POWERTECH™ 8.1 L 6081HF070 OEM Diesel Engines (200,000—)

OPERATOR'S MANUAL

POWERTECH 8.1 L 6081HF070 OEM Diesel Engines (200,000—)

OMRG34944 Issue 03Feb04 (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

Foreword

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

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

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

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

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

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

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

IMPORTANT: This manual covers POWERTECH® 8.1 L OEM engines meeting Tier 2[1] emission standards. These engines, produced after January 2001, are redesigned to meet the 2001 and later emission standards and are noted as engines with serial numbers (200,000—). These engines also have a suffix "070" in the engine model number, as in "6081HF070". Tier 1 engines, produced earlier, are noted as engines (—199,999), and are covered in a separate manual, OMRG24828.

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

POWERTECH is a trademark of Deere & Company

[1]Emission certified for United States as EPA Tier 2 and for European Union as Stage II.

OURGP11,0000258 –19–19NOV03–1/1

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:

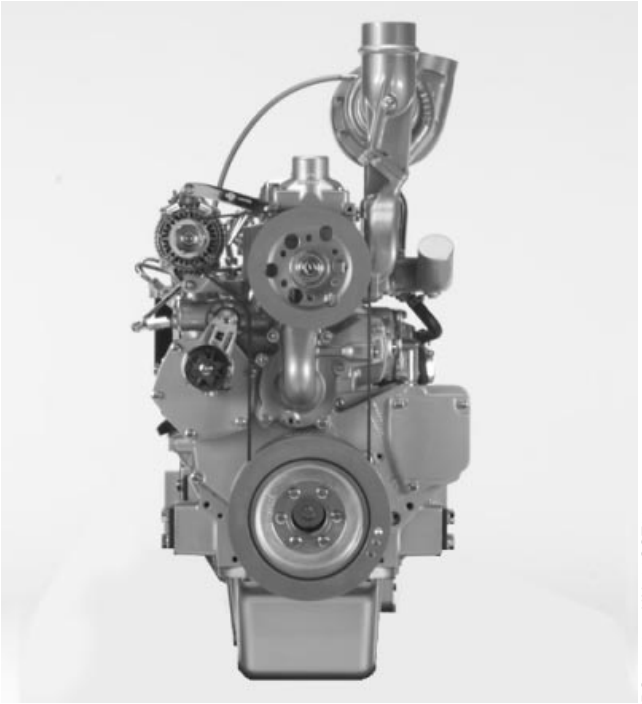
Ta reda på vem din återförsäljare är och besök honom så snart tillfälle ges. Vänta inte tills det är dags för service eller eventuellt garantiarbete. Din motor garantiregistrerar Du via Internet på http://www.johndeere.com/enginewarranty

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

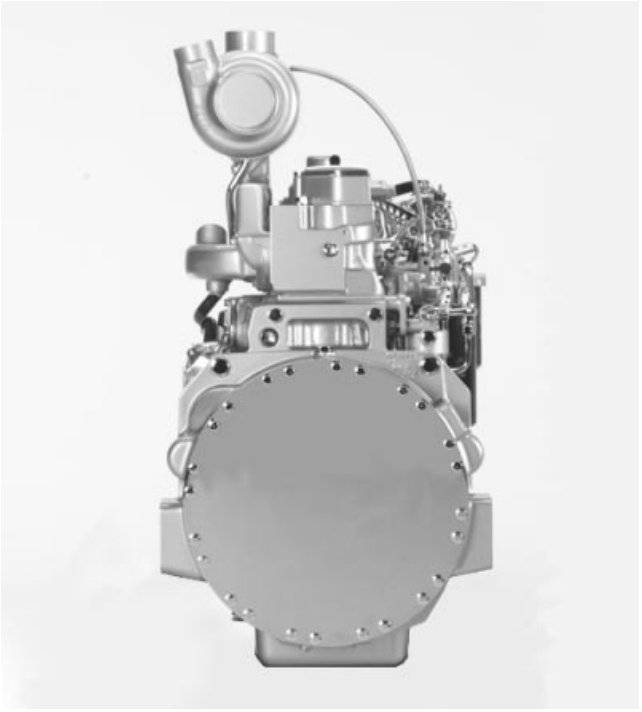
Identification Views—Tier 2 8.1 L Engine Serial Number (200,000—)

8.1 L Diesel Engine Right Front View

8.1 L Diesel Engines Left Front View



8.1 L Diesel Engine Front View



8.1 L Diesel Engine Rear View

NOTE: These are Tier II emission-certified engines.

OURGP11,0000226 –19–20OCT03–1/1

Contents

Continued on next page

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

Continued on next page

Record Engine Serial Number

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

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

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

Engine Serial Number (A)

_____

Application Data or Type (B)

_____

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

RG12746 –UN–08NOV02

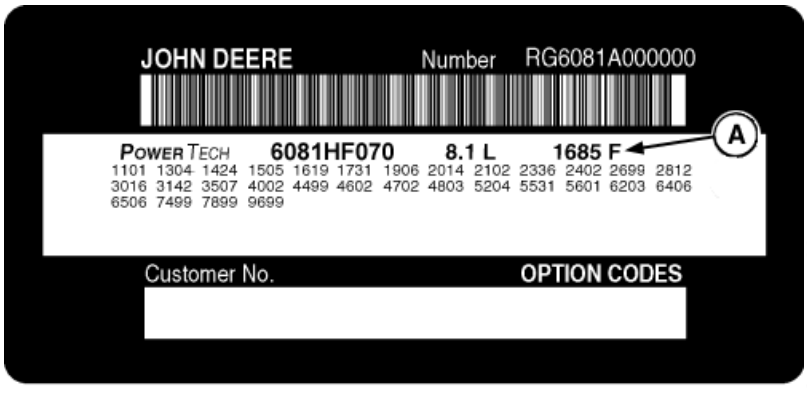
Engine Serial Number Plate

RG12739 –UN–07NOV02

Location of Engine Serial Number Plate

RG,RG34710,4001 –19–07NOV02–1/1

Engine Option Codes



Option Code Label

A—Engine Base Code

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

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

The first two digits of each option code identify a specific group, such as alternators. The last two digits of each code identify one specific option provided on your engine, such as a 24-volt, 42-amp alternator.

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

Engine Base Code (A):

_____

Continued on next page

Engine Option Codes—Continued

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

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

Option Codes	Description
11	Rocker Arm Cover
12	Oil Filter Inlet
13	Crankshaft Pulley/Damper
14	Flywheel Housing
15	Flywheel
16	Fuel Injection System
17	Air Intake
18	Air Cleaner
19	Oil Pan
20	Coolant Pump
21	Thermostat Cover
22	Thermostats
23	Fan Drive
24	Fan Belts
25	Fan
26	Engine Coolant Heater
27	Radiator
28	Exhaust System
29	Ventilator System
30	Starter Motor
31	Alternator
32	Instrument Panel
33	Tachometer
35	Fuel Filter
36	Front Plate
37	Fuel Transfer Pump
38	Operator's Manual
39	Outlet Manifold
40	Oil Dipstick
41	Belt-Driven Front Auxiliary Drive
43	Starting Aid
44	Timing Gear Cover With Gears
46	Cylinder Block
47	Crankshaft And Bearings
48	Connecting Rods and Pistons
49	Valve Actuating Mechanism
50	Oil Pump

Option Codes	Description
51	Cylinder Head With Valves
52	Auxiliary Gear Drive
53	Fuel Heater
55	Shipping Stand
56	Paint Option
57	Coolant Pump Inlet
59	Oil Cooler and Filter
60	Add-0n Auxiliary Drive Pulley
62	Alternator Mounting Bracket
63	Low Pressure Fuel Line
64	Exhaust Elbow
65	Turbocharger
66	Temperature Switch
67	Electronic Sensors (Base Engine)
68	Crankshaft Rear Damper
69	Engine Serial Number Plate
71	Engine Oil Bypass Filter
72	Electronic Software Option
74	Air Conditioning (A/C) Compressor (Optional)
75	Air Restriction Indicator
76	Switches and Sensors
77	Timing Gear Cover
78	Air Compressor (Optional)
79	Engine Certification
81	Primary Fuel Filter and Water Separator
83	Electronic Software (Vehicle Option)
84	Electrical Wiring Harness
86	Fan Pulley
87	Belt Tensioner
88	Oil Filter
92	Accessories (Factory Installed)(Rear PTO)
93	Emissions Label
95	Special Equipment (Factory Installed)
96	Engine Installation Kit
97	Special Equipment (Field Installed)
98	Shipping (Engine Hanger Straps
99	Service Only Items

NOTE: These option codes are based on the latest information available at the time of publication.

The right is reserved to make changes at any time without notice.

Record Fuel Transfer Pump Model Number

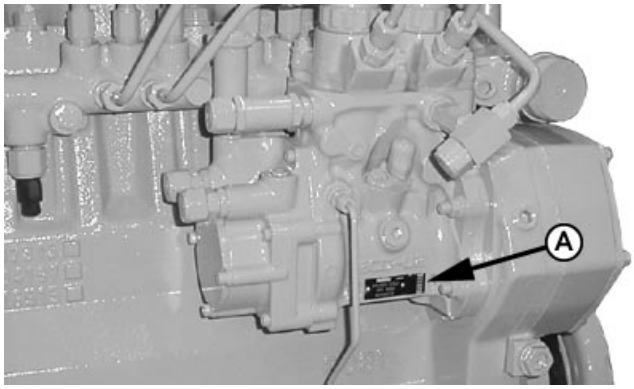
Record the fuel transfer pump model and serial information found on the serial number plate (A).

Model No._____ RPM_____

Manufacturer's No._____

Serial No._____

A—Serial Number Plate



RG12740 –UN–07NOV02

Fuel Transfer Pump Serial Number Plate

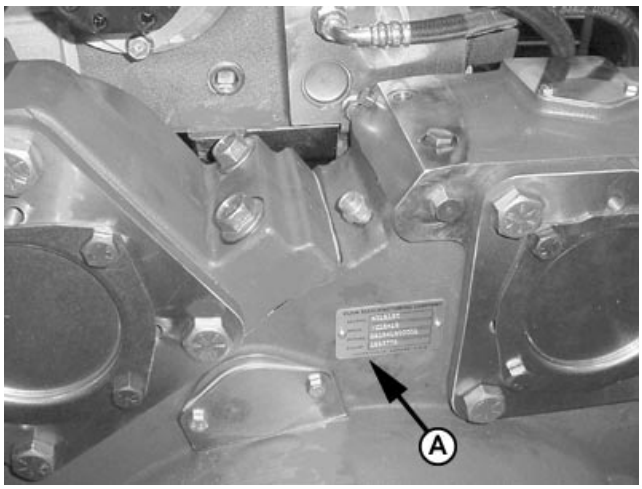
RG,RG34710,4005 –19–07NOV02–1/1

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

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

Rear PTO Serial Number

_____



RG12594 –UN–24SEP02

Rear PTO Serial Number Plate

RG,RG34710,4004 –19–11OCT02–1/1

Recognize Safety Information

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

Follow recommended precautions and safe operating practices.

T81389 –UN–07DEC88

Safety-alert symbol

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

Signal Words

DX,SIGNAL –19–03MAR93–1/1

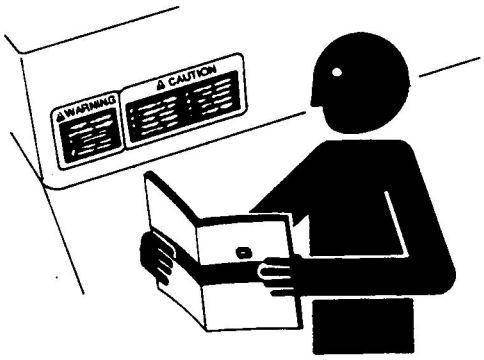
Follow Safety Instructions

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 engine and how to use controls properly. Do not let anyone operate without instruction.

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

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



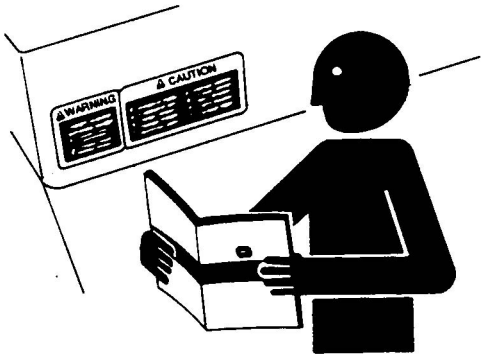
TS201 –UN–23AUG88

Safety Messages

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

Safety Signs

DX,SIGNS1 –19–04JUN90–1/1

Prevent Bypass Starting

Avoid possible injury or death from engine runaway.

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

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

RG5419 –UN–28FEB89

Prevent Bypass Starting

RG,RG34710,7508 –19–30JUN97–1/1

Handle Fuel Safely—Avoid Fires

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

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

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

TS202 –UN–23AUG88

Avoid Fires

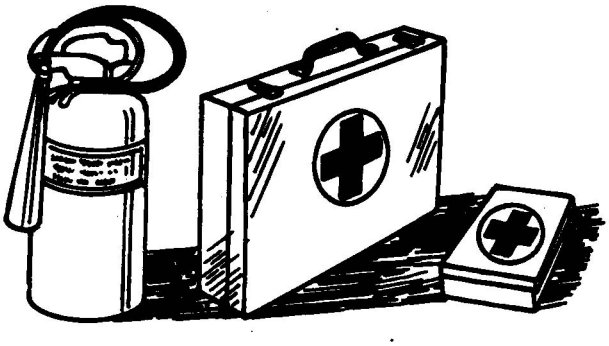
DX,FIRE1 –19–03MAR93–1/1

Prepare for Emergencies

Be prepared if a fire starts.

Keep a first aid kit and fire extinguisher handy.

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



TS291 –UN–23AUG88

First Aid Kit

DX,FIRE2 –19–03MAR93–1/1

Handle Starting Fluid Safely

Starting fluid is highly flammable.

Keep all sparks and flame away when using it. Keep starting fluid away from batteries and cables.

To prevent accidental discharge when storing the pressurized can, keep the cap on the container, and store in a cool, protected location.

Do not incinerate or puncture a starting fluid container.

TS1356 –UN–18MAR92

Store Safely

DX,FIRE3 –19–16APR92–1/1

Handle Fluids Safely—Avoid Fires

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

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

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

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

TS227 –UN–23AUG88

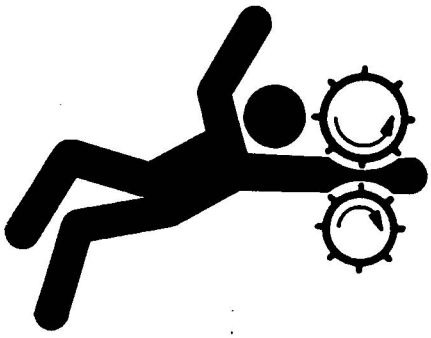
Avoid Fires

DX,FLAME –19–29SEP98–1/1

Service Engines Safely

Tie long hair behind your head. Do not wear a necktie, scarf, loose clothing, or necklace when you work near engine 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

Moving Parts

DX,LOOSE –19–04JUN90–1/1

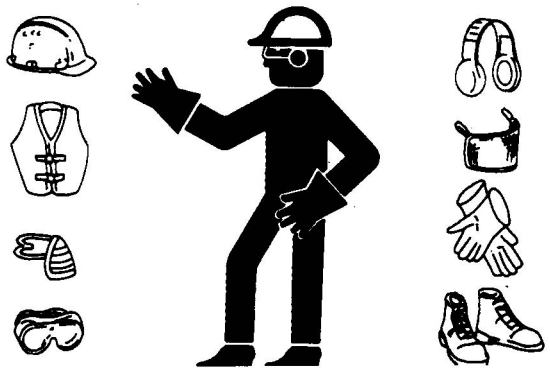
Wear Protective Clothing

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

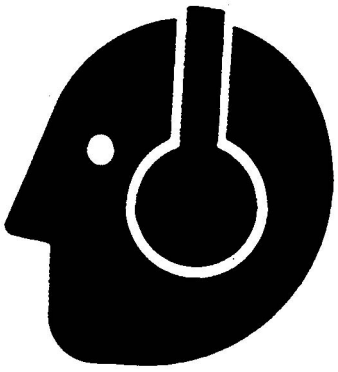
Protective Clothing

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

Noise Exposure

DX,NOISE –19–03MAR93–1/1

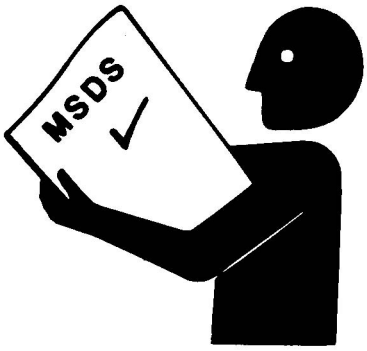
Handle Chemical Products Safely

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

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

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

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



TS1132 –UN–26NOV90

Material Safety Data Sheet

DX,MSDS,NA –19–03MAR93–1/1

Stay Clear of Rotating Drivelines

Entanglement in rotating driveline can cause serious injury or death.

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

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

TS1644 –UN–22AUG95

Rotating Drivelines

OUO1004,0000BD8 –19–03NOV00–1/1

Practice Safe Maintenance

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

Never lubricate, service, or adjust engine 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 engine to cool.

Securely support any engine 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.

Disconnect battery ground cable (-) before making adjustments on electrical systems or welding on engine.

TS218 –UN–23AUG88

Keep Area Clean

DX,SERV –19–17FEB99–1/1

Work In Ventilated Area

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

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

TS220 –UN–23AUG88

Engine exhaust fumes

DX,AIR –19–17FEB99–1/1

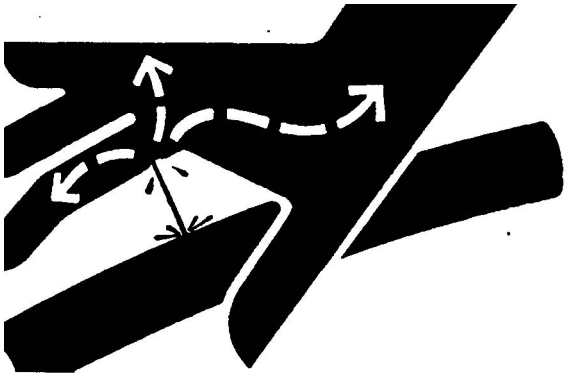
Avoid High-Pressure Fluids

Escaping fluid under pressure can penetrate the skin causing serious injury.

Avoid the hazard by relieving pressure before disconnecting hydraulic or other lines. Tighten all connections before applying pressure.

Search for leaks with a piece of cardboard. Protect hands and body from high pressure fluids.

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



X9811 –UN–23AUG88

High-Pressure Fluids

DX,FLUID –19–03MAR93–1/1

Avoid Heating Near Pressurized Fluid Lines

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

TS953 –UN–15MAY90

Flammable Spray

DX,TORCH –19–03MAR93–1/1

Do Not Open High-Pressure Fuel System

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

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

TS1343 –UN–18MAR92

DX,WW,HPCR1 –19–07JAN03–1/1

Remove Paint Before Welding or Heating

Avoid potentially toxic fumes and dust.

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

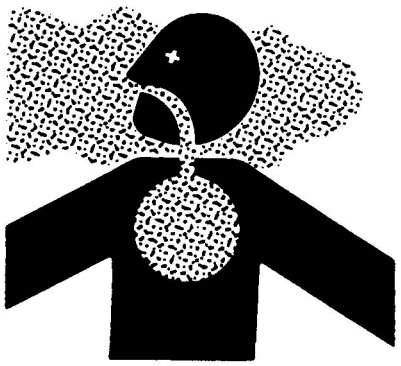
Remove paint before heating:

- Remove paint a minimum of 101 mm (4 in.) from area to be affected by heating. If paint cannot be removed, wear an approved respirator before heating or welding.
- If you sand or grind paint, avoid breathing the dust. Wear an approved respirator.
- If you use solvent or paint stripper, remove stripper with soap and water before welding. Remove solvent or paint stripper containers and other flammable material from area. Allow fumes to disperse at least 15 minutes before welding or heating.

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

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

Dispose of paint and solvent properly.



TS220 –UN–23AUG88

DX,PAINT –19–24JUL02–1/1

Service Cooling System Safely

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

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

TS281 –UN–23AUG88

Cooling System

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

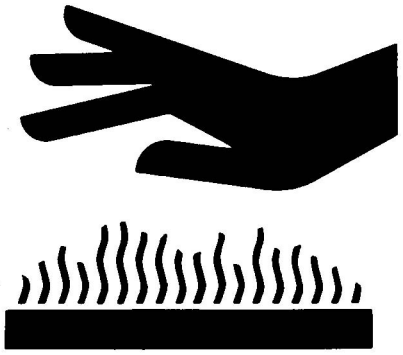
Rotating Fan

OUOD006,000009D –19–04DEC02–1/1

Avoid Hot Parts

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

External dry exhaust parts become very hot during operation. Turbochargers may reach temperatures as high as 500°C (932°F) under full load, and naturally aspired exhaust manifolds may reach 600°C (1112°F) under full load. This may ignite paper, cloth or wooden materials. Parts on engines that have been at full load and reduced to no load idle will maintain approximately 150°C (302°F).



TS271 –UN–23AUG88

Hot Surface

OUOD006,000009E –19–04DEC02–1/1

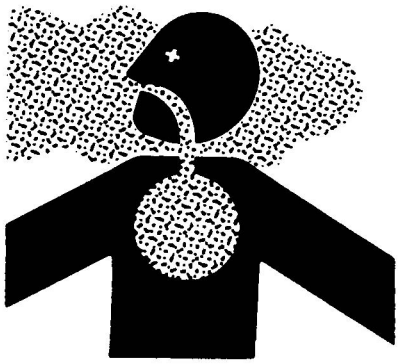
Avoid Harmful Asbestos Dust

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

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

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

Keep bystanders away from the area.



TS220 –UN–23AUG88

Asbestos Dust

DX,DUST –19–15MAR91–1/1

Prevent Battery Explosions

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

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

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

TS204 –UN–23AUG88

Battery Explosions

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:

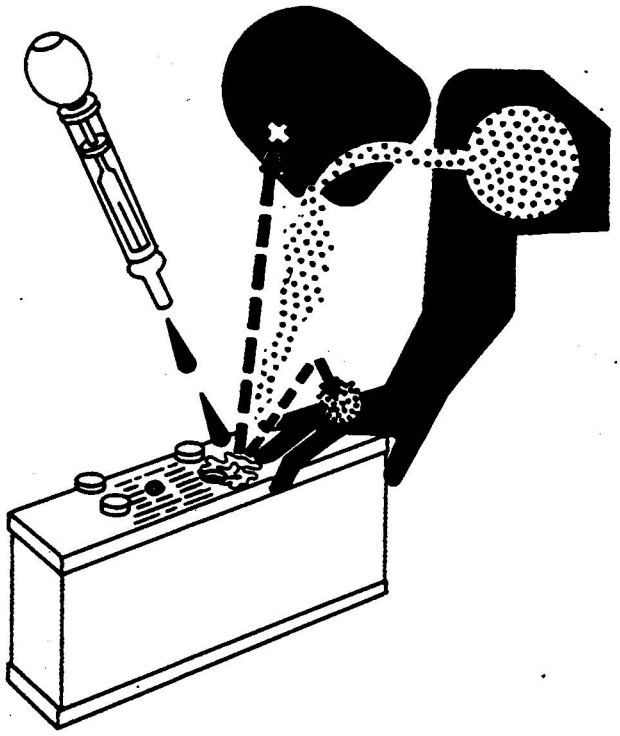
1. **Filling batteries in a well-ventilated area.**
2. **Wearing eye protection and rubber gloves.**
3. **Avoiding breathing fumes when electrolyte is added.**
4. **Avoiding spilling or dripping electrolyte.**
5. **Using proper jump start procedure.**

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 –19–11MAY00–1/1

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

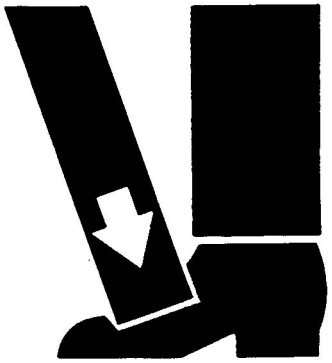
High Pressure Spray

DX,SPRAY –19–16APR92–1/1

Use Proper Lifting Equipment

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

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



TS226 –UN–23AUG88

Proper Lifting Equipment

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

Proper Tools

DX,REPAIR –19–17FEB99–1/1

Dispose of Waste Properly

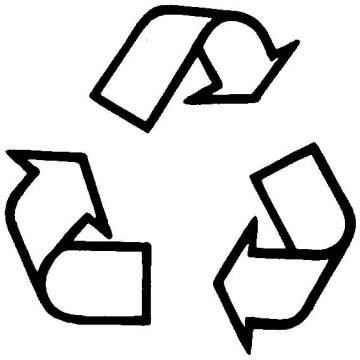
Improperly disposing of waste can threaten the environment and ecology. Potentially harmful waste used with John Deere equipment include such items as oil, fuel, coolant, brake fluid, filters, and batteries.

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

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

Air conditioning refrigerants escaping into the air can damage the Earth's atmosphere. Government regulations may require a certified air conditioning service center to recover and recycle used air conditioning refrigerants.

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



TS1133 –UN–26NOV90

Recycle Waste

DX,DRAIN –19–03MAR93–1/1

Fuels, Lubricants, and Coolant

Diesel Fuel

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

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

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

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

Cetane number of 40 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 of 3100 gram load level as measured by the BOCLE scuffing test.

Sulfur content:

- Sulfur content should not exceed 0.5%. Sulfur content less than 0.05% is preferred.
- If diesel fuel with sulfur content greater than 0.5% sulfur content is used, reduce the service interval for engine oil and filter by 50%.
- DO NOT use diesel fuel with sulfur content greater than 1.0%.

Bio-diesel fuels may be used ONLY if the fuel properties meet DIN 51606 or equivalent specification.

DO NOT mix used engine oil or any other type of lubricant with diesel fuel.

DX,FUEL1 –19–19DEC03–1/1

Lubricity of Diesel Fuel

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

ASTM D975 and EN 590 specifications do not require fuels to pass a fuel lubricity test.

Sulfur content of diesel fuel for highway use is less than 0.05% (500 ppm) in the United States and Canada, and less than 0.035% (350 ppm) in the European Union.

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

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

Fuel lubricity should pass a minimum load level of 3100 grams as measured by ASTM D6078 or 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 –19–19DEC03–1/1

Handling and Storing Diesel Fuel

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

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

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

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

Ensure that all fuel tank caps and covers are installed properly to prevent moisture from entering.Monitor water content of the fuel regularly.

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

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

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

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

DX,FUEL4 –19–19DEC03–1/1

Dieselscan Fuel Analysis

DIESELSCAN™ is a John Deere fuel sampling program to help you monitor the quality of your fuel source. It verifies fuel type, cleanliness, water content, suitability for cold weather operation, and if fuel is within ASTM specifications. Check with your John Deere dealer for availability of DIESELSCAN kits.

DIESELSCAN is a trademark of Deere & Company

DX,FUEL6 –19–06DEC00–1/1

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

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 –19–05JAN04–1/1

Minimizing the Effect of Cold Weather on Diesel Engines

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

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

Use Grade No. 1-D Fuel

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

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

NOTE: On an average, Grade No. 1-D fuel has a lower BTU (heat content) rating than Grade No. 2-D fuel. When using Grade No. 1-D fuel you may notice a drop in power and fuel efficiency, but should not experience any other engine performance effects. Check the grade of fuel being used before troubleshooting for low power complaints in cold weather operation.

Coolant Heaters

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

Seasonal Viscosity Oil and Proper Coolant Concentration

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

Diesel Fuel Flow Additive

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

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

Winterfronts

Use of fabric, cardboard, or solid winterfronts is not recommended with any John Deere engine. Their use can result in excessive engine coolant, oil, and charge air temperatures. This can lead to reduced engine life, loss of power and poor fuel economy. Winterfronts may also put abnormal stress on fan and fan drive components potentially causing premature failures.

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

Radiator Shutters

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

Continued on next page

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

For more information, see your John Deere engine distributor or servicing dealer.

RG,RG34710,7529 –19–11SEP02–2/2

Diesel Engine Break-In Oil

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

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

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

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

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

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

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

API CI-4	**ACEA E5**
API CH-4	**ACEA E4**
API CG-4	**ACEA E3**
API CF-4	
API CF-2	
API CF	

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

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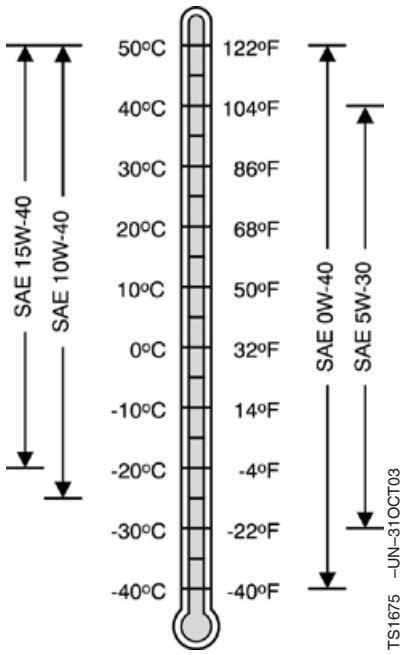
DX,ENOIL4 –19–07NOV03–1/1

Diesel Engine Oil



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

John Deere PLUS-50™ oil is preferred.

Oils meeting one of the following specifications are also recommended

- ACEA Oil Sequence E5
- ACEA Oil Sequence E4

Extended service intervals may apply when John Deere PLUS-50, ACEA E5, or ACEA E4 engine oils are used. Consult your John Deere dealer for more information.

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

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

Multi-viscosity diesel engine oils are preferred. Diesel fuel quality and fuel sulfur content must comply with all existing emissions regulations for the area in which the engine operates.

If diesel fuel with sulfur content greater than 0.05% (500 ppm) is used, reduce the service interval by 100 hours.

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).

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TORQ-GARD SUPREME is a trademark of Deere & Company

DX,ENOIL7 –19–07NOV03–1/1

Extended Diesel Engine Oil Service Intervals

When John Deere PLUS-50™, ACEA E5, or ACEA E4 oils are 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 maximum of 500 hours.

If John Deere PLUS-50, 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 CI-4, API CH-4, or ACEA E3 oils are used, change the engine oil and filter at the normal service interval.

DX,ENOIL8 –19–03NOV03–1/1

Mixing of Lubricants

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

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

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

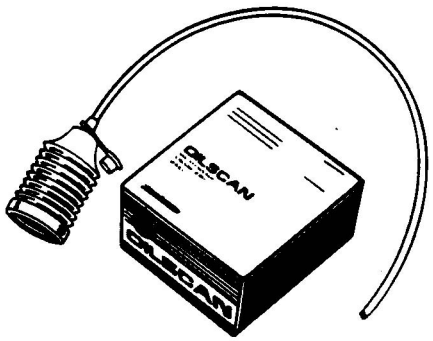
DX,LUBMIX –19–18MAR96–1/1

OILSCAN™and COOLSCAN™

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

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

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



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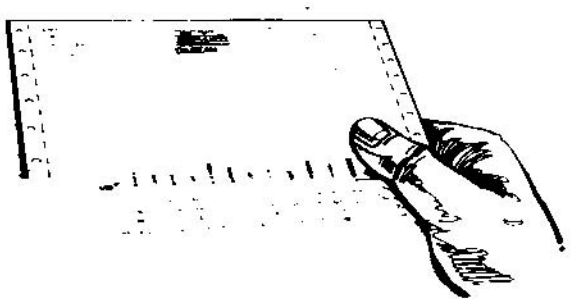

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OILSCAN is a registered trademark of Deere & Company.
COOLSCAN is a trademark of Deere & Company.

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.

The following greases are preferred:

- John Deere SD POLYUREA GREASE

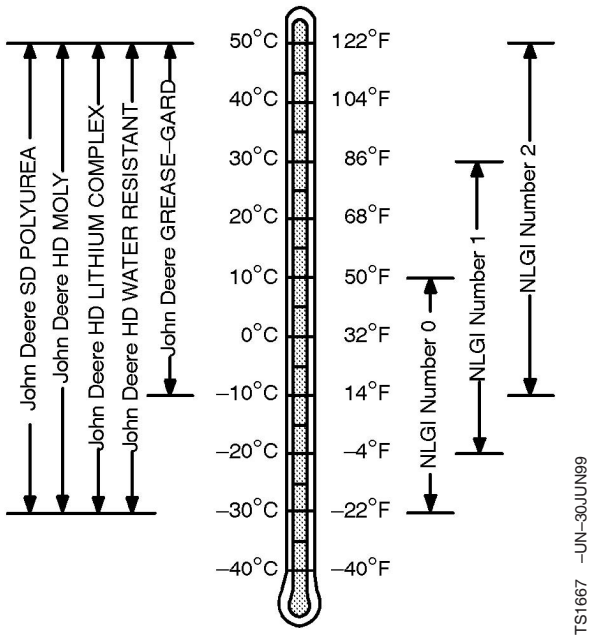
The following greases are also recommended:

- John Deere HD MOLY GREASE
- 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 thickener are not compatible with others. Consult your grease supplier before mixing different types of grease.



DX,GREA1 –19–14NOV03–1/1

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 either a concentration of 50% ethylene glycol or a 55% propylene glycol.

Additional recommended coolants

The following engine coolant is also recommended:

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

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

Other fully formulated coolants

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

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

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

Coolants requiring supplemental coolant additives

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

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

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

Other coolants

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

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

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

Water quality

Water quality is important to the performance of the cooling system. Distilled, deionized, or demineralized water is recommended for mixing with ethylene glycol and propylene glycol base engine coolant concentrate.

Continued on next page

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

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

DX,COOL3 –19–19DEC03–2/2

Drain Intervals for Diesel Engine Coolant

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

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

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

If John Deere COOL-GARD is used but the coolant is not tested OR additives are not replenished by adding a supplemental coolant additive, the drain interval is 3 years or 3000 hours of operation

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

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DX,COOL11 –19–19DEC03–1/1

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

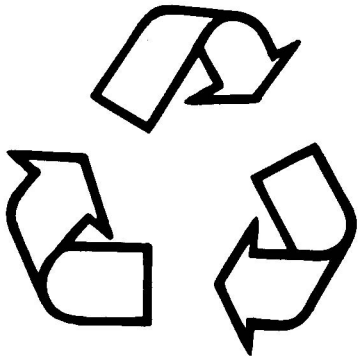
Disposing of Coolant

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 –19–24JAN03–1/1

Instrument Panel Identification

Instrument Panels - Identification

The instrument panels shown on the next page compare the panel offered for earlier engines with those offered for later engines. The earlier instrument panel operation is covered in Section 16. The later instrument panels (Full-Featured and Basic versions) are covered in Section 17.

