PowerTech™ 2.4 L and 3.0 L 4024 and 5030 OEM Diesel Engines

OPERATOR'S MANUAL

PowerTech™ 2.4 L and 3.0 L OEM Diesel Engines

OMRG34851 Issue 20Feb07 (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 beyond published factory specifications or otherwise overpowering will result in loss of warranty protection for this engine.

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

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

TX,DH2120 –19–31JAN07–1/1

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 colleghi al seguente sito URL: http://www.johndeere.com/enginewarranty

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

Propietario De Equipo John Deere:

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

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

Till ägare av John Deere motorer:

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

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

POWERTECH™ 2.4 L and 3.0 L Diesel Engines

RG12961 –UN–03JUN03

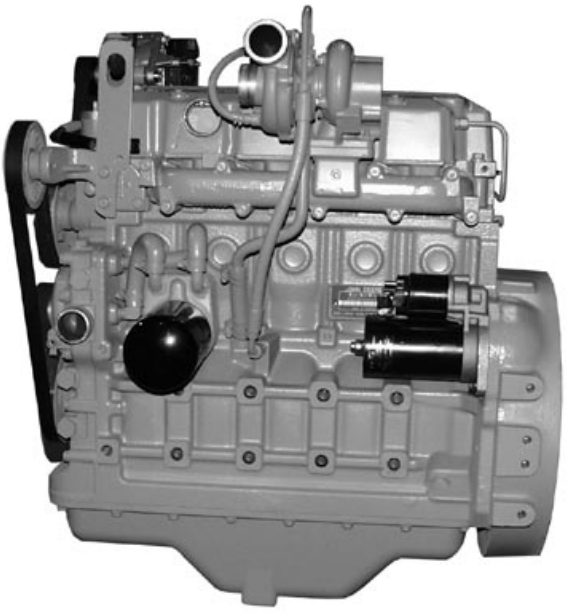
2.4 L Right Side View

RG12960 –UN–03JUN03

2.4 L Left Side View

RG12962 –UN–03JUN03

3.0 L Right Side View



RG12963 –UN–03JUN03

3.0 L Left Side View

POWERTECH is a trademark of Deere & Company

RG41183,000001D –19–31JAN07–1/1

Contents

Continued on next page

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A John Deere ILLUSTRUCTION® Manual
Previous Editions
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Page

POWERTECH™ Medallion

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

RG12685 –UN–12DEC02

RG12684 –UN–12DEC02

POWERTECH is a trademark of Deere & Company.

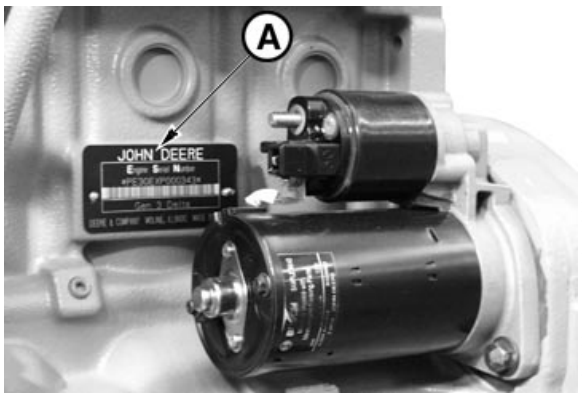
RG41183,0000022 –19–10DEC02–1/1

Engine Serial Number Plate

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

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

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



RG12687 –UN–12DEC02

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)

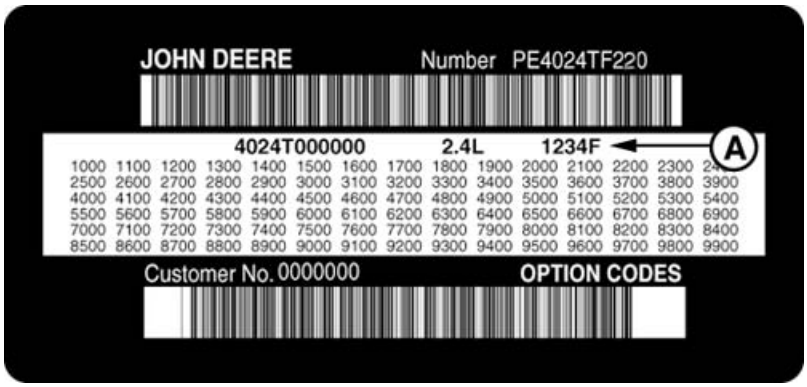
_____

RG13539 –UN–21MAY04

Engine Serial Number Plate

OURGP12,0000104 –19–21MAY04–1/1

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
43	Starting Aids
44	Timing Gear Cover
45	Balancer Shafts

Option Codes	Description
46	Cylinder Block and Camshaft
47	Crankshaft and Bearings
48	Connecting Rods and Pistons
49	Valve Actuating Mechanism
50	Oil Pump
51	Cylinder Head With Valves
52	Auxiliary Gear Drive
55	Shipping Stand
56	Paint Option
57	Coolant Pump Inlet
59	Oil Cooler
60	Alternator Fan Drive Pulley
62	Alternator Mounting
64	Exhaust Elbow
65	Turbocharger
66	Coolant Temperature Switch
67	Speed Sensor
68	Crankshaft Rear Damper
69	Engine Serial Number Plate
74	Air Conditioning (Freon) Compressor
75	Air Restriction Indicator
76	Oil Pressure Switch
78	Air Compressor
86	Fan Pulley
87	Belt Tensioner
88	Oil Filter
92	Test Certificate
95	Special Equipment (Factory Installed)
97	Special Equipment (Field Installed)
98	Lift Straps for Engine
99	Service Only Parts and Kits

_____ **Engine Base Code**

RG41183,0000027 –19–11DEC02–2/2

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

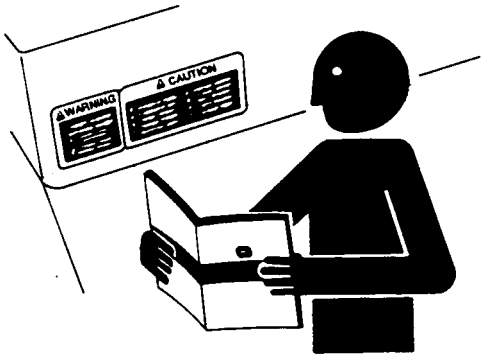
Follow Safety Instructions

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.

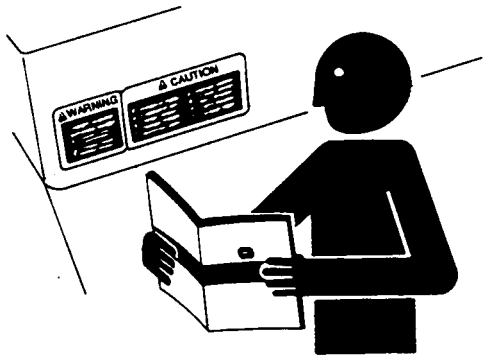


TS201 –UN–23AUG88

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.



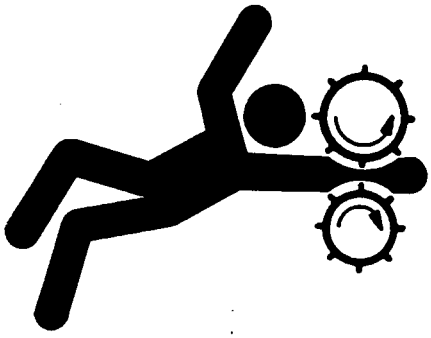
TS201 –UN–23AUG88

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

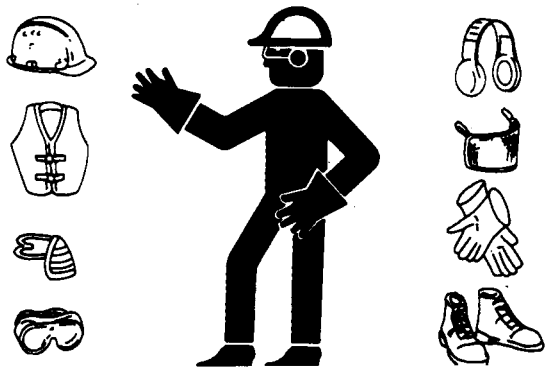
Wear Protective Clothing

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.



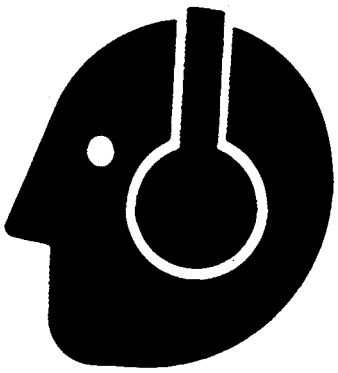
TS206 –UN–23AUG88

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.



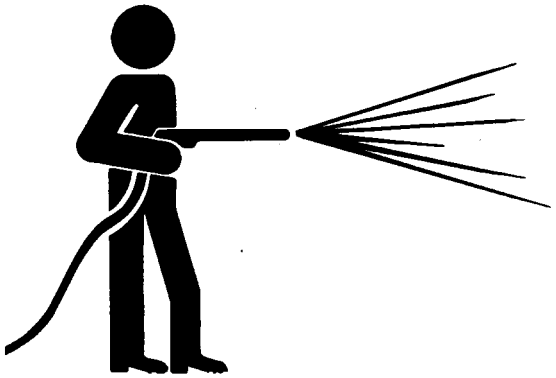
TS207 –UN–23AUG88

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.



T6642EJ –UN–18OCT88

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.

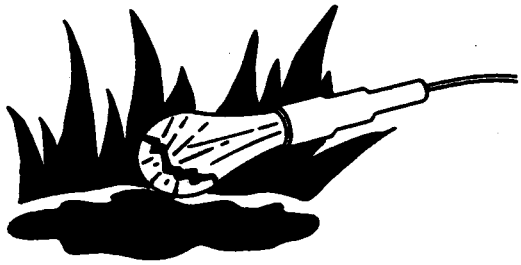
On towed implements, disconnect wiring harnesses from tractor before servicing electrical system components or welding on machine.

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.



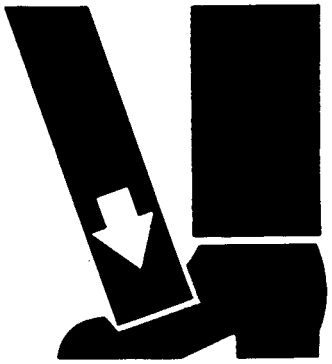
TS223 –UN–23AUG88

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.

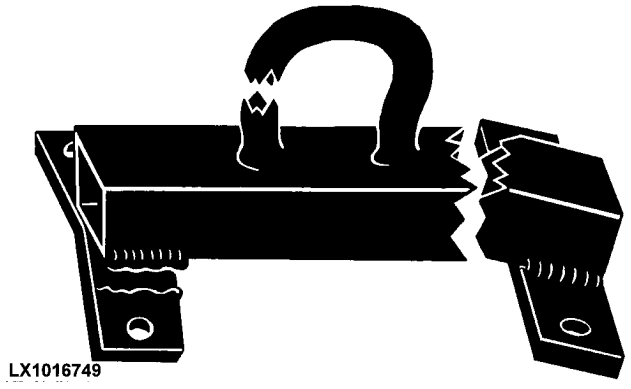
TS779 –UN–08NOV89

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

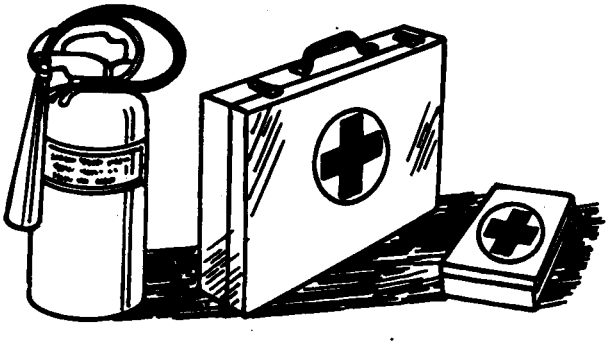
DX,BYPAS1 –19–29SEP98–1/1

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

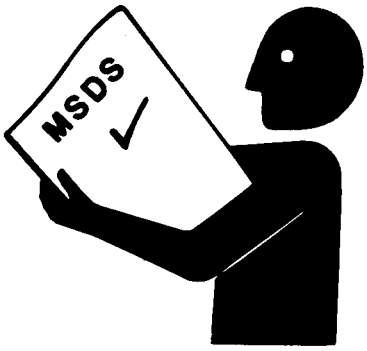
Handle Chemical Products Safely

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

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

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

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



TS1132 –UN–26NOV90

DX,MSDS,NA –19–03MAR93–1/1

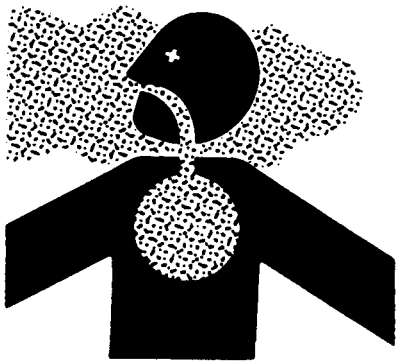
Handle Agricultural Chemicals Safely

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.



TS220 –UN–23AUG88

A34471

A34471 –UN–11OCT88

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

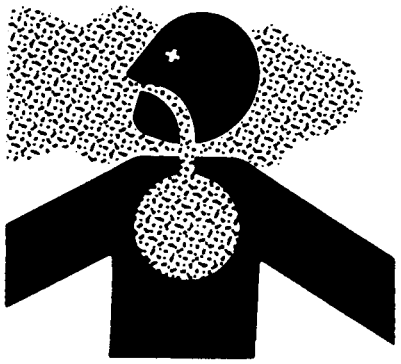
Rotating Drivelines

OUO1004,0000BD8 –19–23JAN07–1/1

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.

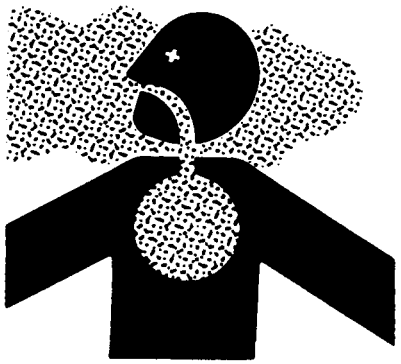
If you do not have an exhaust pipe extension, open the doors and get outside air into the area



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.

