# PowerTech E™ 4024HF285/HF295 and 5030HF285 OEM Diesel Engines

## OPERATOR'S MANUAL

## PowerTech E™ 2.4L Tier 3/Stage IIIA/ Interim Tier 4 and 3.0L Tier 3/ Stage IIIA OEM Diesel Engines

**OMRG37673 Issue 26Oct07 (ENGLISH)**

CALIFORNIA
Proposition 65 Warning

Diesel engine exhaust and some of its constituents are known to the State of California to cause cancer, birth defects, and other reproductive harm.

If this product contains a gasoline engine:

**⚠ WARNING**

The engine exhaust from this product contains chemicals known to the State of California to cause cancer, birth defects or other reproductive harm.

The State of California requires the above two warnings.

**John Deere Power Systems**
LITHO IN U.S.A.

# Introduction

## Forward

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

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

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

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

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

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

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

*NOTE: This operator's manual covers PowerTech E™ 2.4 L and 3.0 L engine models 4024HF285, 4024HF295 and 5030HF285 . These engines meet emission standards for EPA Tier 3 in the United States, and Stage III A in the European Union. For earlier 2.4 L and 3.0 L engines, refer to OMRG34851.*

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



OUOD006,00000AC –19–03AUG07–1/1

## Engine Owner

**John Deere Engine Owner:**

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

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

**Aux Utilisateurs De Moteurs John Deere:**

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

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

**An Den Besitzer Des John Deere Motors:**

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

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

**Proprietario del motore John Deere:**

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

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

**Propietario De Equipo John Deere:**

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

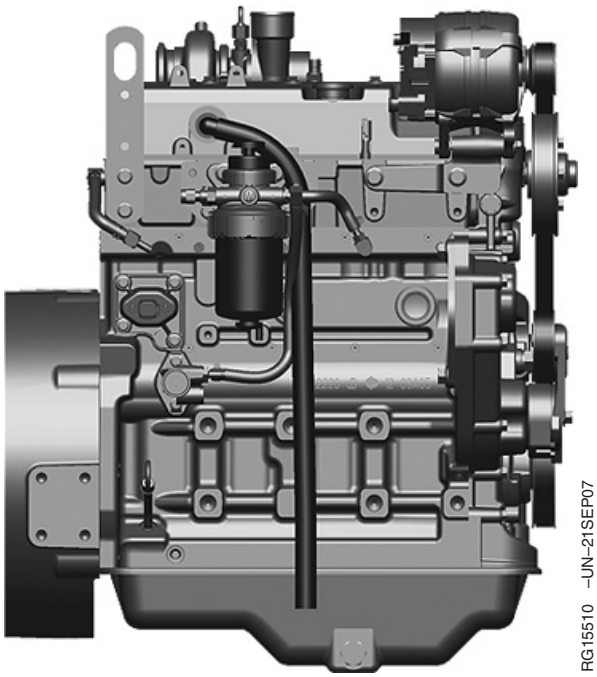
Aprenda quién es su distribuidor y donde él está situado. Cuando tenga un momento, vaya a visitarlo. A él le gustará conocerlo, y saber cuáles podrían ser sus necesidades.

**Till ägare av John Deere motorer:**

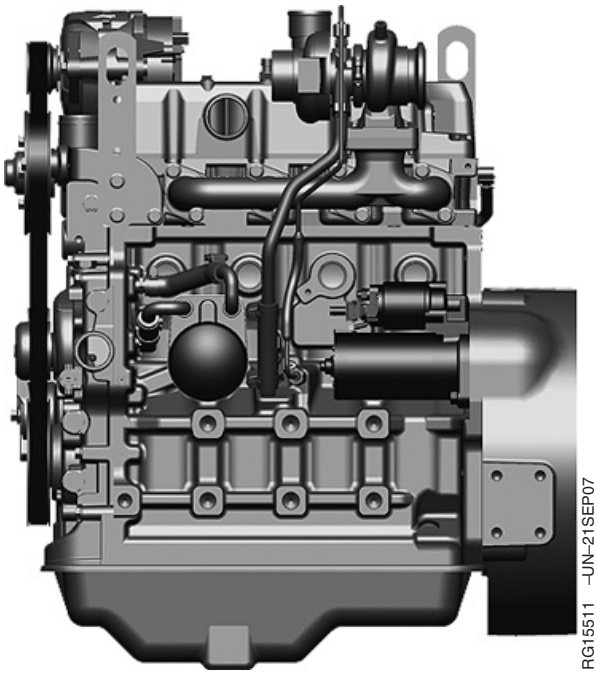
Ta reda på vem din återförsäljare är och besök honom så snart tillfälle ges. Vänta inte tills det är dags för service eller eventuellt garantiarbete. Din motor garantiregistrerar Du via Internet på http://www.johndeere.com/enginewarranty

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

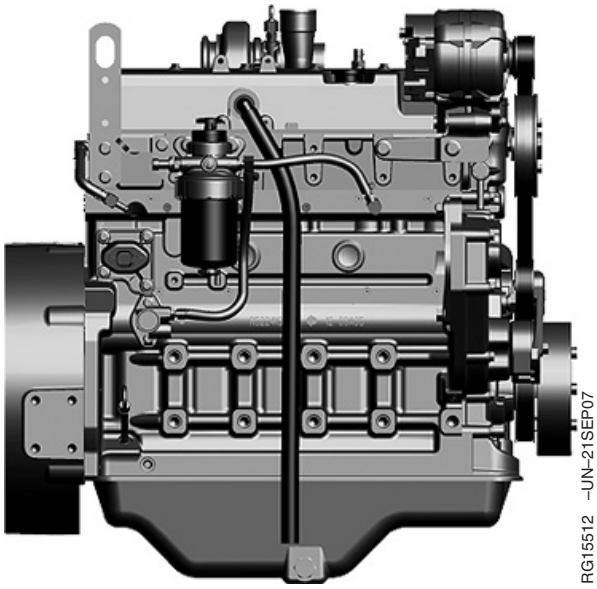
## POWERTECH E 2.4 L and 3.0 L Diesel Engines



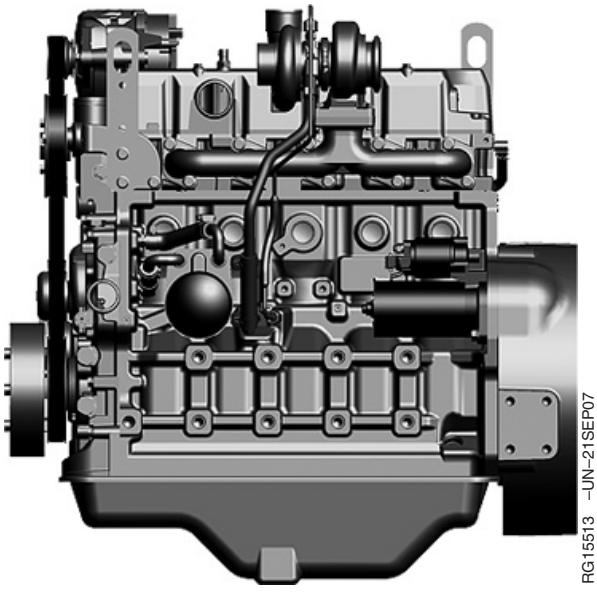

*2.4 L Right Side View*




*2.4 L Left Side View*




*3.0 L Right Side View*




*3.0 L Left Side View*

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

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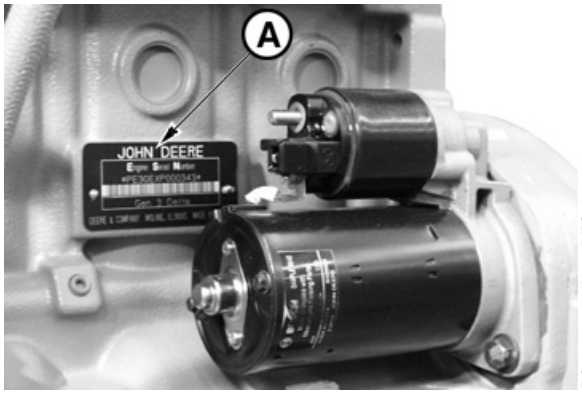
## Engine Serial Number Plate

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

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

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




*13-Digit Engine Serial Number Plate*

RG41183,0000025 –19–11DEC02–1/1

## Record Engine Serial Number

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

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

Engine Serial Number (B)

_____

Engine Model Number (C)

_____


*Engine Serial Number Plate*

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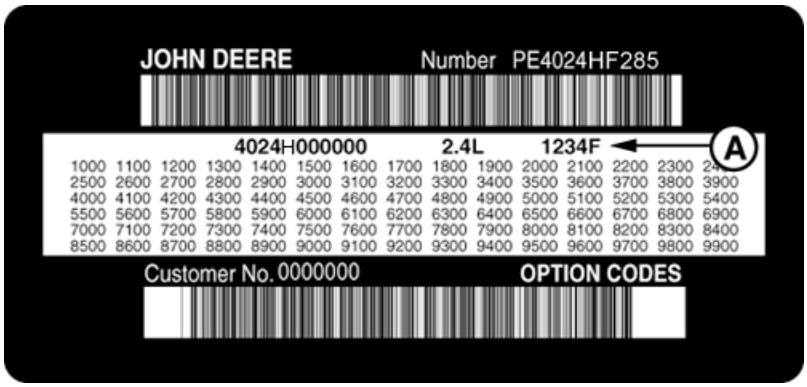
## Engine Option Codes




*Engine Option Codes*

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

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

The first two digits of each code identify a specific group, such as alternators. The last two digits of each code identify one specific option provided on your engine, such as a 12-volt, 70-amp alternator.

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

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

**Continued on next page**

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

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

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

| Option Codes | Description |
|---|---|
| 11 | Rocker Arm Cover |
| 12 | Oil Filler |
| 13 | Crankshaft Pulley |
| 14 | Flywheel Housing |
| 15 | Flywheel |
| 16 | Fuel Injection System |
| 17 | Air Inlet |
| 18 | Air Cleaner |
| 19 | Oil Pan |
| 20 | Coolant Pump |
| 21 | Thermostat Cover |
| 22 | Thermostat |
| 23 | Fan Drive |
| 24 | Fan Belt |
| 25 | Fan |
| 26 | Engine Coolant Heater |
| 27 | Radiator |
| 28 | Exhaust Manifold |
| 29 | Crankcase Vent System |
| 30 | Starter Motor |
| 31 | Alternator |
| 32 | Instrument Panel |
| 33 | Tachometer |
| 35 | Fuel Filter |
| 36 | Front Plate |
| 37 | Fuel Transfer Pump |
| 39 | Thermostat Housing |
| 40 | Oil Dipstick |
| 41 | Belt-Driven Front Auxiliary Drive |
| 43 | Starting Aids |
| 44 | Timing Gear Cover |
| 45 | Balancer Shafts |
| 46 | Cylinder Block and Camshaft |
| 47 | Crankshaft and Bearings |
| 48 | Connecting Rods and Pistons |
| 49 | Valve Actuating Mechanism |
| 50 | Oil Pump |

| Option Codes | Description |
|---|---|
| 51 | Cylinder Head With Valves |
| 52 | Auxiliary Gear Drive |
| 53 | Fuel Heater |
| 54 | Air Intake for Turbocharger |
| 55 | Shipping Stand |
| 56 | Paint Option |
| 57 | Coolant Pump Inlet |
| 59 | Oil Cooler |
| 60 | Alternator Fan Drive Pulley |
| 62 | Alternator Mounting |
| 63 | Low Pressure Fuel Line |
| 64 | Exhaust Elbow |
| 65 | Turbocharger |
| 66 | Coolant Temperature Switch |
| 67 | Speed Sensor |
| 68 | Crankshaft Rear Damper |
| 69 | Engine Serial Number Plate |
| 71 | Engine Oil Bypass Filter |
| 72 | ECU Electronic Software Option |
| 74 | Air Conditioning (Freon) Compressor |
| 75 | Air Restriction Indicator |
| 76 | Oil Pressure Switch |
| 77 | Timing Gear Cover |
| 78 | Air Compressor |
| 79 | Engine Certification |
| 81 | Primary Fuel Filter and Water Separator |
| 83 | Electronic Software (Vehicle Option) |
| 84 | Electrical Wiring Harness |
| 86 | Fan Pulley |
| 87 | Belt Tensioner |
| 88 | Oil Filter |
| 92 | Test Certificate |
| 95 | Special Equipment (Factory Installed) |
| 96 | Engine Installation Kit |
| 97 | Special Equipment (Field Installed) |
| 98 | Lift Straps for Engine |
| 99 | Service Only Parts and Kits |

_____ **Engine Base Code**

## Recognize Safety Information

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

Follow recommended precautions and safe operating practices.

T81389 –UN–07DEC88

DX,ALERT –19–29SEP98–1/1

## Understand Signal Words

A signal word—DANGER, WARNING, or CAUTION—is used with the safety-alert symbol. DANGER identifies the most serious hazards.

DANGER or WARNING safety signs are located near specific hazards. General precautions are listed on CAUTION safety signs. CAUTION also calls attention to safety messages in this manual.


TS187 –19–30SEP88

DX,SIGNAL –19–03MAR93–1/1

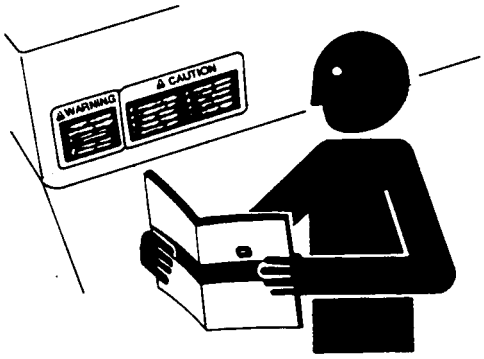
## Follow Safety Instructions

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

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

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

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

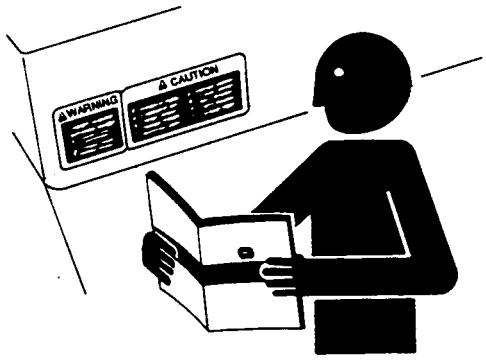



TS201 –UN–23AUG88

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.



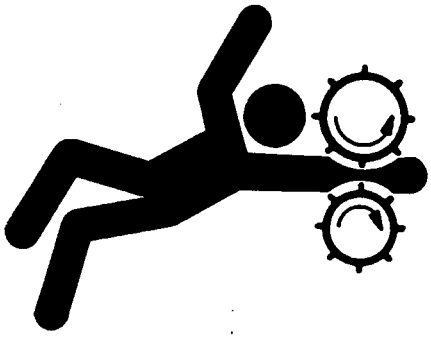

TS201 –UN–23AUG88

DX,SIGNS1 –19–04JUN90–1/1

## Service Machines Safely

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

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



TS228 –UN–23AUG88

DX,LOOSE –19–04JUN90–1/1

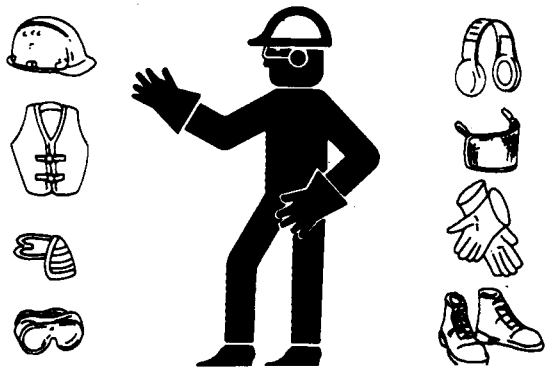
## Wear Protective Clothing

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

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

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

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



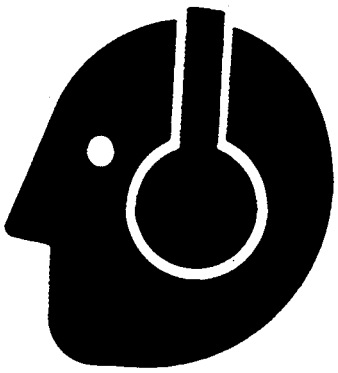
TS206 –UN–23AUG88

DX,WEAR –19–10SEP90–1/1

## Protect Against Noise

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

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



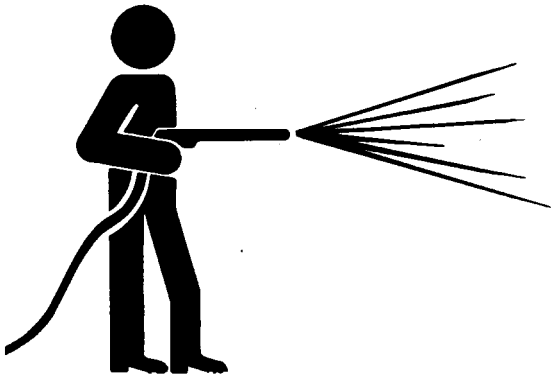
TS207 –UN–23AUG88

DX,NOISE –19–03MAR93–1/1

## Work in Clean Area

Before starting a job:

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



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DX,CLEAN –19–04JUN90–1/1

## Practice Safe Maintenance

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

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

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

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

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

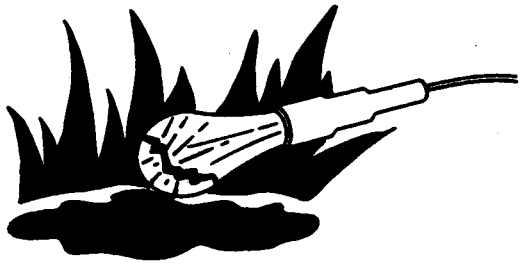
On towed implements, disconnect wiring harnesses from tractor before servicing electrical system components or welding on machine.

TS218 –UN–23AUG88

DX,SERV –19–17FEB99–1/1

## Illuminate Work Area Safely

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



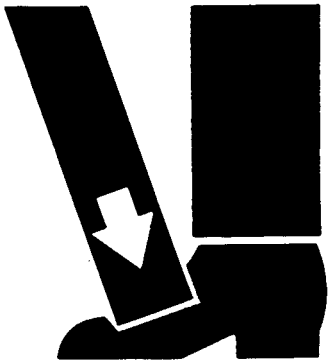
TS223 –UN–23AUG88

DX,LIGHT –19–04JUN90–1/1

## Use Proper Lifting Equipment

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

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



TS226 –UN–23AUG88

DX,LIFT –19–04JUN90–1/1

## Use Proper Tools

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

Use power tools only to loosen threaded parts and fasteners.

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

Use only service parts meeting John Deere specifications.

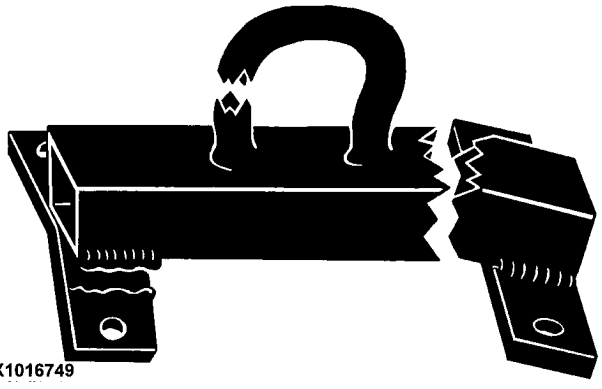
TS779 –UN–08NOV89

DX,REPAIR –19–17FEB99–1/1

## Construct Dealer-Made Tools Safely

Faulty or broken tools can result in serious injury. When constructing tools, use proper, quality materials, and good workmanship.

Do not weld tools unless you have the proper equipment and experience to perform the job.




LX1016749 –UN–01JUL97

DX,SAFE,TOOLS –19–10OCT97–1/1

## Prevent Machine Runaway

Avoid possible injury or death from machinery runaway.

Do not start engine by shorting across starter terminals. Machine will start in gear if normal circuitry is bypassed.

NEVER start engine while standing on ground. Start engine only from operator's seat, with transmission in neutral or park.

TS177 –UN–11JAN89

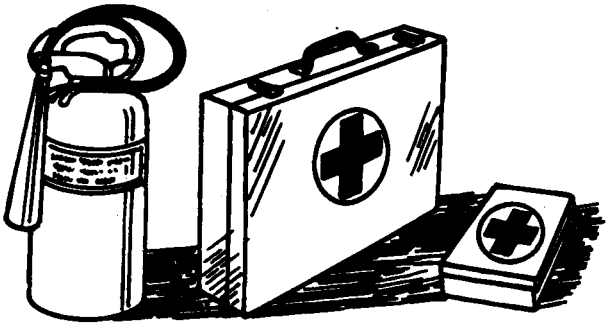
DX,BYPAS1 –19–29SEP98–1/1

## Prepare for Emergencies

Be prepared if a fire starts.

Keep a first aid kit and fire extinguisher handy.

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



TS291 –UN–23AUG88

DX,FIRE2 –19–03MAR93–1/1

## Handle Fuel Safely—Avoid Fires

Handle fuel with care: it is highly flammable. Do not refuel the machine while smoking or when near open flame or sparks.

Always stop engine before refueling machine. Fill fuel tank outdoors.

Prevent fires by keeping machine clean of accumulated trash, grease, and debris. Always clean up spilled fuel.

TS202 –UN–23AUG88

DX,FIRE1 –19–03MAR93–1/1

## DO NOT USE Starting Fluids

DO NOT USE any starting fluids with these glow plug - equipped engines as they could cause an extreme explosion with possible personal injury.

OUOD006,0000076 –19–15FEB07–1/1

## Handle Fluids Safely—Avoid Fires

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

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

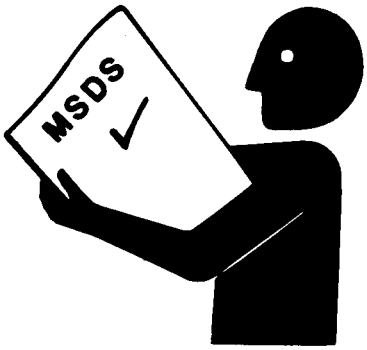
Make sure machine is clean of trash, grease, and debris.

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

TS227 –UN–23AUG88

DX,FLAME –19–29SEP98–1/1

## Handle Chemical Products Safely




TS1132 –UN–26NOV90

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.

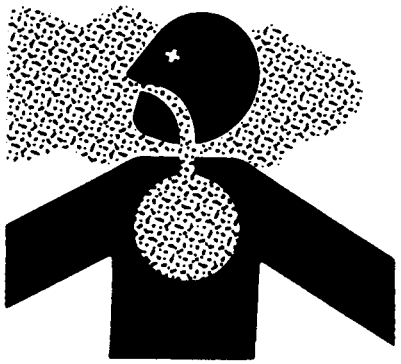
A Material Safety Data Sheet (MSDS) provides specific details on chemical products: physical and health hazards, safety procedures, and emergency response techniques.

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.)

DX,MSDS,NA –19–03MAR93–1/1

## Handle Agricultural Chemicals Safely



TS220 –UN–23AUG88

A34471

A34471 –UN–11OCT88

Chemicals used in agricultural applications such as fungicides, herbicides, insecticides, pesticides, rodenticides, and fertilizers can be harmful to your health or the environment if not used carefully.

Always follow all label directions for effective, safe, and legal use of agricultural chemicals.

Reduce risk of exposure and injury:

- Wear appropriate personal protective equipment as recommended by the manufacturer. In the absence of manufacturer's instructions, follow these general guidelines:
  - Chemicals labeled **'Danger'**: Most toxic. Generally require use of goggles, respirator, gloves, and skin protection.
  - Chemicals labeled **'Warning'**: Less toxic. Generally require use of goggles, gloves, and skin protections.
  - Chemicals labeled **'Caution'**: Least toxic. Generally require use of gloves and skin protection.
- Avoid inhaling spray or dusts.
- Always have soap, water, and towel available when working with chemicals. If chemical contacts skin, hands, or face, wash immediately with soap and water. If chemical gets into eyes, flush immediately with water.
- Wash hands and face after using chemicals and before eating, drinking, smoking, or urination.
- Do not smoke or eat while applying chemicals.
- After handling chemicals, always bathe or shower and change clothes. Wash clothing before wearing again.
- Seek medical attention immediately if illness occurs during or shortly after use of chemicals.
- Keep chemicals in original containers. Do not transfer chemicals to unmarked containers or to containers used for food or drink.
- Store chemicals in a secure, locked area way from human or livestock food. Keep children away.
- Always dispose of containers properly. Triple rinse empty containers and puncture or crush containers and dispose of properly.

DX,WW,CHEM01 –19–05APR04–1/1

## Stay Clear of Rotating Drivelines

Entanglement in rotating driveline can cause serious injury or death.

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

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

TS1644 –UN–22AUG95

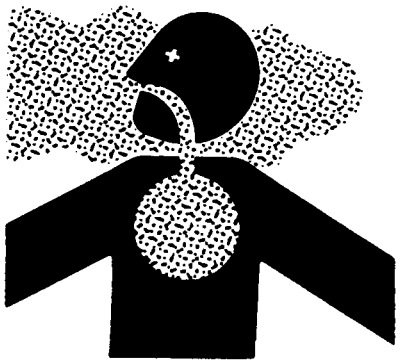
*Rotating Drivelines*

OUO1004,0000BD8 –19–15OCT07–1/1

## Work In Ventilated Area

Engine exhaust fumes can cause sickness or death. If it is necessary to run an engine in an enclosed area, remove the exhaust fumes from the area with an exhaust pipe extension.

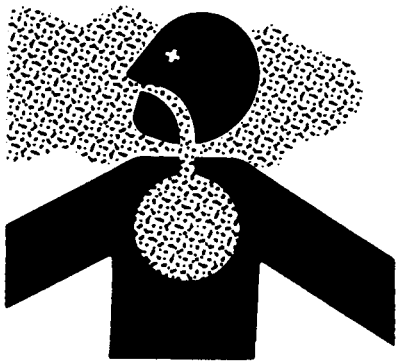
If you do not have an exhaust pipe extension, open the doors and get outside air into the area.



TS220 –UN–23AUG88

DX,AIR –19–17FEB99–1/1

## Avoid Harmful Asbestos Dust



TS220 –UN–23AUG88

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

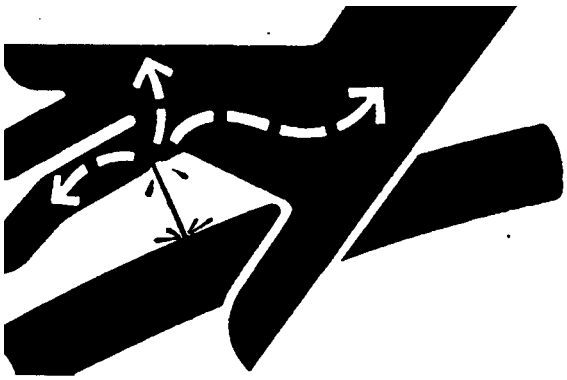
Components in products that may contain asbestos fibers are brake pads, brake band and lining assemblies, clutch plates, and some gaskets. The asbestos used in these components is usually found in a resin or sealed in some way. Normal handling is not hazardous as long as airborne dust containing asbestos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

DX,DUST –19–15MAR91–1/1

## Avoid High-Pressure Fluids



X9811 –UN–23AUG88

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.

DX,FLUID –19–03MAR93–1/1

## Protect Against High Pressure Spray

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

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

TS1343 –UN–18MAR92

DX,SPRAY –19–16APR92–1/1

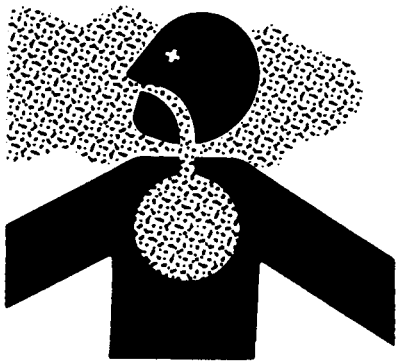
## Avoid Heating Near Pressurized Fluid Lines

Flammable spray can be generated by heating near pressurized fluid lines, resulting in severe burns to yourself and bystanders. Do not heat by welding, soldering, or using a torch near pressurized fluid lines or other flammable materials. Pressurized lines can accidentally burst when heat goes beyond the immediate flame area.

TS953 –UN–15MAY90

DX,TORCH –19–10DEC04–1/1

## Remove Paint Before Welding or Heating



TS220 –UN–23AUG88

Avoid potentially toxic fumes and dust.

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

Remove paint before heating:

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

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

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

Dispose of paint and solvent properly.

DX,PAINT –19–24JUL02–1/1

## Service Cooling System Safely

TS281 –UN–23AUG88

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

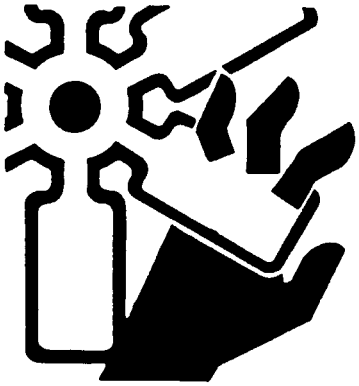
Shut off engine. Only remove filler cap when cool enough to touch with bare hands. Slowly loosen cap to first stop to relieve pressure before removing completely.

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.