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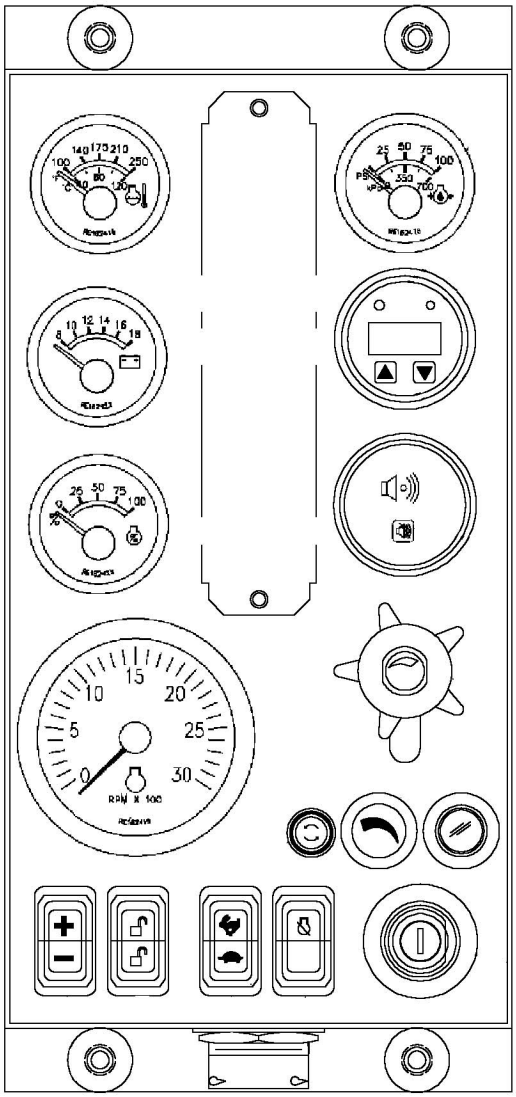

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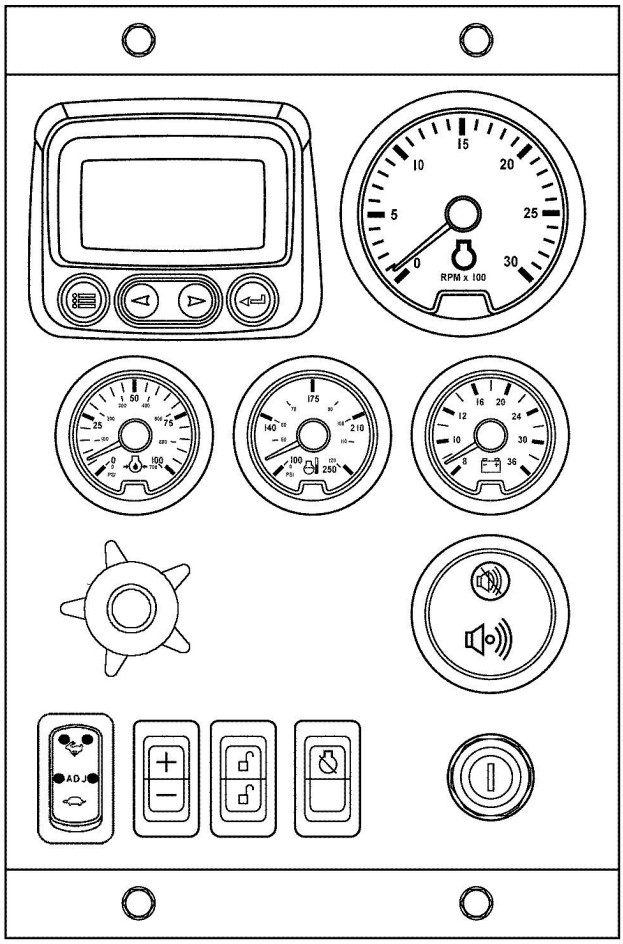
Instrument Panel For Earlier Engines (See Section 16)



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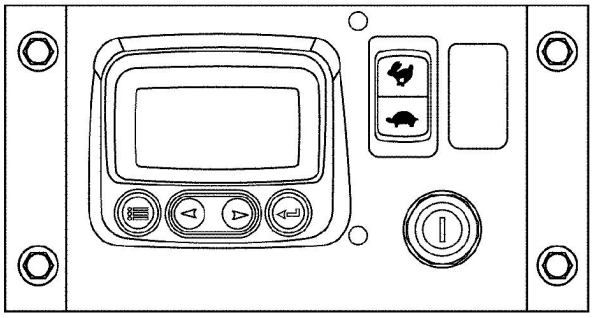
Full-Featured Instrument Panel For Later Engines (See Section 17)



RG13275 –UN–21OCT03

Basic Instrument Panel For Later Engines (See Section 17)

OURGP11,0000228 –19–21OCT03–2/2

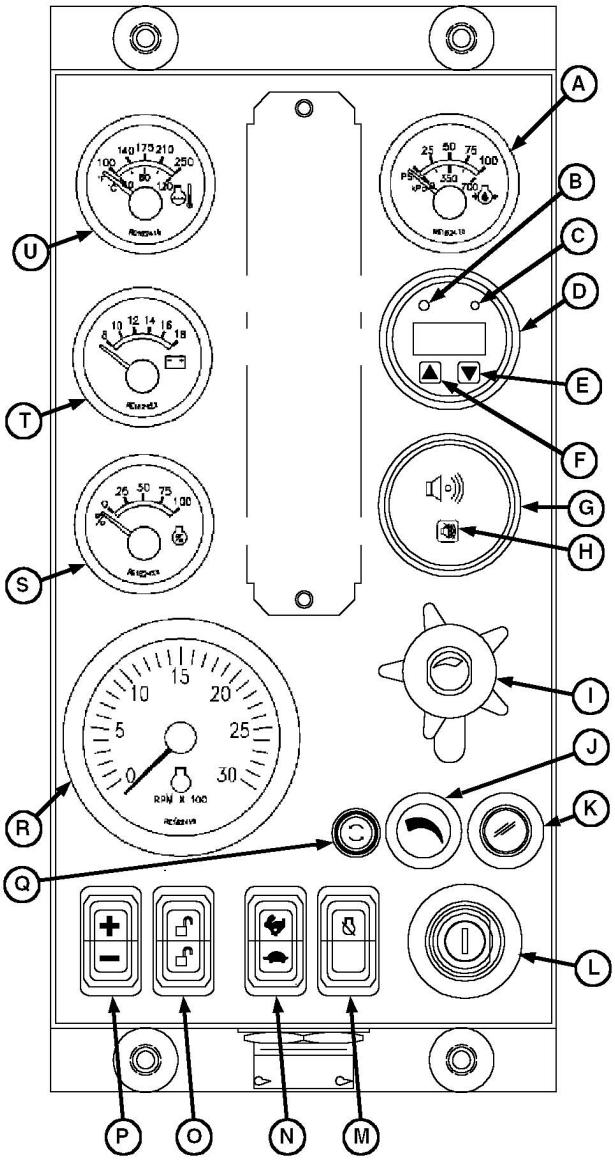
Instrument Panel

NOTE: Instrument panels for later engines are covered in Section 17.

This instrument panel for *POWERTECH*™ 8.1 L engines is electronically linked to the John Deere engine control unit (ECU). This allows the operator to monitor engine performance as well as to diagnose any troubles during engine operation.

All electronic engine controls are optional equipment for John Deere *POWERTECH*™ OEM Engines. These electronic controls may be provided by the equipment manufacturer instead of purchased from John Deere. Refer to your engine application manual for specific guidelines if John Deere sourced controls and instrumentation are not used.

A—Engine Oil Pressure Gauge
B—Amber "WARNING" Indicator
C—Red "STOP ENGINE" Indicator
D—Diagnostic Gauge/Hour Meter
E—Touch Switch
F—Touch Switch
G—Audible Alarm (Optional)
H—Audible Alarm Override Switch (Optional)
I—Analog Throttle Control (Optional)
J—Dimmer Control (Optional)
K—Engine Preheater Indicator (Optional)
L—Key Start Switch
M—Override Shutdown Rocker Switch
N—High-Low Speed Select Rocker Switch
O—Bump Speed Enable Rocker Switch
P—Speed Select Rocker Switch
Q—Fuse Holder (5-Amp Fuse)
R—Tachometer
S—Power Meter (Percent Load) (Optional)
T—Voltmeter (Optional)
U—Engine Coolant Temperature Gauge



Instrument Panel (Earlier Engines)

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IMPORTANT: Any time an electric gauge or meter does not register correctly, replace with a new one. Do not attempt to repair it. All gauges are plug-in type.

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

Engine Oil Pressure Gauge

The engine oil pressure gauge (A) indicates engine oil pressure in pounds per square inch (psi) or kPa. An optional audible alarm (G) warns the operator if engine oil pressure falls below a safe operating pressure.

Amber "Warning" Indicator

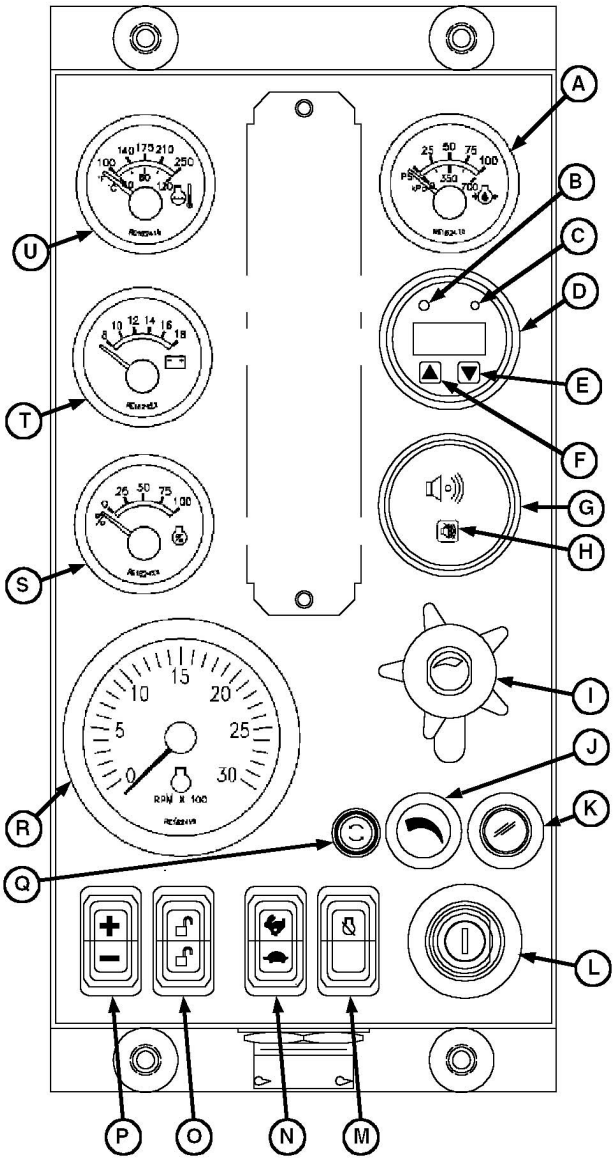
The amber "WARNING" indicator (B) signals an abnormal condition such as low oil pressure, high coolant temperature, water in fuel, low battery voltage, etc. Observe displayed code in window of diagnostic gauge/hour meter (D) for diagnostic trouble code (DTC). (Use the service code menu. See USING DIAGNOSTIC GAUGE TO ACCESS ENGINE INFORMATION later in this section.)

Red "Stop Engine" Indicator

The Red "STOP ENGINE" indicator (C) signals operator to stop engine immediately or as soon as safely possible. A condition exists that could cause damage to engine.

Diagnostic Gauge/Hour Meter

The diagnostic gauge/hour meter (D) displays diagnostic trouble codes (DTCs) as they are accessed. Other information on the engine can be accessed using the touch switches (E and F). The hour meter shows the operating hours of the engine. If engine trouble occurs, the gauge will alternately flash from displayed parameter to the message "SvrcCode". Then the touch switches (E and F) can be used to access the trouble code (see following).



Instrument Panel

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Touch Switches

The touch switches are used to change the display on the window of the diagnostic gauge to access engine performance data. Pressing the DOWN switch (E) or UP switch (F) scrolls through various engine parameters and diagnostic trouble codes. (See Using Diagnostic Gauge To Access Engine Information on the following pages for instructions.)

Audible Alarm (Optional)

The audible alarm (G) sounds whenever a low oil pressure, high coolant temperature or water-in-fuel/plugged fuel filter condition exists. This includes all signals that light up the amber “WARNING” indicator (B) or the red “STOP ENGINE” indicator (C).

Audible Alarm Override Switch (Optional)

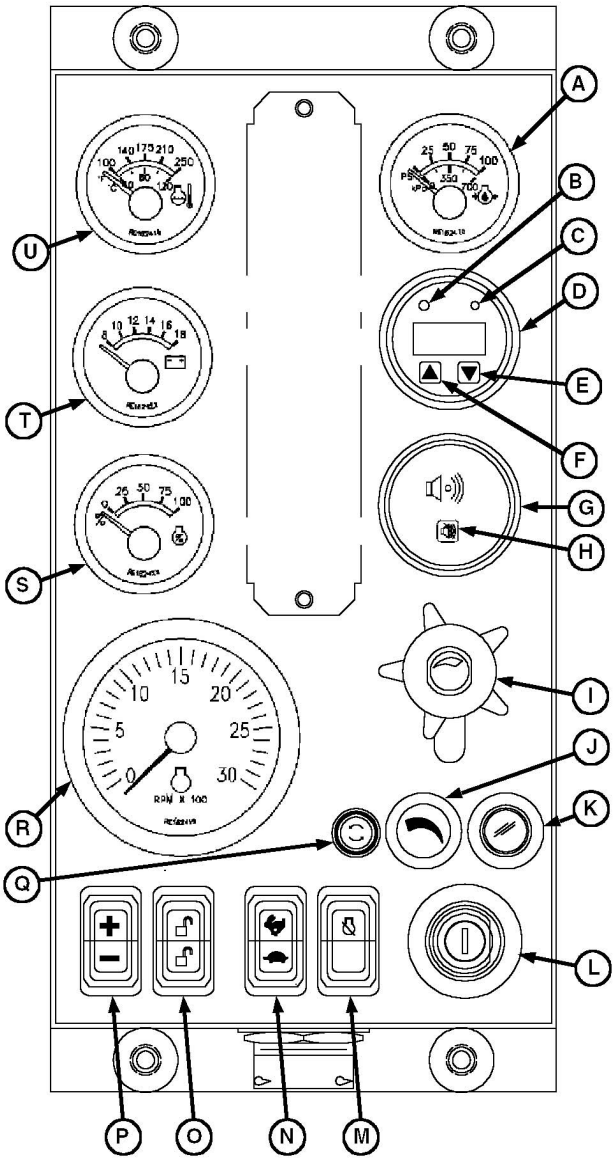
The audible alarm override switch (H) can be pressed to silence the alarm for approximately 2-1/2 minutes.

Analog Throttle Control (Optional)

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

Dimmer Control (Optional)

The dimmer control (J) is used to control illumination of the instrument panel gauges.



Instrument Panel For Earlier Engines

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Engine Preheater Indicator (Optional)

The engine preheater indicator (K) lights up while the engine is being preheated for cold weather starting. When the engine is warmed up, the light goes off, indicating the engine can now be started.

Key Start Switch

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

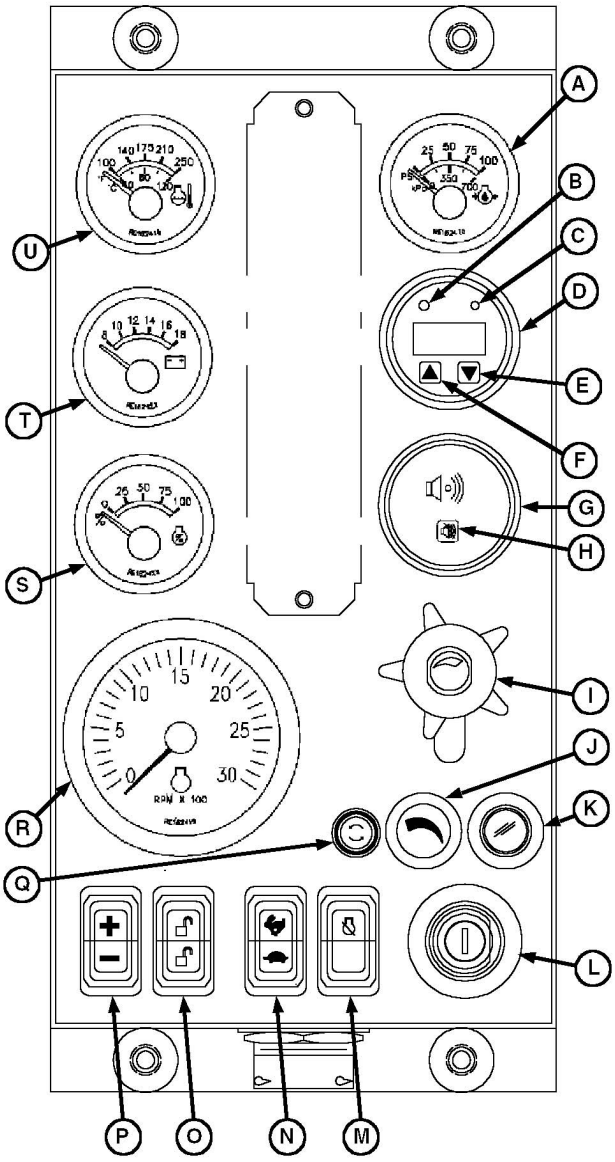
Override Shutdown Rocker Switch

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

High-Low Speed Select Rocker Switch

This instrument panel has two versions, one with a two position switch as shown, and one with a three position switch. The two position switch has high/low and is used to set the engine operating speeds at slow (turtle) or fast (rabbit). Factory preset idle speeds can also be adjusted using bump speed enable switch (O) with speed select switch (P).

The three position switch has Slow (turtle), Middle (Adj) and Fast (rabbit) settings. Slow (turtle) position is factory preset at low engine idle, while middle (ADJ) position is factory set at high engine idle. To adjust engine speeds, See Changing Engine Speeds in Section 18.



Instrument Panel For Earlier Engines

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Bump Speed Enable Rocker Switch

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

Speed Select Rocker Switch

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

How To Select Preset Operating Speeds (Bump Speeds)

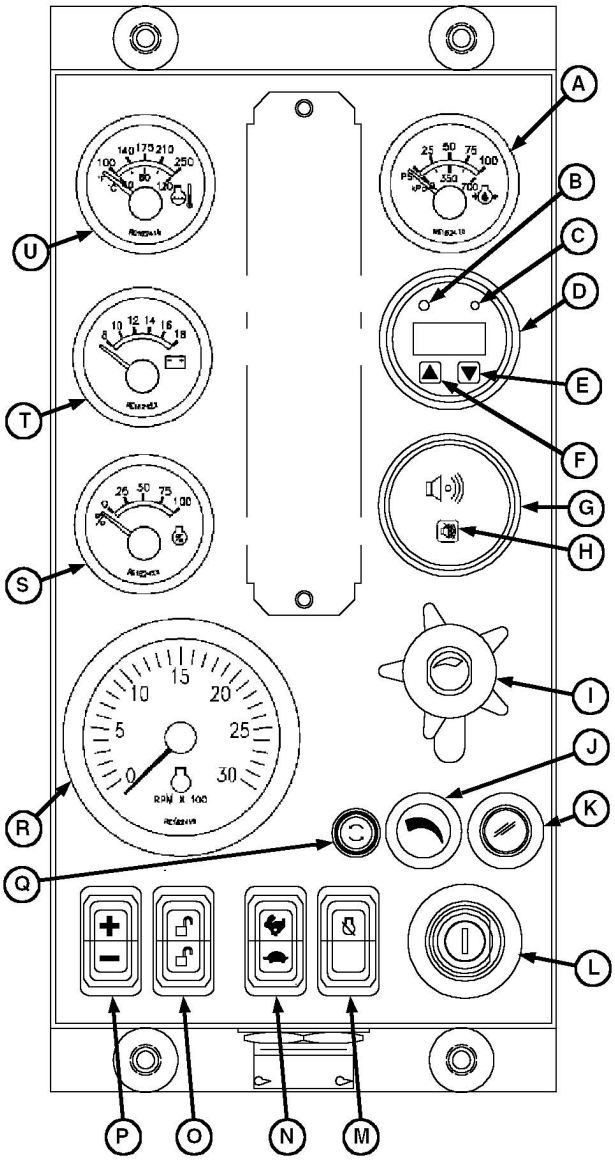
First select slow or fast speed option by pressing high-low speed select switch (N) to “turtle” (slow) or “rabbit” (fast). Then you can press either the upper or lower portion of the bump speed enable switch (O) to unlock the high or low setting. The bump speed enable must be held down as the speed select switch (P) is used to change the high or low setting by pressing (+) to increase speed or (-) to decrease speed.

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

The fast idle speed cannot be locked into memory. It will always go back to the factory preset fast idle speed.

Fuse Holder

The fuse holder (Q) contains a 5-amp fuse for power to the instrument panel.



Instrument Panel For Earlier Engines

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Tachometer

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

Percent Load (Optional)

The power meter (S) shows percent of available power being used by the engine.

Voltmeter

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

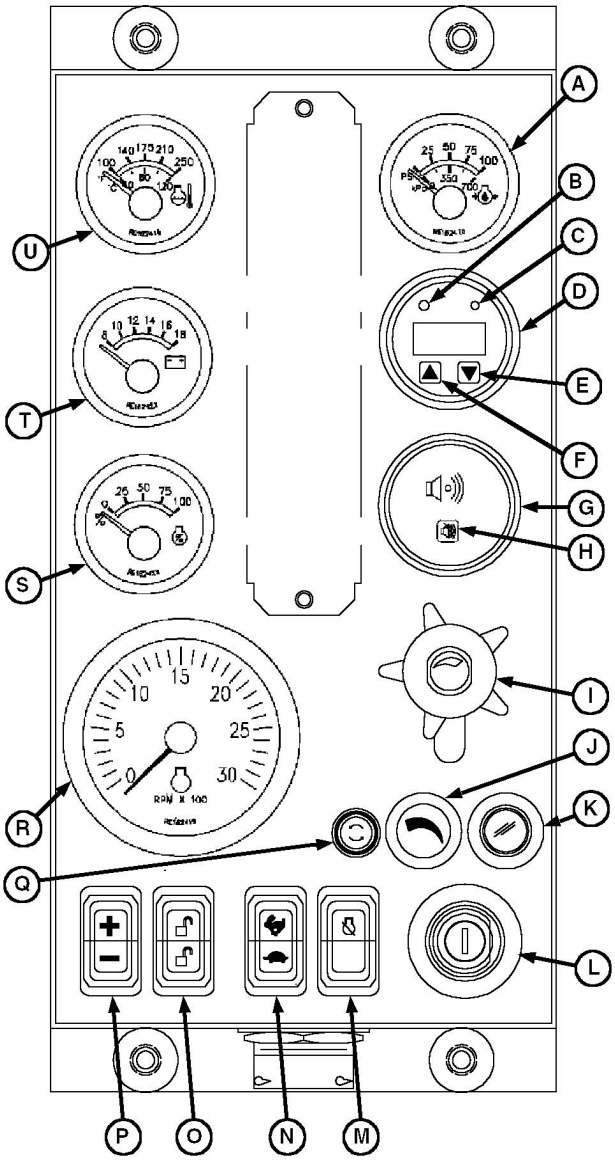
Engine Coolant Temperature Gauge

The coolant temperature gauge (U) indicates engine coolant temperature in degrees Celsius or Fahrenheit. An optional audible alarm (G) warns the operator if coolant temperature rises above the preset safe operating temperature.

Cruise Control

Engine ECUs are available with the cruise control function. The cruise control is an off-road type that maintains a constant engine rpm under varying load conditions.

The cruise cancel/resume function is a one-button cancel, then resume, function. The first time contact is made with the cruise control active, the cruise control will disengage and the engine speed will drop to idle. If the contact is made again within one minute and with the engine speed above 1300 rpm, the cruise control will “resume”. This feature allows the placement of the cancel/resume button in a convenient location in the vehicle cab and does not require the use of the normal cruise controls for momentary interruptions in cruise operation.



Instrument Panel For Earlier Engines

Continued on next page

The cancel/resume function is intended for applications like agricultural tractors and sprayers that turn around at the end of each row in a field. This allows the operator to use the throttle and/or brake to turn the vehicle around. When ready to resume field operations, the operator brings the engine speed above 1300 rpm and activates the cancel/resume function again to resume cruise speed. An internal timer gives the operator one minute to complete the turnaround maneuver.

The cruise control has the normal functions of:

- Cruise control power “ON” or “OFF”.
- “Set” or “bump up” engine speed.
- “Resume” or “bump down” engine speed.
- Use vehicle brake or clutch pedal to disengage cruise control.

The “bump up” and “bump down” speed controls allow the operator to change the set speed. Small engine speed changes can be made by “bumping” the control switch. Holding the “bump up” or “bump down” switch will result in greater engine rpm changes until the engine reaches either full speed or idle. The cruise control cannot operate beyond the normal min/max engine speeds.

OURGP11,0000259 –19–19NOV03–7/7

Using Diagnostic Gauge to Access Engine Information

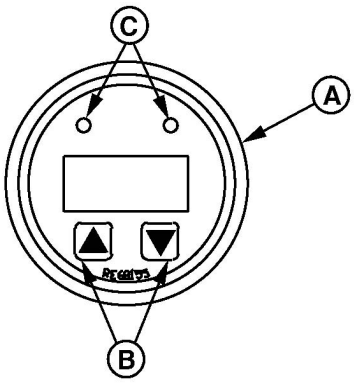
The diagnostic gauge (A) allows the operator to view many readouts of engine functions and diagnostic trouble codes (DTCs). The gauge is linked to the electronic control system and its sensors. This allows the operator to monitor engine functions and to troubleshoot the engine systems when needed.

Press the two touch switches (B) to view the various engine functions in sequence. The displays can be selected as either customary English or metric units.

NOTE: Engine parameters which can be accessed will vary with the engine application.

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

- Accelerator pedal position
- Percentage load @ current speed
- Actual engine percent torque
- Engine speed
- Trip distance
- Total vehicle distance
- Engine hours
- Trip fuel
- Total fuel used
- Coolant temperature
- Fuel temperature
- Engine oil temperature
- Engine intercooler temperature
- Fuel delivery pressure
- Engine oil level
- Engine oil pressure
- Coolant pressure
- Coolant level
- Wheel base vehicle speed
- Fuel rate
- Instantaneous fuel economy
- Average fuel economy
- Barometric pressure
- Air inlet temperature
- Boost pressure
- Intake manifold temperature



RG10031 –UN–28OCT99

Diagnostic Gauge

A—Diagnostic Gauge
B—Touch Switches
C—Lights

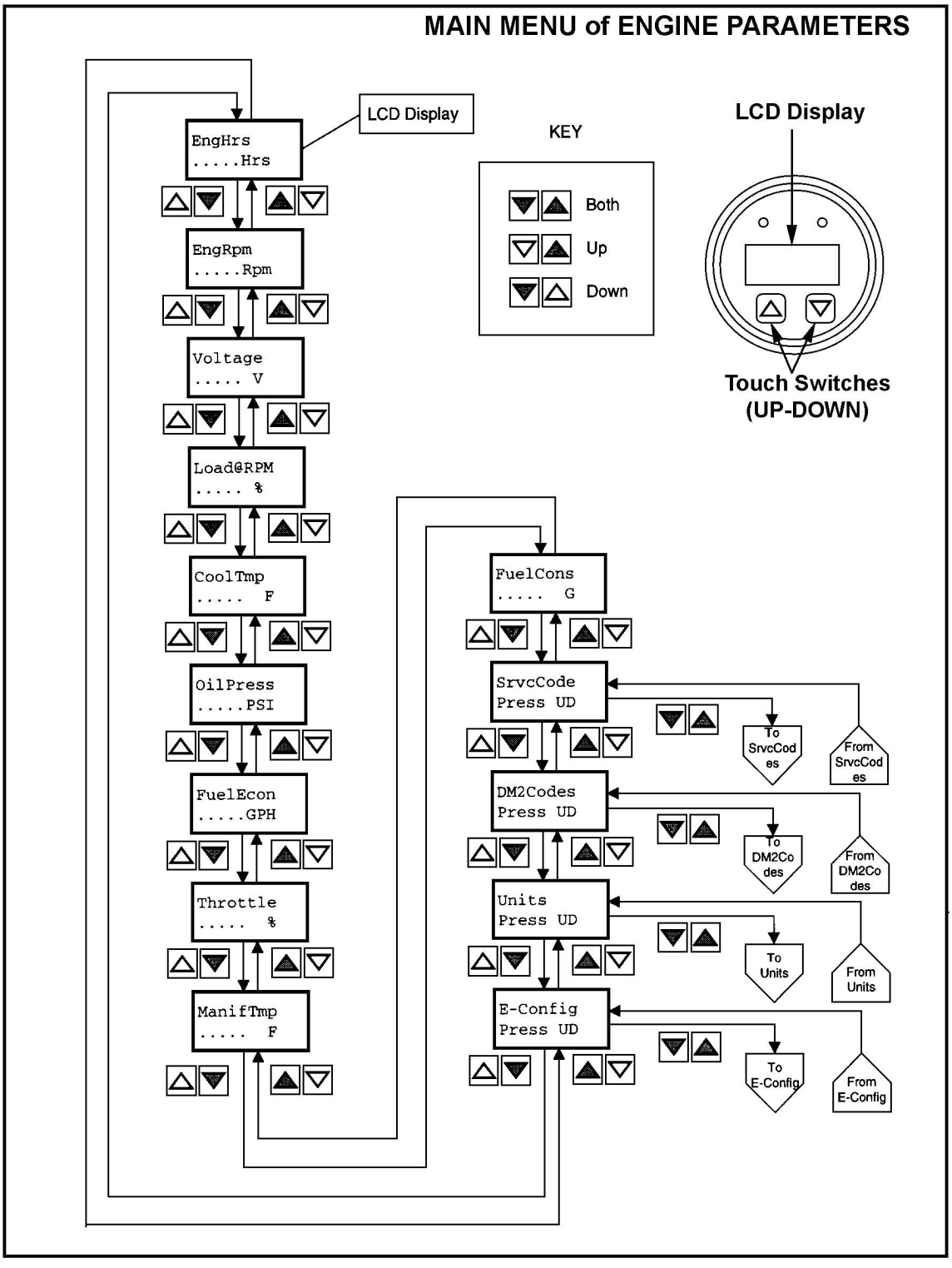
Continued on next page

- Air filter differential pressure
- Exhaust gas temperature
- Electrical potential (voltage)
- Battery potential (voltage), switched
- Transmission oil pressure (Optional)
- Transmission oil temperature (Optional)
- Injector metering rail #1 pressure
- Injector metering rail #2 pressure
- Estimated percent fan speed
- Active service (diagnostic) codes
- Stored service (diagnostic) codes

The diagnostic gauge includes a two-line by eight-character backlit Liquid Crystal Display (LCD). The top line displays the data label, i.e. “EngHrs” and the bottom line displays the matching unit information, i.e. “1246 hrs.”. The diagnostic gauge uses two touch switches (UP and DOWN) for scrolling through the engine parameter list and viewing the menu list. Two lights (C) (amber and red) are used to signal active trouble messages received by the diagnostic gauge.

OURGP11,000028D –19–24DEC03–2/2

Using Touch Switches to Display Information



Using Touch Switches

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The touch switches on the diagnostic gauge allow quick and easy navigation through the menu to find the information needed.

The diagram on the preceding page is a typical Main Menu of Engine Parameters. The Main Menu has 14 entries; the first 10 are engine data parameters, and the last four are sub-menu entry points.

Accessing the Menus

The following two rules are used for accessing the various items on the menus:

1. To scroll through the parameter list, press ***either*** the UP or DOWN touch switch.
2. To select or exit a sub-menu, ***simultaneously*** press the UP and DOWN switches.

Selecting Engine Data Parameters

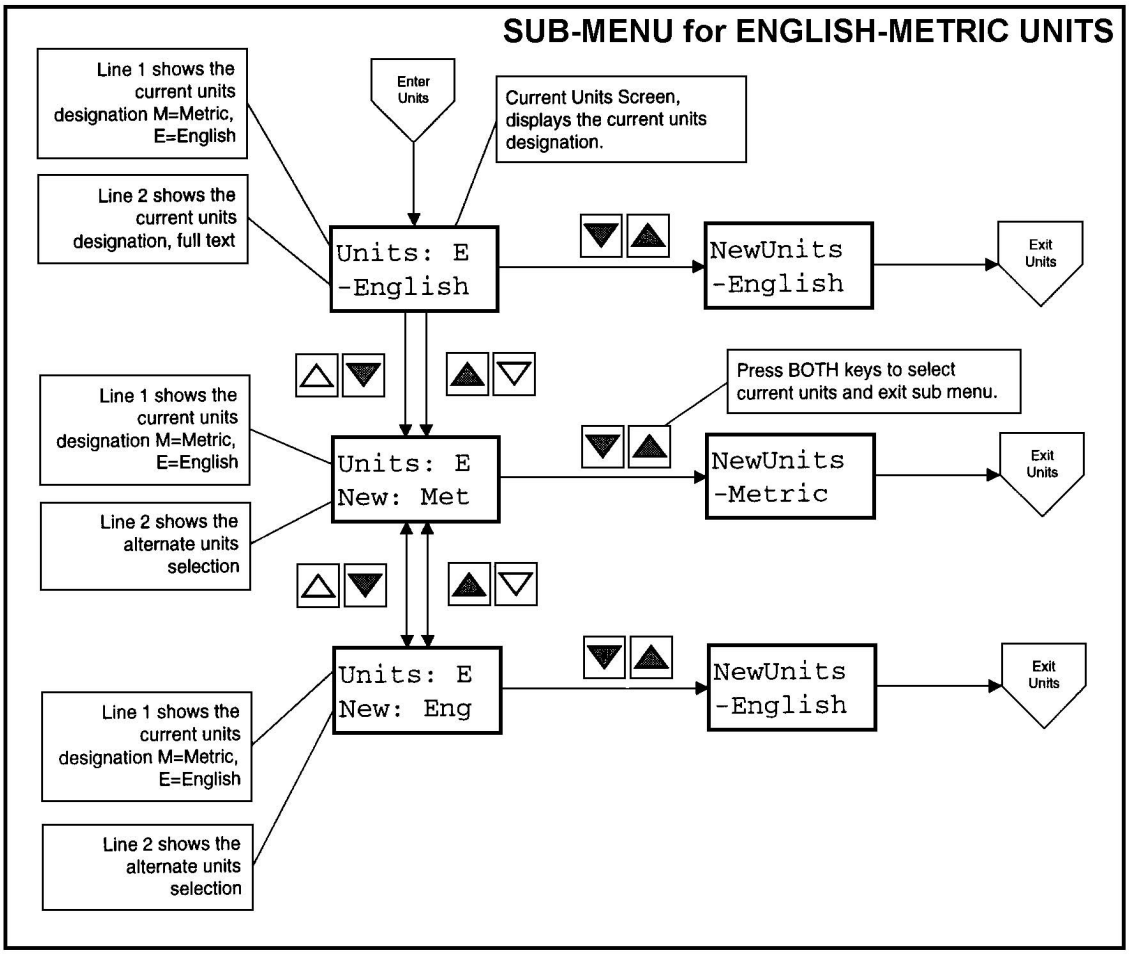
To read any of the engine parameters, press either UP or DOWN switch (as shown on diagram) until the top line of the display shows the desired information.

Selecting Sub-Menus

Press either the UP or DOWN switch until the top line of the display shows the label of the desired sub-menu. Then press **BOTH** the UP and DOWN switches at the same time. This action will select the sub-menu and the next screen on the display will list the sub-menu items. This is also the way to access diagnostic trouble codes (DTCs).

DPSG,OUOD007,2841 –19–01DEC00–2/2

Changing Units of Measure (English or Metric)



Changing Units Of Measure

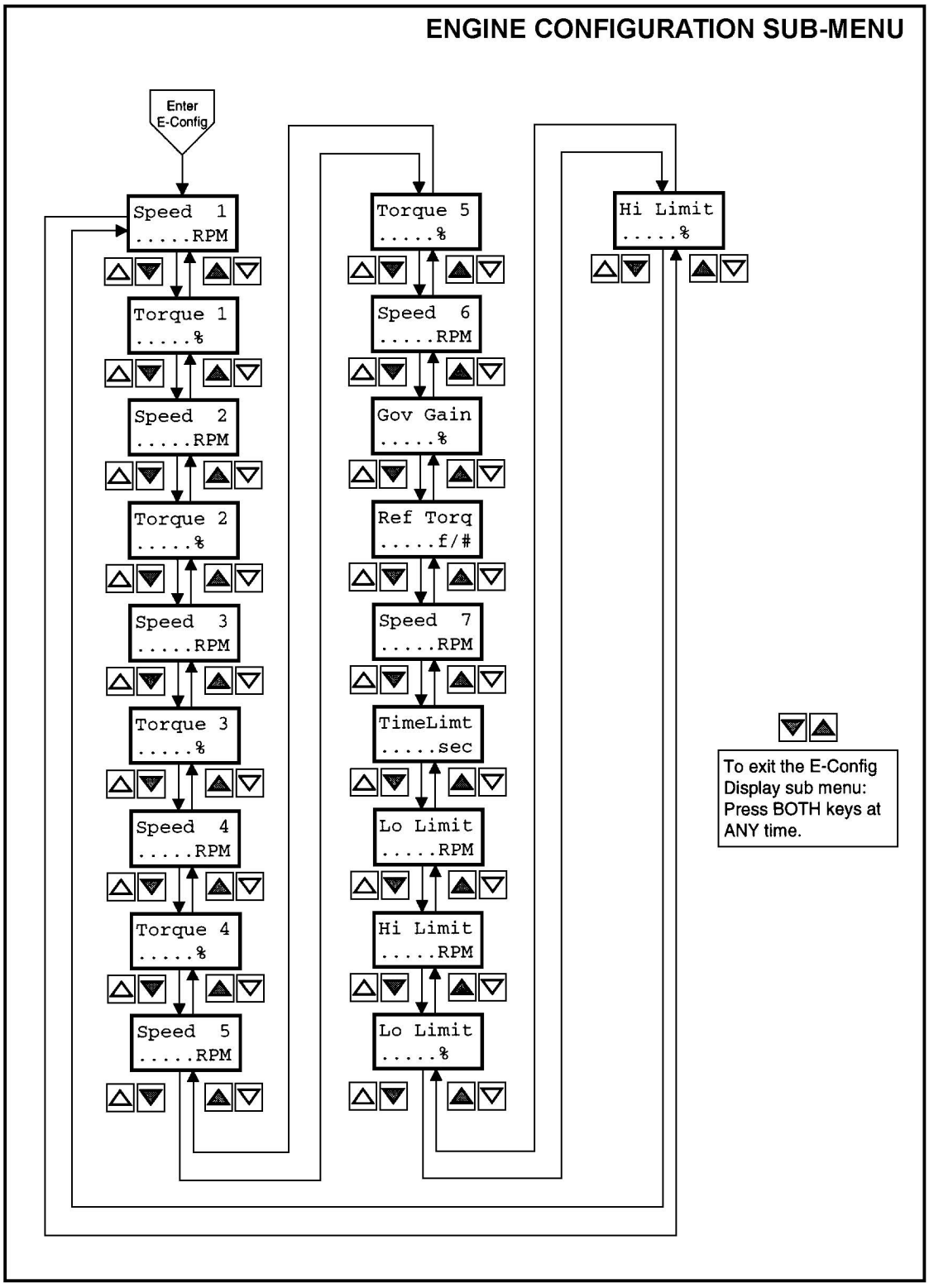
The diagnostic gauge can display engine data in either English or Metric units. To toggle between these, the *Units Sub-Menu*, must be selected.

