sup>	•			
Perform Visual Walkaround Inspection	•			
Service Fire Extinguisher				
Service Battery				
Change Engine Oil And Replace Oil Filter <sup>b, c</sup>				
Check Coolant Pump Weep Hole Foam Filter				
Clean Crankcase Vent Tube		•		
Check Air Intake Hoses, Connections & System		•		
Replace Fuel Filter Elements <sup>d</sup>		•		
Check Belt Tensioner and Belt Wear		•		
Check Cooling System		•		
Coolant Solution Analysis-SCAs as required		•		
Pressure Test Cooling System		•		
Check Engine Speeds		•		
Check Crankshaft Vibration Damper <sup>e</sup>		•		
Check Engine Ground Connection		•		
Check Engine Mounts		•		
Flush and Refill Cooling System <sup>f</sup>			•	
Test Thermostats			•	
Adjust Engine Valve Clearance			•	
Drain Water From Fuel Filters When Alarm Sounds <sup>g</sup>				•
Add Coolant				•
Service Air Cleaner Elements				•
<sup>a</sup> Replace primary air cleaner element when restriction indicator shows a vacuum of 625 mm (25 in.) H <sub>2</sub> O. If not equipped with indicator, replace air cleaner elements at 500 hours or 12 months, whichever occurs first.				
<sup>b</sup> During engine break-in, change the oil and filter for the first time after 100 hours of operation (maximum).				
<sup>c</sup> If John Deere PLUS-50™ or ACEA-E6/E7 oil is used along with the specified John Deere oil filter, an extended drain oil pan is used, and the fuel sulfur content is less than 1000 ppm (0.10%), the oil and filter change interval may be extended to every 500 hours. 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.)				
<sup>d</sup> Also replace fuel filter elements anytime audible alarm sounds and trouble codes indicate plugged fuel filters (low fuel pressure). If no alarm sounds during the 12 month service interval, replace elements at that time, or after 500 hours of operation, whichever comes first.				
<sup>e</sup> Replace crankshaft damper at 4500 hours or 60 months, whichever occurs first. Damper cannot be repaired.				
<sup>f</sup> If John Deere COOL-GARD is used, the flushing interval may be extended to 3000 hours or 36 months. If John Deere COOL-GARD is used and the coolant is tested annually AND additives are replenished by adding supplemental coolant additives (SCAs), the flushing interval may be extended to 5000 hours or 60 months, whichever occurs first.				
<sup>g</sup> Replace fuel filter element(s) when audible alarm sounds and trouble codes indicate plugged fuel filter(s) (low fuel pressure). If no alarm sounds during the 12 month service interval, replace element(s) at that time, or after the normal service interval, whichever comes first.				

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OURGP12.00000C5 -19-22DEC04-1/2

Item	Lubrication and Maintenance Service Intervals			
	Daily	500 Hour/12 Month	2000 Hour/24 Month	As Required
Replace Alternator Belt				•
Check Fuses				•
Check Electrical Wiring and Connections				•
Check Air Compressors (If Equipped)				•
Check Freon (A/C) Compressor (If Equipped)				•
Check Rear Power Take-Off (If Equipped)				•

OURGP12,00000C5 -19-22DEC04-2/2

## 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 standby generators. Match service items below to titles in Lubrication and Maintenance Sections for procedures.

Item	Lubrication and Maintenance Service Intervals			
	Every 2 Weeks	500 Hour/12 Month	2000 Hour/24 Month	As Required
Operate Engine at Rated Speed and 50%–70% Load a Minimum of 30 Minutes	•			
Check Engine Oil and Coolant Level	•			
Drain Water From Fuel Filters	•			
Check Air Cleaner Dust Valve Restriction Indicator Gauges <sup>a</sup>	•			
Perform Visual Walkaround Inspection	•			
Service Fire Extinguisher		•		
Service Battery		•		
Change Engine Oil And Replace Oil Filter <sup>b, c</sup>		•		
Check Coolant Pump Weep Hole Foam Filter		•		
Check Engine Mounts		•		
Clean Crankcase Vent Tube		•		
Check Air Intake Hoses, Connections, & System		•		
Replace Fuel Filter Elements <sup>d</sup>		•		
Check Automatic Belt Tensioner and Belt Wear		•		
Check Cooling System		•		
Coolant Solution Analysis-Add SCAs as required		•		
Pressure Test Cooling System		•		
Check Crankshaft Vibration Damper <sup>e</sup>		•		
Checking and Adjusting Engine Speeds		•		
Checking Engine Ground Connection		•		
Flush and Refill Cooling System <sup>f</sup>			•	
Test Thermostats			•	

<sup>a</sup>Replace primary air cleaner element when restriction indicator shows a vacuum of 625 mm (25 in.) H<sub>2</sub>O. If not equipped with indicator, replace air cleaner elements at 500 hours or 12 months, whichever occurs first.

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

<sup>c</sup>If John Deere PLUS-50™ or ACEA-E6/E7 oil is used along with the specified John Deere oil filter, an extended drain oil pan is used, and the fuel sulfur content is less than 1000 ppm (0.10%), the oil and filter change interval may be extended to every 500 hours. 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.)

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

<sup>e</sup>Replace crankshaft damper at 4500 hours or 60 months, whichever occurs first. Damper cannot be repaired.

<sup>f</sup>If John Deere COOL-GARD is used, the flushing interval may be extended to 3000 hours or 36 months. If John Deere COOL-GARD is used and the coolant is tested annually AND additives are replenished by adding supplemental coolant additives (SCAs), the flushing interval may be extended to 5000 hours or 60 months, whichever occurs first.

Continued on next page

OURGP12.00000C6 -19-22DEC04-1/2



Item	Lubrication and Maintenance Service Intervals			
	Every 2 Weeks	500 Hour/12 Month	2000 Hour/24 Month	As Required
Adjust Engine Valve Clearance			•	
Drain Water From Fuel Filters When Alarm Sounds <sup>g</sup>				•
Add Coolant				•
Service Air Cleaner Element				•
Replace Alternator Belt				•
Check Fuses				•
Check Electrical Wiring and Connections				•
Check Air Compressors (If Equipped)				•
Check Rear Power Take-Off (If Equipped)				•
<sup>g</sup> Replace fuel filter element(s) when audible alarm sounds and trouble codes indicate plugged fuel filter(s) (low fuel pressure). If no alarm sounds during the 12 month service interval, replace element(s) at that time, or after the normal service interval, whichever comes first.				

OURGP12,00000C6 -19-22DEC04-2/2

# Lubrication & Maintenance/Daily

## Daily Prestarting Checks

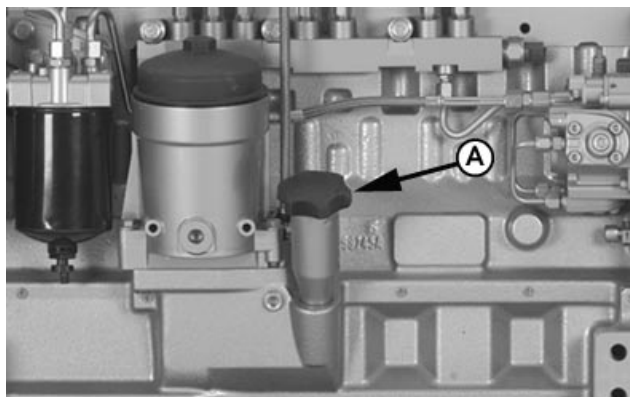
Do the following BEFORE STARTING THE ENGINE for the first time each day:

**IMPORTANT: DO NOT** add makeup oil until the oil level is **BELOW** the “ADD” mark on the dipstick.

1. Check engine oil level on dipstick by unscrewing and pulling out oil fill cap/dipstick (A). Fill cap/dipstick may be located on left or right side, depending on application. Add as required, using seasonal viscosity grade oil. (See DIESEL ENGINE OIL in Fuels, Lubricants, and Coolant Section for oil specifications.)

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

Oil may be added at dipstick tube or rocker arm cover filler cap locations.



RG13815 —UN—11JAN05

*Checking Engine Oil Level*

**A—Oil Fill Cap/Dipstick**

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OURGP11,000003E —19—14JAN05—1/4

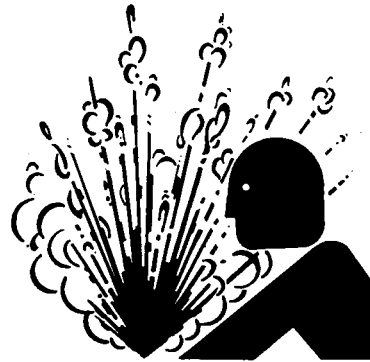
**CAUTION:** Explosive release of fluids from pressurized cooling system can cause serious burns.

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.

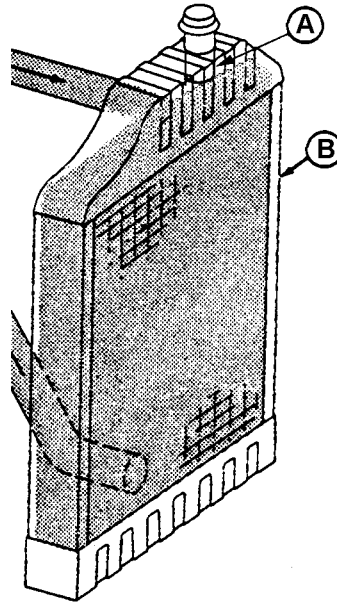
2. Check the coolant level when engine is cold. Coolant level should be at bottom of the radiator filler neck (A). Fill radiator (B) with proper coolant solution if level is low. (See ADDING COOLANT in Service As Required Section.) Check overall cooling system for leaks.

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

A—Radiator Filler Neck  
B—Radiator



High Pressure Fluids



Radiator and Coolant

RG13295 -UN-20NOV03

TS281 -UN-23AUG88

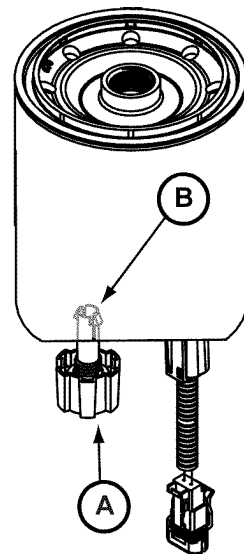
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OURGP11,000003E -19-14JAN05-2/4

3. Loosen drain valve (A) on each fuel filter all the way so that the valve opens to the hold tabs (B) and drain water and debris as needed.

**NOTE:** Any water in fuel is drained into the bottom of the fuel filters. The operator is signaled by an amber indicator on the instrument panel. To service, see *DRAIN FUEL/WATER SEPARATOR BOWL* in *Service as Required*.

A—Drain Valve  
B—Hold Tabs



*Drain Water From Fuel Filters*

RG13353 -UN-24DEC03

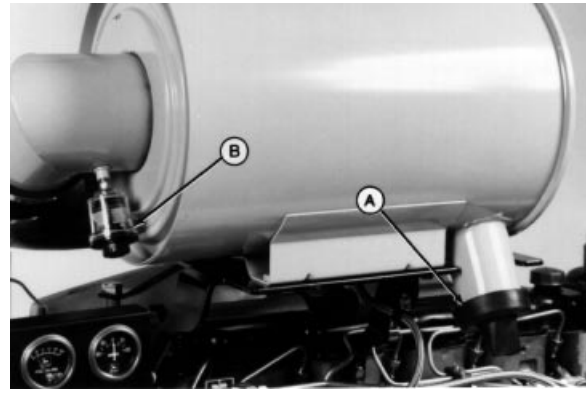
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OURGP11,000003E -19-14JAN05-3/4

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

**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.



Air Cleaner

A—Unloader Valve  
B—Restriction Indicator Gauge

#### Specification

Maximum Air Intake Restriction—

Vacuum..... 25 in. (625 mm) H<sub>2</sub>O (6.25 kPa)  
(0.06 bar) (1.0 psi)

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.
- Air intake system hoses and connections for cracks and loose clamps.
- Fan, alternator, and accessory drive belts for cracks, breaks or other damage.
- 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 indicated the need to replace the coolant pump seal. Contact your engine distributor or servicing dealer for repairs.*

## Servicing Fire Extinguisher

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

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

**A—Fire Extinguisher**



*Fire Extinguisher*

RW4918 -UN-15DEC88

OURGP12,00000B9 -19-19NOV04-1/1

## 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.



Exploding Battery

TS204 -JUN-23AUG88

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

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

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

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

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

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

Continued on next page

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

**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:

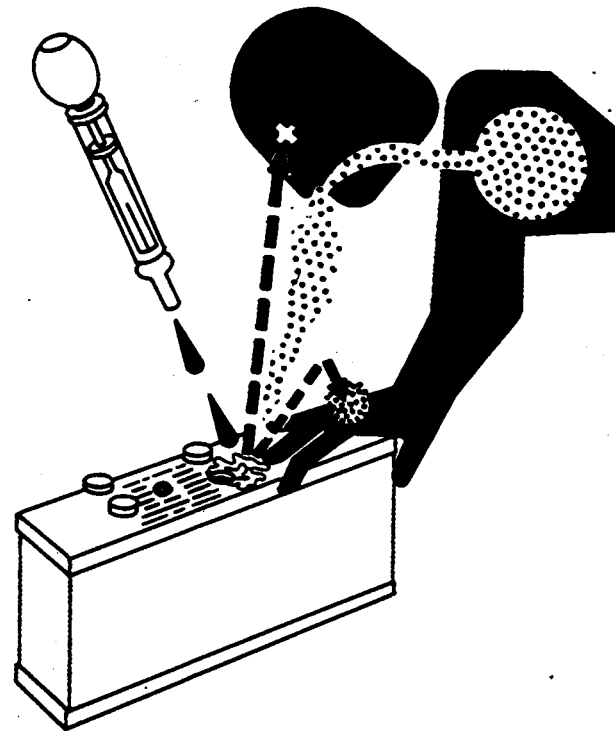
1. Filling batteries in a well-ventilated area.
2. Wearing eye protection and rubber gloves.
3. Avoiding breathing fumes when electrolyte is added.
4. Avoiding spilling or dripping electrolyte.
5. Using proper jump start procedure.

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.



Sulfuric Acid

TS203 -UN-23AUG88

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<sup>1</sup> at —18°C (0°F):

#### Specification

12-Volt System—Minimum	
Battery Capacity—Cold Cranking	
Amps.....	800 Minimum
Reserve Capacity (Minutes).....	350 Minimum
24-Volt System—Minimum	
Battery Capacity—Cold Cranking	
Amps.....	570 Minimum
Reserve Capacity (Minutes).....	275 Minimum

<sup>1</sup> Total recommended capacity based on batteries connected in series or parallel.



## Changing Engine Oil and Replacing Oil Filter

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

- Use of John Deere PLUS-50™ or ACEA-E6/E7 oil;
- Use of an approved John Deere oil filter;
- Use of diesel fuel with sulfur content less than 1000 ppm (0.10%);
- Engine equipped with an extended drain interval oil pan.

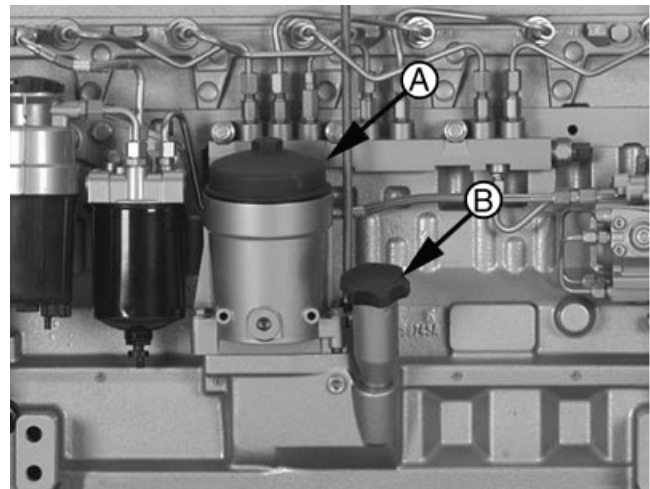
The oil and filter change interval is reduced if **ANY** of the above listed requirements are not followed.

**NOTE:** During **break-in**, change engine oil and filter for the first time before **100** hours maximum of operation, and every 500 hours thereafter.

After break-in, if John Deere PLUS-50™ or ACEA-E6/E7 engine oil **and** the specified John Deere oil filter are used, along with an extended drain oil pan, and the sulfur content is less than 1000 ppm (0.01%), the oil and filter change interval is every **500** hours or every 12 months, whichever comes first.

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

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



Changing Engine Oil and Replacing Oil Filter

A—Oil Filter  
B—Oil Fill Cap/Dipstick

RG13866 -UN-07FEB05

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

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OURGP12,00000C8 -19-23DEC04-1/4

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

Change engine oil as follows:

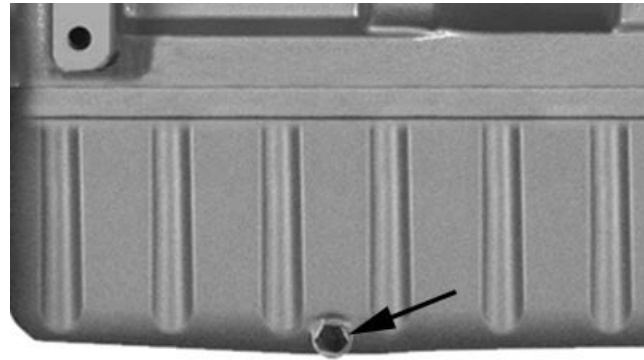
1. Run engine approximately 5 minutes to warm up oil. Shut off engine.

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

2. Remove oil pan drain plug.
3. Drain crankcase oil from engine while warm.
4. Install oil pan drain plug with a new O-ring and tighten to specifications.