TS677 –UN–21SEP89

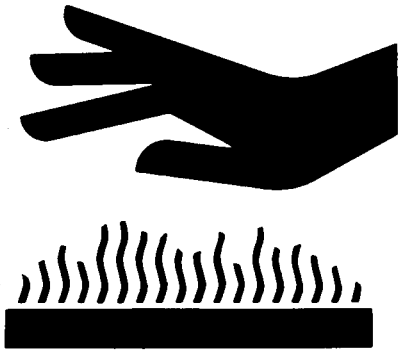
*Rotating Fan*

OUOD006,000009D –19–23JAN07–1/1

## Avoid Hot Parts

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

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



TS271 –UN–23AUG88

*Hot Surface*

OURGP12,0000135 –19–15OCT07–1/1

## Prevent Battery Explosions

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

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

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

TS204 –UN–23AUG88

DX,SPARKS –19–03MAR93–1/1

## Handling Batteries Safely

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

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

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

TS204 –UN–23AUG88

*Explosion*

**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:**

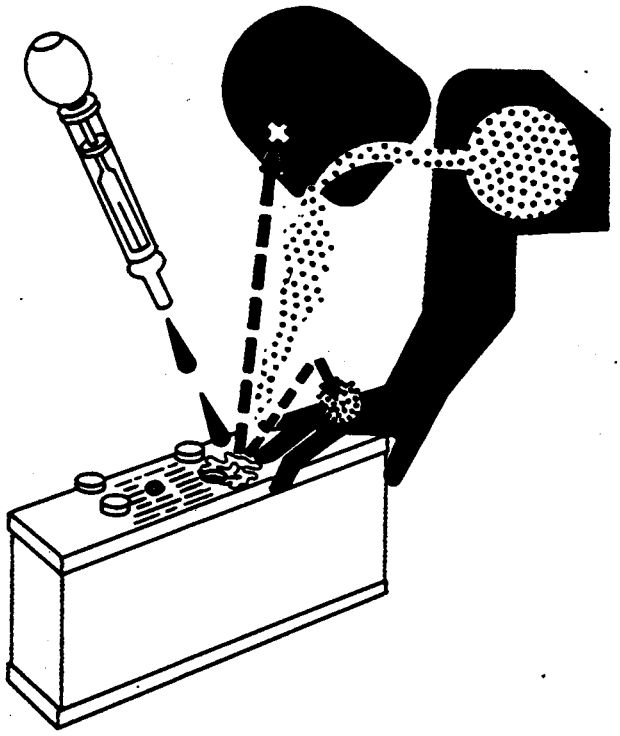
1. **Filling batteries in a well-ventilated area.**
2. **Wearing eye protection and rubber gloves.**
3. **Avoiding breathing fumes when electrolyte is added.**
4. **Avoiding spilling or dripping electrolyte.**
5. **Using proper jump start procedure.**

**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.**



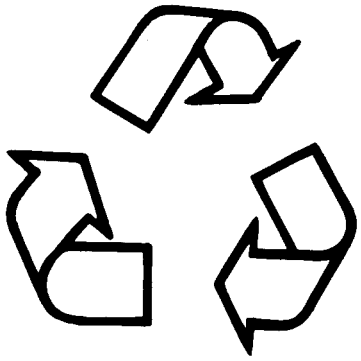
TS203 –UN–23AUG88

*Acid*

**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.**

DPSG,OUO1004,2758 –19–15OCT07–1/1

## Dispose of Waste Properly



TS1133 –UN–26NOV90

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.

DX,DRAIN –19–03MAR93–1/1

## Diesel Fuel

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

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

Diesel fuels specified to EN 590 or ASTM D975 are recommended. Renewable diesel is basically identical to petroleum diesel fuel that is created by Hydrotreating fats and oils. Renewable diesel that meets EN 590 or ASTM D975 is acceptable for use at all percentage mixture levels.

**Required fuel properties**

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

**Cetane number of 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) should be at least 5°C (9°F) below the expected lowest temperature or **Cloud Point** below the expected lowest ambient temperature.

**Fuel lubricity** should pass a maximum scar diameter of 0.45 mm as measured by ASTM D6079 or ISO 12156-1.

**Sulfur content:**

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

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

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

DX,FUEL1 –19–05OCT07–1/1

## Lubricity of Diesel Fuel

Most diesel fuels manufactured in the United States, Canada, and the European Union have adequate lubricity to ensure proper operation and durability of fuel injection system components. However, diesel fuels manufactured in some areas of the world may lack the necessary lubricity.

**IMPORTANT: Make sure the diesel fuel used in your machine demonstrates good lubricity characteristics.**

Fuel lubricity should pass a maximum scar diameter of 0.45 mm as measured by ASTM D6079 or ISO 12156-1.

If fuel of low or unknown lubricity is used, add John Deere PREMIUM DIESEL FUEL CONDITIONER (or equivalent) at the specified concentration.

**Lubricity of Biodiesel Fuel**

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

DX,FUEL5 –19–05OCT07–1/1

## Handling and Storing Diesel Fuel

**CAUTION: Handle fuel carefully. Do not fill the fuel tank when engine is running.**

**DO NOT smoke while you fill the fuel tank or service the fuel system.**

Fill the fuel tank at the end of each day's operation to prevent water condensation and freezing during cold weather.

Keep all storage tanks as full as practicable to minimize condensation.

Ensure that all fuel tank caps and covers are installed properly to prevent moisture from entering.

Monitor water content of the fuel regularly.

When using bio-diesel fuel, the fuel filter may require more frequent replacement due to premature plugging.

Check engine oil level daily prior to starting engine. A rising oil level may indicate fuel dilution of the engine oil.

**IMPORTANT: The fuel tank is vented through the filler cap. If a new filler cap is required, always replace it with an original vented cap.**

When fuel is stored for an extended period or if there is a slow turnover of fuel, add a fuel conditioner to stabilize the fuel and prevent water condensation. Contact your fuel supplier for recommendations.

DX,FUEL4 –19–19DEC03–1/1

## Testing Diesel Fuel

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

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

*DIESELSCAN is a trademark of Deere & Company*

DX,FUEL6 –19–14NOV05–1/1

## Bio-Diesel Fuel

Biodiesel is a fuel comprised of mono-alkyl esters of long chain fatty acids derived from vegetable oils or animal fats. Biodiesel blends are biodiesel mixed with petroleum diesel fuel on a volume basis.

Biodiesel users in the U.S. are strongly encouraged to purchase biodiesel blends from a BQ-9000 Certified Marketer and sourced from a BQ-9000 Accredited Producer (as certified by the National Biodiesel Board). Certified Marketers and Accredited Producers can be found at the following website: http://www.bq-9000.org.

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

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

John Deere engines can also operate on biodiesel blends above B20 (up to 100% biodiesel) ONLY if the biodiesel meets the EN 14214 specification (primarily available in Europe). Engines operating on biodiesel blends above B20 may not fully comply with all applicable emissions regulations. Expect up to a 12% reduction in power and an 18% reduction in fuel economy when using 100% biodiesel. John Deere approved fuel conditioners containing detergent/dispersant additives are required.

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

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

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

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

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

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

- Cold weather flow degradation
- Stability and storage issues (moisture absorption, oxidation, microbial growth)
- Possible filter restriction and plugging (usually a problem when first switching to biodiesel on used engines.)
- Possible fuel leakage through seals and hoses
- Possible reduction of service life of engine components

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

- Possible coking and/or blocked injector nozzles, resulting in power loss and engine misfire if John Deere approved fuel conditioners containing detergent/dispersant additives are not used
- Possible crankcase oil dilution, requiring more frequent oil changes
- Possible corrosion of fuel injection equipment
- Possible lacquering and/or seizure of internal components
- Possible formation of sludge and sediments
- Possible thermal oxidation of fuel at elevated temperatures
- Possible elastomer seal and gasket material degradation ( primarily an issue with older engines)

**Continued on next page**

- Possible compatibility issues with other materials (including copper, lead, zinc, tin, brass, and bronze) used in fuel systems and fuel handling equipment
- •Possible reduction in water separator efficiency
- •Potential high acid levels within fuel system
- •Possible damage to paint if exposed to biodiesel

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

DX,FUEL7 –19–04OCT07–2/2

## Aviation (Jet) Fuels

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

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

OURGP12,000003F –19–07JUL04–1/1

## Burner Fuels

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

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

OURGP12,0000040 –19–07JUL04–1/1

## Minimizing the Effect of Cold Weather on Diesel Engines

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

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

**Use Winter Blend Diesel Fuel**

When temperatures fall below -10°C (14°F), winter blend diesel fuel is best suited for cold weather operation. Winter blend diesel fuel has a lower cloud point and a lower pour point.

**Cloud point** is the temperature at which wax will begin to form in the fuel and this wax causes fuel filters to plug. **Pour point** is the lowest temperature at which movement of the fuel is observed.

*NOTE: On an average, winter blend diesel fuel has a lower BTU (heat content) rating. Using winter blend diesel fuel may reduce power and fuel efficiency, but should not cause any other engine performance effects. Check the grade of fuel being used before troubleshooting for low power complaints in cold weather operation.*

**CAUTION: Do not use ether when starting these engines. They are equipped with glow plugs.**

**Coolant Heater**

An engine block heater (coolant heater) is an available option to aid cold weather starting.

**Seasonal Viscosity Oil and Proper Coolant Concentration**

Use seasonal grade viscosity engine oil based on the expected air temperature range between oil changes and a proper concentration of low silicate antifreeze as recommended. (See DIESEL ENGINE OIL and ENGINE COOLANT requirements this section.)

**Diesel Fuel Flow Additive**

Use John Deere Premium Diesel Fuel Conditioner (winter formula) which contains anti-gel chemistry, or equivalent to treat Grade No.2-D fuel during the cold weather season. This generally extends operability about 10°C (18°F) below its Cloud Point. For operability at temperatures further below, winter grade fuel (a blend of No.2-D and No.1-D, or straight No.1-D fuel) is best suited for cold weather operation.

**IMPORTANT: Treat fuel when outside temperature drops below 0°C (32°F). For best results, use with untreated fuel. Follow all recommended instructions on label.**

**Biodiesel**

When running with BIODIESEL blends wax formation can generate at warmer temperatures. Begin to use John Deere Premium Biodiesel Conditioner (winter) at 5°C (40°F) to treat biodiesel fuels during the cold weather season. Below 0°C (32°F) John Deere requires the use of B5 or lower blends. Below -10°C (14°F) John Deere requires the use of winter blend diesel fuel.

**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.

Continued on next page

If winterfronts are used, they should never totally close off the grill frontal area. Approximately 25% area in the center of the grill should remain open at all times. At no time should the air blockage device be applied directly to the radiator core.

**Radiator Shutters**

If equipped with a thermostatically controlled radiator shutter system, this system should be regulated in such a way that the shutters are completely open by the time the coolant reaches 93°C (200°F) to prevent excessive intake manifold temperatures. Manually controlled systems are not recommended.

If air-to-air aftercooling is used, the shutters must be completely open by the time the intake manifold air temperature reaches the maximum allowable temperature out of the charge air cooler.

For more information, see your John Deere dealer.

OUOD006,000011E –19–26OCT07–2/2

## 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 E7
- ACEA Oil Sequence E6

Extended service intervals may apply when John Deere PLUS-50™, ACEA E7, or ACEA E6 engine oils are used. Consult your John Deere dealer for more information.

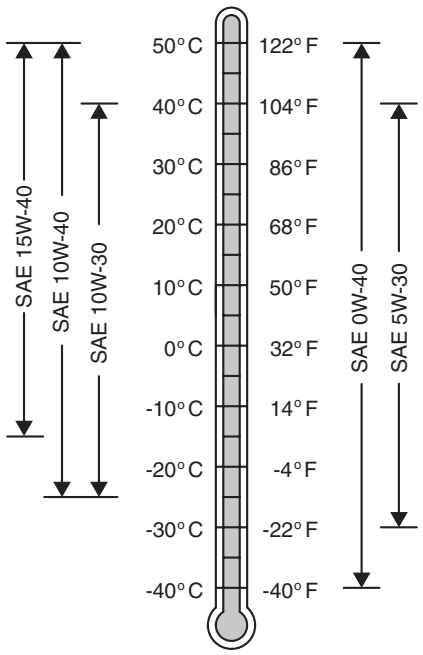
Other oils may be used if they meet one or more of the following:

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

**Multi-viscosity diesel engine oils are preferred.**

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

DO NOT use diesel fuel with sulfur content greater than 1.0% (10 000 ppm).




*Oil Viscosities for Air Temperature Ranges*

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

DX,ENOIL11 –19–26JUL07–1/1

## Diesel Engine Oil and Filter Service Intervals

The oil and filter service intervals in the table below should be used as guidelines. Actual service intervals also depend on operation and maintenance practices. It is suggested to use oil analysis to determine the actual useful life of the oil and to aid in selection of the proper oil and filter service interval.

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

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

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

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

**Oil types** (premium or standard) in the table include:

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

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

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

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

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

**Using Charts to Find Oil and Filter Service Interval**

1. Determine your engine power rating and find it in the left column of chart.
2. Locate your engine oil pan option code (19__) on engine label.
3. In the chart column under your oil pan code, select whether you use premium oil (PLUS-50™, ACEA 7 or ACEA 6) or standard grade oil.
4. Determine the sulfur content of your diesel fuel.
5. Now you can find the proper oil and filter change interval by lining up your power level and fuel sulfur content with oil pan/oil type column. The number indicates how frequently your oil and filter should be changed.

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

**Continued on next page**

**Example:**

- Engine Power - 60 kW (80 hp)
- Oil Pan Code - 1902
- Oil Type - Premium
- Oil Filter - John Deere approved
- Fuel Sulfur Level - 0.10-0.20 (1000-2000 ppm)

In the left column of the chart, find 60 kW Power Rating, and select the line for 0.10-0.20 “Fuel Sulfur Content”. Move across to column for 1902 “oil pan option code”, select “Prem Oil” and read **500** hour oil change interval.

| Engine Oil and Filter Service Intervals in Hours of Operation | | | | | | | |
|---|---|---|---|---|---|---|---|
| | | Oil Pan Option Codes | | | | | |
| **Power Rating** | **Fuel Sulfur Content** | **2.4L Engines 1901, 1909, 1911, 1912** | | **2.4L Engines 1921, 1924, 1925, 1925** | | **3.0L Engines 1902, 1910, 1913, 1914** | |
| | | **Interval** | | **Interval** | | **Interval** | |
| **kW (hp)** | | **Std Oil** | **Prem Oil** | **Std Oil** | **Prem Oil** | **Std Oil** | **Prem Oil** |
| **68-74 (91-99)** | Less Than 0.10% (1000 ppm) | 250 | 375 | 250 | 375 | 250 | 500 |
| | 0.10% - 0.20% (1000 - 2000 ppm) | 200 | 300 | 200 | 300 | 250 | 500 |
| | 0.20% - 0.50% (2000 - 5000 ppm) | 150 | 275 | 150 | 275 | 250 | 500 |
| | 0.50% - 1.00% (5000 - 10,000 ppm) | 125 | 187 | 125 | 187 | 125 | 250 |
| **60-65 (80-87)** | Less Than 0.10% (1000 ppm) | 250 | 500 | 250 | 500 | 250 | 500 |
| | 0.10% - 0.20% (1000 - 2000 ppm) | 200 | 400 | 200 | 400 | 250 | 500 |
| | 0.20% - 0.50% (2000 - 5000 ppm) | 175 | 350 | 175 | 350 | 250 | 500 |
| | 0.50% - 1.00% (5000 - 10,000 ppm) | 125 | 250 | 125 | 250 | 125 | 250 |
| **45-57 (60-76)** | Less Than 0.10% (1000 ppm) | 250 | 500 | 250 | 500 | 250 | 500 |
| | 0.10% - 0.20% (1000 - 2000 ppm) | 250 | 500 | 250 | 500 | 250 | 500 |
| | 0.20% - 0.50% (2000 - 5000 ppm) | 250 | 500 | 250 | 500 | 250 | 500 |
| | 0.50% - 1.00% (5000 - 10,000 ppm) | 125 | 250 | 125 | 250 | 125 | 250 |
| Use of premium oil also requires use of an approved John Deere oil filter. | | | | | | | |

OUOD006,00000FE –19–04OCT07–2/2

## 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

## 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.

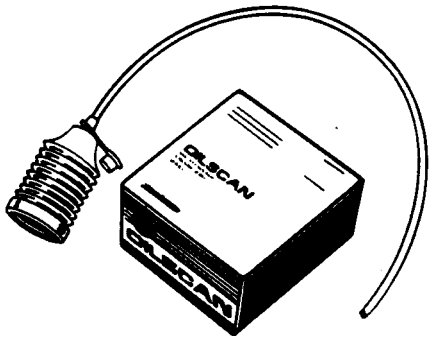
DX,FILT –19–18MAR96–1/1

## OILSCAN™and COOLSCAN™

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

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

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

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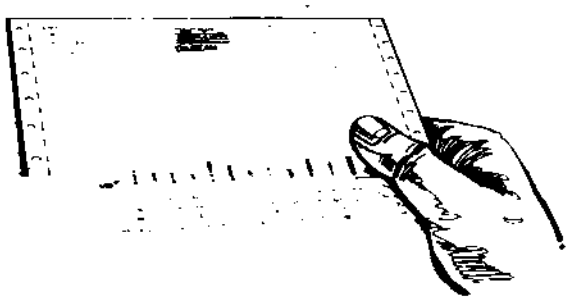

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*COOLSCAN is a trademark of Deere & Company.*

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

## Grease

Use grease based on NLGI consistency numbers and the expected air temperature range during the service interval.

**John Deere SD POLYUREA GREASE is preferred.**

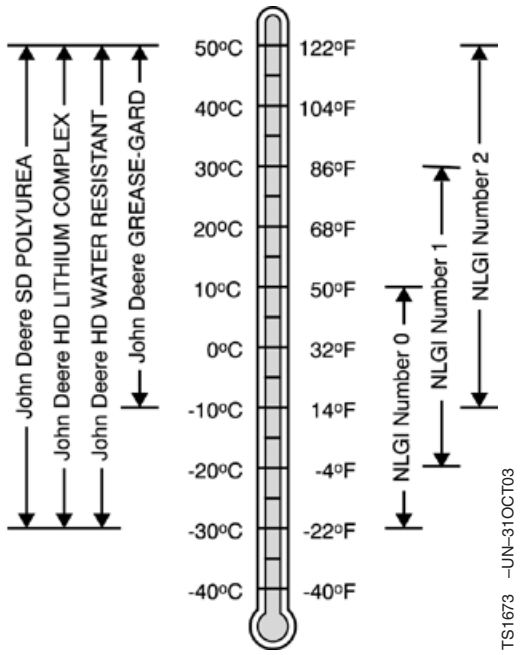
The following greases are also recommended

- John Deere HD LITHIUM COMPLEX GREASE
- John Deere HD WATER RESISTANT GREASE
- John Deere GREASE-GARD™

Other greases may be used if they meet the following:

NLGI Performance Classification GC-LB

**IMPORTANT: Some types of grease thickeners are not compatible with others. Consult your grease supplier before mixing different types of grease.**




*GREASE-GARD is a trademark of Deere & Company*

DX,GREA1 –19–07NOV03–1/1

## 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**

It is possible that neither John Deere COOL-GARD nor coolants meeting one of the coolant standards listed above is available in the geographical area where service is performed. If these coolants are unavailable, use a coolant concentrate or prediluted coolant with a quality additive package that provides cylinder liner cavitation protection and protects the cooling system metals (cast iron, aluminum alloys, and copper alloys such as brass) from corrosion.

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

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

**Water quality**



**Continued on next page**

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 –19–27OCT05–2/2

## 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.

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Continued on next page

| 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

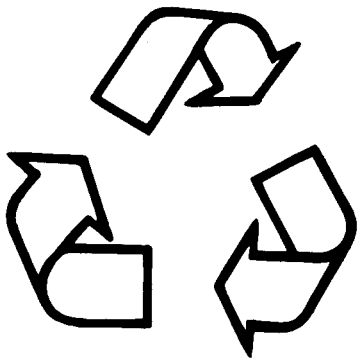
## Disposing of Coolant

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.



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*Recycle Waste*

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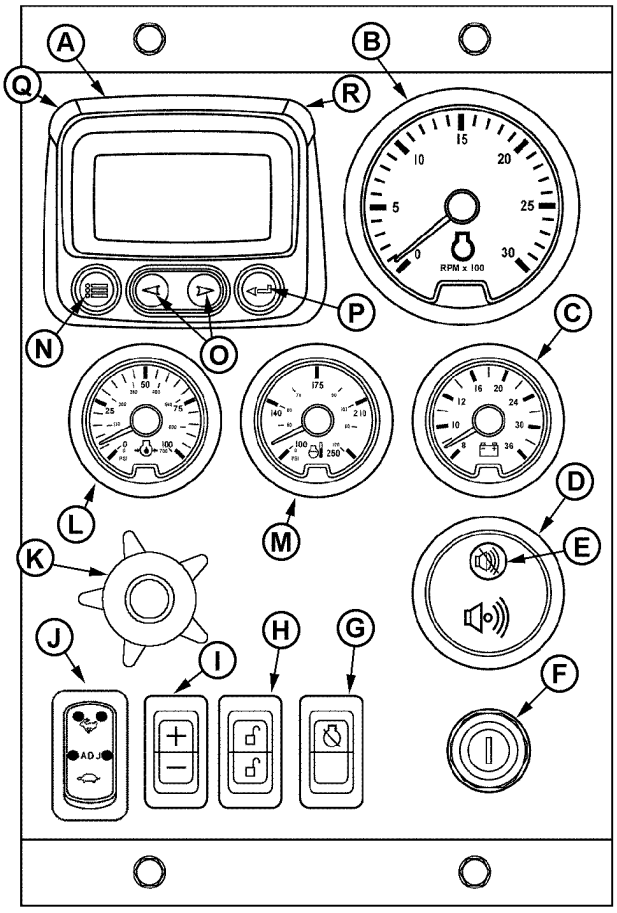
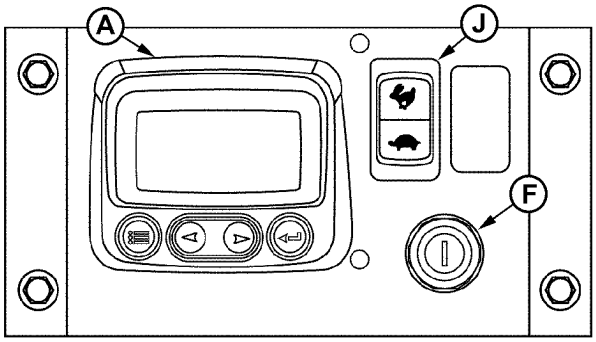
## Instrument Panels




RG13276 –UN–28OCT03

*Full-Featured Instrument Panel*

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*Basic Instrument Panel*

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

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

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



**Continued on next page**

**Instrument Panel (Continued)**

**A—Diagnostic Gauge/Hour Meter**

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

**B—Tachometer**

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

**C—Voltmeter (Optional)**

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.

**Continued on next page**

**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.

## Using Diagnostic Gauge to Access Engine Information

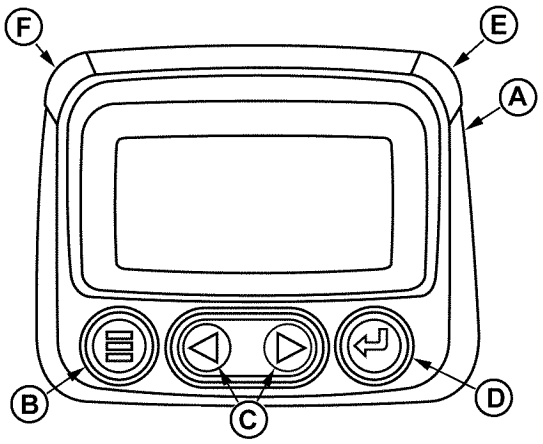
The diagnostic gauge (A) allows the operator to view many readouts of engine functions and trouble codes (DTCs). The gauge is linked to the electronic control system and its sensors. This allows the operator to monitor engine functions and to troubleshoot the engine systems when needed.

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
- Current fuel consumption
- Active service (diagnostic) codes
- Stored service (diagnostic) codes from the engine
- Set the units for display
- View the engine configuration parameters

*NOTE: Engine parameters which can be accessed will vary with the engine application. Six languages for readouts are available and can be selected during setup of gauge.*

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.




RG13132 –UN–09SEP03

*Diagnostic Gauge (Later Engines)*

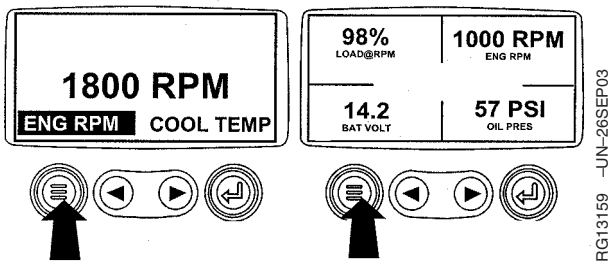
**A—Diagnostic Gauge**
**B—Menu Key**
**C—Arrow Keys**
**D—Enter Key**
**E—Red "STOP ENGINE" Indicator Light**
**F—Amber "WARNING" Indicator Light**

OURGP11,0000074 –19–31JAN06–1/1

## Main Menu Navigation

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

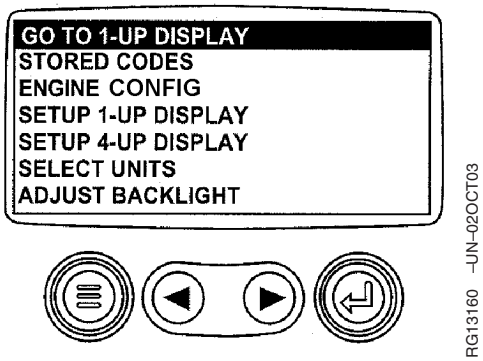
1. Turn the key switch to the ON position. Starting at the single or four engine parameter display, press the "Menu" key.




*Menu Key*

OURGP11,00000A9 –19–03SEP03–1/5

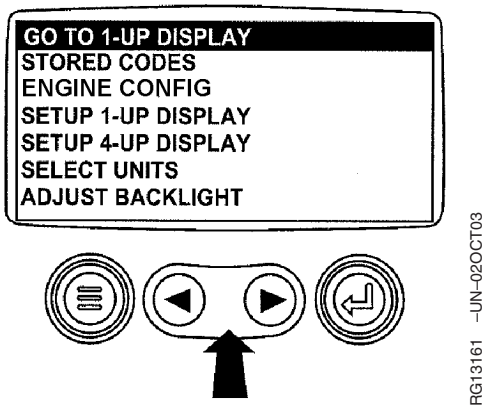
2. The first seven items of the "Main Menu" will be displayed.




*Menu Display*

OURGP11,00000A9 –19–03SEP03–2/5

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

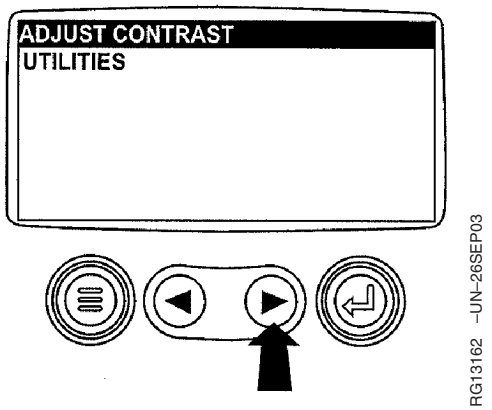



*Main Menu Items*

**Continued on next page**

OURGP11,00000A9 –19–03SEP03–3/5

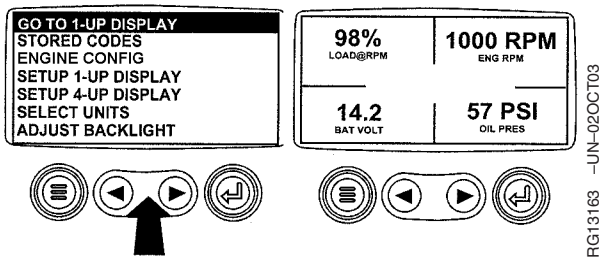
4. Pressing the right arrow key will scroll down to reveal the last items of "Main Menu" screen, highlighting the next item down.




*Last Items On Main Menu*

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*

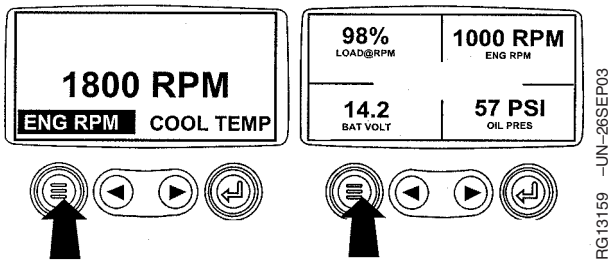
OURGP11,00000A9 –19–03SEP03–5/5

## 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.*

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

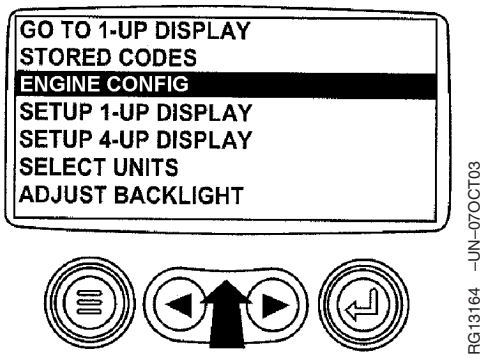



*Menu Key*

Continued on next page

OURGP11,00000AB –19–03SEP03–1/6

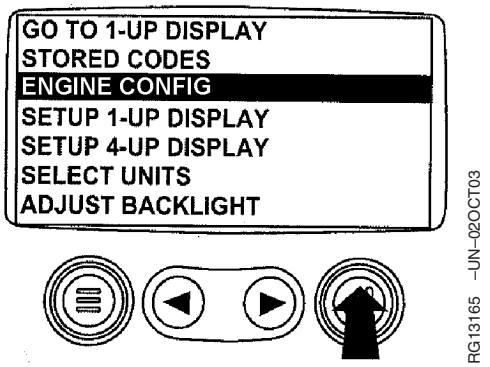
2. The main menu will be displayed. Use the "Arrow" keys to scroll through the menu until "Engine Config" is highlighted.




*Select Engine Configuration*

OURGP11,00000AB –19–03SEP03–2/6

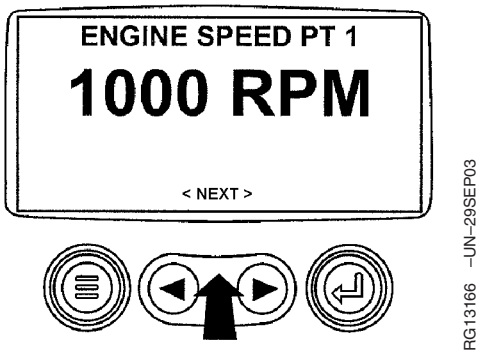
3. Once "Engine Config" menu item has been highlighted, press the "Enter" key to view the engine configuration data.




*Enter Key*

OURGP11,00000AB –19–03SEP03–3/6

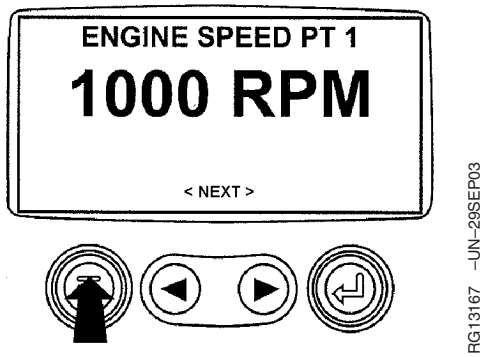
4. Use the "Arrow" keys to scroll through the engine configuration data.