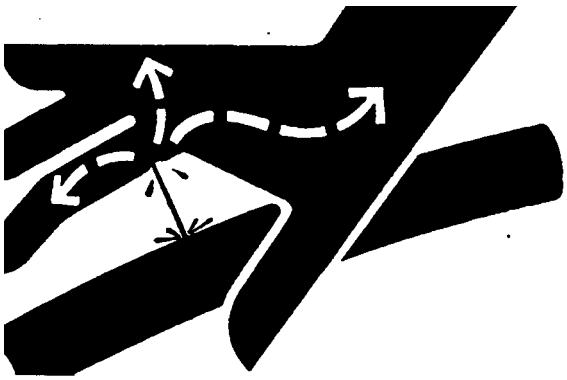
Components in products that may contain asbestos fibers are brake pads, brake band and lining assemblies, clutch plates, and some gaskets. The asbestos used in these components is usually found in a resin or sealed in some way. Normal handling is not hazardous as long as airborne dust containing asbestos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

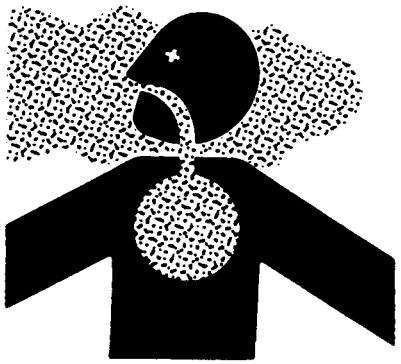
Avoid Heating Near Pressurized Fluid Lines

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.

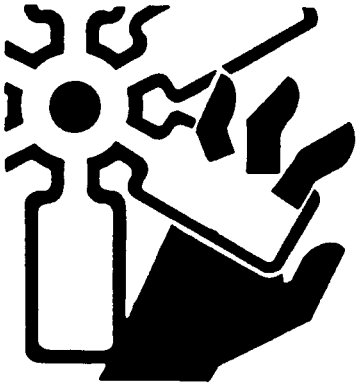
Shut off engine. Only remove filler cap when cool enough to touch with bare hands. Slowly loosen cap to first stop to relieve pressure before removing completely.

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

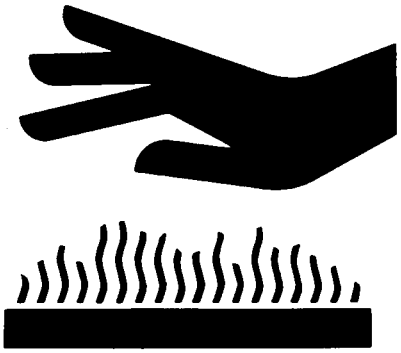
Rotating Fan

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 –19–11OCT06–1/1

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:

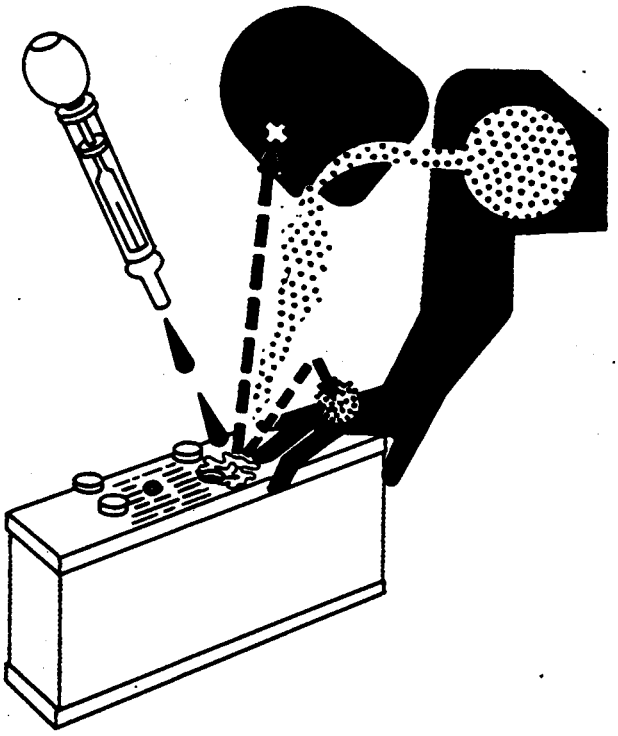
1. **Filling batteries in a well-ventilated area.**
2. **Wearing eye protection and rubber gloves.**
3. **Avoiding breathing fumes when electrolyte is added.**
4. **Avoiding spilling or dripping electrolyte.**
5. **Using proper jump start procedure.**

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.**



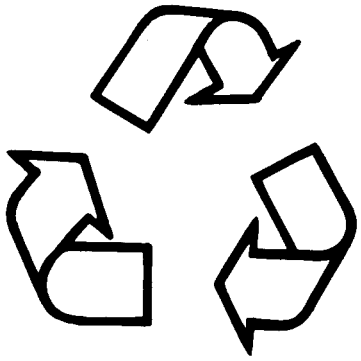
TS203 –UN–23AUG88

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 –19–23JAN07–1/1

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.

Required fuel properties

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

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

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

Fuel lubricity should pass a minimum level of 3100 grams as measured by ASTM D6078 or maximum scar diameter of 0.45 mm as measured by ASTM D6079 or ISO 12156-1.

Sulfur content:

- Diesel fuel quality and fuel sulfur content must comply with all existing emissions regulations for the area in which the engine operates.
- 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.
- 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 1.0%.

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 –19–17NOV05–1/1

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 minimum load level of 3100 grams as measured by ASTM D6078 or a maximum scar diameter of 0.45 mm as measured by ASTM D6079 or ISO 12156-1.

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

DX,FUEL5 –19–27OCT05–1/1

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

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

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

It is recommended to purchase bio-diesel fuel blended with B100 from a BQ-9000 Accredited Producer or a BQ-9000 Certified Marketer as recommended by the National Bio-diesel Board.

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

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

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

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

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

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

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

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

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

DX,FUEL7 –19–14NOV05–1/1

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 Grade Fuel

When temperatures fall below 5°C (40°F), winter grade fuel (Grade No. 1-D fuel in North America) is best suited for cold weather operation. Winter grade fuel has a lower cloud point and a lower pour point.

Cloud point is the temperature at which wax will begin to form in the fuel and this wax causes fuel filters to plug. **Pour point** is the temperature at which fuel begins to thicken and becomes more resistant to flow through fuel pumps and lines.

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

Air Intake Heater

An air intake heater is an available option to aid cold weather starting.

CAUTION: Do not use any starting fluid with an air intake heater.

Starting Fluid

A starting fluid port on the intake is available to aid cold weather starting.

CAUTION: Do not use any starting fluid with an engine 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 ion the expected air temperature range between oil changes and 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) or equivalent to treat fuel during the cold weather season. This winter formulation is a combination diesel fuel conditioner and anti-gel additive.

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

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.

DX,FUEL10 –19–16DEC05–2/2

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 E4
- ACEA Oil Sequence E5
- ACEA Oil Sequence E6
- ACEA Oil Sequence E7

Extended service intervals may apply when above engine oils are used. Consult the following page.

Other oils may be used if they meet any of the following:

- John Deere TORQ-GARD SUPREME™
- API Service Category CJ-4
- API Service Category CI-4
- API Service Category CI-4 Plus
- API Service Category CH-4
- ACEA Oil Sequence E3

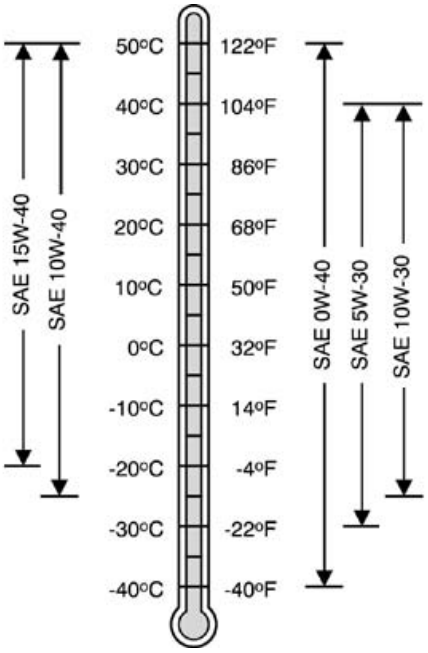
Multi-viscosity diesel engine oils are preferred.

NOTE: DO NOT USE BREAK-IN OILS IN THESE ENGINES. These engines are factory-filled with John Deere PLUS-50 10W-30, ACEA E4, or ACEA E5 oil, and only these oils should be used to maintain the specified oil level. (Engines may be shipped dry to comply with certain legislations.)

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

If diesel fuel with sulfur content greater than 0.5% (5000 ppm) is used, reduce the service interval by 50%.

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



Air Temperature Ranges

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

OUOD006,000006C –19–02FEB07–1/1

Extended Diesel Engine Oil Service Intervals

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

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

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

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

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

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TORQ-GARD SUPREME is a trademark of Deere & Company

DX,ENOIL6 –19–13SEP06–1/1

Mixing of Lubricants

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

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

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

DX,LUBMIX –19–18MAR96–1/1

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.

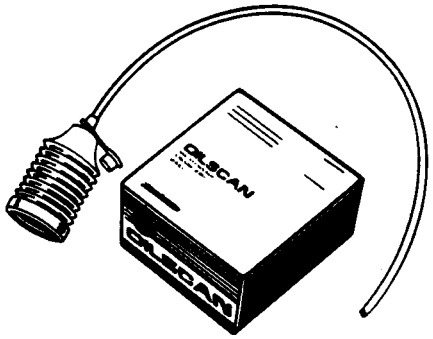
DX,FILT –19–18MAR96–1/1

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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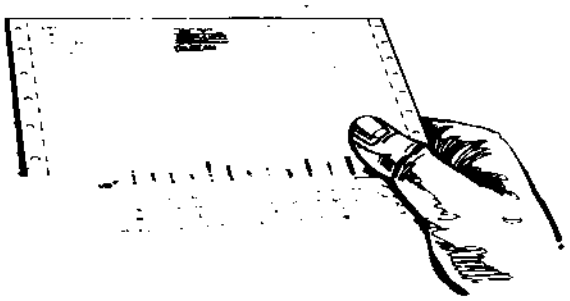

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OILSCAN is a registered trademark of Deere & Company.
COOLSCAN is a trademark of Deere & Company.

DX,OILSCAN –19–02DEC02–1/1

Alternative and Synthetic Lubricants

Conditions in certain geographical areas may require lubricant recommendations different from those printed in this manual.

Some John Deere brand coolants and lubricants may not be available in your location.

Consult your John Deere dealer to obtain information and recommendations.

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

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

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

DX,ALTER –19–15JUN00–1/1

Lubricant Storage

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

Use clean containers to handle all lubricants.

Whenever possible, store lubricants and containers in an area protected from dust, moisture, and other contamination. Store containers on their side to avoid water and dirt accumulation.

Make certain that all containers are properly marked to identify their contents.

Properly dispose of all old containers and any residual lubricant they may contain.

DX,LUBST –19–18MAR96–1/1

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.

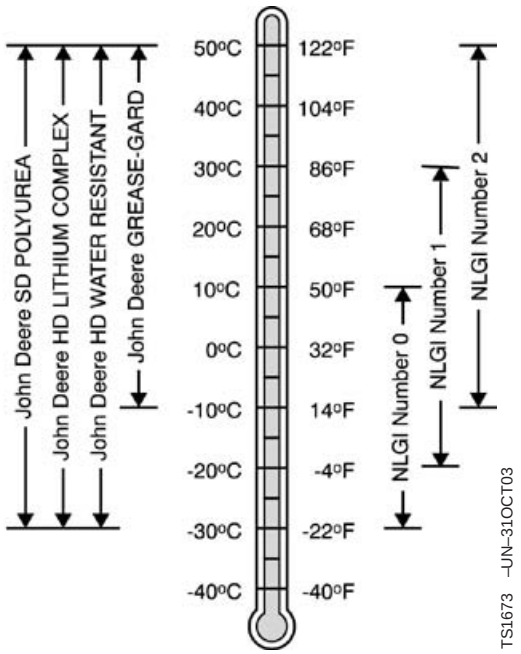
The following greases are also recommended

- 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

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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

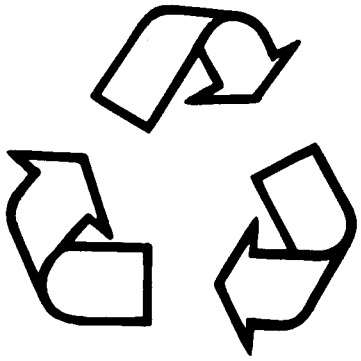
Disposing of Coolant

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.



TS1133 –UN–26NOV90

Recycle Waste

RG,RG34710,7543 –19–09JAN07–1/1

Instrument Panel

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

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

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

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

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

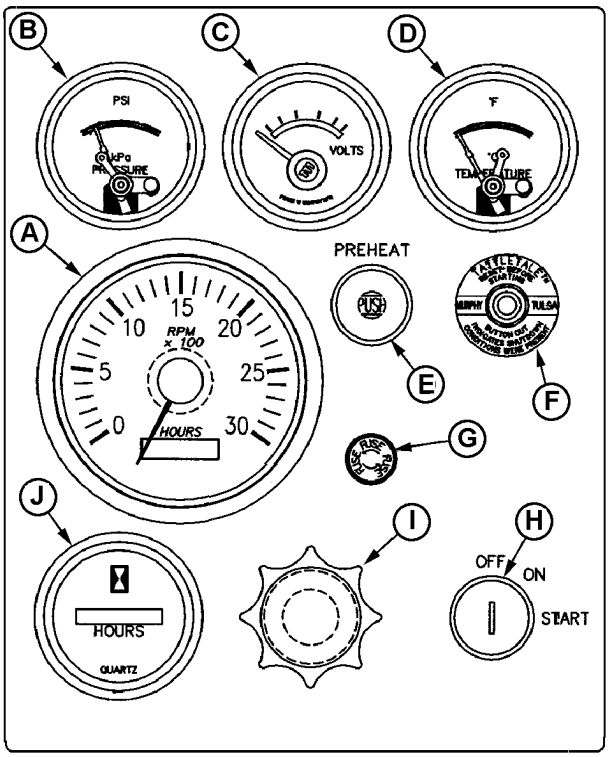
C—Voltmeter Gauge - The voltmeter indicates system battery voltage.

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

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

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

G—Fuse Holder - Contains 14 amp fuse.