#### Specification

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



Oil Pan Drain Plug

RG13816 -JUN-11JAN05

Continued on next page

OURGP12,00000C8 -19-23DEC04-2/4

## Replacing Oil Filter

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

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

5. Loosen filter cap (A) one-half turn with wrench. Wait 30 seconds to allow oil filter housing to drain. Remove cap and filter assembly.

6. While holding cap, strike filter element against solid surface as shown to unfasten filter from cap. Discard used filter.

7. Remove O-ring seal, and replace with new O-ring provided with new filter element.

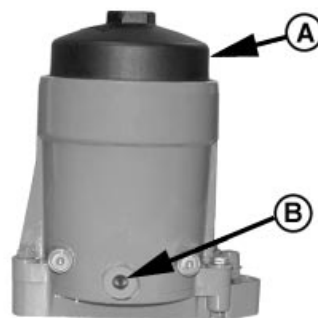
8. Press new filter element into cap until it snaps into place.

9. Insert cap and filter assembly into oil filter housing. Screw cap into place.

10. Tighten cap to specifications.

### Specification

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



Remove Oil Filter Cap



Remove Filter Element from Cap

A—Oil Filter Cap  
B—Plug (DO NOT REMOVE)

RG13817A -UN-01APR05

RG11628 -UN-01FEB01

Continued on next page

OURGP12,00000C8 -19-23DEC04-3/4

## Filling Engine Crankcase with Oil

1. Remove oil fill cap/dipstick (A) and fill engine crankcase with correct John Deere engine oil. (See DIESEL ENGINE OIL in Fuels, Lubricants, and Coolant Section for determining correct engine oil.)

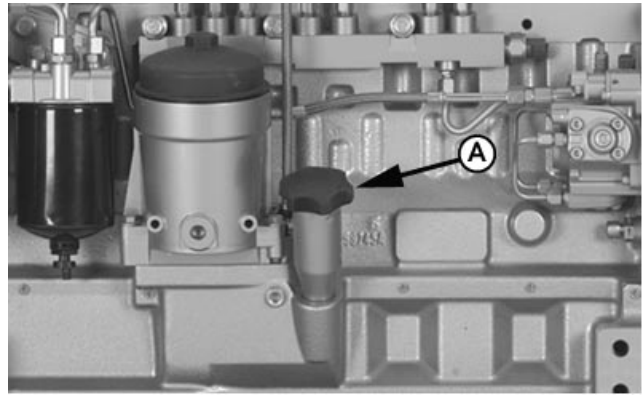
**NOTE:** Crankcase oil capacity may vary slightly. ALWAYS fill crankcase to full mark or within crosshatch on dipstick, whichever is present. DO NOT overfill.

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

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

2. Start engine and run to check for possible leaks.

3. Stop engine and check oil level after 10 minutes. Oil level reading should be on upper mark of dipstick.



RG13815 -UN-11JAN05

Filling Engine Crankcase With Oil

A—Oil Fill Cap/Dipstick

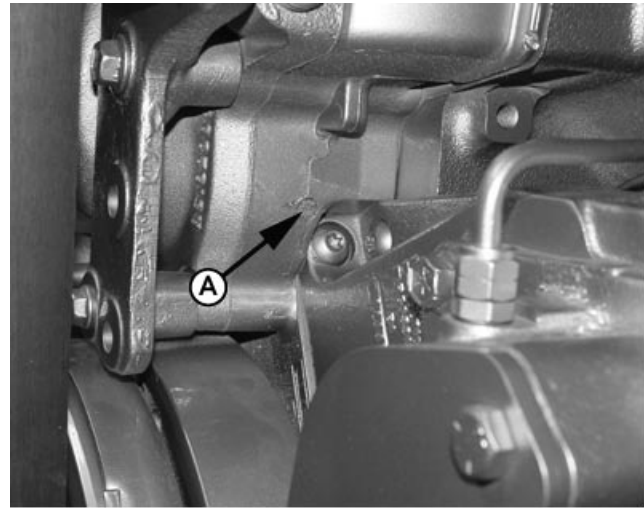
OURGP12.00000C8 -19-23DEC04-4/4

## Visually Inspecting Coolant Pump

### Inspect Weep Hole

1. Remove foam filter 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.

Replace complete coolant pump assembly if leakage is detected: individual repair parts are not available.



RG13857 -UN-17JAN05

Coolant Pump Weep Hole Filter

A—Weep Hole

### Inspect for Impeller Contact with Cover

1. Remove radiator-to-coolant pump hose from coolant pump inlet elbow.
2. Using a flashlight, inspect ID of coolant pump cover for internal impeller contact.
  - Impeller contact with cover usually indicates that impeller has moved on shaft or there is a damaged bearing.

Replace coolant pump assembly and cover as necessary if impeller contact is detected.

OURGP11,000003D -19-14JAN05-1/1

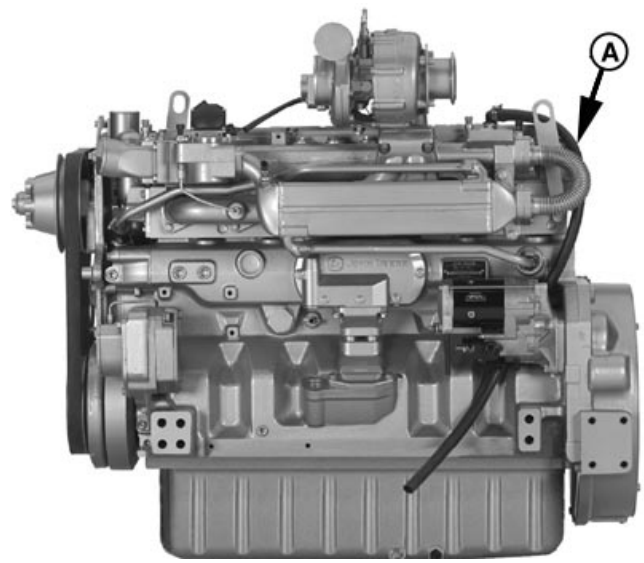
## Cleaning Crankcase Vent Tube

1. Remove and clean crankcase vent tube (A).

**IMPORTANT: Keep vent tube clear of kinks.**

2. Install the vent tube to vent downward. Be sure the O-ring fits correctly in the rocker arm cover for elbow adapter. Tighten hose clamp securely.

A—Vent Tube



RG13818 -UN-11JAN05

Clean Crankcase Vent Tube

OURGP11,0000038 -19-05JAN05-1/1

## Checking Air Intake System

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

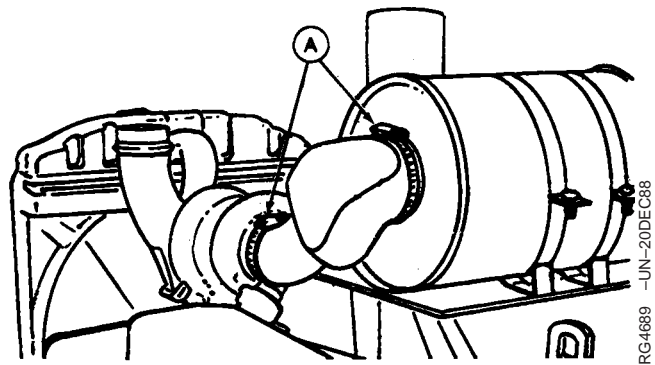
1. Inspect all intake hoses (piping) for cracks. Replace as necessary.
2. Check clamps (A) on piping which connect the air cleaner to the engine. Tighten clamps as necessary. This will help prevent dirt from entering the air intake system through loose connections causing internal engine damage.
3. If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

**IMPORTANT:** ALWAYS REPLACE primary air cleaner element when air restriction indicator shows a vacuum of 625 mm (25 in.) H<sub>2</sub>O, is torn, or visibly dirty.

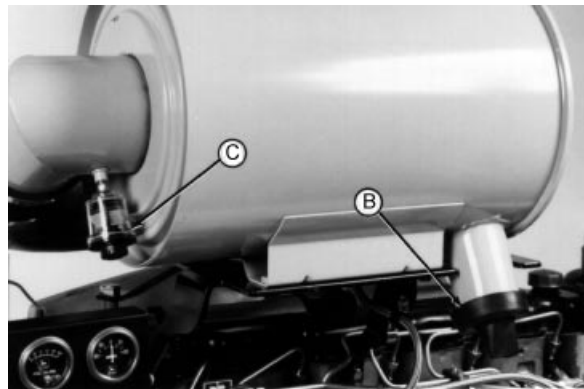
4. Test air restriction indicator gauge (C) for proper operation. Replace indicator as necessary.

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

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



Air Intake Hose Clamps



Air Cleaner

A—Clamps  
B—Unloader Valve  
C—Restriction Indicator Gauge

RG, RG34710, 4072 -19-09OCT02-1/1

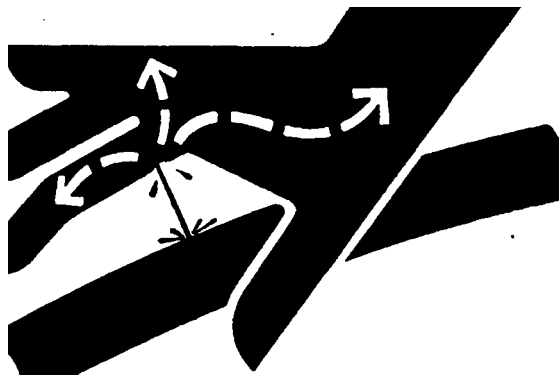
## Replacing Fuel Filter Elements

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

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

**CAUTION:** Due to High Pressure Common Rail system design, fuel in filter is likely to be under high pressure. To avoid possible personal harm, open valve (C) on bottom of water separator bowl to relieve pressure prior to removing each filter.

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



High Pressure Fluids



X9811 -UN-23AUG88

TS1343 -UN-18MAR92

Continued on next page

OURGP12,00000C9 -19-23DEC04-1/2



1. Thoroughly clean exterior of fuel filters and surrounding area.
2. Drain water and contaminants from primary fuel filter (A) and final fuel filter (B) into suitable container by opening drain valves (C) on bottom of filters.
3. Disconnect the water-in-fuel (WIF) sensor connector from primary filter.

**IMPORTANT: Always replace both filters at the same time.**

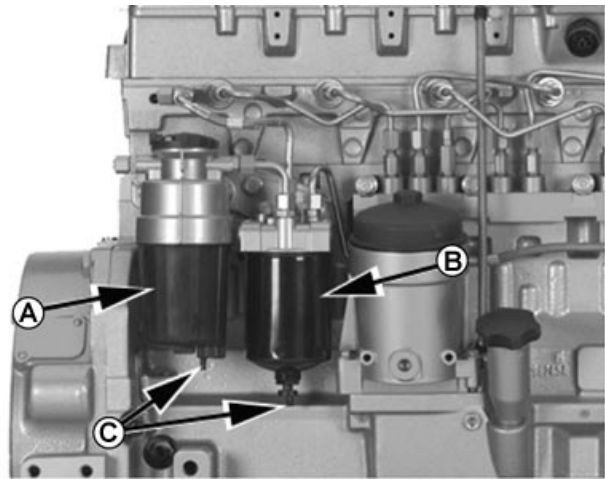
4. Remove the final fuel filter (B) first, for clearance, using a suitable filter wrench. Then remove primary fuel filter (A).
5. Remove primary fuel filter element and replace with new element.

**IMPORTANT: Do NOT prefill either fuel filter with fuel.**

6. Remove packing for primary fuel filter, and replace with new packing provided with filter element. Lubricate packing for primary fuel filter, and install canister onto base. Tighten 1/2 turn after packing contacts base.
7. Connect sensor.
8. Lubricate packing on new final fuel filter, and install filter onto base. Tighten 1/2 turn after packing contacts base.

**IMPORTANT: Key must be turned to ON position for 60 seconds before starting engine to provide time to prefill fuel filters. Fuel system is self-bleeding.**

9. Turn key switch to ON position for 60 seconds to allow transfer pump time to prefill fuel filters.
10. Turn key switch clockwise to START position, and run engine at fast idle for 2 minutes.



Fuel Filters

A—Primary Fuel Filter  
B—Final Fuel Filter  
C—Drain Valves

RG13845 -UN-11JAN05



## 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 tensioner is designed to maintain proper belt tension over the life of the belt. If tensioner spring tension is not within specification, replace tensioner assembly.

DPSG,OUOD002,1917 -19-08DEC00-1/1

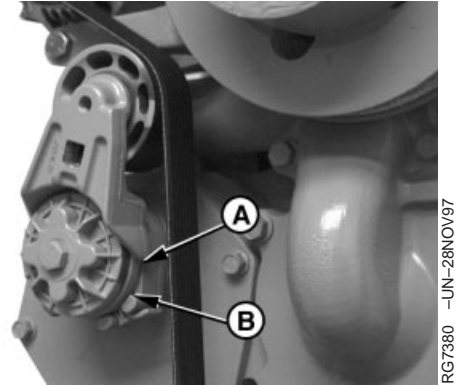
## Checking Belt Wear

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

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 (A) on swing arm 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 BELT in Service As Required Section).



Belt Tensioner

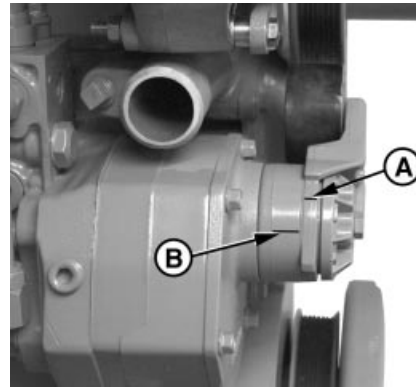
A—Tensioner Stop  
B—Fixed Stop

OURGP11,0000288 -19-18DEC03-1/1

## Checking Tensioner Spring Tension

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

1. Release tension on belt using a long-handle 1/2 inch breaker bar in tension arm. Remove belt from pulleys.
2. Release tension on tension arm and remove breaker bar.
3. Put a mark (A) on swing arm of tensioner as shown.
4. Measure 21 mm (0.83 in.) from mark (A) and put a mark (B) on tensioner mounting base.



Checking Belt Tension Spring

A—Mark  
B—Mark

RG7382 -UN-28NOV97

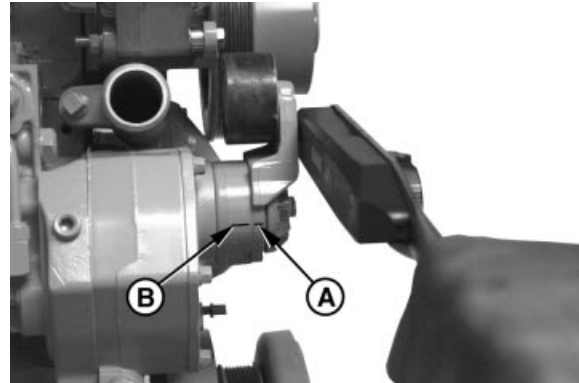
DPSG,OUOD002,1919 -19-08DEC00-1/2

5. Rotate the swing arm using a torque wrench until marks (A and B) are aligned.
6. Record torque wrench measurement and compare with specification below. Replace tensioner assembly as required.

### Specification

Spring—Tension ..... 24-28 N•m (17-21 lb-ft)

A—Mark  
B—Mark



Checking Belt Tensioner Spring Tension

RG7381 -UN-28NOV97

DPSG,OUOD002,1919 -19-08DEC00-2/2

## Checking Cooling System

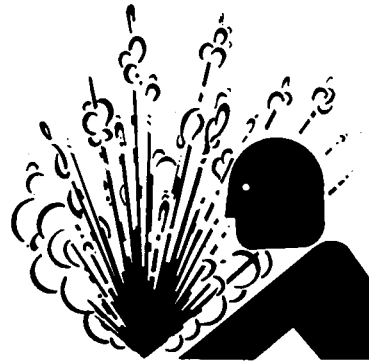


**CAUTION:** Explosive release of fluids from pressurized cooling system can cause serious burns.

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

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

1. Check entire cooling system for leaks. Tighten all clamps securely.
2. Thoroughly inspect all cooling system hoses for hard, flimsy, or cracked conditions. Replace hoses if any of the above conditions are found.



*High Pressure Fluids*

TS281 -JUN-23AUG88

RG, RG34710, 4077 -19-10OCT02-1/1

## Testing Diesel Engine Coolant

### 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.

Compare the results to the supplemental coolant additive (SCA) chart to determine the amount of inhibiting additives in your coolant and whether more John Deere COOLANT CONDITIONER should be added.