*Use Arrow Keys To Scroll*

OURGP11,00000AB –19–03SEP03–4/6

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

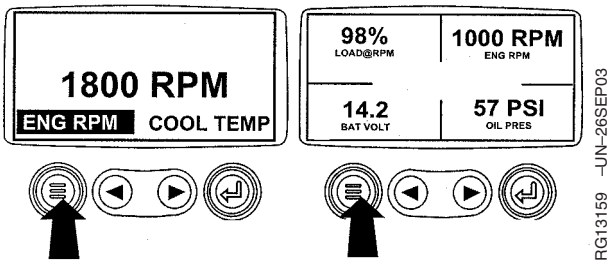



*Return To Main Menu*

**Continued on next page**

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*

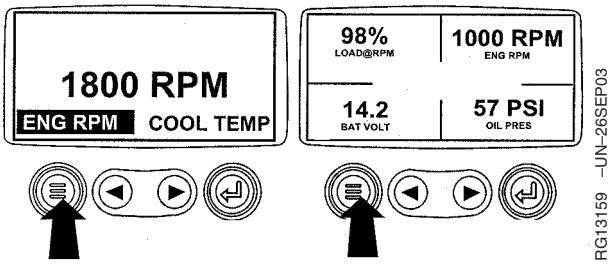
OURGP11,00000AB –19–03SEP03–6/6

## 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.*

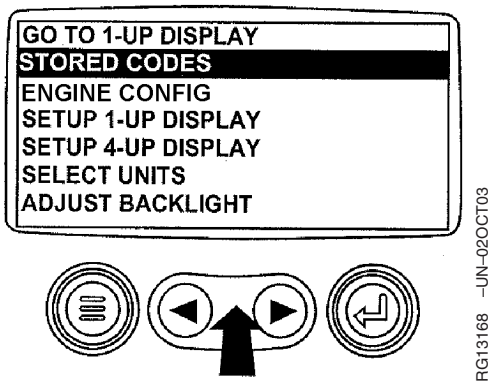
1. Turn the key switch to the ON position. Starting at the single or four engine parameter display, press the "Menu" key.




*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.

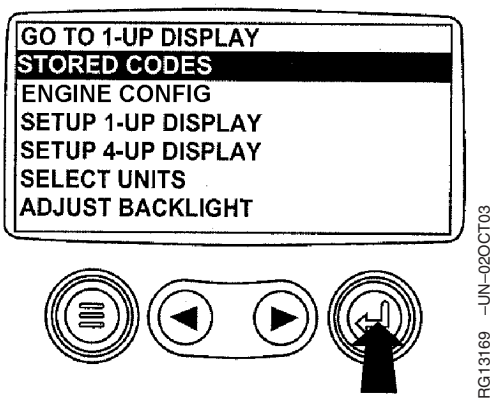



*Select Stored Codes*

**Continued on next page**

OURGP11,00000AC –19–03SEP03–2/6

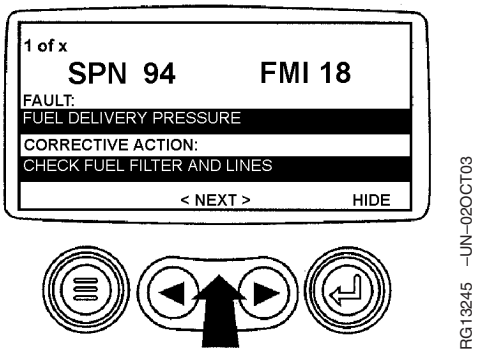
3. Once the "Stored Codes" menu item has been highlighted press the "Enter" key to view the stored codes.




*Enter Key*

OURGP11,00000AC –19–03SEP03–3/6

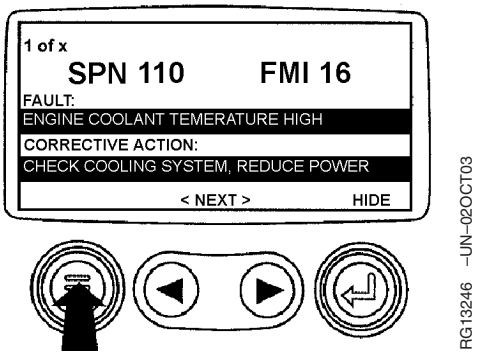
4. If the word "Next" appears above the "Arrow" keys, there are more stored codes that may be viewed. Use the "Arrow" key to scroll to the next stored code.




*Use Arrow Keys To Scroll*

OURGP11,00000AC –19–03SEP03–4/6

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

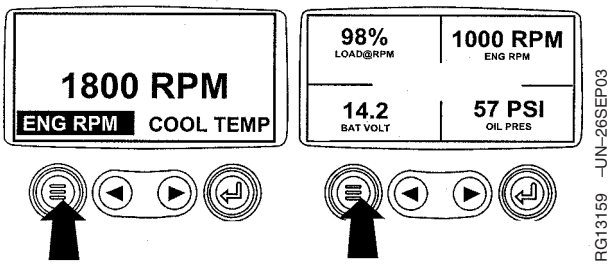



*Return To Main Menu*

**Continued on next page**

OURGP11,00000AC –19–03SEP03–5/6

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




*Exit Main Menu*

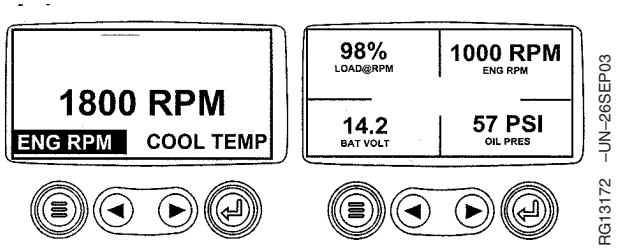
OURGP11,00000AC –19–03SEP03–6/6

## 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.

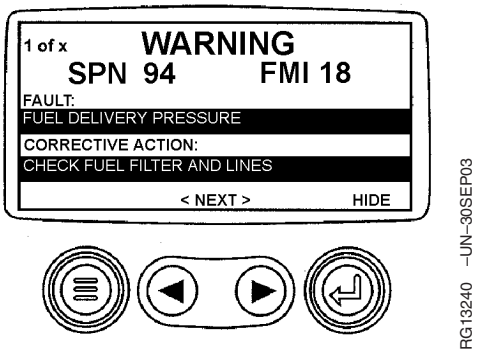



*Normal Operation*

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.**

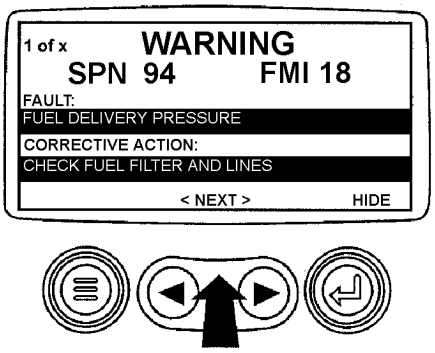



*Active Trouble Codes Displayed*

**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.

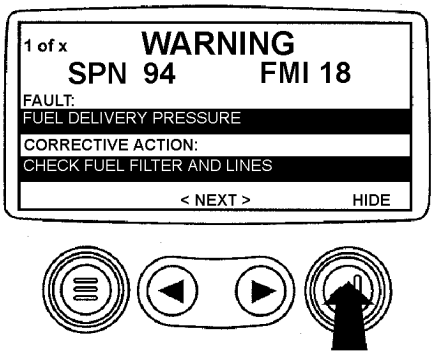



*Use Arrow Keys To Scroll*

OURGP11,00000AD –19–03SEP03–3/7

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

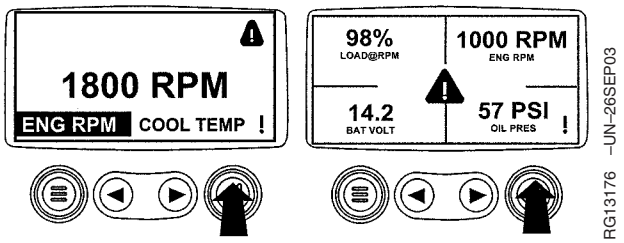
4. To acknowledge and hide the code and return to the single or four parameter display, press the "Enter" Key.




*Hide Trouble Codes*

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.

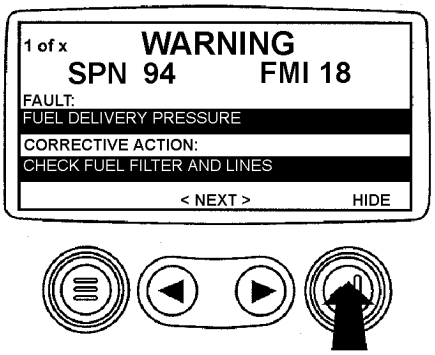



*Active Trouble Code Icon*

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.

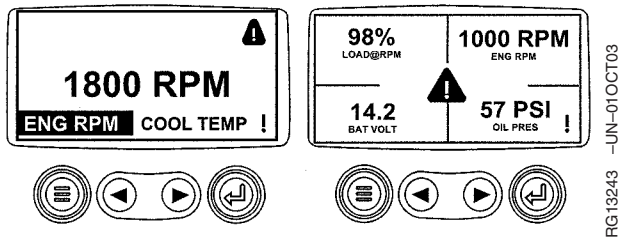



*Enter Key*

**Continued on next page**

OURGP11,00000AD –19–03SEP03–6/7

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

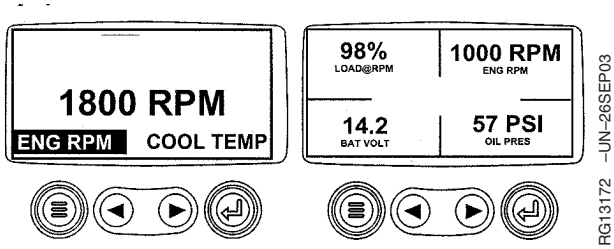



*Active Trouble Code Condition*

OURGP11,00000AD –19–03SEP03–7/7

## Engine Shutdown Codes

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

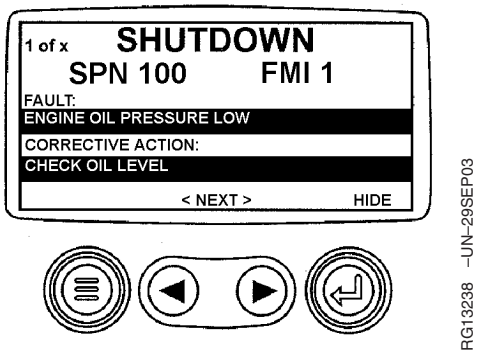



*Normal Operation*

OURGP11,00000AE –19–03SEP03–1/6

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

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

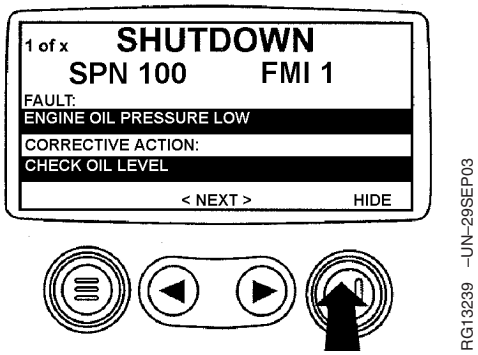



*Shutdown Message*

OURGP11,00000AE –19–03SEP03–2/6

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

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



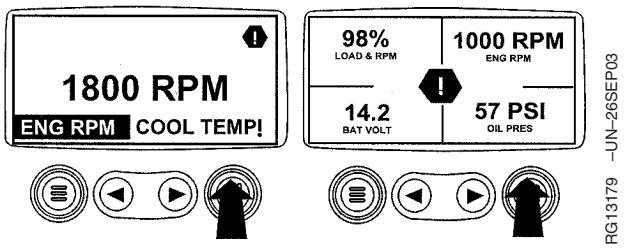

*Hide Trouble Code*

**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.

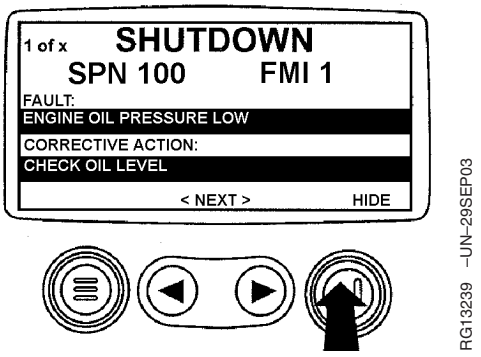
**IMPORTANT: Ignoring the shutdown message can result in severe engine damage.**




*Flashing Shutdown Icon*

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.

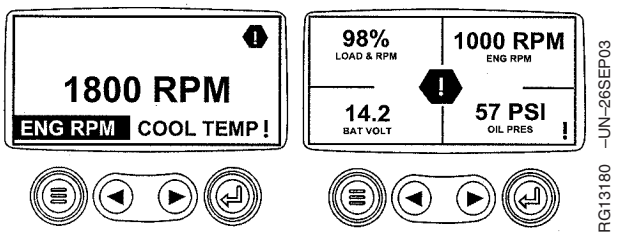



*Redisplay Trouble Code*

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.**

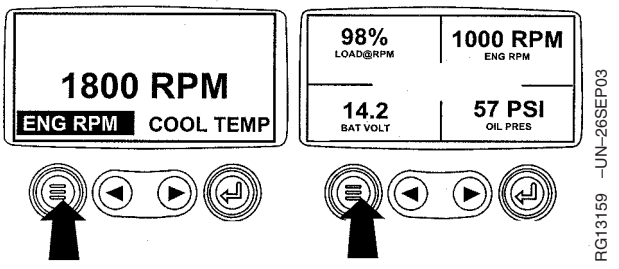



*Shutdown Icon*

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.

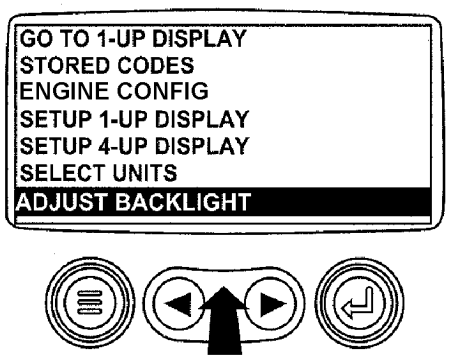



*Menu Key*

**Continued on next page**

OURGP11,0000237 –19–21OCT03–1/6

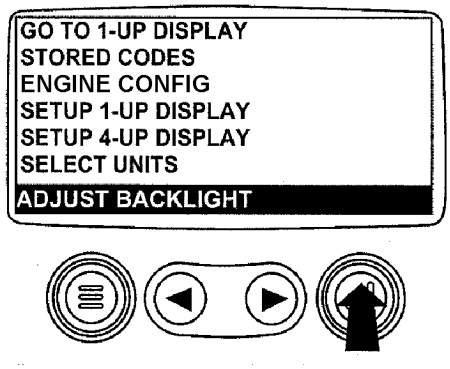
2. The main menu will be displayed. Use the "Arrow" keys to scroll through the menu until "Adjust Backlight" is highlighted.




*Select Adjust Backlight*

OURGP11,0000237 –19–21OCT03–2/6

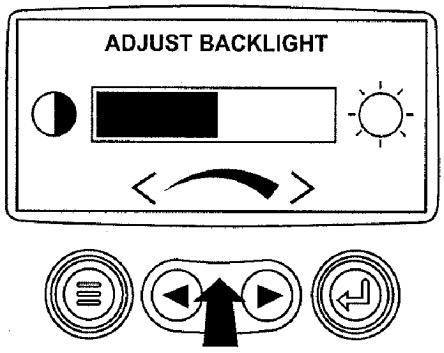
3. Once the "Adjust Backlight" menu item has been highlighted, press the "Enter" key to activate the "Adjust Backlight" function.




*Press Enter Key*

OURGP11,0000237 –19–21OCT03–3/6

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

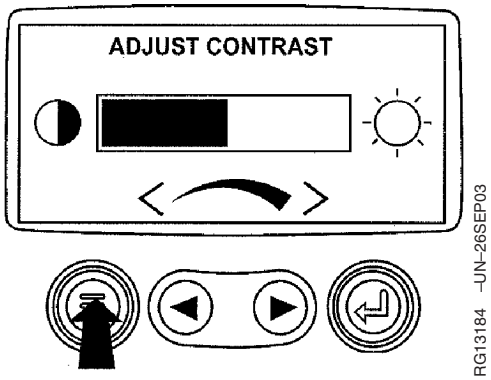



*Adjust Backlight Intensity*

**Continued on next page**

OURGP11,0000237 –19–21OCT03–4/6

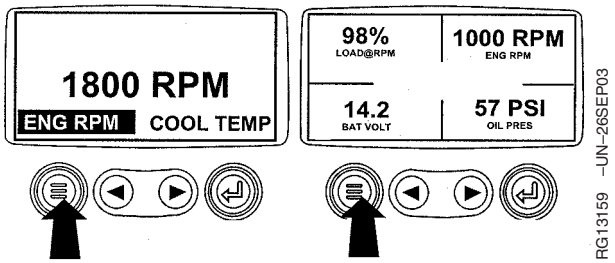
5. Press the "Menu" key to return to the main menu.




*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.

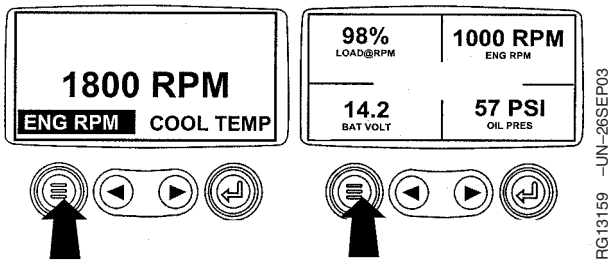



*Exit Main Menu*

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.

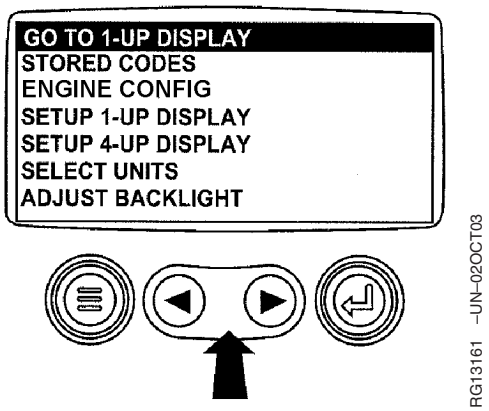



*Menu Key*

**Continued on next page**

OURGP11,00000AF –19–03SEP03–1/6

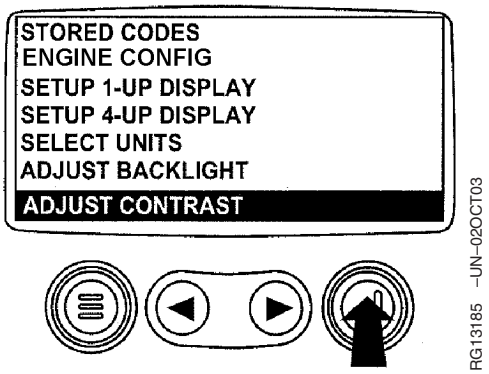
2. The main menu will be displayed. Use the "Arrow" keys to scroll through the menu until "Adjust Contrast" is highlighted.




*Select Adjust Contrast*

OURGP11,00000AF –19–03SEP03–2/6

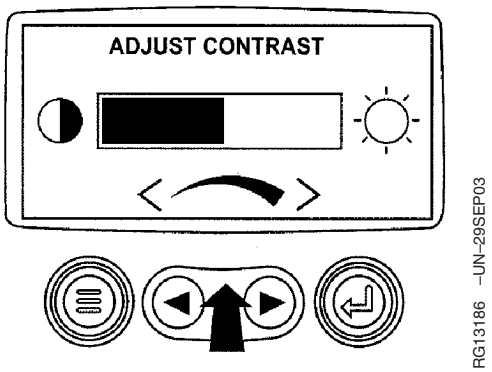
3. Once the "Adjust Contrast" menu item has been highlighted, press the "Enter" key to activate the "Adjust Contrast" function.




*Press Enter Key*

OURGP11,00000AF –19–03SEP03–3/6

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

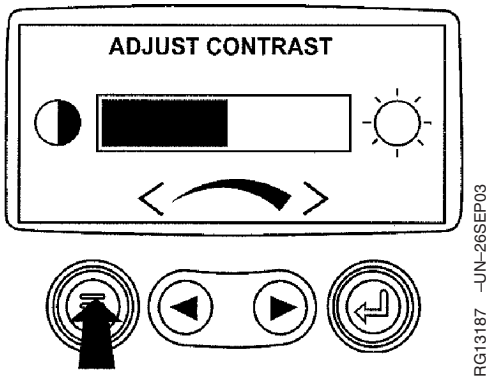



*Adjust Contrast Intensity*

Continued on next page

OURGP11,00000AF –19–03SEP03–4/6

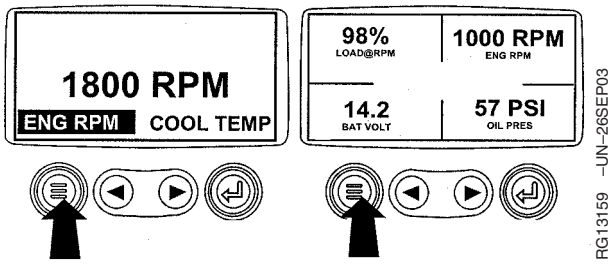
5. Press the "Menu" key to return to the main menu.




*Return To 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.

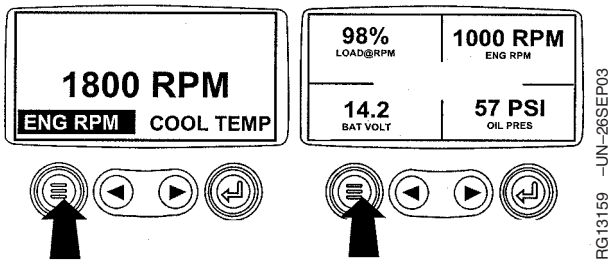



*Exit Main Menu*

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.

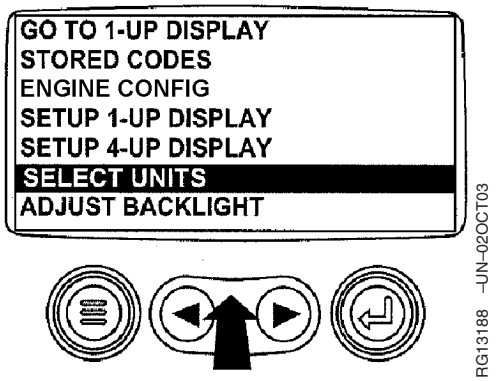



*Menu Key*

**Continued on next page**

OURGP11,00000B0 –19–03SEP03–1/7

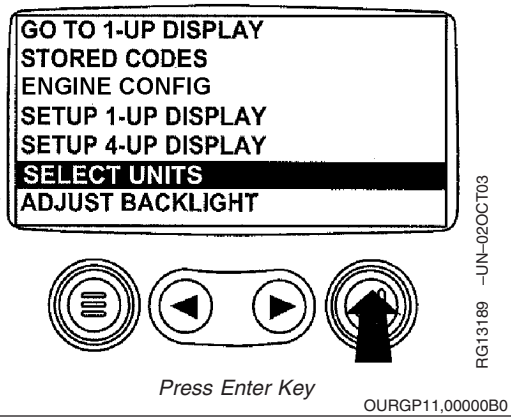
2. The main menu will be displayed. Use the "Arrow" keys to scroll through the menu until "Select Units" is highlighted.




*Select Units*

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*

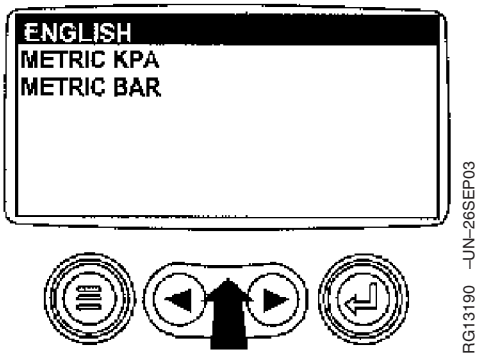
OURGP11,00000B0 –19–03SEP03–3/7

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.

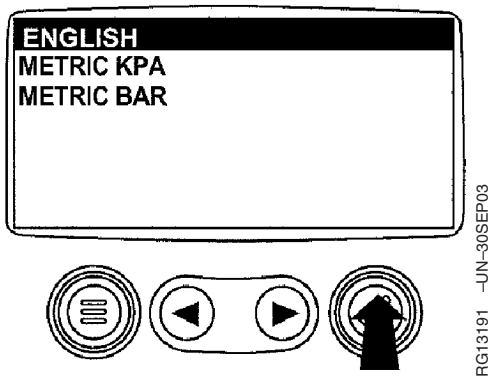



*Select Desired Units*

**Continued on next page**

OURGP11,00000B0 –19–03SEP03–4/7

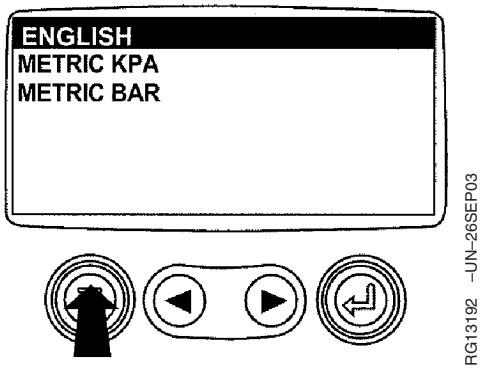
5. Press the "Enter" key to select the highlighted units.




*Press Enter Key to Select*

OURGP11,00000B0 –19–03SEP03–5/7

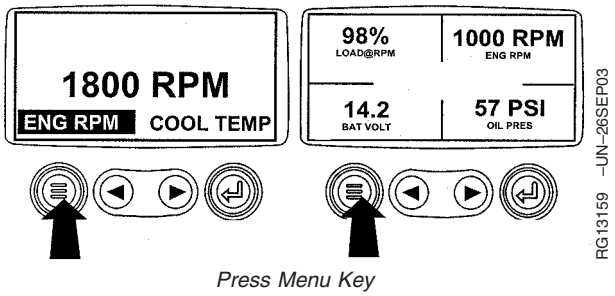
6. Press the "Menu" key to return to the main menu.




*Return To Main Menu*

OURGP11,00000B0 –19–03SEP03–6/7

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

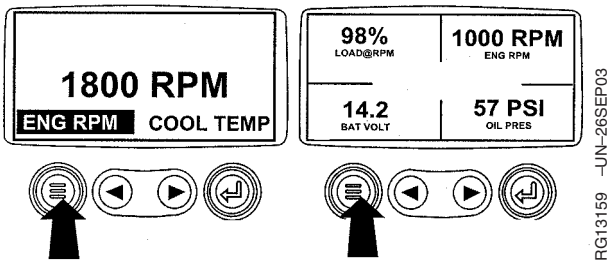



*Press Menu Key*

OURGP11,00000B0 –19–03SEP03–7/7

## Setup 1-Up Display

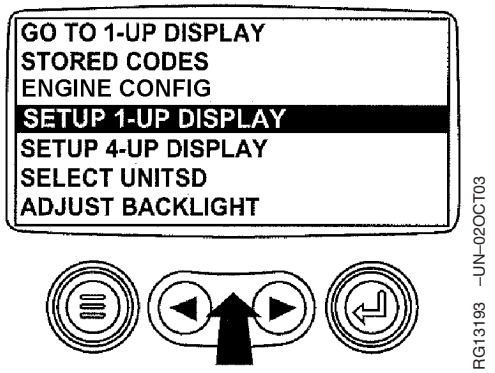
1. Turn the key switch to the ON position. Starting at the single engine parameter display, press the "Menu" key.




*Menu Key*

OURGP11,00000B1 –19–03SEP03–1/18

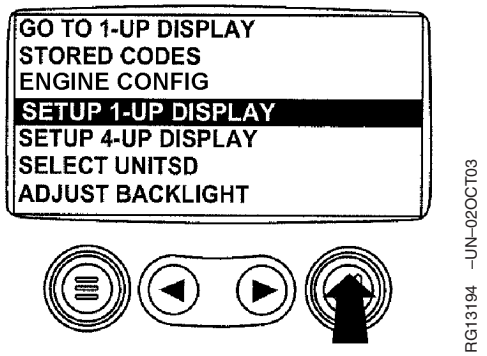
2. Use the "Arrow" keys to scroll through the menu until "Setup 1-Up Display" is highlighted.




*Setup 1-Up Display*

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.




*Press Enter Key*

**Continued on next page**

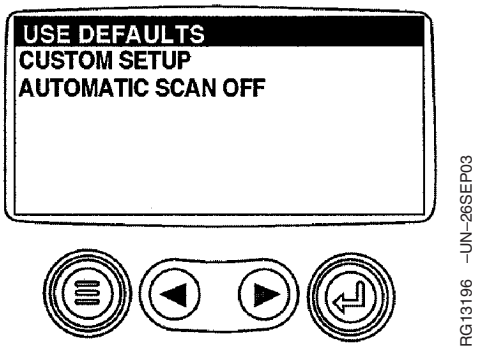
OURGP11,00000B1 –19–03SEP03–3/18

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.

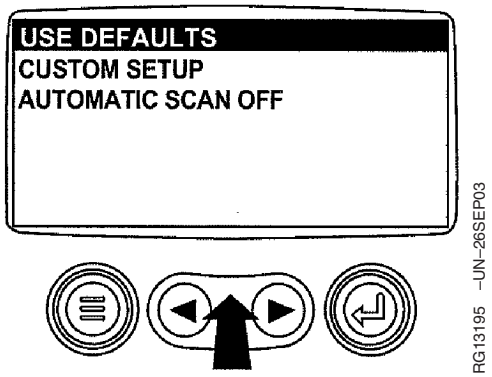
   c. **Automatic Scan** – Selecting the scan function will allow the 1-Up Display to scroll through the selected set of parameters one at a time, momentarily pausing at each.




*1-Up Display Options*

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.

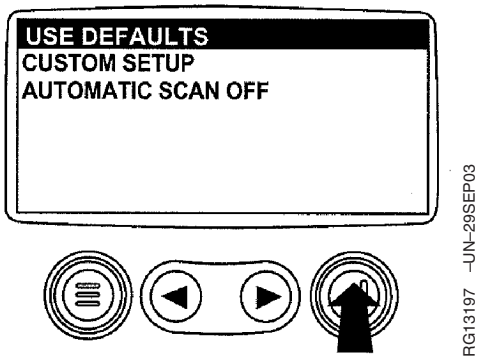



*Select Defaults*

**Continued on next page**

OURGP11,00000B1 –19–03SEP03–5/18

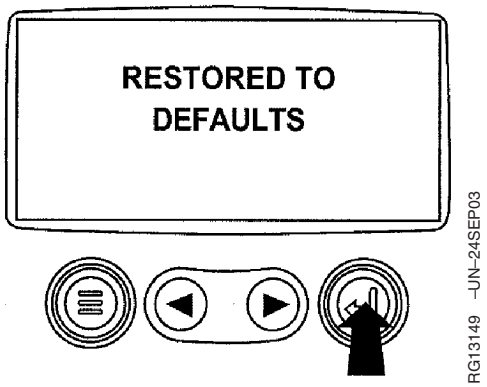
6. Press the "Enter" key to activate the "Use Defaults" function.