To select the *Units Sub-Menu*, press the UP or DOWN switch until the top line of the display reads “Units”. Then press BOTH the UP and DOWN switches at the same time to select the *Units Sub-Menu*. The above diagram shows the steps for selecting the desired units of measure. Two options are available:

1. Press both the switches to retain the current units designation.
2. Press either UP or DOWN switch to toggle the units selection, then press both switches to select the desired unit of measure.

DPSG,OUOD007,2842 –19–21OCT99–1/1

Viewing Engine Configuration Data



Viewing Engine Configuration Data

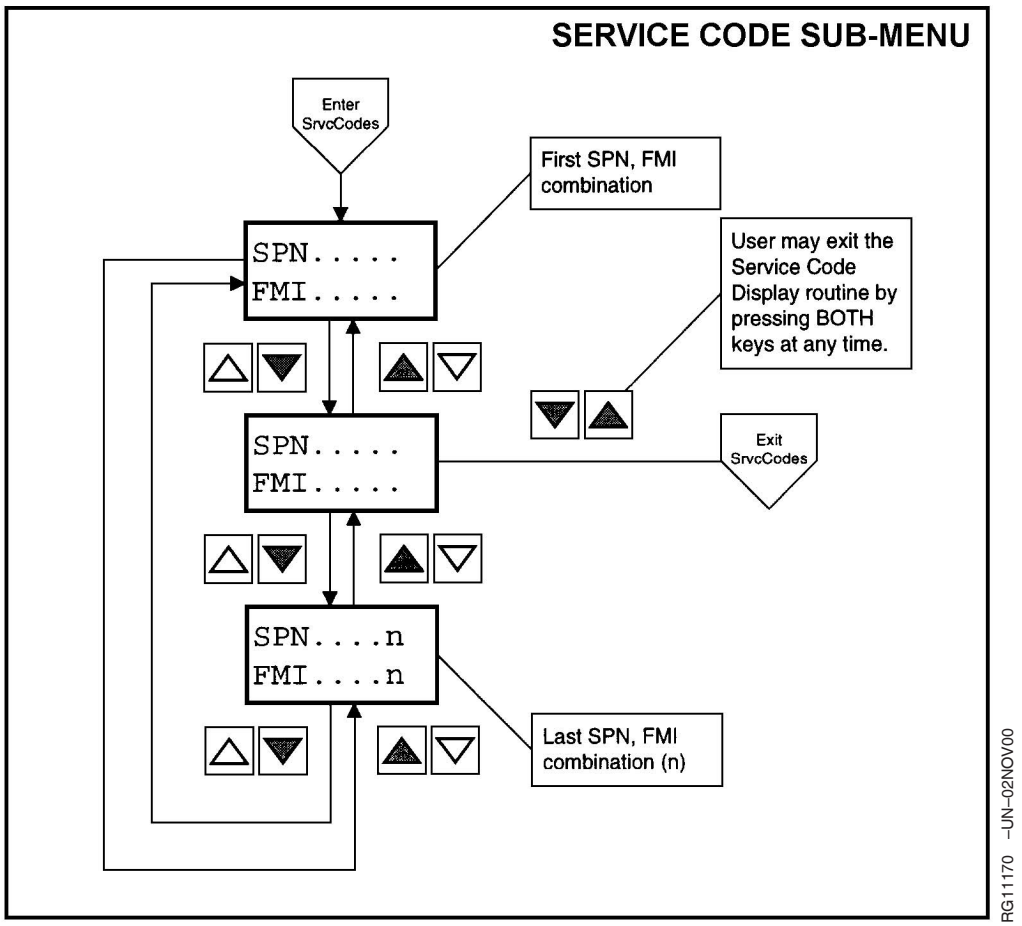
Continued on next page

DPSG,OUOD002,1927 –19–19DEC00–1/2

The diagnostic gauge can display the engine configuration data stored in the Engine Control Unit (ECU). To select the *Engine Configuration Sub-Menu* (see diagram on previous page), press the UP or DOWN switches until the top line of the display reads "E-Config". Then press BOTH the UP and DOWN switches at the same time to select the *Engine Configuration Sub-Menu* . The diagnostic gauge will display the engine configuration data as shown in the diagram.

DPSG,OUOD002,1927 –19–19DEC00–2/2

Viewing Active Engine Service Codes/Diagnostic Trouble Codes (DTCs)



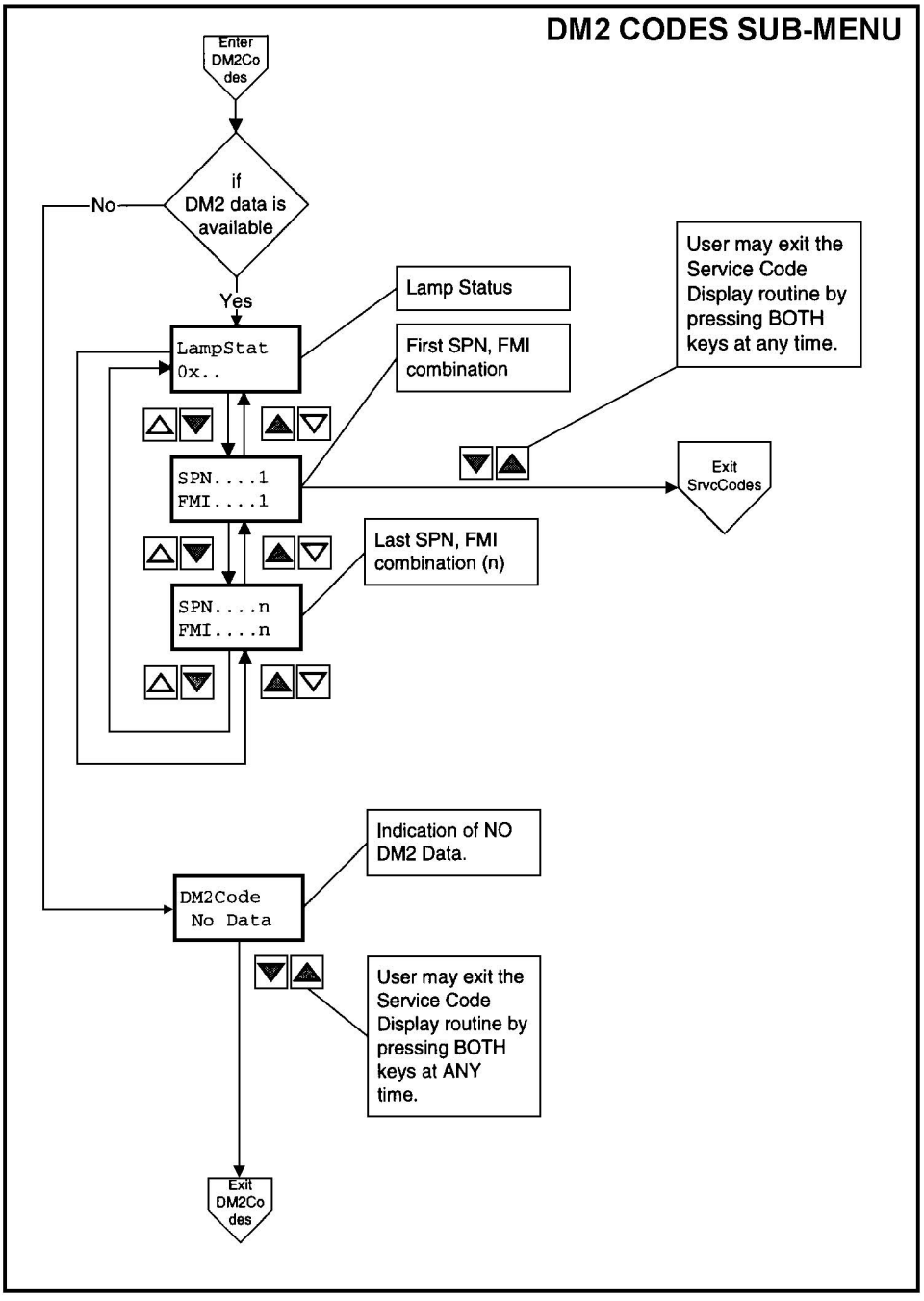
Viewing Active Service Codes/Diagnostic Trouble Codes (DTCs)

The diagnostic gauge continuously monitors all messages broadcast over the Control Area Network (CAN) and displays all active service codes /diagnostic trouble codes (DTCs) at the time the message is broadcast. The word “SrvcCode” is displayed on the second line. The display will cycle every 5 seconds between the currently displayed parameter and the “SrvcCode” message until the active service code (DTC) clears. To view the active codes, select the *Service Code Sub-Menu* by pressing the UP or DOWN switch until the top line of the display reads “SrvcCode”. Then press BOTH the UP and DOWN switches at the same time to select the Service Code (DTC) Sub-Menu. The diagnostic gauge has the ability to display all active service codes (DTCs) received. The diagram above titled *Service Code (DTC) Sub-Menu* shows the process for selecting active service codes (DTCs) and their values.

NOTE: For a list of service codes/diagnostic trouble codes (DTCs), refer to the Troubleshooting section later in this manual.

OUOD006,000006A –19–24SEP02–1/1

Viewing Stored Service Codes/Diagnostic Trouble Codes (DTCs) in the Engine ECU

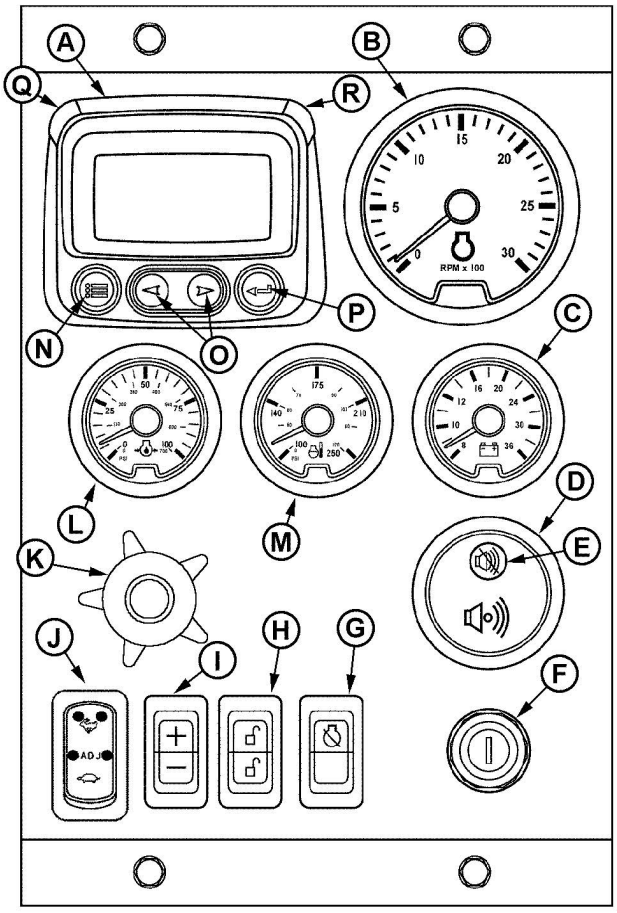


Viewing Stored Service Codes/Diagnostic Trouble Codes (DTCs)

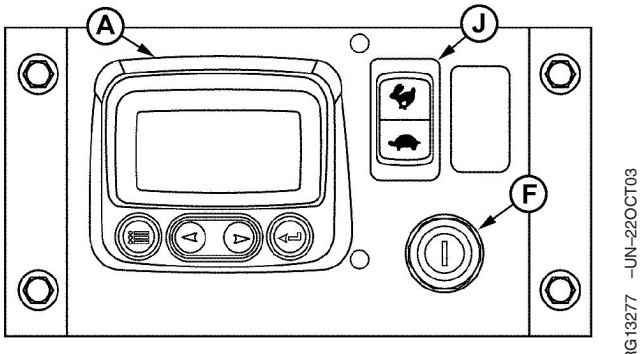
The diagnostic gauge can request stored service codes (DTCs) from the engine. The stored service codes may be used for diagnostic and service needs. To view the stored service codes, it is necessary to select the *DM2 Codes Sub-Menu* by pressing the UP or DOWN switch until the top line of the display reads “DM2 Codes”. Then press BOTH the UP and DOWN switches at the same time to select the *DM2 Codes Sub-Menu.* The gauge will display the stored service codes according to the menus shown in the diagram.

OUOD006,000006B –19–24SEP02–1/1

Instrument Panels



Full-Featured Instrument Panel (Later Engines)



Basic Instrument Panel (Later Engines)

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

Later Tier 2 John Deere *POWERTECH*™ OEM Engines have an electronic control system, which has the following controls and gauges as shown. The following information applies only to those controls and gauges supplied by John Deere. Refer to your engine application manual for specific guidelines if John Deere-sourced controls and instrumentation are not used.

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

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Instrument Panel (Continued)

A—Diagnostic Gauge/Hour Meter

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

B—Tachometer

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

C—Voltmeter (Optional)

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

D—Audible Alarm (Optional)

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

E—Audible Alarm Override Button

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

F—Key Start Switch

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

G—Override Shutdown Rocker Switch

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

H—Bump Speed Enable Rocker Switch

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

I—Speed Select Rocker Switch

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

J—High-Low Speed Select Rocker Switch

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

The basic instrument panel will have the high-low speed select switch only. Press and hold up (+) or down (-) to adjust engine speed as desired. The engine speed selected will not be held in the memory. To adjust engine speeds, See Changing Engine Speeds in Section 18.

Continued on next page

How To Select Preset Operating Speeds (Bump Speeds)

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

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

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

K—Analog Throttle Control (Optional)

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

L—Engine Oil Pressure Gauge

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

M—Engine Coolant Temperature Gauge

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

N—Menu Key

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

O—Arrow Keys

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

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

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

P—Enter Key

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

Q—Amber “WARNING” Indicator Light

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

R—Red “STOP ENGINE” Indicator Light

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

OURGP11,0000230 –19–21OCT03–3/3

Using Diagnostic Gauge to Access Engine Information

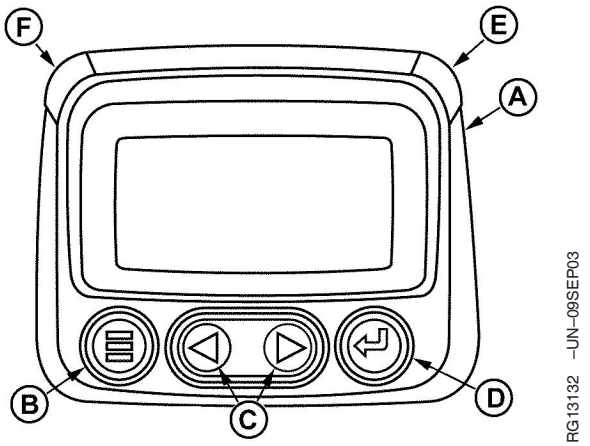
The diagnostic gauge (A) allows the operator to view many readouts of engine functions and trouble codes (DTCs). The gauge is linked to the electronic control system and its sensors. This allows the operator to monitor engine functions and to troubleshoot the engine systems when needed.

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

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

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

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



RG13132 –UN–09SEP03

Diagnostic Gauge

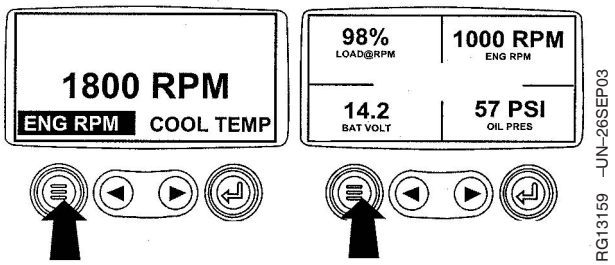
A—Diagnostic Gauge
B—Menu Key
C—Arrow Keys
D—Enter Key
E—Red “STOP ENGINE” Indicator Light
F—Amber “WARNING” Indicator Light

OURGP11,00000A7 –19–03SEP03–1/1

Main Menu Navigation

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

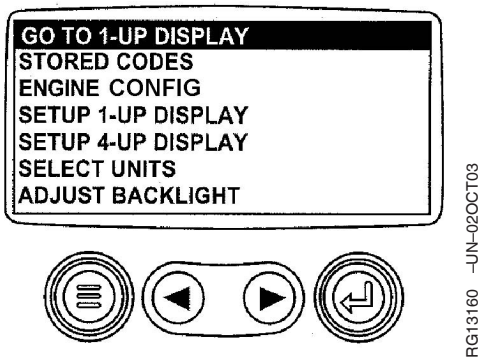
1. Turn the key switch to the ON position. Starting at the single or four engine parameter display, press the "Menu" key.



Menu Key

OURGP11,00000A9 –19–03SEP03–1/5

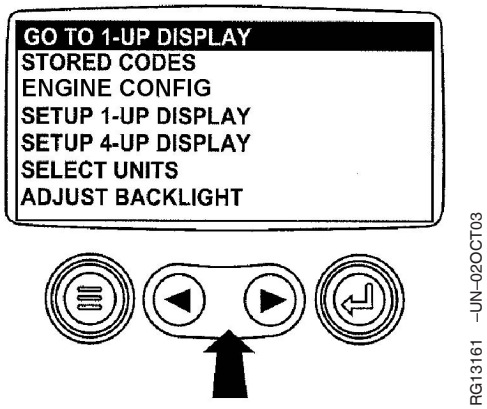
2. The first seven items of the "Main Menu" will be displayed.



Menu Display

OURGP11,00000A9 –19–03SEP03–2/5

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

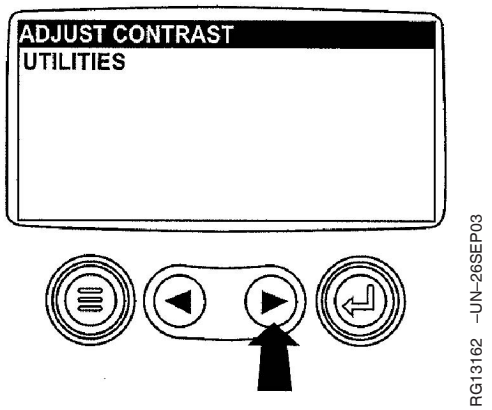


Main Menu Items

Continued on next page

OURGP11,00000A9 –19–03SEP03–3/5

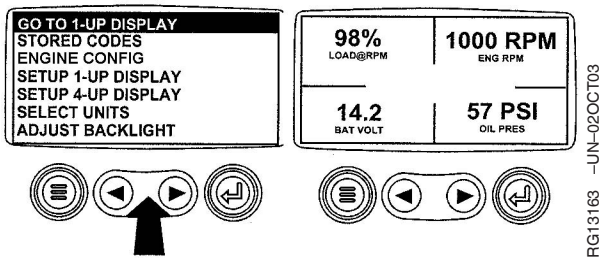
4. Pressing the right arrow key will scroll down to reveal the last items of "Main Menu" screen, highlighting the next item down.



Last Items On Main Menu

OURGP11,00000A9 –19–03SEP03–4/5

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



Use Arrow Buttons To Scroll / Quadrant Display

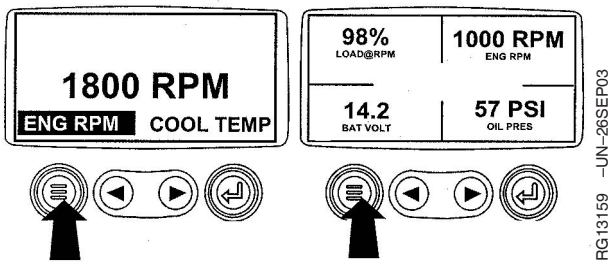
OURGP11,00000A9 –19–03SEP03–5/5

Engine Configuration Data

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

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

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

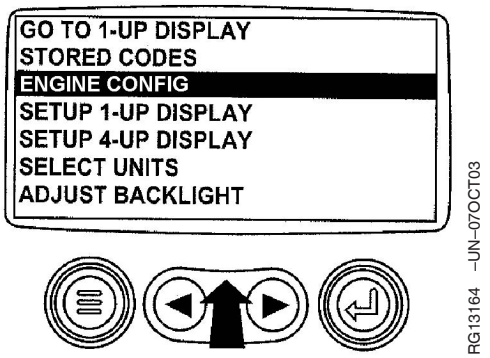


Menu Key

Continued on next page

OURGP11,00000AB –19–03SEP03–1/6

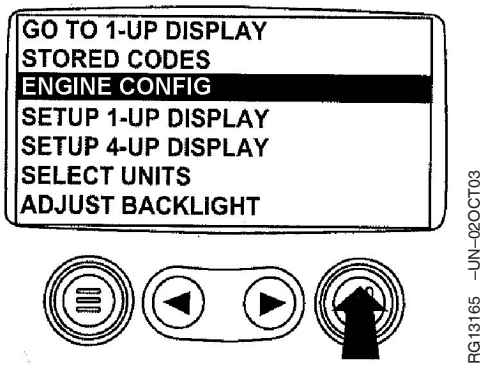
2. The main menu will be displayed. Use the "Arrow" keys to scroll through the menu until "Engine Config" is highlighted.



Select Engine Configuration

OURGP11,00000AB –19–03SEP03–2/6

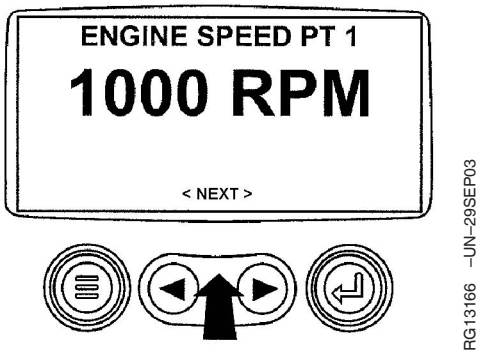
3. Once "Engine Config" menu item has been highlighted, press the "Enter" key to view the engine configuration data.



Enter Key

OURGP11,00000AB –19–03SEP03–3/6

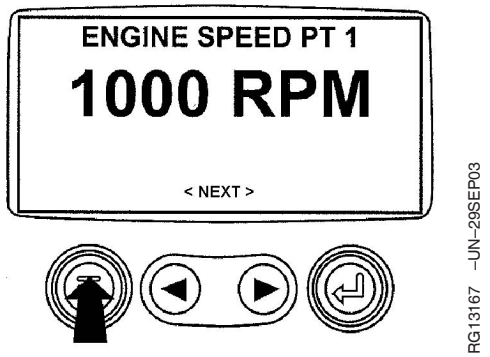
4. Use the "Arrow" keys to scroll through the engine configuration data.



Use Arrow Keys To Scroll

OURGP11,00000AB –19–03SEP03–4/6

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

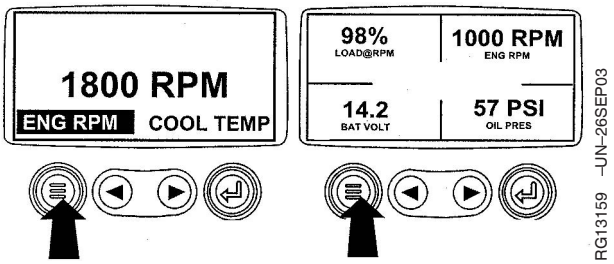


Return To Main Menu

Continued on next page

OURGP11,00000AB –19–03SEP03–5/6

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



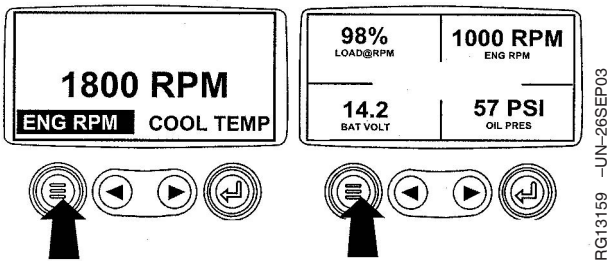
Exit Main Menu

OURGP11,00000AB –19–03SEP03–6/6

Accessing Stored Trouble Codes

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

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

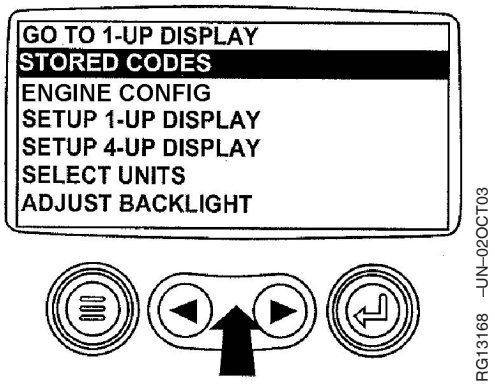


Menu Key

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

OURGP11,00000AC –19–03SEP03–1/6

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

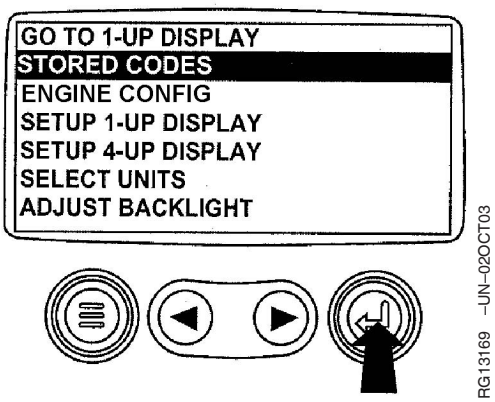


Select Stored Codes

Continued on next page

OURGP11,00000AC –19–03SEP03–2/6

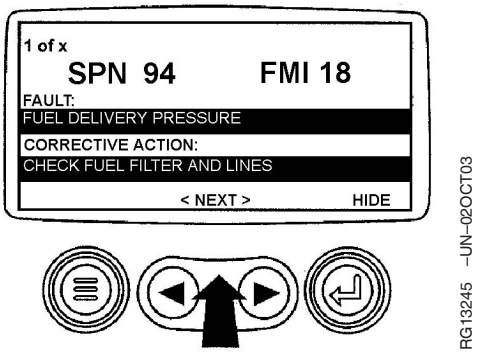
3. Once the "Stored Codes" menu item has been highlighted press the "Enter" key to view the stored codes.



Enter Key

OURGP11,00000AC –19–03SEP03–3/6

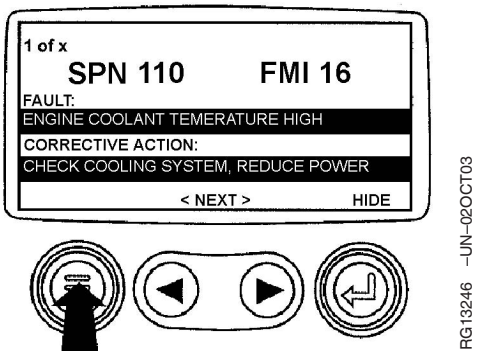
4. If the word "Next" appears above the "Arrow" keys, there are more stored codes that may be viewed. Use the "Arrow" key to scroll to the next stored code.



Use Arrow Keys To Scroll

OURGP11,00000AC –19–03SEP03–4/6

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

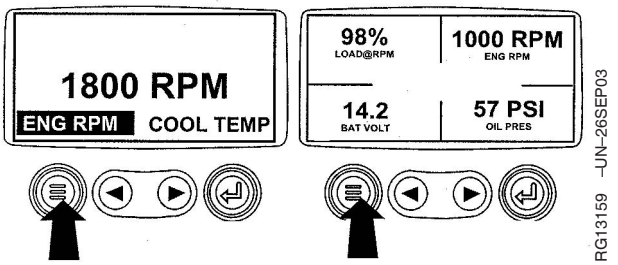


Return To Main Menu

Continued on next page

OURGP11,00000AC –19–03SEP03–5/6

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



Exit Main Menu

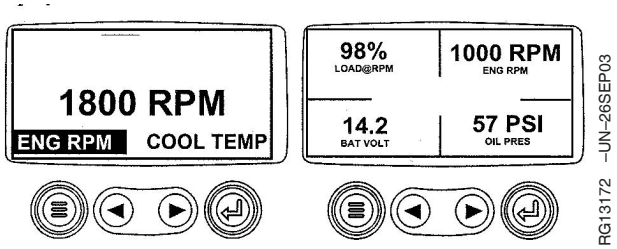
OURGP11,00000AC –19–03SEP03–6/6

Accessing Active Trouble Codes

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

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

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

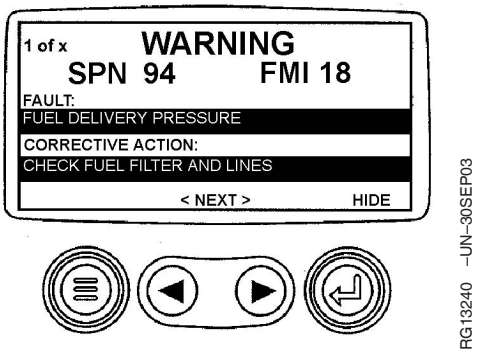


Normal Operation

OURGP11,00000AD –19–03SEP03–1/7

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

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

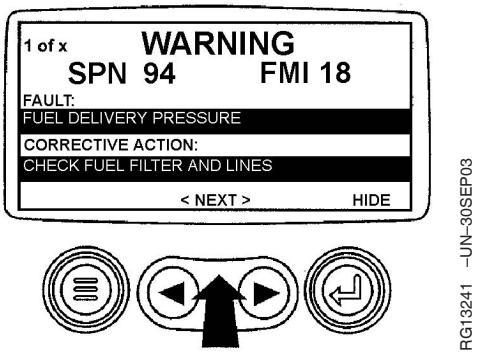


Active Trouble Codes Displayed

Continued on next page

OURGP11,00000AD –19–03SEP03–2/7

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

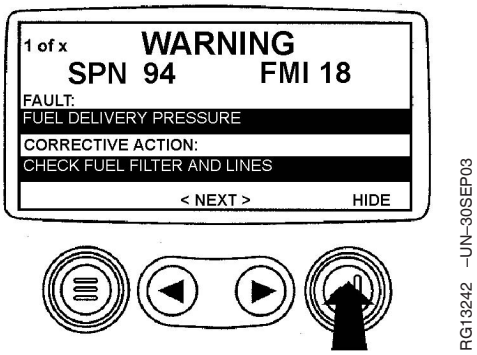


Use Arrow Keys To Scroll

OURGP11,00000AD –19–03SEP03–3/7

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

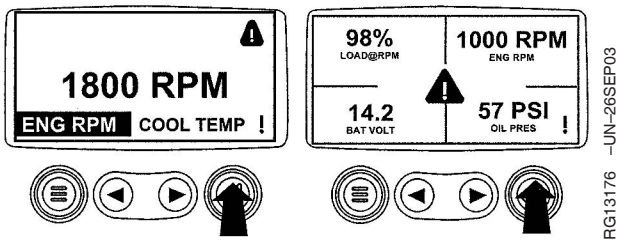
4. To acknowledge and hide the code and return to the single or four parameter display, press the "Enter" Key.



Hide Trouble Codes

OURGP11,00000AD –19–03SEP03–4/7

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

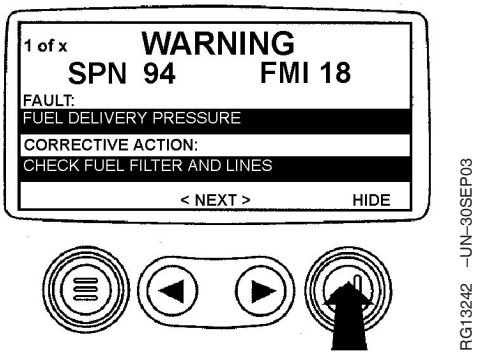


Active Trouble Code Icon

OURGP11,00000AD –19–03SEP03–5/7

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

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

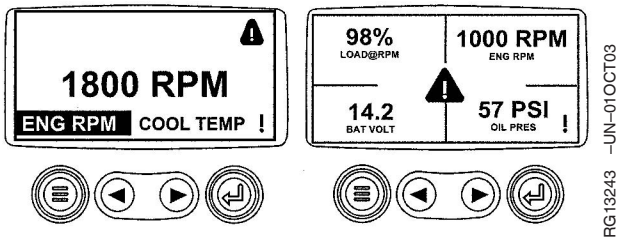


Enter Key

Continued on next page

OURGP11,00000AD –19–03SEP03–6/7

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

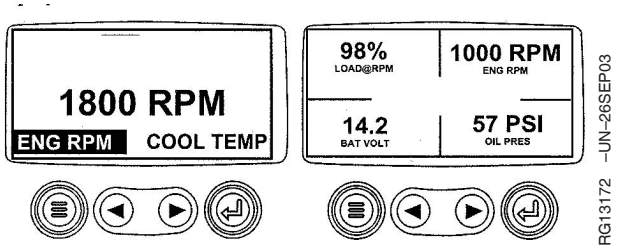


Active Trouble Code Condition

OURGP11,00000AD –19–03SEP03–7/7

Engine Shutdown Codes

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

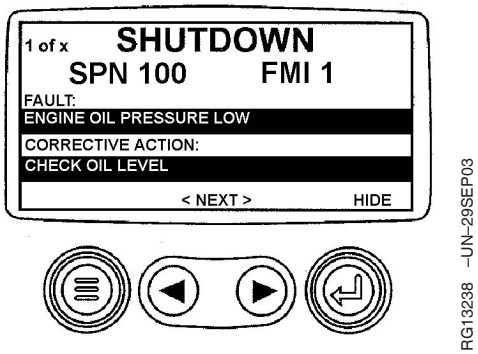


Normal Operation

OURGP11,00000AE –19–03SEP03–1/6

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

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

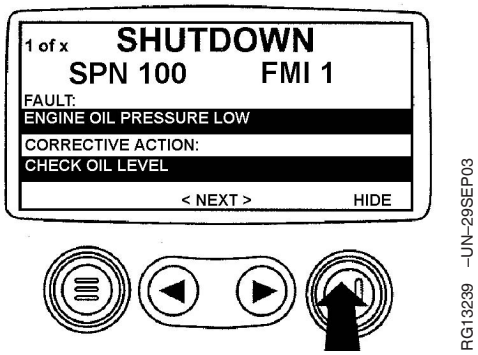


Shutdown Message

OURGP11,00000AE –19–03SEP03–2/6

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

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



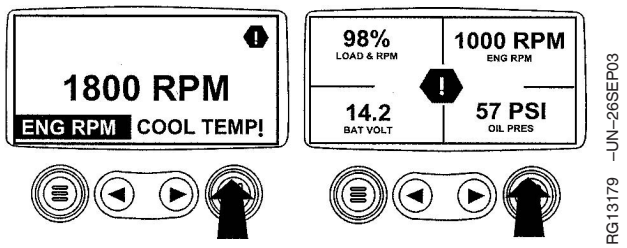
Hide Trouble Code

Continued on next page

OURGP11,00000AE –19–03SEP03–3/6

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

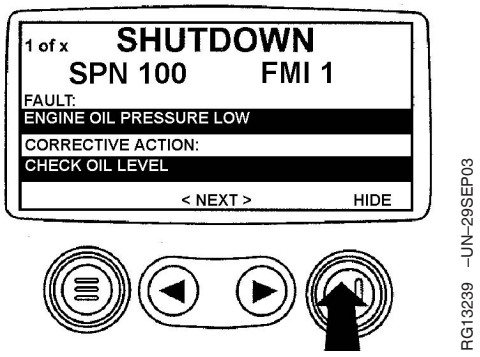
IMPORTANT: Ignoring the shutdown message can result in severe engine damage.



Flashing Shutdown Icon

OURGP11,00000AE –19–03SEP03–4/6

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

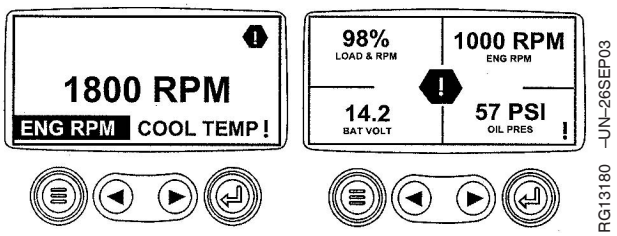


Redisplay Trouble Code

OURGP11,00000AE –19–03SEP03–5/6

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

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

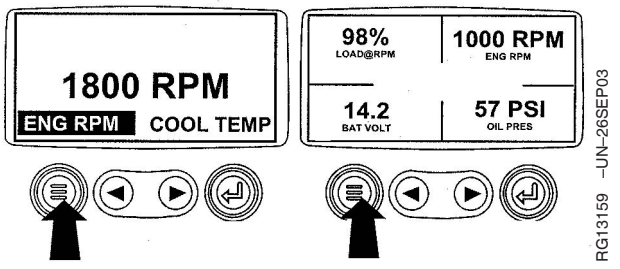


Shutdown Icon

OURGP11,00000AE –19–03SEP03–6/6

Adjusting Backlighting

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

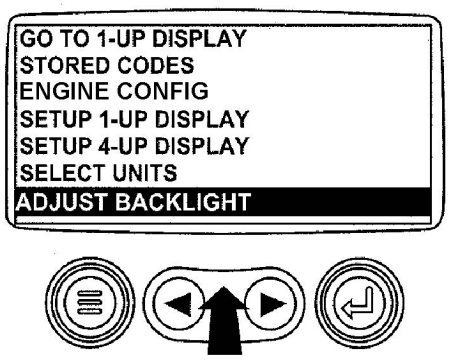


Menu Key

Continued on next page

OURGP11,0000237 –19–21OCT03–1/6

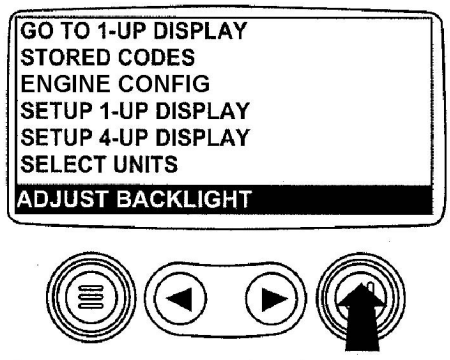
2. The main menu will be displayed. Use the "Arrow" keys to scroll through the menu until "Adjust Backlight" is highlighted.