Instrument Panel and Gauges (Deluxe Version Shown)

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

Continued on next page

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

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

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

OURGP12,00002AD –19–02JAN07–2/2

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.
- Normal engine oil pressure is 360 ± 105 kPa (52 ± 15 psi).
- Normal engine coolant operating temperature range is 82° – 94° C (180° – 201° F). If coolant temperature rises above 105° C (220° F), 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

OURGP12,00002AF –19–02JAN07–1/1

Break-In Service

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

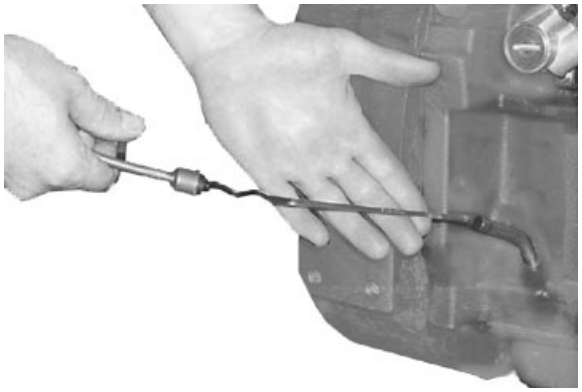
NOTE: The use of BREAK-IN oils is not required for this engine. Perform the following steps to break-in your engine properly during the first 100 hours. Factory-fill oil and filter are suitable for extended 500-hour drain interval, provided diesel fuel sulfur content is less than 0.10% (1000 ppm).

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

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

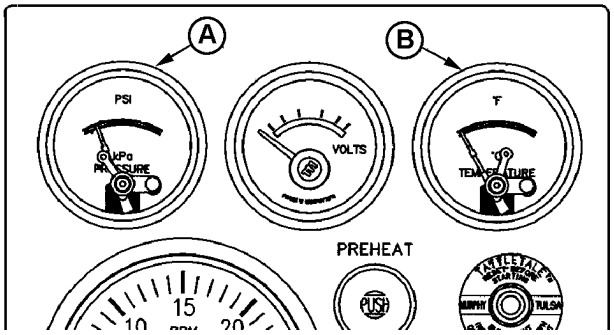
2. Check oil level daily or every 10 hours during engine break-in period. If oil must be added during this period, use John Deere PLUS-50™ 10W-30 oil. (See DIESEL ENGINE OIL in Fuels, Lubricants, and Coolant section.)

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



RG12692 –UN–07FEB03

Check Engine Oil Level Daily



RG13361 –UN–06FEB04

Oil Pressure and Coolant Temperature Gauges

A—Oil Pressure
B—Coolant Temperature

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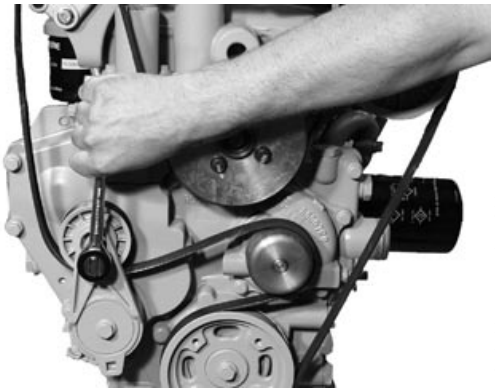
OUOD006,000006D –19–31JAN07–1/2

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

5. Change oil and filter 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.)

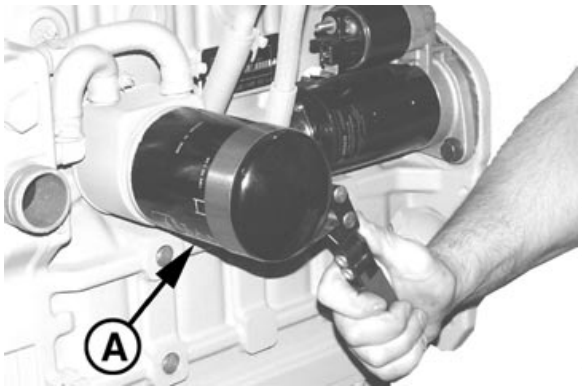
IMPORTANT: DO NOT operate engine when oil level is below ADD mark on dipstick. Check oil level before starting engine for the first time.



RG12502 –UN–12DEC02

Belt Tensioner

A—Oil Filter



RG12693 –UN–07FEB03

Engine Oil Filter

OUOD006,000006D –19–31JAN07–2/2

Auxiliary Gear Drive Limitations

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

- 30 kW (40 hp) Continuous Operation at 2800 rpm
- 37 kW (50 hp) Intermittent Operation at 2800 rpm

RG41183,0000030 –19–16DEC02–1/1

Starting The Engine

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

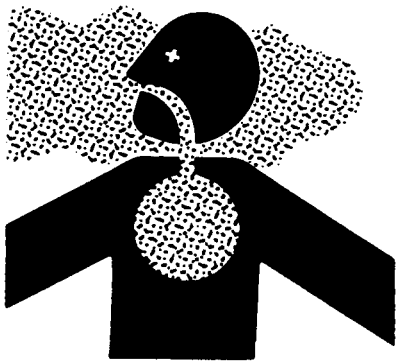
CAUTION: Before starting engine in a confined building, install proper outlet exhaust ventilation equipment. Always use safety approved fuel storage and piping.

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

1. Perform all prestarting checks outlined in Lubrication & Maintenance/Daily Section later in this manual.
2. Disengage engine rear driveline (if equipped) or gen set drive.
3. Open the fuel supply shut-off valve, if equipped.
4. Place the speed control lever in the "START" position, if equipped.

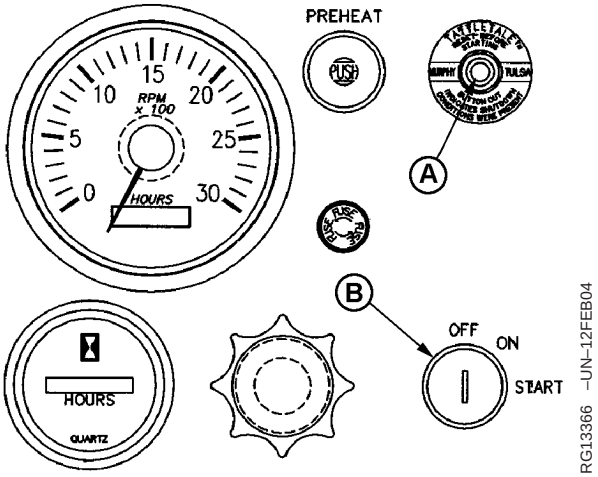
IMPORTANT: Do not operate the starter for more than 30 seconds at a time. To do so may overheat the starter. If the engine does not start the first time, wait at least 2 minutes before trying again. If engine does not start after four attempts, see Troubleshooting Section.

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



TS220 –UN–23AUG88

Use Proper Ventilation



RG13366 –UN–12FEB04

Starting Engine Using Reset Button and Key Switch

A—Reset Button
B—Key Switch

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

OURGP12,0000101 –19–04JAN07–2/2

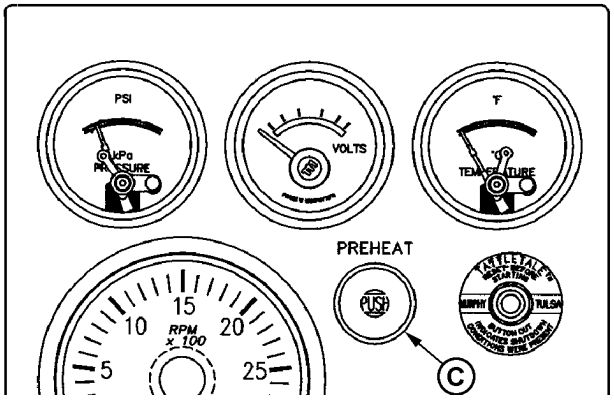
Cold Weather Starting

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 a cold start advance mechanism.

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.

Additionally, your PowerTech™ Engines may be fitted with a block heater, and increased capacity battery and/or lower viscosity oil may also be used. See your local John Deere engine distributor or servicing dealer for recommendations.

1. Perform all prestarting checks outlined in Lubrication & Maintenance/Daily Section later in this manual.
2. Disengage engine rear driveline (if equipped) or gen set drive.
3. Open the fuel supply shut-off valve, if equipped.
4. Place the throttle knob or speed control lever in the “START” position, if equipped.
5. Press and hold preheat button (C) for 10-30 seconds, as needed. This activates the glow plugs to warm the combustion chamber.



Using Preheat Button to Activate Glow Plugs

C—Preheat Button

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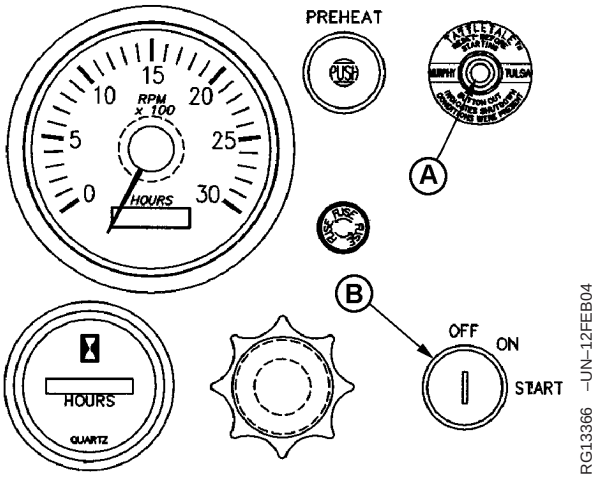
OURGP12,00002B0 –19–16FEB07–1/2

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.

6. Press reset button (A) while turning key switch (B) to “START” position and hold until engine starts. Release key and button once engine starts; key automatically returns to “ON” position and instrument panel gauges start operating.

7. Warm-up engine for at least 5 minutes before applying a load. (See WARMING ENGINE, later in this section.)



Starting Engine Using Reset Button and Key Switch

A—Reset Button
B—Key Switch

OURGP12,00002B0 –19–16FEB07–2/2

Warming Engine

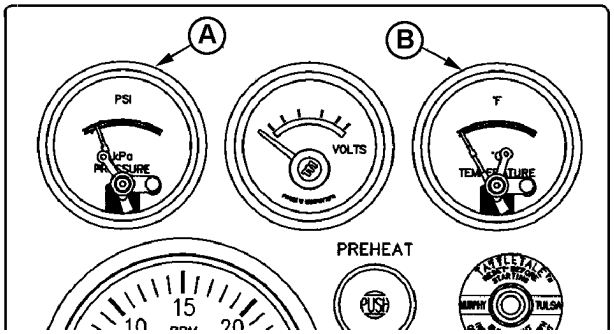
IMPORTANT: To assure proper lubrication, operate engine at or below 1200 rpm with no load for 1–2 minutes. Extend this period 2–4 minutes when operating at temperatures below freezing.

1. Check oil pressure gauge (A) as soon as engine starts. If gauge needle does not rise above minimum oil pressure specification of 150 kPa (1.50 bar) (22.0 psi) within 5 seconds, stop the engine and determine the cause. Normal engine oil pressure is 360 ± 105 kPa (3.60 ± 1.05 bar) (52 ± 15 psi) at rated full load speed (1800–2800 rpm) with oil at normal operating temperature of 125° C (257° F). This oil pressure can vary within the ranges given above.

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

2. Watch coolant temperature gauge (B). Do not place engine under full load until it is properly warmed up. The normal engine coolant temperature range is 82° – 94° C (180° – 201° F).

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



RG13361 –UN–06FEB04

Oil Pressure and Coolant Temperature Gauges

A—Oil Pressure
B—Coolant Temperature

OURGP12,00002B1 –19–02JAN07–1/1

Avoid Excessive Engine Idling

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

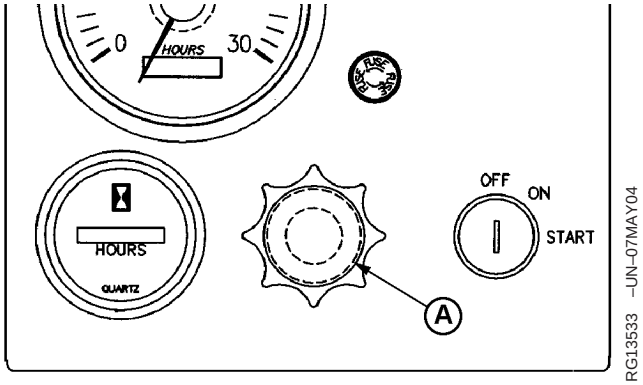
Once an engine is warmed to normal operating temperatures, engine should be idled at slow idle speed. (See ENGINE POWER RATING AND SPEED SPECIFICATIONS in the Specifications Section for slow idle speed information.) If an engine will be idling for more than 5 minutes, stop and restart later.

OURGP12,00000FC –19–18MAY04–1/1

Locking Throttle at Preset Speed

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

A—Locking Knob



Locking Throttle

OURGP12,00002B2 –19–04MAY04–1/1

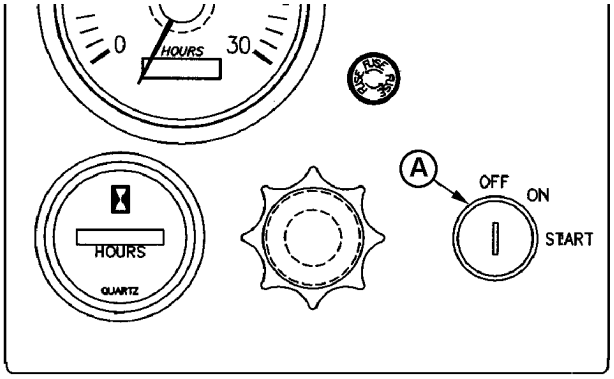
Stopping the Engine

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

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

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

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



RG13362 –UN–06FEB04

Key Switch on Instrument Panel

A—Key Switch

OURGP12,00002B3 –19–04MAY04–1/2

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

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

RG10616 –UN–16JUN00

Exhaust Stack Rain Cap

OURGP12,00002B3 –19–04MAY04–2/2

Using a Booster Battery or Charger

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

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

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

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

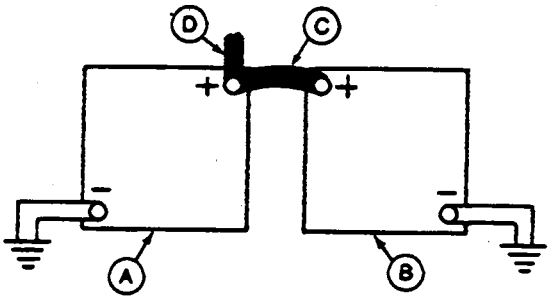
1. Connect booster battery or batteries to produce the required system voltage for your engine application.