*Defaults Selected*

OURGP11,00000B1 –19–03SEP03–6/18

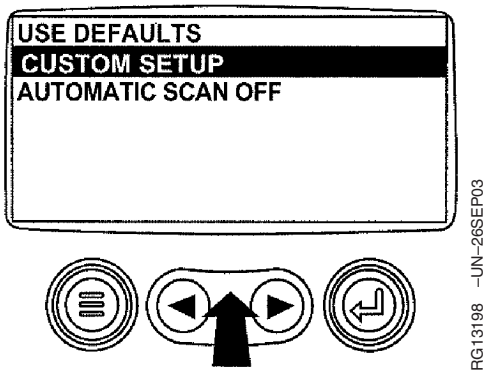
7. The display parameters are reset to the factory defaults, then the display will return to the "Setup 1-Up Display" menu.




*Restored To Defaults*

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.

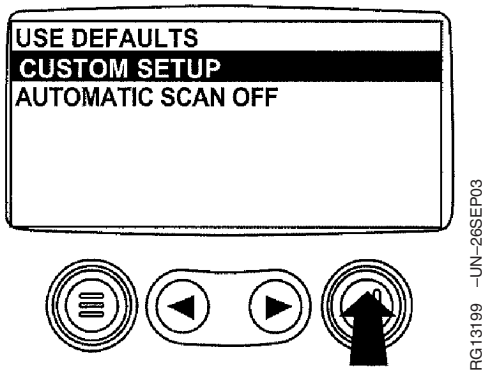



*Select Custom Setup*

**Continued on next page**

OURGP11,00000B1 –19–03SEP03–8/18

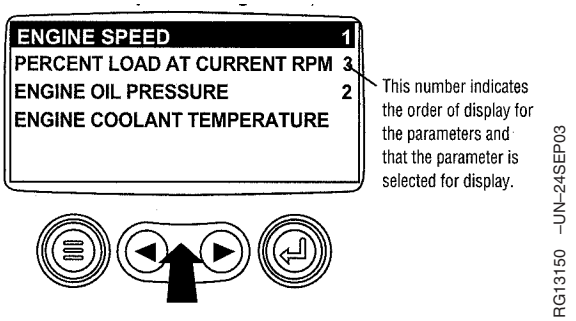
9. Press the "Enter" key to display a list of engine parameters.




*Engine Parameters*

OURGP11,00000B1 –19–03SEP03–9/18

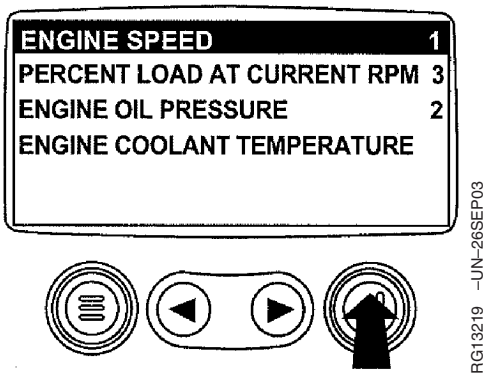
10. Use the "Arrow" keys to scroll to and highlight a selected parameter (parameter with a number to right of it).




*Select Parameters*

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.

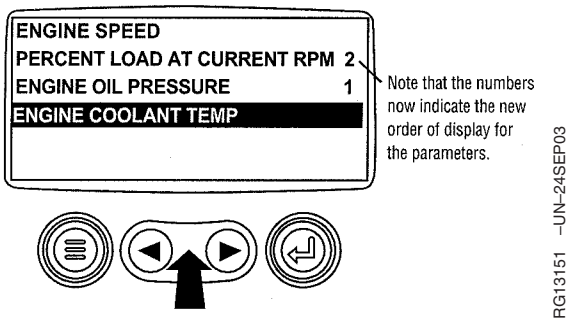



*Deselect Parameters*

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).

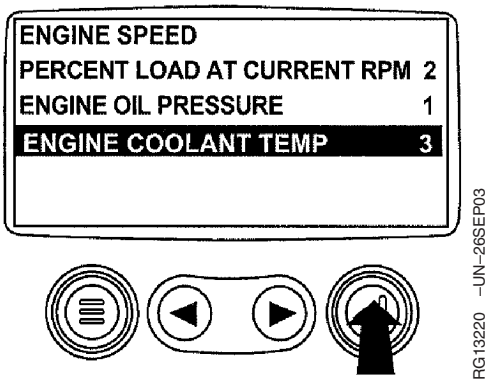



*Select Desired Parameters*

OURGP11,00000B1 –19–03SEP03–12/18

13. Press the "Enter" key to select the parameter for inclusion in the Single Engine Parameter Display.

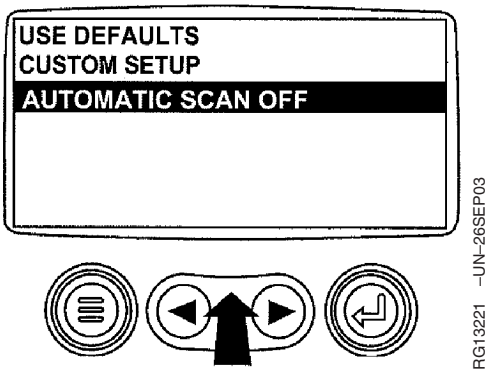
14. Continue to scroll through and select additional parameters for the custom 1-Up Display. Press the "Menu" key at any time to return to the "Custom Setup" menu.




*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.

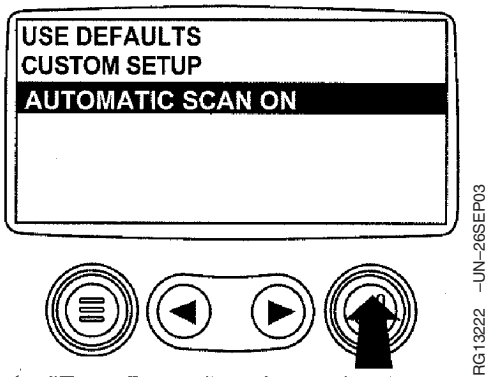



*Automatic Scan Off*

**Continued on next page**

OURGP11,00000B1 –19–03SEP03–14/18

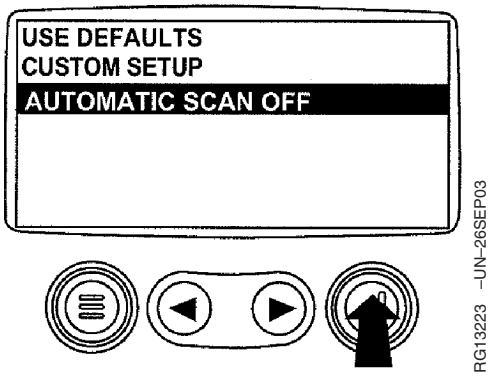
16. Press the "Enter" key to toggle the "Automatic Scan" function on.




*Automatic Scan On*

OURGP11,00000B1 –19–03SEP03–15/18

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

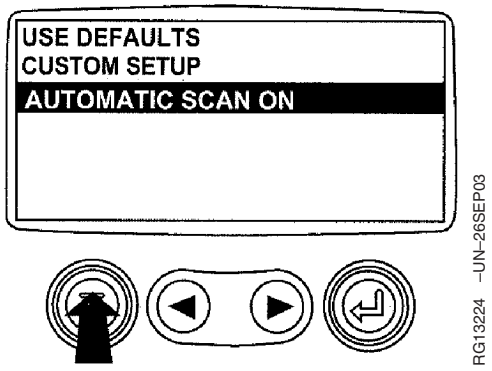



*Automatic Scan Off*

**Continued on next page**

OURGP11,00000B1 –19–03SEP03–16/18

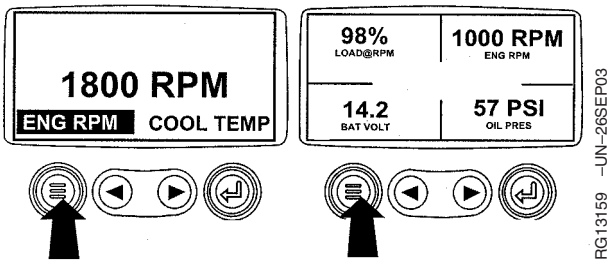
18. Once the "Use Defaults", "Custom Setup" and "Automatic Scan" functions have been set, press the "Menu" key to return to the main menu.




*Menu Key*

OURGP11,00000B1 –19–03SEP03–17/18

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

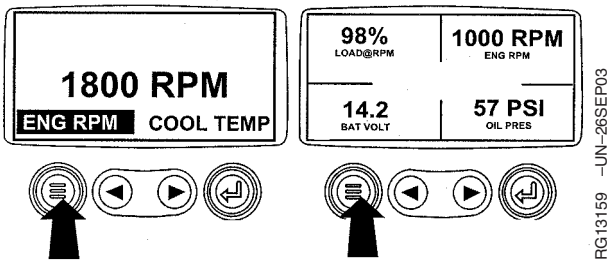



*Exit Main Menu*

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.

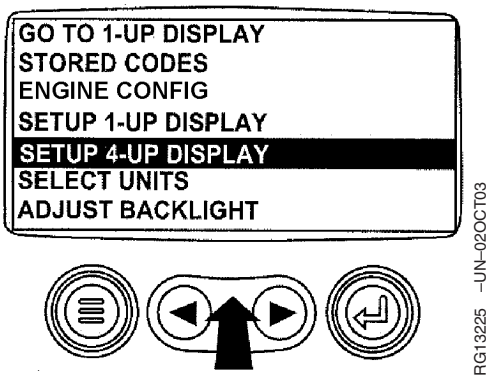



*Menu Key*

**Continued on next page**

OURGP11,00000B2 –19–03SEP03–1/14

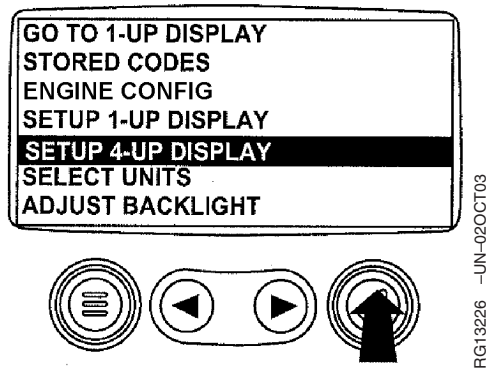
2. The main menu will be displayed. Use the "Arrow" keys to scroll through the menu until "Setup 4-Up Display" is highlighted.




*Select Setup 4-Up Display*

OURGP11,00000B2 –19–03SEP03–2/14

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




*Press Enter Key*

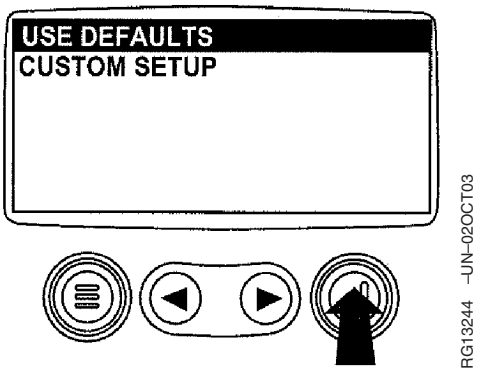
**Continued on next page**

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.

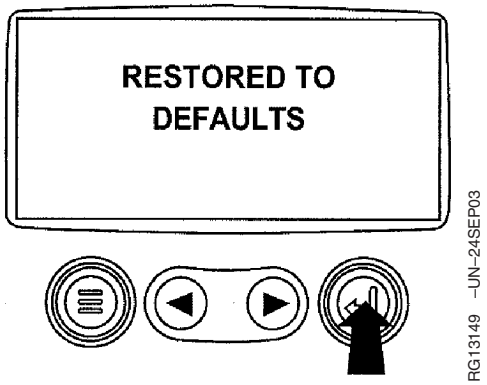
   b. **Custom Setup** – This option contains a list of engine parameters. Engine parameters from this list can be selected to replace any or all of the default parameters.




*Select Factory Defaults*

OURGP11,00000B2 –19–03SEP03–4/14

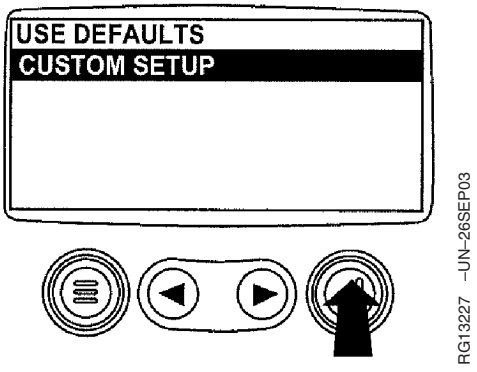
5. To reset the display parameters to the factory defaults, scroll to and highlight "Use Defaults". Press the "Enter" key to activate the "Use Defaults" function. A message indicating the display parameters are reset to the factory defaults will be displayed, then the display will return to the "Setup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




*Restored To Defaults*

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.

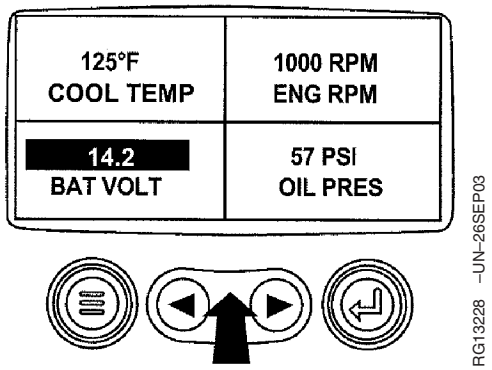



*Custom Setup*

**Continued on next page**

OURGP11,00000B2 –19–03SEP03–6/14

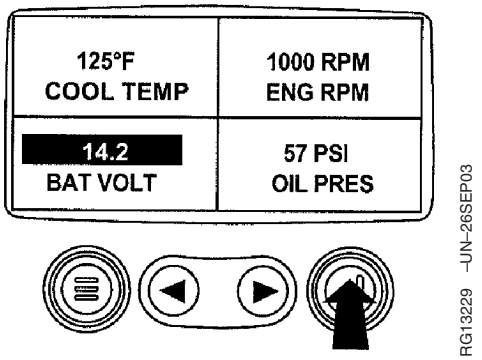
7. The quadrant with the highlighted parameter value is the current selected parameter. Use the "Arrow" keys to highlight the value in the quadrant you wish to change to a new parameter.




*Select Parameters*

OURGP11,00000B2 –19–03SEP03–7/14

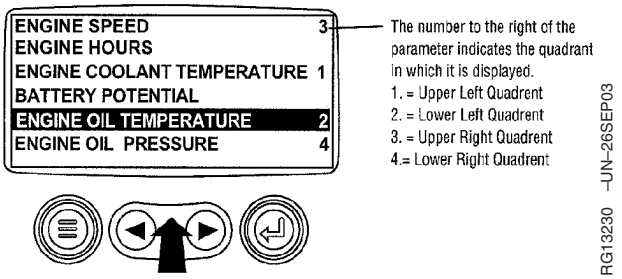
8. Press the "Enter" key and a list of engine parameters will be displayed.




*List Of Engine Parameters*

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".

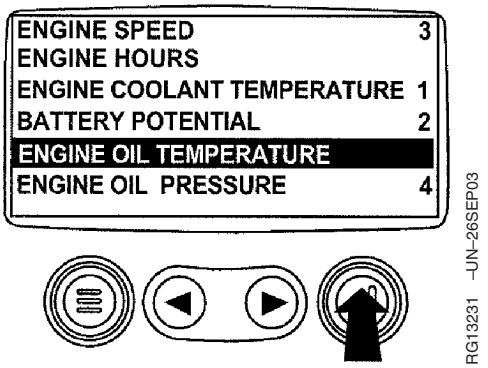



*Select Desired Engine Parameter*

**Continued on next page**

OURGP11,00000B2 –19–03SEP03–9/14

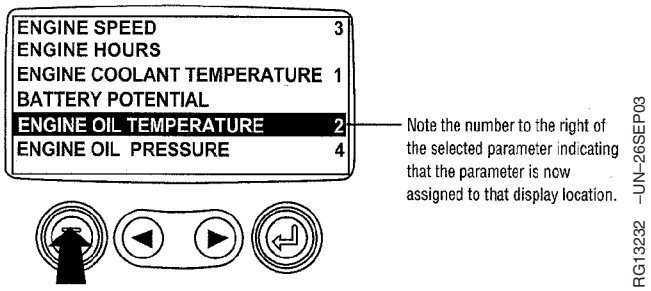
10. Press the "Enter" key to change the selected parameter in the quadrant to the new parameter.




*Enter Selected Parameter*

OURGP11,00000B2 –19–03SEP03–10/14

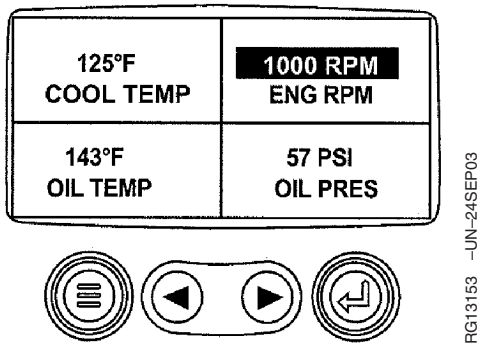
11. Use the "Menu" keys to return to the "4-Up Custom Setup" screen.




*Return To 4-Up Custom Setup*

OURGP11,00000B2 –19–03SEP03–11/14

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



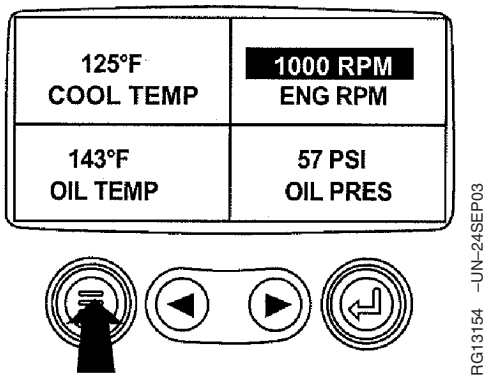

*4-Up Display*

**Continued on next page**

OURGP11,00000B2 –19–03SEP03–12/14

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

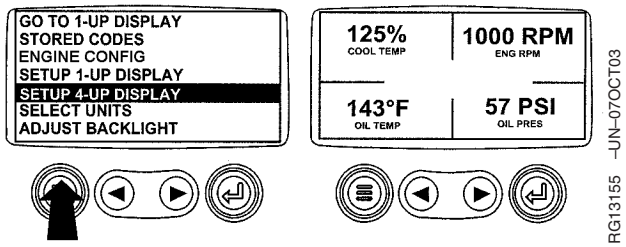
14. Press the "Menu" key to return to the main menu.




*Return To 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.




*Select Remaining Parameters*

OURGP11,00000B2 –19–03SEP03–14/14

## Break-In Service

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

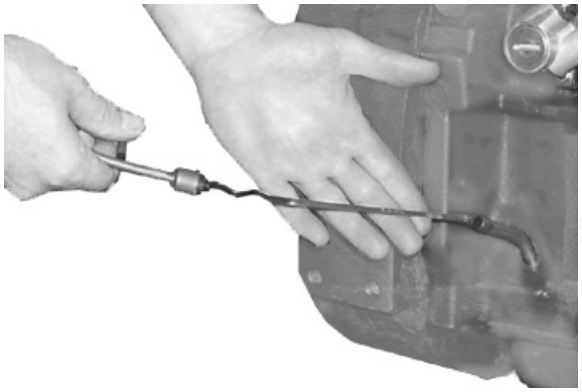
*NOTE: The use of BREAK-IN oils is not required for this engine. Perform the following steps to break-in your engine properly during the first 100 hours. Factory-fill oil and filter are suitable for extended 500-hour drain interval, provided diesel fuel sulfur content is less than 0.10% (1000 ppm).*

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

1. During the first 20 hours, avoid prolonged periods of engine idling or sustained maximum load operation. Warm-up engine carefully and operate at normal loads. If engine will idle longer than 5 minutes, stop engine.

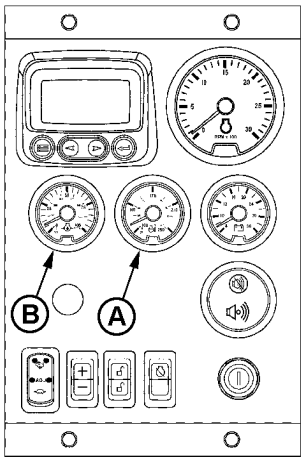
2. Check oil level daily or every 10 hours during engine break-in period. If oil must be added during this period, use John Deere PLUS-50™ 10W-30 oil. (See DIESEL ENGINE OIL in Fuels, Lubricants, and Coolant section.)

3. Watch oil pressure (A) and coolant temperature (B) closely during break-in period. Also check coolant level daily or every 10 hours and check for leaks.



RG12692 –UN–07FEB03

*Check Engine Oil Level Daily*




RG13720 –UN–11NOV04

*Oil Pressure and Coolant Temperature Gauges*

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

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

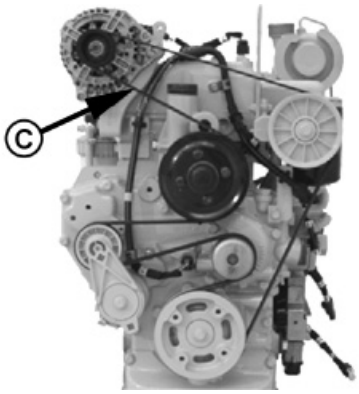
**Continued on next page**

4. Check poly-vee belt (C) for proper alignment and seating in pulley grooves.

5. Change oil and oil filter (D) after first 500 hours/12 months. (See CHANGE ENGINE OIL AND FILTER in Lubrication and Maintenance/500 Hour Section.) Fill crankcase with seasonal viscosity grade oil. (See DIESEL ENGINE OIL, in Fuels, Lubricants, and Coolant Section.)

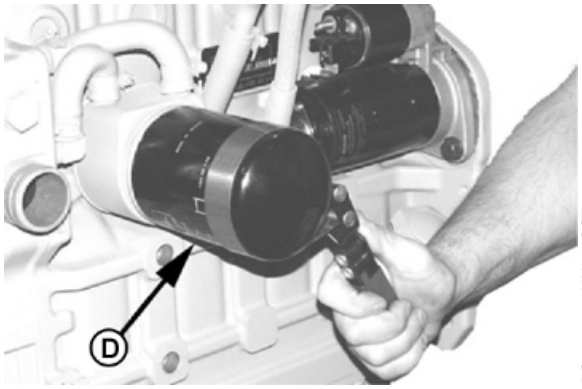
**IMPORTANT: DO NOT operate engine when oil level is below ADD mark on dipstick. Check oil level before starting engine for the first time.**

**C—Poly-Vee Belt**
**D—Oil Filter**




RG15340 –UN–04OCT07

*Poly-Vee Belt*




RG15341 –UN–04OCT07

*Engine Oil Filter*

OUOD006,00000C6 –19–10AUG07–2/2

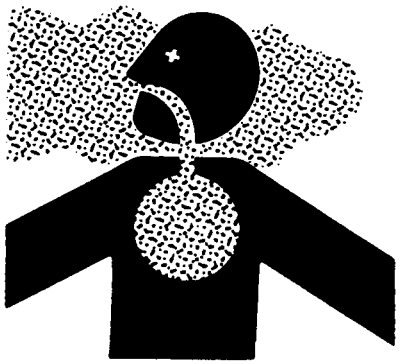
## Starting the Engine

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

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

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

1. Perform all prestarting checks outlined in Lubrication & Maintenance/Daily Section later in this manual.
2. Open the fuel supply shut-off valve, if equipped.
3. Disengage clutch (if equipped) controlling any engine drivelines.



TS220 –UN–23AUG88

*Use Proper Ventilation*

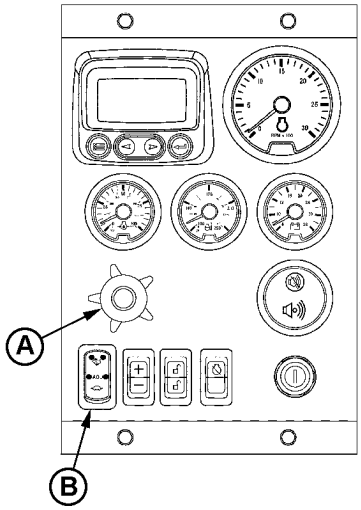
**Continued on next page**

4. Set slow idle as follows:

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

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

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




RG13722 –UN–11NOV04

*Analog Throttle Control and Speed Select Switch On Panel*

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

**Continued on next page**

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

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

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

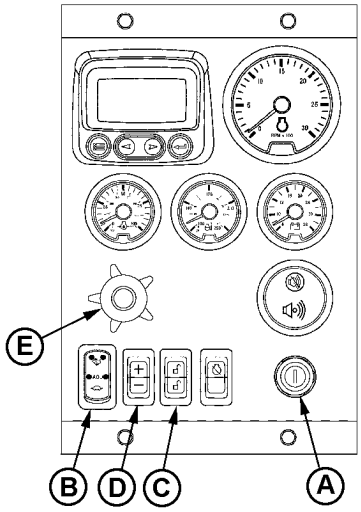
   **Panels with high-low speed select rocker switch (B) only:** Set rpm using bump speed enable switch (C) with speed select rocker switch (D).

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

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

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.)

*NOTE: Hand throttle may have an analog potentiometer (E) for changing engine speeds (See “Changing Engine Speeds” later in this section).*




RG13723 –UN–11NOV04

*Start And Idle Engine Controls On Panel*

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

OURGP12,00001C9 –19–14MAR06–3/3

## Normal Engine Operation

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

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

OUOD006,00000C5 –19–04OCT07–1/1

## Warming Engine

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

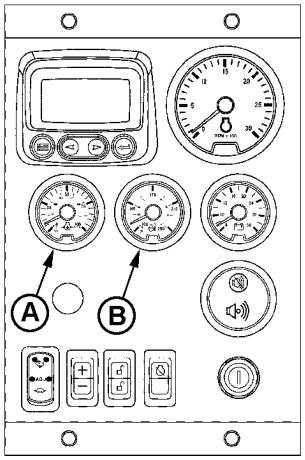
1. Refer to GENERAL OEM ENGINE SPECIFICATIONS in the Specifications section for oil pressure and coolant temperature specifications.

2. Check oil pressure gauge (A) as soon as engine starts. If gauge needle does not rise above the minimum oil pressure specification within 5 seconds, stop the engine and determine the cause. Normal engine oil pressure (see Specifications section) can vary within pressure ranges provided.

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

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

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




RG13724 –UN–11NOV04

*Oil Pressure and Coolant Temperature Gauges*

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

OUOD006,00000C8 –19–09OCT07–1/1

## Cold Weather Starting

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

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

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

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

*NOTE: Glow plugs operate automatically through the ECU. The light, located above the diagnostic gauge, should illuminate when the glow plugs are activated. In warm weather, the light illuminates briefly as a light check. In cold weather, the light remains on during the automatic operation of the glow plugs. Operating time depends on temperature. Do not crank the engine until light turns off.*

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

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

OUOD006,00000C7 –19–19OCT07–1/1

## Using a Booster Battery or Charger

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

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

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

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

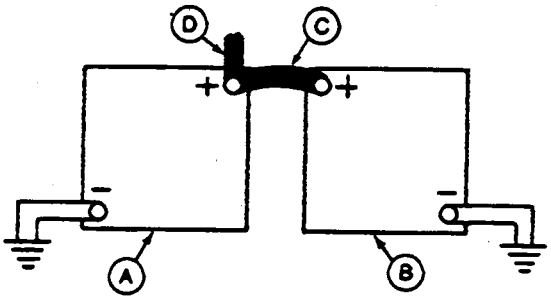
1. Connect booster battery or batteries to produce the required system voltage for your engine application.

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

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

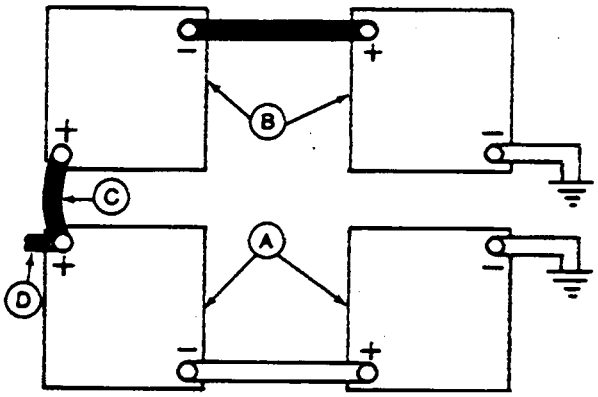
TS204 –UN–23AUG88

*Exploding Battery*




RG4678 –UN–14DEC88

*12-Volt System*




RG4698 –UN–14DEC88

*24-Volt System*

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

Continued on next page

RG,RG34710,5564 –19–27JUL06–1/2

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

RG,RG34710,5564 –19–27JUL06–2/2

## Avoid Excessive Engine Idling

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

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

OURGP12,00000FC –19–04OCT07–1/1

## Changing Engine Speed

**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:*

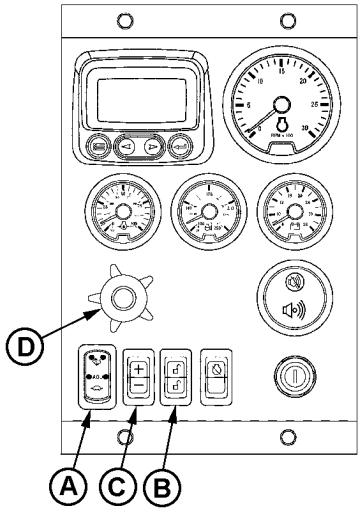
1. *Select fast (rabbit) or slow (turtle) position on High-Low Speed Select Rocker Switch (A).*
2. *Press and hold top or bottom half of Bump Speed Enable Rocker Switch (B) while using Speed Select Rocker Switch (C).*
3. *Use Speed Select Rocker Switch (C) to bump engine speed up (+) or down (-).*

*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):**

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).




RG13725 –UN–11NOV04

*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)**

**Continued on next page**

*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 potentiometer throttle (D)**

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

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

2. Turn potentiometer throttle clockwise to increase speed or counterclockwise to decrease speed.

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

**Continued on next page**

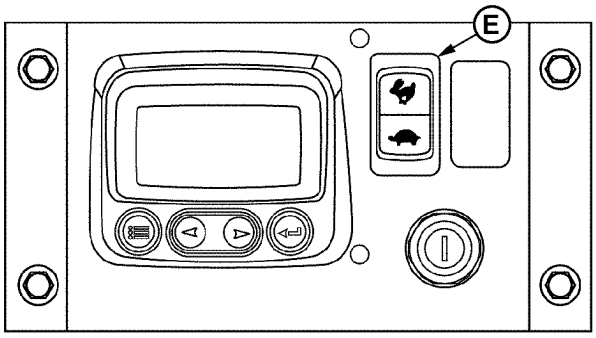
**Changing engine speeds on engines equipped with the Basic Instrument Panel**

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

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

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

The settings will not be stored.