Select Adjust Backlight

OURGP11,0000237 –19–21OCT03–2/6

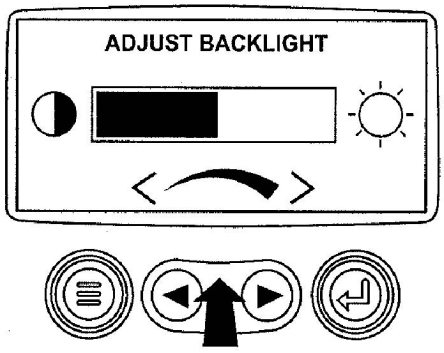
3. Once the "Adjust Backlight" menu item has been highlighted, press the "Enter" key to activate the "Adjust Backlight" function.



Press Enter Key

OURGP11,0000237 –19–21OCT03–3/6

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

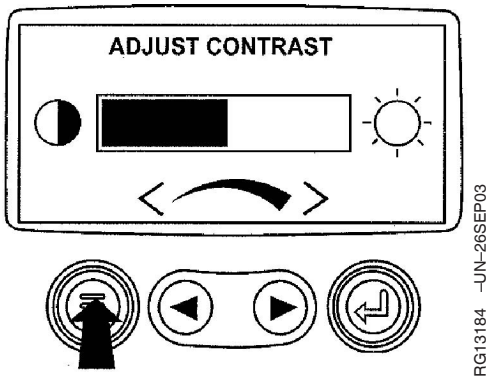


Adjust Backlight Intensity

Continued on next page

OURGP11,0000237 –19–21OCT03–4/6

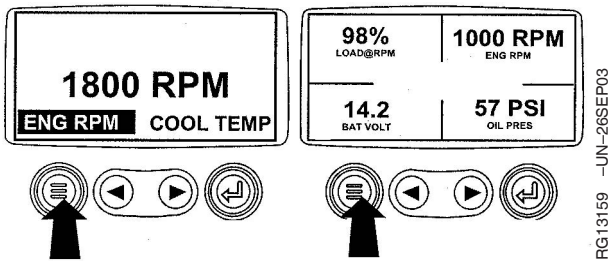
5. Press the "Menu" key to return to the main menu.



Return To Main Menu

OURGP11,0000237 –19–21OCT03–5/6

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

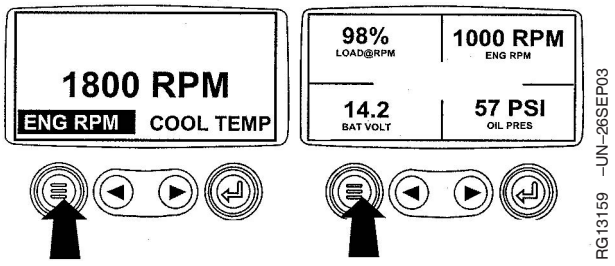


Exit Main Menu

OURGP11,0000237 –19–21OCT03–6/6

Adjusting Contrast

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

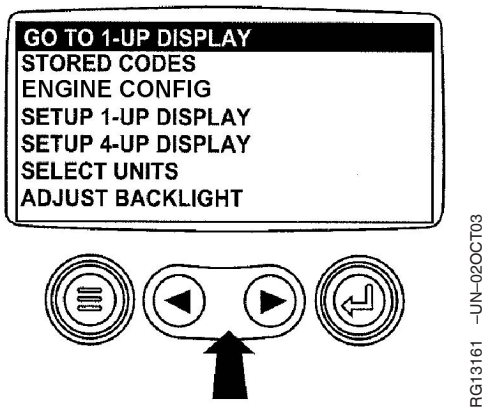


Menu Key

Continued on next page

OURGP11,00000AF –19–03SEP03–1/6

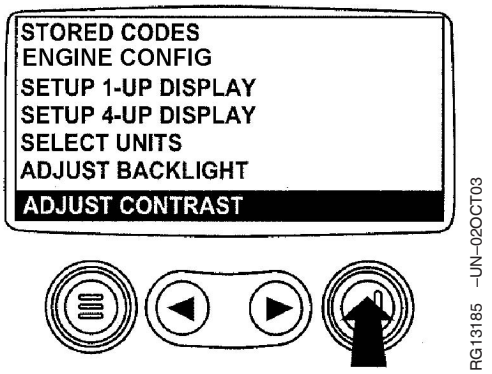
2. The main menu will be displayed. Use the "Arrow" keys to scroll through the menu until "Adjust Contrast" is highlighted.



Select Adjust Contrast

OURGP11,00000AF –19–03SEP03–2/6

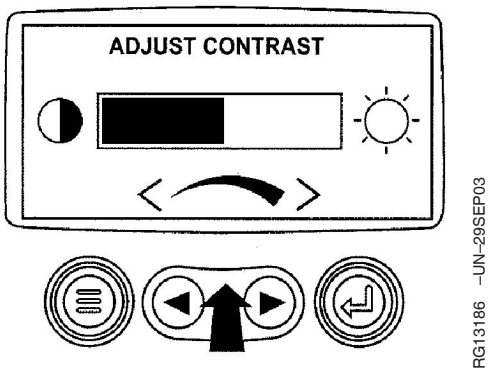
3. Once the "Adjust Contrast" menu item has been highlighted, press the "Enter" key to activate the "Adjust Contrast" function.



Press Enter Key

OURGP11,00000AF –19–03SEP03–3/6

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

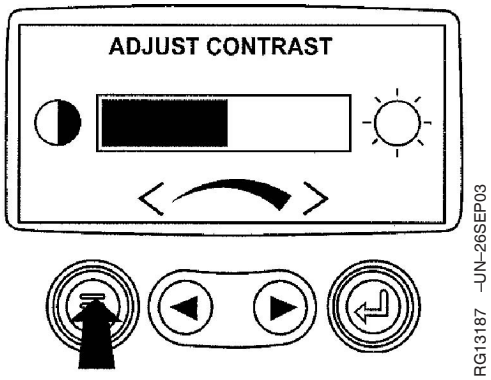


Adjust Contrast Intensity

Continued on next page

OURGP11,00000AF –19–03SEP03–4/6

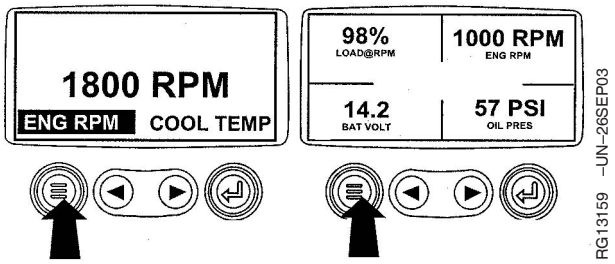
5. Press the "Menu" key to return to the main menu.



Return To Main Menu

OURGP11,00000AF –19–03SEP03–5/6

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

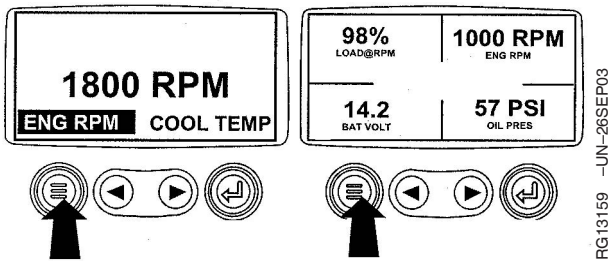


Exit Main Menu

OURGP11,00000AF –19–03SEP03–6/6

Selecting Units Of Measurement

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

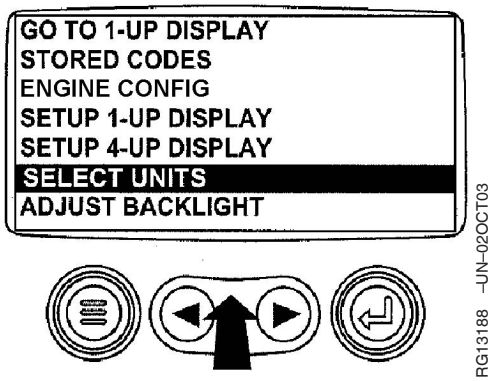


Menu Key

Continued on next page

OURGP11,00000B0 –19–03SEP03–1/7

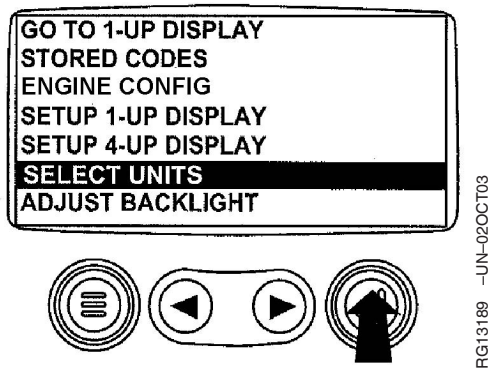
2. The main menu will be displayed. Use the "Arrow" keys to scroll through the menu until "Select Units" is highlighted.



Select Units

OURGP11,00000B0 –19–03SEP03–2/7

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



Press Enter Key

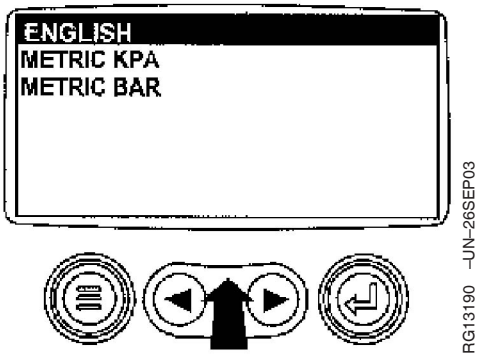
OURGP11,00000B0 –19–03SEP03–3/7

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

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

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

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

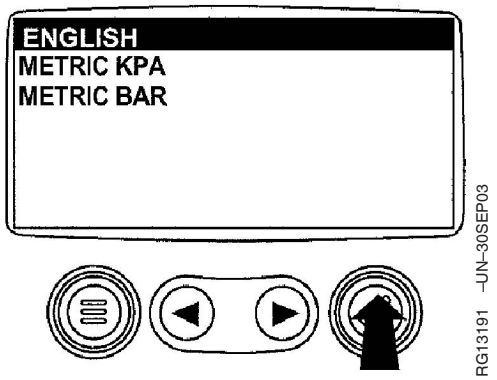


Select Desired Units

Continued on next page

OURGP11,00000B0 –19–03SEP03–4/7

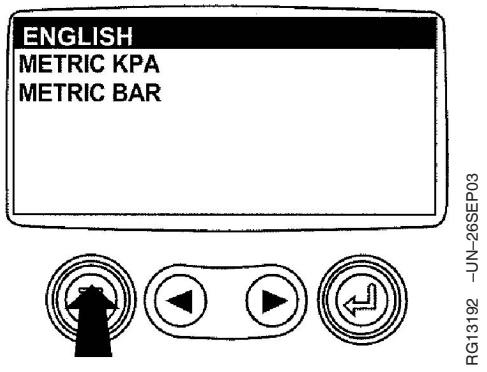
5. Press the "Enter" key to select the highlighted units.



Press Enter Key to Select

OURGP11,00000B0 –19–03SEP03–5/7

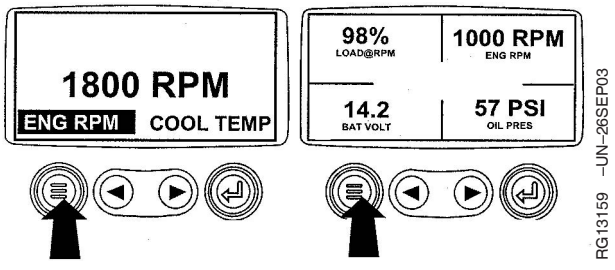
6. Press the "Menu" key to return to the main menu.



Return To Main Menu

OURGP11,00000B0 –19–03SEP03–6/7

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

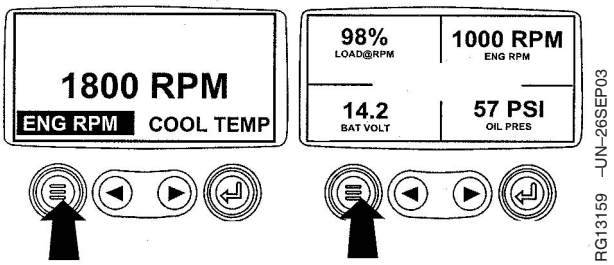


Press Menu Key

OURGP11,00000B0 –19–03SEP03–7/7

Setup 1-Up Display

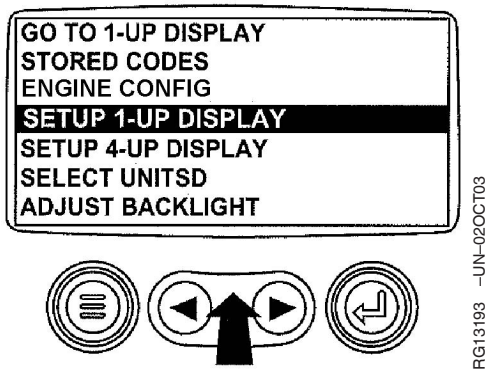
1. Turn the key switch to the ON position. Starting at the single engine parameter display, press the "Menu" key.



Menu Key

OURGP11,00000B1 –19–03SEP03–1/18

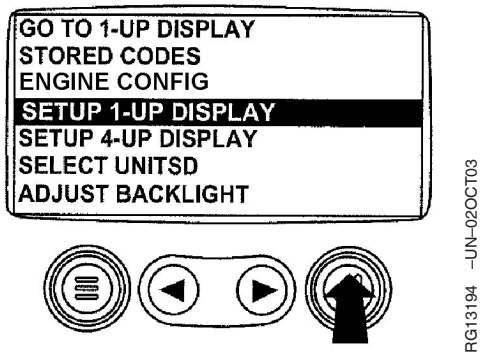
2. Use the "Arrow" keys to scroll through the menu until "Setup 1-Up Display" is highlighted.



Setup 1-Up Display

OURGP11,00000B1 –19–03SEP03–2/18

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



Press Enter Key

Continued on next page

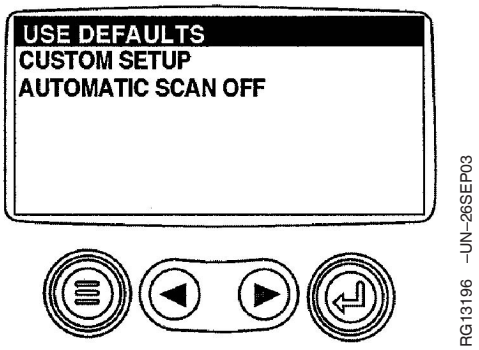
OURGP11,00000B1 –19–03SEP03–3/18

4. Three options are available for modification of the 1-Up Display.

   a. **Use Defaults** – This option contains the following engine parameters for display: Engine Hours, Engine Speed, Battery Voltage, % Load, Coolant Temperature and Oil Pressure.

   b. **Custom Setup** – This option contains a list of engine parameters. Engine parameters from this list can be selected to replace any or all of the default parameters. This option can be used to add parameters available for scrolling in the 1-Up Display.

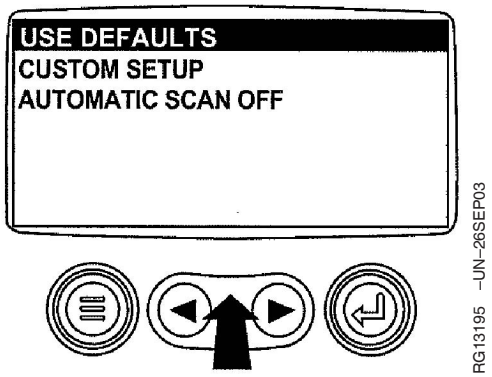
   c. **Automatic Scan** – Selecting the scan function will allow the 1-Up Display to scroll through the selected set of parameters one at a time, momentarily pausing at each.



1-Up Display Options

OURGP11,00000B1 –19–03SEP03–4/18

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

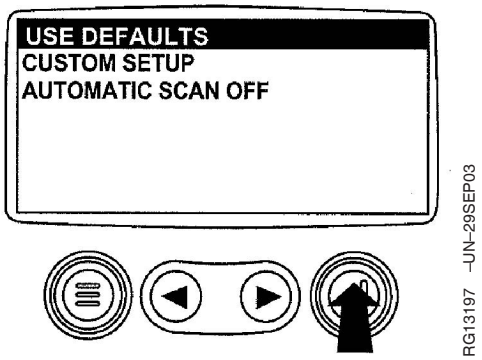


Select Defaults

Continued on next page

OURGP11,00000B1 –19–03SEP03–5/18

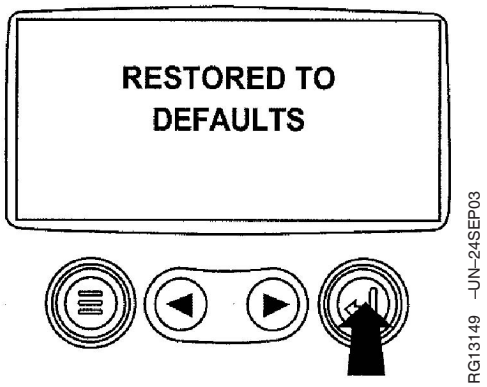
6. Press the "Enter" key to activate the "Use Defaults" function.



Defaults Selected

OURGP11,00000B1 –19–03SEP03–6/18

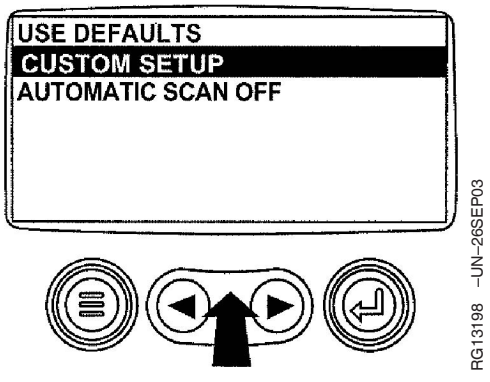
7. The display parameters are reset to the factory defaults, then the display will return to the "Setup 1-Up Display" menu.



Restored To Defaults

OURGP11,00000B1 –19–03SEP03–7/18

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

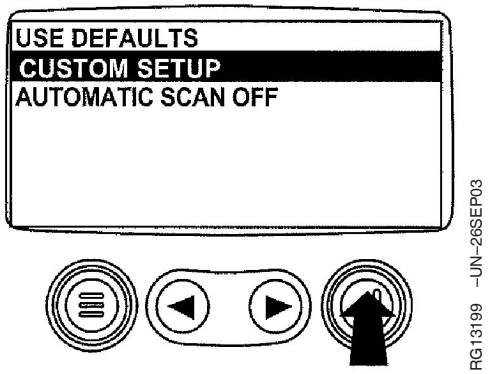


Select Custom Setup

Continued on next page

OURGP11,00000B1 –19–03SEP03–8/18

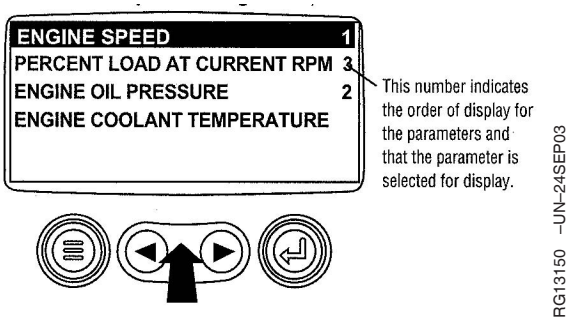
9. Press the "Enter" key to display a list of engine parameters.



Engine Parameters

OURGP11,00000B1 –19–03SEP03–9/18

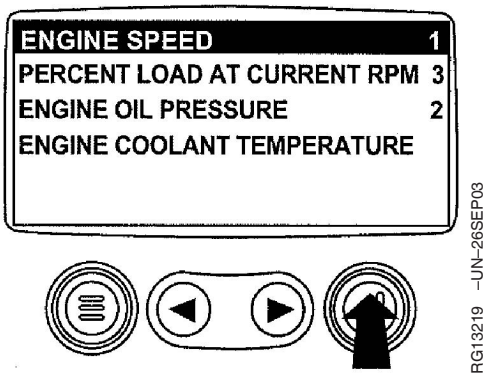
10. Use the "Arrow" keys to scroll to and highlight a selected parameter (parameter with a number to right of it).



Select Parameters

OURGP11,00000B1 –19–03SEP03–10/18

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

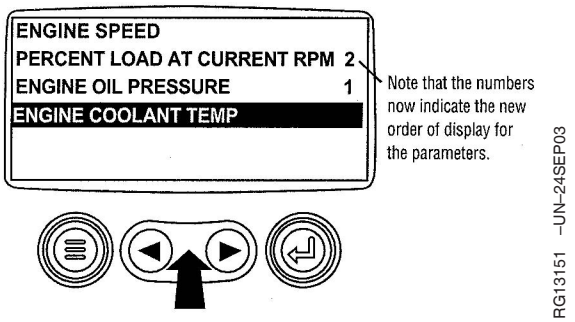


Deselect Parameters

Continued on next page

OURGP11,00000B1 –19–03SEP03–11/18

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

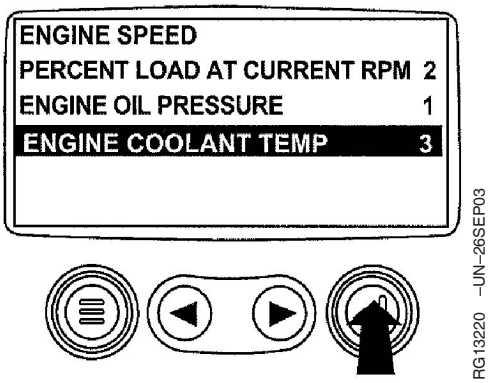


Select Desired Parameters

OURGP11,00000B1 –19–03SEP03–12/18

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

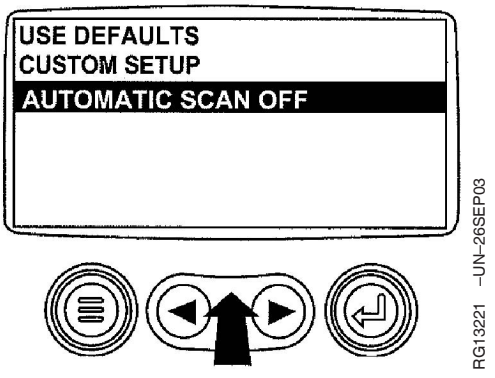
14. Continue to scroll through and select additional parameters for the custom 1-Up Display. Press the "Menu" key at any time to return to the "Custom Setup" menu.



Select Parameters For Display

OURGP11,00000B1 –19–03SEP03–13/18

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

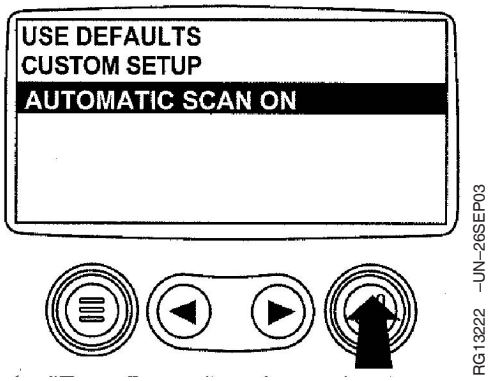


Automatic Scan Off

Continued on next page

OURGP11,00000B1 –19–03SEP03–14/18

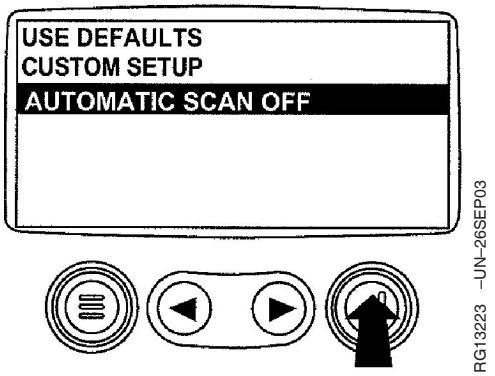
16. Press the "Enter" key to toggle the "Automatic Scan" function on.



Automatic Scan On

OURGP11,00000B1 –19–03SEP03–15/18

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

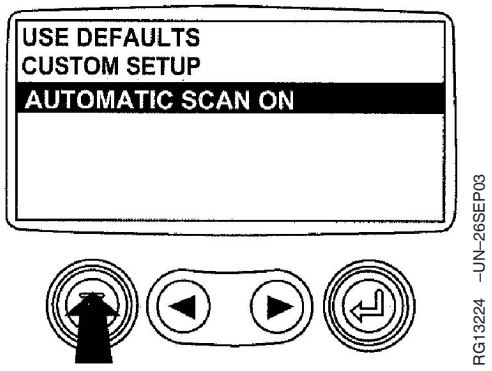


Automatic Scan Off

Continued on next page

OURGP11,00000B1 –19–03SEP03–16/18

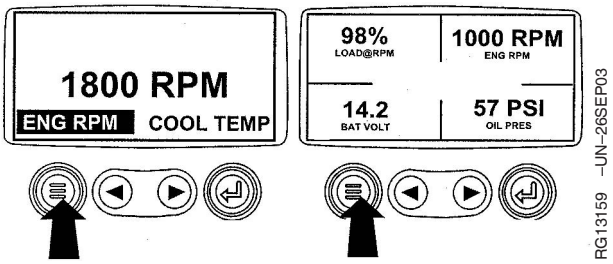
18. Once the "Use Defaults", "Custom Setup" and "Automatic Scan" functions have been set, press the "Menu" key to return to the main menu.



Menu Key

OURGP11,00000B1 –19–03SEP03–17/18

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

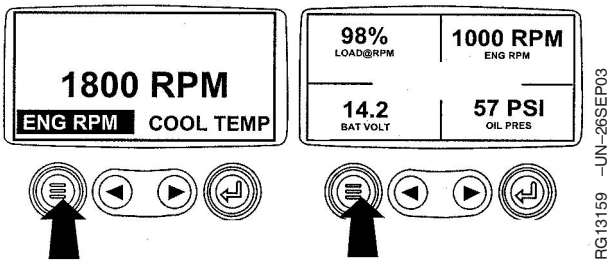


Exit Main Menu

OURGP11,00000B1 –19–03SEP03–18/18

Setup 4-Up Display

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

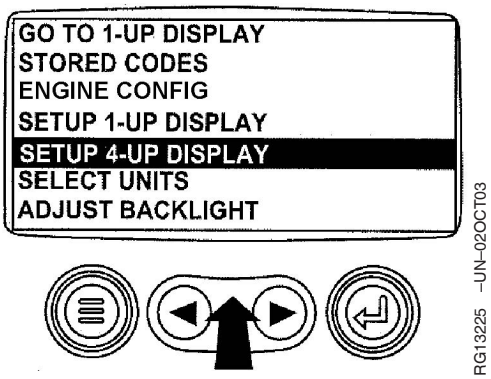


Menu Key

Continued on next page

OURGP11,00000B2 –19–03SEP03–1/14

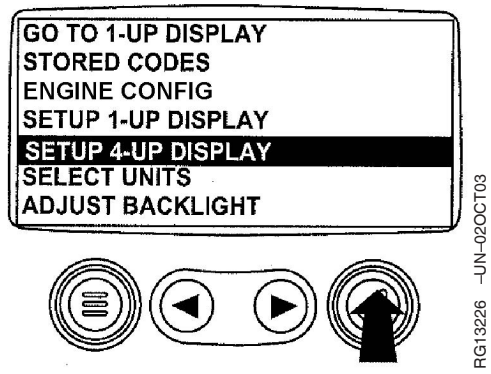
2. The main menu will be displayed. Use the "Arrow" keys to scroll through the menu until "Setup 4-Up Display" is highlighted.



Select Setup 4-Up Display

OURGP11,00000B2 –19–03SEP03–2/14

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



Press Enter Key

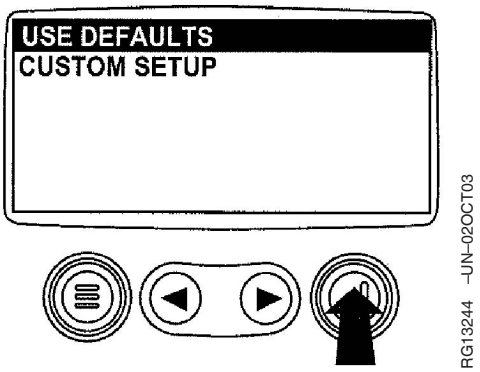
Continued on next page

OURGP11,00000B2 –19–03SEP03–3/14

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

   a. **Use Defaults** – This option contains the following engine parameters for display: Engine Speed, Battery Voltage, Coolant Temperature and Oil Pressure.

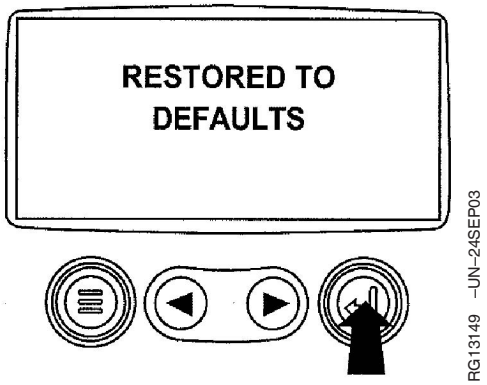
   b. **Custom Setup** – This option contains a list of engine parameters. Engine parameters from this list can be selected to replace any or all of the default parameters.



Select Factory Defaults

OURGP11,00000B2 –19–03SEP03–4/14

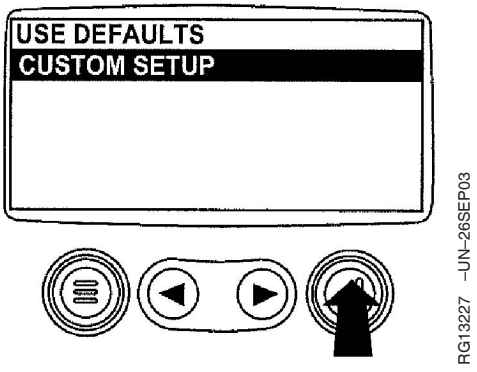
5. To reset the display parameters to the factory defaults, scroll to and highlight "Use Defaults". Press the "Enter" key to activate the "Use Defaults" function. A message indicating the display parameters are reset to the factory defaults will be displayed, then the display will return to the "Setup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



Restored To Defaults

OURGP11,00000B2 –19–03SEP03–5/14

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

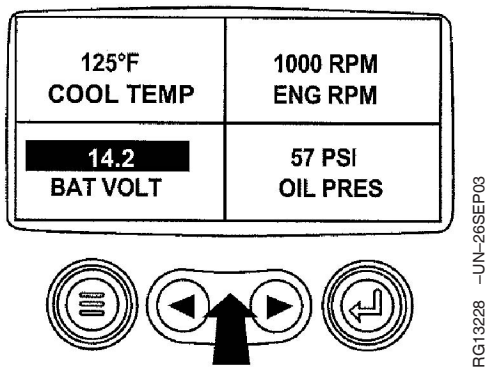


Custom Setup

Continued on next page

OURGP11,00000B2 –19–03SEP03–6/14

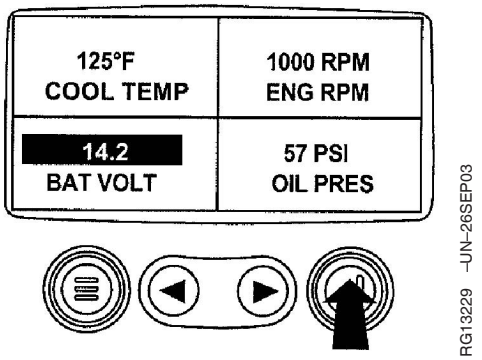
7. The quadrant with the highlighted parameter value is the current selected parameter. Use the "Arrow" keys to highlight the value in the quadrant you wish to change to a new parameter.



Select Parameters

OURGP11,00000B2 –19–03SEP03–7/14

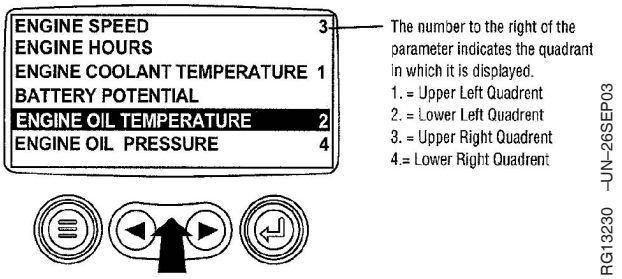
8. Press the "Enter" key and a list of engine parameters will be displayed.



List Of Engine Parameters

OURGP11,00000B2 –19–03SEP03–8/14

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

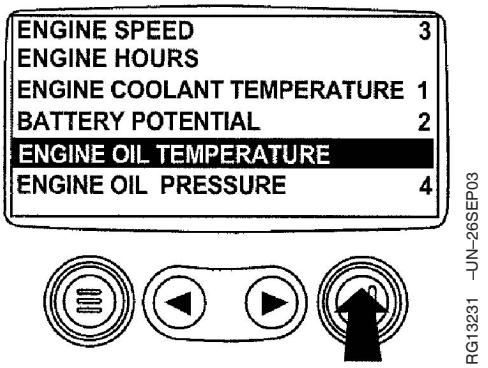


Select Desired Engine Parameter

Continued on next page

OURGP11,00000B2 –19–03SEP03–9/14

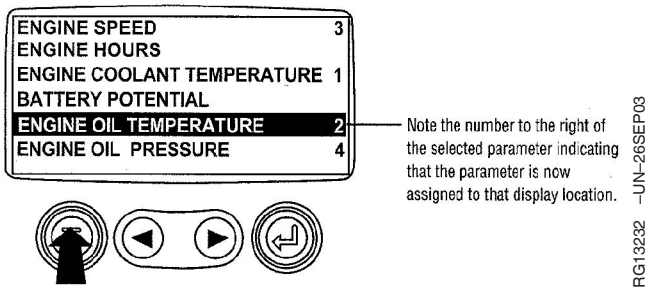
10. Press the "Enter" key to change the selected parameter in the quadrant to the new parameter.



Enter Selected Parameter

OURGP11,00000B2 –19–03SEP03–10/14

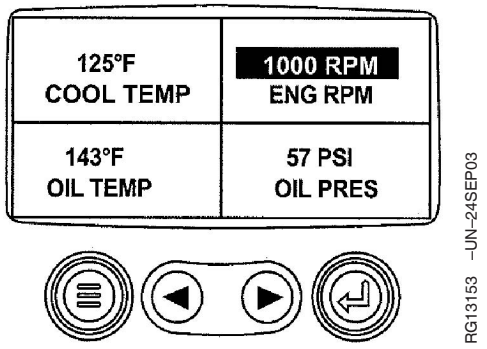
11. Use the "Menu" keys to return to the "4-Up Custom Setup" screen.



Return To 4-Up Custom Setup

OURGP11,00000B2 –19–03SEP03–11/14

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

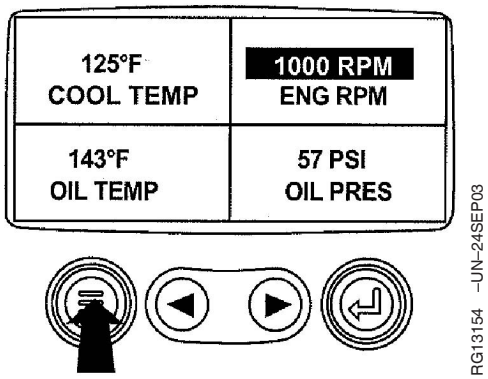


4-Up Display

Continued on next page

OURGP11,00000B2 –19–03SEP03–12/14

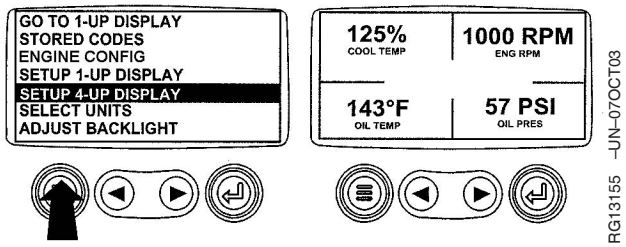
13. Repeat the parameter selection process until all spaces are as desired.
14. Press the "Menu" key to return to the main menu.