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

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

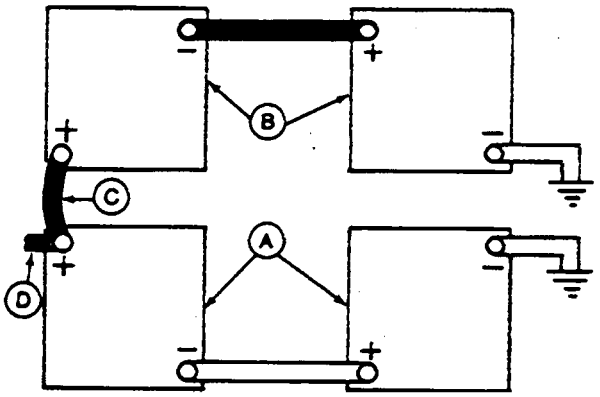
TS204 –UN–23AUG88

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

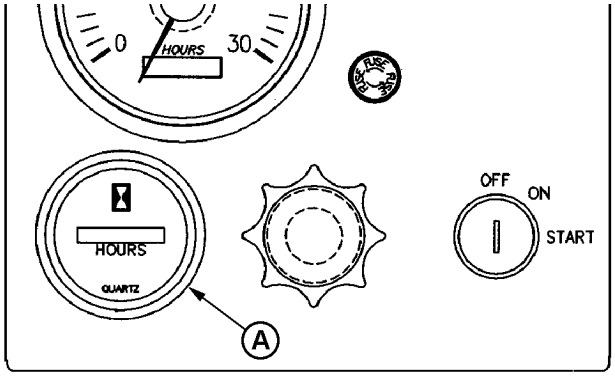
6. Start the engine. Disconnect jumper cables immediately after engine starts. Disconnect NEGATIVE (–) cable first.

RG,RG34710,5564 –19–27JUL06–2/2

Observe Service Intervals

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

IMPORTANT: Recommended service intervals are for normal operating conditions. Service MORE OFTEN if engine is operated under adverse conditions. Neglecting maintenance can result in failures or permanent damage to the engine.



Instrument Panel with Optional Hour Meter

A—Hour Meter

OURGP12,00002B4 –19–05MAY04–1/1

Use Correct Fuels, Lubricants, and Coolant

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

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

DPSG,OUOE003,20 –19–06JAN99–1/1

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	•			
Check Lamps	•			
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 –19–02JAN07–2/2

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	•			
Check Lamps	•			
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				•

[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**
Replacing Poly-Vee Belt				•
Checking Fuses				•
Checking Air Compressor (If Equipped)				•
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:

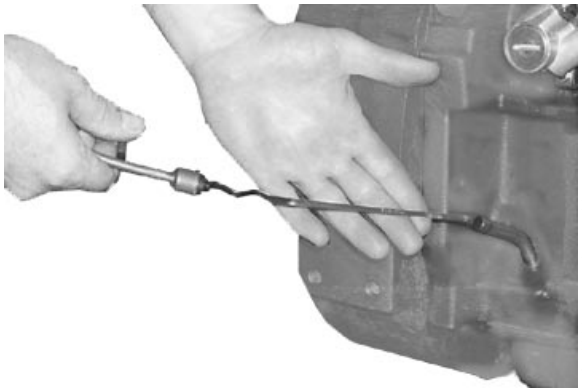
IMPORTANT: DO NOT add makeup oil until the oil level is BELOW the "ADD" mark on dipstick. Do not use break-in oil in this engine.

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 (C) locations.

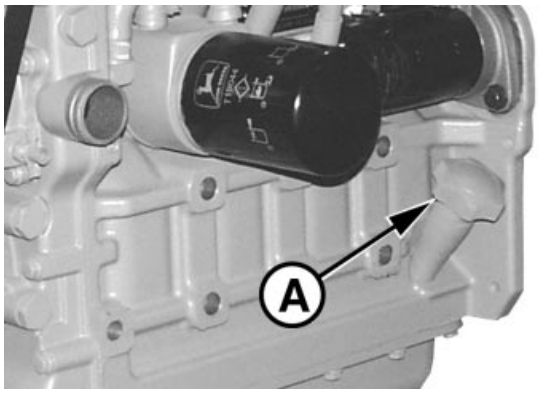
   After checking oil, hand tighten dipstick used on left-hand oil fillers.

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



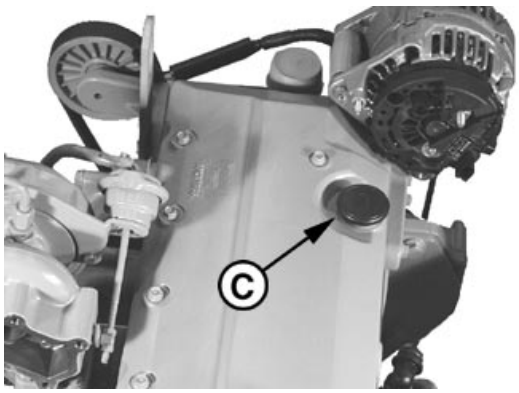
RG12692 –UN–07FEB03

Left Side Oil Dipstick



RG12779 –UN–07JAN03

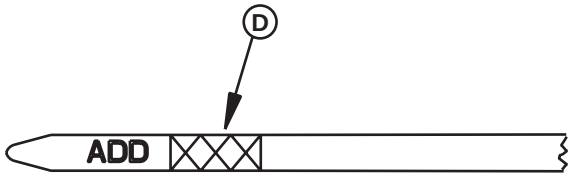
Left Side Oil Filler Cap and Dipstick



RG12780 –UN–07JAN03

Rocker Arm Cover Filler Cap

RG12781 –UN–17FEB03



Crosshatch on dipstick

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OURGP12,00002B6 –19–02JAN07–1/4

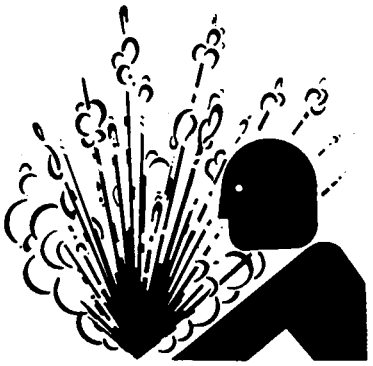
CAUTION: Explosive release of fluids from pressurized cooling system can cause serious burns.

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

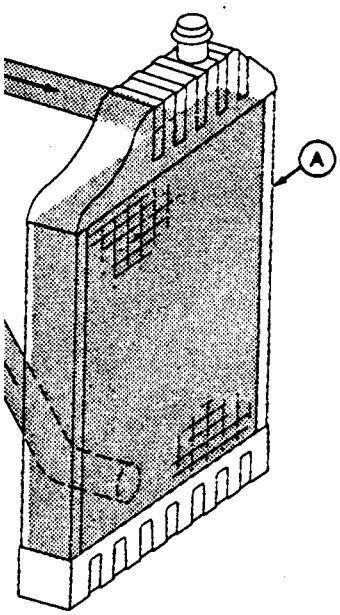


TS281 –UN–23AUG88

High-Pressure Fluids

RG6576 –UN–20JAN93

Check Coolant Level in Radiator



RG4675 –UN–14DEC88

Fill Radiator

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

3. Check the fuel filter 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 (A) two full turns on fuel filter mounting and drain water from bottom until fuel starts to drain out.

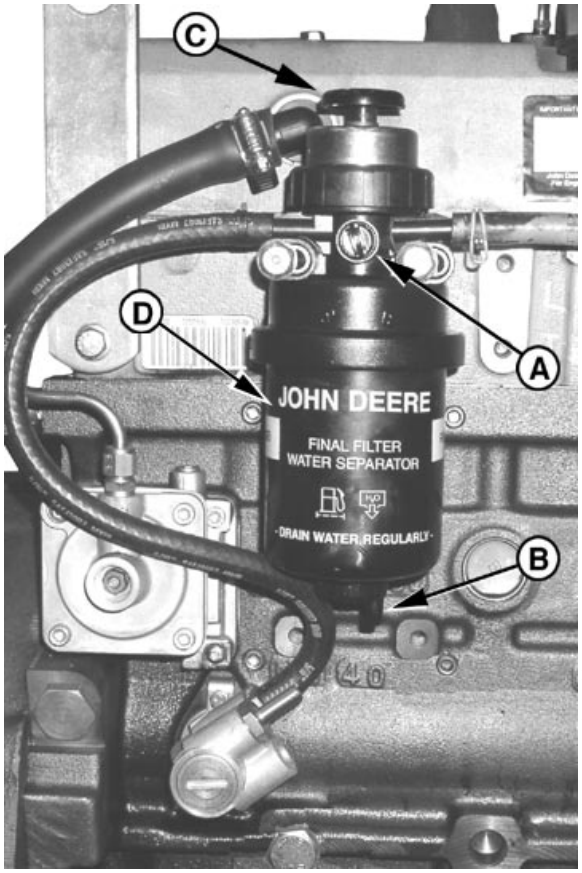
c. When fuel starts to drain out, tighten drain plug securely.

After draining water from the fuel filter, the filter must be primed by bleeding all air from the fuel system.

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

b. Tighten bleed plug securely, continue operating primer until pumping action is not felt.

If the fuel system needs further bleeding of air, see BLEEDING FUEL SYSTEM in Service As Required Section, later in this manual.



Fuel Transfer Pump and Filter

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

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.

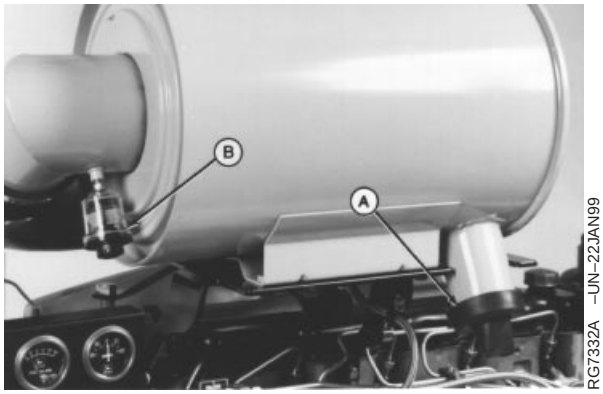
   Inspect:

   - 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.

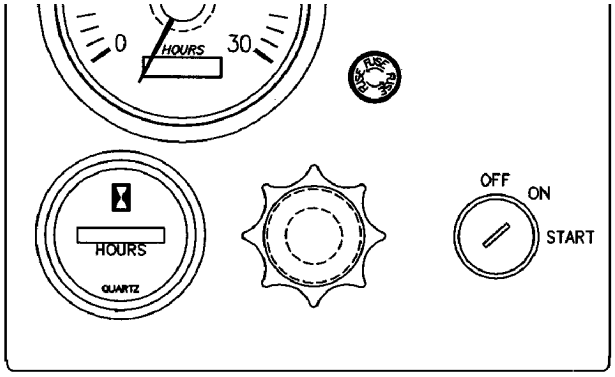
NOTE: It is normal for a small amount of leakage to occur as the engine cools down and parts contract. Excessive coolant leakage may indicate the need to replace the coolant pump. Contact your engine distributor or servicing dealer for repairs.

6. Turn key switch to “ON” position and check lamps. “WATER” and “HEAT” lamps should be off, while “OIL” and “CHG” lamps should be lit.

   Replace lamps as needed. If this does not solve any problems, see your John Deere dealer or distributor.



Dust Unloader Valve and Indicator Gauge



Key Switch in "ON" Position

A—Dust Unloader Valve
B—Air Restriction Indicator

Changing Engine Oil and Replacing Filter

If John Deere PLUS-50™ 10W-30 or ACEA - E4, E5, E6, or E7 engine oil **and** a John Deere oil filter are used, the oil and filter change interval is every 500 hours or every 12 months, whichever occurs first.

NOTE: If other than recommended oils or filters are used, the oil and filter change interval is reduced to every 250 hours.

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.

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

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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.

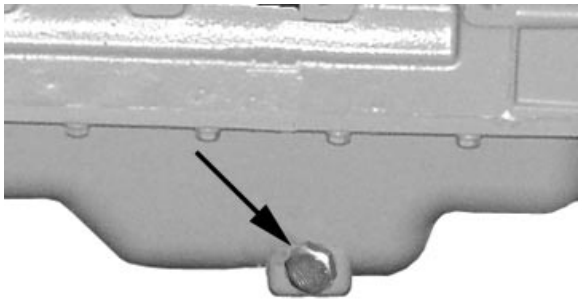
5. Remove oil filter packing and clean filter mounting pad.

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)



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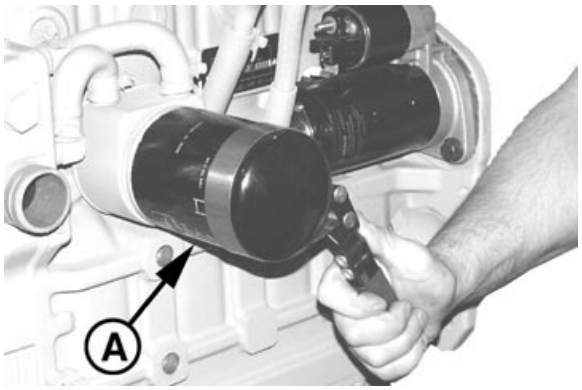
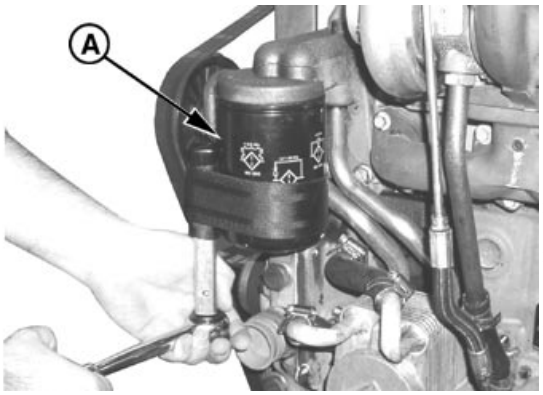
Oil Pan Drain Plug



RG12693 –UN–07FEB03

Removing Horizontal Oil Filter Element



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

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

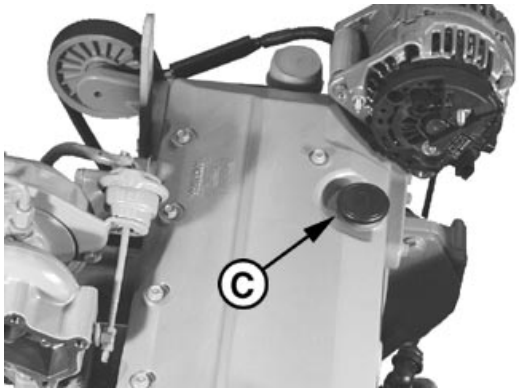
IMPORTANT: Immediately after completing any oil change, crank engine for 30 seconds without permitting engine to start. This will help insure adequate lubrication to engine components before engine starts.