### 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 PLUS is a trademark of Deere & Company*

DX,COOL9 -19-19DEC03-1/1

## Replenishing Supplemental Coolant Additives (SCAs) Between Coolant Changes

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

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

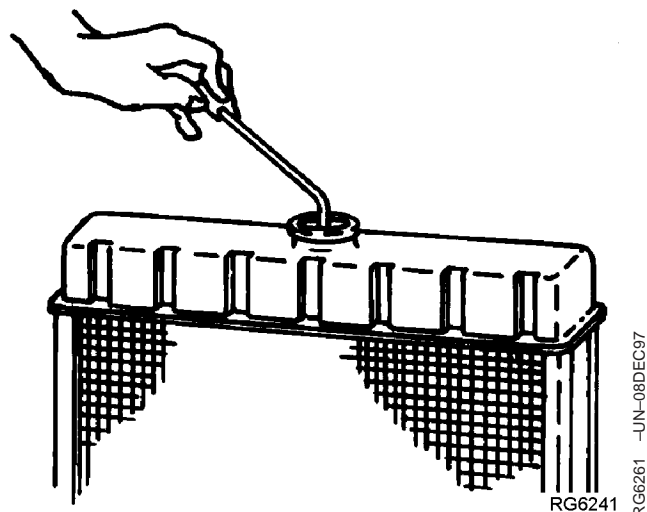
Through time and use, the concentration of coolant additives is gradually depleted during engine operation. Periodic replenishment of inhibitors is required, even when John Deere COOL-GARD™ is used. The cooling system must be recharged with additional supplemental coolant additives available in the form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

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

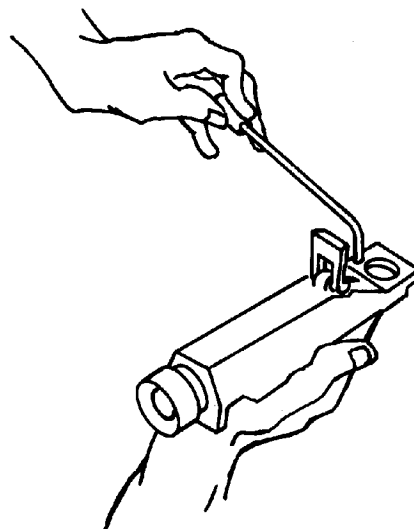
**John Deere LIQUID COOLANT CONDITIONER is recommended as a supplemental coolant additive in John Deere engines.**

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

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



Radiator Coolant Check



JT07298 Coolant/Battery Tester

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

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OURGP11,000004C -19-22FEB05-1/2

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

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

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

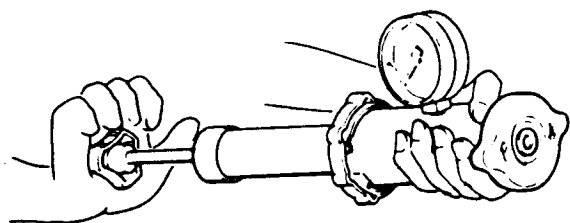
The use of non-recommended supplemental coolant additives may result in additive drop-out and gelation of the coolant.

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

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

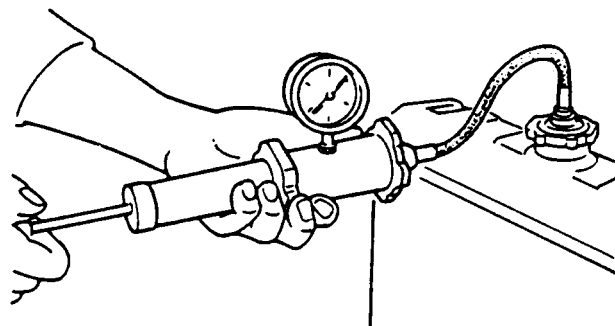
OURGP11,000004C -19-22FEB05-2/2

## Pressure Testing Cooling System



Test Radiator Cap

RG6657 -JUN-20JAN93



Test Cooling System

RG6658 -JUN-20JAN93

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

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

### Test Radiator Cap

1. Remove radiator cap and attach to D05104ST Tester as shown.
2. Pressurize cap to following specifications.<sup>1</sup> Gauge should hold pressure for 10 seconds within the normal range if cap is acceptable.

#### Specification

Radiator Cap—Minimum Test Pressure..... 100 kPa (1.00 bar) (14.5 psi)

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.

### Test Cooling System for Leaks

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

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

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

3. Connect gauge and adapter to radiator filler neck. Pressurize cooling system to the following specifications<sup>1</sup>.

#### Specification

Cooling System—Minimum Test Pressure ..... 100 kPa (1.00 bar) (14.5 psi)

4. With pressure applied, check all cooling system hose connections, radiator, and overall engine for leaks.

<sup>1</sup>Test pressures recommended are for all Deere OEM cooling systems. On specific vehicle applications, test cooling system and pressure cap according to the recommended pressure for that vehicle.

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OURGP12.00000CA -19-23DEC04-1/2

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

If no leakage is detected, but the gauge indicated a drop in pressure, coolant may be leaking internally

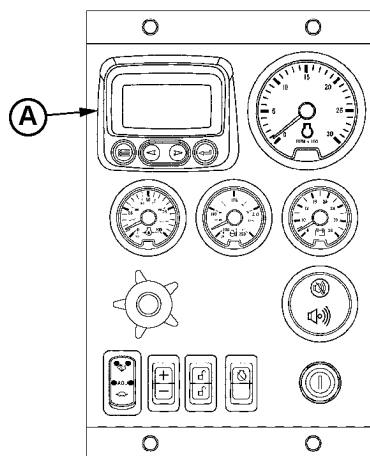
within the system or at the block-to-head gasket. Have your servicing dealer or distributor correct this problem immediately.

OURGP12,00000CA -19-23DEC04-2/2

## 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—Tachometer



Using Tachometer to Check Engine Speeds

RG13728 -UN-11NOV04

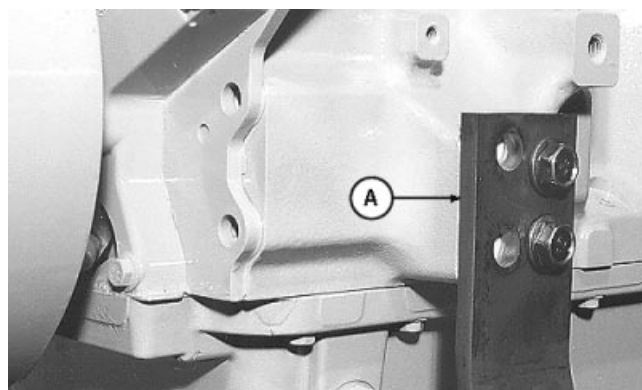
OURGP12,0000090 -19-28SEP04-1/1

## 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.



Engine Mounting

A—Mounting Bracket

RG9905 -UN-06JAN99

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



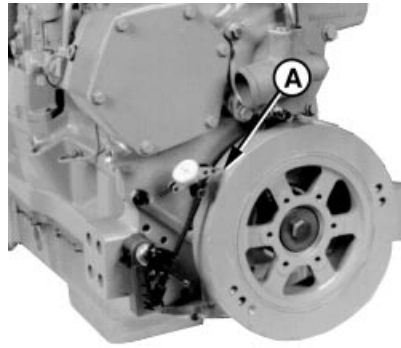
## Checking Crankshaft Vibration Damper

On some applications there may be dual dampers. Make same checks on each damper.

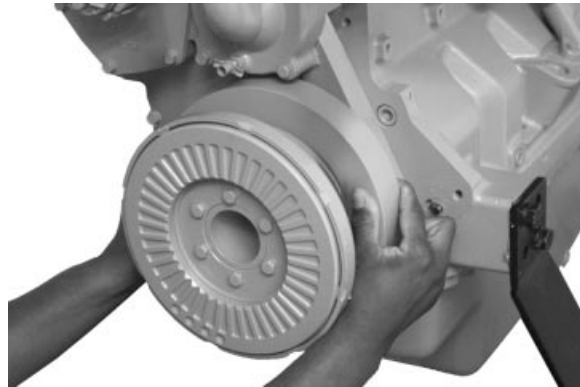
1. Remove belts (shown removed).

**NOTE:** *On engines equipped with dual dampers, ALWAYS replace both dampers as a matched set.*

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



Single Damper



Dual Damper

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RG, RG34710, 4081 -19-01JAN96-1/2

RG13867 -UN-07FEB05

RG7369 -UN-05JAN98

**NOTE:** On engines equipped with dual dampers, check runout on inner damper only. Always replace both dampers as a matched set.

3. Check vibration damper radial runout by positioning a dial indicator (A) so probe contacts damper outer diameter.
4. Rotate crankshaft using JDG820 Flywheel Turning Tool.
5. Note dial indicator reading.

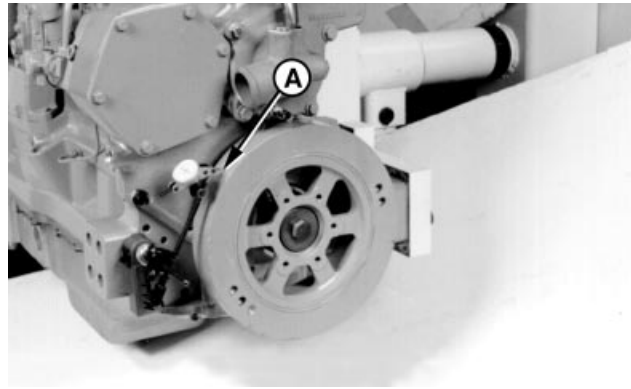
#### Specification

Damper—Maximum Radial  
Runout ..... 1.02 mm (0.040 in.)

If runout exceeds specifications, replace vibration damper.

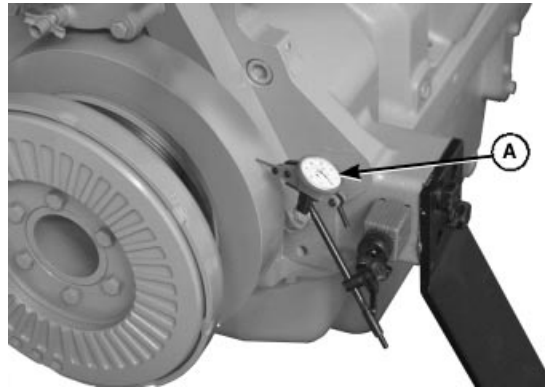
**IMPORTANT:** The vibration damper assembly is not repairable and should be replaced every 4500 hours or 60 months, whichever occurs first.

A—Dial Indicator



Single Damper

RG7065 -UN-26NOV97



Dual Damper

RG11601 -UN-11DEC00

RG, RG34710, 4081 -19-01JAN96-2/2

## Checking Engine Ground Connection

Check engine ground connection to be sure it is secure and clean. This will prevent electrical arcing which can damage engine.

DPSG, OUOD002, 1920 -19-08DEC00-1/1

## 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.

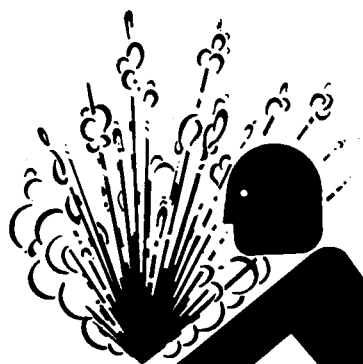
**NOTE:** Drain the initial factory fill engine coolant after the first 3000 hours or 36 months of operation. Subsequent drain intervals are determined by the coolant used for service.

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 cooling additive (SCA).**

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

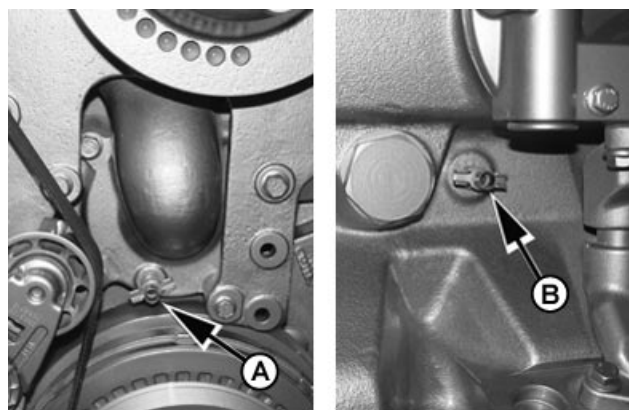
Drain old coolant, flush the entire cooling system, replace thermostats, and fill with recommended clean coolant as follows:

1. Pressure test entire cooling system and pressure cap if not previously done. (See PRESSURE TESTING COOLING SYSTEM, in Lubrication and Maintenance 500 Hour/12Month.)
2. Slowly open the engine cooling system filler cap or radiator cap (C) to relieve pressure and allow coolant to drain faster.
3. Open coolant pump drain valve (A) and engine block drain valve (B) on left side of engine. Drain all coolant from engine block.
4. Open radiator drain valve and drain coolant from radiator.



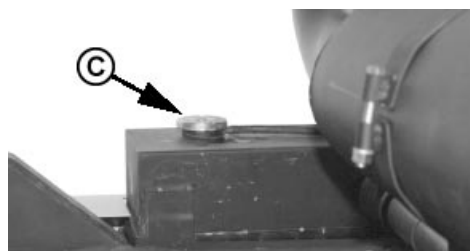
High Pressure Fluids

TS281 -UN-23AUG88



Cooling System Drains

RG13858 -UN-17JAN05



Radiator Cap

RG13293 -UN-20NOV03

A—Pump Drain Valve  
B—Block Drain Valve  
C—Radiator Cap

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OURGP11,000003F -19-14JAN05-1/3

5. Remove thermostats (A) at this time, if not previously done. Install cover (without thermostats) and tighten cap screws to specifications.

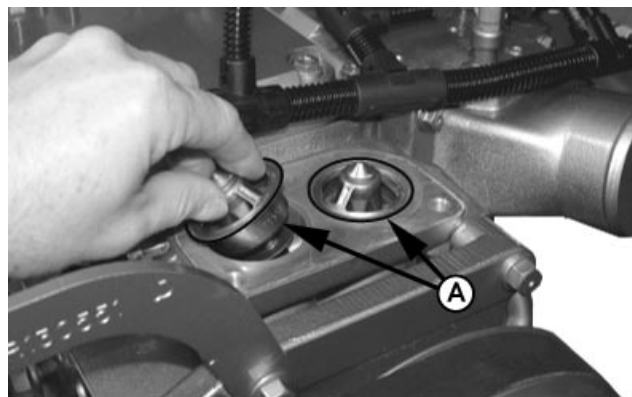
**Specification**

Cast Iron Thermostat Cover Cap

Screws—Torque..... 45 N•m (33 lb-ft)

6. Test thermostat opening temperature. (See Testing Thermostat Opening Temperature in this section.)

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



Thermostats

RG13859 -UN-12APR05

7. Close all drain valves after coolant has drained.
8. Fill the cooling system with clean water. Run the engine about 10 minutes to stir up possible rust or sediment.
9. Stop engine and immediately drain the water from system before rust and sediment settle.
10. After draining water, close drain valves and fill the cooling system with clean water and a heavy duty cooling system cleaner such as FLEETGUARD® RESTORE™ or RESTORE PLUS™. Follow manufacturer's directions on label.
11. After cleaning the cooling system, drain cleaner and fill with water to flush the system. Run the engine about 10 minutes, then drain out flushing water.

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RESTORE is a trademark of Fleetguard Inc.

RESTORE PLUS is a trademark of Fleetguard Inc.

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OURGP11,000003F -19-14JAN05-2/3

12. Close all drain valves on engine and radiator. Install new rubber seal on each thermostat and install thermostats. Install cover and tighten cap screws to specifications.

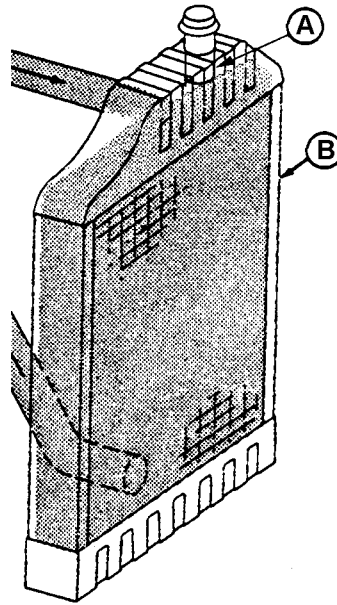
**Specification**

Cast Iron Thermostat Cover Cap

Screws—Torque..... 45 N•m (33 lb-ft)

**IMPORTANT:** Air must be expelled from cooling system when system is refilled. Loosen temperature sending unit fitting in cylinder head or plug in thermostat housing to allow air to escape when filling system. Retighten fitting or plug when all the air has been expelled.

13. Refill radiator (B) with fresh coolant until coolant touches bottom of the radiator filler neck (A). (See ADDING COOLANT in Service As Required Section.)
14. Run engine until it reaches operating temperature. This mixes the solution uniformly and circulates it through the entire system. The normal engine coolant temperature range is 82°- 94°C (180° - 202°F).
15. After running the 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 Month)



*Radiator and Coolant Level*

A—Radiator Filler Neck  
B—Radiator

RG13295 -UN-20NOV03

OURGP11,000003F -19-14JAN05-3/3

## Testing Thermostats



**CAUTION:** Explosive release of fluids from pressurized cooling system can cause serious burns. Do not drain coolant until coolant temperature is below operating temperature. Always loosen cooling system filler cap, radiator cap or drain valve slowly to relieve pressure.

1. Visually inspect the area around the coolant manifold for leaks. Partially drain coolant from the cooling system.
2. Remove thermostat cover (A).



RG13860 -UN-17JAN05

*Remove Thermostat Cover*

**A—Thermostat Cover**

OURGP11,00000DA -19-25SEP03-1/4

3. Inspect thermostats.
4. Test each thermostat for proper opening temperature.



RG13861 -UN-12APR05

*Removing Thermostats*

Continued on next page

OURGP11,00000DA -19-25SEP03-2/4

## Testing Thermostats Opening Temperature

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

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

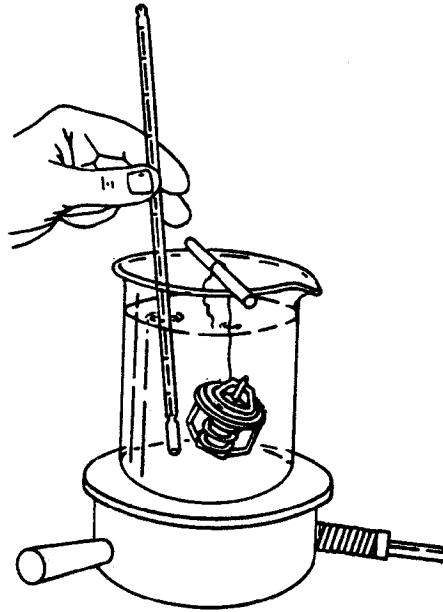
3. Suspend thermostat and a thermometer in a container of water.
4. Stir the water as it heats. Observe opening action of thermostat and compare temperatures with specification given in chart below.