Return To Main Menu

OURGP11,00000B2 –19–03SEP03–13/14

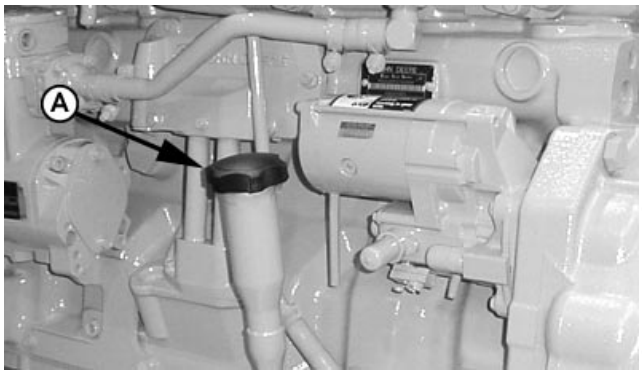
15. Press the "Menu" key to exit the main menu and return to the engine parameter display.



Select Remaining Parameters

OURGP11,00000B2 –19–03SEP03–14/14

Break-In Service



Check Engine Oil Level (Left-Side Option Shown)

Engine Oil Level Dipstick

A—Oil Fill Cap/Dipstick

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

1. This engine is factory-filled with John Deere Engine Break-in Oil. Operate the engine at heavy loads with minimal idling during the break-in period.

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

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

DO NOT use PLUS-50™ Engine Oil or engine oils meeting API CG4, API CF4, ACEA E3, ACEA E2, API CI-4, ACEA E5, API CH-4 or ACEA E4 performance levels during the first 100 hours of operation of a new or rebuilt engine. These oils will not allow a new or rebuilt engine to break-in properly.

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

Continued on next page

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

Specification	
Engine Oil Pressure— Full Load Rated Speed[1]	345 ± 103 kPa (3.45 ± 1.03 bar) (50 ± 15 psi)
Engine Oil Pressure—Low Idle	140 kPa (1.40 bar) (20 psi)(Minimum)
Engine Coolant Temperature Range—Temperature	82°—94°C (180°—202°F)

4. During the first 20 hours, avoid prolonged periods of engine idling or sustained maximum load operation.

5. If engine will idle longer than 5 minutes, stop engine.

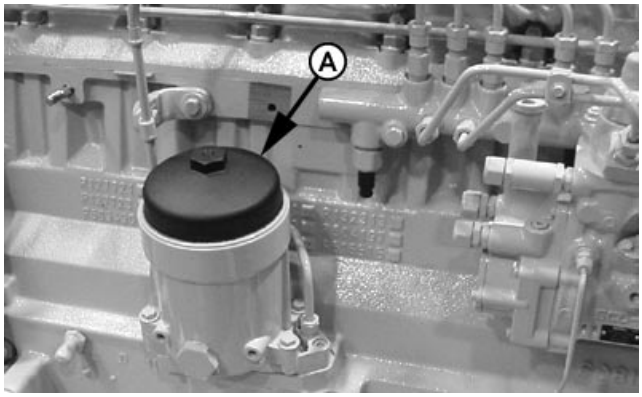
[1]*At normal operating temperature of 115° C (240° F) in crankcase sump and at full load speeds of 1500—2200 rpm.*

OURGP11,000025A –19–19NOV03–2/4

6. After the first 100 hours maximum, change engine oil and replace engine oil filter (A). (Top-load oil filter illustrated.)(See CHANGING ENGINE OIL AND REPLACING FILTER in Lubrication and Maintenance/250 Hour Section.) Fill crankcase with seasonal viscosity grade oil. (See DIESEL ENGINE OIL, in Fuels, Lubricants, and Coolant Section.)

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

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



Replacing Engine Oil Filter

A—Oil Filter (Top-Load)

Continued on next page

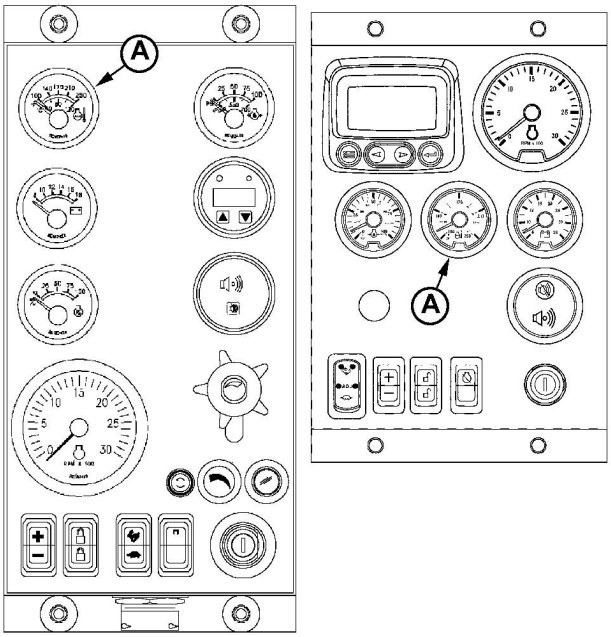
OURGP11,000025A –19–19NOV03–3/4

7. Watch coolant temperature gauge (A) closely during engine operation. If coolant temperature rises above 104° C (220° F), reduce load on engine. Unless temperature drops quickly, stop the engine and determine the cause before resuming operation. Normal temperature range at full load rated speed is 82—94° C (180—202° F).

NOTE: When the coolant temperature gauge rises to approximately 104° C (220° F), the engine will reduce power automatically if equipped with recommended safety controls.

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

A—Engine Coolant Temperature Gauge



Watch Coolant Temperatures On Earlier Panel (Left) or Later Panel (Right)

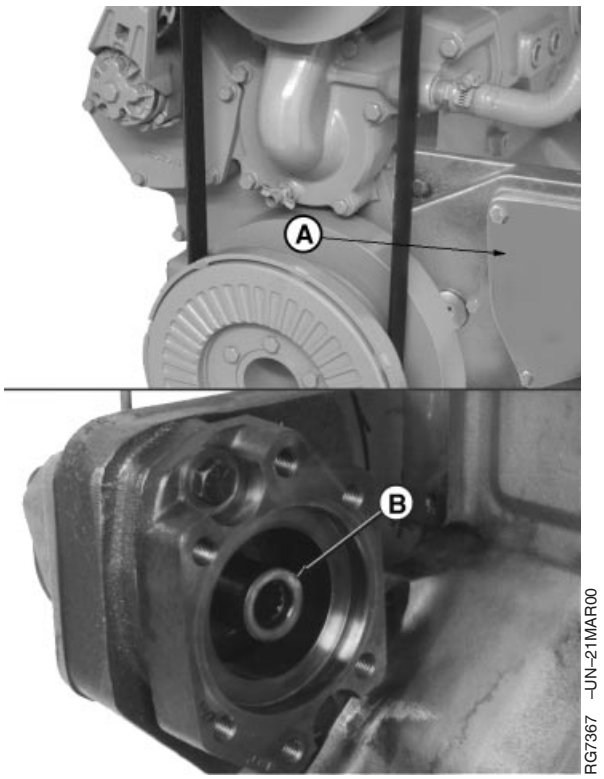
OURGP11,000025A –19–19NOV03–4/4

Auxiliary Gear Drive Limitations

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

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

A—SAE Drive, Front
B—SAE Drive, Rear



Auxiliary Drives

RG,RG34710,4051 –19–08OCT02–1/1

Generator Set (Standby) Applications

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

RG,RG34710,4052 –19–01JAN96–1/1

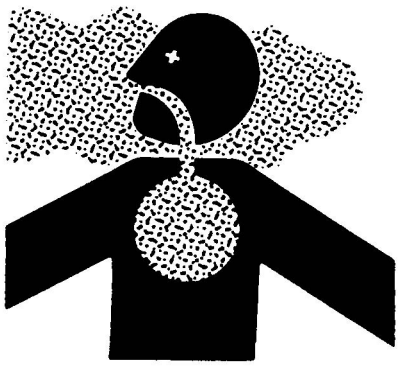
Starting the Engine

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

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

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

1. Perform all prestarting checks outlined in Lubrication and Maintenance/Daily section later in this manual.
2. Open the fuel supply shut-off valve, if equipped.
3. Disengage power to any engine drivelines.



TS220 –UN–23AUG88

Use Proper Ventilation

Continued on next page

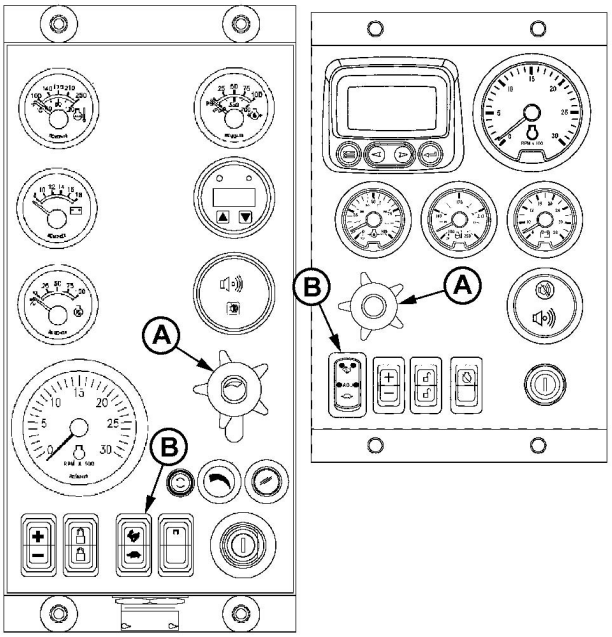
OURGP11,000023D –19–21OCT03–1/3

4. Set slow idle as follows:

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

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

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



RG13279 –UN–30OCT03

Analog Throttle Control and Speed Select Switch On Earlier Panel (Left) or Later Panel (Right)

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

Continued on next page

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

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

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

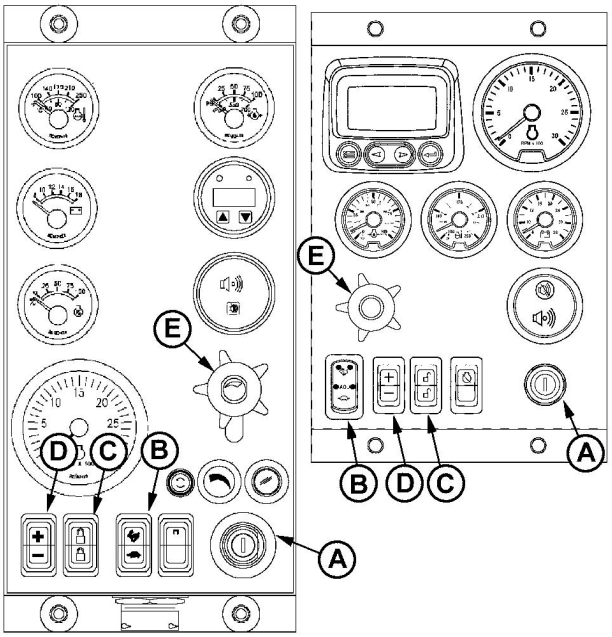
6. After engine starts, idle engine at not more than 1200 rpm until warm. (See WARMING ENGINE later in this section).

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

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

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

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



RG13280 –UN–30OCT03

Start And Idle Engine On Earlier Panel (Left) or Later Panel (Right)

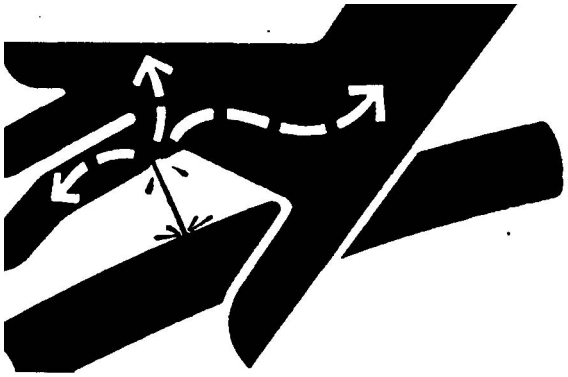
A—Key Start Switch
B—High-Low Speed Select Rocker Switch
C—Bump Speed Enable Rocker Switch
D—Speed Select Rocker Switch
E—Analog Throttle Control (Optional)

OURGP11,000023D –19–21OCT03–3/3

Restarting Engine That Has Run Out Of Fuel (Earlier Engines)

CAUTION: Escaping fluid under pressure can penetrate the skin causing serious injury. Relieve pressure before disconnecting fuel or other lines. Tighten all connections before applying pressure. Keep hands and body away from pinholes and nozzles that 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, a doctor familiar with this type of injury must surgically remove it 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.



X9811 –UN–23AUG88

High Pressure Fluids

Whenever the fuel system has been opened up for service (lines disconnected or filters removed), it will be necessary to **bleed** air from the system. (See BLEEDING THE FUEL SYSTEM in Service as Required section.)

In case the engine has run out of fuel, the fuel system must be **primed** by the following method:

1. Fill fuel tank

Continued on next page

2. Loosen fuel pump low pressure outlet line (A) (outboard lower line of fuel pump). Unlock and pump hand primer (B) until primary filter bowl is full of fuel and all air is bled from the line (Must pull hand primer all the way up between pumps). Tighten outlet line to specification below:

Specification

Low Pressure Outlet Line—
Torque ..... 27 N•m (20 lb-ft)

3. Connect JT03472 coupler and hose to diagnostic port (D). If JT03472 coupler is not available, loosen the diagnostic port to allow air and fuel to escape. Bleed fuel into suitable container. Tighten diagnostic port to specification below.

Specification

Diagnostic Port—Torque ..... 14 N•m (10 lb-ft)

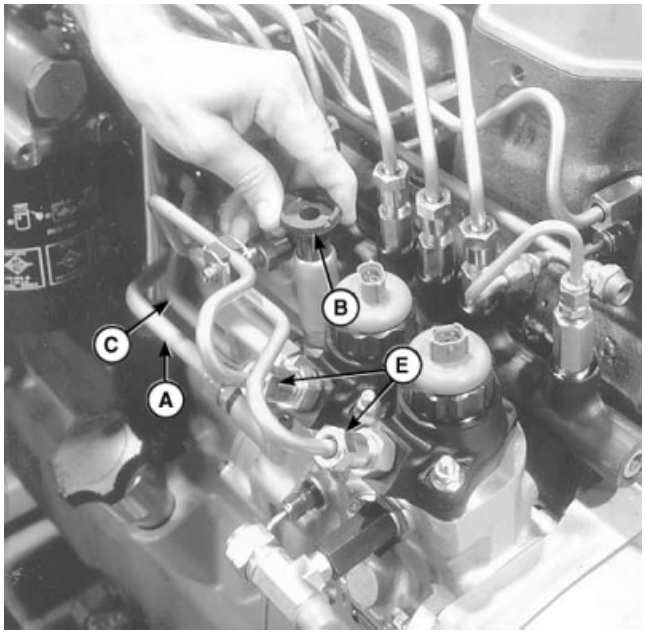
4. Loosen high pressure fuel lines (E). Pump hand primer (B) until steady flow of fuel escapes the fuel pump. Tighten fuel lines to specification below and lock hand primer (pull up, then push down and lock).

Specification

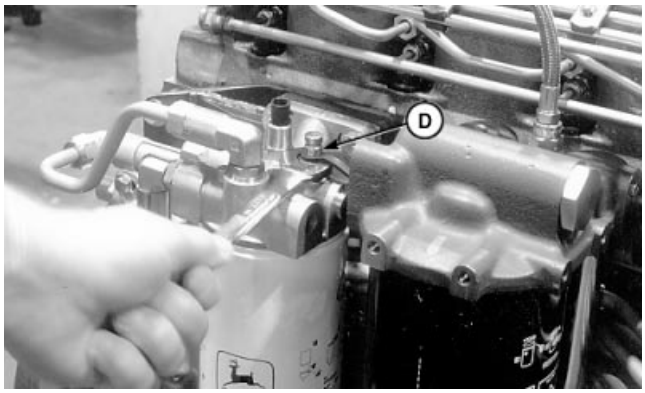
High Pressure Fuel Lines—
Torque ..... 27 N•m (20 lb-ft)

5. Start engine. If engine will not start, do NOT crank for more than 30 seconds. Repeat step 4.

6. Once engine starts, run at 1200-1500 RPM for 3-5 minutes.



RG11600 –UN–11DEC00



RG11599 –UN–11DEC00

A—Low Pressure Outlet Line
B—Hand Primer
C—Low Pressure Inlet Line
D—Diagnostic Port
E—High Pressure Fuel Lines

OURGP11,0000283 –19–18DEC03–2/2

Restarting Engine That Has Run Out Of Fuel (Later Engines)

If engine has run out of fuel, the system must be primed.

1. Fill fuel tank.

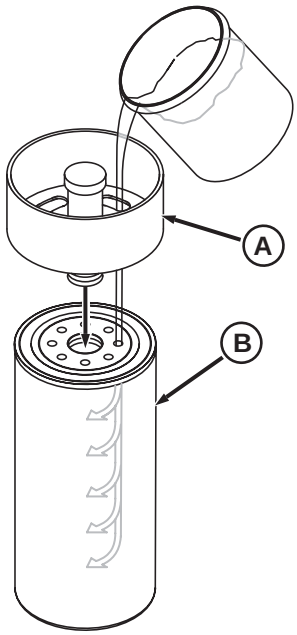
IMPORTANT: Prefill cup must be used when filling fuel filters, to make sure fuel is being filtered.

2. Remove fuel filters and connect prefill cup (A) to filter (B). Fill filters with fuel.

3. Remove cup and install filters.

4. Bleed air from system. See BLEEDING FUEL SYSTEM in Service As Required Section.

A—Prefill Cup
B—Fuel Filter



RXA0071966 –UN–03NOV03

OURGP11,0000280 –19–16DEC03–1/1

Normal Engine Operation

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

Normal engine coolant operating temperature range is 82°–94° C (180°–202° F). If coolant temperature rises above 104° C (220° F), reduce load on engine. Unless temperature drops quickly, stop engine and determine cause before resuming operation.

NOTE: When coolant temperature is excessive (above 104°C (220°F) engine will reduce power automatically if equipped with recommended safety controls.

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

RG,RG34710,4047 –19–01JAN96–1/1

Cold Weather Operation

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

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

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

Engines may be equipped with intake air heaters, coolant heaters, or ether injectors as a cold weather starting aid.

Starting aids are required below 14°F (-10°C). They will enhance starting performance above these temperatures and may be needed to start applications that have high parasitic loads during cranking and/or start acceleration to idle.

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

Other cold weather starting aids are required at temperatures below -22°F (-30°C) or at altitudes above 1500 m (5000 ft).

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

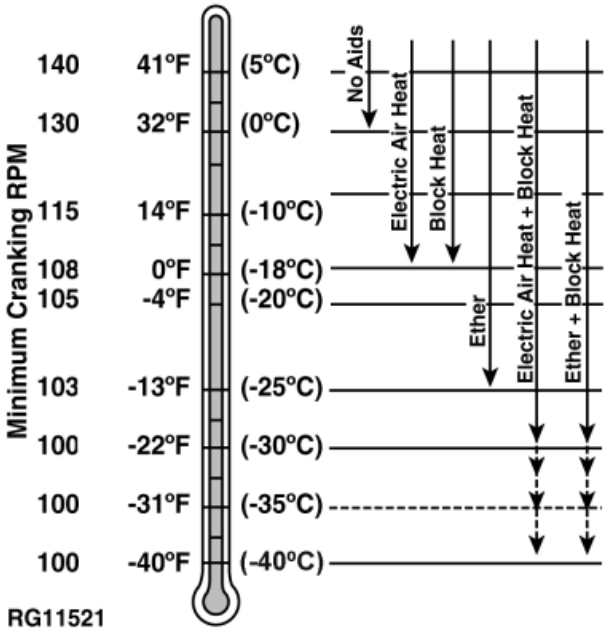
2. Use cold weather starting aids as needed. Follow supplier instructions for starting aid provided on your engine.

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

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

TS1356 –UN–18MAR92

Starting Fluid is Flammable



RG11521 –19–10JAN01

Cold Weather Starting Guidelines

Continued on next page

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

OURGP11,0000285 –19–18DEC03–2/2

Warming Engine

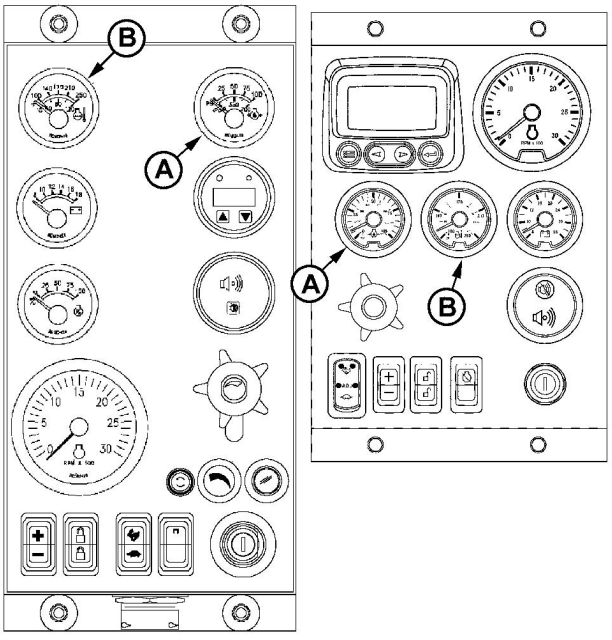
IMPORTANT: To assure proper lubrication, operate engine at or below 1200 rpm with no load for 1–2 minutes. Extend this period 2–4 minutes when operating at temperatures below freezing.

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

1. Check oil pressure gauge (A) as soon as engine starts. If gauge needle does not rise above minimum oil pressure specification of 140 kPa (1.4 bar) (20.0 psi) within 5 seconds, stop the engine and determine the cause. Normal engine oil pressure is 345 ±103 kPa (3.45 bar ± 1.03 bar) (50 ±15 psi) at rated full load speed (1800–2500 rpm) with oil at normal operating temperature of 115° C (240° F).

2. Watch coolant temperature gauge (B). Do not place engine under full load until it is properly warmed up. The normal engine coolant temperature range is 82°–94° C (180°–202° F).

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



RG13281 –UN–30OCT03

Oil Pressure and Coolant Temperature Gauges On Earlier Panel (Left) or Later Panel (Right)

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

OURGP11,000025B –19–19NOV03–1/1

Idling Engine

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

Once an engine is warmed to normal operating temperatures, engine should be idled at slow idle speed. Slow idle speed for this engine is set at the factory at 800 rpm for standard industrial engines and at 850 rpm for generator sets. If an engine will be idling for more than 5 minutes, stop and restart later.

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

RG,RG34710,4058 –19–14NOV02–1/1

Changing Engine Speed

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

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

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

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

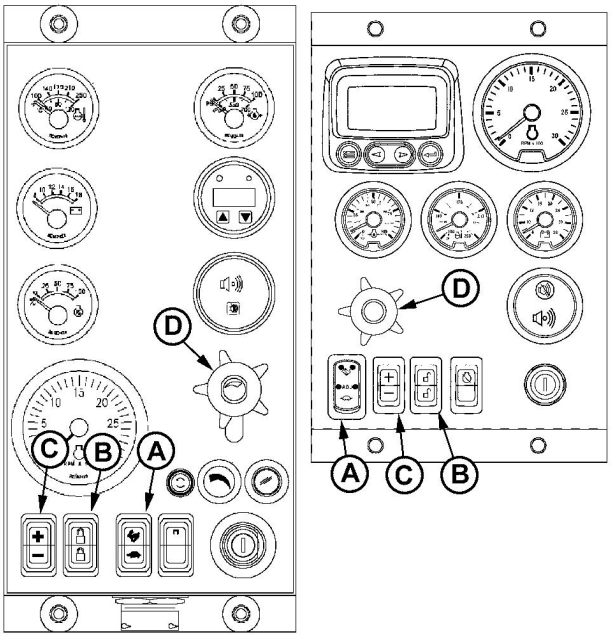
1. *Select fast (rabbit) or slow (turtle) position on High-Low Speed Select Rocker Switch (A).*
2. *Press and hold top or bottom half of Bump Speed Enable Rocker Switch (B) while using Speed Select Rocker Switch (C).*
3. *Use Speed Select Rocker Switch (C) to bump engine speed up (+) or down (-).*

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

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

Later engines have an adjustable **three-position** rocker switch (A) that can be used to select slow idle, fast idle, or an adjustable ("ADJ") intermediate speed.

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



RG13282 –UN–30OCT03

Changing Engine Speed On Earlier Panel (Left) or Later Panel (Right)

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

Continued on next page

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

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

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

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

Changing engine speed using optional analog potentiometer throttle (D)

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

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

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

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

Continued on next page

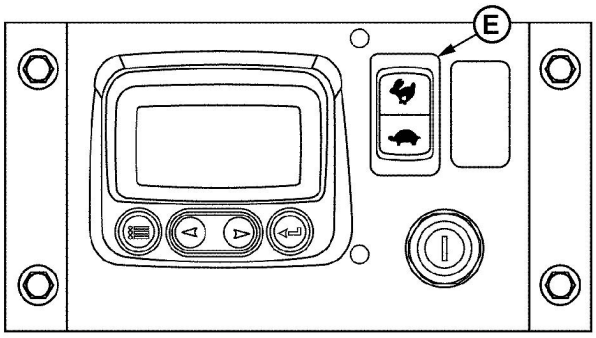
Changing engine speeds on later engines equipped with the Basic Instrument Panel

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

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

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

The settings will not be stored.



RG13289 –UN–30OCT03

Changing Engine Speed With Basic Panel

E—High-Low Speed Select Rocker Switch

OURGP11,000023F –19–21OCT03–3/3

Stopping the Engine

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

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

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

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

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

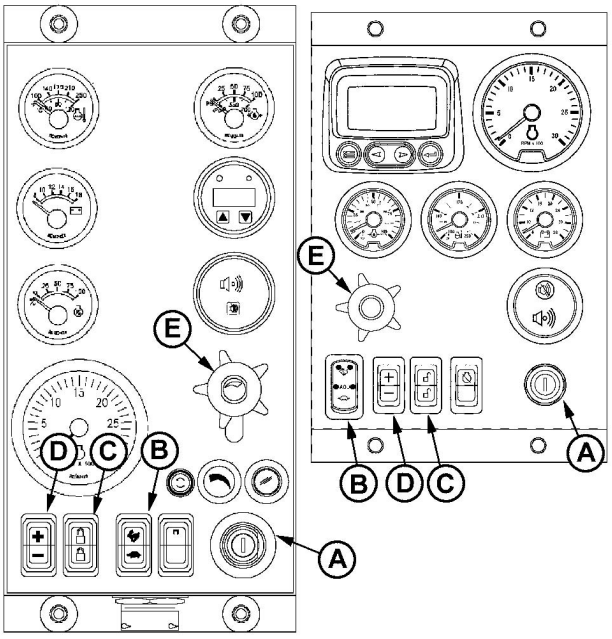
   Panels with optional analog throttle (E): Set either high-low speed select switch (B) or analog throttle control (E) to slow idle, and set desired speed with remaining control.

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

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

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

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



RG13280 –UN–30OCT03

Stopping the Engine On Earlier Panel (Left) or Later Panel (Right)

RG9933 –UN–18NOV99

Exhaust Stack Rain Cap

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

OURGP11,0000240 –19–21OCT03–1/1

Using a Booster Battery or Charger

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

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

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

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

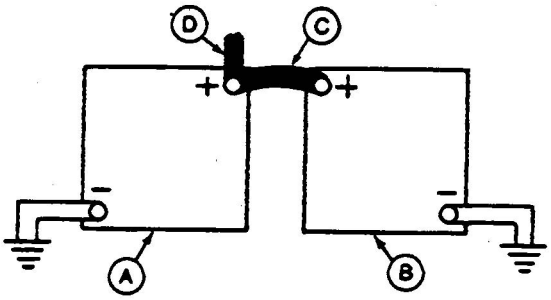
1. Connect booster battery or batteries to produce the required system voltage for your engine application.

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

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

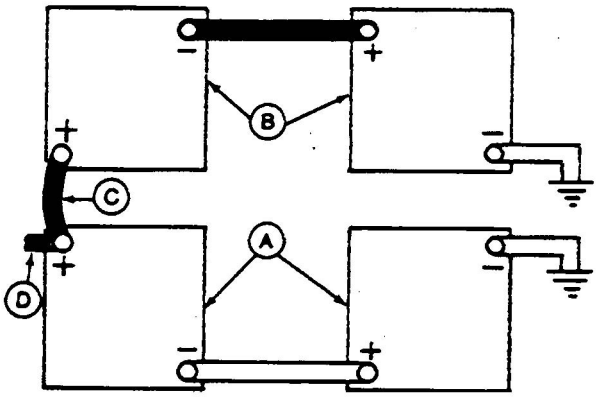
Exploding Battery

TS204 –UN–23AUG88



12-Volt System

RG4678 –UN–14DEC88



24-Volt System

RG4698 –UN–14DEC88

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. Always disconnect NEGATIVE (–) cable first.

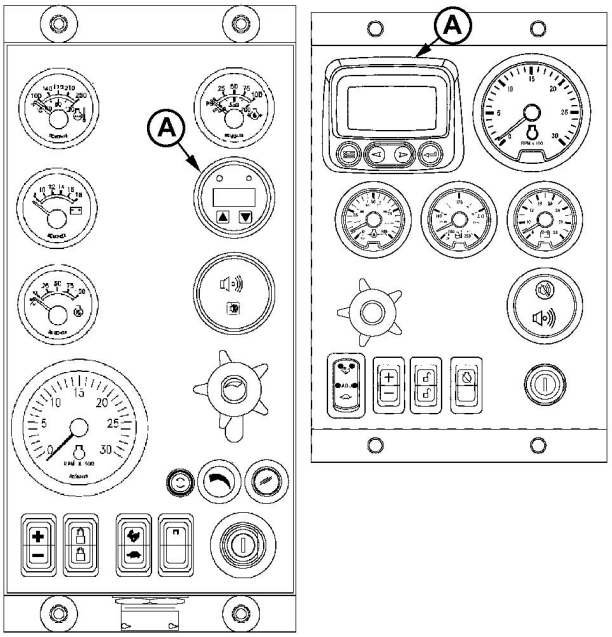
RG,RG34710,4060 –19–01JAN96–2/2

Observe Service Intervals

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

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

A—Hour Meter



RG13283 –UN–30OCT03

Hour Meter On Earlier Panel (Left) or Later Panel (Right)

OURGP11,0000241 –19–21OCT03–1/1

Use Correct Fuels, Lubricants, and Coolant

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

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

TS100 –UN–23AUG88

John Deere Parts Network

RG,RG34710,4062 –19–01JAN96–1/1

Lubrication and Maintenance Service Interval Chart—Standard Industrial Engines

	Lubrication and Maintenance Service Intervals				
Item	**Daily**	**250 Hour/6 Month**	**500 Hour/12 Month**	**2000 Hour/24 Month**	**As Required**
Check Engine Oil and Coolant Level	•				
Check Fuel Strainer	•				
Check Air Cleaner Dust Valve Restriction Indicator Gauge[a]	•				
Perform Visual Walkaround Inspection	•				
Service Fire Extinguisher		•			
Service Battery		•			
Change Engine Oil and Replace Oil Filter[b]		•			
Check Coolant Pump Weep Hole Foam Filter		•			
Replace Single Fuel Filter/Clean Strainer (Earlier Engines)[c]		•			
Clean Crankcase Vent Tube			•		
Check Air Intake Hoses, Connections & System			•		
Replace Dual Fuel Filter Elements (Later Engines)[d]			•		
Check Belt Tensioner and Belt Wear			•		
Check Cooling System			•		
Coolant Solution Analysis-SCAs as required			•		
Pressure Test Cooling System			•		
Check Engine Speeds			•		
Check Crankshaft Vibration Damper[e]			•		
Check Engine Ground Connection			•		
Check Engine Mounts			•		
Flush and Refill Cooling System[f]				•	
Test Thermostats				•	
Adjust Engine Valve Clearance				•	

[a]Service air cleaner element when restriction indicator shows a vacuum of 625 mm (25 in.) H_2O.

[b]Change the oil for the first time before 100 hours maximum of (break-in) operation, then every 250 hours thereafter. If John Deere PLUS-50 or ACEA-E4/E5 oil is used along with the specified John Deere oil filter, the oil and filter change interval may be extended by 50 percent to every 375 hours.

[c]Also replace fuel filter element anytime audible alarm sounds and trouble codes indicate a plugged fuel filter (low fuel pressure). If no alarm sounds during the 12 month service interval, replace element at that time, or after 250 hours of operation, whichever comes first.

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

[e]Replace crankshaft damper at 4500 hours or 60 months, whichever occurs first. Damper cannot be repaired.

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

Continued on next page

	Lubrication and Maintenance Service Intervals				
Item	**Daily**	**250 Hour/6 Month**	**500 Hour/12 Month**	**2000 Hour/24 Month**	**As Required**
Drain Water Separator Bowl When Alarm Sounds[g]					•
Add Coolant					•
Service Air Cleaner Elements					•
Replace Alternator Belt					•
Check Fuses					•
Check Electrical Wiring and Connections					•
Bleed Fuel System					•
Check Air Compressors (If Equipped)					•
Check Freon (A/C) Compressor (If Equipped)					•
Check Rear Power Take-Off (If Equipped)					•

[g]Replace fuel filter element(s) when audible alarm sounds and trouble codes indicate plugged fuel filter(s) (low fuel pressure). If no alarm sounds during the 12 month service interval, replace element(s) at that time, or after the normal service interval, whichever comes first.

OURGP11,000025C –19–19NOV03–2/2

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

NOTE: The service intervals in the Lubrication and Maintenance Sections that follow reflect standard engines. Use service intervals listed below for standby generators. Match service items below to titles in Lubrication and Maintenance Sections for procedures.

	Lubrication and Maintenance Service Intervals				
Item	**Every 2 Weeks**	**250 Hour/6 Month**	**500 Hour/12 Month**	**2000 Hour/24 Month**	**As Required**
Operate Engine at Rated Speed and 50%–70% Load a Minimum of 30 Minutes	•				
Check Engine Oil and Coolant Level	•				
Check Fuel Strainer	•				
Check Air Cleaner Dust Valve Restriction Indicator Gauges[a]	•				
Perform Visual Walkaround Inspection	•				
Service Battery		•			
Change Engine Oil and Replace Oil Filter[b]		•			
Check Coolant Pump Weep Hole Foam Filter		•			
Check Engine Mounts		•			
Service Fire Extinguisher		•			
Replace Single Fuel Filter/Clean Strainer (Earlier Engines)[c]		•			
Clean Crankcase Vent Tube			•		
Check Air Intake Hoses, Connections, & System			•		
Replace Dual Fuel Filter Elements (Later Engines)[d]			•		
Check Automatic Belt Tensioner and Belt Wear			•		
Check Cooling System			•		
Coolant Solution Analysis-Add SCAs as required			•		
Pressure Test Cooling System			•		
Check Crankshaft Vibration Damper[e]			•		
Checking and Adjusting Engine Speeds			•		
Checking Engine Ground Connection			•		

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

[b]Change the oil for the first time before 100 hours maximum of (break-in) operation, then every 250 hours thereafter. If John Deere PLUS-50 or ACEA-E4/E5 oil is used along with the specified John Deere oil filter, the oil and filter change interval may be extended by 50 percent to every 375 hours.

[c]Also replace fuel filter element anytime audible alarm sounds and trouble codes indicate a plugged fuel filter (low fuel pressure). If no alarm sounds during the 12 month service interval, replace element at that time, or after 250 hours of operation, whichever comes first.

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

[e]Replace crankshaft damper at 4500 hours or 60 months, whichever occurs first. Damper cannot be repaired.

Continued on next page

Item	Lubrication and Maintenance Service Intervals				
	Every 2 Weeks	250 Hour/6 Month	500 Hour/12 Month	2000 Hour/24 Month	As Required
Flush and Refill Cooling System[f]				•	
Test Thermostats				•	
Adjust Engine Valve Clearance				•	
Drain Water Separator Bowl When Alarm Sounds[g]					•
Add Coolant					•
Service Air Cleaner Element					•
Replace Alternator Belt					•
Check Fuses					•
Check Electrical Wiring and Connections					•
Bleed Fuel System					•
Check Air Compressors (If Equipped)					•
Check Rear Power Take-Off (If Equipped)					•

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

[g]Replace fuel filter element(s) when audible alarm sounds and trouble codes indicate plugged fuel filter(s) (low fuel pressure). If no alarm sounds during the 12 month service interval, replace element(s) at that time, or after the normal service interval, whichever comes first.