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.

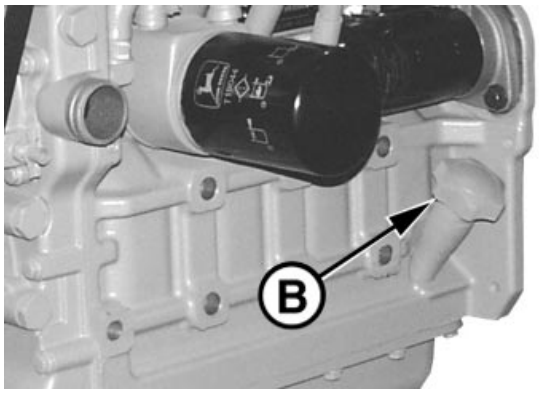
11. Stop engine and check oil level after 10 minutes. Oil level reading should be within crosshatch marks (D) on dipstick.

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



RG12780 –UN–07JAN03

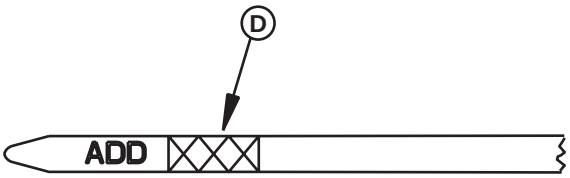
Rocker Arm Cover Oil Fill



RG12779A –UN–07JAN03

Optional Side Oil Fill

RG12781 –UN–17FEB03



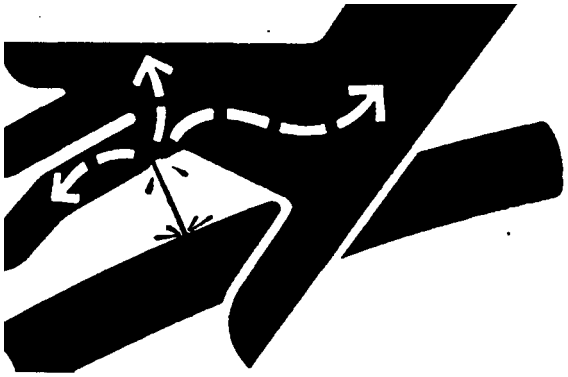
Crosshatch Marks on Dipstick

OUOD006,0000074 –19–31JAN07–3/3

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.



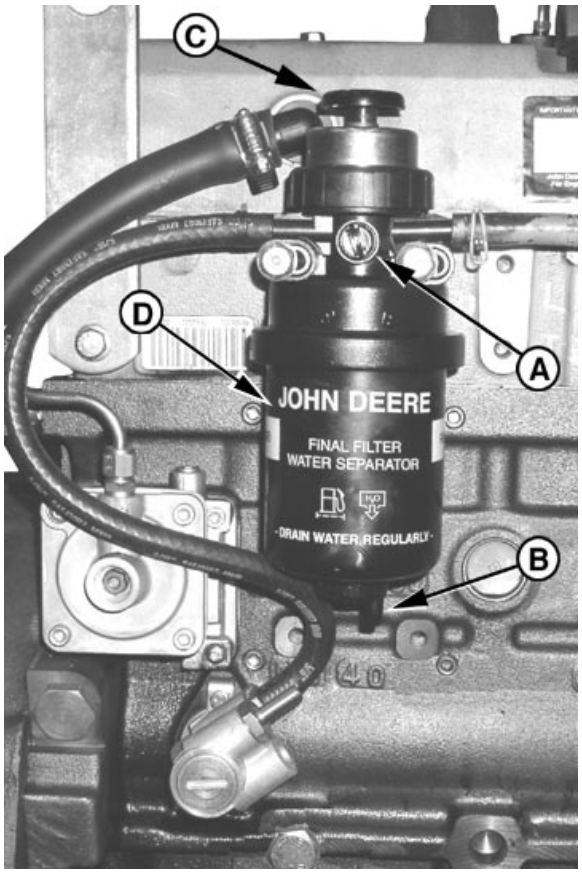
X9811 –UN–23AUG88

High-Pressure Fluids

1. Close fuel shut-off valve, if equipped.
2. Thoroughly clean fuel filter assembly and surrounding area.
3. Loosen drain plug (B) and drain fuel into a suitable container.
4. Firmly grasp the filter element (A) and rotate it counterclockwise 1/4 turn. Remove filter element.
5. Inspect filter mounting base for cleanliness. Clean as required.
6. Install new filter element by pushing up firmly into mounting base, then turn clockwise until it locks in place. Be sure element is firmly seated in base.

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

7. Open fuel shut-off valve and bleed the fuel system by pressing down in the primer button (D) on top of filter until resistance is felt or fuel flows freely from the bleed plug. Tighten bleed plug (C).



RG12782A –UN–18FEB03

Fuel Filter

A—Bleed Plug
B—Drain Plug
C—Primer Button
D—Filter Element

RG41183,0000046 –19–08JAN03–1/1

Cleaning Crankcase Vent Tube

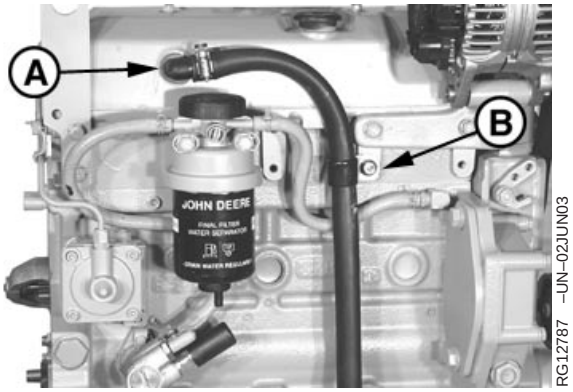
If you operate the engine in dusty conditions, clean the tube at shorter intervals.

1. Remove and clean crankcase vent tube (A) by loosening clamp (B) and hose clamp screw.

2. Install the vent tube and hose clamp screw. Tighten hose clamp cap screw to specification.

Specification

Vent Tube Clamp Cap Screw—
Torque ..... 40 N•m (30 lb ft)



Crankcase Vent Tube and Clamp

RG41183,000003C –19–31JAN07–1/1

Checking Air Intake System

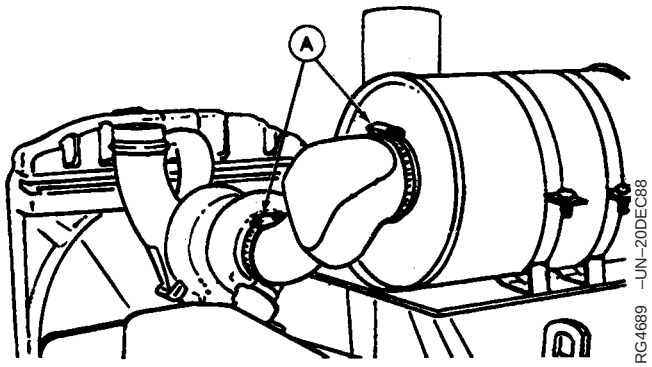
IMPORTANT: The air intake system must not leak. Any leak, no matter how small, may result in internal engine damage due to abrasive dirt and dust entering the intake system.

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.

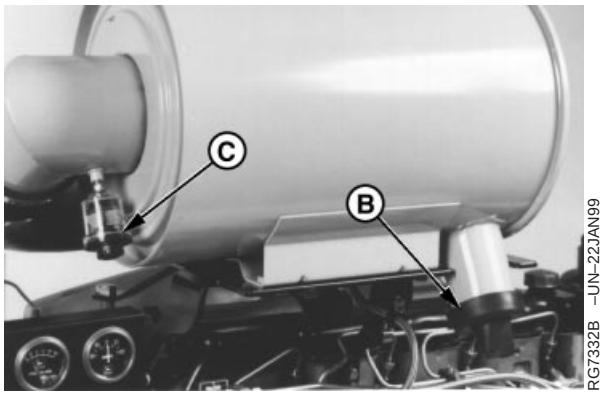
IMPORTANT: ALWAYS REPLACE primary air cleaner element when air restriction indicator shows a vacuum of 625 mm (25 in.) H_2O, is torn, or visibly dirty. See REPLACING AIR CLEANER ELEMENT later in Service As Required section.

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

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Check Engine Speeds

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

RG41183,000003E –19–31JAN07–1/1

Checking Belt Tensioner Spring Tension and Belt Wear

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

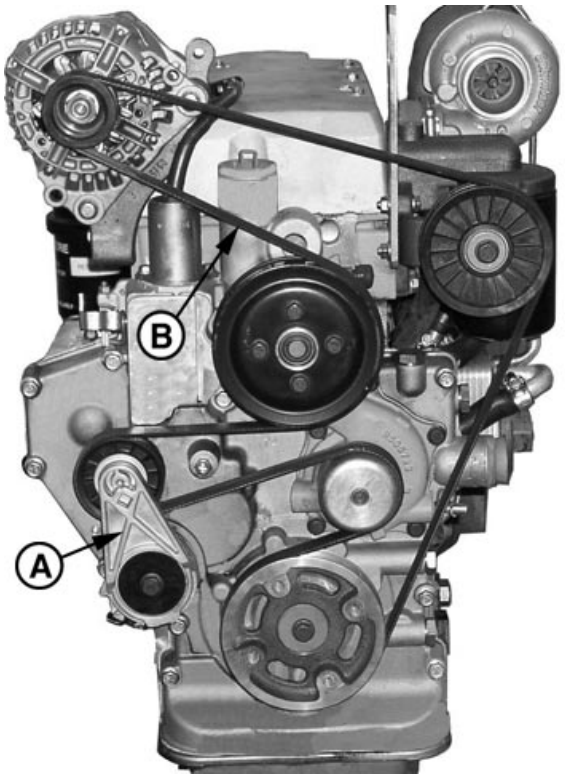
RG41183,0000048 –19–15FEB07–1/3

Checking Belt Wear

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

Visually inspect belt for excessive wear and cracks. See Replacing Fan and Alternator Belt in Section 40.

A—Belt Tensioner
B—Poly-Vee Belt



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Belt Wear Inspection

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RG41183,0000048 –19–15FEB07–2/3

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:

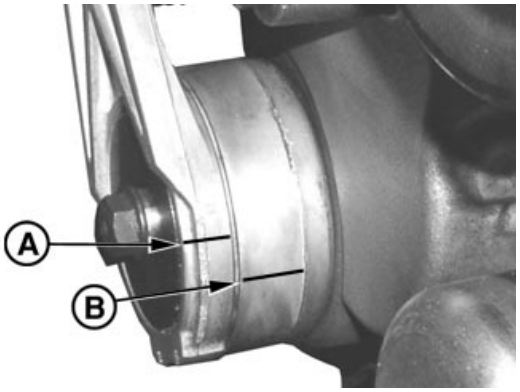
1. Release tension on belt using a breaker bar and socket on tension arm. Remove belt from pulleys.
2. Release tension on tension arm and remove breaker bar.
3. Put a mark (A) on swing arm of tensioner as shown.
4. Measure 21 mm (0.83 in.) from (A) and put a mark (B) on tensioner mounting base.
5. Install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

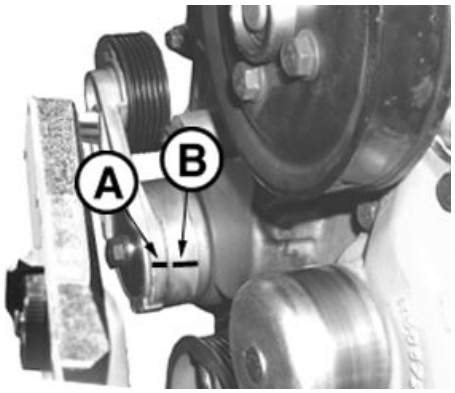
Spring Tension—Torque ..... 18-22 N•m (13-16 lb-ft)

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

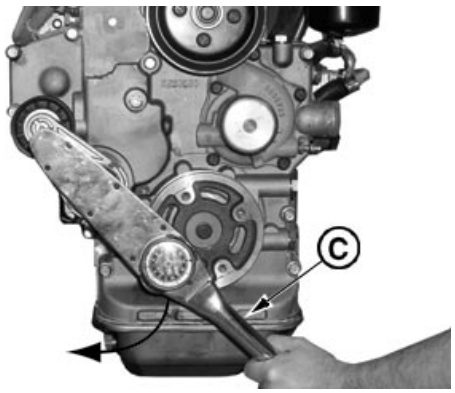
A—Mark On Swing Arm
B—Mark On Tensioner Mounting Base
C—Torque Wrench



Marks on Tensioner



Align Marks



Align Torque Wrench With Pulley And Tensioner

RG41183,0000048 –19–15FEB07–3/3

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:

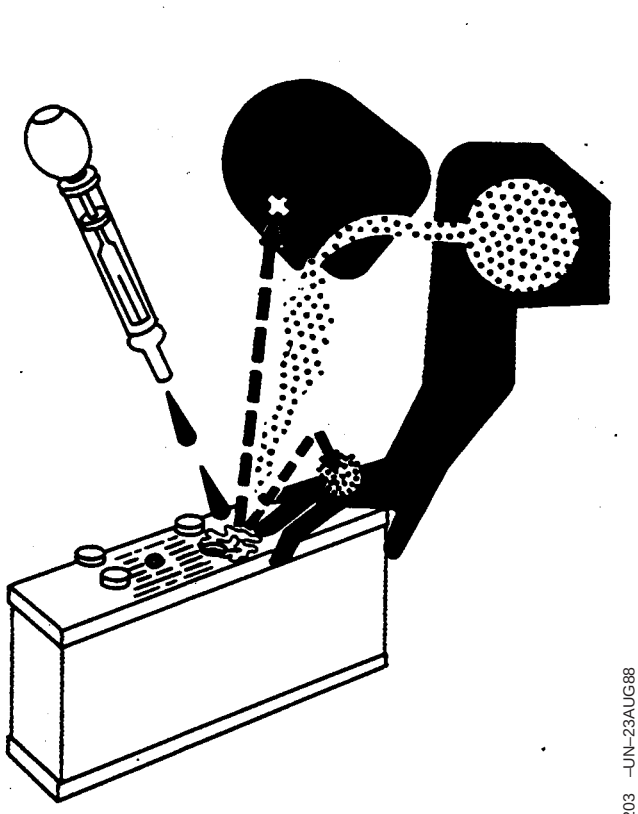
1. **Filling batteries in a well-ventilated area.**
2. **Wearing eye protection and rubber gloves.**
3. **Avoiding breathing fumes when electrolyte is added.**
4. **Avoiding spilling or dripping electrolyte.**
5. **Use proper jump start procedure.**

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.**



TS203 –UN–23AUG88

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.