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

### THERMOSTAT TEST SPECIFICATIONS

Rating	Initial Opening (Range)	Full Open (Nominal)
82°C (180°F)	80—84°C (175—182°F)	94°C (202°F)

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



Thermostats and Thermometer in Water

RG5971 -UN-23NOV97

Continued on next page

OURGP11,00000DA -19-25SEP03-3/4



## Installing Thermostats

1. Install new rubber seal on each thermostat and install thermostats.
2. Install cover and tighten cap screws to specifications.

### Specification

Cast Iron Thermostat Cover Cap

Screws—Torque..... 45 N•m (33 lb-ft)

**IMPORTANT:** Air must be expelled from cooling system when system is refilled. Loosen temperature sending unit fitting at rear of cylinder head or plug in thermostat housing to allow air to escape when filling system. Retighten fitting when all air has been expelled. Damage to EGR cooler could result if cooling system is not bled properly.



Installing Thermostats

RG13861 -UN-12APR05

3. Pressure test the cooling system a second time to be sure the thermostat cover is sealed (See Pressure Testing Cooling System , in Lubrication And Maintenance 500 Hour/12 Months).

OURGP11,00000DA -19-25SEP03-4/4



## Adjusting Valve Clearance

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

**IMPORTANT:** Valve clearance **MUST BE** adjusted with engine **COLD**. Accurate valve adjustment is critical for maximum engine performance.

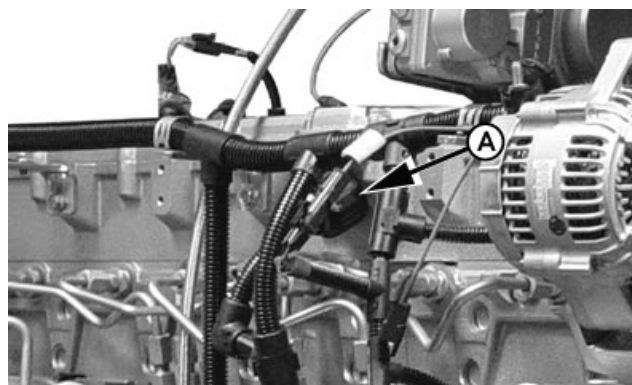
1. Disconnect wiring harness (A).
2. Remove rocker arm cover (B) with vent tube.

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

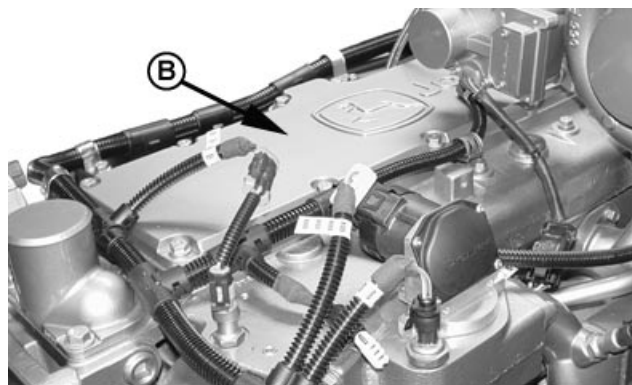
Rocker arms that exhibit excessive valve clearance should be inspected more thoroughly to identify damaged parts.

3. Remove plastic plugs from cylinder block bores and install JDG820 Flywheel Turning Tool (C) and JDE81-4 Timing Pin (D).

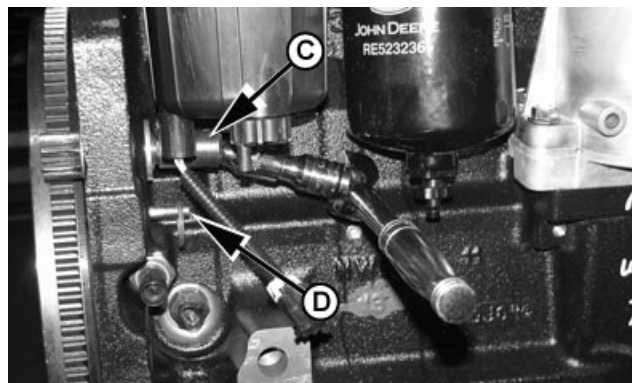
A—Wiring Harness  
B—Rocker Arm Cover  
C—JDG820 Flywheel Turning Tool  
D—JDE81-4 Timing Pin



Disconnect Harness



Remove Rocker Arm Cover



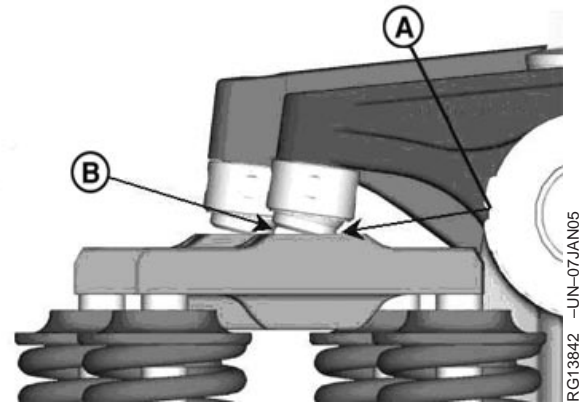
Flywheel Turning Tool and Timing Pin

Continued on next page

OURGP11,000004B -19-07FEB05-1/4

4. Rotate engine with the flywheel turning tool until timing pin engages timing hole in flywheel.
5. If the rocker arms for No. 1 (front) cylinder are loose, the engine is at No. 1 TDC-Compression.
6. If the rocker arms for No. 6 (rear) cylinder are loose, the engine is at No. 6 TDC-Compression. Rotate the engine one full revolution (360 degrees) to No. 1 TDC-Compression.

**NOTE:** To assist in adjusting valve clearance, push the rocker arm foot forward (A) for easier feeler gauge access (B)



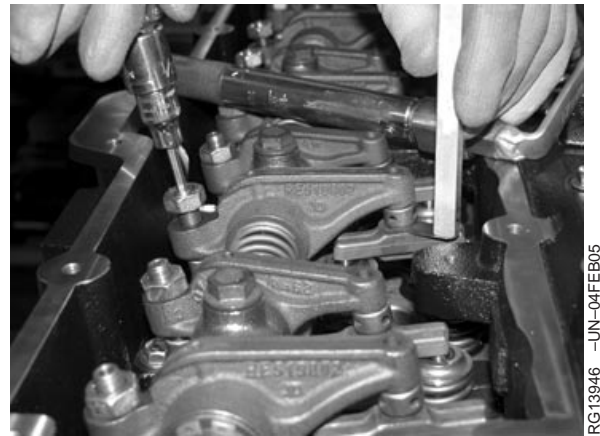
Valve Clearance Setting Procedure

7. With engine lock-pinned at "TDC" of No. 1 piston's compression stroke, use a bent feeler gauge to check valve clearance on Nos. 1, 3, and 5 exhaust valves and Nos. 1, 2, and 4 intake valves. If out of specification, loosen lock nut on rocker arm adjusting screw. Turn adjusting screw until feeler gauge slips with a slight drag. Hold the adjusting screw from turning with screwdriver and tighten lock nut to specifications.

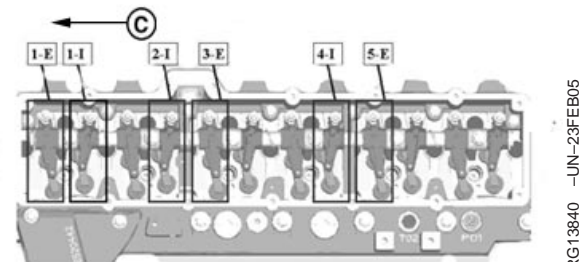
#### Specification

Intake Valve Clearance (Rocker Arm-to-Valve Tip With Engine Cold)—Clearance .....	0.18 mm (0.007 in.)
Exhaust Valve Clearance (Rocker Arm-to-Valve Tip With Engine Cold)—Clearance .....	0.64 mm (0.025 in.)
Valve Adjusting Screw Lock Nut—Torque .....	27 N•m (20 lb-ft)

Recheck clearance again after tightening lock nut.  
Readjust clearance as necessary.



Checking Valve Clearance Using Bent Feeler Gauge



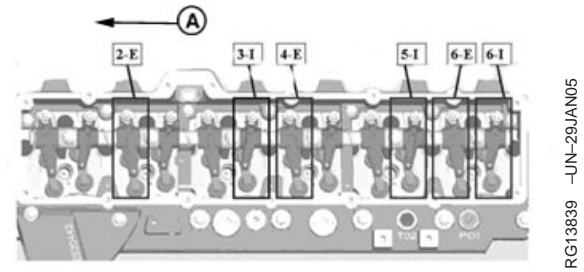
Valve Adjusting Sequence - No. 1 Cylinder at TDC

A—Rocker Arm Foot  
B—Feeler Gauge Access  
C—Front of Engine

Continued on next page

OURGP11,000004B -19-07FEB05-2/4

8. Remove timing pin and rotate flywheel 360° and install timing pin. No. 6 piston is now at "TDC" of its compression stroke. Rocker arms for No. 6 piston should be loose.
9. Check and adjust valve clearance to the same specifications on Nos. 2, 4, and 6 exhaust and Nos. 3, 5, and 6 intake valves.
10. Install rocker arm cover gasket.



Valve Adjusting Sequence - No. 6 Cylinder at TDC

A—Front of Engine

OURGP11,000004B -19-07FEB05-3/4

11. Install rocker arm cover with vent tube and tighten cap screws in sequence shown to specification.

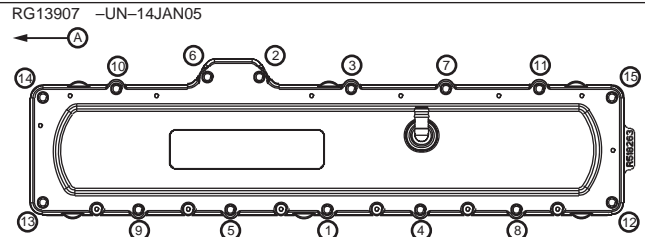
**Specification**

Rocker Arm Cover Cap Screws—

Torque ..... 20 N•m (15 lb-ft)

12. Connect wiring harness.

13. Remove timing pin and flywheel turning tool. Install plastic plugs in block.



Rocker Arm Cover Torque Sequence

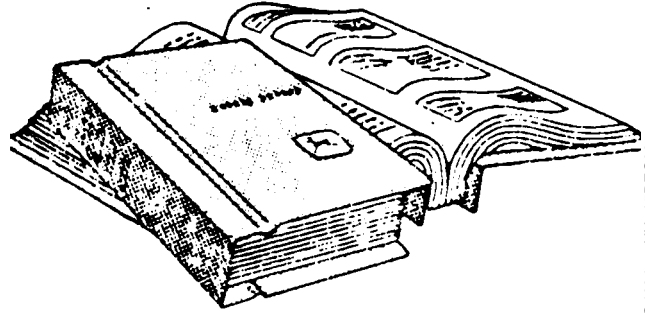
A—Front of Engine

OURGP11,000004B -19-07FEB05-4/4

# Service As Required

## Additional Service Information

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



*Component Technical Manuals*

RG4624 -UN-15DEC88

OURGP11,0000048 -19-07FEB05-1/1

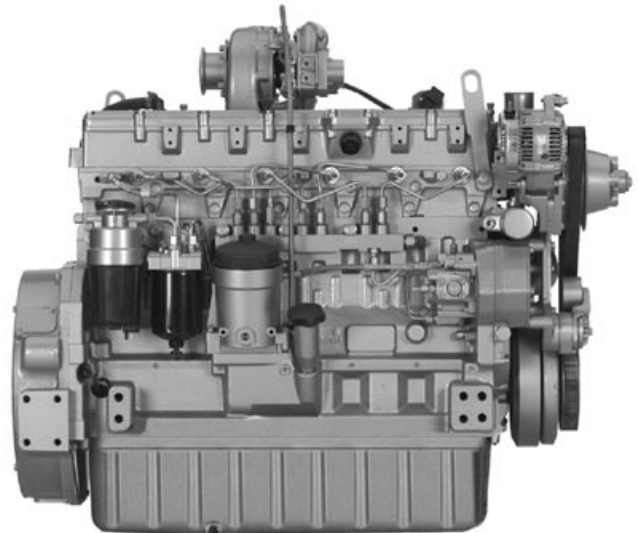
## Do Not Modify Fuel System

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

In addition, tampering with fuel system which alters emission-related equipment on engines may result in fines or other penalties, per EPA regulations or other local emission laws.

Do not attempt to service fuel pump, fuel rail, or fuel injectors yourself. Special training and special tools are required. (See your authorized servicing dealer or engine distributor.)

Avoid seizure of internal precision parts in high-pressure fuel pump or fuel injection rail. Never steam clean or pour cold water on pump or rail while these components are still warm.



*Fuel System*

RG13868 -UN-07FEB05

OURGP12,00000CB -19-23DEC04-1/1

## Drain Water From Fuel Filters

**NOTE:** Always perform regular fuel filter changes at 500 Hours/12 Months.

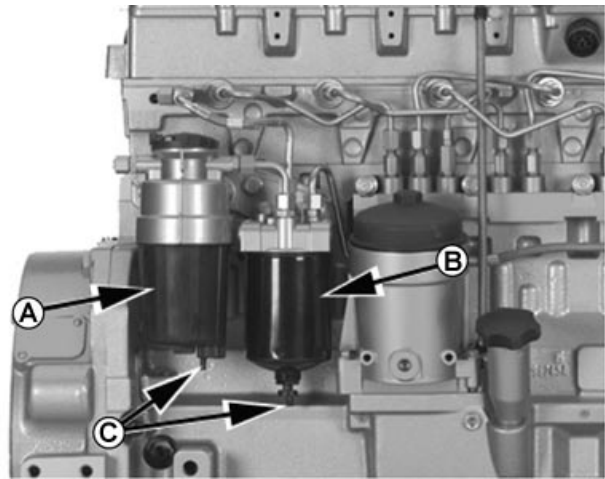
The primary fuel filter is equipped with a sensor that detects the presence of water in the fuel filter element. This sensor will illuminate the red "STOP ENGINE" warning light on the diagnostic gauge and also sound an audible alarm. A Diagnostic Trouble Code (DTC), a description of the trouble code and the corrective action needed will be displayed on the diagnostic gauge.

**ALWAYS STOP ENGINE IMMEDIATELY** and drain water from the primary (A) and final fuel filter (B) when these warnings occur.

1. Loosen drain valves (C) to drain water and debris as needed.

2. Install drain plug and tighten securely.

**NOTE:** Also replace fuel filter elements when amber indicator on instrument panel lights up AND Diagnostic Trouble Code (DTC) in diagnostic gauge window indicates plugged fuel filters ("low fuel pressure"). To replace fuel filter elements, see *Replacing Fuel Filters in Lubrication and Maintenance, 500 Hour/12 Month*.



Drain Water From Fuel Filters

A—Primary Fuel Filter  
B—Final Fuel Filter  
C—Drain Valves

RG13845 —UN-11JAN05

OURGP12,00000CC —19-23DEC04-1/1

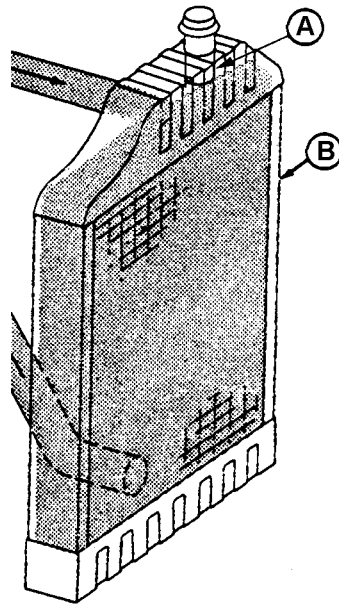


## Adding Coolant



High Pressure Fluids

TS281 -UN-23AUG88



Radiator and Coolant

RG13295 -UN-20NOV03

A—Coolant Level At Bottom  
Of Filler Neck

B—Radiator



**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 TY15161 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.**

Coolant level should be kept even with the bottom of the filler neck (A). Add coolant as follows:

1. Loosen temperature sending unit fitting at rear of cylinder head to relieve pressure when filling system.

Continued on next page

OURGP11,0000262 -19-19NOV03-1/2

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

**Do not overfill cooling system. A pressurized system needs space for**

**heat expansion without overflowing at top of radiator.**

2. Fill radiator (B) until coolant level touches bottom of filler neck (A).
3. Tighten fitting when air has been expelled from system.

OURGP11,0000262 -19-19NOV03-2/2

## 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<sub>2</sub>O, is torn, or visibly dirty.

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

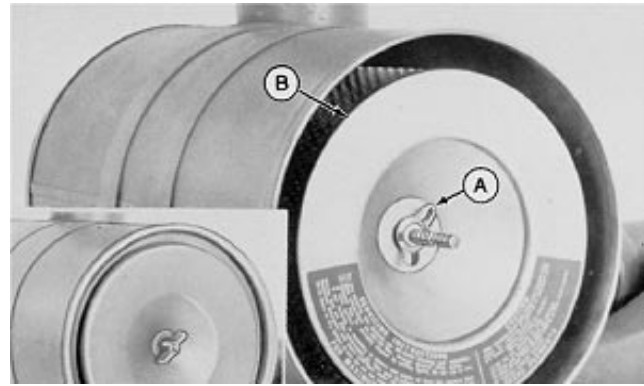
1. Remove wing nut and remove canister cover shown in small illustration inset.
2. Remove wing nut (A) and remove primary element (B) from canister.
3. Thoroughly clean all dirt from inside canister.