OURGP11,000025D –19–19NOV03–2/2

Daily Prestarting Checks

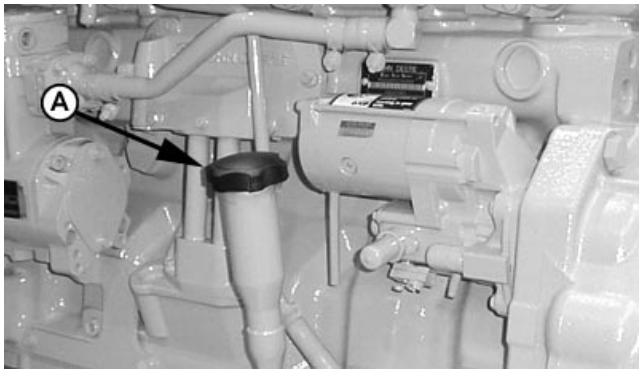
Do the following BEFORE STARTING THE ENGINE for the first time each day:

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

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

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

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



Checking Engine Oil Level (Left-Side Option Shown)

A—Oil Fill Cap

Continued on next page

OURGP11,0000286 –19–18DEC03–1/5

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

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

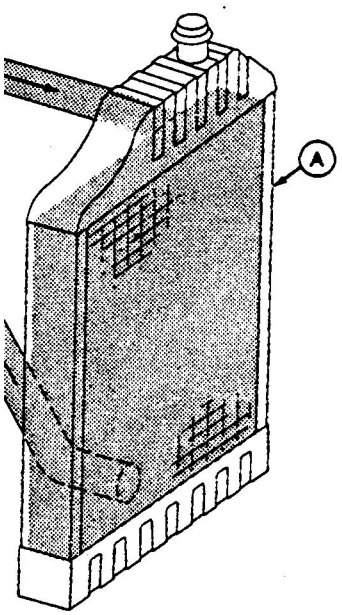
2. Check the coolant level when engine is cold. Coolant level should be at bottom of filler neck. Fill radiator (A) with proper coolant solution if level is low. (See ADDING COOLANT in Service As Required Section.) Check overall cooling system for leaks.

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

A—Radiator

TS281 –UN–23AUG88

High Pressure Fluids



RG4675 –UN–14DEC88

Radiator and Coolant

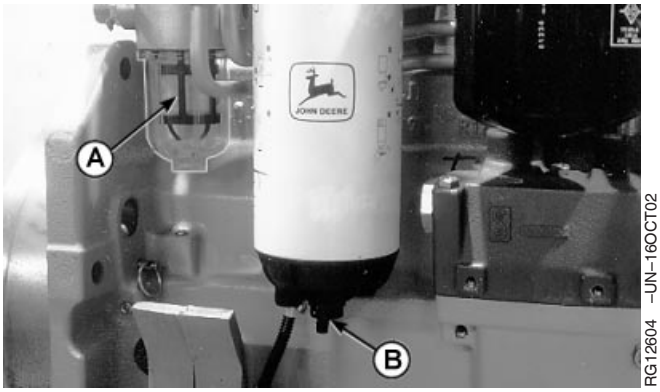
Continued on next page

OURGP11,0000286 –19–18DEC03–2/5

NOTE: Any water in fuel is drained into the separator bowl (B). The operator is signaled by an amber indicator on the instrument panel. To service, see DRAIN FUEL/WATER SEPARATOR BOWL in Service as Required.

3. **Earlier Engines** - Check filter screen (A) for debris. To service, see CLEAN FUEL STRAINER in Lubrication and Maintenance/250 Hour/12Month

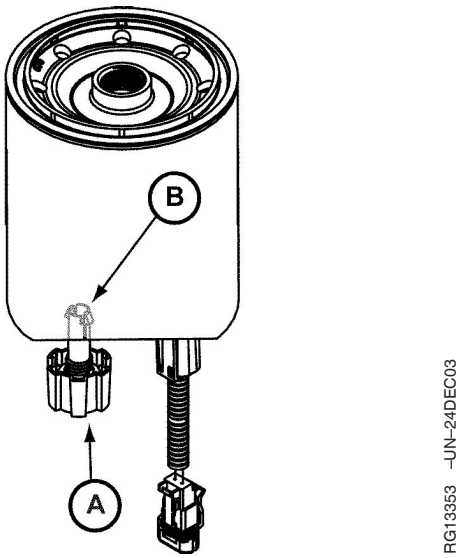
A—Filter Screen
B—Separator Bowl



Inspect Filter Screen (Earlier Engines)

OURGP11,0000286 –19–18DEC03–3/5

Later Engines - Loosen drain valve (A) all the way so that the valve opens to the hold tabs (B) and drain water and debris as needed.



Drain Sediment Bowl (Later Engines)

Continued on next page

OURGP11,0000286 –19–18DEC03–4/5

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

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

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

Specification

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

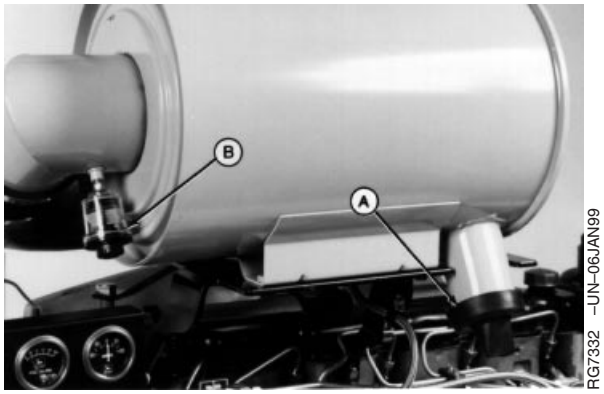
5. Make a thorough inspection of the engine compartment. Look for oil or coolant leaks, worn fan and accessory drive belts, loose connections and trash build-up. Remove trash build-up and have repairs made as needed if leaks are found.

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

Inspect:

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

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



Air Cleaner

A—Unloader Valve
B—Restriction Indicator Gauge

OURGP11,0000286 –19–18DEC03–5/5

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 250 hours of engine operation or every 6 months. Once extinguisher is operated, no matter how long, it must be recharged. Keep record of inspections on the tag which comes with the extinguisher instruction booklet.

Fire Extinguisher

OURGP11,000015D –19–28JAN04–1/1

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

RG,RG34710,7563 –19–05SEP02–1/2

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

Avoid the hazard by:

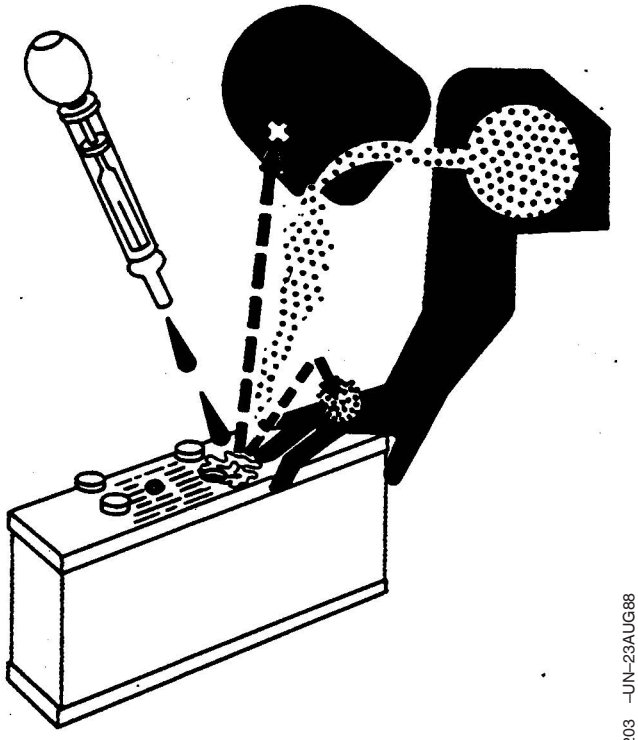
1. **Filling batteries in a well-ventilated area.**
2. **Wearing eye protection and rubber gloves.**
3. **Avoiding breathing fumes when electrolyte is added.**
4. **Avoiding spilling or dripping electrolyte.**
5. **Using proper jump start procedure.**

If you spill acid on yourself:

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

If acid is swallowed:

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



TS203 –UN–23AUG88

Sulfuric Acid

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

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

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

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

RG,RG34710,7563 –19–05SEP02–2/2

Changing Engine Oil and Replacing Oil Filter

NOTE: Change engine oil and filter for the first time after 100 hours maximum of operation, then every 250 hours thereafter.

If John Deere PLUS-50™or ACEA-E4/E5 engine oil and the specified John Deere oil filter are used, the oil and filter change interval may be extended by 50 percent or to every 375 hours.

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

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

OURGP11,000025E –19–19NOV03–1/5

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

Change engine oil as follows:

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

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

2. Remove oil pan drain plug.

3. Drain crankcase oil from engine while warm.

4. Install oil pan drain plug with a new O-ring and tighten to specifications.

Specification

Oil Pan Drain Plug—Torque ..... 101 N•m (75 lb-ft)

RG12748 –UN–15NOV02

Oil Pan Drain Plug

Continued on next page

OURGP11,000025E –19–19NOV03–2/5

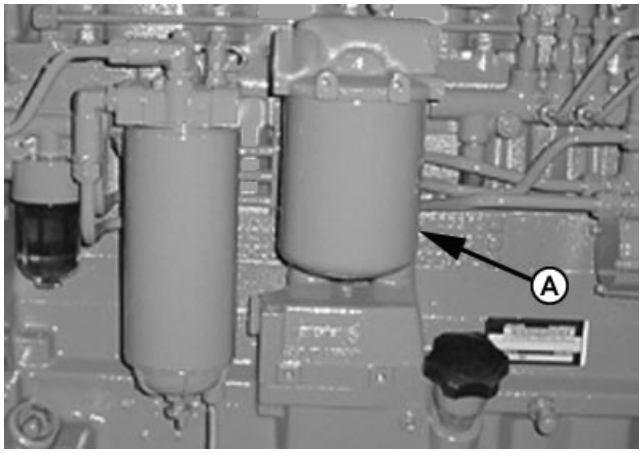
IMPORTANT: Filtration of oils is critical to proper lubrication. Always change filter regularly. Use filter meeting John Deere performance specifications.

Changing Standard (Bottom-Load) Oil Filter

5. Remove oil filter element (A) from mounting pad by turning counterclockwise using a suitable filter wrench. Discard used filter element.

6. Remove old oil filter packing and clean filter mounting pad.

7. Oil new packing and install new filter element onto filter mounting pad; tighten element approximately 1/2 - 3/4 turn after packing contacts mounting pad. DO NOT overtighten filter element.



Replace Standard Engine Oil Filter

A—Oil Filter Element

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Changing Top-Load Oil Filter

5. Unscrew filter cap (A) with wrench. Wait 30 seconds to allow oil filter housing to drain. Remove cap and filter assembly.

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

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

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

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

10. Tighten cap to specifications.

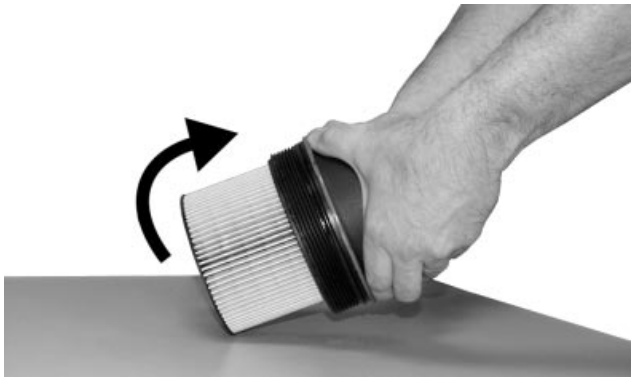
Specification

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

A—Cap

RG11629A –UN–20DEC00

Remove Cap (Top-Load Filter)



RG11628 –UN–01FEB01

Remove Filter Element from Cap

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OURGP11,000025E –19–19NOV03–4/5

Filling Engine Crankcase with Oil

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

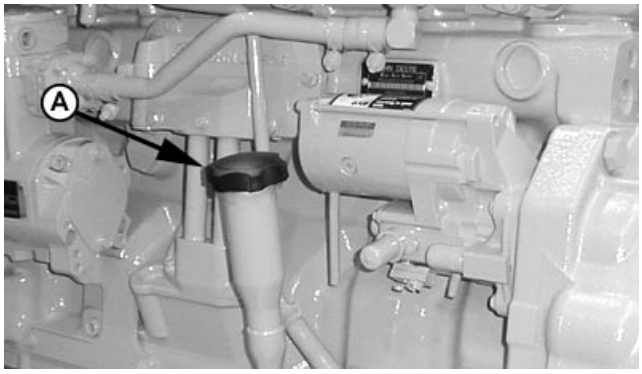
NOTE: Crankcase oil capacity may vary slightly. ALWAYS fill crankcase to full mark or within crosshatch on dipstick, whichever is present. DO NOT overfill.

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

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

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

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



RG12741 –UN–07NOV02

Filling Engine Crankcase With Oil (Left-Side Oil Filler Option Shown)

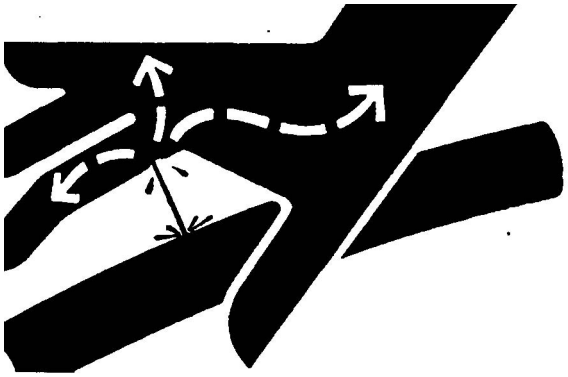
A—Oil Fill Cap

OURGP11,000025E –19–19NOV03–5/5

Cleaning Fuel Strainer (Earlier Engines)

CAUTION: Escaping fluid under pressure can penetrate the skin causing serious injury. Relieve pressure before disconnecting fuel or other lines. Tighten all connections before applying pressure. Keep hands and body away from pinholes and nozzles that 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, a doctor familiar with this type of injury must surgically remove it 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.



X9811 –UN–23AUG88

High Pressure Fluids

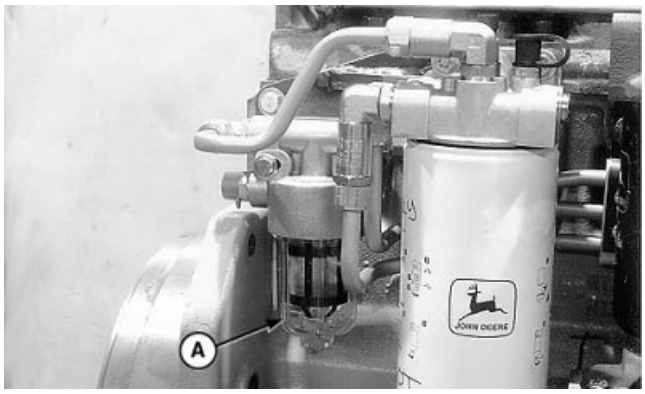
TS1343 –UN–18MAR92

CAUTION: High-pressure fluid remaining in fuel lines can cause serious injury. Before disconnecting fuel lines, sensors, or any other components between the high-pressure fuel pump and nozzles on engines with High Pressure Common Rail (HPCR) fuel system, wait a minimum of 15 minutes after engine is stopped.

NOTE: Do not clean fuel strainer and change fuel filter at the same time. Clean fuel strainer and run engine before changing fuel filter.

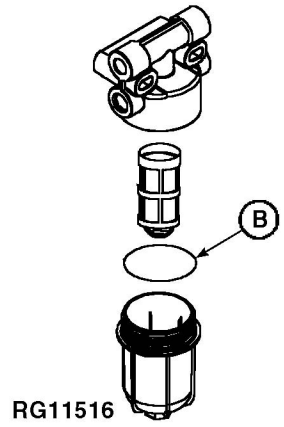
1. Close shut-off valve at bottom of fuel tank (not illustrated).
2. Thoroughly clean fuel strainer assembly and surrounding area.
3. Remove fuel strainer bowl (A) using a 1 in. socket on bottom of bowl.
4. Clean screen and replace O-ring (B) on bowl.

A—Fuel Strainer
B—O-Ring



RG11078 –UN–10NOV00

Fuel Strainer (Earlier Engines)



RG11516 –UN–10NOV00

Fuel Strainer Parts

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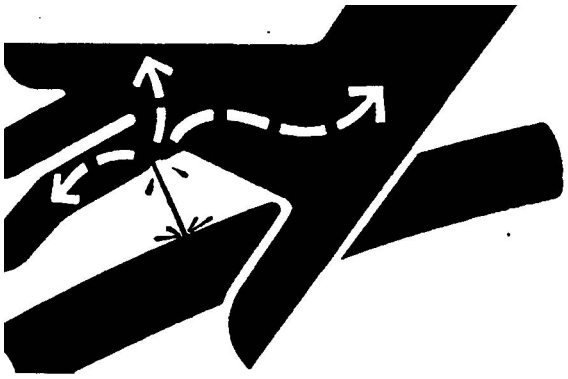
5. Install screen and bowl. Open shut-off valve and start engine.

OURGP11,000025F –19–19NOV03–2/2

Replacing Single Fuel Filter (Earlier Engines)

CAUTION: Escaping fluid under pressure can penetrate the skin causing serious injury. Relieve pressure before disconnecting fuel or other lines. Tighten all connections before applying pressure. Keep hands and body away from pinholes and nozzles that 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, a doctor familiar with this type of injury must surgically remove it 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.



X9811 –UN–23AUG88

High Pressure Fluids

TS1343 –UN–18MAR92

CAUTION: High-pressure fluid remaining in fuel lines can cause serious injury. Before disconnecting fuel lines, sensors, or any other components between the high-pressure fuel pump and nozzles on engines with High Pressure Common Rail (HPCR) fuel system, wait a minimum of 15 minutes after engine is stopped.

Continued on next page

OURGP11,0000260 –19–19NOV03–1/2

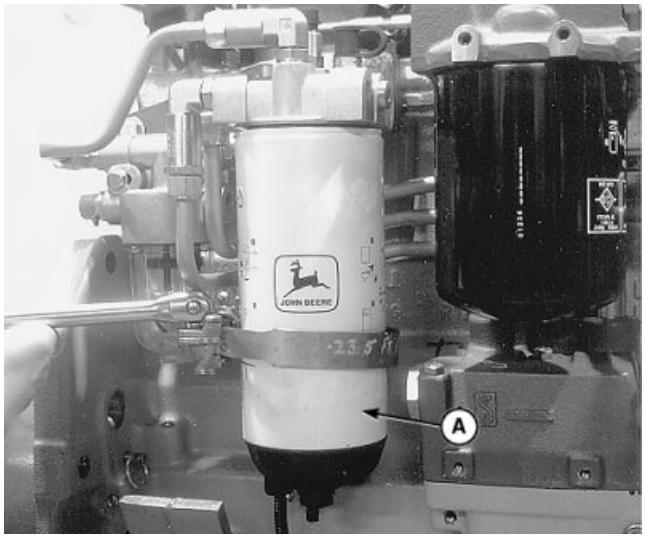
NOTE: Do not clean fuel strainer and change fuel filter at the same time. Clean fuel strainer and run engine before changing fuel filter.

1. Close shut-off valve at bottom of fuel tank and disconnect water-in-fuel sensor (not illustrated).
2. Thoroughly clean fuel filter/water separator assembly and surrounding area.
3. Remove filter (A) using a suitable filter wrench.
4. Remove water separator bowl (B) from filter element. Drain and clean separator bowl. Dry with compressed air.
5. Inspect bowl (B) and O-ring (C). Replace if necessary.

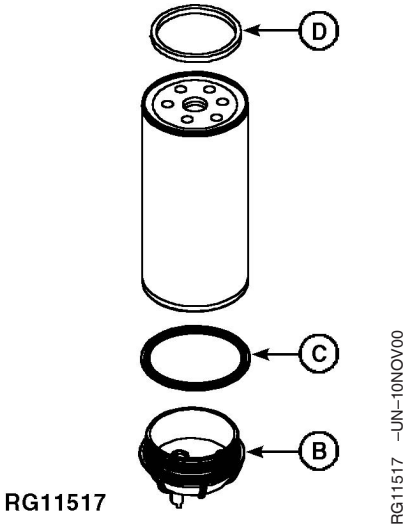
IMPORTANT: DO NOT prefill the fuel filter element or bowl with fuel as damage to injectors could occur.

6. Lubricate O-ring and install separator bowl onto new filter element. Tighten 1/2 turn after O-ring contacts filter.
7. Lubricate packing (D) and install filter onto base. Tighten 3/4 turn after packing contacts base. Connect sensor.
8. Open shut-off valve and bleed fuel system (See Service As Required section. (If engine will not start after bleeding the fuel system, prime the fuel system. See “Restarting Engine That Has Run Out Of Fuel”, earlier in this manual.)

A—Filter
B—Separator Bowl
C—O-ring
D—Packing



Fuel Filter



Fuel Filter Parts

OURGP11,0000260 –19–19NOV03–2/2

Visually Inspecting Coolant Pump

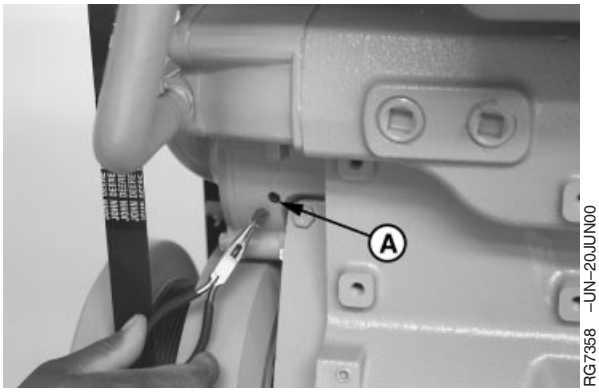
Inspect Weep Hole

1. Remove foam filter from coolant pump weep hole (A) as shown.

2. Inspect weep hole for oil or coolant leakage.

   - Oil leakage indicates a damaged rear seal.
   - Coolant leakage indicates a damaged front seal.

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



Coolant Pump Weep Hole Filter

A—Weep Hole

Inspect for Impeller Contact with Cover

1. Remove radiator-to-coolant pump hose from coolant pump inlet elbow.

2. Using a flashlight, inspect ID of coolant pump cover for internal impeller contact.

   - Impeller contact with cover usually indicates that impeller has moved on shaft or there is a damaged bearing.

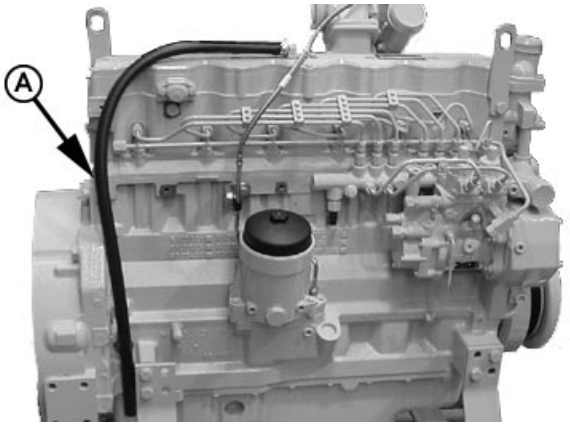
   Replace coolant pump assembly and cover as necessary if impeller contact is detected.

RG,RG34710,4069 –19–01JAN96–1/1

Cleaning Crankcase Vent Tube

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

A—Vent Tube



RG12744 –UN–07NOV02

Clean Crankcase Vent Tube

OUOD006,0000098 –19–07NOV02–1/1

Checking Air Intake System

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

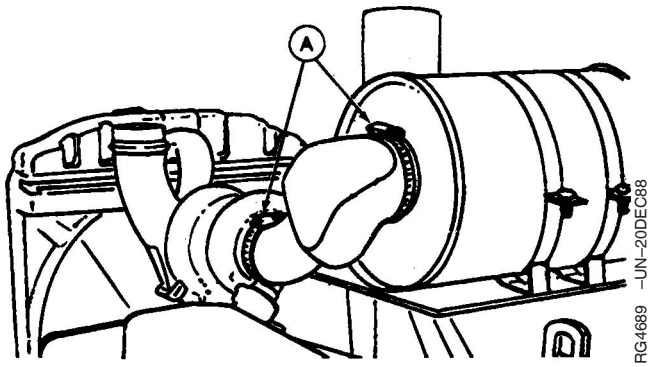
1. Inspect all intake hoses (piping) for cracks. Replace as necessary.
2. Check clamps (A) on piping which connect the air cleaner to the engine. Tighten clamps as necessary. This will help prevent dirt from entering the air intake system through loose connections causing internal engine damage.
3. If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

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

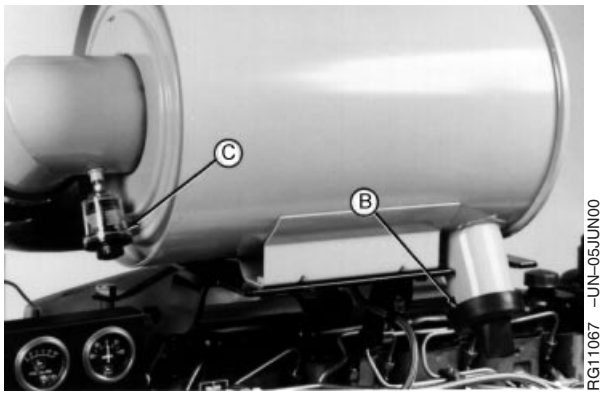
4. Test air restriction indicator gauge (C) for proper operation. Replace indicator as necessary.

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

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



Air Intake Hose Clamps



Air Cleaner

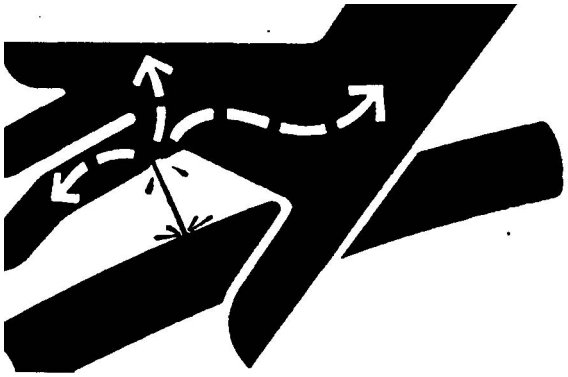
A—Clamps
B—Unloader Valve
C—Restriction Indicator Gauge

RG,RG34710,4072 –19–09OCT02–1/1

Replacing Fuel Filter Elements (Later Engines)

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

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



X9811 –UN–23AUG88

High Pressure Fluids

TS1343 –UN–18MAR92

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

Continued on next page

OURGP11,0000287 –19–18DEC03–1/3

1. Thoroughly clean exterior of fuel filter assemblies and surrounding area.

NOTE: Water separator is part of the fuel filter assembly.

2. Drain water and contaminants from fuel filters (A) and (B) into suitable container by opening drain valves (C) on bottom of filters.

3. Disconnect the water-in-fuel (WIF) sensor connector (D).

IMPORTANT: Always replace both filters at the same time.

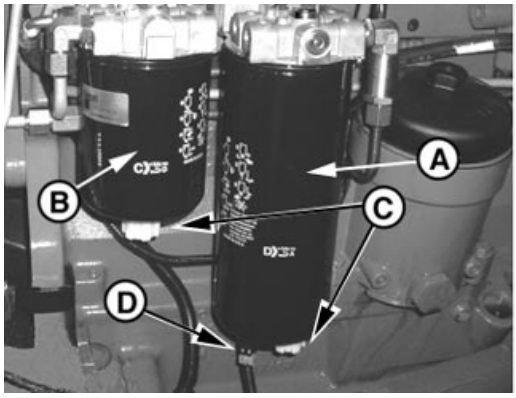
4. Remove the old filter elements (A) and (B) using a suitable filter wrench.

5. Remove water-in-fuel (WIF) sensor from old primary filter. Inspect O-ring, replace as necessary and install in new primary fuel filter. Tighten to specification.

Specification

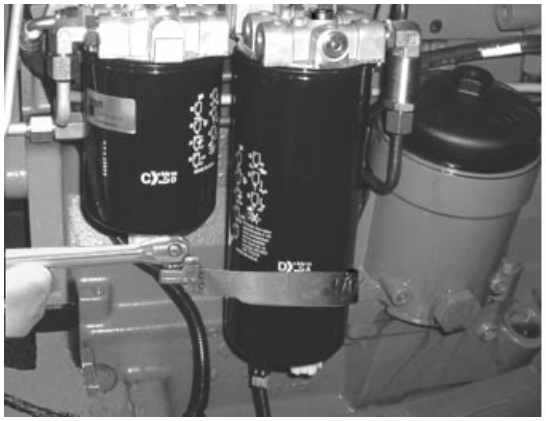
Water-in-Fuel Sensor—Torque	3.3 N•m 30 lb-in.

A—Primary Fuel filter
B—Secondary Fuel Filter
C—Drain Valve
D—Water-In-Fuel (WIF) Sensor



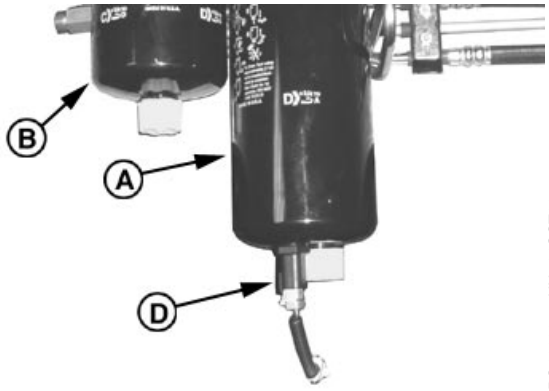
RG13299 –UN–15OCT03

Fuel Filters



RG13297 –UN–14OCT03

Removing Fuel Filter



RG13298 –UN–14OCT03

Water In Fuel (WIF) Sensor

Continued on next page

OURGP11,0000287 –19–18DEC03–2/3

6. Using the filter cup (A), fill the new fuel filter element with fuel and drain excess fuel into suitable container.

NOTE: The primary and secondary fuel filter use different size filter cups. Use correct fill cup on filters to ensure fuel is properly filtered during prefill.

IMPORTANT: Avoid fuel system contamination. Do not pour fuel directly into filter without filler cup. Injection pump could seize.

NOTE: Pour fuel slowly to allow fuel to flow into the element. This will eliminate the need to dump out access fuel once the element is full.

7. Remove filler cup.

8. Lubricate packing and install filter onto base. Tighten 1/2 turn after packing contacts base. Connect sensor.

9. Start and run engine at fast idle for 2 minutes. If engine won't start or dies, bleed the fuel system, see BLEED THE FUEL SYSTEM (LATER ENGINES) in Service As Required Section. If engine will not start after bleeding the fuel system, prime the fuel system, see RESTARTING ENGINE THAT HAS RUN OUT OF FUEL (LATER ENGINES) in Engine Operation Section 18.

Filling Fuel Filter

OURGP11,0000287 –19–18DEC03–3/3

Checking Belt Tensioner Spring Tension and Belt Wear

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

DPSG,OUOD002,1917 –19–08DEC00–1/1

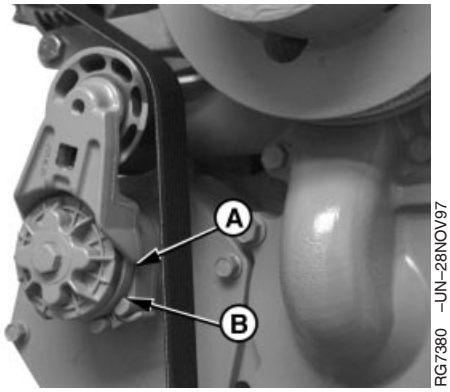
Checking Belt Wear

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

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

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

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



Belt Tensioner

A—Tensioner Stop
B—Fixed Stop

OURGP11,0000288 –19–18DEC03–1/1

Checking Tensioner Spring Tension

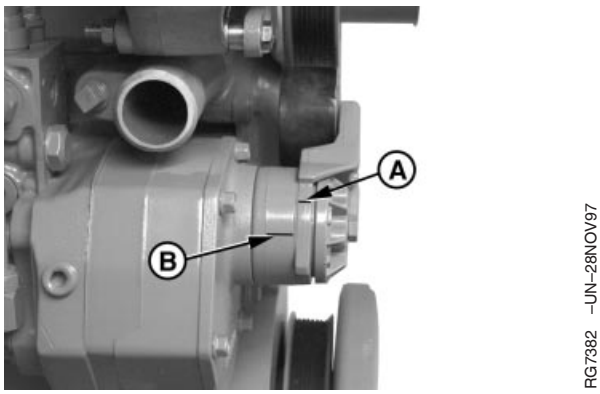
A belt tension gauge will not give an accurate measure of the belt tension when automatic spring tensioner is used. Measure tensioner spring tension using a torque wrench and procedure outlined below:

1. Release tension on belt using a long-handle 1/2 inch breaker bar in tension arm. Remove belt from pulleys.

2. Release tension on tension arm and remove breaker bar.

3. Put a mark (A) on swing arm of tensioner as shown.

4. Measure 21 mm (0.83 in.) from mark (A) and put a mark (B) on tensioner mounting base.



Checking Belt Tension Spring

A—Mark
B—Mark

Continued on next page

DPSG,OUOD002,1919 –19–08DEC00–1/2

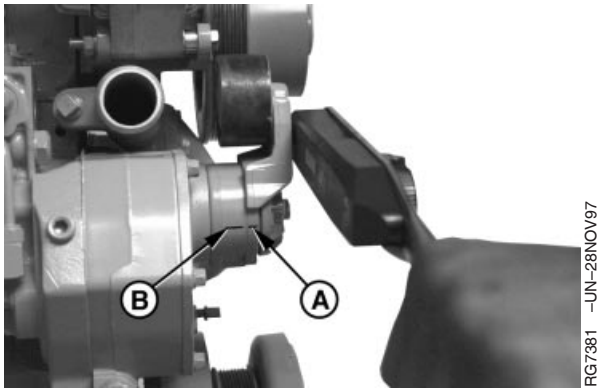
5. Rotate the swing arm using a torque wrench until marks (A and B) are aligned.

6. Record torque wrench measurement and compare with specification below. Replace tensioner assembly as required.

Specification

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

A—Mark
B—Mark



Checking Belt Tensioner Spring Tension

DPSG,OUOD002,1919 –19–08DEC00–2/2

Checking Cooling System

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

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

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

1. Check entire cooling system for leaks. Tighten all clamps securely.

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

High Pressure Fluids

RG,RG34710,4077 –19–10OCT02–1/1

Testing Diesel Engine Coolant

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

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

Coolant Test Strips

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

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™

For a more thorough evaluation of your coolant, perform a COOLSCAN analysis. See your John Deere dealer for information about COOLSCAN.

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DX,COOL9 –19–17FEB99–1/1

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 ANTIFREEZE/SUMMER COOLANT or 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.

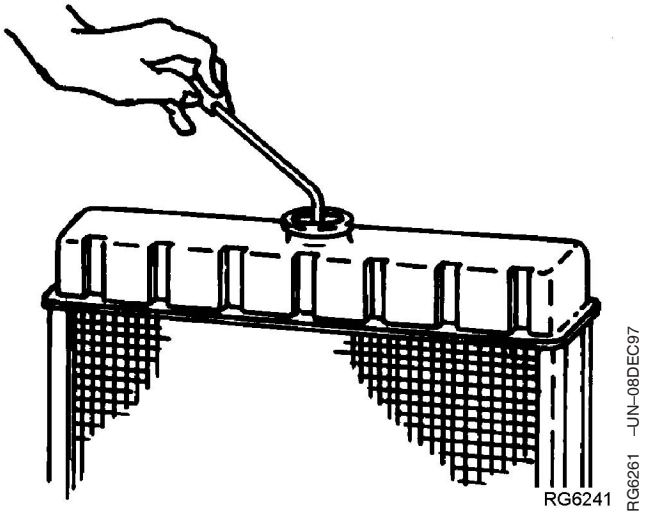
Through time and use, the concentration of coolant additives is gradually depleted during engine operation. Periodic replenishment of inhibitors is required, even when John Deere ANTIFREEZE/SUMMER COOLANT is used. The cooling system must be recharged with additional supplemental coolant additives available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

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

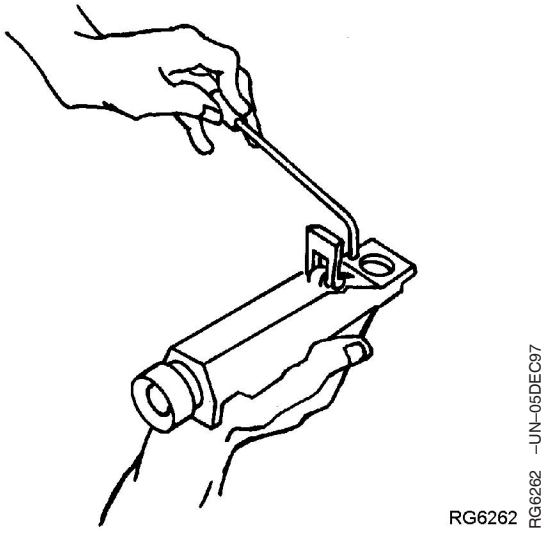
John Deere LIQUID COOLANT CONDITIONER is recommended as a supplemental coolant additive in John Deere engines.

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

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



Radiator Coolant Check



JT07298 Coolant/Battery Tester

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

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DPSG,OUOD002,1921 –19–09OCT02–1/2

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.

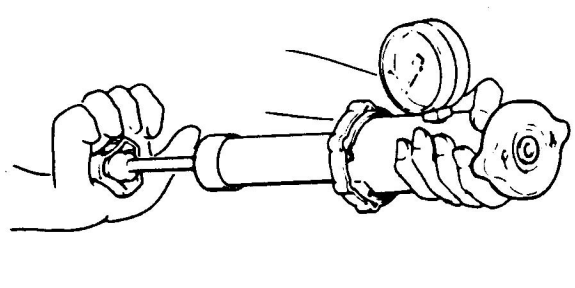
The use of non-recommended supplemental coolant additives may result in additive drop-out and gelation of the coolant.