RG13289 –UN–30OCT03

*Changing Engine Speed With Basic Panel*

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

OURGP12,00001CD –19–14MAR06–3/3

## Stopping The Engine

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

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

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

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

Panels with High-Low Speed Select Rocker Switch (B) only: Set rpm using Bump Speed Enable Switch (C) with Speed Select Rocker Switch (D).

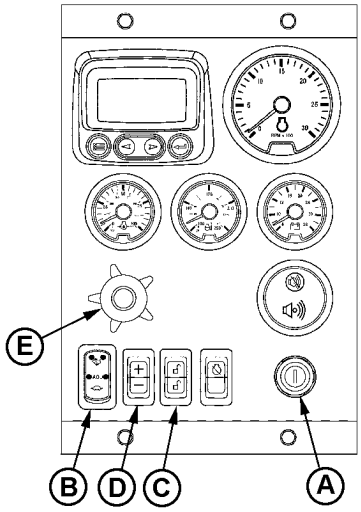
Panels with optional Analog Throttle (E): Set either High-Low Speed Select Switch (B) or Analog Throttle (E) to low idle, and set desired speed with remaining control.

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

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

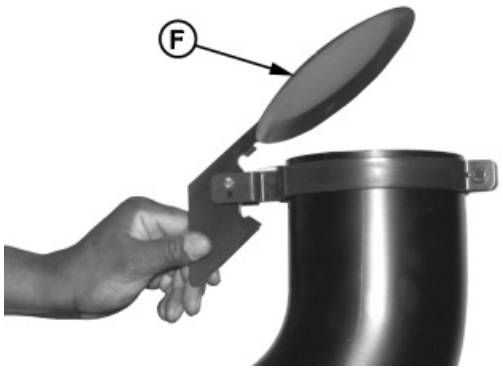
4. Turn key switch (A) to “OFF” position to stop the engine. Remove ignition key.

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




RG13723 –UN–11NOV04

*Stopping the Engine Controls*




RG9933 –UN–18NOV99

*Exhaust Stack Rain Cap*

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

OURGP12,00001CE –19–14MAR06–1/1

## Auxiliary Gear Drive Limitations

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

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

OUOD006,00000F6 –19–04OCT07–1/1

## Generator Set (Standby) Applications

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

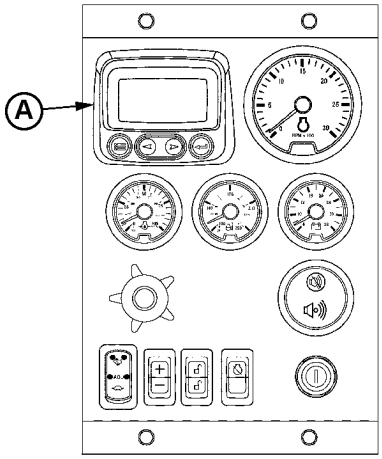
RG,RG34710,5556 –19–27JUL06–1/1

## 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**




RG13728 –UN–11NOV04

*Hour Meter On Panel*

OURGP12,00001D0 –19–14MAR06–1/1

## Use Correct Fuels, Lubricants, and Coolant

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

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


TS100 –UN–23AUG88

DPSG,OUOE003,20 –19–09OCT07–1/1

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

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

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

[a]Replace primary air cleaner element when restriction indicator shows a vacuum of 625 mm (25 in.) H2O.

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

[c]Replace crankshaft damper every 4500 hours or 60 months, whichever occurs first.

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

**Continued on next page**

| Item | Lubrication and Maintenance Service Intervals | | | |
|---|---|---|---|---|
| | Daily | 500 Hour/ 12 Month | 2000 Hour/ 24 Month | As Required |
| Checking Air Compressor (If Equipped) | | | | • |
| Bleeding Fuel System | | | | • |

OURGP12,00000FD –19–10AUG07–2/2

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

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

| | Lubrication and Maintenance Service Intervals | | | |
|---|---|---|---|---|
| **Item** | **Every 2 Weeks** | **500 Hours or 12 Months** | **2000 Hours or 24 Months** | **As Required** |
| Operate Engine at Rated Speed and 50%–70% Load a Minimum of 30 Minutes | • | | | |
| Check Engine Oil and Coolant Level | • | | | |
| Check Fuel Filter | • | | | |
| Check Air Cleaner Dust Unloader Valve & Indicator [a] | • | | | |
| Perform Visual Walkaround Inspection | • | | | |
| Changing Engine Oil And Replacing Oil Filter[b] | | • | | |
| Replacing Fuel Filter Element | | • | | |
| Cleaning Crankcase Vent Tube | | • | | |
| Checking Air Intake System | | • | | |
| Checking Engine Speeds | | • | | |
| Checking Belt Tensioner Spring Tension and Belt Wear | | • | | |
| Checking Engine Electrical Ground Connection | | • | | |
| Servicing Fire Extinguisher | | • | | |
| Checking Engine Mounts | | • | | |
| Servicing Battery | | • | | |
| Checking Cooling System | | • | | |
| Replenishing SCAs as Required | | • | | |
| Testing Diesel Engine Coolant | | • | | |
| Pressure Testing Cooling System | | • | | |
| Checking Crankshaft Vibration Damper [c] | | | • | |
| Flushing Cooling System[d] | | | • | |
| Testing Thermostats | | | • | |
| Adding Coolant | | | | • |
| Replacing Air Cleaner Elements | | | | • |
| Replacing Poly-Vee Belt | | | | • |
| Checking Fuses | | | | • |
| Checking Air Compressor (If Equipped) | | | | • |

[a]Replace primary air cleaner element when restriction indicator shows a vacuum of 625 mm (25 in.) H2O.

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

[c]Replace crankshaft damper every 4500 hours or 60 months, whichever occurs first.

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

**Continued on next page**

| Item | Lubrication and Maintenance Service Intervals | | | |
|---|---|---|---|---|
| | Every 2 Weeks | 500 Hours or 12 Months | 2000 Hours or 24 Months | As Required |
| Adjusting Speed Gain | | | | • |
| Bleeding Fuel System | | | | • |

OURGP12,00002B5 –19–02JAN07–2/2

## Daily Prestarting Checks

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

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

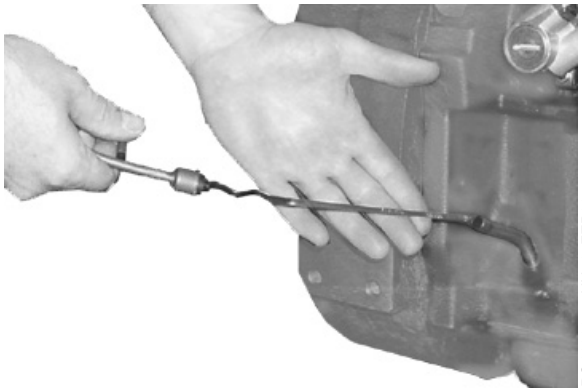
1. Check engine oil level on dipstick. Add as required, using seasonal viscosity grade oil. (See DIESEL ENGINE OIL in Fuels, Lubricants, and Coolant Section for oil specifications.)

   Depending on application, oil may be added at left side (A) or rocker arm cover filler cap (B) locations.

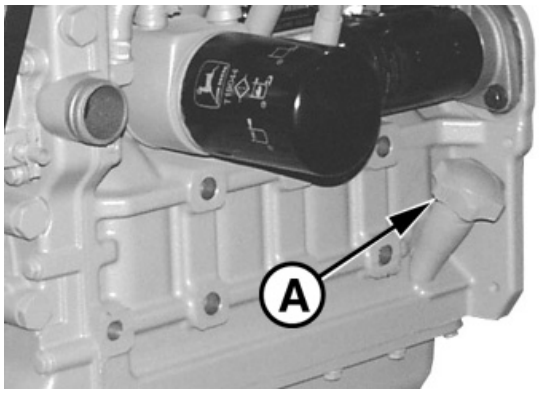
   After checking oil, hand tighten dipstick used on left-hand oil fillers.

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

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

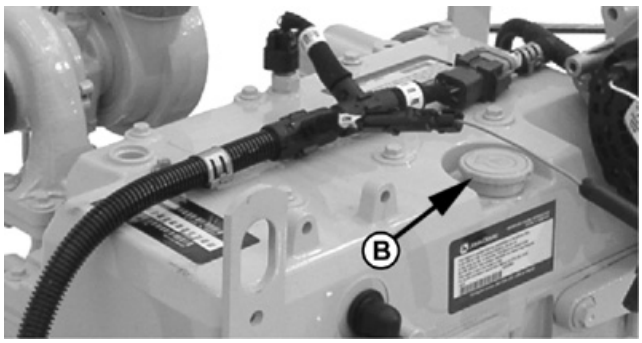

RG12692 –UN–07FEB03

*Engine Oil Dipstick*



RG12779 –UN–07JAN03

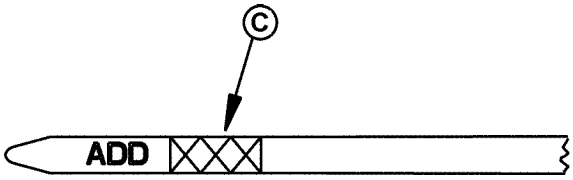
*Left Side Oil Filler Cap and Dipstick*



RG15337 –UN–04OCT07

*Rocker Arm Cover Filler Cap*

RG14931 –UN–13JUL06




*Crosshatch on Dipstick*

**Continued on next page**

OUOD006,00000C2 –19–03AUG07–1/4

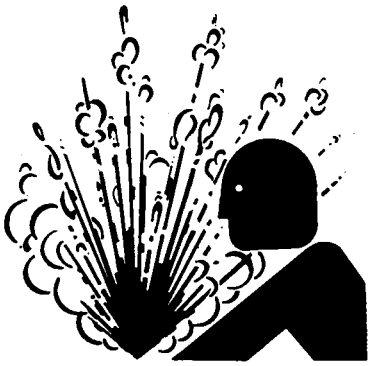
**CAUTION: Explosive release of fluids from pressurized cooling system can cause serious burns.**

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

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

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

**A—Fill Radiator**

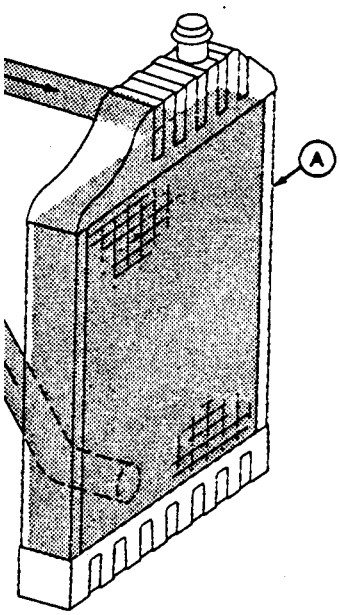


TS281 –UN–23AUG88

*High-Pressure Fluids*

RG6576 –UN–20JAN93

*Check Coolant Level in Radiator*




RG4675 –UN–14DEC88

*Fill Radiator*

Continued on next page

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

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

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

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

a. Loosen drain plug (B) at bottom of fuel filter or bowl, if equipped, two or three turns.

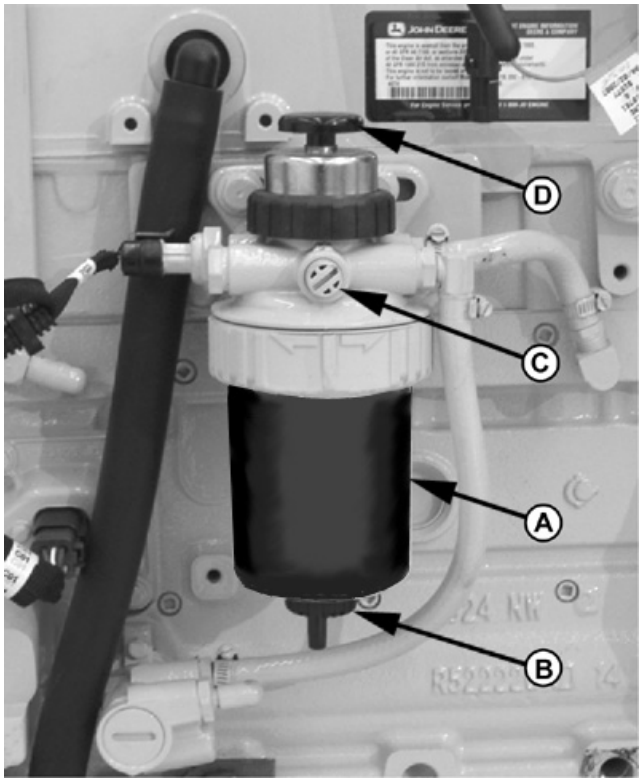
b. Loosen air bleed plug (C) two full turns on fuel filter mounting and drain water from bottom until fuel starts to drain out.

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

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

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

b. Tighten bleed plug securely.




RG15334A –UN–11OCT07

*Fuel Transfer Pump and Filter*

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

**Continued on next page**

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

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

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

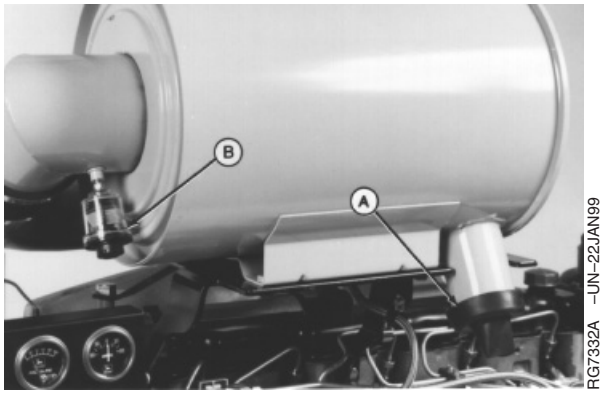
5. Make a thorough inspection of the engine compartment. Look for oil or coolant leaks, worn fan and accessory drive belts, loose connections and trash build-up. Remove trash buildup and have repairs made as needed if leaks are found.

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

Inspect:

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

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




*Dust Unloader Valve and Indicator Gauge*

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

OUOD006,00000C2 –19–03AUG07–4/4

## Changing Engine Oil and Replacing Filter

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

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

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

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

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

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

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



**Continued on next page**

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

**To change engine oil and oil filter:**

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

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

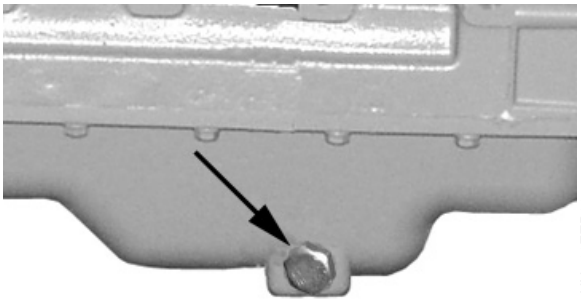
5. Remove oil filter packing and clean filter mounting pad.

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

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

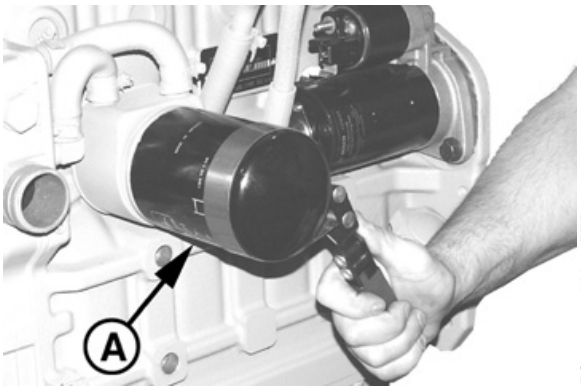
6. Oil new packing and install new filter element. Hand tighten element according to values printed on filter element. If values are not provided, tighten element by hand approximately 3/4 — 1-1/4 turn after packing contacts filter housing. DO NOT overtighten filter element. If a filter wrench is used,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

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



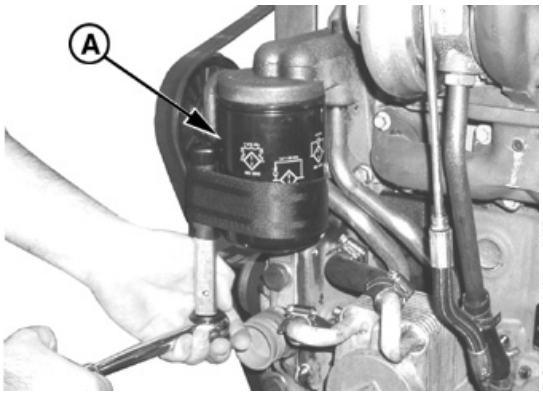
RG12783 –UN–18FEB03

*Oil Pan Drain Plug*




RG12693 –UN–07FEB03

*Removing Horizontal Oil Filter Element*




RG12822 –UN–09FEB03

*Removing Optional Vertical Oil Filter Element*

**A—Oil Filter Element**

**Continued on next page**

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

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

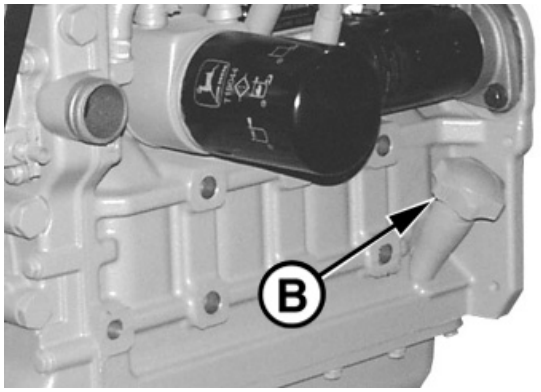
**IMPORTANT: Immediately after completing any oil change, crank engine for 30 seconds without permitting engine to start. This will help insure adequate lubrication to engine components before engine starts.**

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

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

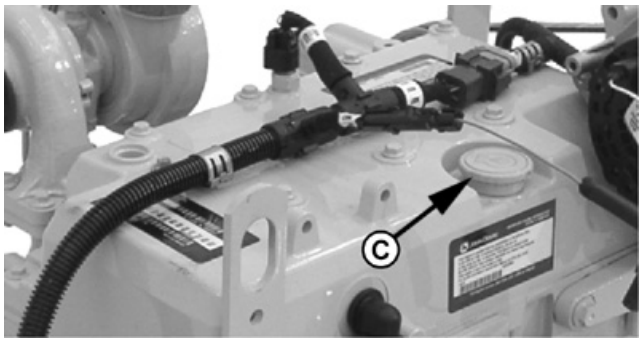
11. Stop engine and check oil level after 10 minutes. Oil level reading should be within crosshatch marks (D) on dipstick.

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




RG12779A –UN–07JAN03

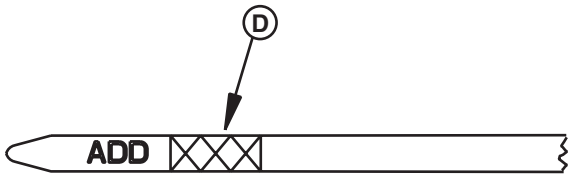
*Optional Side Oil Fill*




RG15338 –UN–04OCT07

*Rocker Arm Cover Oil Fill*

RG12781 –UN–17FEB03



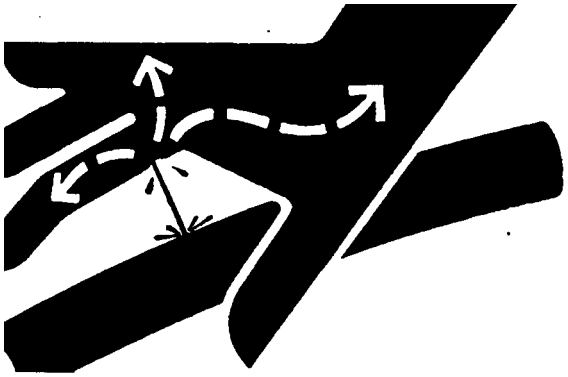

*Crosshatch Marks on Dipstick*

OUOD006,00000C9 –19–10AUG07–3/3

## Replacing Fuel Filter Element

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

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



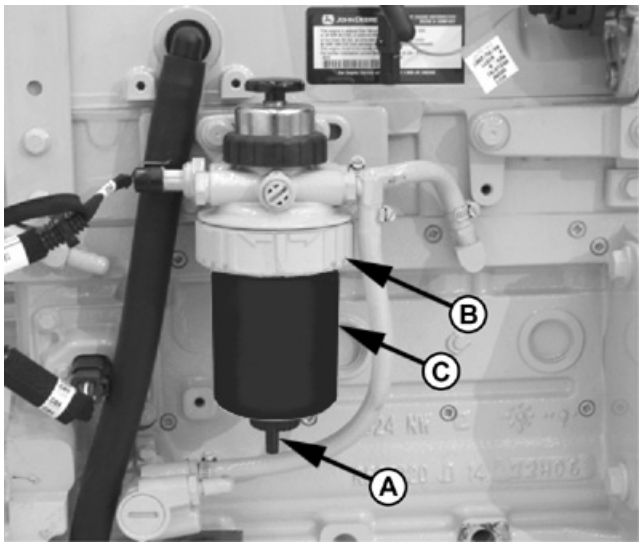
X9811 –UN–23AUG88

*High-Pressure Fluids*

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

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

5. Firmly grasp retaining ring (B) and rotate it counterclockwise 1/4 turn (as viewed from top). Remove ring with filter element (C).
6. Inspect filter mounting base for cleanliness. Clean as required.




RG15479 –UN–19OCT07

*Fuel Filter*

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

**Continued on next page**

OUOD006,00000C3 –19–17OCT07–1/2

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

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

   If equipped with water separator bowl, remove filter element from separator bowl. Drain and clean separator bowl. Dry with compressed air. Install bowl onto new element. Tighten securely.

8. Align keys on filter element with slots in filter base.

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

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

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

10. Reconnect water sensor wiring (if equipped).

11. Open fuel shut-off valve and prime the fuel filter. (See PRIMING THE FUEL FILTER in Service As Required Section.)

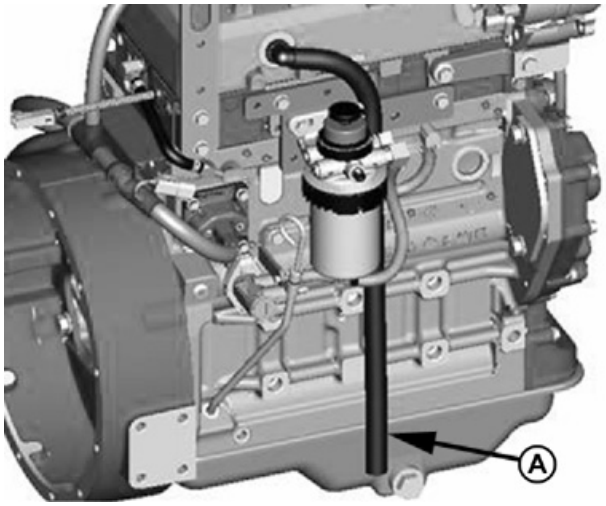
OUOD006,00000C3 –19–17OCT07–2/2

## Cleaning Crankcase Vent Tube

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

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

2. Install the vent tube.



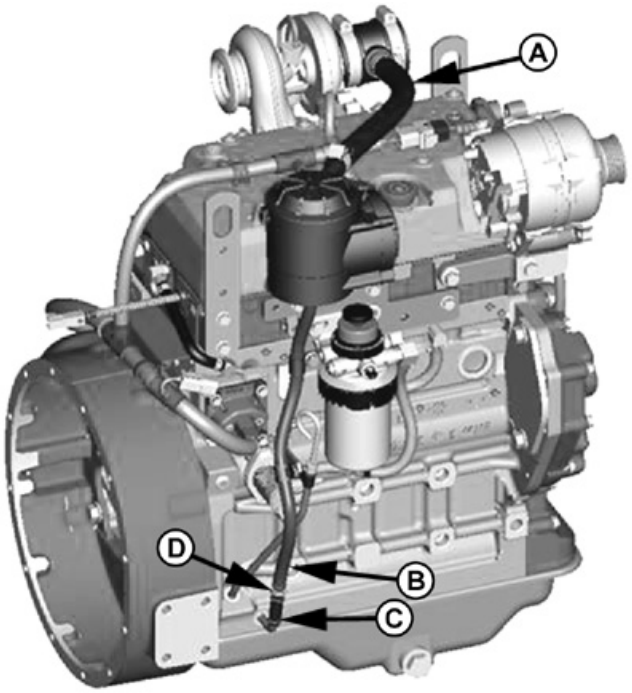

*Crankcase Vent Tube*

OUOD006,00000CA –19–10AUG07–1/1

## Checking Closed Crankcase Vent System (If Equipped)

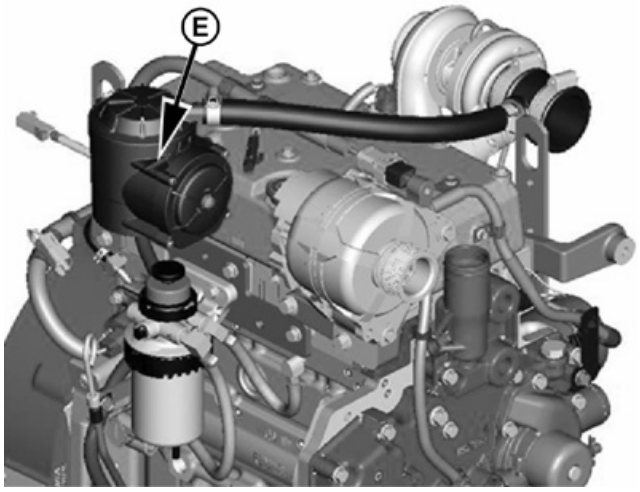
1. Inspect hoses (A) and (B) and oil drain tube assembly (C) for kinks, blockage, or other damage.
2. Inspect check valve (D) for damage.
3. Verify that the crankcase vent system bypass port (E) is not plugged.
4. Inspect CCV unit for cracks or other damage.
5. Inspect turbo compressor coupling for cracks, blockage or other damage.

**A—Hose, Compressor to Filter Housing**
**B—Oil Drain Hose**
**C—Oil Drain Tube Assembly**
**D—Check Valve**
**E—Crankcase Vent System Bypass Port**




RG15633 –UN–19OCT07

*Closed Crankcase Vent System*




RG15632 –UN–19OCT07

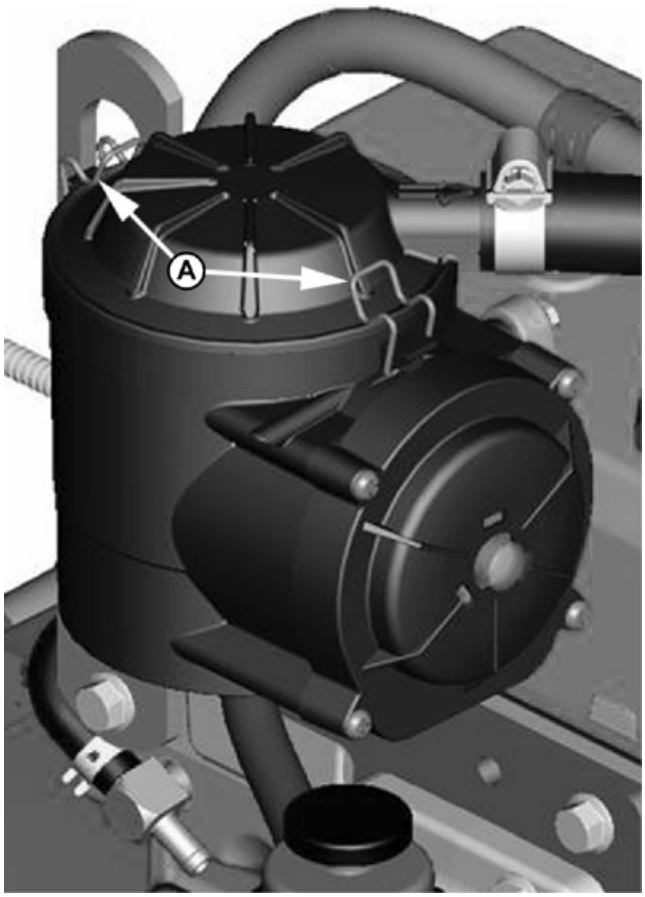
*Crankcase Vent System Bypass Port*

OUOD006,000011B –19–19OCT07–1/1

## Replace Crankcase Vent Filter (If Equipped)

1. Open clips (A) and remove the crankcase vent lid.
2. Remove old filter and discard.
3. Install new filter into crankcase vent housing and snap into place.
4. Install lid and lock down clips.