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

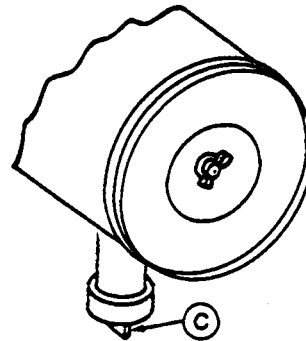
**IMPORTANT:** Remove secondary (safety) element (E) **ONLY** for replacement. **DO NOT** attempt to clean, wash, or reuse secondary element. Replacement of secondary element is usually necessary **ONLY** when primary element has a hole in it or when the element is not properly seated.

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

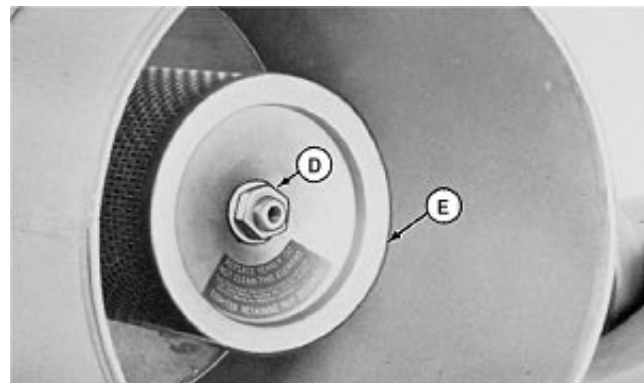
5. Install new primary element and tighten wing nut securely. Install cover assembly and tighten retaining wing nut securely.



Air Cleaner Primary Element



Dust Unloader Valve



Air Cleaner Secondary Element

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

Continued on next page

DPSG,OUOD002,1580 -19-21JUN00-1/2



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

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

DPSG,OUOD002,1580 -19-21JUN00-2/2

## Inspecting Primary Filter Element

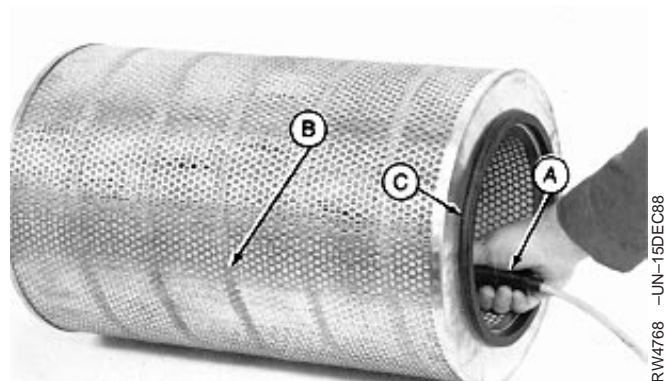
**IMPORTANT:** Do not wash primary filter element. Clean with dry air only (see procedure on following pages).

Inspect filter to determine if it is practical to clean or for damage after cleaning filter.

1. Hold a bright light (A) inside element and check carefully for holes. Discard any element which shows the smallest hole or rupture.
2. Be sure outer screen (B) is not dented. Vibration would quickly wear a hole in filter.
3. Be sure filter gasket (C) is in good condition. If gasket is damaged or missing, replace element.

**IMPORTANT:** Air cleaner **MUST BE DRY** before storing in plastic bag.

If the filter is to be stored for later use, place it in a plastic bag to protect it from dust and damage.



Inspecting Primary Air Filter Element

A—Light  
B—Outer Screen  
C—Gasket

RW4768 -UN-15DEC88

RG,RG34710,3598 -19-30AUG96-1/1

## Cleaning Primary Filter Element

**IMPORTANT:** This procedure only applies to air cleaners provided by John Deere.

Always replace secondary (safety) filter elements. DO NOT attempt to clean them.

Do not blow air from outside portion of filter with air nozzle. Wear safety glasses and remove bystanders.

1. Gently pat sides of element with palm of hand to loosen dirt. DO NOT tap element against a hard surface.

OURGP12,00000EE -19-21APR05-1/2

**CAUTION:** Only a special air cleaning gun (A) should be used. Concentrated air pressure from an ordinary air nozzle may severely damage filter element. Do not exceed 210 kPa (2.1 bar) (30 psi) when cleaning filter element.

2. Insert the cleaning gun into element, hold air nozzle about 25.4 mm (1.0 in.) from perforated metal retainer. Force air through filter from inside to outside and move air gun up and down pleats to remove as much dirt as possible.
3. Repeat steps 1 and 2 to remove additional dirt.
4. Inspect element for damage after cleaning (see previous instructions). Replace element if any damage is found.



RG11065 -JN-26JUN00

Cleaning Primary Element

A—Air Cleaning Gun

OURGP12,00000EE -19-21APR05-2/2

## Element Storage

**IMPORTANT:** Air cleaner element **MUST BE DRY** before storing in plastic bag.

Seal element in a plastic bag and store in shipping container to protect against dust and damage.

RG, RG34710, 3601 -19-30AUG96-1/1

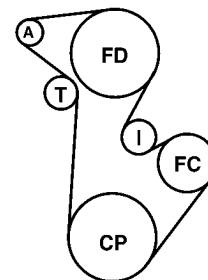
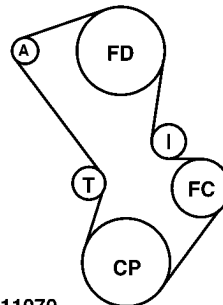
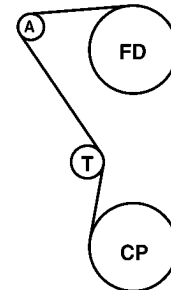
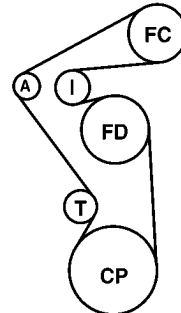
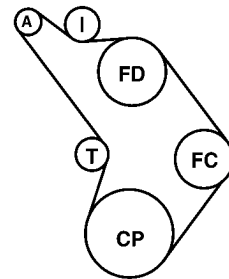
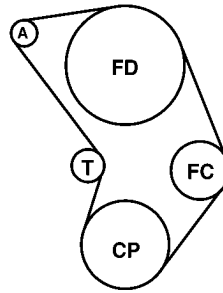
## Replacing Fan/Alternator Belt

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

Refer to CHECKING BELT TENSIONER SPRING TENSION AND BELT WEAR in Lubrication and Maintenance/500 Hour/12 Month section to determine if belt needs replacing.

1. Release tension on belt using a 1/2 in. drive ratchet.
2. Remove belt from pulleys and discard belt.
3. Install new belt, be sure that belt is correctly seated in all pulley grooves.
4. Apply tension to belt with tensioner. Remove ratchet.
5. Start engine and check belt alignment.

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



RG11070

Belt Routing Options

RG11070 -UN-05JUL00

OURGP11,0000040 -19-14JAN05-1/1

## Checking Fuses

Check the following fuses located in the control panel wiring harness. Replace defective fuses.

- Main system fuse- 30 amp
- ECU fuse- 20 amp
- Fuel filter fuse- 15 amp

Refer to ENGINE WIRING DIAGRAM later in Troubleshooting section.

OURGP12,00000CD -19-23DEC04-1/1

## Checking Electrical Wiring And Connections

Check for loose or corroded wiring and connectors. Tighten connections or replace wiring as needed. See your authorized servicing dealer for repairs.

OURGP11,0000264 -19-19NOV03-1/1

## Bleeding Fuel System

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

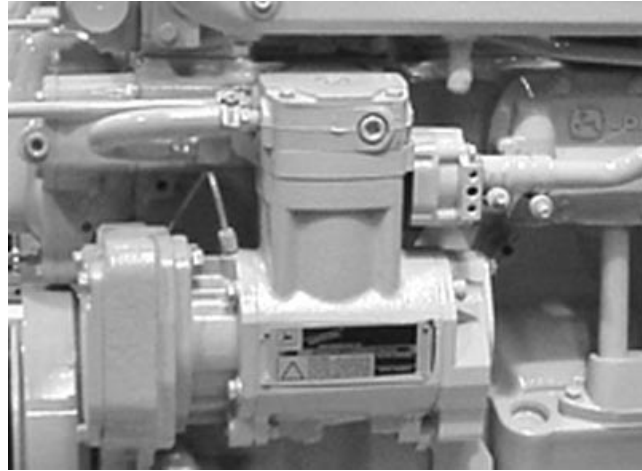
OURGP12,00000CE -19-23DEC04-1/1

## Checking Air Compressors (If Equipped)

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

Air compressors are engine-driven piston types. They are either air cooled or cooled with engine coolant. The compressors are lubricated with engine oil. The compressor runs continuously as gear or spline driven by the auxiliary drive of the engine but has “loaded” and “unloaded” operating modes. This is controlled by the vehicle's air system (refer to vehicle technical manual for complete air system checks and services).

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



RG12738 -JUN-07NOV02

*Air Compressor (Optional)*

OUOD006,0000080 -19-11OCT02-1/1

## Checking Freon (A/C) Compressor (If Equipped)

Contact your authorized servicing dealer for any service or repairs to the air conditioning system.

OURGP11,0000266 -19-19NOV03-1/1

## Checking Rear Power Take-Off (PTO)

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

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

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

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

**IMPORTANT:** An additional 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.)

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.



*Rotating Drivelines*



*John Deere Rear PTO (Optional)*

TS1644 -UN-22AUG95

RG12745 -UN-07NOV02

QUOD006,000008A -19-16OCT02-1/1

# Troubleshooting

## General Troubleshooting Information

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

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

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

- Know the engine and all related systems.
- Study the problem thoroughly.
- Relate the symptoms to your knowledge of engine and systems.

- Diagnose the problem starting with the easiest things first.
- Double-check before beginning the disassembly.
- Determine cause and make a thorough repair.
- After making repairs, operate the engine under normal conditions to verify that the problem and cause was corrected.

*NOTE: All engines have electronic control systems which may send diagnostic trouble codes to signal problems (see DISPLAYING OF DIAGNOSTIC TROUBLE CODES, later in this section).*

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

OURGP12.00000EF -19-21APR05-1/1

## 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:

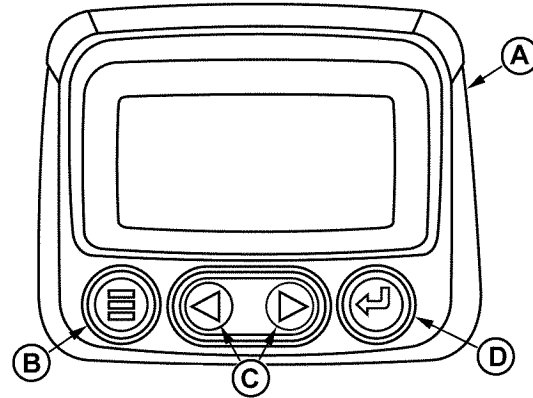
1. Make sure all engine mechanical and other systems not related to the electronic control system are operating properly.

*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.

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.



Trouble Code Display On Instrument Panel

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

RG13740 -UN-11NOV04



## Displaying Of Diagnostic Trouble Codes (DTCs)

### SPN/FMI CODES

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

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

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

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

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

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## Listing of Diagnostic Trouble Codes (DTCs)

**NOTE:** 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.

### Fault Code Listing in Ascending SPN/FMI Codes

SPN	FMI	Fault	Corrective Action
000094	03 .....	Fuel Pressure Voltage Out of Range High .....	Check Sensor and Wiring
	04 .....	Fuel Pressure Voltage Out of Range Low .....	Check Sensor and Wiring
	17 .....	Fuel Pressure Low-Least Severe .....	Check Fuel Supply, Fuel Filters, and Lines
000097	03 .....	Water in Fuel Voltage Out of Range High .....	Check Sensor and Wiring
	04 .....	Water in Fuel Voltage Out of Range Low .....	Check Sensor and Wiring
	16 .....	Water in Fuel Detected .....	Stop and Drain Water Separator
000100	01 .....	Engine Oil Pressure Low-Most Severe .....	Check Oil Level
	03 .....	Engine Oil Pressure Voltage Out of Range High .....	Check Sensor and Wiring
	04 .....	Engine Oil Pressure Voltage Out of Range Low .....	Check Sensor and Wiring
	18 .....	Engine Oil Pressure Low-Moderately Severe .....	Check Oil Level
	31 .....	Oil Pressure Detected with Zero Engine Speed .....	Not Available
000102	02 .....	Boost Pressure Sensor In-Range Failure .....	Not Available
	03 .....	Boost Pressure Voltage Out of Range High .....	Not Available
	04 .....	Boost Pressure Voltage Out of Range Low .....	Not Available
	04 .....	Boost Pressure Voltage Out of Range Low .....	Not Available
000103	00 .....	Turbocharger Speed High-Most Severe .....	Not Available
	02 .....	Turbocharger Speed Data Incorrect .....	Not Available
	05 .....	Turbocharger Harness Open Circuit .....	Not Available
	06 .....	Turbocharger Harness Shorted To Ground .....	Not Available
	08 .....	Turbocharger Speed Signal In-Range Failure .....	Not Available
	31 .....	Turbocharger Speed Signal Missing .....	Not Available
000105	00 .....	Manifold Air Temperature High-Most Severe .....	Check Air Cleaner, Aftercooler, or Room Temperature
	03 .....	Manifold Air Temperature Input Voltage High .....	Check Sensor and Wiring
	04 .....	Manifold Air Temperature Input Voltage Low .....	Check Sensor and Wiring
	15 .....	Manifold Air Temperature High-Least Severe .....	Not Available
	16 .....	Manifold Air Temperature High-Moderately Severe .....	Check Air Cleaner, Aftercooler, or Room Temperature
000108	02 .....	Barometric Air Pressure Sensor Signal Invalid .....	Not Available
000110	00 .....	Engine Coolant Temperature High-Most Severe .....	Check Cooling System, Reduce Power
	03 .....	Engine Coolant Temperature Input Voltage High .....	Check Sensor and Wiring
	04 .....	Engine Coolant Temperature Input Voltage Low .....	Check Sensor and Wiring
	15 .....	Engine Coolant Temperature High-Least Severe .....	Check Cooling System, Reduce Power
	16 .....	Engine Coolant Temperature High-Moderately Severe .....	Check Cooling System, Reduce Power
000157	03 .....	Fuel Rail Pressure Voltage Out of Range High .....	Not Available
	04 .....	Fuel Rail Pressure Voltage Out of Range Low .....	Not Available
	10 .....	Fuel Rail Pressure Drops Too Fast .....	Not Available
	17 .....	Fuel Rail Pressure Not Developed .....	Not Available
000158	17 .....	Keyswitch Circuit Problem .....	Check Service Manual
000174	00 .....	Fuel Temperature High-Most Severe .....	Add Fuel or Switch Fuel Tanks
	03 .....	Fuel Temperature Voltage Out of Range High .....	Check Sensor and Wiring
	04 .....	Fuel Temperature Voltage Out of Range Low .....	Check Sensor and Wiring
	16 .....	Fuel Temperature High-Moderately Severe .....	Add Fuel or Switch Fuel Tanks
000189	00 .....	Engine Speed Derate .....	Not Available
000412	00 .....	Exhaust Gas Recirculation Temperature Input Voltage	
		High-Most Severe .....	Not Available

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SPN	FMI	Fault	Corrective Action
	03 .....	Exhaust Gas Recirculation Temperature Voltage Out of Range High .....	Not Available
	04 .....	Exhaust Gas Recirculation Temperature Voltage Out of Range Low .....	Not Available
	16 .....	Exhaust Gas Recirculation Temperature Moderately Severe .....	Not Available
000611	03 .....	Electronic Injector Wiring Shorted to Power Source .....	Check Wiring
	04 .....	Electronic Injector Wiring Shorted to Ground .....	Check Wiring
000620	03 .....	5V Sensor Supply Voltage Out of Range High .....	Check Wiring
	04 .....	5V Sensor Supply Voltage Out of Range Low .....	Check Wiring
000627	01 .....	Injector Pull-In Current Low or Hold Current Incorrect .....	Check Battery Voltage and Wiring
000628	12 .....	ECU Programming Error .....	Not Available
000629	12 .....	ECU Programming Error .....	Not Available
	13 .....	ECU Failure .....	Contact Service Dealer
000636	02 .....	Engine Position Sensor Noise .....	Check Sensor and Wiring
	05 .....	Engine Position Sensor Current Low or Open Circuit .....	Not Available
	06 .....	Engine Position Sensor Current High or Grounded Circuit .....	Not Available
	08 .....	Engine Position Sensor Input Missing .....	Check Sensor and Wiring
	10 .....	Engine Position Sensor Pattern Error .....	Check Sensor and Wiring
000637	02 .....	Timing (Crank) Position Sensor Noise .....	Check Sensor and Wiring
	05 .....	Timing (Crank) Position Sensor Current Low or Open Circuit .....	Not Available
	06 .....	Timing (Crank) Position Sensor Current High or Grounded Circuit .....	Not Available
	07 .....	Crank/Camshaft Positions Out of Sync .....	Check Sensor and Wiring
	08 .....	Crank Position Input Missing .....	Check Sensor and Wiring
	10 .....	Crank Position Input Pattern Error .....	Check Sensor and Wiring
000641	04 .....	Turbocharger Actuator Disabled .....	Not Available
	05 .....	Turbocharger Actuator Current Low or Open Circuit .....	Not Available
	12 .....	Turbocharger Actuator Communication Error .....	Not Available
	13 .....	Turbocharger Learn Error .....	Not Available
	16 .....	Turbocharger Temperature High-Moderately Severe .....	Not Available
000651	02 .....	Cylinder #1 Injector Part Number Not Recognized .....	Not Available
	05 .....	Cylinder #1 Electronic Injector Circuit Open .....	Check Injector Wiring or Injector Solenoid
	06 .....	Cylinder #1 Electronic Injector Circuit Shorted .....	Check Injector Wiring or Injector Solenoid
	07 .....	Cylinder #1 Electronic Injector Fuel Flow Low .....	Injector Failed or Flow Limiter Closed
	13 .....	Cylinder #1 Injector QR Code String Error .....	Not Available
000652	02 .....	Cylinder #2 Injector Part Number Not Recognized .....	Not Available
	05 .....	Cylinder #2 Electronic Injector Circuit Open .....	Check Injector Wiring or Injector Solenoid
	06 .....	Cylinder #2 Electronic Injector Circuit Shorted .....	Check Injector Wiring or Injector Solenoid
	07 .....	Cylinder #2 Electronic Injector Fuel Flow Low .....	Injector Failed or Flow Limiter Closed
	13 .....	Cylinder #2 Injector QR Code String Error .....	Not Available
000653	02 .....	Cylinder #3 Injector Part Number Not Recognized .....	Not Available
	05 .....	Cylinder #3 Electronic Injector Circuit Open .....	Check Injector Wiring or Injector Solenoid
	06 .....	Cylinder #3 Electronic Injector Circuit Shorted .....	Check Injector Wiring or Injector Solenoid
	07 .....	Cylinder #3 Electronic Injector Fuel Flow Low .....	Injector Failed or Flow Limiter Closed
	13 .....	Cylinder #3 Injector QR Code String Error .....	Not Available
000654	02 .....	Cylinder #4 Injector Part Number Not Recognized .....	Not Available
	05 .....	Cylinder #4 Electronic Injector Circuit Open .....	Check Injector Wiring or Injector Solenoid
	06 .....	Cylinder #4 Electronic Injector Circuit Shorted .....	Check Injector Wiring or Injector Solenoid
	07 .....	Cylinder #4 Electronic Injector Fuel Flow Low .....	Injector Failed or Flow Limiter Closed
	13 .....	Cylinder #4 Injector QR Code String Error .....	Not Available
000655	02 .....	Cylinder #5 Injector Part Number Not Recognized .....	Not Available
	05 .....	Cylinder #5 Electronic Injector Circuit Open .....	Check Injector Wiring or Injector Solenoid