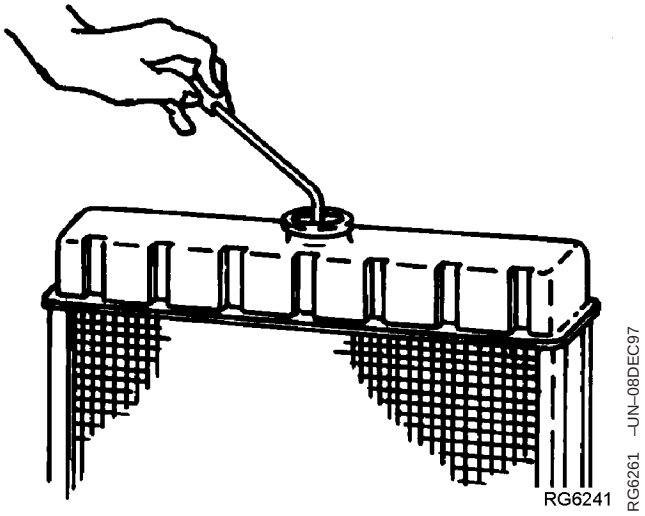
Through time and use, the concentration of coolant additives is gradually depleted during engine operation. Periodic replenishment of inhibitors is required, even when John Deere COOL-GARD™ is used. The cooling system must be recharged with additional supplemental coolant additives available in the form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

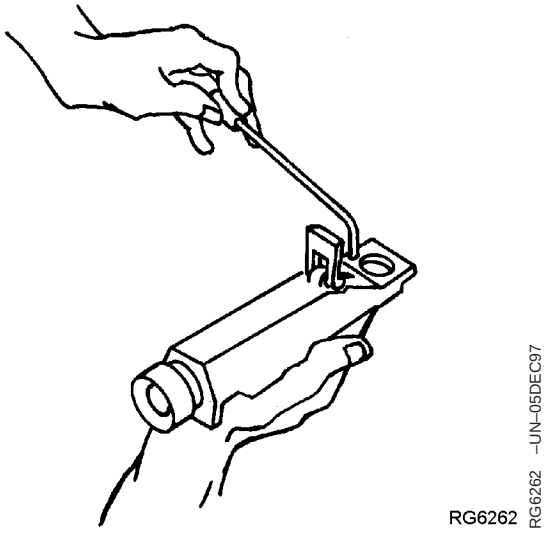
John Deere LIQUID COOLANT CONDITIONER is recommended as a supplemental coolant additive in John Deere engines.

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

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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.

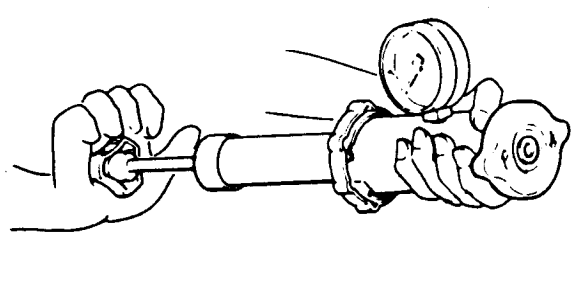
COOLSCAN™ and COOLSCAN PLUS™

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

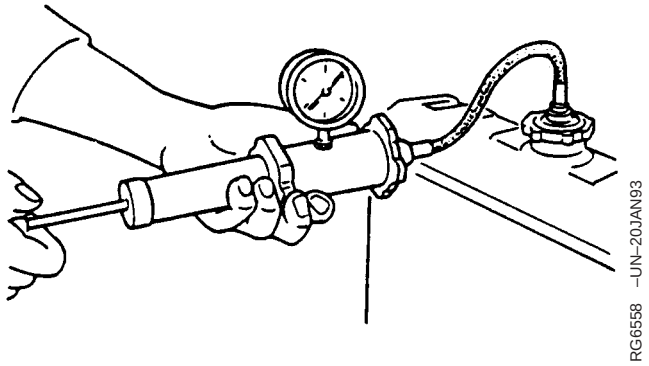
COOLSCAN is a trademark of Deere & Company
COOLSCAN PLUS is a trademark of Deere & Company

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.

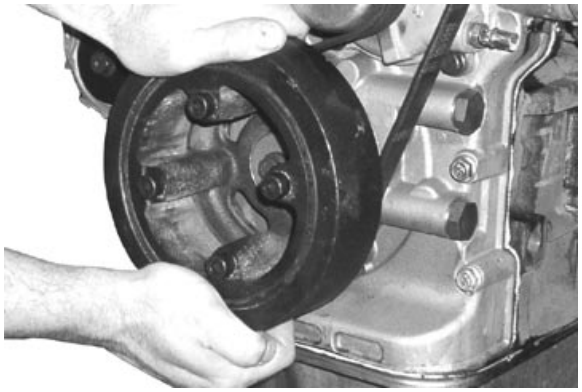
Specification

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.

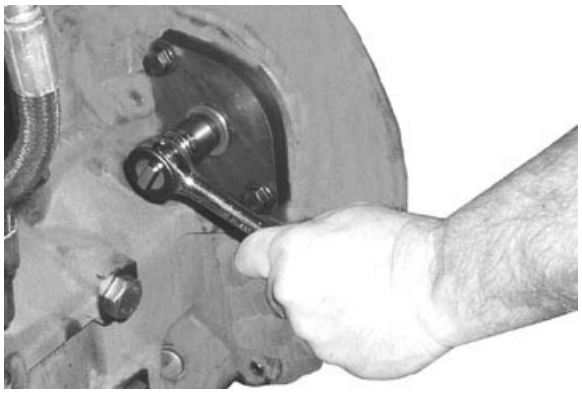
Specification

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



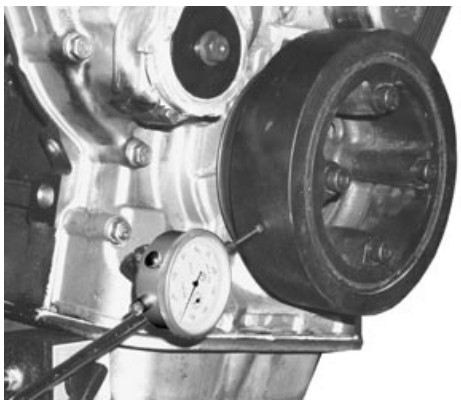
RG12917 –UN–16MAY03

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.

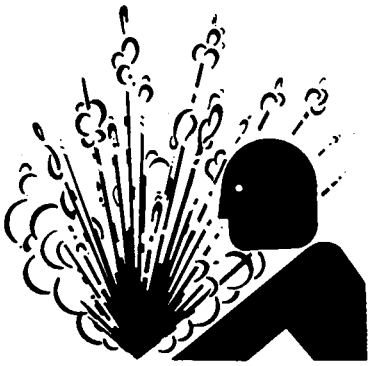
Shut off engine. Only remove filler cap when cool enough to touch with bare hands. Slowly loosen cap to first stop to relieve pressure before removing completely.

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.

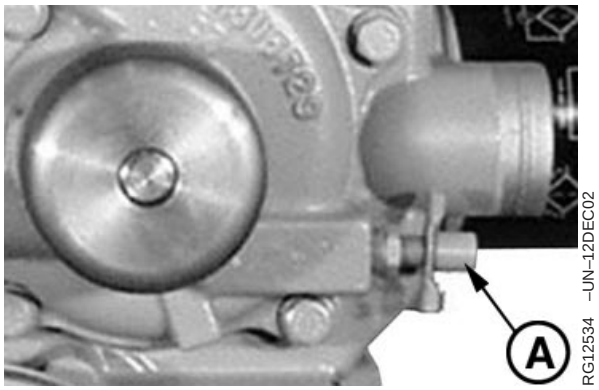


TS281 –UN–23AUG88

High-Pressure Fluids

RG6576 –UN–20JAN93

Cooling System Filler Cap



RG12534 –UN–12DEC02

Engine Coolant Drain Valve

A—Engine Coolant Drain Valve

Continued on next page

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 Engine— Coolant Capacity	2.6 L (2.7 qt)
3.0 L 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. The normal engine coolant temperature range is 82°—94°C (180° — 201°F).

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

OURGP12,00002B8 –19–03JAN07–3/3

Testing Thermostats Opening Temperature-Earlier Engines

To Remove Thermostat (Earlier Engines)

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

TS281 –UN–23AUG88

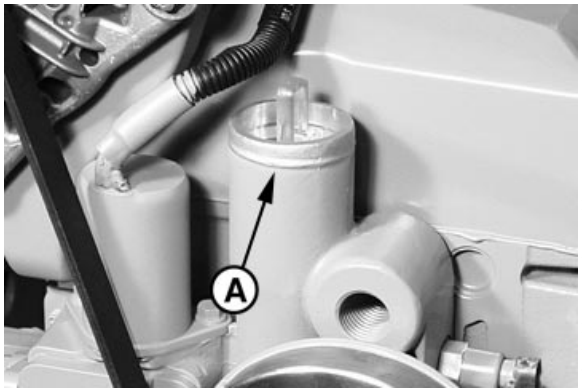
High Pressure Fluids

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.

A—Thermostat Hose Connection



RG12789 –UN–21JAN03

Coolant Hose to Thermostat Housing (Earlier Engine Shown)

Continued on next page

RG41183,0000050 –19–02JAN07–1/4

4. Remove thermostat from thermostat housing by squeezing handle to release from grooves inside bore and pull out.

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

Removing Thermostat from Housing (Earlier Engine Shown)

Continued on next page

RG41183,0000050 –19–02JAN07–2/4

Testing Thermostats Opening Temperature (Earlier Engines)

1. Remove thermostat(s).

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

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

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

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

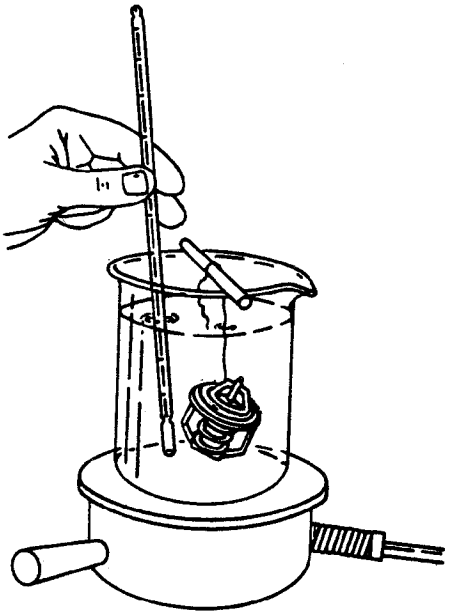
NOTE: Due to varying tolerances of different suppliers, initial opening and full open temperatures may vary slightly from specified temperatures.

THERMOSTAT TEST SPECIFICATIONS

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

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

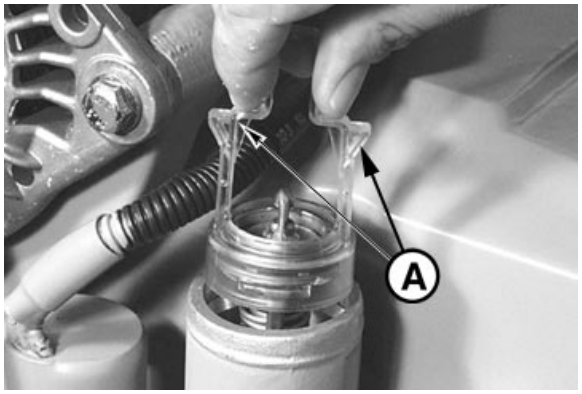
To Install Thermostats (Earlier Engines)

1. Insert thermostat in housing as shown until both tabs (A) are fully engaged in the groove in the housing bore.

2. Install coolant hose to thermostat cover. Tighten clamp.

3. If not already done, fill cooling system and check for leaks.

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



Installing Thermostat (Earlier Engine Shown)

RG41183,0000050 –19–02JAN07–4/4

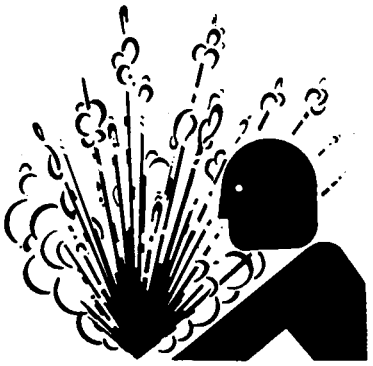
Testing Thermostats Opening Temperature-Later Engines

To Remove Thermostat (Later Engines)

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

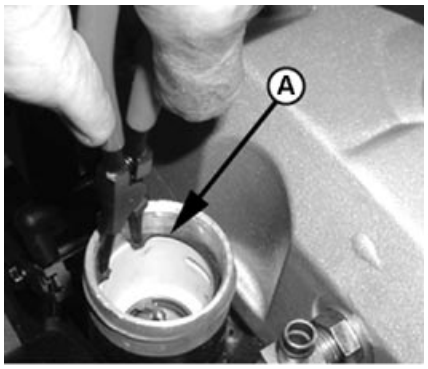
1. Visually inspect area around thermostat housing on top of engine timing gear cover for leaks.
2. Remove radiator pressure cap and partially drain cooling system.
3. Remove coolant hose (shown removed) from thermostat housing.
4. Remove snap ring (A) from thermostat housing.
5. Remove thermostat (B)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

A—Snap Ring
B—Thermostat



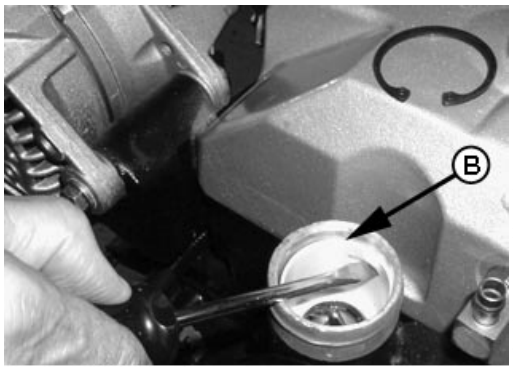
TS281 –UN–23AUG88

High Pressure Fluids



RG14940 –UN–03JAN07

Remove Snap Ring (Later Engine Shown)



RG14941 –UN–03JAN07

Remove Thermostat (Later Engine Shown)

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OUOD006,000006F –19–02JAN07–1/3

Testing Thermostats Opening Temperature (Later Engines)

1. Remove thermostat(s).

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

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

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

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

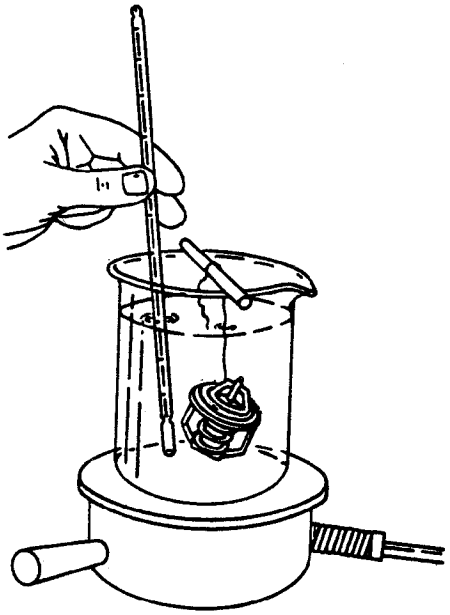
NOTE: Due to varying tolerances of different suppliers, initial opening and full open temperatures may vary slightly from specified temperatures.