**A—Clips**




*Replace Crankcase Vent Filter*

OUOD006,000011C –19–19OCT07–1/1

## Checking Air Intake System

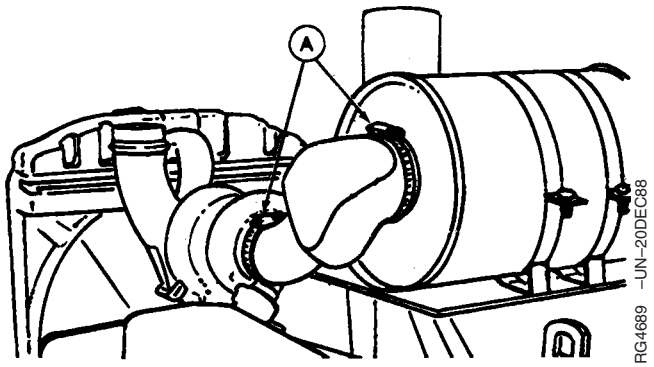
**IMPORTANT: The air intake system must not leak. Any leak, no matter how small, may result in internal engine damage due to abrasive dirt and dust entering the intake system.**

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

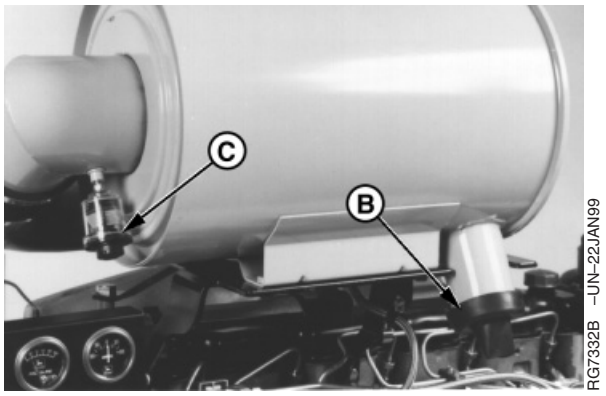
**IMPORTANT: ALWAYS REPLACE primary air cleaner element when air restriction indicator shows a vacuum of 625 mm (25 in. $H_2O$), is torn, or visibly dirty. See REPLACING AIR CLEANER ELEMENT later in Service As Required section.**

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

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




*Check Clamps*




*Unloader Valve and Air Restriction Indicator*

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

RG41183,000003D –19–31JAN07–1/1

## Check Engine Speeds

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

RG41183,000003E –19–31JAN07–1/1

## Checking Belt Tensioner Spring Tension and Belt Wear

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

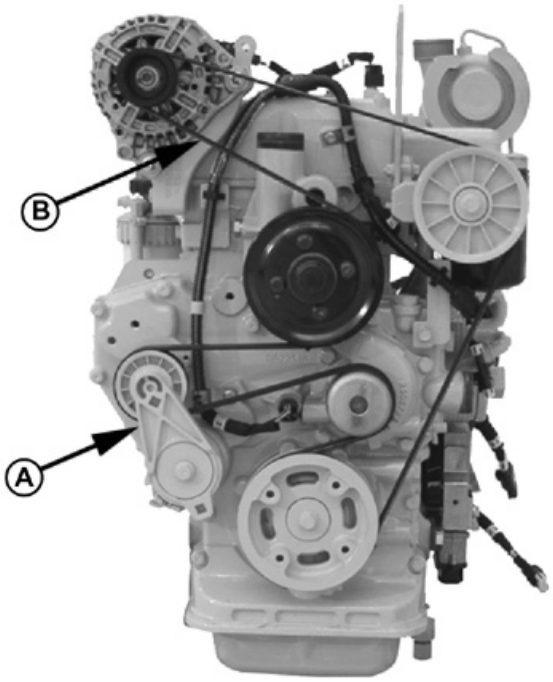
OUOD006,000010E –19–10OCT07–1/3

### Checking Belt Wear

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

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

**A—Belt Tensioner**
**B—Poly-Vee Belt**




RG15339 –UN–04OCT07

*Belt Wear Inspection*

**Continued on next page**

OUOD006,000010E –19–10OCT07–2/3

### Checking Tensioner Spring Tension

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

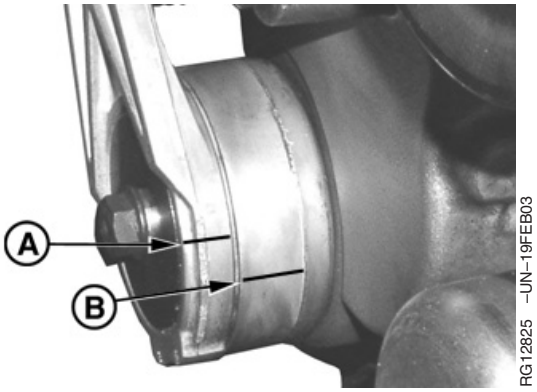
1. Release tension on belt using a breaker bar and socket on tension arm. Remove belt from pulleys.
2. Release tension on tension arm and remove breaker bar.
3. Put a mark (A) on swing arm of tensioner as shown.
4. Measure 21 mm (0.83 in.) from (A) and put a mark (B) on tensioner mounting base.
5. Install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

**Specification**

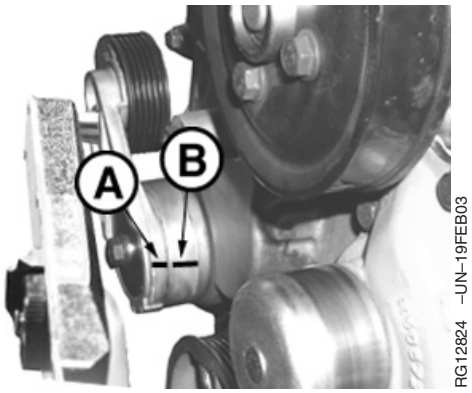
Spring Tension—Torque ..... 18-22 N•m (13-16 lb-ft)

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

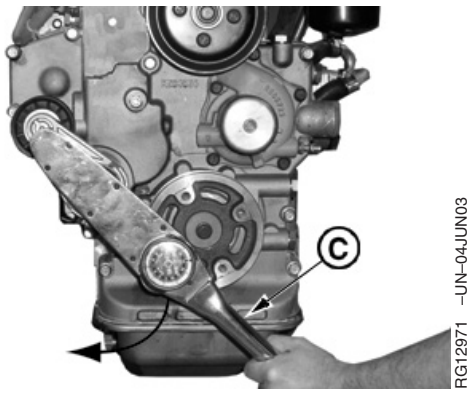
**A—Mark On Swing Arm**
**B—Mark On Tensioner Mounting Base**
**C—Torque Wrench**




*Marks on Tensioner*




*Align Marks*




*Align Torque Wrench With Pulley And Tensioner*

OUOD006,000010E –19–10OCT07–3/3

## Checking Engine Electrical Ground Connections

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

RG41183,0000049 –19–08JAN03–1/1

## Servicing Fire Extinguisher

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

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

**A—Fire Extinguisher**


*Fire Extinguisher*

RG,RG34710,5567 –19–02JAN07–1/1

## Checking Engine Mounts

Engine mounting is the responsibility of the vehicle or generator manufacturer. Follow manufacturer's guidelines for mounting specifications.

**IMPORTANT: Use only Grade SAE 8 or higher grade of hardware for engine mounting.**

1. Check the engine mounting bracket, vibration isolators, and mounting bolts on support frame and engine block for tightness. Tighten as necessary.

2. Inspect overall condition of vibration isolators, if equipped. Replace isolators if rubber has deteriorated or mounts have collapsed, as necessary.

DPSG,RG34710,111 –19–07JAN02–1/1

## Servicing Battery

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

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

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

TS204 –UN–23AUG88

*Exploding Battery*

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

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

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

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

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

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

**Continued on next page**

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

**Avoid the hazard by:**

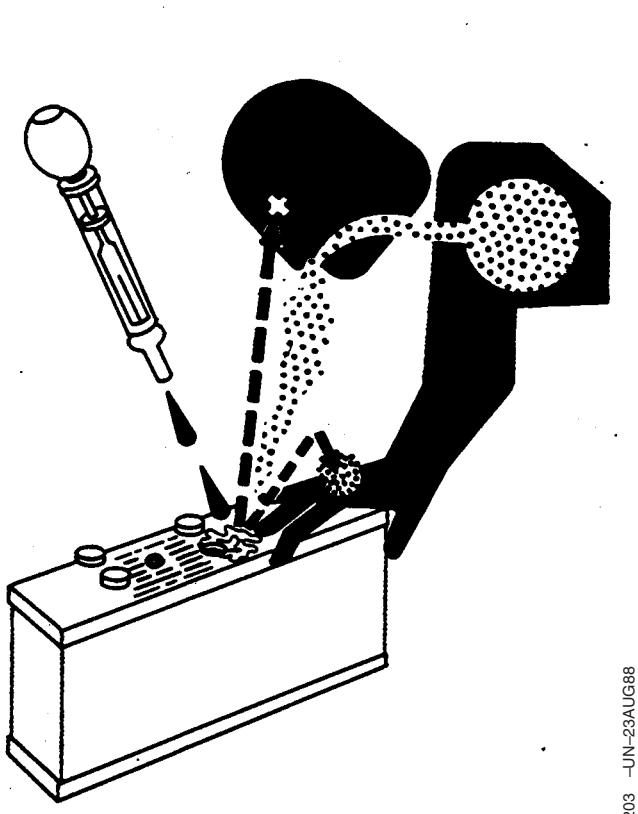
1. **Filling batteries in a well-ventilated area.**
2. **Wearing eye protection and rubber gloves.**
3. **Avoiding breathing fumes when electrolyte is added.**
4. **Avoiding spilling or dripping electrolyte.**
5. **Use proper jump start procedure.**

**If you spill acid on yourself:**

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

**If acid is swallowed:**

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




*Sulfuric Acid*

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

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

| Specification | |
|---|---|
| 12 Volt Standard Duty Starter—Cold Cranking Amps | 640 |
| 12 Volt Heavy Duty Starter—Cold Cranking Amps | 800 |
| 24 Volt Standard Duty Starter—Cold Cranking Amps | 570 |

RG,RG34710,5568 –19–20MAY96–2/2

## Checking Cooling System

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

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

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

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

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

TS281 –UN–23AUG88

*High-Pressure Fluids*

RG,RG34710,5580 –19–20MAY96–1/1

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

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

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

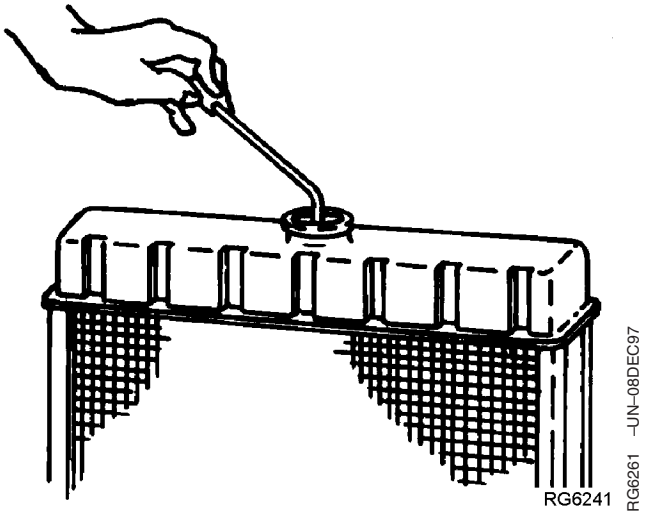
Through time and use, the concentration of coolant additives is gradually depleted during engine operation. Periodic replenishment of inhibitors is required, even when John Deere COOL-GARD™ is used. The cooling system must be recharged with additional supplemental coolant additives available in the form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

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

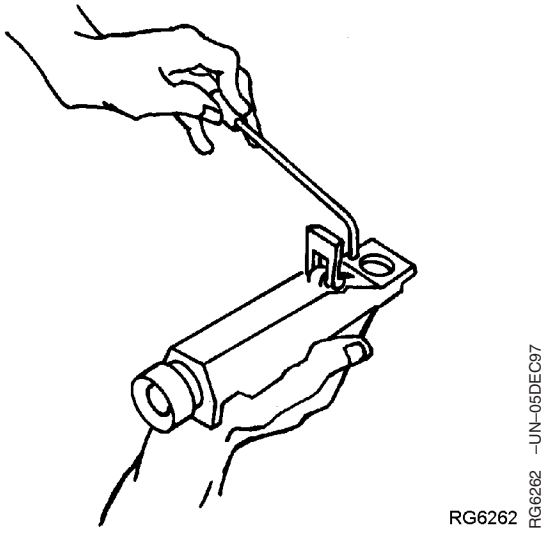
**John Deere LIQUID COOLANT CONDITIONER is recommended as a supplemental coolant additive in John Deere engines.**

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

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




*Radiator Coolant Check*




*JT07298 Coolant/Battery Tester*

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

**Continued on next page**

DPSG,OUOD002,1921 –19–27JUL06–1/2

**IMPORTANT: ALWAYS maintain coolant at correct level and concentration. DO NOT operate engine without coolant even for a few minutes.**

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

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

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

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

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

DPSG,OUOD002,1921 –19–27JUL06–2/2

## 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.

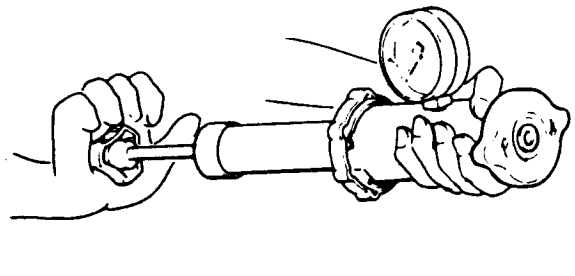
### COOLSCAN™ and COOLSCAN PLUS™

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

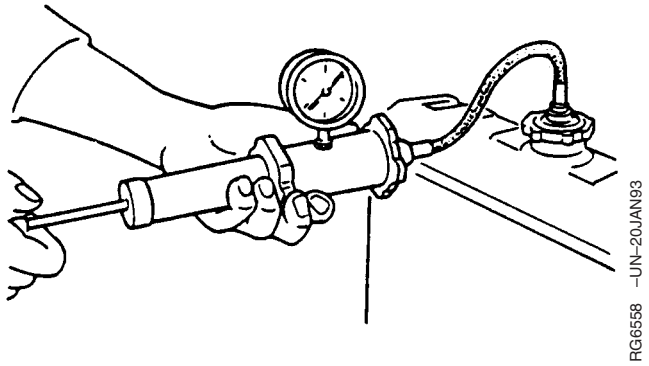
*COOLSCAN is a trademark of Deere & Company*
*COOLSCAN PLUS is a trademark of Deere & Company*

DX,COOL9 –19–19DEC03–1/1

## Pressure Testing Cooling System




*Test Radiator Cap*




*Test Cooling System*

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

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

### Test Radiator Cap

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

   If gauge does not hold pressure, replace radiator cap.

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

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

### Test Cooling System

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

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

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

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

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

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

RG,RG34710,5586 –19–07JAN02–1/1

## Checking Crankshaft Vibration Damper (If Equipped)

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

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

2. Check vibration damper radial runout by positioning a dial indicator so probe contacts damper outer diameter.

3. Remove starter motor.

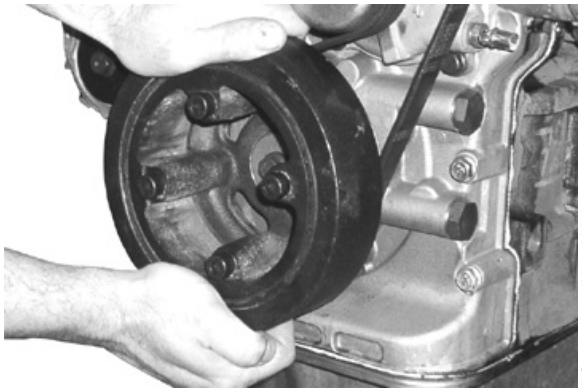
4. Rotate crankshaft using JDG1704 or JDG10221 Flywheel Turning Tool as shown. This tool is available from your John Deere dealer or distributor.

5. Note dial indicator reading. If runout exceeds specifications given below, replace vibration damper.

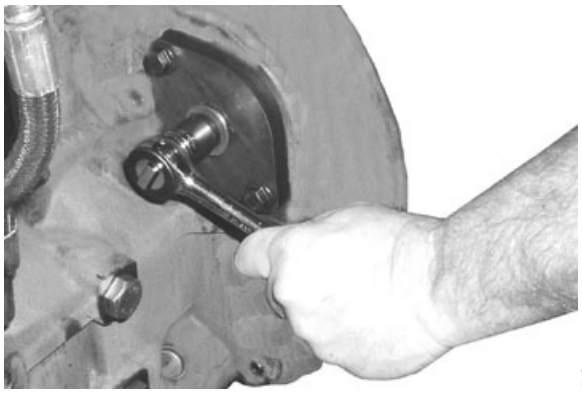
| Specification | |
|---|---|
| Vibration Damper—Maximum Radial Runout | 1.00 mm (0.040 in.) |

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

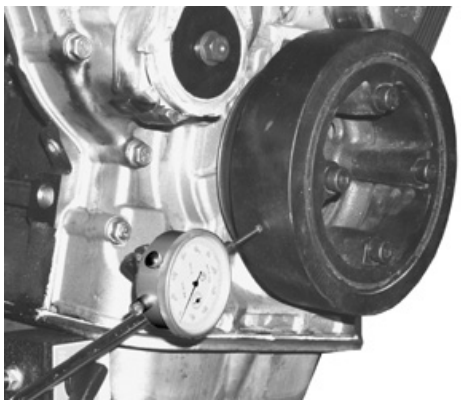
| Specification | |
|---|---|
| Starter Motor Mounting Cap Screws—Torque | 80 N•m (59 lb-ft) |


RG12917 –UN–16MAY03

*Vibration Damper*


RG12788 –UN–21JAN03

*Rotating Crankshaft Using JDG1704*


RG12918 –UN–16MAY03

*Vibration Damper Radial (Concentricity)*

OUOD006,000006E –19–02JAN07–1/1

## Flushing and Refilling Cooling System

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

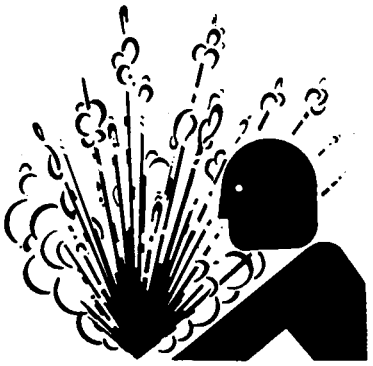
**Shut off engine. Only remove filler cap when cool enough to touch with bare hands. Slowly loosen cap to first stop to relieve pressure before removing completely.**

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

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

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

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

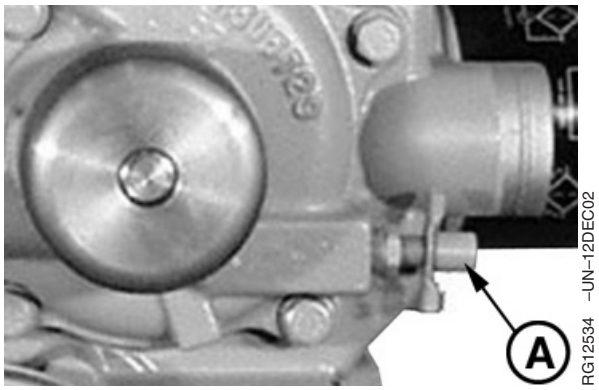


TS281 –UN–23AUG88

*High-Pressure Fluids*

RG6576 –UN–20JAN93

*Cooling System Filler Cap*




RG12534 –UN–12DEC02

*Engine Coolant Drain Valve*

**A—Engine Coolant Drain Valve**

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

7. Fill the cooling system with clean water. Run the engine about 10 minutes to stir up possible rust or sediment.

8. Stop engine, pull off lower radiator hose and remove radiator cap. Immediately drain the water from system before rust and sediment settle.

9. After draining water, close drain valves. Reinstall radiator cap and radiator hose and clamp. Fill the cooling system with clean water and a heavy duty cooling system cleaner such as Fleetguard® RESTORE™ and RESTORE PLUS™. These products may be available from your John Deere dealer. Follow manufacturer's directions on label.

10. After cleaning the cooling system, drain cleaner and fill with water to flush the system. Run the engine about 10 minutes, remove radiator cap and pull off lower radiator hose to drain out flushing water.

11. Close all drain valves on coolant pump and radiator. Install thermostat. Reinstall radiator hose and tighten clamps securely.

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

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


*Radiator Cap*

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

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

13. Run engine until it reaches operating temperature. This mixes the solution uniformly and circulates it through the entire system. See GENERAL ENGINE SPECIFICATIONS in Specification Section for normal coolant temperature specification for your engine.

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

OURGP12,00002B8 –19–03AUG07–3/3

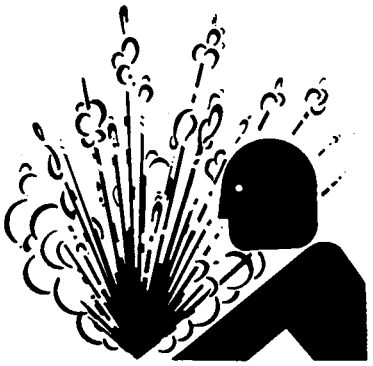
## Testing Thermostats Opening Temperature

**To Remove Thermostat**

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

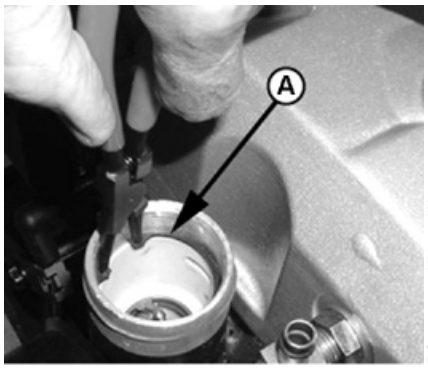
1. Visually inspect area around thermostat housing on top of engine timing gear cover for leaks.
2. Remove radiator pressure cap and partially drain cooling system.
3. Remove coolant hose (shown removed) from thermostat housing.
4. Remove snap ring (A) from thermostat housing.
5. Remove thermostat (B)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

**A—Snap Ring**
**B—Thermostat**



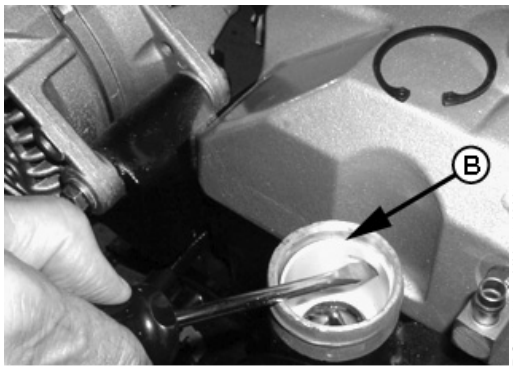
TS281 –UN–23AUG88

*High Pressure Fluids*




RG14940 –UN–03JAN07

*Remove Snap Ring*




RG14941 –UN–03JAN07

*Remove Thermostat*

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OUOD006,00000C1 –19–03AUG07–1/3

**Testing Thermostats Opening Temperature**

1. Remove thermostat(s).

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

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

3. Suspend thermostat and a thermometer in a container of water.

4. Stir the water as it heats. Observe opening action of thermostat and compare temperatures with the specification below.

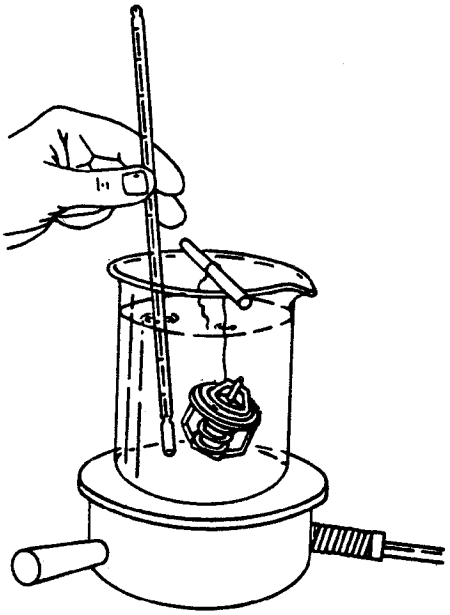
*NOTE: Due to varying tolerances of different suppliers, initial opening and full open temperatures may vary slightly from specified temperatures.*

**THERMOSTAT TEST SPECIFICATIONS**

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

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

6. Replace any defective thermostat.



RG5971 –UN–23NOV97

*Testing Thermostat Opening Temperature*

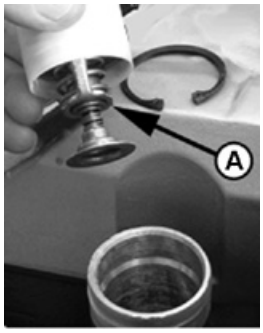
**Continued on next page**

**To Install Thermostats**

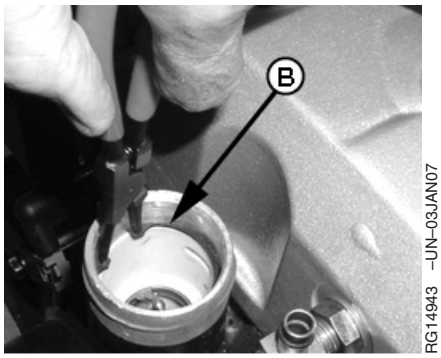
1. Insert thermostat (A) in housing.
2. Install snap ring (B) in groove.
3. Install coolant hose to thermostat cover. Tighten clamp.
4. If not already done, fill cooling system and check for leaks.

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

**A—Thermostat**
**B—Snap Ring**




*Install Thermostat*



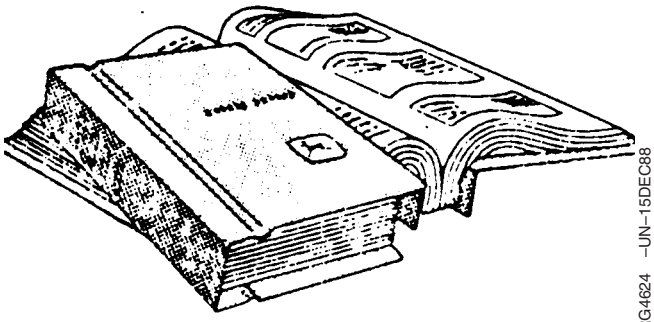

*Install Snap Ring*

OUOD006,00000C1 –19–03AUG07–3/3

# 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.



RG4624 –UN–15DEC88

*Component Technical Manuals*

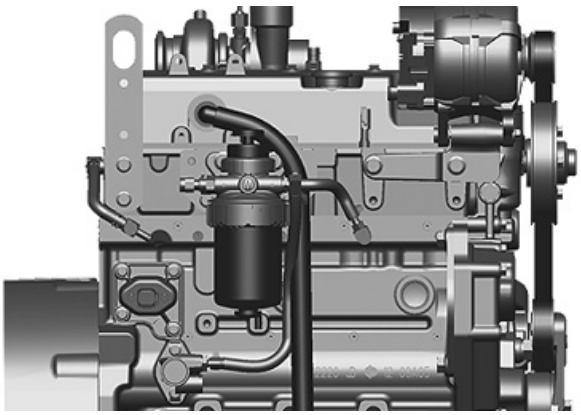
OURGP11,0000048 –19–11OCT06–1/1

## Do Not Modify Fuel System

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

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

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



RG15478 –UN–19OCT07

*Fuel System*

OUOD006,000011D –19–19OCT07–1/1

## Adding Coolant

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

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

TS281 –UN–23AUG88

*High-Pressure Fluids*

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

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

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


RG6576A –UN–04JUN03

*Radiator Filler Neck*

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

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

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

2. Remove radiator cap and fill until coolant level touches bottom of radiator filler neck (A).

**Continued on next page**

3. Tighten plugs and fittings when air has been expelled from system.

4. Run engine until it reaches operating temperature.

OUOD006,0000070 –19–03JAN07–2/2

## Replacing Single Stage Air Cleaner Element

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

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

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

| Specification | |
|---|---|
| Air Cleaner Neck to Engine Intake—Overlap | 38 mm (1.5 in) |

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

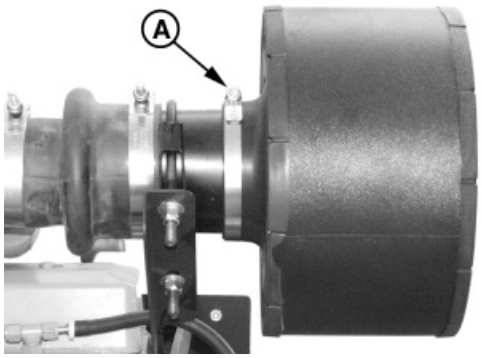
| Specification | |
|---|---|
| Air Cleaner Neck Clamp—Torque | 6.8 N•m (60 lb-in.) |

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

6. If equipped, tighten body clamp until snug.

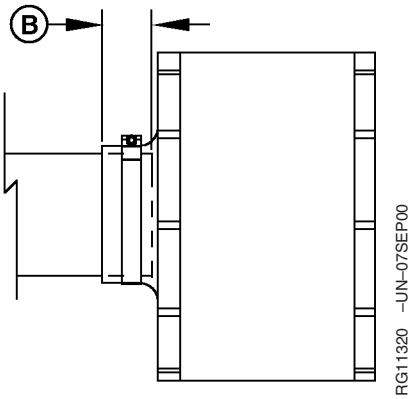
**IMPORTANT: Whenever the air cleaner has been serviced or removed, ALWAYS fully depress the air restriction indicator reset button (if equipped) to assure accurate readings.**

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




RG11319A –UN–06SEP00

*Single Stage Air Filter*




RG11320 –UN–07SEP00

*Installation of Single Stage Air Cleaner*

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

RG41183,0000053 –19–03JAN07–1/1

## Replacing Axial Seal Air Cleaner Filter Element

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

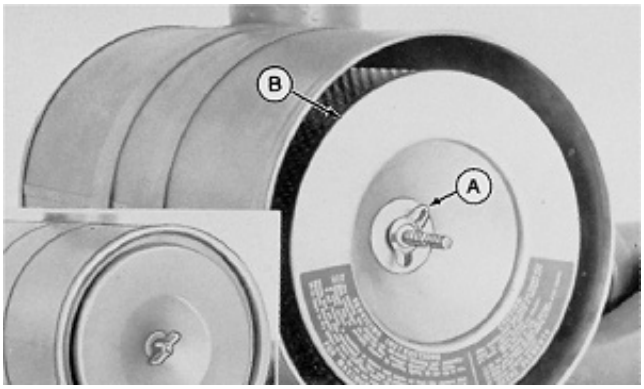
*NOTE: Refer to manufacturers' instructions for servicing air cleaners not supplied by John Deere. If engine is NOT equipped with an air restriction indicator, replace air filter element every 500 hours of operation or every 12 months, whichever occurs first.*

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

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

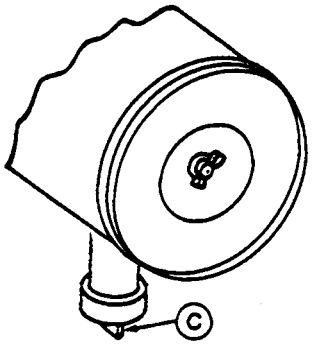
**IMPORTANT: Remove secondary (safety) element (E) ONLY for replacement. DO NOT attempt to clean, wash, or reuse secondary element. Replacement of secondary element is usually necessary ONLY when primary element has a hole in it.**

4. To replace secondary element, remove retaining nut (D) and secondary element (E). Immediately replace secondary element with new element to prevent dust from entering air intake system.
5. Install new primary element and tighten wing nut securely. Install cover assembly and tighten retaining wing nut securely.



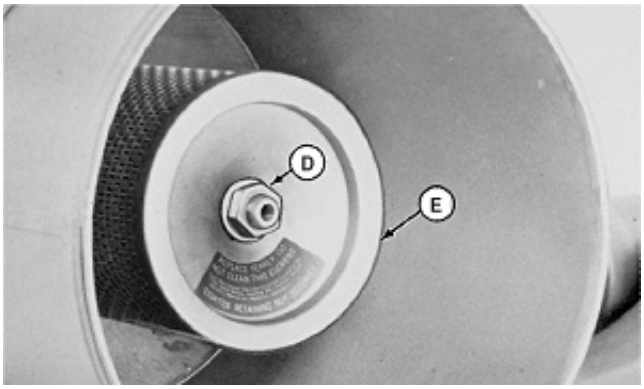

RG4686 –UN–20DEC88

*Wing Nut and Primary Element*




RG4687 –UN–20DEC88

*Dust Unloader Valve*




RG11068 –UN–26JUN00

*Retaining Nut and Secondary Element*

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

**Continued on next page**

**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.

RG41183,0000054 –19–03JAN07–2/2

## Replacing Radial Seal Air Cleaner Filter Element

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

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

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

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

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

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

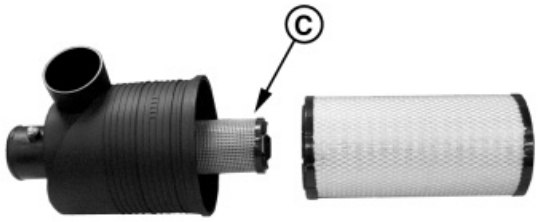
7. Close housing with dust unloader valve aimed down and latch latches.