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SPN	FMI	Fault	Corrective Action
000656	06 .....	Cylinder #5 Electronic Injector Circuit Shorted .....	Check Injector Wiring or Injector Solenoid
	07 .....	Cylinder #5 Electronic Injector Fuel Flow Low .....	Injector Failed or Flow Limiter Closed
	13 .....	Cylinder #5 Injector QR Code String Error .....	Not Available
	02 .....	Cylinder #6 Injector Part Number Not Recognized .....	Not Available
	05 .....	Cylinder #6 Electronic Injector Circuit Open .....	Check Injector Wiring or Injector Solenoid
001075	06 .....	Cylinder #6 Electronic Injector Circuit Shorted .....	Check Injector Wiring or Injector Solenoid
	07 .....	Cylinder #6 Electronic Injector Fuel Flow Low .....	Injector Failed or Flow Limiter Closed
	13 .....	Cylinder #6 Injector QR Code String Error .....	Not Available
	05 .....	Fuel Transfer Pump Current Low or Open Circuit .....	Not Available
	06 .....	Fuel Transfer Pump Current High or Grounded Circuit .....	Not Available
001079	08 .....	Fuel Transfer Pump Failure .....	Not Available
	12 .....	Fuel Transfer Pump Failure .....	Not Available
	03 .....	Sensor Supply Voltage 3 Out of Range High .....	Check Wiring
001080	04 .....	Sensor Supply Voltage 3 Out of Range Low .....	Check Wiring
	03 .....	Fuel Rail Pressure Sensor Supply Voltage 2 Out of Range High .....	Check Wiring
	04 .....	Fuel Rail Pressure Sensor Supply Voltage 2 Out of Range Low .....	Check Wiring
001136	00 .....	ECU Temperature High-Most Severe .....	Not Available
	16 .....	ECU Temperature High-Moderately Severe .....	Not Available
001172	03 .....	Compressor Inlet Temperature Input Voltage High .....	Not Available
	04 .....	Compressor Inlet Temperature Input Voltage Low .....	Not Available
001180	00 .....	Turbine Inlet Temperature High-Most Severe .....	Not Available
	16 .....	Turbine Inlet Temperature High-Moderately Severe .....	Not Available
001209	02 .....	Exhaust Pressure Incorrect .....	Not Available
	03 .....	Exhaust Pressure Sensor Voltage Out of Range High .....	Not Available
	04 .....	Exhaust Pressure Sensor Voltage Out of Range Low .....	Not Available
001347	03 .....	Fuel Pump Pressurizing Assembly #1 Sensor Voltage High .....	Not Available
	05 .....	Fuel Pump Pressurizing Assembly #1 Sensor Circuit Open, Shorted to Ground, or Overloaded .....	Check Pump Wiring
	07 .....	Fuel Pump Assembly #1 Rail Pressure Control Mismatch .....	Check Fuel Filter and Lines
001569	31 .....	Engine Protection Derate .....	Check Fault Codes
002630	00 .....	Charge Air Cooler Temperature High-Most Severe .....	Not Available
	03 .....	Charge Air Cooler Sensor Voltage Out of Range High .....	Not Available
	04 .....	Charge Air Cooler Sensor Voltage Out of Range Low .....	Not Available
	15 .....	Charge Air Cooler Temperature High-Least Severe .....	Not Available
	16 .....	Charge Air Cooler Temperature High-Moderately Severe .....	Not Available
002659	02 .....	Exhaust Gas Recirculation Flow/Temperature Mismatch .....	Not Available
	15 .....	Exhaust Gas Recirculation Flow Rate Above Normal .....	Not Available
	17 .....	Exhaust Gas Recirculation Flow Rate Below Normal .....	Not Available
002790	16 .....	Turbocharger Compressor Outlet Temperature High-Most Severe .....	Not Available
002791	02 .....	Exhaust Gas Recirculation Valve Sensor Voltage Mismatch .....	Not Available
	03 .....	Exhaust Gas Recirculation Valve Sensor Voltage Out of Range High .....	Not Available
	04 .....	Exhaust Gas Recirculation Valve Sensor Voltage Out of Range Low .....	Not Available
	05 .....	Exhaust Gas Recirculation Valve Current Low or Open Circuit .....	Not Available
	06 .....	Exhaust Gas Recirculation Valve Current High or Grounded Circuit .....	Not Available

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SPN	FMI	Fault	Corrective Action
	07 .....	Exhaust Gas Recirculation Valve Not Responding or Out of Adjustment .....	Not Available
	13 .....	Exhaust Gas Recirculation Valve Out of Calibration .....	Not Available
	14 .....	Exhaust Gas Recirculation Valve Off .....	Not Available
	31 .....	Exhaust Gas Recirculation Valve Position Error .....	Not Available
002795	07 .....	Turbocharger Actuator Not Responding or Out Of Adjustment .....	Not Available
	12 .....	Turbocharger Actuator Bad Intelligent Device Or Component .....	Not Available
523222	03 .....	Sensor Supply Voltage 1 Out of Range High .....	Not Available
	04 .....	Sensor Supply Voltage 1 Out of Range Low .....	Not Available
523229	03 .....	Sensor Supply Voltage 4 High .....	Not Available
523229	04 .....	Sensor Supply Voltage 4 Low .....	Not Available

**NOTE:** Diagnostic gauge on instrument panel will display text for communication faults, such as “CAN BUS FAILURE”.

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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 splices and terminals. Look for broken wires, damaged splices, and wire-to-wire shorts. Use good judgement if component replacement is thought to be required.

**NOTE:** The engine control unit (ECU) is the component LEAST likely to fail.

- 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:

- Faulty connection between sensor or actuator harness.
- Faulty contact between terminals in connector.
- Faulty terminal/wire connection.
- Electromagnetic interference (EMI) from an improperly installed 2-way radio, etc., can cause faulty signals to be sent to the ECU.

**NOTE:** Refer to wiring diagrams earlier in this section as a guide to connections and wiring.

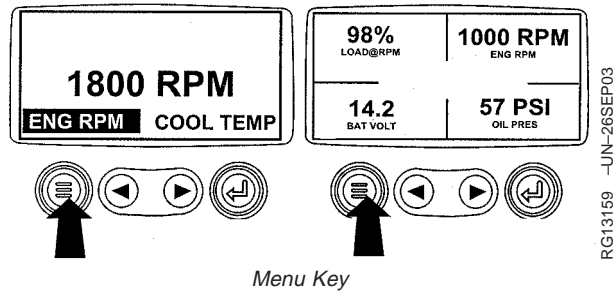
### Suggestions for diagnosing intermittent faults:

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## Displaying Diagnostic Gauge Software

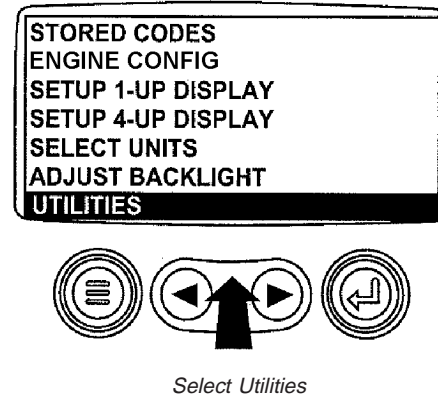
**NOTE:** The following steps can be used to display the software version of the diagnostic gauge if needed by your dealer for troubleshooting. This is a read only function.

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



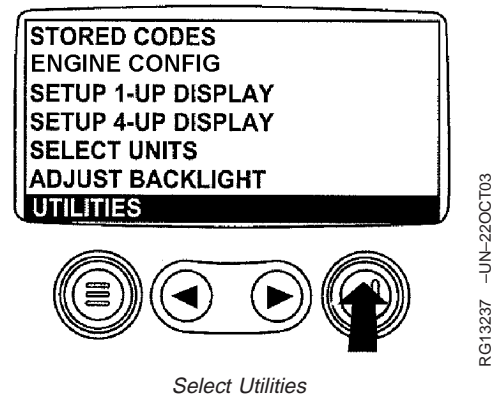
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2. The main menu will be displayed. Use the "Arrow" key to scroll through the menu until "Utilities" is highlighted.



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



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



Software Version

RG13236 -UN-13OCT03

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## 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
<b>Engine Will Not Crank</b>	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.
<b>Hard to Start or Will Not Start</b>	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.
<b>Engine Misfiring or Runs Irregularly</b>	Electronic Control System problem or basic engine problem	See your John Deere engine distributor or servicing dealer.
<b>Lack of Engine Power</b>	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.

**NOTE:** Exhaust gas recirculating valve will recycle occasionally, causing a momentary loss of speed. This is normal.

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Symptom	Problem	Solution
<b>Black or Gray Exhaust Smoke</b>	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.
	Engine overloaded	Reduce engine load.
	Engine burning oil	See LUBRICATION SYSTEM TROUBLESHOOTING, later in this section.
	Air cleaner restricted or dirty	Replace air cleaner element as required.
<b>White Exhaust Smoke</b>	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.
	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.
	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.
<b>Engine Idles Poorly</b>	Electronic Control System problem or basic engine problem	See your John Deere engine distributor or servicing dealer.
	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.

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Symptom	Problem	Solution
<b>Excessive Fuel Consumption</b>	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.
	Improper type of fuel.	Use proper type of fuel.
	Clogged or dirty air cleaner.	Service air cleaner.
	Engine overloaded.	Reduce load.
	Improper valve clearance.	See your authorized servicing dealer or engine distributor.
	Fuel injectors defective.	See your authorized servicing dealer or engine distributor.
	Engine out of time.	See your authorized servicing dealer or engine distributor.
	Defective turbocharger.	See your authorized servicing dealer or engine distributor.
	Low engine temperature.	Check thermostat.
<b>Fuel in Oil</b>	Cracked cylinder head	Locate crack, repair/replace components as required. See your John Deere engine distributor or servicing dealer.
<b>Low-Pressure System - Fuel Pressure Low</b>	Plugged fuel filter	Replace fuel filter.
	Restricted fuel line	Locate restriction, repair as required.

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Symptom	Problem	Solution
	Faulty high-pressure fuel pump	Remove fuel pump, repair/replace pump as required. See your John Deere engine distributor or servicing dealer.
<b>Abnormal Engine Noise</b>  <i>NOTE: Variable geometry turbocharger recycles after starting engine, causing a momentary revving sound in the engine. This is normal.</i>  <i>Do not confuse the whine heard during turbocharger run down with noise which indicates a bearing failure. The whine heard during turbocharger run down is normal.</i>	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 back lash. See your John Deere engine distributor or servicing dealer.

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Symptom	Problem	Solution
	Excessive valve clearance	Check and adjust valve clearance. See your John Deere engine distributor or servicing dealer.
	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.
<b>Engine emits white smoke</b>	Improper type of fuel.	Use proper fuel.
	Low engine temperature.	Warm up engine to normal operating temperature.
	Defective thermostat.	Remove and check thermostat.
	Defective fuel injectors.	See your authorized servicing dealer or engine distributor.
	Engine out of time.	See your authorized servicing dealer or engine distributor.
<b>Engine emits black or gray exhaust smoke</b>	Improper type of fuel.	Use proper fuel.
	Clogged or dirty air cleaner.	Service air cleaner.
	Engine overloaded.	Reduce load.
	Fuel injectors dirty.	See your authorized servicing dealer or engine distributor.
	Engine out of time.	See your authorized servicing dealer or engine distributor.

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Symptom	Problem	Solution
<b>Engine Overheats</b>	Turbocharger not functioning.	See your authorized servicing dealer or engine distributor.
	Engine overloaded.	Reduce load.
	Low coolant level.	Fill radiator to proper level, check radiator and hoses for loose connections or leaks.
	Faulty radiator cap.	Have technician check.
	Stretched poly V-belt or defective belt tensioner.	Check automatic belt tensioner and check belts for stretching. Replace as required.
	Low engine oil level.	Check oil level. Add oil as required.
	Cooling system needs flushing.	Flush cooling system.
	Defective or wrong type of thermostat.	Remove and check thermostat.
	Defective temperature gauge or sender.	Check coolant temperature with thermometer and replace, if necessary.
	Incorrect grade of fuel.	Use correct grade of fuel.

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## Electrical Troubleshooting

Symptom	Problem	Solution
<b>Undercharged system</b>	Excessive electrical load from added accessories.	Remove accessories or install higher output alternator.
	Excessive engine idling.	Increase engine rpm when heavy electrical load is used.
	Poor electrical connections on battery, ground strap, starter, or alternator.	Inspect and clean as necessary.
	Defective battery.	Test battery.
	Defective alternator.	Test charging system.
<b>Battery used too much water</b>	Cracked battery case.	Check for moisture and replace as necessary.
	Defective battery.	Test battery.
	Battery charging rate too high.	Test charging system.
<b>Batteries will not charge</b>	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.
<b>Starter will not crank</b>	Engine drivelines engaged.	Disengage engine drivelines.
	Loose or corroded connections.	Clean and tighten loose connections.
	Low battery output voltage.	See your authorized servicing dealer or engine distributor.
	Faulty start circuit relay.	See your authorized servicing dealer or engine distributor.
	Blown fuse.	Replace fuse.

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Symptom	Problem	Solution
<b>Starter cranks slowly</b>	Low battery output.	See your authorized servicing dealer or engine distributor.
	Crankcase oil too heavy.	Use proper viscosity oil.
	Loose or corroded connections.	Clean and tighten loose connections.
<b>Starter and hour meter functions; rest of electrical system does not function</b>	Blown fuse on magnetic switch.	Replace fuse.
<b>Entire electrical system does not function</b>	Faulty battery connection.	Clean and tighten connections.
	Sulfated or worn-out batteries.	See your authorized servicing dealer or engine distributor.
	Blown fuse.	Replace fuse.

RG, RG34710, 4090 -19-09OCT02-2/2

## Lubrication System Troubleshooting

Symptom	Problem	Solution
<b>Low Oil Pressure</b>	Low crankcase oil level	Fill crankcase to proper oil level.
	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.
	Clogged oil pump screen or cracked pick-up tube	Remove oil pan and clean screen/replace pick-up tube.
<b>High Oil Pressure</b>	Excessive main or connecting rod bearing clearance	Determine bearing clearance. See your John Deere engine distributor or servicing dealer.
	Improper oil classification	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.
	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.

Continued on next page

RG, RG34710, 7600 -19-30JUN97-1/3



Symptom	Problem	Solution
<b>Excessive Oil Consumption</b>	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 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.
	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.
	Front and/or rear crankshaft oil seal faulty	Replace oil seals. See your John Deere engine distributor or servicing dealer.

Continued on next page

RG, RG34710, 7600 -19-30JUN97-2/3

Symptom	Problem	Solution
		See LOW PRESSURE SYSTEM-FUEL PRESSURE LOW TROUBLESHOOTING earlier in this section.
Fuel in Oil		See FUEL IN OIL TROUBLESHOOTING earlier in this section.
Coolant in Oil		See COOLING SYSTEM TROUBLESHOOTING later in this section.

RG, RG34710, 7600 -19-30JUN97-3/3

## Cooling System Troubleshooting

Symptom	Problem	Solution
Engine Overheats	Lack of coolant in cooling system	Fill cooling system to proper level.
	Radiator core 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.
	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.

Continued on next page

RG, RG34710, 7601 -19-09OCT02-1/2

Symptom	Problem	Solution
<b>Coolant in Crankcase</b>	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.
<b>Coolant Temperature Below Normal</b>	Defective thermostat(s)	Test thermostats; replace thermostats as required.