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

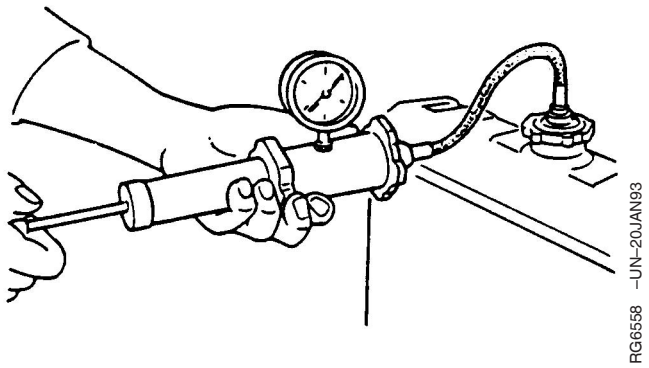
See DIESEL ENGINE COOLANTS AND SUPPLEMENTAL ADDITIVE INFORMATION for proper mixing of coolant ingredients before adding to the cooling system.

DPSG,OUOD002,1921 –19–09OCT02–2/2

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 following specifications.[1]. Gauge should hold pressure for 10 seconds within the normal range if cap is acceptable.

Specification	
Radiator Cap—Test Pressure	67 kPa (0.7 bar) (10 psi)

If gauge does not hold pressure, replace radiator cap.

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

Test Cooling System for Leaks

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

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

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

3. Connect gauge and adapter to radiator filler neck. Pressurize cooling system to the following specifications[1].

Specification	
Cooling System—Test Pressure	67 kPa (0.7 bar) (10 psi)

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

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

Continued on next page

RG,RG34710,4083 –19–09OCT02–1/2

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

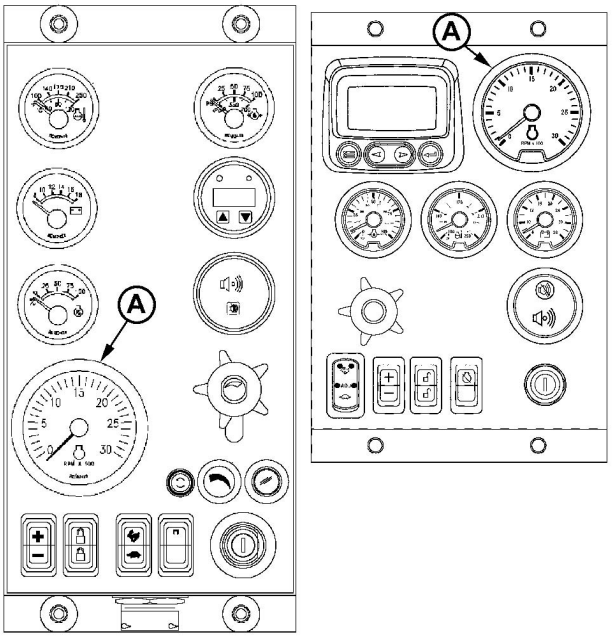
If no leakage is detected, but the gauge indicated a drop in pressure, coolant may be leaking internally within the system or at the block-to-head gasket. Have your servicing dealer or distributor correct this problem immediately.

RG,RG34710,4083 –19–09OCT02–2/2

Checking and Adjusting Engine Speeds

Observe tachometer reading (A) on the instrument panel to verify engine speeds while running engine. (Refer to FUEL SYSTEM SPECIFICATIONS in Specifications section later in this manual for engine speed specifications.) If engine speeds need adjustment, contact your engine dealer or distributor.

A—Tachometer



Observe Tachometer Reading On Earlier Panel (Left) or Later Panel (Right)

OURGP11,0000242 –19–21OCT03–1/1

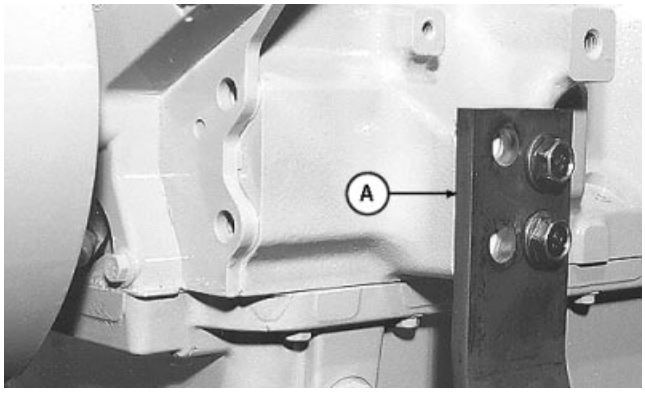
Checking Engine Mounts

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

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

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

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



Engine Mounting

A—Mounting Bracket

OURGP11,0000110 –19–16OCT03–1/1

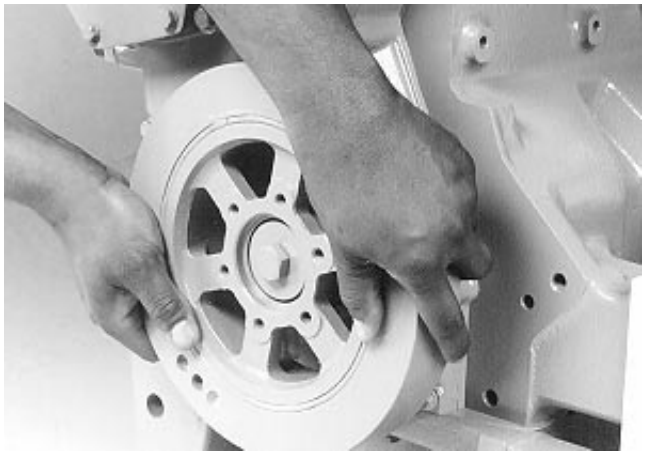
Checking Crankcase Vibration Damper

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

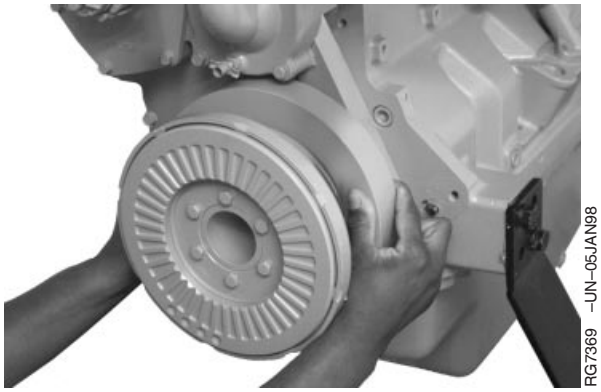
1. Remove belts (shown removed).

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

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



Single Damper



Dual Damper

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RG,RG34710,4081 –19–01JAN96–1/2

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

3. Check vibration damper radial runout by positioning a dial indicator (A) so probe contacts damper outer diameter.

4. Rotate crankshaft using JDG820 Flywheel Turning Tool.

5. Note dial indicator reading.

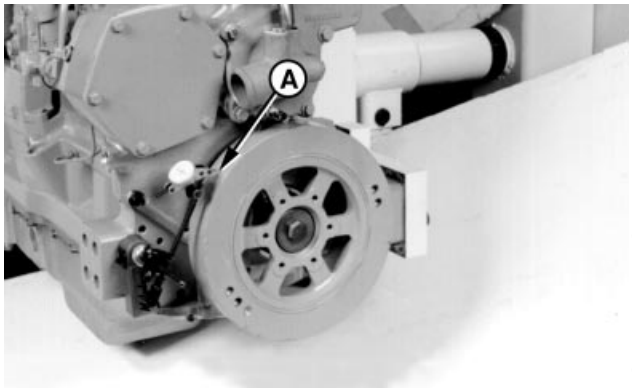
Specification

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

If runout exceeds specifications, replace vibration damper.

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

A—Dial Indicator



RG7065 –UN–26NOV97

Single Damper

RG11601 –UN–11DEC00

Dual Damper

RG,RG34710,4081 –19–01JAN96–2/2

Checking Engine Ground Connection

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

DPSG,OUOD002,1920 –19–08DEC00–1/1

Flushing And Refilling Cooling System

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

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

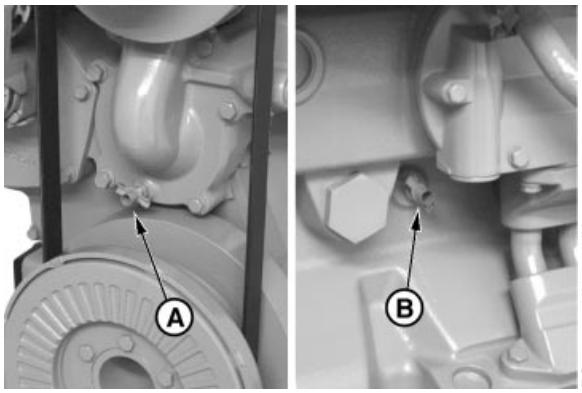
NOTE: Drain the initial factory fill engine coolant after the first 3000 hours or 36 months of operation. Subsequent drain intervals are determined by the coolant used for service.

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

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

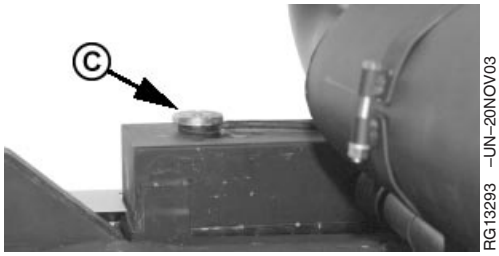
TS281 –UN–23AUG88

High Pressure Fluids



RG7371 –UN–20JUN00

Cooling System Drains



RG13293 –UN–20NOV03

Radiator Cap

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

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

1. Pressure test entire cooling system and pressure cap if not previously done. (See PRESSURE TESTING COOLING SYSTEM, in Lubrication and Maintenance 500 Hour/12Month.)

2. Slowly open the engine cooling system filler cap or radiator cap (C) to relieve pressure and allow coolant to drain faster.

3. Open coolant pump drain valve (A) and engine block drain valve (B) on left side of engine. Drain all coolant from engine block.

4. Open radiator drain valve and drain coolant from radiator.

Continued on next page

5. Remove thermostats (A) at this time, if not previously done. Install cover (without thermostats) and tighten cap screws to 20 N•m (15 lb-ft).

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

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

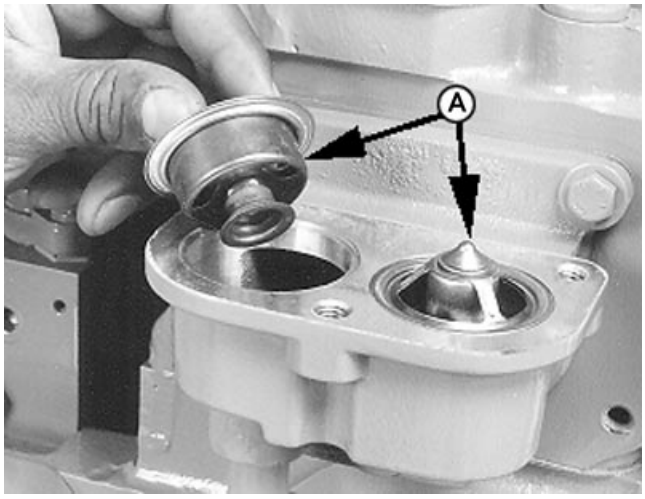
7. Close all drain valves after coolant has drained.

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

9. Stop engine and immediately drain the water from system before rust and sediment settle.

10. After draining water, close drain valves and fill the cooling system with clean water and a heavy duty cooling system cleaner such as FLEETGUARD® RESTORE™ or RESTORE PLUS™. Follow manufacturer's directions on label.

11. After cleaning the cooling system, drain cleaner and fill with water to flush the system. Run the engine about 10 minutes, then drain out flushing water.



Thermostats

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

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OURGP11,0000227 –19–20OCT03–2/3

12. Close all drain valves on engine and radiator. Install thermostats using a new gasket.

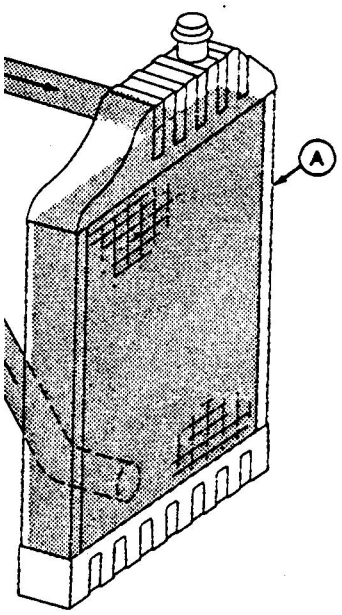
IMPORTANT: Air must be expelled from cooling system when system is refilled. Loosen temperature sending unit fitting in cylinder head or plug in thermostat housing to allow air to escape when filling system. Retighten fitting or plug when all the air has been expelled.

13. Refill system with fresh coolant at radiator (A) until coolant touches bottom of filler neck. (See ADDING COOLANT in Service As Required Section.)

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

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

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



Radiator and Coolant

A—Radiator

OURGP11,0000227 –19–20OCT03–3/3

Testing Thermostats

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

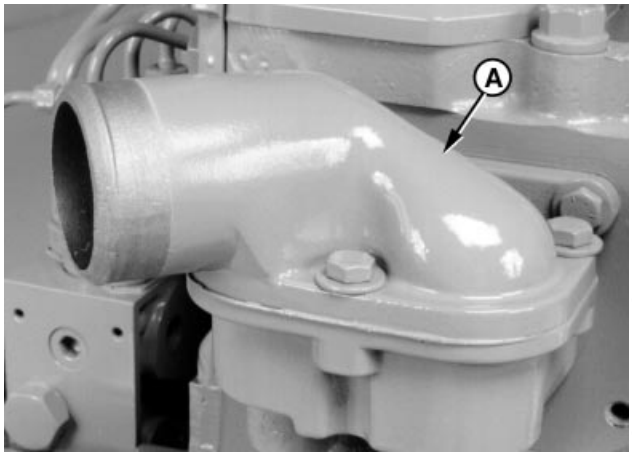
1. Visually inspect the area around the coolant manifold for leaks. Partially drain coolant from the cooling system.

Continued on next page

OURGP11,00000DA –19–25SEP03–1/5

2. Remove thermostat cover (A) with gasket. Remove and discard all gasket material.

A—Thermostat Cover



Remove Thermostat Cover

OURGP11,00000DA –19–25SEP03–2/5

3. Inspect thermostats.

4. Test each thermostat for proper opening temperature.

Removing Thermostats

Continued on next page

OURGP11,00000DA –19–25SEP03–3/5

Testing Thermostats Opening Temperature

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

2. Inspect thermostat with wiggle wire in vent notch. If wire movement is restricted, replace thermostat if cleaning does not free movement.

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

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

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

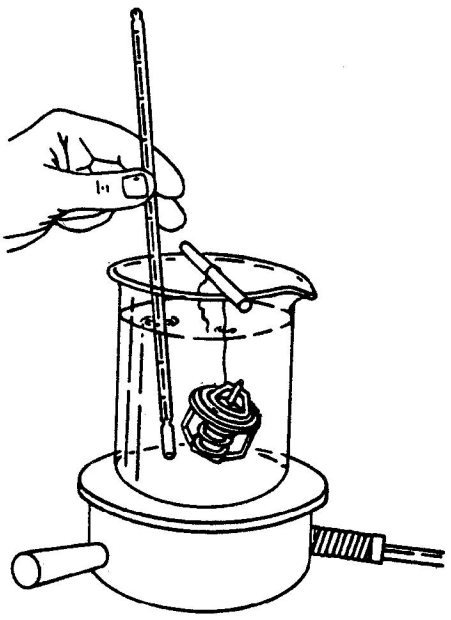
NOTE: Due to varying tolerances of different supplies, initial opening and full open temperatures may vary slightly from specified temperatures.

THERMOSTAT TEST SPECIFICATIONS

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

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

6. If any one thermostat is defective, replace both thermostats.



RG5971 –UN–23NOV97

Thermostats and Thermometer in Water

Continued on next page

OURGP11,00000DA –19–25SEP03–4/5

Installing Thermostats

NOTE: Install thermostats in groove in housing first. Then install gasket after thermostat is properly seated in grooves.

1. Install thermostats. Install a new gasket on housing or in cover, as applicable.

2. Install cover and tighten screws to specifications.

Specification	
Thermostat Cover Screws— Torque	30 N•m (22 lb-ft)

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

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

Installing Thermostats

OURGP11,00000DA –19–25SEP03–5/5

Checking Engine Valve Clearance

Too little valve clearance throws valves out of time. Valves open too early and close too late. This causes the valves to overheat due to hot combustion gases rushing past valves when out of time. Overheating lengthens valve stems which prevents proper seating of valves. The valves seat so briefly or poorly that normal heat transfer into the cooling system does not have time to take place, causing burned valves and low power.

Too much valve clearance causes a lag in valve timing, causing engine valve train imbalance. The fuel-air mixture enters the cylinders late during intake stroke. The exhaust valve closes early and prevents waste gases from being completely removed from cylinders. Also, the valves close with a great deal of impact, which may crack or break the valves and scuff the camshaft and followers.

RG41165,0000032 –19–09OCT02–1/4

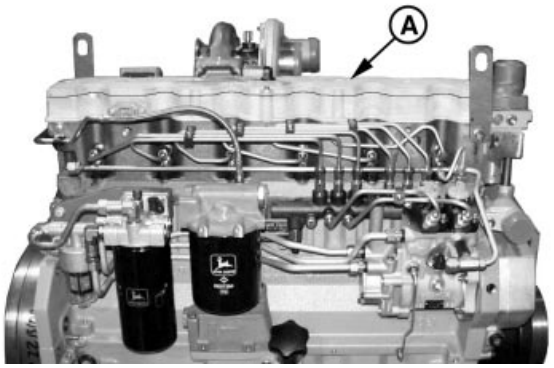
CAUTION: To prevent accidental starting of engine while performing valve adjustments, always disconnect NEGATIVE (—) battery terminal.

IMPORTANT: Valve clearance MUST BE checked and adjusted with engine COLD.

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

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

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



RG11562B –UN–17NOV00

Remove Rocker Arm Cover

A—Rocker Arm Cover

Continued on next page

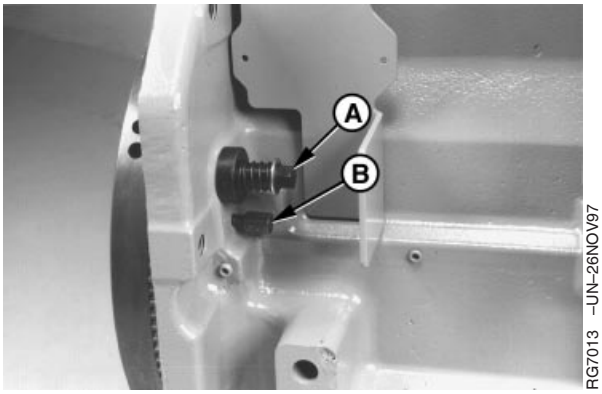
RG41165,0000032 –19–09OCT02–2/4

3. Remove plastic plug from cylinder block bores and install JDE81-1 or JDG820 Flywheel Turning Tool (A) and JDE81-4 Timing Pin (B).

4. Rotate engine with the flywheel turning tool until timing pin engages timing hole in flywheel.

5. If the rocker arms for No. 1 (front) cylinder are loose, the engine is at No. 1 “TDC-Compression.”

6. If the rocker arms for No. 6 (rear) cylinder are loose, the engine is at No. 6 “TDC-Compression.” Rotate the engine one full revolution (360°) to No. 1 “TDC-Compression.”



Flywheel Turning Tool and Timing Pin

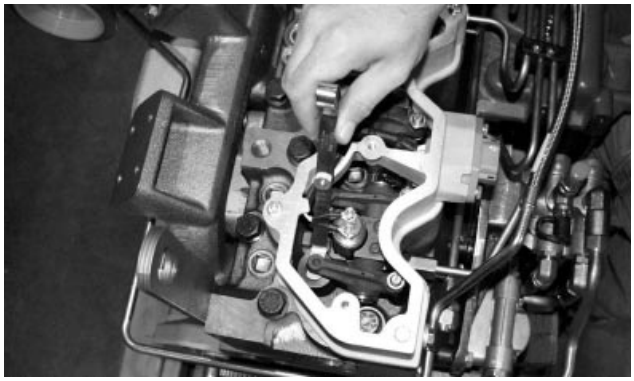
A—Flywheel Turning Tool
B—Timing Pin

Continued on next page

7. With engine lock-pinned at “TDC” of No. 1 piston’s compression stroke, use a bent feeler gauge to check valve clearance on Nos. 1, 3, and 5 exhaust valves and Nos. 1, 2, and 4 intake valves.

Specification

Intake Valve Clearance Checking (Rocker Arm-to-Valve Tip With Engine Cold)—Clearance	0.41—0.51 mm (0.016—0.020 in.)
Exhaust Valve Clearance Checking (Rocker Arm-to-Valve Tip With Engine Cold)—Clearance	0.66—0.76 mm (0.026—0.030 in.)



Checking Valve Clearance Using Bent Feeler Gauge

8. Rotate flywheel 360° until No. 6 piston is at “TDC” of its compression stroke. Rocker arms for No. 6 piston should be loose.

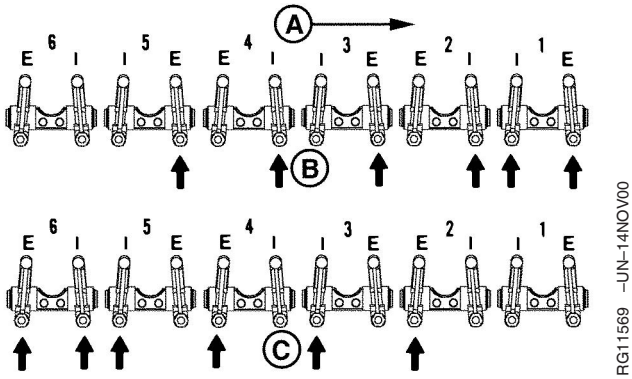
9. Check valve clearance to the same specifications on Nos. 2, 4, and 6 exhaust and Nos. 3, 5, and 6 intake valves.

10. If valve clearance needs to be adjusted, see ADJUSTING VALVE CLEARANCE, later in this section.

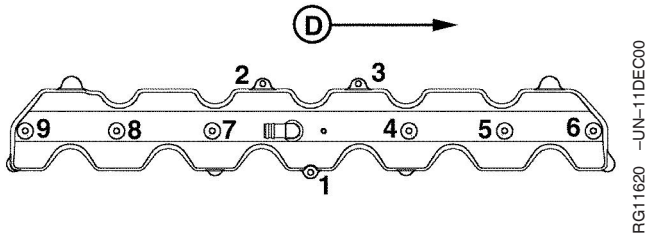
11. Install rocker arm cover with vent tube and tighten cap screws to specifications in order shown.

Specification

Rocker Arm Cover-to-Carrier Cap Screws—Torque	8 N•m (5.9 lb-ft)



Valve Checking Sequence



Order to Tighten Rocker Arm Cover Cap Screws

A—Front of Engine
B—No. 1 Cylinder “TDC”
C—No. 6 Cylinder “TDC”
D—Front of Engine

RG41165,0000032 –19–09OCT02–4/4

Adjusting Engine Valve Clearance

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

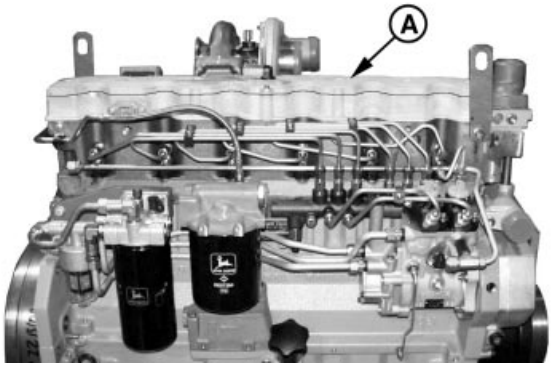
IMPORTANT: Valve clearance MUST BE checked and adjusted with engine COLD.

1. Disconnect carrier wiring harness. (Shown disconnected.)
2. Remove rocker arm cover (A) with vent tube.
3. Remove wires (B) from electronic injectors.
4. Remove carrier (C).

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

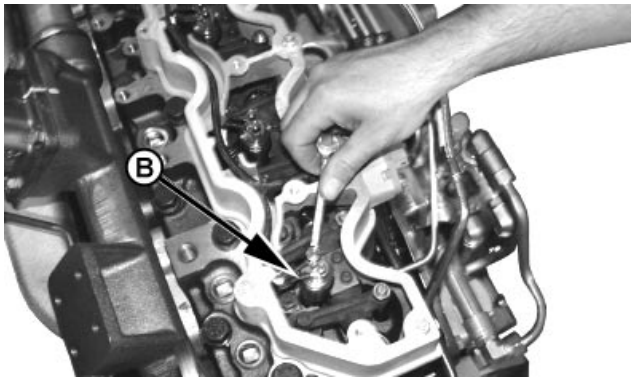
Rocker arms that exhibit excessive valve clearance should be inspected more thoroughly to identify damaged parts.

A—Rocker Arm Cover
B—Injector Wire
C—Carrier



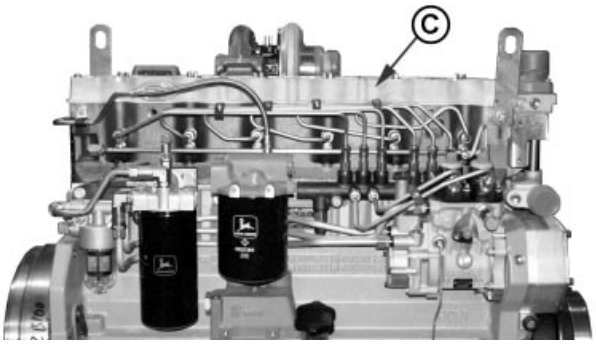
RG11562B –UN–17NOV00

Remove Rocker Arm Cover



RG12605 –UN–07NOV02

Remove Wires From Injectors



RG12606 –UN–08NOV02

Remove Carrier

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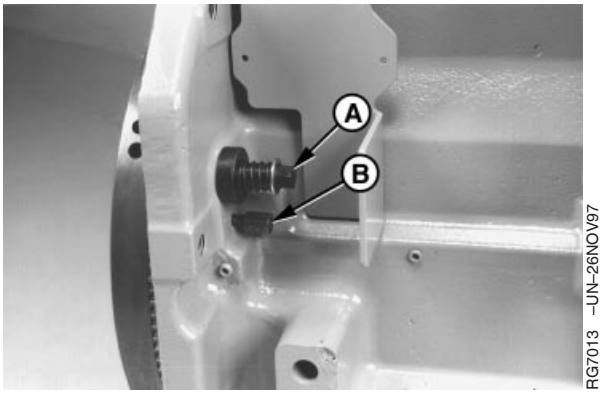
RG41165,0000031 –19–16OCT02–1/6

5. Remove plastic plug from cylinder block bores and install JDE81-1 or JDG820 Flywheel Turning Tool (A) and JDE81-4 Timing Pin (B).

6. Rotate engine with the flywheel turning tool until timing pin engages timing hole in flywheel.

   If the rocker arms for No. 1 (front) cylinder are loose, the engine is at No. 1 “TDC-Compression.”

   If the rocker arms for No. 6 (rear) cylinder are loose, the engine is at No. 6 “TDC-Compression.” Rotate the engine one full revolution (360°) to No. 1 “TDC-Compression.”



Flywheel Turning Tool and Timing Pin

A—Flywheel Turning Tool
B—Timing Pin

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

Specification

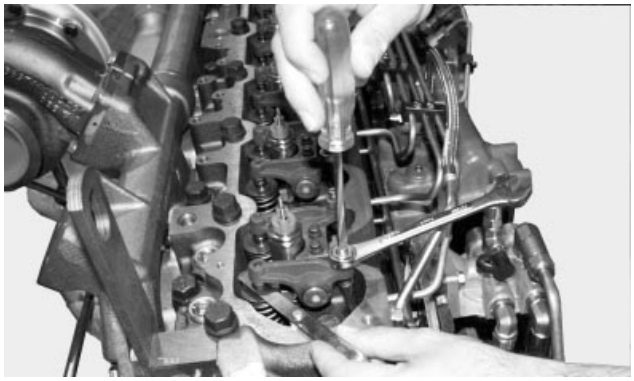
Intake Valve Clearance Adjustment (Rocker Arm-to-Valve Tip With Engine Cold)—Clearance	0.46 mm (0.018 in.)
Exhaust Valve Clearance Adjustment (Rocker Arm-to-Valve Tip With Engine Cold)—Clearance	0.71 mm (0.028 in.)
Valve Adjusting Screw Lock Nut—Torque	27 N•m (20 lb-ft)

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

8. Rotate flywheel 360° until No. 6 piston is at "TDC" of its compression stroke. Rocker arms for No. 6 piston should be loose.

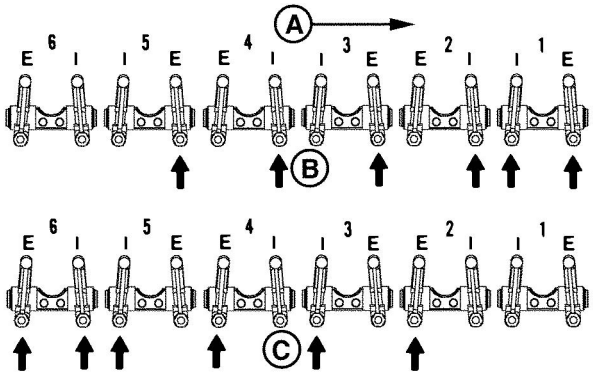
9. Adjust valve clearance to the same specifications on Nos. 2, 4, and 6 exhaust and Nos. 3, 5, and 6 intake valves.

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



RG11560 –UN–08NOV00

Adjusting Valve Clearance



RG11569 –UN–14NOV00

Valve Adjusting Sequence

A—Front of Engine
B—No. 1 Cylinder "TDC"
C—No. 6 Cylinder "TDC"

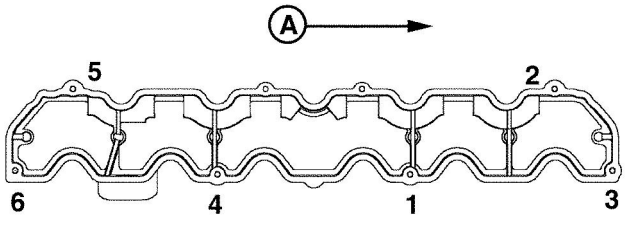
RG41165,0000031 –19–16OCT02–3/6

10. Install carrier and attach wiring harness to main connector. Tighten cap screws in order shown to specifications.

Specification

Carrier-to-Cylinder Head Cap Screws—Torque	8 N•m (5.9 lb-ft)

A—Front of Engine



RG11621 –UN–11DEC00

Order to Tighten Carrier Cap Screws

Continued on next page

RG41165,0000031 –19–16OCT02–4/6

11. Install injector wiring leads on injector studs.

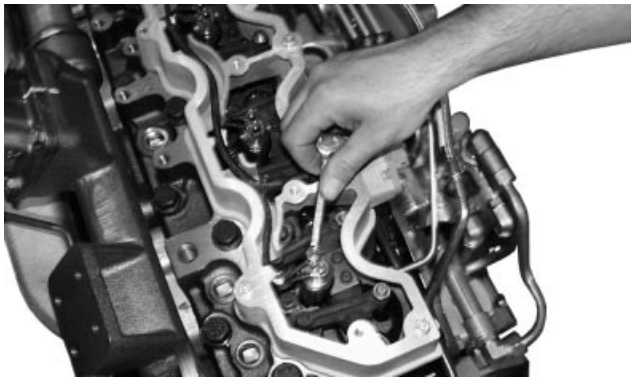
IMPORTANT: DO NOT use red or blue LOCTITE® on injector studs. Bonding strength is too high for small studs, making future removal impossible without twisting off stud.

12. Apply LOCTITE® 222 (TY24311) to injector studs.

13. Install solenoid wire retaining nuts to injector studs and tighten to specifications.

Specification

Solenoid Wire Retaining Nuts—
Torque ..... 1.75 N•m (1.29 lb-ft)



RG11570 –UN–14NOV00

Install Solenoid Wire Retaining Nuts to Injector Studs

LOCTITE is a trademark of Loctite Corp.

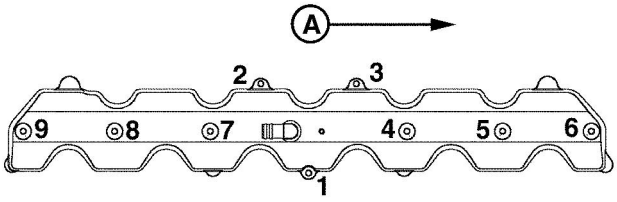
RG41165,0000031 –19–16OCT02–5/6

14. Install rocker arm cover with vent tube. Tighten cap screws in order shown to specifications.

Specification

Rocker Arm Cover Cap screws—
Torque ..... 8 N•m (5.9 lb-ft)

A—Front of Engine



RG11620A –UN–11DEC00

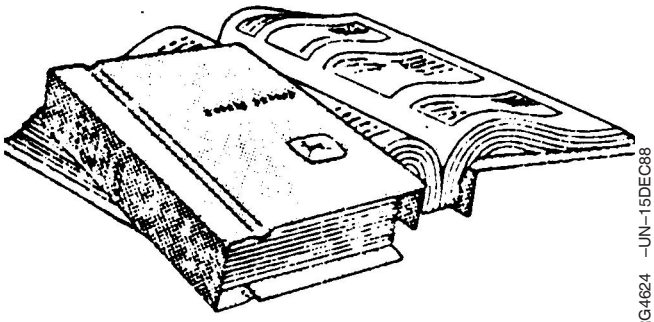
Order to Tighten Rocker Arm Cover Cap Screws

RG41165,0000031 –19–16OCT02–6/6

Service As Required

Additional Service Information

This is not a detailed service manual. If you want more detailed service information, See Publications For This Engine in the back of this manual to order the Component Technical Manuals for “Base Engine” or “Electronic Fuel System”. These manuals cover diagnosis and repair procedures for all engines covered in this operator’s manual.



RG4624 –UN–15DEC88

Additional Service Information

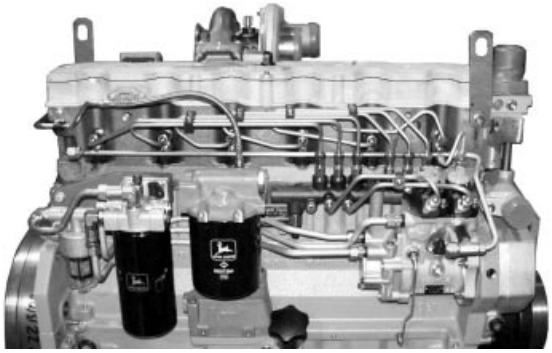
RG,RG34710,3591 –19–14NOV02–1/1

Do Not Modify Fuel System

IMPORTANT: Modification or alteration of the injection pump, the injection pump 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 injection pump or fuel injectors yourself. Special training and special tools are required. (See your authorized servicing dealer or engine distributor.)



RG11602 –UN–11DEC00

Fuel System

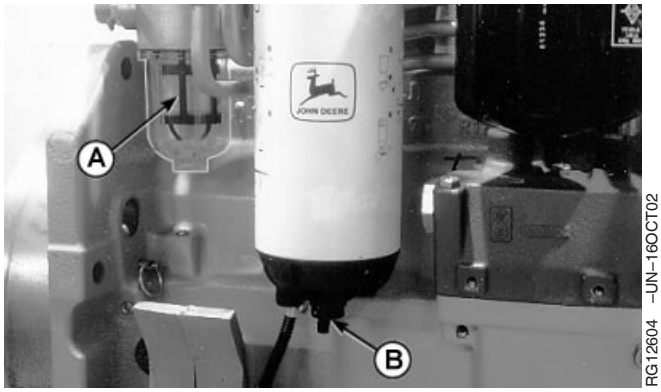
OUOD006,0000087 –19–16OCT02–1/1

Draining Fuel/Water Separator Bowl (Earlier Engines)

Check filter screen (A) for debris. To service, see CLEANING FUEL STRAINER in Lubrication and Maintenance 250 Hour/6 Month.

Any water in fuel is drained into the separator bowl. The operator is signaled by an amber indicator on the instrument panel. Loosen thumb screw (B) and drain water and debris as needed.

NOTE: Also replace fuel filter element (above separator bowl) when amber indicator on instrument panel lights up AND Diagnostic Trouble Code (DTC) in diagnostic gauge window indicates a plugged fuel filter ("low fuel pressure"). To replace fuel filter element, see REPLACING FUEL FILTER in Lubrication and Maintenance, 250 Hour/6 Month.