THERMOSTAT TEST SPECIFICATIONS

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

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

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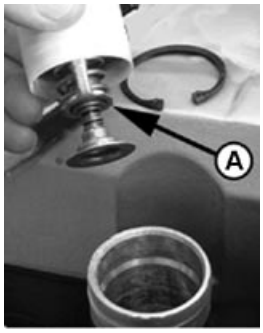
OUOD006,000006F –19–02JAN07–2/3

To Install Thermostats (Later Engines)

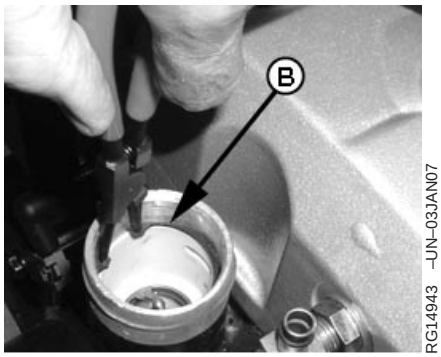
1. Insert thermostat (A) in housing.
2. Install snap ring (B) in groove.
3. Install coolant hose to thermostat cover. Tighten clamp.
4. If not already done, fill cooling system and check for leaks.

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 (Later Engine Shown)



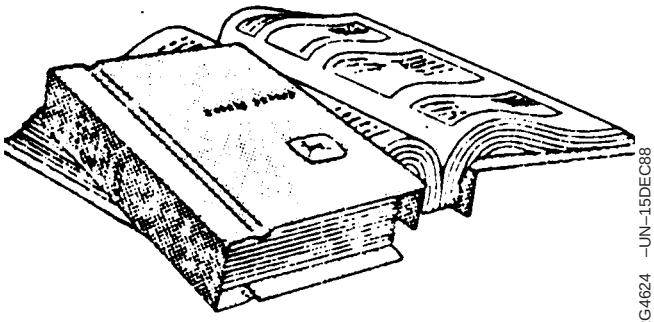
Install Snap Ring (Later Engine Shown)

OUOD006,000006F –19–02JAN07–3/3

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.)

RG12798 –UN–21JAN03

Fuel System

RG41183,0000052 –19–16JAN03–1/1

Adding Coolant

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

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

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

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

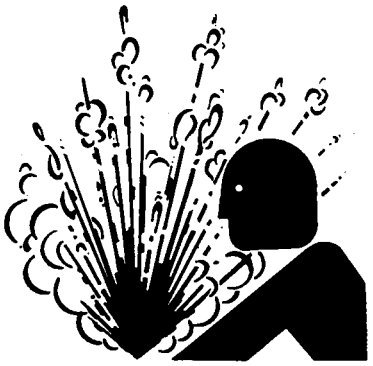
Air must be expelled from cooling system when coolant is added.

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

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

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

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



TS281 –UN–23AUG88

High-Pressure Fluids

RG6576A –UN–04JUN03

Radiator Filler Neck

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.

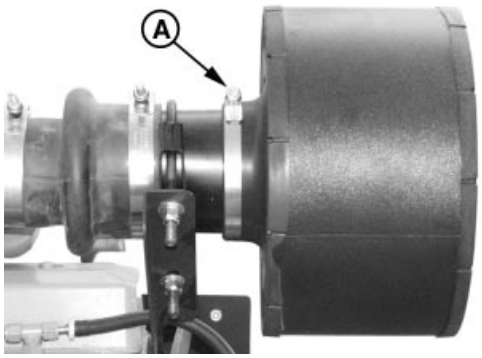
Specification	
Air Cleaner Neck Clamp—Torque	6.8 N•m (60 lb-in.)

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.

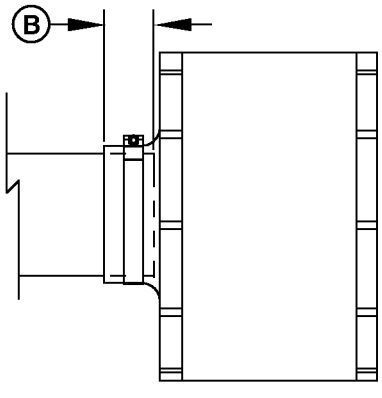
IMPORTANT: Whenever the air cleaner has been serviced or removed, ALWAYS fully depress the air restriction indicator reset button (if equipped) to assure accurate readings.

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.

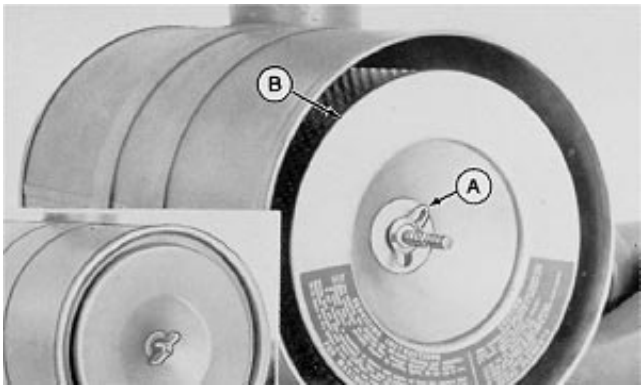
NOTE: Refer to manufacturers' instructions for servicing air cleaners not supplied by John Deere. If engine is NOT equipped with an air restriction indicator, replace air filter element every 500 hours of operation or every 12 months, whichever occurs first.

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.

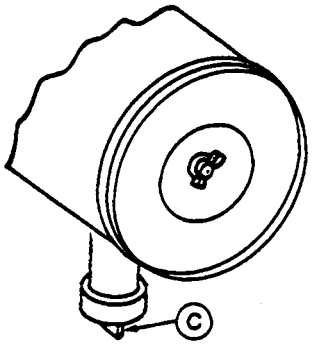
IMPORTANT: Remove secondary (safety) element (E) ONLY for replacement. DO NOT attempt to clean, wash, or reuse secondary element. Replacement of secondary element is usually necessary ONLY when primary element has a hole in it.

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.



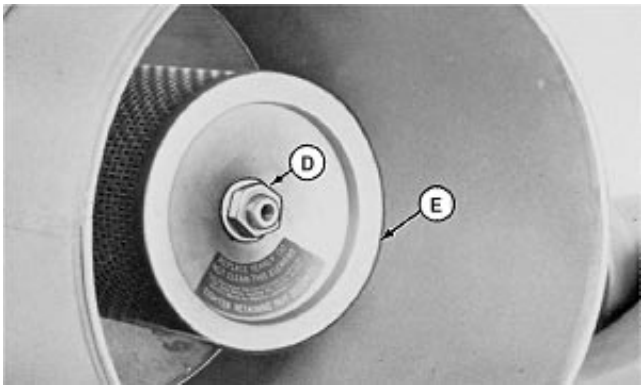
RG4686 –UN–20DEC88

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.

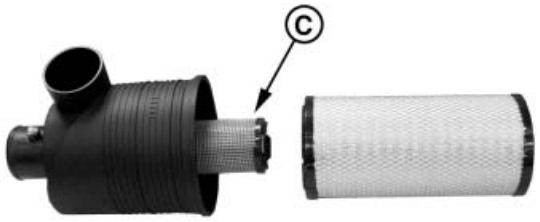
7. Close housing with dust unloader valve aimed down and latch latches.

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.

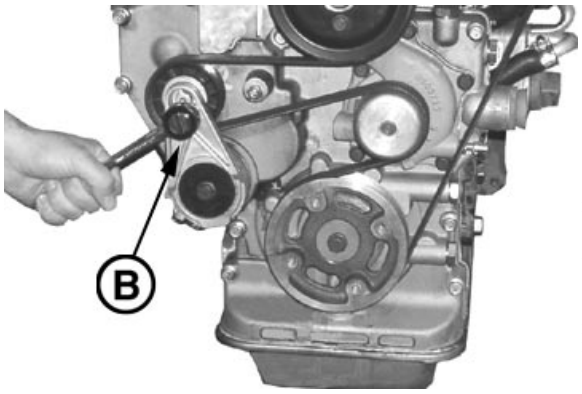
3. Remove poly-vee belt from pulleys and discard belt.

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.

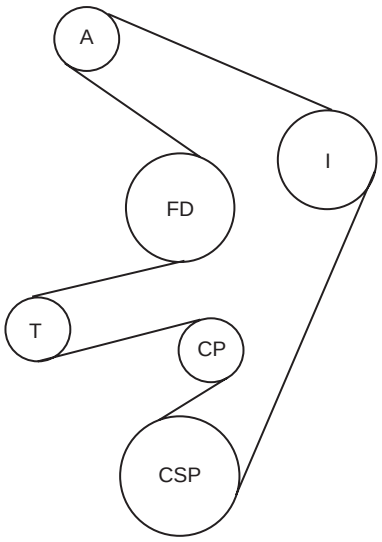
6. Apply tension to belt with tensioner. Remove drive arm.

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

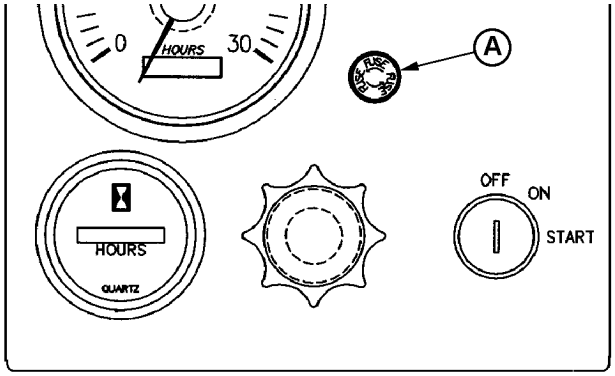
RG41183,0000056 –19–03JAN07–1/1

Checking Fuses

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

For John Deere instrument panels, there is a replaceable 14-amp fuse (A) located on the face of the panel. To replace, press in and rotate the fuse.

A—14- Amp Fuse



14- Amp Fuse

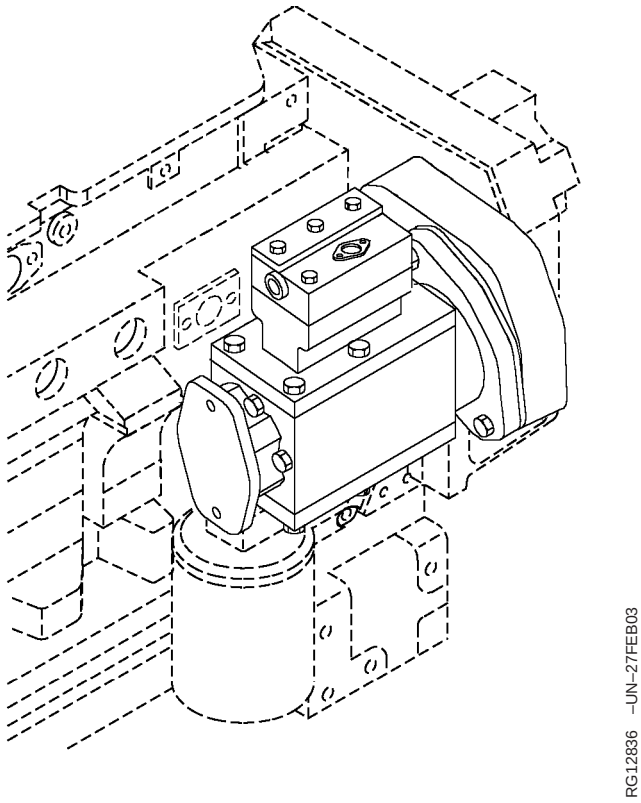
OURGP12,00002B9 –19–05MAY04–1/1

Checking Air Compressors (If Equipped)

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

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

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



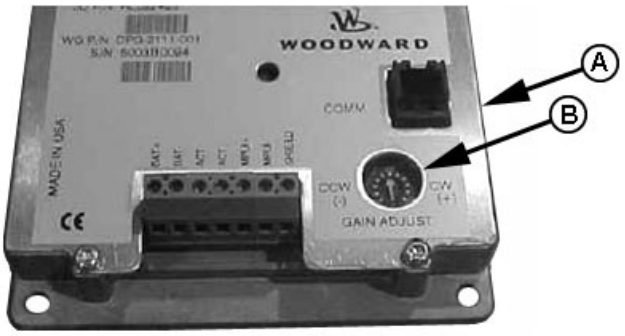
Air Compressor (Optional)

OURGP12,00001E0 –19–26FEB03–1/1

Adjusting Speed Gain (Generator Sets)

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

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



RG13537 –UN–07MAY04

Engine Control Unit

A—Engine Control Unit
B—Gain Potentiometer

OURGP12,00002BC –19–05MAY04–1/1

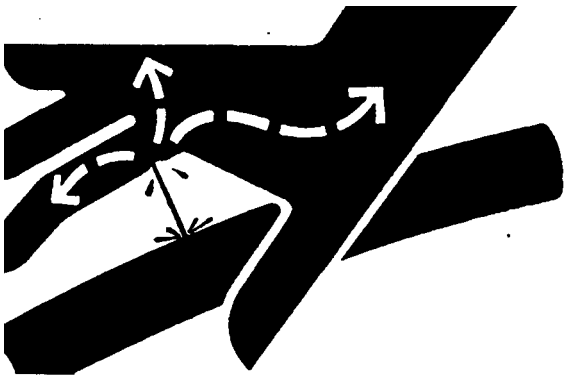
Bleeding the Fuel System

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 bleed air from the system.