RG11321A –UN–08SEP00

*Dust Cup/Cover*


RG11322A –UN–08SEP00

*Primary Filter Element*




RG11327A –UN–08SEP00

*Secondary Filter Element*

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

**Continued on next page**

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

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

RG41183,0000055 –19–03JAN07–2/2

## Replacing Fan and Alternator Belt

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

1. Inspect belts for cracks, fraying, or stretched out areas. Replace if necessary.

2. To replace belt, release tension on belt using a 3/8-inch drive arm (B) on tension arm.

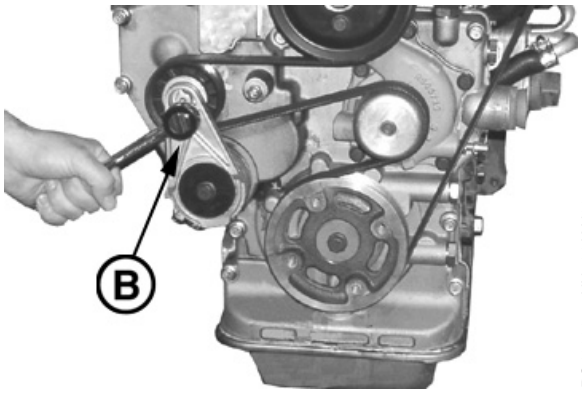
3. Remove poly-vee belt from pulleys and discard belt.

4. Install new belt, making sure belt is correctly seated in all pulley grooves. Refer to belt routing at right for your application.

5. Best method to install belt is:
Back-wrap it around the fan pulley (FD), route it over the alternator (A), over top of the idler pulley (I), then down and around the crankshaft pulley (CSP). Finally, use a 3/8-inch drive arm to rotate the tensioner (T) to the tensioned position and slip the belt (back-wrap) over the coolant pump pulley (CP), then release the tensioner.

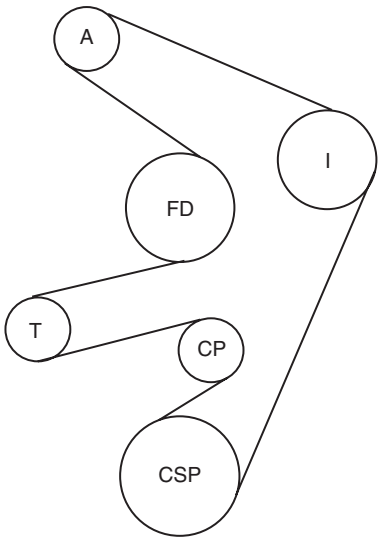
6. Apply tension to belt with tensioner. Remove drive arm.

7. Start engine and check belt alignment.




RG12800 –UN–21JAN03

*Replacing Belt*




RG12799 –UN–21JAN03

*Belt Routing*

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

RG41183,0000056 –19–03JAN07–1/1

## Checking Fuses

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

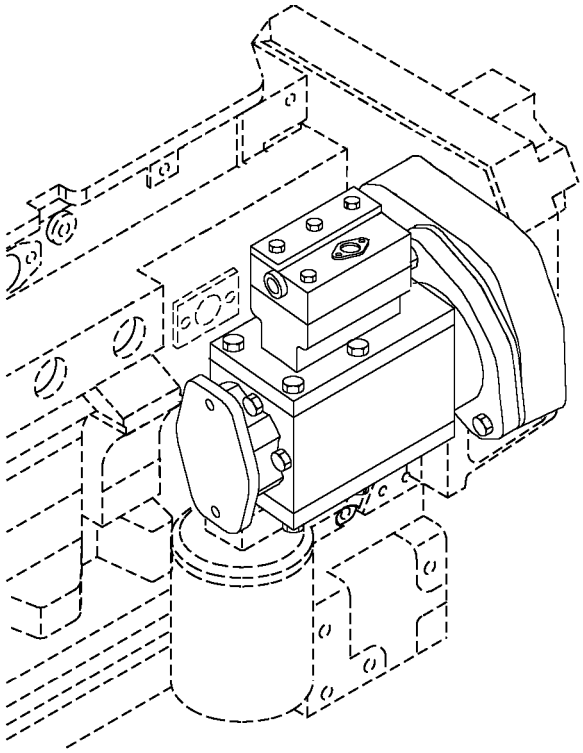
OUOD006,0000111 –19–11OCT07–1/1

## Checking Air Compressors (If Equipped)

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

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

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

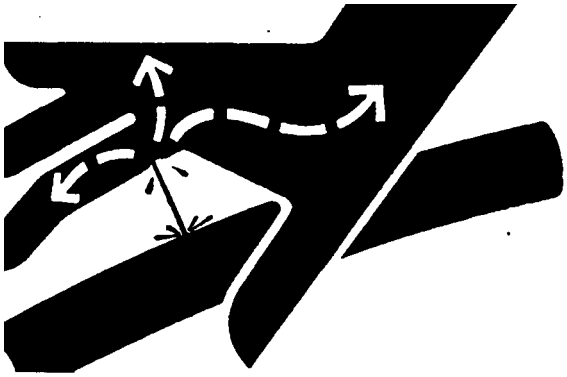


RG12836 –UN–27FEB03

*Air Compressor (Optional)*

OURGP12,00001E0 –19–26FEB03–1/1

## Priming the Fuel Filter



X9811 –UN–23AUG88

*High Pressure Fluids*

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

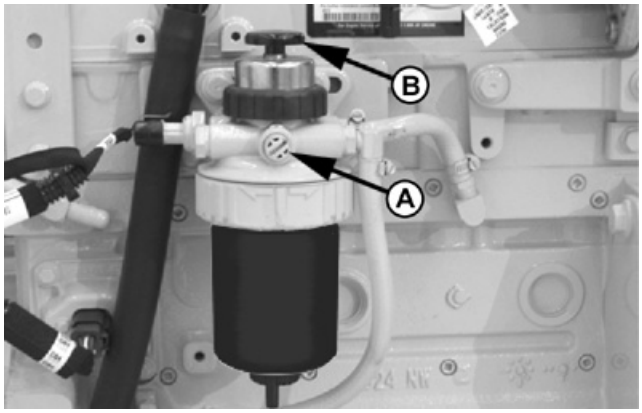
**If an accident occurs, see a doctor immediately. Any fluid injected into the skin must be surgically removed within a few hours or gangrene may result. Doctors unfamiliar with this type of injury may call the Deere & Company Medical Department in Moline, Illinois, or other knowledgeable medical source.**

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

OUOD006,00000C4 –19–19OCT07–1/2

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

**A—Air Bleed Plug**
**B—Hand Primer**




RG15630 –UN–19OCT07

*Fuel Filter Air Bleed Plug and Hand Primer*

OUOD006,00000C4 –19–19OCT07–2/2

## General Troubleshooting Information

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

Wiring diagrams are shown for the electronic instrument panel and harness offered for these engines.

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: The engines covered in this manual have electronic control systems which send diagnostic trouble codes to signal problems (see DIAGNOSTIC TROUBLE CODE PROCEDURE, later in this section).*

RG,RG34710,5605 –19–27JUL06–1/1

## Precautions For Welding On Engines Equipped With Electronic Engine Control Unit (ECU)

**IMPORTANT: ALWAYS disconnect Electronic Control Unit (ECU) connectors and engine control system-to-machine ground before welding on engine or machine. 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.

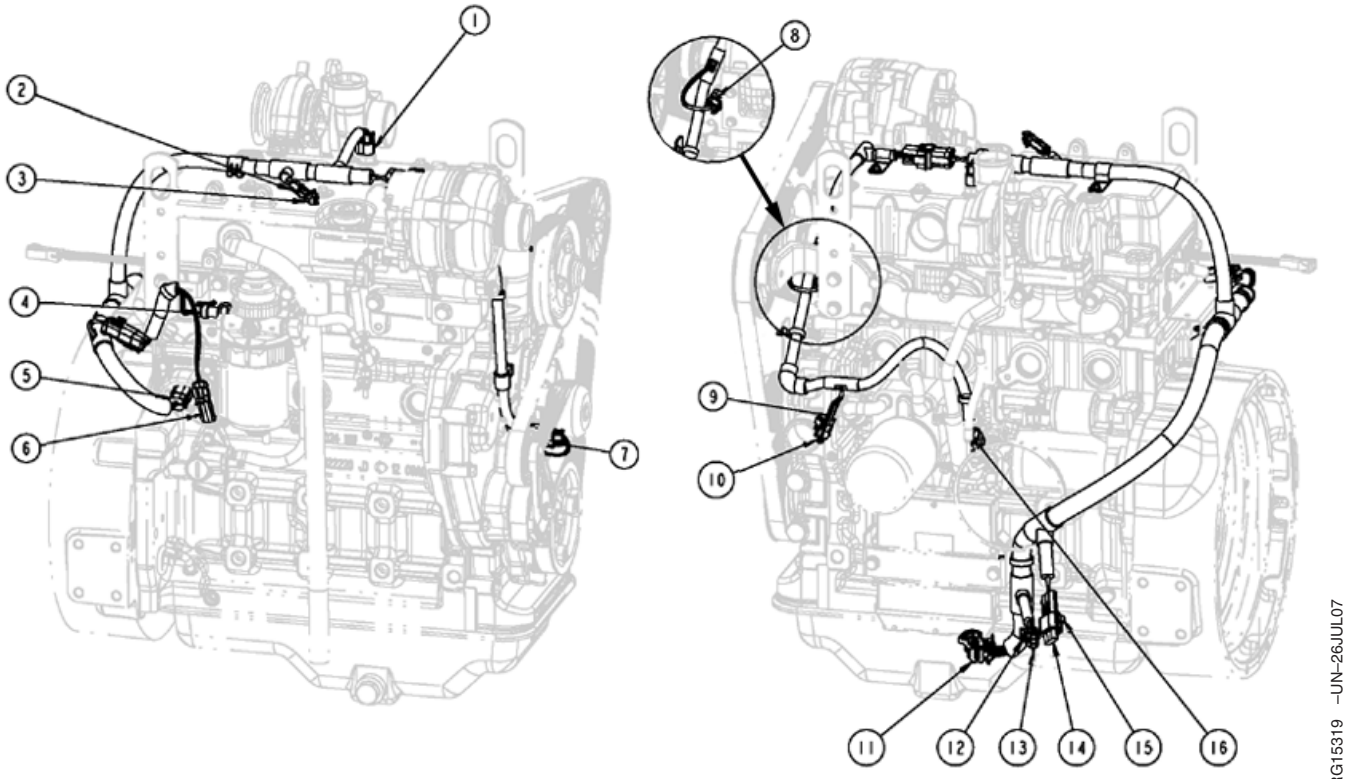
OUOD002,000016B –19–27JUL06–1/1

## Precautions for Electrical System When Steam Cleaning Engine

**IMPORTANT: Do not steam clean any electrical or electronic components while steam cleaning the engine as it could damage sensitive parts.**

OURGP11,000012A –19–12SEP06–1/1

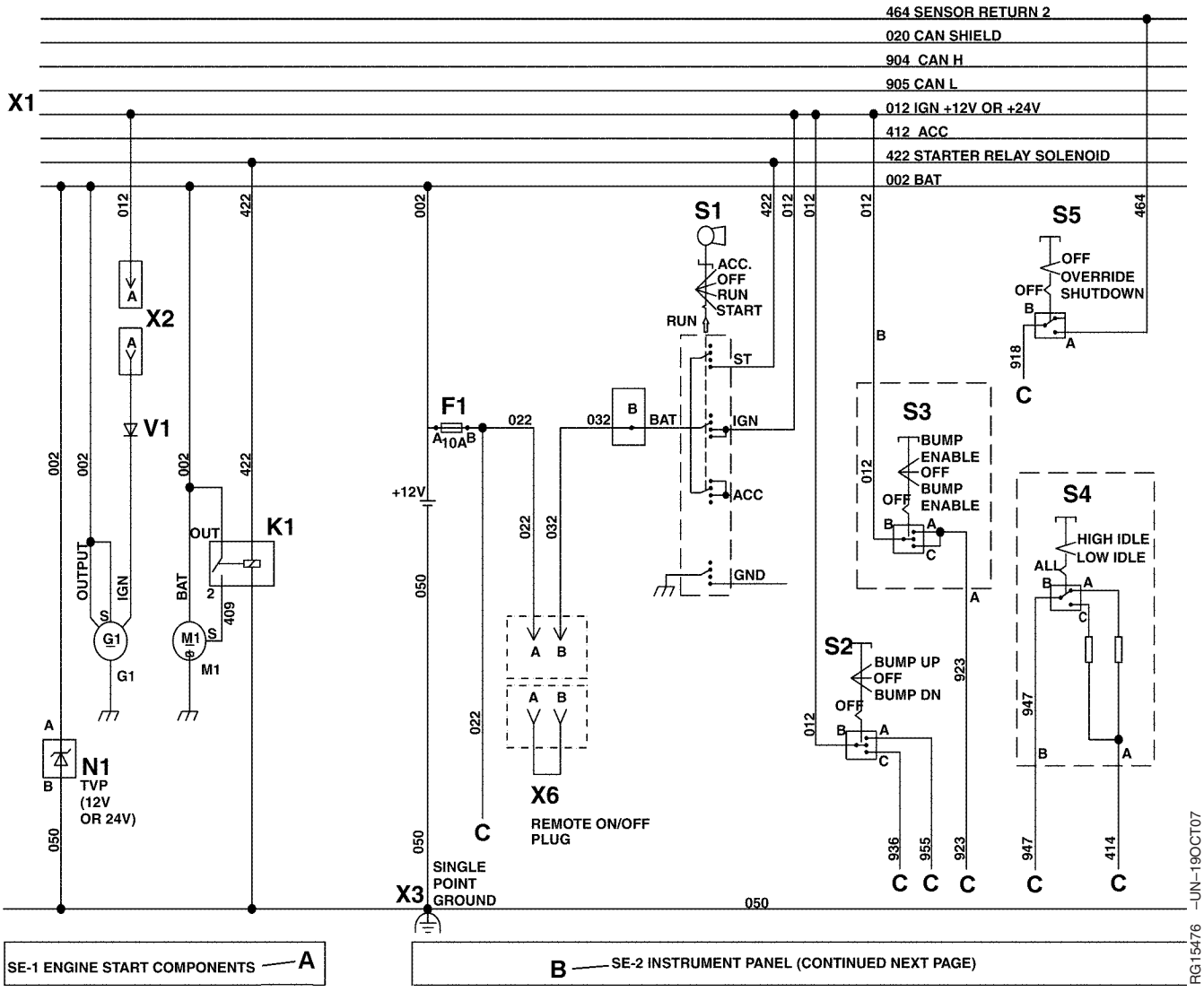
## Wiring Harness Layout




1—Manifold Air Temperature
2—Alternator Excitation
3—Alternator Excitation Dust Cap
4—Fuel Pressure
5—Fuel Injection
6—Water In Fuel Sensor
7—Cam Sensor
8—Coolant Temperature
9—Oil Pressure
10—Oil Pressure Dust Cap
11—ECU Engine Connector
12—Glow Plug
13—Glow Plug Dust Cap
14—Auxiliary Power Dust Cap
15—Auxiliary Power Connector
16—Engine Crank Sensor

OUOD006,00000B5 –19–04OCT07–1/1

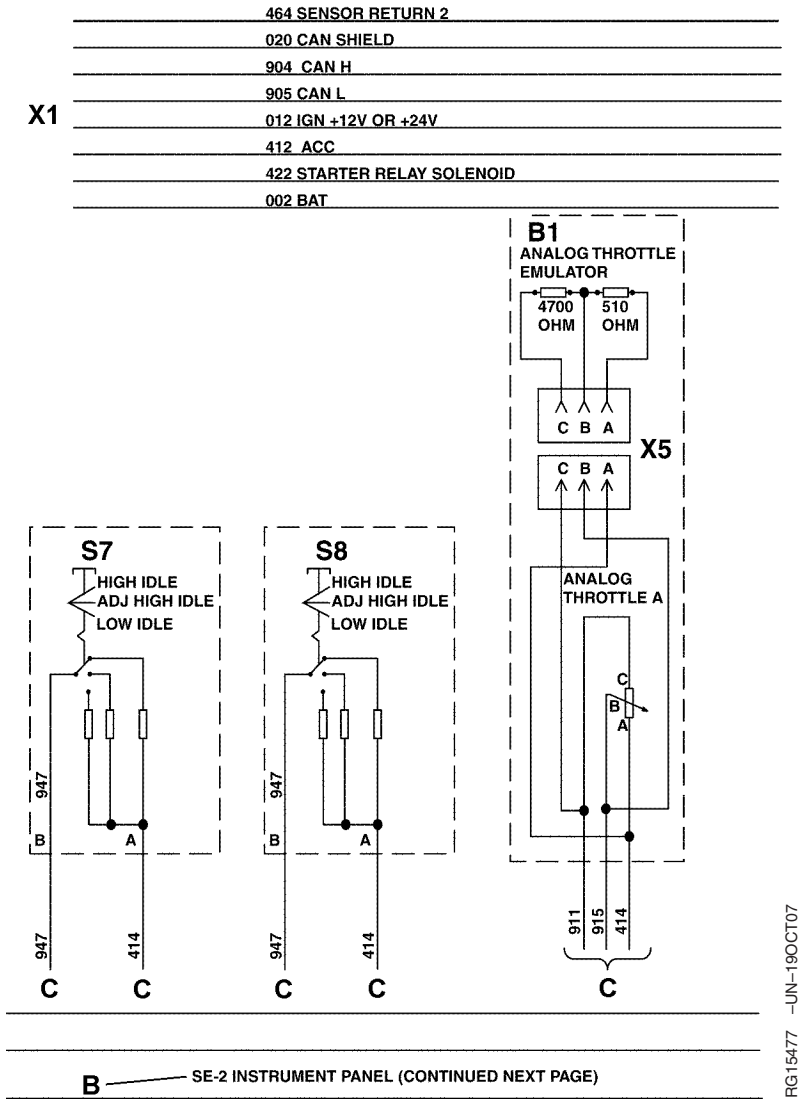
## Wiring Diagram - Instrument Panel Components




A—SE-1 Engine Start Components
B—SE-2 Instrument Panel (Continued Next Page)
C—To ECU
F1—Fuse (10 Amp)
G1—Alternator
K1—Starter Relay
M1—Starter Motor
N1—Transient Voltage Protector
S1—Ignition Key Switch
S2—Speed Select Switch (Momentary)
S3—Bump Enable Switch (Momentary)
S4—Dual State Throttle Switch
S5—Override Shutdown Switch (Momentary)
V1—Diode
X1—Vehicle Harness Connector
X2—Alternator Harness Connector
X3—Single Point Ground
X6—Remote On/Off Plug
002—BAT
012—IGN +12V or + 24V
020—CAN Shield
412—ACC
422—Starter Relay Solenoid
464—Sensor Return 2
904—CAN H
905—CAN L

OUOD006,000010B –19–10OCT07–1/1

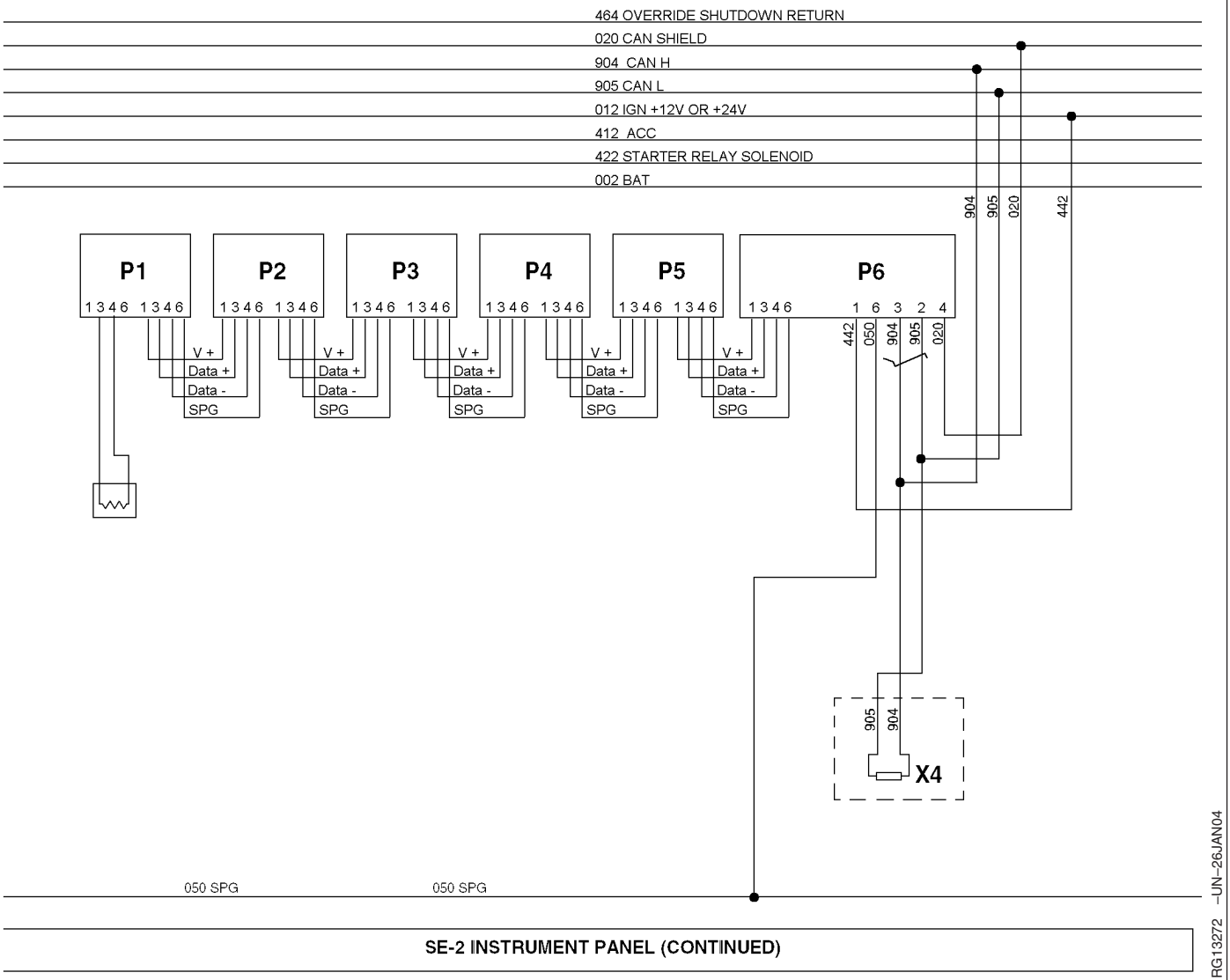
## Wiring Diagram - Instrument Panel Components (Continued)




B—SE-2 Instrument Panel (Continued Next Page)
B1—Analog Throttle Emulator
C—To ECU
S7—Tri-state Throttle Switch
S8—Ramp Throttle Switch
X1—Vehicle Harness Connector
X5—Analog Throttle Connector
002—BAT
012—IGN +12V or + 24V
020—CAN Shield
412—ACC
422—Starter Relay Solenoid
464—Sensor Return 2
904—CAN H
905—CAN L

OUOD006,000010C –19–10OCT07–1/1

## Wiring Diagram - Instrument Panel Components (Continued)




**P1—Optional Gauge**
**P2—Optional Gauge**
**P3—Oil Pressure Gauge**
**P4—Coolant Temperature Gauge**
**P5—Tachometer Display**
**P6—Hourmeter/ Diagnostic Meter**
**X4—CAN Terminator**
**002—BAT**
**012—IGN +12V or + 24V**
**020—CAN Shield**
**412—ACC**
**422—Starter Relay Solenoid**
**464—Sensor Return 2**
**904—CAN H**
**905—CAN L**

OUOD006,000010D –19–10OCT07–1/1

## Engine Troubleshooting

| Symptom | Problem | Solution |
|---|---|---|
| *NOTE: If using BIODIESEL blends above B20, the possibility of some of the symptoms listed below, such as power loss, could increase.* | Incorrect starting procedure. | Verify correct starting procedure. |
| **Engine cranks but will not start** | | |
| | No fuel. | Check fuel in tank and manual shut-off valve. |
| | Exhaust restricted. | Check and correct exhaust restriction. |
| | Fuel filter plugged or full of water. | Replace fuel filter or drain water from filter. |
| | Unit injection pumps not getting fuel /or air in fuel system. | Check fuel flow at transfer pump or bleed fuel system. |
| | Faulty injection pumps or nozzles. | Consult authorized diesel repair station for repair or replacement. |

**Continued on next page**

| Symptom | Problem | Solution |
|---|---|---|
| **Engine hard to start or will not start** | Engine starting under load. | Disengage driveline. |
| | Improper starting procedure. | Review starting procedure. |
| | No fuel. | Check fuel tank. |
| | Air in fuel line. | Bleed fuel line. |
| | Cold weather. | Activate glow plugs. |
| | Slow starter speed. | See “Starter Cranks Slowly”. |
| | Crankcase oil too heavy. | Use oil of proper viscosity. |
| | Improper type of fuel. | Consult fuel supplier; use proper type fuel for operating conditions. |
| | Water, dirt, or air in fuel system. | Drain, flush, fill, and bleed system. |
| | Clogged fuel filter. | Replace filter element. |
| | Dirty or faulty injection nozzles. | Have authorized servicing dealer or engine distributor check injectors. |
| | Injection shut-off not reset. | Turn key switch to “OFF” then to “ON”. |
| **Engine overspeeds at startup (Generator set engines)** | Low gain on electronic governor. | Increase governor speed gain. |
| **Sluggish response to load changes (Generator set engines)** | Low gain on electronic governor. | Increase governor speed gain. |
| **Engine knocks** | Low engine oil level. | Add oil to engine crankcase. |
| | Unit injection pumps out of time. | See your authorized servicing dealer or engine distributor. |
| | Hydraulic valve lifters. | See your authorized servicing dealer or engine distributor. |
| | Low coolant temperature. | Remove and check thermostat. |
| | Engine overheating. | See “Engine Overheats”. |

Continued on next page

| Symptom | Problem | Solution |
|---|---|---|
| **Engine runs irregularly or stalls frequently** | Low coolant temperature. | Remove and check thermostat. |
| | Clogged fuel filter. | Replace fuel filter element. |
| | Water, dirt, or air in fuel system. | Drain, flush, fill, and bleed system. |
| | Dirty or faulty injectors. | Have authorized servicing dealer or engine distributor check injectors. |
| **Below normal engine temperature** | Defective thermostat. | Remove and check thermostat. |
| | Defective temperature gauge or sender. | Check gauge, sender, and connections. |

**Continued on next page**

| Symptom | Problem | Solution |
|---|---|---|
| **Lack of power** | Engine overloaded. | Reduce load. |
| | Intake air restriction. | Service air cleaner. |
| | Clogged fuel filter. | Replace filter elements. |
| | Improper type of fuel. | Use proper fuel. |
| | Overheated engine. | See “Engine Overheats”. |
| | Below normal engine temperature. | Remove and check thermostat. |
| | Improper valve clearance. | See your authorized servicing dealer or engine distributor. |
| | Dirty or faulty injectors. | Have authorized servicing dealer or engine distributor check injectors. |
| | Injector tip deposits. | Use John Deere approved biodiesel fuel conditioners containing detergents. |
| | Unit injection pumps out of time | See your authorized servicing dealer or engine distributor. |
| | Turbocharger not functioning. | See your authorized servicing dealer or engine distributor. |
| | Leaking exhaust manifold gasket. | See your authorized servicing dealer or engine distributor. |
| | Restricted fuel hose. | Clean or replace fuel hose. |
| | Low fast idle speed. | See your authorized servicing dealer or engine distributor. |
| **Low oil pressure** | Low oil level. | Add oil. |
| | Improper type of oil. | Drain, fill crankcase with oil of proper viscosity and quality. |

**Continued on next page**

| Symptom | Problem | Solution |
|---|---|---|
| **High oil consumption** | Crankcase oil too light. | Use proper viscosity oil. |
| | Oil leaks. | Check for leaks in lines, gaskets, and drain plug. |
| | Restricted crankcase vent tube. | Clean vent tube. |
| | Defective turbocharger. | See your authorized servicing dealer or engine distributor. |
| **Engine emits white smoke** | Improper type of fuel. | Use proper fuel. |
| | Low engine temperature. | Warm up engine to normal operating temperature. |
| | Defective thermostat. | Remove and check thermostat. |
| | Defective fuel injectors. | See your authorized servicing dealer or engine distributor. |
| | Engine out of time. | See your authorized servicing dealer or engine distributor. |
| **Engine emits black or gray exhaust smoke** | Improper type of fuel. | Use proper fuel. |
| | Clogged or dirty air cleaner. | Service air cleaner. |
| | Engine overloaded. | Reduce load. |
| | Fuel injectors dirty. | Use John Deere approved Biodiesel or diesel fuel conditioners. If no improvement is seen, see your authorized servicing dealer or engine distributor. |
| | Engine out of time. | See your authorized servicing dealer or engine distributor. |
| | Turbocharger not functioning. | See your authorized servicing dealer or engine distributor. |

**Continued on next page**

| Symptom | Problem | Solution |
|---|---|---|
| **Engine overheats** | Engine overloaded. | Reduce load. |
| | Low coolant level. | Fill radiator to proper level, check radiator and hoses for loose connections or leaks. |
| | Faulty radiator cap. | Have serviceman check. |
| | Stretched poly-vee belt or defective belt tensioner. | Check automatic belt tensioner and check belts for stretching. Replace as required. |
| | Low engine oil level. | Check oil level. Add oil as required. |
| | Cooling system needs flushing. | Flush cooling system. |
| | Defective thermostat. | Remove and check thermostat. |
| | Defective temperature gauge or sender. | Check water temperature with thermometer and replace, if necessary. |
| | Incorrect grade of fuel. | Use correct grade of fuel. |
| **High fuel consumption** | Improper type of fuel. | Use proper type of fuel. |
| | Clogged or dirty air cleaner. | Service air cleaner. |
| | Engine overloaded. | Reduce load. |
| | Improper valve clearance. | See your authorized servicing dealer or engine distributor. |
| | Injector tip deposits. | Use John Deere approved biodiesel fuel conditioners containing detergents. |
| | Fuel injectors dirty. | See your authorized servicing dealer or engine distributor. |
| | Engine out of time. | See your authorized servicing dealer or engine distributor. |
| | Defective turbocharger. | See your authorized servicing dealer or engine distributor. |
| | Low engine temperature. | Check thermostat. |

Continued on next page

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

**Continued on next page**

| Symptom | Problem | Solution |
|---|---|---|
| **Entire electrical system does not function** | Faulty battery connection. | Clean and tighten connections. |
| | Sulfated or worn-out batteries. | See your authorized servicing dealer or engine distributor. |
| | Blown main system fuse. | Replace electrical system fuse. |

OUOD006,00000CB –19–19OCT07–8/8

## Instrument Panel Method for Retrieving Diagnostic Trouble Codes

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

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

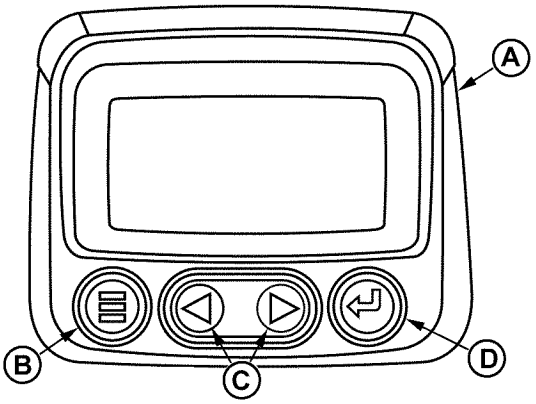
1. Make sure all engine mechanical and other systems not related to the electronic control system are operating properly. (See ENGINE TROUBLESHOOTING later in this section.)