RG, RG34710, 7601 -19-09OCT02-2/2

## Air Intake and Exhaust System Troubleshooting

Symptom	Problem	Solution
<b>Hard to Start or Will Not Start</b>		See ENGINE TROUBLESHOOTING earlier in this section.
<b>Engine Misfiring or Runs Irregularly</b>		See ENGINE TROUBLESHOOTING earlier in this section.
<b>Black or Grey Exhaust Smoke</b>		See ENGINE TROUBLESHOOTING earlier in this section.
<b>Lack of Engine Power</b>		See ENGINE TROUBLESHOOTING earlier in this section.
<i>NOTE: Exhaust gas recirculating valve will recycle occasionally, causing a momentary loss of speed. This is normal.</i>		
<b>Turbocharger “Screams”</b>	Air leak in intake manifold.	Check intake manifold gasket and manifold; repair as required. See your John Deere engine distributor or servicing dealer.
<b>Turbocharger Noise or Vibration</b>	Bearings not lubricated (insufficient oil pressure)	Determine cause of lack of lubrication; repair as required. See your John Deere engine distributor or servicing dealer.
<i>NOTE: Variable geometry turbocharger recycles after starting engine, causing a momentary revving sound in the engine. This is normal.</i>		
<i>Do not confuse the whine heard during run down with noise which indicates a bearing failure.</i>		
	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.

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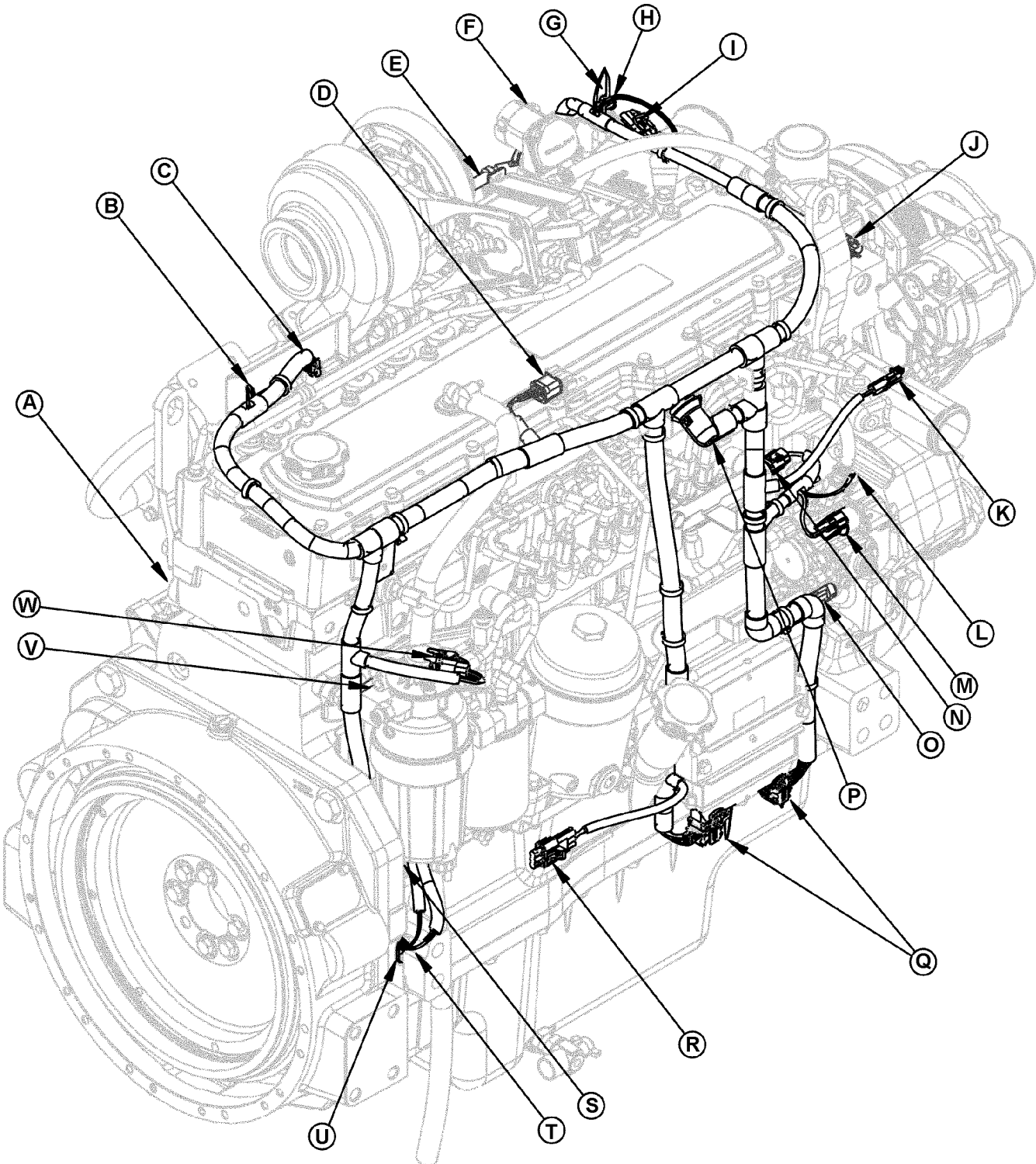
OURGP12,00000D2 -19-23DEC04-1/2

## *Troubleshooting*

Symptom	Problem	Solution
	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.

OURGP12,00000D2 -19-23DEC04-2/2

Engine Wiring Layout



Electrical Wiring Layout

RG13863 -UN-25JAN05

Continued on next page

OURGP11,0000045 -19-25JAN05-1/2

A—Starter Relay Connections	F—Exhaust Gas Recirculation (EGR) Valve Sensor Connector	K—Alternator Excitation Sensor Connector	P—Fuel Injector Connector
B—Manifold Air Pressure (MAP) Sensor Connector	G—Exhaust Pressure Sensor Connector	L—Fuel Temperature Sensor Connector	Q—ECU Connectors
C—Exhaust Gas Recirculation (EGR) Mixed Air Temperature Sensor Connector	H—Exhaust Gas Recirculation (EGR) Fresh Air Sensor Connector	M—Fuel Pump Control Valve Connector	R—Auxiliary Power Connector
D—Turbocharger Sensor Jumper Connector	I—Air Heater Jumper Connection	N—Fuel Rail Pressure Sensor Connector	S—Water In Fuel Sensor
E—Exhaust Gas Recirculation (EGR) Exhaust Temperature Sensor Connector	J—Coolant Temperature Sensor Connector	O—Camshaft Sensor Connector	T—Engine Crankshaft Sensor
			U—Oil Pressure Sensor
			V—Fuel Pressure Sensor
			W—Fuel Transfer Pump Sensor

OURGP11,0000045 -19-25JAN05-2/2

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

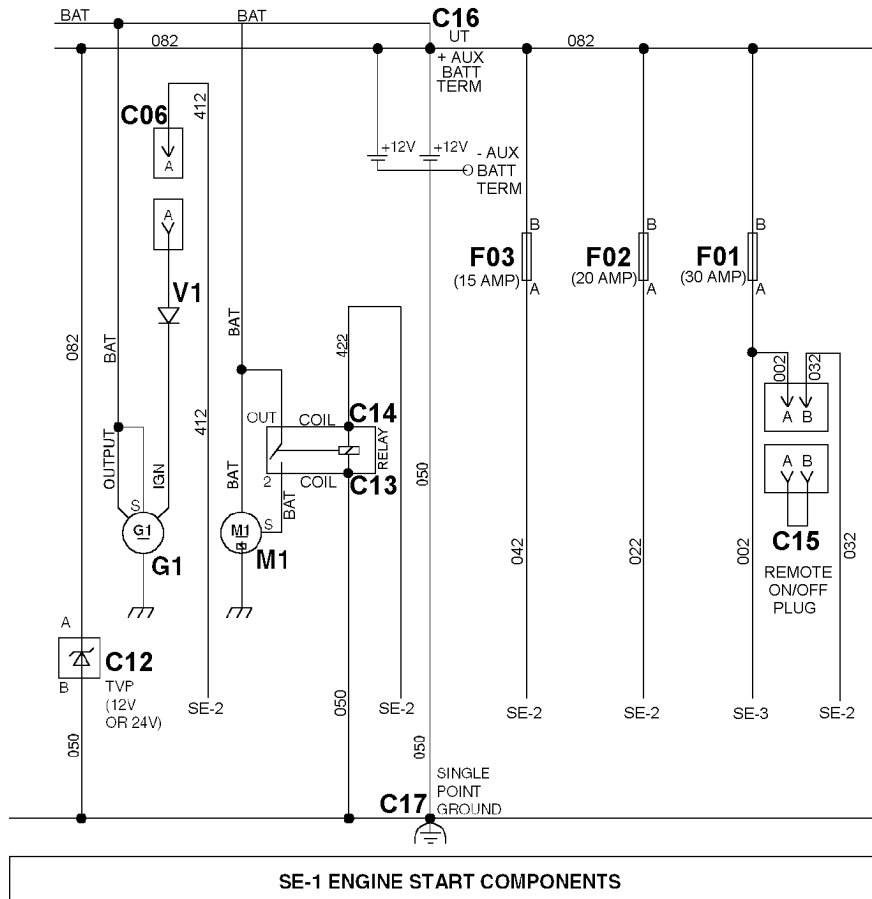
**IMPORTANT:** ALWAYS disconnect Electronic Control Unit (ECU) connectors and engine control system-to-machine ground before welding. High currents or electro-static discharge in electronic components from welding may cause permanent damage.

1. Remove the ground connection for the engine control system-to-machine 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.

**IMPORTANT:** Do not steam clean any electrical or electronic components while steam cleaning the engine as it could damage sensitive parts.

DPSG,OUOD002,1836 -19-15AUG00-1/1

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



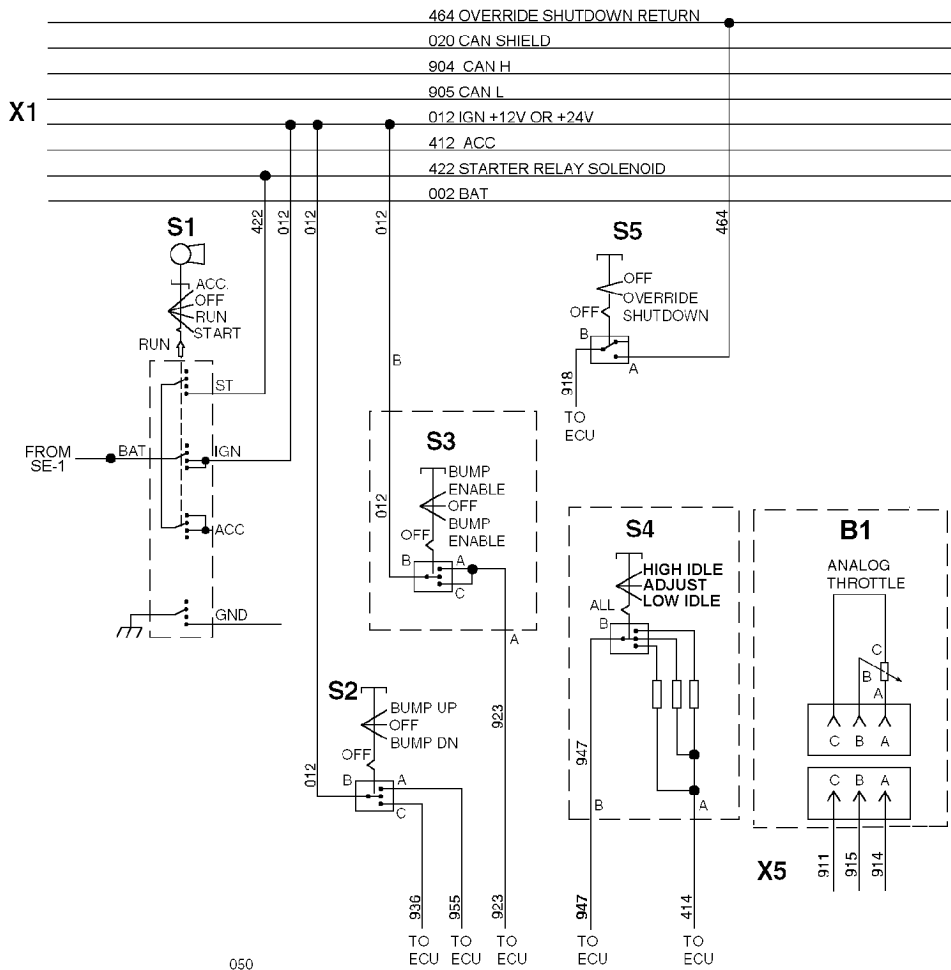
RG13874 -UN-08APR05

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

OURGP12,00000EC -19-08APR05-1/1



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



SE-2 INSTRUMENT PANEL (CONTINUED NEXT PAGE)

RG13873 -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

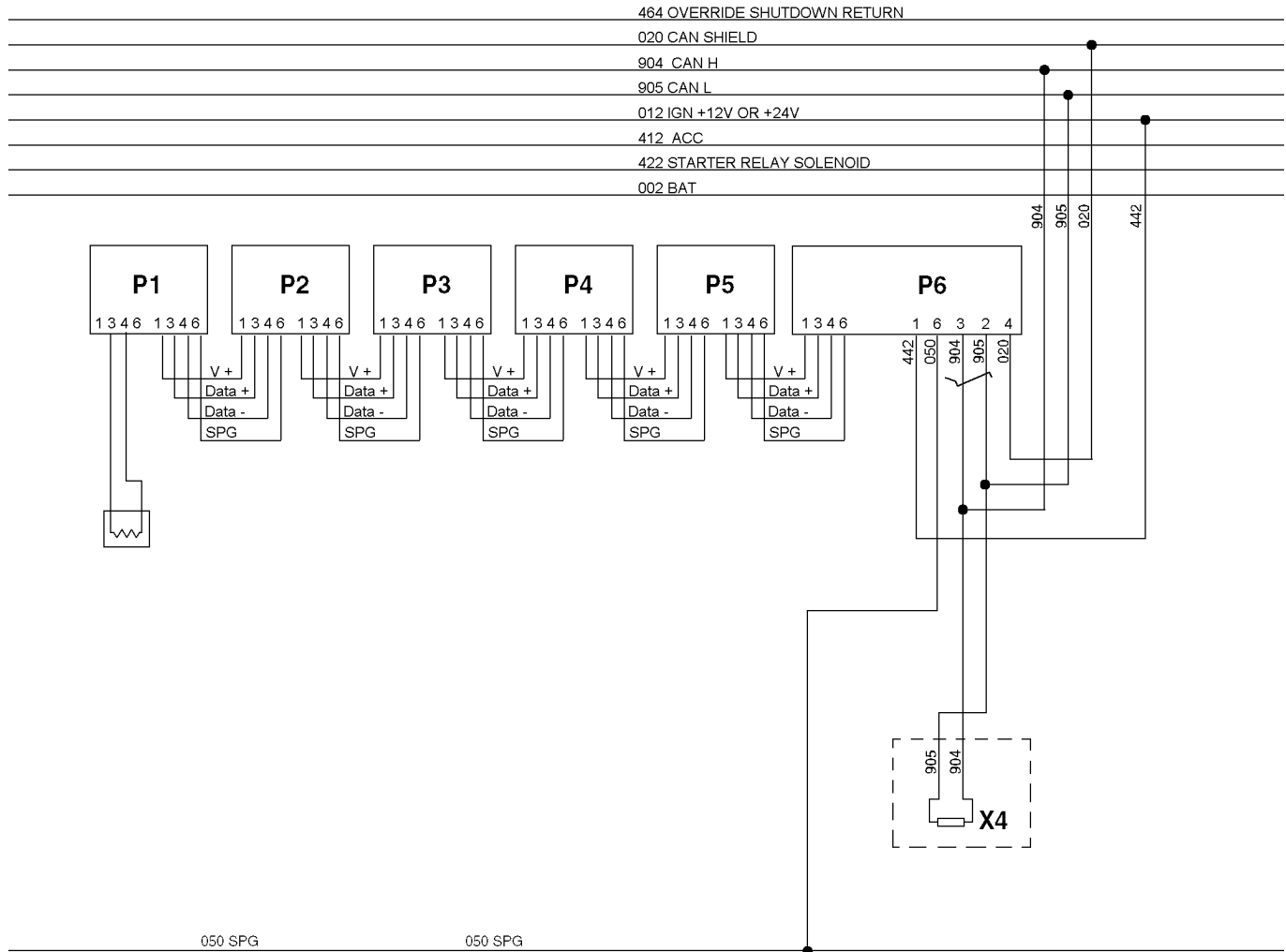
F01—Fuse (30 Amp)(System)  
F02—Fuse (20 Amp)(ECU)  
F03—Fuse (15 Amp)(Fuel Filter)  
G1—Alternator  
M1—Starter Motor  
P1—Optional Gauge  
P2—Optional Gauge  
P3—Oil Pressure Gauge  
P4—Coolant Temperature Gauge

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

OURGP12,00000ED -19-08APR05-1/1

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



## SE-2 INSTRUMENT PANEL (CONTINUED)

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

# Storage

## Engine Storage Guidelines

1. John Deere engines can be stored outside for up to three (3) months with no long term preparation IF COVERED BY WATERPROOF COVERING. No outside storage is recommended without a waterproof covering.
2. John Deere engines can be stored in a standard overseas shipping container for up to three (3) months with no long term preparation.
3. John Deere engines can be stored inside for up to six (6) months with no long term preparation.
4. John Deere engines expected to be stored more than six (6) months MUST have long term storage preparation. ( See PREPARING ENGINE FOR LONG TERM STORAGE, later in this section.)
5. Long term storage includes the use of a stabilized rust preventive oil to protect internal metal components of the engine. This oil should be an SAE 10 oil with 1-4 percent morpholine or equivalent vapor corrosion inhibitor. These rust preventive oils are available from area distributors.