The fuel system may be bled at one of several locations. On some engine applications it may be necessary to consult your operator's manual and choose the best location for your engine/machine application.



X9811 –UN–23AUG88

High Pressure Fluids

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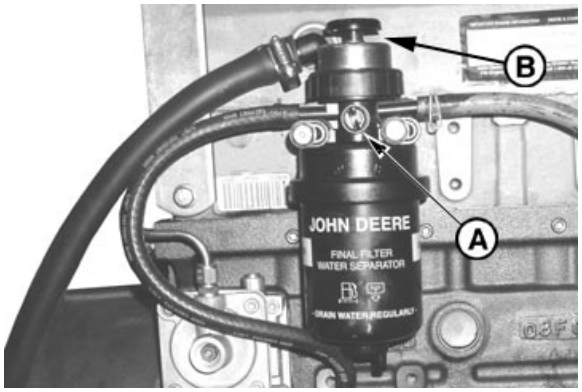
OUOD006,0000071 –19–03JAN07–1/2

1. Open air bleed vent screw (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.
3. Pump the hand primer several times until resistance is felt. Continue pumping and open air bleed vent screw again.
4. Close air bleed vent screw and pump the hand primer several times until resistance is felt again.



Fuel Filter Bleed Vent Screw and Hand Primer

A—Bleed Vent Screw
B—Hand Primer

OUOD006,0000071 –19–03JAN07–2/2

Troubleshooting

General Troubleshooting Information

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

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

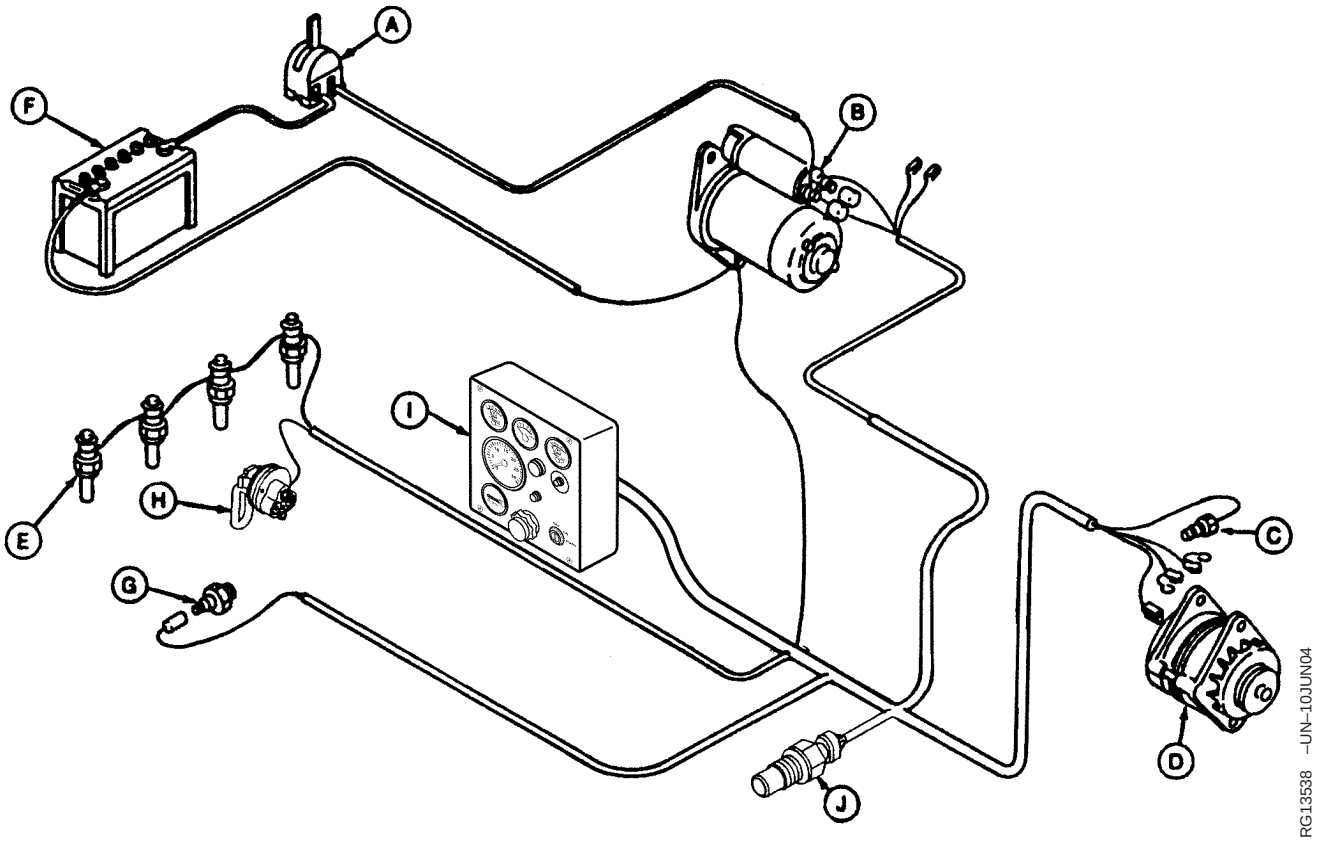
Later in this section is a list of possible engine problems along with possible causes and corrections. The illustrated diagrams and troubleshooting information are of a general nature, final design of the overall system for your engine application may be different. See your engine distributor or servicing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

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

- Know the engine and all related systems.
- Study the problem thoroughly.
- Relate the symptoms to your knowledge of engine and systems.
- Diagnose the problem starting with the easiest things first.
- Double-check before beginning the disassembly.
- Determine cause and make a thorough repair.
- After making repairs, operate the engine under normal conditions to verify that the problem and cause was corrected.

RG41183,0000058 –19–16JAN03–1/1

Electrical System Schematic



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

OURGP12,00002BB –19–05MAY04–1/1

Engine Troubleshooting

Symptom	Problem	Solution
Engine cranks but will not start	Incorrect starting procedure.	Verify correct starting procedure.
	No fuel.	Check fuel in tank and manual shut-off valve.
	Exhaust restricted.	Check and correct exhaust restriction.
	Fuel filter plugged or full of water.	Replace fuel filter or drain water from filter.
	Unit injection pumps not getting fuel /or air in fuel system.	Check fuel flow at transfer pump or bleed fuel system.
	Faulty injection pumps or nozzles.	Consult authorized diesel repair station for repair or replacement.
Engine hard to start or will not start	Engine starting under load.	Disengage driveline.
	Improper starting procedure.	Review starting procedure.
	No fuel.	Check fuel tank.
	Air in fuel line.	Bleed fuel line.
	Cold weather.	Activate glow plugs.
	Slow starter speed.	See “Starter Cranks Slowly”.
	Crankcase oil too heavy.	Use oil of proper viscosity.
	Improper type of fuel.	Consult fuel supplier; use proper type fuel for operating conditions.
	Water, dirt, or air in fuel system.	Drain, flush, fill, and bleed system.
	Clogged fuel filter.	Replace filter element.
	Dirty or faulty injection nozzles.	Have authorized servicing dealer or engine distributor check injectors.
	Injection shut-off not reset.	Turn key switch to “OFF” then to “ON”.

Continued on next page

Symptom	Problem	Solution
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”.
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.
	Unit injection pumps out of time	See your authorized servicing dealer or engine distributor.
	Turbocharger not functioning. (Turbocharger engines only.)	See your authorized servicing dealer or engine distributor.
	Leaking exhaust manifold gasket.	See your authorized servicing dealer or engine distributor.
	Defective aneroid control line. (Aneroid engines only.)	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. (Turbocharger engines only.)	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.	See your authorized servicing dealer or engine distributor.
	Engine out of time.	See your authorized servicing dealer or engine distributor.
	Turbocharger not functioning. (Turbocharged engines only)	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.
	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. (Turbocharged engines only.)	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.

OURGP12,0000102 –19–19MAY04–7/7

Storage

Engine Storage Guidelines

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

OURGP12,00000DF –19–07JAN05–1/1

Preparing Engine for Long Term Storage

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

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

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

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

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

4. Pour three (3) ounces of rust preventive oil into the turbocharger intake. (It may be necessary to temporarily install a short intake elbow on the turbocharger inlet to receive the oil.)

5. Prepare a tank with a solution of diesel fuel and rust preventive oil, at ten (10) ounces of rust preventive oil per gallon of diesel fuel.

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

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

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

NOTE: One gallon of fuel/oil solution can be used to treat 100 engines; two gallons to treat 200 engines, etc. The oil could then be replenished by adding an additional five (5) ounces of rust preventive oil per gallon of solution. However, starting over with a new solution is recommended to dispose of any water or other impurities.

9. Loosen, or remove and store, fan/alternator poly-vee belt.

10. Remove and clean batteries. Store them in a cool, dry place and keep them fully charged.

11. Disengage the clutch for any driveline.

12. Clean the exterior of the engine with salt-free water and touch up any scratched or chipped painted surfaces with a good quality paint.

13. Coat all exposed (machined) metal surfaces with grease or corrosion inhibitor if not feasible to paint.

14. Seal all openings on engine with plastic bags and tape.

Continued on next page

15. Store the engine in a dry protected place. If engine must be stored outside, cover it with a waterproof canvas or other suitable protective material and use a strong waterproof tape.

OURGP11,000006C –19–26JAN06–2/2

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 for correct readings before placing engine under load.
8. On the first day of operation after storage, check overall engine for leaks and check all gauges for correct readings.

RG,RG34710,5613 –19–20MAY96–1/1

Specifications

General OEM Engine Specifications

ITEM	UNIT OF MEASURE	4024TF	5030TF/HF
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]	—	18.0:1/18.2:1 19.1:1/20.5:1	18.0:1/18.2:1 19.1:1/20.5:1
Max. Crank Pressure	kPa (in. H_2O)	0.5 (2)	0.5 (2)
Governor Regulation- Mechanical (Industrial)	—	7—10 %	7—10 %
Governor Regulation- Speed Gain (Gen Set)	—	3-5 %	3-5 %
Oil Pressure At Rated Speed	kPa (psi)	360±105 (52±15)	360±105 (52±15)
Oil Pressure At Low Idle	kPa (psi)	150 (22)	150 (22)
Coolant Temperature Range	°C (°F)	82—94 (180—201)	82—94 (180—201)
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)

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.

OURGP12,00002BE –19–03JAN07–1/1

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]
4024TF270	1602, 1608, 1657	Industrial	900	3000	2800	37 (49)
4024TF270	1601, 1654	Industrial	900	3000	2800	45 (60)
4024TF270	1601, 1603, 1654	Industrial	900	3000	2800	49 (66)
4024TF270	1615	Industrial	900	2550	2400	42 (57)
4024TF270	60 Hz	Gen Set	1400	1870	1800	36 (48)
4024TF220	50 Hz	Gen Set	1400	1560	1500	31 (42)
4024TF220	50 Hz	Gen Set	1400	1560	1500	21 (28)
5030TF270	1604, 1655	Industrial	900	3000	2800	56 (75)
5030TF270	1605, 1656	Industrial	900	3000	2800	63 (84)
5030HF270	1606	Industrial	900	3000	2800	74 (99)
5030TF270	60 Hz	Gen Set	1400	1870	1800	60 (80)
5030HF270	60 Hz	Gen Set	1400	1870	1800	72 (96)
5030TF220	50 Hz	Gen Set	1400	1560	1500	41 (56)
5030HF220	50 Hz	Gen Set	1400	1560	1500	62 (84)

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

OURGP12,00002BF –19–03JAN07–1/1

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.

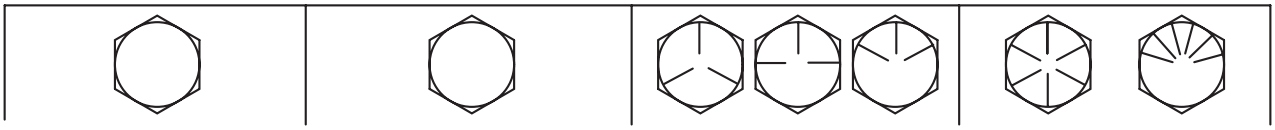
NOTE: Crankcase oil capacity may vary slightly. ALWAYS fill crankcase to within crosshatch marks on dipstick. DO NOT overfill.

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)

OUOD006,0000075 –19–31JAN07–1/1

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.

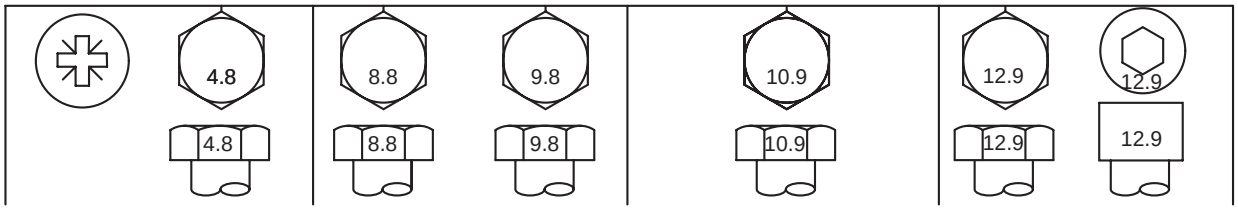
[a]Grade 2 applies for hex cap screws (not hex bolts) up to 6. in (152 mm) long. Grade 1 applies for hex cap screws over 6 in. (152 mm) long, and for all other types of bolts and screws of any length.

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

OUOD006,0000072 –19–03JAN07–1/1

2000 Hour/24 Month Service

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

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

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”.

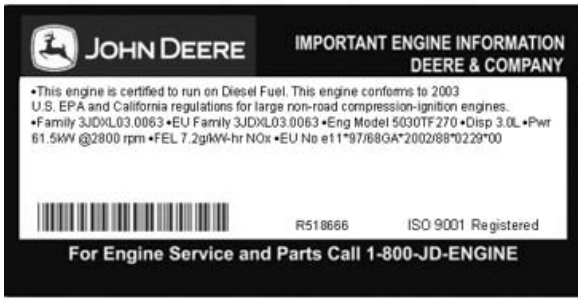
RG,RG34710,7629 –19–30JUN97–1/1

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

DX,SERVLIT –19–31JUL03–1/2

– 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

Index