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

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

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.




RG13740 –UN–11NOV04

*Trouble Code Display On Instrument Panel*

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

OURGP11,0000063 –19–08DEC05–1/1

## Displaying Of Diagnostic Trouble Codes (DTCs)

There are several different methods for displaying both stored and active DTCs from the ECU via a fault lamp or a diagnostic gauge on the electronic instrument panel.

**2-DIGIT CODES**

Some engines display Service Codes or DTCs as 2-digit codes read from a fault lamp which gives blink codes.

**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 six-digit Suspect Parameter Number (SPN) followed by a two-digit 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 engine coolant temperature input voltage too high, or the equivalent of 2-digit fault code 18.

If diagnosing an application that shows DTCs as SPNs and FMIs, using the following list, determine the equivalent 2-digit code and have your dealer use the diagnostic procedure in the component technical manual for that 2-digit code.

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

DPSG,OUOD002,1591 –19–27JUL06–1/1

# Listing of Diagnostic Trouble Codes (DTCs)

*NOTE: Not all of these codes are used on all OEM engine applications*

## Trouble Codes

**DTC's Listing in Ascending SPN/FMI Codes**

| —SPN | FMI | Description of Fault | Corrective Action |
|---|---|---|---|
| 000029 | 03 | Throttle #2 Signal Out of Range High | Check Sensor and Wiring |
| | 04 | Throttle #2 Signal Out of Range Low | Check Sensor and Wiring |
| 000091 | 03 | Throttle #1 Signal Out of Range High | Check Switch and Wiring |
| | 04 | Throttle #1 Signal Out of Range Low | Check Switch and Wiring |
| | 07 | Throttle #1 Not Responding | Contact Servicing Dealer |
| | 13 | Throttle Voltage Out of Range | Check Sensor and Wiring |
| 000094 | 03 | Low Pressure Fuel Signal Out of Range High | Check Sensor and Wiring |
| | 04 | Low Pressure Fuel Signal Out of Range Low | Check Sensor and Wiring |
| | 17 | High Pressure Fuel System- Pressure Slightly Low | Contact Servicing Dealer |
| 000100 | 01 | Engine Oil Pressure Signal Extremely Low | Check Oil Level |
| | 04 | Engine Oil Pressure Signal Out of Range Low | Check Sensor and Wiring |
| 000105 | 00 | Intake Manifold Air Temperature Signal Extremely High | Check Air Cleaner, Aftercooler, or Room Temperature |
| | 03 | Intake Manifold Air Temperature Signal Out of Range High | Check Sensor and Wiring |
| | 04 | Intake Manifold Air Temperature Signal Out of Range Low | Check Sensor and Wiring |
| | 15 | Intake Manifold Air Temperature Signal Slightly High | Check Air Cleaner, Aftercooler, or Room Temperature |
| | 16 | Intake Manifold Air Temperature Signal Moderately High | Check Air Cleaner, Aftercooler, or Room Temperature |
| 000108 | 02 | Barometric Pressure Signal Invalid | Contact Servicing Dealer |
| 000110 | 00 | Engine Coolant Temperature Signal Extremely High | Check Cooling System, Reduce Power |
| | 03 | Engine Coolant Temperature Signal Out of Range High | Check Sensor and Wiring |
| | 04 | Engine Coolant Temperature Signal Out of Range Low | Check Sensor and Wiring |
| | 15 | Engine Coolant Temperature Signal Slightly High | Check Cooling System, Reduce Power |
| | 16 | Engine Coolant Temperature Signal Moderately High | Check Cooling System, Reduce Power |
| 000158 | 17 | ECU Power Down Error (Internal ECU Problem) | Contact Servicing Dealer |
| 000174 | 03 | Fuel Temperature Signal Out of Range High | Check Sensor and Wiring |
| | 04 | Fuel Temperature Signal Out of Range Low | Check Sensor and Wiring |
| 000189 | 00 | Engine Speed Derate Condition Exists | Check Fault Codes or Contact Servicing Dealer |
| 000569 | 03 | Rear Axle Differential Lock Signal Out of Range High | Contact Servicing Dealer |
| | 04 | Rear Axle Differential Lock Signal Out of Range Low | Contact Servicing Dealer |
| 000611 | 03 | Injector Shorted to Power | Check Wiring |
| | 04 | Injector Shorted to Ground | Check Wiring |
| 000627 | 01 | All Injector Currents Are Low | Check Battery Voltage and Wiring |
| | 18 | Battery Voltage Moderately Low | Contact Service Dealer |
| 000629 | 12 | ECU EEPROM Error | Contact Service Dealer |
| | 13 | ECU Programming Error | Contact Service Dealer |
| 000636 | 02 | Camshaft Sensor Signal Unreliable | Check Sensor and Wiring |
| | 05 | Camshaft Sensor Circuit Has High Resistance | Contact Service Dealer |
| | 06 | Camshaft Sensor Circuit Has Low Resistance | Contact Service Dealer |
| | 08 | Camshaft Sensor Signal Missing | Check Sensor and Wiring |
| | 10 | Camshaft Sensor Signal Rate of Change Abnormal | Check Sensor and Wiring |
| 000637 | 02 | Engine Timing Sensor Signal Unreliable | Check Sensor and Wiring |
| | 05 | Engine Position Sensor Circuit Has High Resistance | Contact Service Dealer |
| | 06 | Engine Position Sensor Circuit Has Low Resistance | Contact Service Dealer |
| | 07 | Engine Timing and Position Sensors Out of Sync | Check Sensor and Wiring |
| | 08 | Engine Timing Sensor Signal Missing | Check Sensor and Wiring |
| | 10 | Engine Timing Signal Rate of Change Abnormal | Check Sensor and Wiring |

**Continued on next page**

| —SPN | FMI | Description of Fault | Corrective Action |
|---|---|---|---|
| 000651 | 05 | Injector Number 1 Circuit Has High Resistance | Check Injector Wiring or Injector Solenoid |
| | 06 | Injector Number 1 Circuit Has Low Resistance | Check Injector Wiring or Injector Solenoid |
| | 13 | Injector Number 1 Calibration Fault | Contact Service Dealer |
| 000652 | 05 | Injector Number 2 Circuit Has High Resistance | Check Injector Wiring or Injector Solenoid |
| | 06 | Injector Number 2 Circuit Has Low Resistance | Check Injector Wiring or Injector Solenoid |
| | 13 | Injector Number 21 Calibration Fault | Contact Service Dealer |
| 000653 | 05 | Injector Number 3 Circuit Has High Resistance | Check Injector Wiring or Injector Solenoid |
| | 06 | Injector Number 3 Circuit Has Low Resistance | Check Injector Wiring or Injector Solenoid |
| | 13 | Injector Number 3 Calibration Fault | Contact Service Dealer |
| 000654 | 05 | Injector Number 4 Circuit Has High Resistance | Check Injector Wiring or Injector Solenoid |
| | 06 | Injector Number 4 Circuit Has Low Resistance | Check Injector Wiring or Injector Solenoid |
| | 13 | Injector Number 4 Calibration Fault | Contact Service Dealer |
| 000655 | 05 | Injector Number 5 Circuit Has High Resistance | Check Injector Wiring or Injector Solenoid |
| | 06 | Injector Number 5 Circuit Has Low Resistance | Check Injector Wiring or Injector Solenoid |
| | 13 | Injector Number 5 Calibration Fault | Contact Service Dealer |
| 000676 | 03 | Glow Plug Signal Received When Not Expected | Contact Service Dealer |
| | 05 | Glow Plug Signal Not Received When Expected | Contact Service Dealer |
| 001136 | 00 | ECU Temperature High-Most Severe | Contact Service Dealer |
| | 16 | ECU Temperature High-Moderately Severe | Contact Service Dealer |
| 001569 | 31 | Engine in Derate Condition | Check Fault Codes |
| 002003 | 09 | No CAN Message Received from Source Address 17 Within Time Out Period | Contact Service Dealer |
| 002023 | 09 | Message ETCP1 From ICC Timed Out | Contact Service Dealer |
| 003509 | 03 | Sensor Supply Voltage out of Range High | Contact Service Dealer |
| | 04 | Sensor Supply Voltage out of Range Low | Contact Service Dealer |
| 003510 | 03 | Sensor Supply Voltage out of Range High | Contact Service Dealer |
| | 04 | Sensor Supply Voltage out of Range Low | Contact Service Dealer |
| 003511 | 03 | Sensor Supply Voltage out of Range High | Contact Service Dealer |
| | 04 | Sensor Supply Voltage out of Range Low | Contact Service Dealer |
| 003597 | 01 | Injector Power Supply Voltage Extremely Low | Contact Service Dealer |
| | 18 | Injector Power Supply Voltage Moderately Low | Contact Service Dealer |
| 524037 | 02 | MFWD Switch Circuit Fault | Contact Service Dealer |
| 524223 | 03 | Rear Axle Differential Lock Circuit | Contact Service Dealer |
| 524225 | 31 | Engine Start Protection Bypass Detected | Contact Service Dealer |
| 524235 | 03 | MWFD Solenoid Circuit Voltage High | Contact Service Dealer |
| | 04 | MWFD Solenoid Circuit Voltage Low | Contact Service Dealer |
| N/A | N/A | When reading blink codes, signifies the start of active codes. | |
| N/A | N/A | When reading blink codes, signifies the start of stored codes. | |
| N/A | N/A | When reading blink codes, signifies that no fault codes are in the buffer. | |

OUOD006,000011A –19–19OCT07–2/2

## Intermittent Fault Diagnostics (With Electronic Controls)

Intermittent faults are problems that periodically “go away”. A problem such as a terminal that intermittently doesn’t make contact can cause an intermittent fault. Other intermittent may be set only under certain operating conditions such as heavy load, extended idle, etc. When diagnosing intermittent faults, take special note of the condition of wiring and connectors, since a high percentage of intermittent problems originate here. Check for loose, dirty or disconnected connectors. Inspect the wiring routing, looking for possible shorts caused by contact with external parts (for example, rubbing against sharp sheet metal edges). Inspect the connector vicinity, looking for wires that have pulled out of connectors, poorly positioned terminals, damaged connectors and corroded or damaged splices and terminals. Look for broken wires, damaged splices, and wire-to-wire shorts. Use good judgement if component replacement is thought to be required.

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

**Suggestions for diagnosing intermittent faults:**

- If the problem is intermittent, try to reproduce the operating conditions that were present when the diagnostic trouble code (DTC) set.
- If a faulty connection or wire is suspected to be the cause of the intermittent problem: clear DTCs, then check the connection or wire by wiggling it while watching the diagnostic gauge to see if the fault resets.

**Possible causes of intermittent faults:**

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

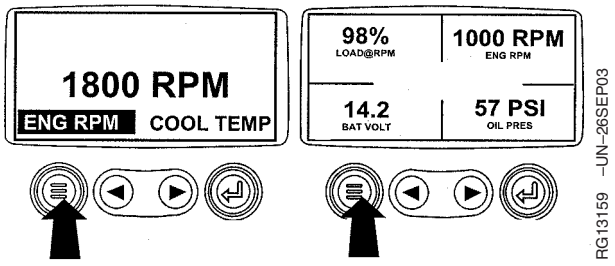
*NOTE: Refer to wiring diagrams earlier in this section as a guide to connection and wiring.*

OUOD007,0000036 –19–27JUL06–1/1

## Displaying Diagnostic Gauge Software

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

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

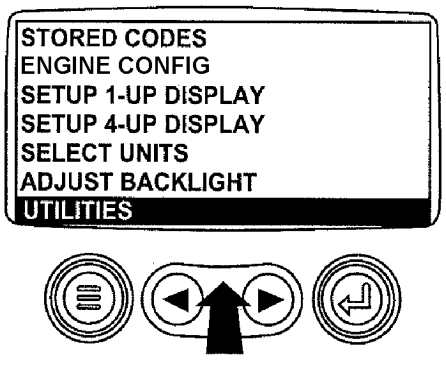



*Menu Key*

**Continued on next page**

OURGP12,00001E3 –19–15MAR06–1/4

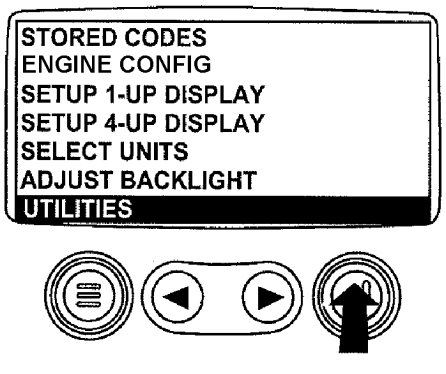
2. The main menu will be displayed. Use the "Arrow" key to scroll through the menu until "Utilities" is highlighted.




*Select Utilities*

OURGP12,00001E3 –19–15MAR06–2/4

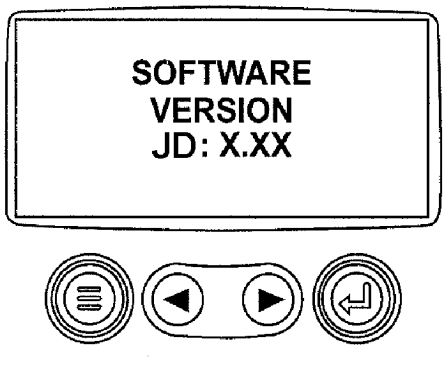
3. Once "Utilities" is highlighted, press "Enter" to activate the utilities function.




*Select Utilities*

OURGP12,00001E3 –19–15MAR06–3/4

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




*Software Version*

OURGP12,00001E3 –19–15MAR06–4/4

## Engine Storage Guidelines

1. John Deere engines can be stored outside for up to three (3) months with no long term preparation IF COVERED BY WATERPROOF COVERING. No outside storage is recommended without a waterproof covering.
2. John Deere engines can be stored in a standard overseas shipping container for up to three (3) months with no long term preparation.
3. John Deere engines can be stored inside for up to six (6) months with no long term preparation.
4. John Deere engines expected to be stored more than six (6) months MUST have long term storage preparation. ( See PREPARING ENGINE FOR LONG TERM STORAGE, later in this section.)
5. Long term storage includes the use of a stabilized rust preventive oil to protect internal metal components of the engine. This oil should be an SAE 10 oil with 1-4 percent morpholine or equivalent vapor corrosion inhibitor. These rust preventive oils are available from area distributors.

OURGP12,00000DF –19–11OCT06–1/1

## Preparing Engine for Long Term Storage

The following storage preparations are used for long term engine storage up to one year. After that, the engine should be started, warmed up, and retreated for an extended storage period.

**IMPORTANT: Any time your engine will not be used for over six (6) months, the following recommendations for storing it and removing it from storage will help to minimize corrosion and deterioration.**

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

1. Change engine oil and replace filter. (See CHANGE ENGINE OIL AND FILTER in Lubrication and Maintenance/500 Hour Section.) Used oil will not give adequate protection. Add one (1) ounce of rust preventive oil to the engine crankcase for every quart of oil. This rust preventive oil should be an SAE 10 oil with 1-4 percent morpholine or equivalent vapor corrosion inhibitor.

2. Ensure the machine fuel tank is filled with high quality petroleum diesel fuel. Filling the tank completely will ensure that water does not build up due to condensation. For storage of more than one year, use John Deere PREMIUM DIESEL FUEL CONDITIONER (or equivalent) at the specified concentration.

3. Service air cleaner. (See REPLACING AIR CLEANER FILTER ELEMENTS in Service As Required Section.)

4. Draining and flushing of cooling system is not necessary if engine is to be stored only for several months. However, for extended storage periods of a year or longer, it is recommended that the cooling system be drained, flushed, and refilled. Refill with appropriate coolant. (See RECOMMENDED ENGINE COOLANT in Fuels, Lubricants, and Coolant Section and ADDING COOLANT in Service As Required Section.)

5. 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.)

6. 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.

7. Remove existing lines/plugs as required, and run a temporary line from the tank to the engine fuel intake, and another temporary line from the fuel return manifold to the tank, so rust preventive oil solution is circulated through the injection system during cranking.

8. Crank the engine several revolutions with starter (do not allow the engine to start). This will allow rust preventive oil solution to circulate.

9. Remove temporary lines installed in Step 6 above, and replace any lines/plugs previously removed.

**Continued on next page**

*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.*

10. Loosen, or remove and store, fan/alternator poly-vee belt.
11. Remove and clean batteries. Store them in a cool, dry place and keep them fully charged.
12. Disengage the clutch for any driveline.
13. Clean the exterior of the engine with salt-free water and touch up any scratched or chipped painted surfaces with a good quality paint.
14. Coat all exposed (machined) metal surfaces with grease or corrosion inhibitor if not feasible to paint.
15. Seal all openings on engine with plastic bags and tape.
16. Store the engine in a dry protected place. If engine must be stored outside, cover it with a waterproof canvas or other suitable protective material and use a strong waterproof tape.

OUOD006,00000FC –19–04OCT07–2/2

## Removing Engine from Long Term Storage

Refer to the appropriate section for detailed services listed below or have your authorized servicing dealer or engine distributor perform services that you may not be familiar with.

1. Remove all protective coverings from engine. Unseal all openings in engine and remove covering from electrical systems.
2. Remove the batteries from storage. Install batteries (fully charged) and connect the terminals.
3. Install fan/alternator poly-vee belt if removed.
4. Fill fuel tank.
5. Perform all appropriate prestarting checks. ( See DAILY PRESTARTING CHECKS in Lubrication and Maintenance/Daily Section.)

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

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

*NOTE: If using BIODIESEL blends after long term storage, frequency of fuel filter plugging may increase initially.*

OUOD006,00000FD –19–02OCT07–1/1

## General OEM Engine Specifications

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

OUOD006,00000B0 –19–26OCT07–1/1

## Engine Power Rating and Speed Specifications

*NOTE: Specifications are subject to change without notice.*

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

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

**POWER RATINGS ON DYNAMOMETER FOR OEM ENGINES**

| Engine Model | Fuel System Option Code or Hz Rating | Engine Application | Slow Idle (rpm) | Fast Idle (rpm) | Rated Speed at Full Load (rpm) | Power Rating kW (HP)[a] |
|---|---|---|---|---|---|---|
| 4024HF285 | 1645 | Industrial | 900 | 3000 | 2800 | 60 (80) |
| 4024HF285 | 60 Hz | Gen Set (Prime) | 1150 | - | 1800 | 55 (74) |
| | | Gen Set (Standby) | 1150 | - | 1800 | 60 (80) |
| 4024HF295 | 1662 | Industrial | 900 | 3000 | 2800 | 46 (61) |
| 4024HF295 | | Industrial | 900 | 3000 | 2800 | 49 (66) |
| 4024HF295 | | Industrial | 900 | 2600 | 2400 | 45 (60) |
| 4024HF295 | | Industrial | 900 | 2600 | 2400 | 49 (66) |
| 5030HF285 | 1644 | Industrial | 900 | 3000 | 2800 | 62 (82) |
| 5030HF285 | | Industrial | 900 | 3000 | 2800 | 74 (99) |
| 5030HF285 | | Industrial | 900 | 2600 | 2400 | 57 (76) |
| 5030HF285 | | Industrial | 900 | 2600 | 2400 | 62 (82) |
| 5030HF285 | | Industrial | 900 | 2600 | 2400 | 68 (91) |
| 5030HF285 | 60 Hz | Gen Set (Prime) | 1150 | - | 1800 | 65 (87) |
| 5030HF285 | 60 Hz | Gen Set (Standby) | 1150 | - | 1800 | 72 (96) |

[a]Power rating is under full load and at rated speed listed.

OUOD006,00000B1 –19–15AUG07–1/1

## Engine Crankcase Oil Capacities

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

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

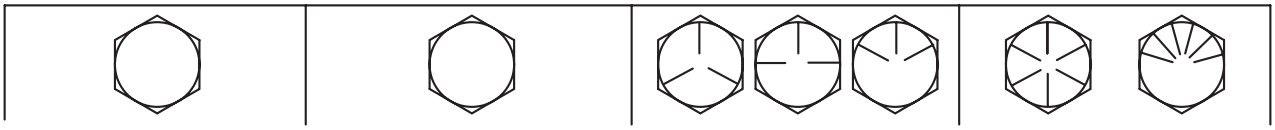
*NOTE: Crankcase oil capacity may vary slightly. ALWAYS fill crankcase to within crosshatch marks on dipstick. DO NOT overfill.*

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

OUOD006,00000B2 –19–03AUG07–1/1

## Unified Inch Bolt and Screw Torque Values

TS1671 –UN–01MAY03



| Bolt or | SAE Grade 1 | | | | SAE Grade 2[a] | | | | SAE Grade 5, 5.1 or 5.2 | | | | SAE Grade 8 or 8.2 | | | |
|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|
| Screw | Lubricated[b] | | Dry[c] | | Lubricated[b] | | Dry[c] | | Lubricated[b] | | Dry[c] | | Lubricated[b] | | Dry[c] | |
| Size | N•m | lb-in | N•m | lb-in | N•m | lb-in | N•m | lb-in | N•m | lb-in | N•m | lb-in | N•m | lb-in | N•m | lb-in |
| 1/4 | 3.7 | 33 | 4.7 | 42 | 6 | 53 | 7.5 | 66 | 9.5 | 84 | 12 | 106 | 13.5 | 120 | 17 | 150 |
| | | | | | | | | | | | | | N•m | lb-ft | N•m | lb-ft |
| 5/16 | 7.7 | 68 | 9.8 | 86 | 12 | 106 | 15.5 | 137 | 19.5 | 172 | 25 | 221 | 28 | 20.5 | 35 | 26 |
| | | | | | | | | | N•m | lb-ft | N•m | lb-ft | | | | |
| 3/8 | 13.5 | 120 | 17.5 | 155 | 22 | 194 | 27 | 240 | 35 | 26 | 44 | 32.5 | 49 | 36 | 63 | 46 |
| | | | N•m | lb-ft | N•m | lb-ft | N•m | lb-ft | | | | | | | | |
| 7/16 | 22 | 194 | 28 | 20.5 | 35 | 26 | 44 | 32.5 | 56 | 41 | 70 | 52 | 80 | 59 | 100 | 74 |
| | N•m | lb-ft | | | | | | | | | | | | | | |
| 1/2 | 34 | 25 | 42 | 31 | 53 | 39 | 67 | 49 | 85 | 63 | 110 | 80 | 120 | 88 | 155 | 115 |
| 9/16 | 48 | 35.5 | 60 | 45 | 76 | 56 | 95 | 70 | 125 | 92 | 155 | 115 | 175 | 130 | 220 | 165 |
| 5/8 | 67 | 49 | 85 | 63 | 105 | 77 | 135 | 100 | 170 | 125 | 215 | 160 | 240 | 175 | 305 | 225 |
| 3/4 | 120 | 88 | 150 | 110 | 190 | 140 | 240 | 175 | 300 | 220 | 380 | 280 | 425 | 315 | 540 | 400 |
| 7/8 | 190 | 140 | 240 | 175 | 190 | 140 | 240 | 175 | 490 | 360 | 615 | 455 | 690 | 510 | 870 | 640 |
| 1 | 285 | 210 | 360 | 265 | 285 | 210 | 360 | 265 | 730 | 540 | 920 | 680 | 1030 | 760 | 1300 | 960 |
| 1-1/8 | 400 | 300 | 510 | 375 | 400 | 300 | 510 | 375 | 910 | 670 | 1150 | 850 | 1450 | 1075 | 1850 | 1350 |
| 1-1/4 | 570 | 420 | 725 | 535 | 570 | 420 | 725 | 535 | 1280 | 945 | 1630 | 1200 | 2050 | 1500 | 2600 | 1920 |
| 1-3/8 | 750 | 550 | 950 | 700 | 750 | 550 | 950 | 700 | 1700 | 1250 | 2140 | 1580 | 2700 | 2000 | 3400 | 2500 |
| 1-1/2 | 990 | 730 | 1250 | 930 | 990 | 730 | 1250 | 930 | 2250 | 1650 | 2850 | 2100 | 3600 | 2650 | 4550 | 3350 |

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

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

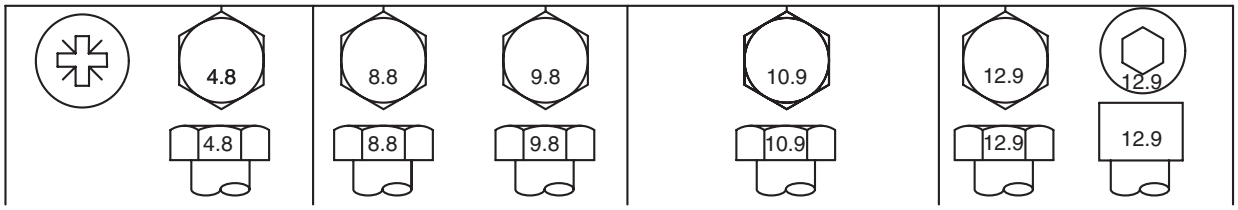
[a]Grade 2 applies for hex cap screws (not hex bolts) up to 6. in (152 mm) long. Grade 1 applies for hex cap screws over 6 in. (152 mm) long, and for all other types of bolts and screws of any length.

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

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

DX,TORQ1 –19–24APR03–1/1

## Metric Bolt and Screw Torque Values




TS1670 –UN–01MAY03

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

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

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

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

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

DX,TORQ2 –19–24APR03–1/1

# Lubrication and Maintenance Records

## Using Lubrication and Maintenance Records

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

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

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

RG,RG34710,5620 –19–20MAY96–1/1

## Daily (Prestarting) Service

- Check engine oil level.
- Check coolant level.

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

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

RG41183,000006B –19–21JAN03–1/1

## 500 Hour/12 Month Service

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

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| Date | | | | | | | | | |

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

OUOD006,0000072 –19–03JAN07–1/1

## 2000 Hour/24 Month Service

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

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| Hours | | | | | | | | | |
| Date | | | | | | | | | |

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

RG41183,000006D –19–21JAN03–1/1

## Service as Required

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

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OURGP12,00000FE –19–18MAY04–1/1

# Emission System Warranty

## U.S. EPA Emissions Control Warranty Statement

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

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

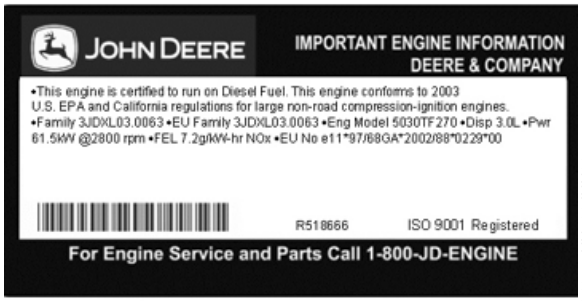
RG,RG34710,7629 –19–30JUN97–1/1

## Emissions Control System Certification Label

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

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

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




RG12943 –UN–02JUN03

*Emissions Label*

RG41183,000006E –19–03JAN07–1/1

# John Deere Service Literature Available

## Technical Information

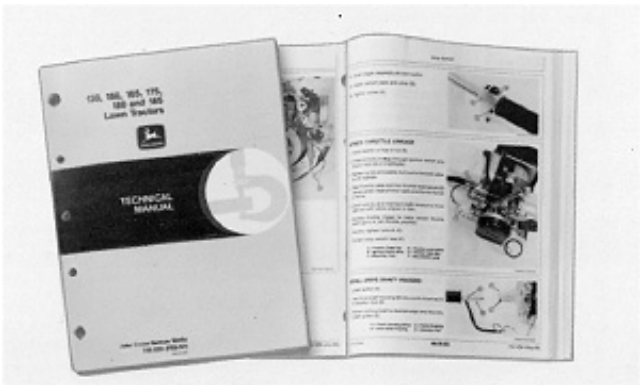
Technical information can be purchased from John Deere. Some of this information is available in electronic media, such as CD-ROM disks, and in printed form. There are many ways to order. Contact your John Deere dealer. Call **1-800-522-7448** to order using a credit card. Search online from http://www.JohnDeere.com.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

Available information includes:

- PARTS CATALOGS list service parts available for your machine with exploded view illustrations to help you identify the correct parts. It is also useful in assembling and disassembling.
- OPERATOR'S MANUALS providing safety, operating, maintenance, and service information. These manuals and safety signs on your machine may also be available in other languages.
- OPERATOR'S VIDEO TAPES showing highlights of safety, operating, maintenance, and service information. These tapes may be available in multiple languages and formats.
- TECHNICAL MANUALS outlining service information for your machine. Included are specifications, illustrated assembly and disassembly procedures, hydraulic oil flow diagrams, and wiring diagrams. Some products have separate manuals for repair and diagnostic information. Some components, such as engines, are available in separate component technical manuals
- FUNDAMENTAL MANUALS detailing basic information regardless of manufacturer:
  - Agricultural Primer series covers technology in farming and ranching, featuring subjects like computers, the Internet, and precision farming.
  - Farm Business Management series examines "real-world" problems and offers practical solutions in the areas of marketing, financing, equipment selection, and compliance.
  - Fundamentals of Services manuals show you how to repair and maintain off-road equipment.

TS189 –UN–17JAN89

TS191 –UN–02DEC88




TS224 –UN–17JAN89


TS1663 –UN–10OCT97

Continued on next page

– Fundamentals of Machine Operation manuals explain machine capacities and adjustments, how to improve machine performance, and how to eliminate unnecessary field operations.

DX,SERVLIT –19–31JUL03–2/2

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