OURGP12,00000DF -19-07JAN05-1/1

## Preparing Engine for Long Term Storage

The following storage preparations are used for long term engine storage up to one year. After that, the engine should be started, warmed up, and retreated for an extended storage period.

**IMPORTANT:** Any time your engine will not be used for over six (6) months, the following recommendations for storing it and removing it from storage will help to minimize corrosion and deterioration.

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 fuel transfer pump intake, and another temporary line from the fuel return manifold to the tank, so rust preventive oil solution is circulated through the injection system during cranking.
7. Crank the engine several revolutions with starter (do not allow the engine to start). This will allow rust preventive oil solution to circulate.
8. Remove temporary lines installed in Step 6 above, and replace any lines/plugs previously removed.

*NOTE: One gallon of fuel/oil solution can be used to treat 100 engines; two gallons to treat 200 engines, etc. The oil could then be replenished by adding an additional five (5) ounces of rust preventive oil per gallon of solution. However, starting over with a new solution is recommended to dispose of any water or other impurities.*

9. Loosen, or remove and store, fan/alternator poly-vee belt.
10. Remove and clean batteries. Store them in a cool, dry place and keep them fully charged.
11. Disengage the clutch for any driveline.
12. Clean the exterior of the engine with salt-free water and touch up any scratched or chipped painted surfaces with a good quality paint.
13. Coat all exposed (machined) metal surfaces with grease or corrosion inhibitor if not feasible to paint.
14. Seal all openings on engine with plastic bags and tape.

15. Store the engine in a dry protected place. If engine must be stored outside, cover it with a

waterproof canvas or other suitable protective material and use a strong waterproof tape.

OURGP12,00000E0 -19-07JAN05-2/2

## Removing Engine from Long Term Storage

Refer to the appropriate section for detailed services listed below or have your authorized servicing dealer or engine distributor perform services that you may not be familiar with.

1. Remove all protective coverings from engine. Unseal all openings in engine and remove covering from electrical systems.
2. Remove the batteries from storage. Install batteries (fully charged) and connect the terminals.
3. Install fan/alternator poly-vee belt if removed.
4. Fill fuel tank.
5. Perform all appropriate prestarting checks. ( See DAILY PRESTARTING CHECKS in Lubrication and Maintenance/Daily Section.)

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

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

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

# Specifications

## General OEM Engine Specifications

*NOTE: For John Deere vehicle engines, see Machine Technical Manual.*

ITEM	UNIT OF MEASURE	ENGINE MODEL 6090HF485
<b>General Data</b>		
Engine Type	—	In-line, 4 cycle diesel
Aspiration	—	Turbocharged and air-to-air after cooled
Number of Cylinders	—	6
Bore	mm (in.)	118.4 (4.66)
Stroke	mm (in.)	136 (5.40)
Displacement	L (cu in.)	9.0 (549)
Combustion System	—	Direct Injection
Compression Ratio	—	16.3:1
<b>Physical Dimensions:</b>		
Width	mm (in.)	630 (24.8)
Height	mm (in.)	1113 (43.8)
Length	mm (in.)	1210 (47.6)
Basic Dry Weight	kg (lb)	901 (1986)
<b>Performance Data (Industrial Applications)</b>		
Rated Power—See ENGINE POWER charts on following pages		
Low Idle Speed	rpm	800
Fast Idle Speed	rpm	2180 or 2380
Rated Speed	rpm	2000 or 2200
<b>Performance Data (Generator Applications)</b>		
Rated Power—See ENGINE POWER charts on following pages		
Low Idle Speed	rpm	—
Fast Idle Speed	rpm	1590 or 1890
Rated Speed	rpm	1500 or 1800
<b>Lubrication System</b>		
Oil Pressure at Rated rpm ( $\pm 35\%$ )	kPa (bar) (psi)	290 (2.9) (42)
Oil Pressure at Low Idle	kPa (bar) (psi)	138 (1.4) (20) (Minimum)
In-Crankcase Oil Temp at Full Load Speeds	°C (°F)	115°C (240°F)
<b>Cooling System (Liquid, pressurized with centrifugal pump)</b>		
Recommended Pressure Cap	kPa (psi)	100 (14.5)
Coolant Temperature Operating Range	°C (°F)	82-94 (180-202)
Coolant Temperature (Maximum)	°C (°F)	111 (231)
Coolant Capacity	L (qt)	16 (17)
<b>Valve Actuation</b>		
Valve Clearance (Cold)		
Intake	mm (in.)	0.18 (0.007)
Exhaust	mm (in.)	0.64 (0.025)

Continued on next page

OURGP12,00000D6 -19-23DEC04-1/2

## Specifications

ITEM	UNIT OF MEASURE	ENGINE MODEL 6090HF485
<b>Fuel System</b>		
Injector Opening Pressure New	kPa (psi)	ECU Programed (Variable)
Injector Opening Pressure Used (min.)	kPa (psi)	ECU Programed (Variable)
<b>Electrical System</b>		
Battery Capacity (Minimum)- 12 Volt System	CCA	1100
Reserve Capacity- 12 Volt System	Minutes	250
Battery Capacity (Minimum)- 24 Volt System	CCA	750
Reserve Capacity- 24 Volt System	Minutes	275
<b>Air System</b>		
Maximum Air Intake Restriction	in. H <sub>2</sub> O (kPa) (bar) (psi)	25 (6.25) (0.06) (1.0)

OURGP12,00000D6 -19-23DEC04-2/2

## Engine Power and Speed Rating Specifications <sup>1</sup>

ENGINE MODEL	FUEL SYSTEM OPTION CODES	POWER RATING @RATED SPEED WITHOUT FAN kW (hp)	RATED SPEED <sup>2</sup> (rpm)	SLOW IDLE (rpm)	FAST IDLE <sup>3</sup> (rpm)
Industrial Units					
6090HF485	1601	298 (400)	2200	800	2380
		280 (375)	2200	800	2380
		261 (350)	2200	800	2380
		261 (350) <sup>4</sup>	2200	800	2380
		261 (350) <sup>4</sup>	2000	800	2180
		242 (325)	2200	800	2380
		242 (325) <sup>4</sup>	2200	800	2380
		242 (325) <sup>4</sup>	2000	800	2180
		224 (300)	2200	800	2380
		224 (300) <sup>4</sup>	2200	800	2380
		224 (300) <sup>4</sup>	2000	800	2180
	1602	205 (275)	2200	800	2380
		205 (275) <sup>4</sup>	2200	800	2380
		205 (275) <sup>4</sup>	2000	800	2180
		187 (250)	2200	800	2380
		187 (250) <sup>4</sup>	2200	800	2380
		187 (250) <sup>4</sup>	2000	800	2180
		168 (225)	2200	800	2380
		168 (225) <sup>4</sup>	2200	800	2380
		168 (225) <sup>4</sup>	2000	800	2180
Generator Sets					
6090HF485 Emission Certified	1601	315 (422)	1800	—	1935
		287 (385)	1800	—	1935
		258 (345)	1800	—	1935
		229 (307)	1800	—	1935

<sup>1</sup> Engine speeds listed are preset to factory specification for application. Therefore, speeds may vary depending upon specific vehicle application requirements. Refer to your machine operator's manual for engine speeds that are different from those preset at the factory.

<sup>2</sup> Generator set engines usually run at 1500 rpm (50 Hz) or 1800 (60 Hz) when operating under load depending on cycles of AC current.

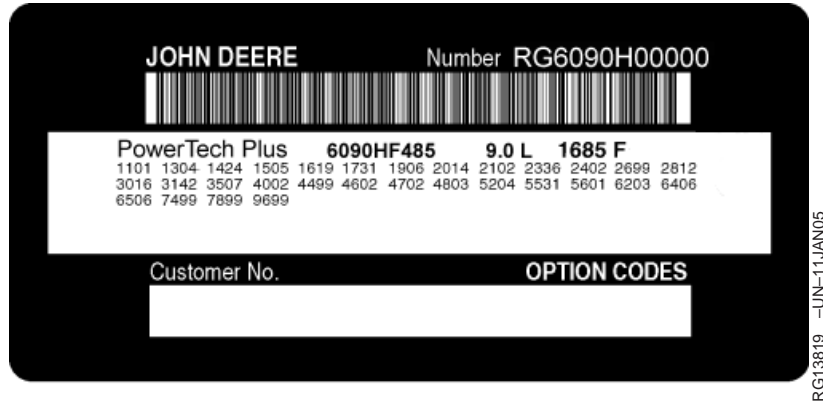
<sup>3</sup> For industrial engines, fast idle is 7-10% above rated speed. For generator set engines, fast idle is 5-7% above rated speed.

<sup>4</sup> These industrial engines have a power bulge which allows for INTERMITTENT operation above rated power.

OURGP12,00000D7 -19-23DEC04-1/1



## Engine Crankcase Oil Fill Quantities



Option Code Label

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

“RG” indicates the engine was built in Waterloo, Iowa.

In addition to the serial number plate, OEM engines have an engine option code label affixed to the rocker arm cover. These codes indicate which of the engine options were installed on your engine at the factory. When in need of parts or service, furnish your authorized servicing dealer or engine distributor with these numbers.

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

Listed below are engine crankcase oil fill quantities:

Engine Model 6090HF485	
Oil Pan Option Code(s)	Crankcase Oil Capacity
1909 .....	31.3 L (33.1 qt)
1911 .....	37.9 L (40.1 qt)
1914 .....	31.8 L (33.6 qt)
1915 .....	31.4 L (33.2qt)
1916 .....	34.1 L (36.0 qt)

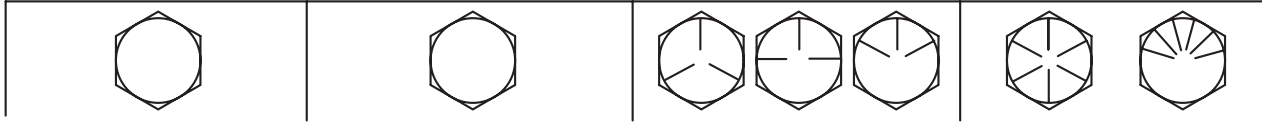
**NOTE:** Add an additional 4 L (4.2 qts) of oil for engines equipped with a John Deere rear PTO.

**NOTE:** Crankcase oil capacities are based on installing a new (dry) oil filter and then filling crankcase with oil to “FULL” mark on dipstick.

OURGP12,00000D8 -19-23DEC04-1/1

## Unified Inch Bolt and Screw Torque Values

TS1671 –UN-01MAY03



Bolt or Screw	SAE Grade 1				SAE Grade 2 <sup>a</sup>				SAE Grade 5, 5.1 or 5.2				SAE Grade 8 or 8.2			
	Lubricated <sup>b</sup>		Dry <sup>c</sup>		Lubricated <sup>b</sup>		Dry <sup>c</sup>		Lubricated <sup>b</sup>		Dry <sup>c</sup>		Lubricated <sup>b</sup>		Dry <sup>c</sup>	
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.

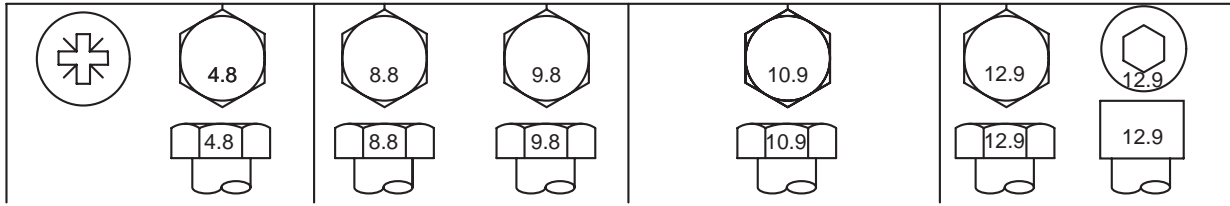
Replace fasteners with the same or higher grade. If higher grade fasteners are used, tighten these to the strength of the original. Make sure fastener threads are clean and that you properly start thread engagement. When possible, lubricate plain or zinc plated fasteners other than lock nuts, wheel bolts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

<sup>a</sup>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.

<sup>b</sup>"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.

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

## Metric Bolt and Screw Torque Values



TS1670 -UN-01MAY03

Bolt or	Class 4.8				Class 8.8 or 9.8				Class 10.9				Class 12.9			
Screw	Lubricated <sup>a</sup>		Dry <sup>b</sup>		Lubricated <sup>a</sup>		Dry <sup>b</sup>		Lubricated <sup>a</sup>		Dry <sup>b</sup>		Lubricated <sup>a</sup>		Dry <sup>b</sup>	
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.

<sup>a</sup>"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.

<sup>b</sup>"Dry" means plain or zinc plated without any lubrication, or M6 to M18 fasteners with JDM F13B zinc flake coating.

# Lubrication and Maintenance Records

## Using Lubrication and Maintenance Records

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

1. Keep a record of the number of hours you operate your engine by regular observation of hour meter.
2. Check your record regularly to learn when your engine needs service.
3. DO ALL the services within an interval section. Write the number of hours (from your service records) and the date in the spaces provided. For a

complete listing of all items to be performed and the service intervals required, refer to the quick-reference chart near the front of the Lubrication and Maintenance Section.

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

RG, RG34710, 4100 -19-01JAN96-1/1

## Daily (Prestarting) Service

*NOTE: Refer to DAILY PRESTARTING CHECKS in Engine Operating Guidelines Section for detailed procedures.*

Check engine oil level.

Check coolant level.

Drain water from fuel filters.

Check air cleaner dust unloader valve and air restriction indicator, if equipped.

Perform visual walkaround inspection.

OURGP11,0000049 -19-07FEB05-1/1

## 500 Hour/12 Month Service

Service fire extinguisher.	Check automatic belt tensioner and belt wear.
Change engine oil and filter. <sup>1,2</sup>	Check cooling system
Service fire extinguisher	Coolant solution analysis - add SCA's as needed.
Service battery.	Pressure test cooling system.
Check coolant pump weep hole foam filter.	Check engine speeds.
Clean crankcase vent tube.	Check crankshaft vibration damper.
Check air intake hoses, connections, and system.	Check engine mounts
Replace fuel filter elements.	

Hours									
Date									
Hours									
Date									
Hours									
Date									
Hours									
Date									

<sup>1</sup>During engine break-in, change the oil and filter for the first time after 100 hours of operation (maximum).

<sup>2</sup> If John Deere PLUS-50™ or ACEA-E6/E7 oil is used along with the specified John Deere oil filter, and oil pan option codes 1911 or 1916 are used, the oil and filter change interval may be extended to every 500 hours. 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.)

## 2000 Hour/24 Month Service

Flush cooling system.<sup>1</sup>

Test Thermostats

Adjust valve clearance.

Hours									
Date									
Hours									
Date									
Hours									
Date									
Hours									
Date									

<sup>1</sup> If John Deere COOL-GARD is used, the flushing interval may be extended to 3000 hours or 36 months. If John Deere COOL-GARD is used and the coolant is tested annually AND additives are replenished by adding supplemental coolant additives (SCA's), the flushing interval may be extended to 5000 hours or 60 months, whichever occurs first.

**Service as Required**

Drain water from fuel filters when alarm sounds.

Add coolant.

Service air cleaner.

Replace fan-alternator belt.

Check fuses.

Check electrical wiring and connectors.

Check air compressor (if equipped). (See your John Deere dealer.)

Check freon (A/C) compressor (if equipped). (See your John Deere dealer.)

Check rear PTO (if equipped). (See your John Deere dealer.)

Hours									
Date									
Hours									
Date									
Hours									
Date									

OURGP12,00000DB -19-23DEC04-1/1

# Emission System Warranty

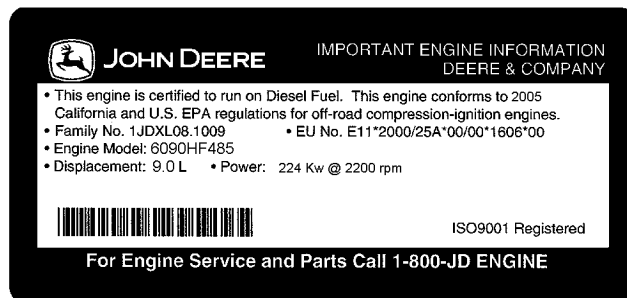
## Emissions Control System Certification Label



**CAUTION:** Statutes providing severe penalties for tampering with emissions controls may apply at the user's location.

The emissions warranty described below applies only to those engines marketed by John Deere that have been certified by the United States Environmental Protection Agency (EPA) and/or California Air Resources Board (CARB); and used in the United States and Canada in non-road mobile (self-propelled or portable/transportable<sup>1</sup>) equipment. The presence of an emissions label like the one shown signifies that the engine has been certified with the EPA and/or CARB. The EPA and CARB warranties only apply to new engines having the certification label affixed to the engine and sold as stated above in the geographic areas. The presence of an EU number in the third line of the label signifies that the engine has been certified with the European Union countries per Directive 97/68/EC. The emissions warranty does not apply to the EU countries.

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



*Emissions Label*

RG13872 -UN-07FEB05

<sup>1</sup>Equipment moved at least once every 12 months.



## **U.S. 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".

RG, RG34710, 4108 -19-18DEC03-1/1



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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 -JUN-23AUG88

RG, RG34710, 4115 -19-01JAN96-1/1

## 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 -JUN-23AUG88

RG, RG34710, 4116 -19-01JAN96-1/1

## 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 -JUN-23AUG88

RG, RG34710, 4117 -19-01JAN96-1/1

## 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 -JUN-23AUG88

RG, RG34710, 4118 -19-01JAN96-1/1