Drain Separator Bowl (Earlier Engines)

A—Filter Screen
B—Thumb Screw

OURGP11,0000261 –19–19NOV03–1/1

Drain Fuel/Water Separator Bowl (Later Engines)

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

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

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

Continued on next page

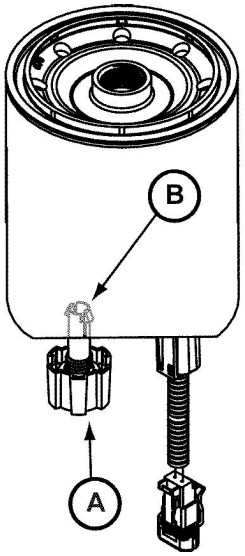
OURGP11,0000289 –19–18DEC03–1/2

1. Loosen drain valve (A) all the way so that the valve opens to the hold tabs (B) and drain water and debris as needed.

2. Install drain plug and tighten securely.

3. Bleed the fuel system. (See Bleeding The Fuel System (Later Engines), in this section.)

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



RG13353 –UN–24DEC03

Drain Separator Bowl

OURGP11,0000289 –19–18DEC03–2/2

Adding Coolant

TS281 –UN–23AUG88

High Pressure Fluids

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

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

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

John Deere TY15161 Cooling System Sealer may be added to the radiator to stop leaks on a temporary or emergency basis only. DO NOT use any other stop-leak additives in the cooling system. Leaks should be permanently repaired as quickly as possible.

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

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

Continued on next page

OURGP11,0000262 –19–19NOV03–1/2

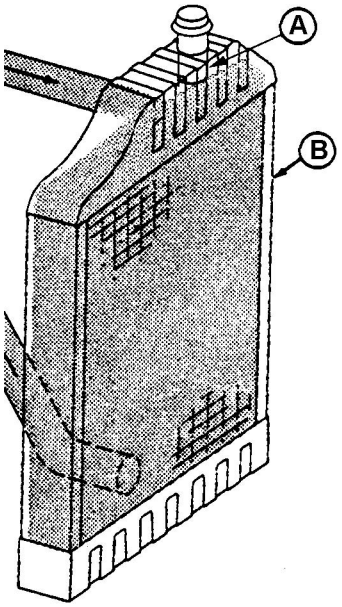
1. Loosen temperature sending unit fitting at rear of cylinder head to relieve pressure when filling system.

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

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

2. Fill radiator (B) until coolant level touches bottom of filler neck (A).

3. Tighten fitting when air has been expelled from system.



RG13295 –UN–20NOV03

Radiator and Coolant

A—Coolant Level At Bottom Of Filler Neck
B—Radiator

OURGP11,0000262 –19–19NOV03–2/2

Replacing Air Cleaner Filter Elements

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

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

1. Remove wing nut and remove canister cover shown in small illustration inset.

2. Remove wing nut (A) and remove primary element (B) from canister.

3. Thoroughly clean all dirt from inside canister.

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

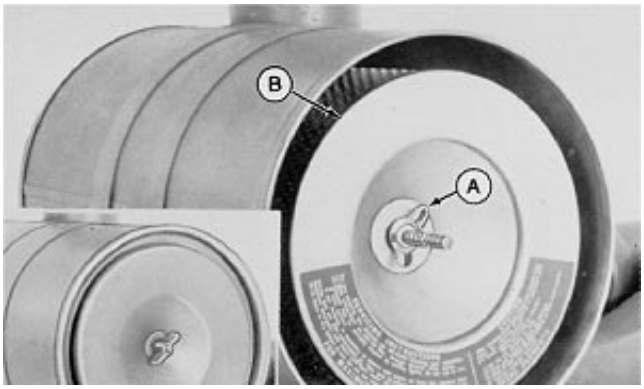
IMPORTANT: Remove secondary (safety) element (E) ONLY for replacement. DO NOT attempt to clean, wash, or reuse secondary element. Replacement of secondary element is usually necessary ONLY when primary element has a hole in it.

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

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

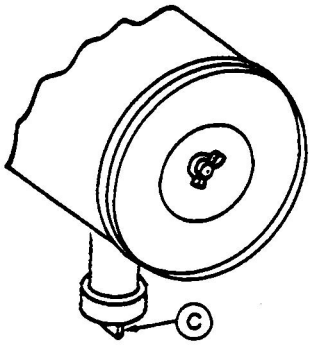
IMPORTANT: Whenever the air cleaner has been serviced or had cover removed, ALWAYS fully depress the air restriction indicator reset button (if equipped) to assure accurate readings.

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



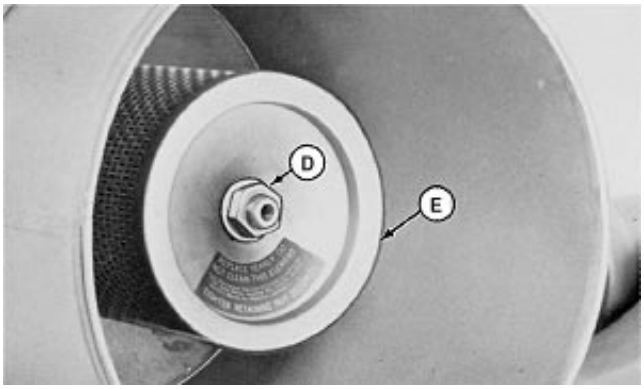
RG4686 –UN–20DEC88

Air Cleaner Primary Element



RG4687 –UN–20DEC88

Dust Unloader Valve



RG11068 –UN–26JUN00

Air Cleaner Secondary Element

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

DPSG,OUOD002,1580 –19–21JUN00–1/1

Inspecting Primary Filter Element

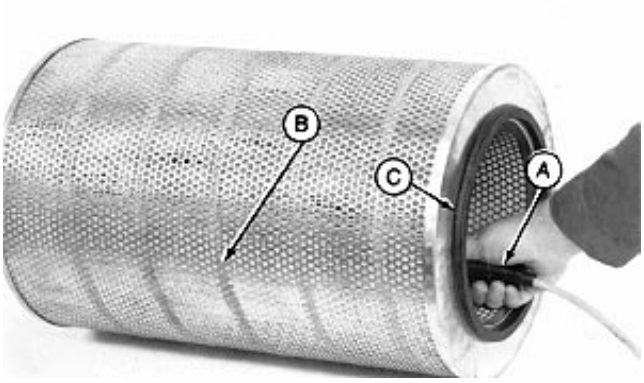
IMPORTANT: Do not wash primary filter element. Clean with dry air only (see procedure on following pages).

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

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

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

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



Inspecting Primary Air Filter Element

A—Light
B—Outer Screen
C—Gasket

RG,RG34710,3598 –19–30AUG96–1/1

Cleaning Primary Filter Element

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

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

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

Continued on next page

RG,RG34710,3599 –19–30AUG96–1/2

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

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

Cleaning Primary Element

A—Air Cleaning Gun

RG,RG34710,3599 –19–30AUG96–2/2

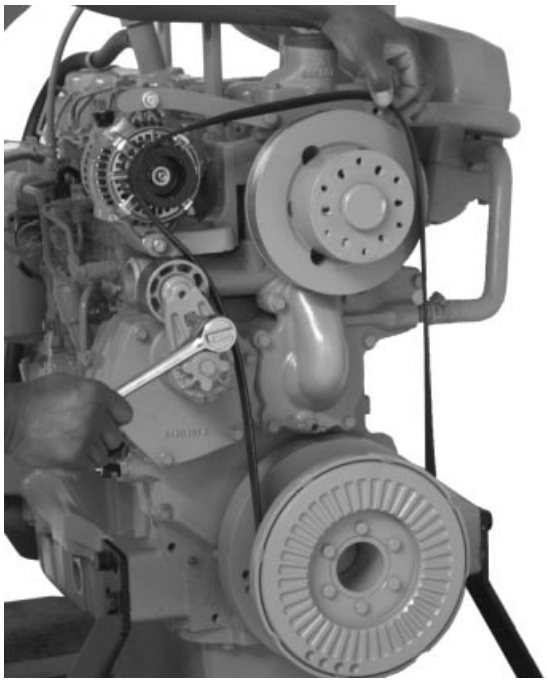
Element Storage

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

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

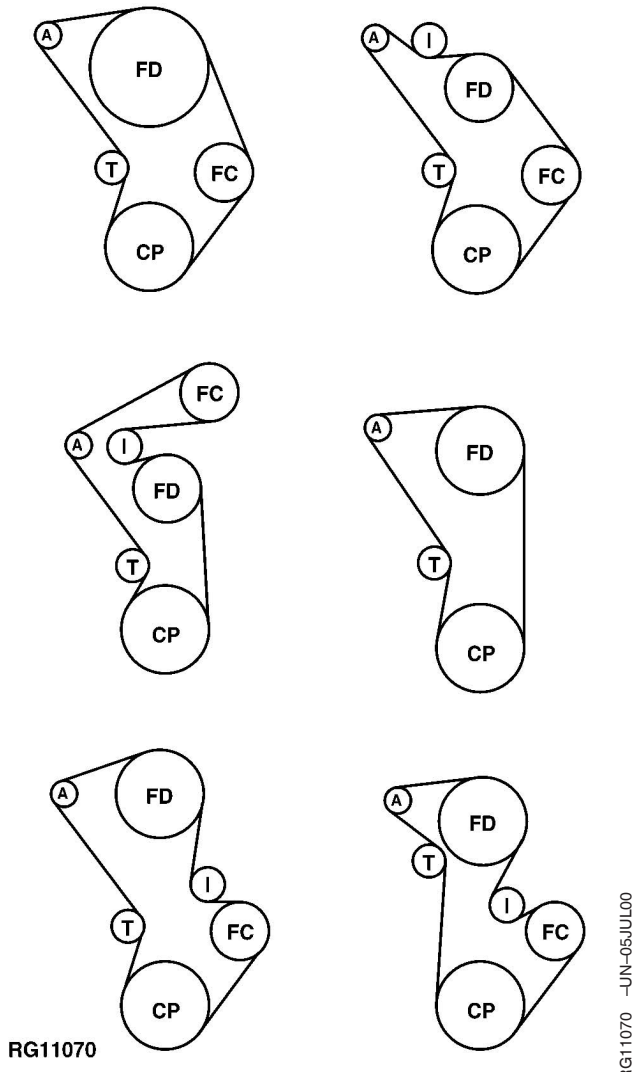
RG,RG34710,3601 –19–30AUG96–1/1

Replacing Fan/Alternator Belt



RG7392 –UN–26JUN00

Replacing Belt



RG11070

RG11070 –UN–05JUL00

Belt Routing Options

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

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

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

1. Release tension on belt using a 1/2 in. drive ratchet as shown in photo.

2. Remove belt from pulleys and discard belt.

3. Install new belt, be sure that belt is correctly seated in all pulley grooves.

4. Apply tension to belt with tensioner. Remove ratchet.

Continued on next page

5. Start engine and check belt alignment.

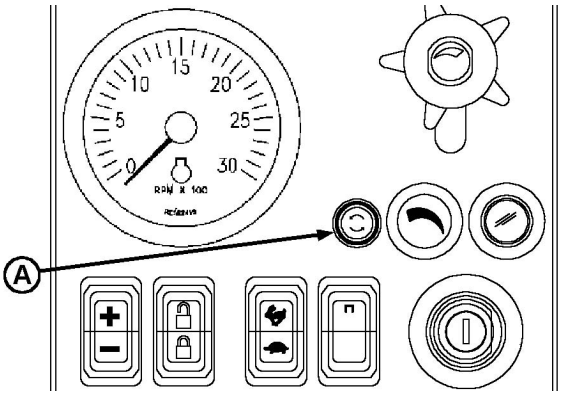
OURGP11,000028A –19–18DEC03–2/2

Checking Fuses

NOTE: The later instrument panels described in Section 17 do not have this fuse.

On engines equipped with a John Deere instrument panel, check the fuse (A) located in the fuse holder on the face of the instrument panel. If defective, replace with a 5-amp fuse.

Also check the main electrical system fuse located in the engine wiring harness (see N on ENGINE WIRING LAYOUT in Troubleshooting Section). If defective, replace with a 10 amp fuse.



RG12599 –UN–11OCT02

Fuse Location

A—Fuse

OURGP11,0000263 –19–19NOV03–1/1

Checking Electrical Wiring And Connections

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

OURGP11,0000264 –19–19NOV03–1/1

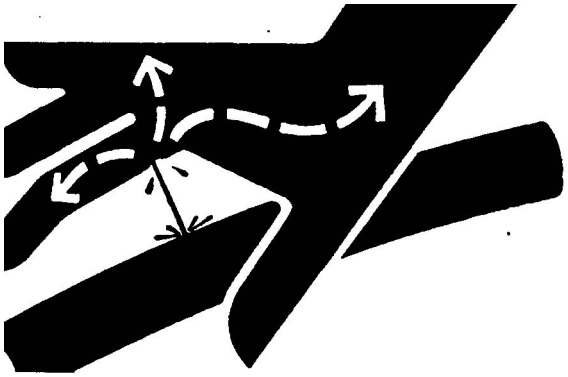
Bleeding Fuel System (Earlier Engines)

CAUTION: Escaping fluid under pressure can penetrate the skin causing serious injury. Relieve pressure before disconnecting fuel or other lines. Tighten all connections before applying pressure. Keep hands and body away from pinholes and nozzles that 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, a doctor familiar with this type of injury must surgically remove it 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.

High-pressure fluid remaining in fuel lines can cause serious injury. Before disconnecting fuel lines, sensors, or any other components between the high-pressure fuel pump and nozzles on engines with High Pressure Common Rail (HPCR) fuel system, wait a minimum of 15 minutes after engine is stopped.

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



X9811 –UN–23AUG88

High Pressure Fluids

TS1343 –UN–18MAR92

Whenever the fuel system has been opened up for service (lines disconnected or filters removed), it will be necessary to bleed air from the system.

Continued on next page

OURGP11,0000265 –19–19NOV03–1/2

1. Drain water and contaminates from water separator bowl by opening the drain valve (D).

2. Connect JT03472 coupler and hose to diagnostic port (A). If JT03472 coupler is not available, loosen the diagnostic port to allow air and fuel to escape. Bleed fuel into suitable container.

3. Unlock and operate hand primer (B) until a steady flow of fuel (without bubbles) flows out of hose (Must pull hand primer all the way up between pumps).

NOTE: It can take up to 200 strokes until fuel comes out steadily.

4. Continue to pump hand primer while disconnecting JT03472 coupler from diagnostic port, or while tightening diagnostic port to specification below.

Specification

Diagnostic Port—Torque ..... 14 N•m (10 lb-ft)

5. Start engine and run at 1200-1500 RPM for 3-5 minutes.

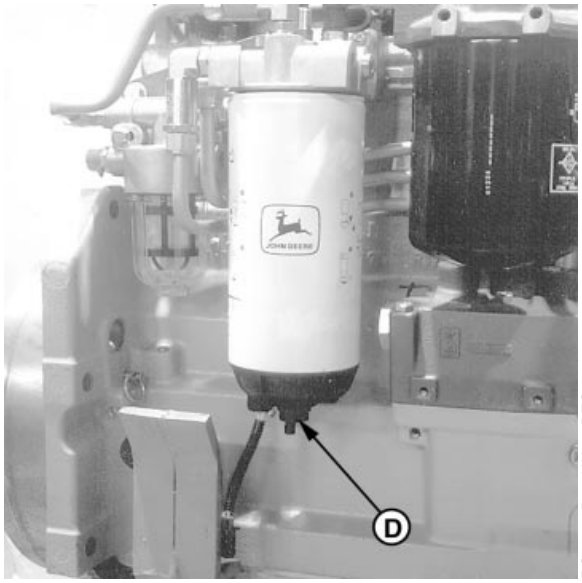
6. If engine fails to start, loosen high pressure fuel lines (C). Pump hand primer (B) until steady flow of fuel escapes the fuel pump. Tighten fuel lines to specification below and lock hand primer (pull up, then push down and lock).

Specification

High Pressure Fuel Lines—
Torque ..... 27 N•m (20 lb-ft)

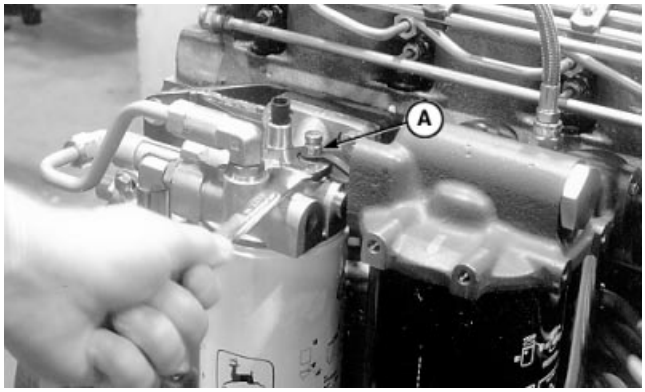
7. Start engine. If engine fails to start, repeat step 6.

A—Diagnostic Port
B—Hand Primer
C—High Pressure Fuel Lines
D—Drain Valve



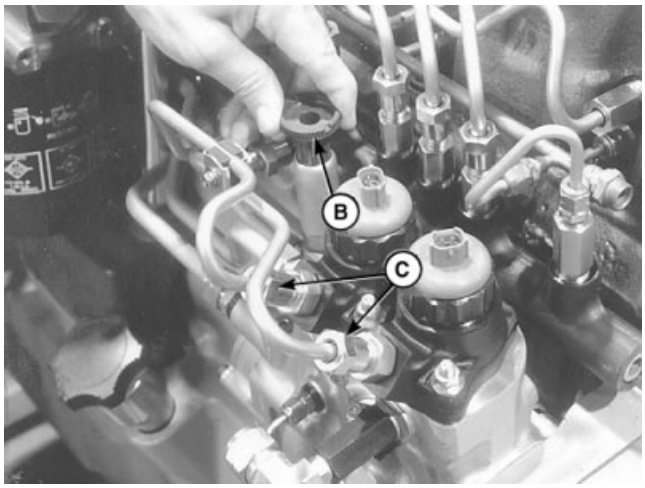
RG11519B –UN–14DEC00

Drain Valve on Final Filter



RG11081 –UN–10NOV00

Diagnostic Port/Bleed Fitting



RG11518 –UN–11DEC00

Hand Primer

Bleeding Fuel System (Later Engines)

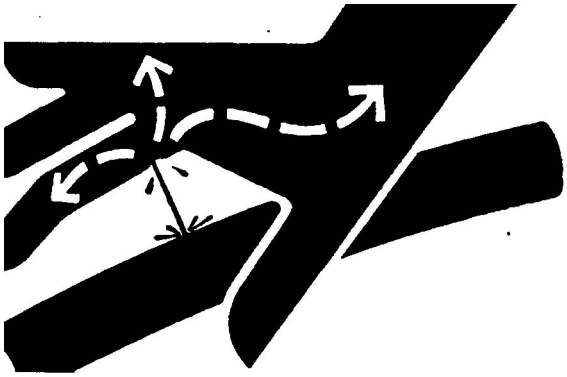
CAUTION: Escaping fluid under pressure can penetrate the skin causing serious injury. Relieve pressure before disconnecting fuel or other lines. Tighten all connections before applying pressure. Keep hands and body away from pinholes and nozzles that eject fluids under high pressure. Use a piece of cardboard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

If ANY fluid is injected into the skin, a doctor familiar with this type of injury must surgically remove it 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.

High-pressure fluid remaining in fuel lines can cause serious injury. Before disconnecting fuel lines, sensors, or any other components between the high-pressure fuel pump and nozzles on engines with High Pressure Common Rail (HPCR) fuel system, wait a minimum of 15 minutes after engine is stopped.

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

Whenever the fuel system has been opened up for service (lines disconnected or filters removed), it will be necessary to bleed air from the system.



X9811 –UN–23AUG88

High Pressure Fluids

TS1343 –UN–18MAR92

Continued on next page

When fuel filters are being removed or replaced they must be prefilled. See Replace Fuel Filters (Later Engines).

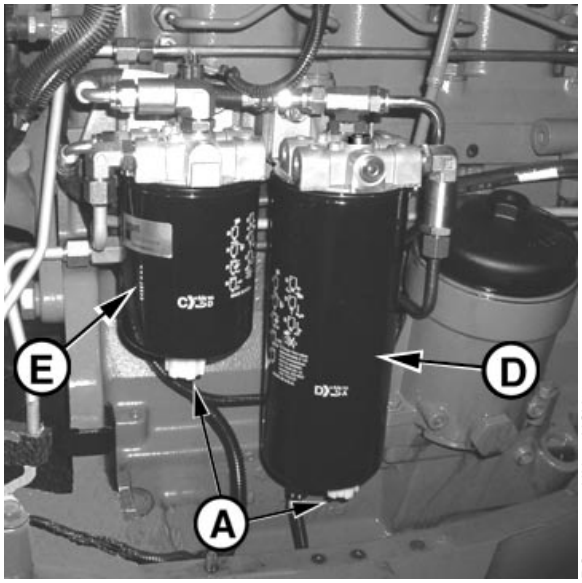
In case the engine has run out of fuel, see Restarting Engine That Has Run Out Of Fuel (Later Engines).

IMPORTANT: When draining water from fuel filters the drain valve must be unthreaded completely and valve drops down approximately 12 mm (0.5 in.) to properly drain water from filter.

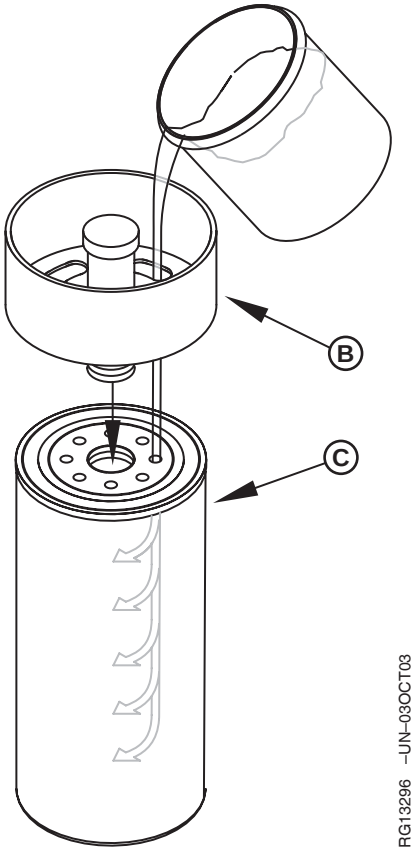
1. Drain water and contaminates from water separator bowl by opening the drain valve (A) on the primary (D) and secondary (E) filters.

2. Prefill fuel filters (C) using prefill cup (B).

A—Drain Valve
B—Prefill Cup
C—Fuel Filter
D—Primary Fuel Filter
E—Secondary Fuel Filter



Drain Valve On Fuel Filters



Prefilling Fuel filter

Continued on next page

OURGP11,000028B –19–18DEC03–2/4

3. Loosen the fuel outlet (A) of the transfer pump. Unlock and operate hand primer (B) until a steady flow of fuel (without bubbles) flows out of connection. This could take 270 - 330 strokes until steady fuel flow is free of air bubbles. Retighten fuel line.

Specification

Fuel Outlet Lines—Torque ..... 24 N•m (18 lb-ft)

4. Unlock and operate hand primer (B) until a steady flow of fuel (without bubbles) flows out of hose.

5. Continue to pump hand primer while disconnecting JT03472 coupler from diagnostic port.

6. Loosen the high-pressure fuel supply line (C) and operate the hand pump until a steady flow of fuel (without bubbles) flows out. Tighten the high-pressure fuel supply line to specification.

Specification

High Pressure Fuel Supply Line—
Torque ..... 24 N•m (18 lb-ft)

7. Loosen one of the high-pressure fuel supply line (D) and operate the hand pump until a steady flow of fuel (without bubbles) flows out. Tighten the high-pressure fuel supply line to specification.

Specification

High Pressure Fuel Line—Torque..... 24 N•m (18 lb-ft)

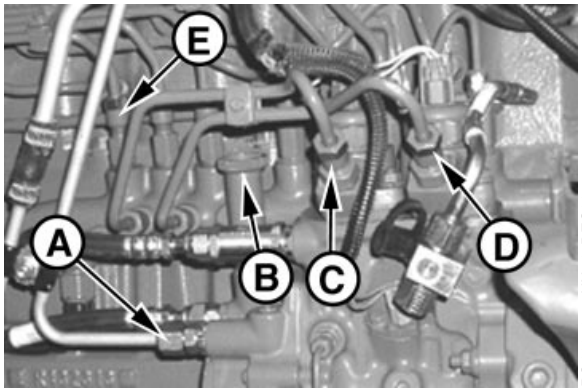
8. Loosen fuel line fitting on fuel rail flow limiter #6 (E). Place rag around fitting to absorb fuel. Pump hand primer (B) until steady flow of fuel escapes the flow limiter. Tighten fuel line to specification.

Specification

Pressure Limiter—Torque ..... 24 N•m (18 lb-ft)

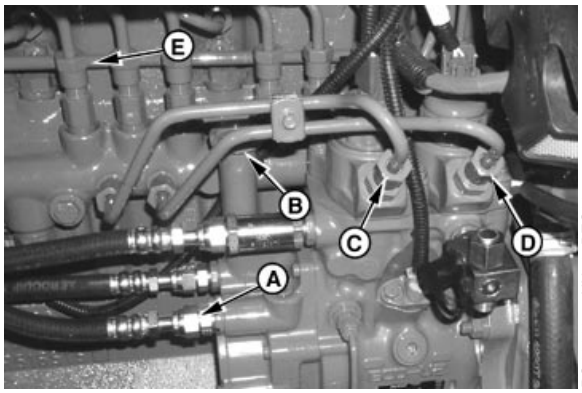
9. Pump hand primer approximately 30 more times. Lock hand primer (B) (pull up, then push down and lock).

10. Crank engine up to 15 seconds. If engine does not start, wait 15 seconds and then crank for an additional 15 seconds. If engine starts, run at 1200-1500 RPM for 3-5 minutes



RG13270 –UN–15DEC03

Model With Fuel Cooler



RG13319 –UN–05DEC03

Model Without Fuel Cooler

A—Fuel Transfer Pump Outlet
B—Hand Primer
C—High Pressure Fuel Supply Line
D—High Pressure Fuel Supply Line
E—Fuel Line Fitting On Fuel Rail Flow Limiter #6

Continued on next page

11. If engine fails to start, loosen fuel line fitting on HPCR flow limiter #6 (E on previous page). Place rag around fitting to absorb fuel. Pump hand primer (B) until steady flow of fuel escapes the flow limiter. Tighten fuel lines to specification below and lock hand primer (pull up, then push down and lock).

Specification	
High Pressure Fuel Lines—	
Torque	24 N•m (18 lb-ft)

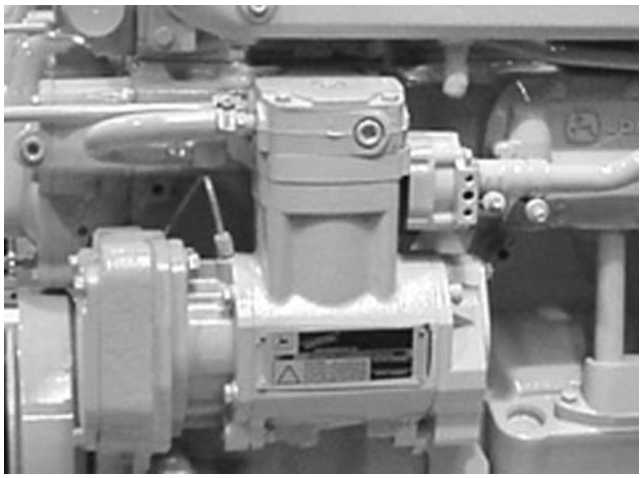
OURGP11,000028B –19–18DEC03–4/4

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)

OUOD006,0000080 –19–11OCT02–1/1

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

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

OURGP11,0000266 –19–19NOV03–1/1

Checking Rear Power Take-Off (PTO)

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

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

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

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

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

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

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

TS1644 –UN–22AUG95

Rotating Drivelines

RG12745 –UN–07NOV02

John Deere Rear PTO (Optional)

OUOD006,000008A –19–16OCT02–1/1

General Troubleshooting Information

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

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

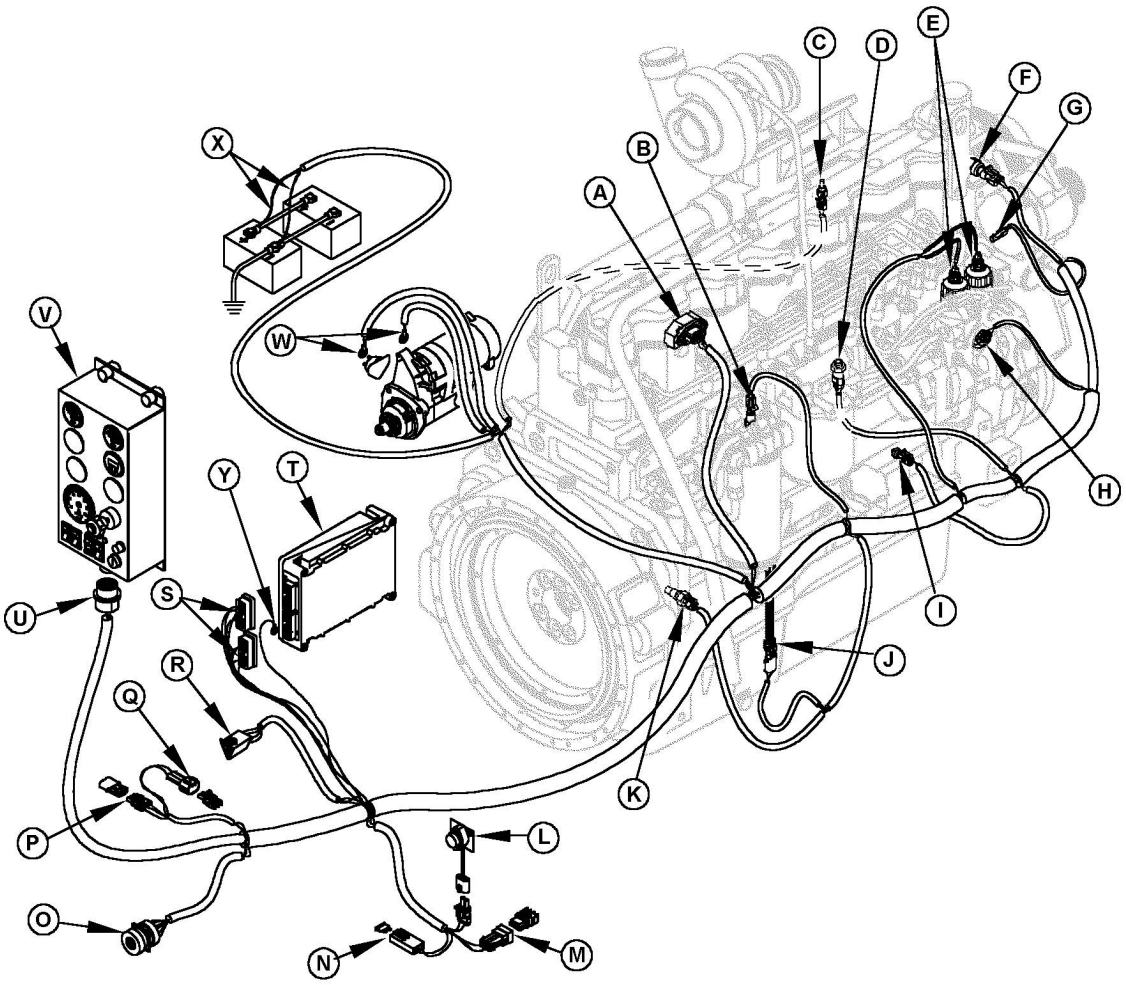
A reliable program for troubleshooting engine problems should include the following basic diagnostic thought process:

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

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

OURGP11,000028E –19–24DEC03–1/1

Engine Wiring Layout



Electrical Wiring Layout (Earlier Engine Shown)

Continued on next page

OURGP11,0000267 –19–19NOV03–1/2

A—Electronic Injector Wiring Harness
B—Fuel Temperature Sensor
C—Manifold Air Temperature (MAT) Sensor (H engines only)
D—Fuel Rail Pressure Sensor
E—Fuel Pump Control Valve Connectors
F—Coolant Temperature Sensor
G—Alternator Ignition Connector
H—Fuel Pump Event Sensor
I—Oil Pressure Sensor
J—Water-in-Fuel Sensor
K—Crank Position Sensor
L—Transient Voltage Protection (TVP) Module
M—Diagnostic Reader Connector
N—Main System Fuse (10 Amp)
O—CAN Diagnostic Connector
P—Secondary Analog Throttle Connector
Q—Remote On / Off Connector
R—SAE 1939 CAN Connector
S—ECU Connectors
T—Engine Control Unit (ECU)
U—Instrument Panel Connector
V—Instrument Panel (Optional)[1]
W—Starter Relay Connections
X—Power And Ground Battery Connections
Y—System Ground (ECU must also be grounded to frame)

[1]Earlier version of instrument panel shown.

OURGP11,0000267 –19–19NOV03–2/2

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

IMPORTANT: ALWAYS disconnect Electronic Control Unit (ECU) connectors and engine control system-to-machine ground before welding. High currents or electro-static discharge in electronic components from welding may cause permanent damage.

1. Remove the ground connection for the engine control system-to-machine frame.

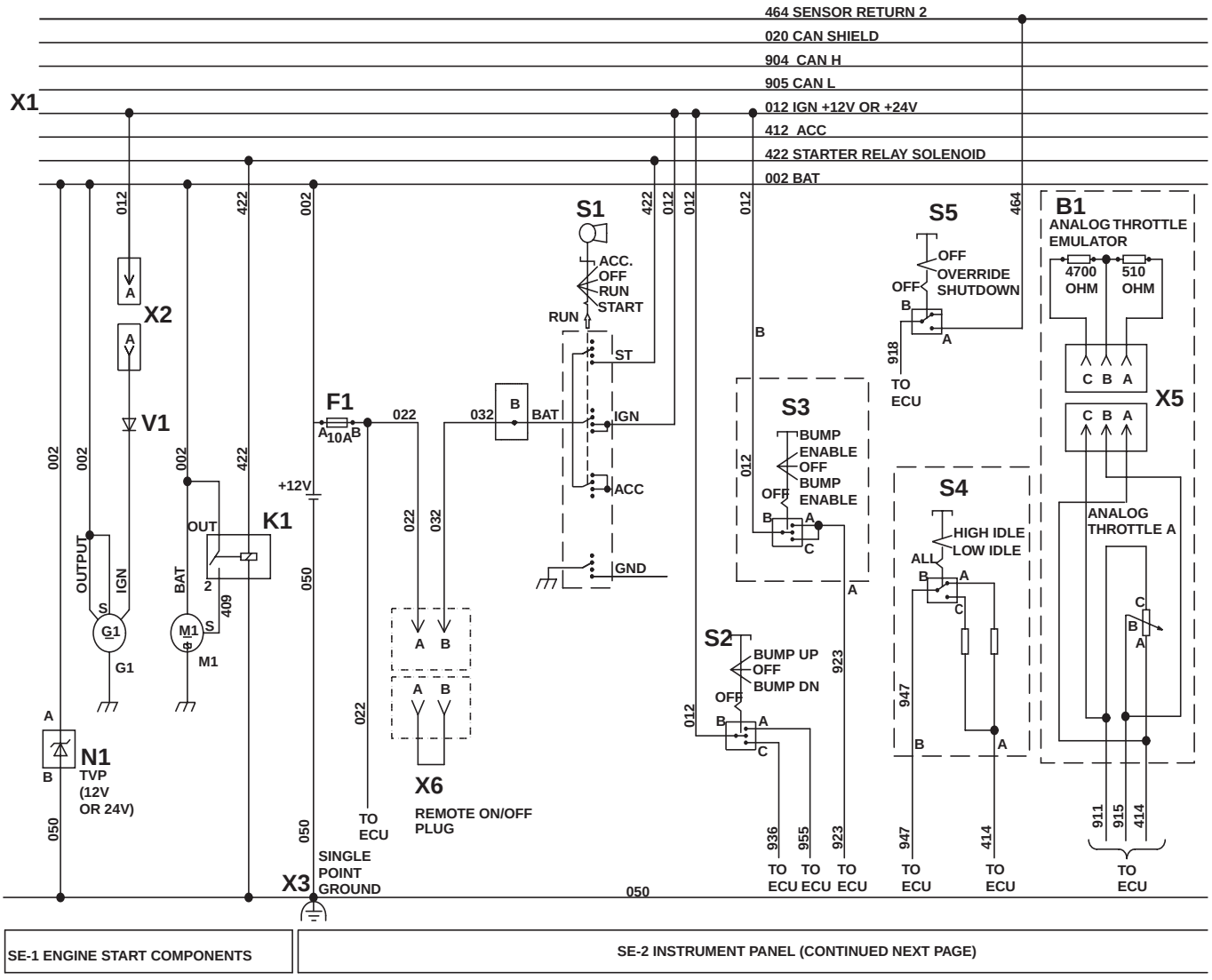
2. Disconnect the connectors from the ECU.

3. Connect the welder ground close to the welding point and be sure ECU or other electronic components are not in the ground path.

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

DPSG,OUOD002,1836 –19–15AUG00–1/1

Engine Wiring Diagram (Engine With Earlier Instrument Panel)



SE-1 ENGINE START COMPONENTS

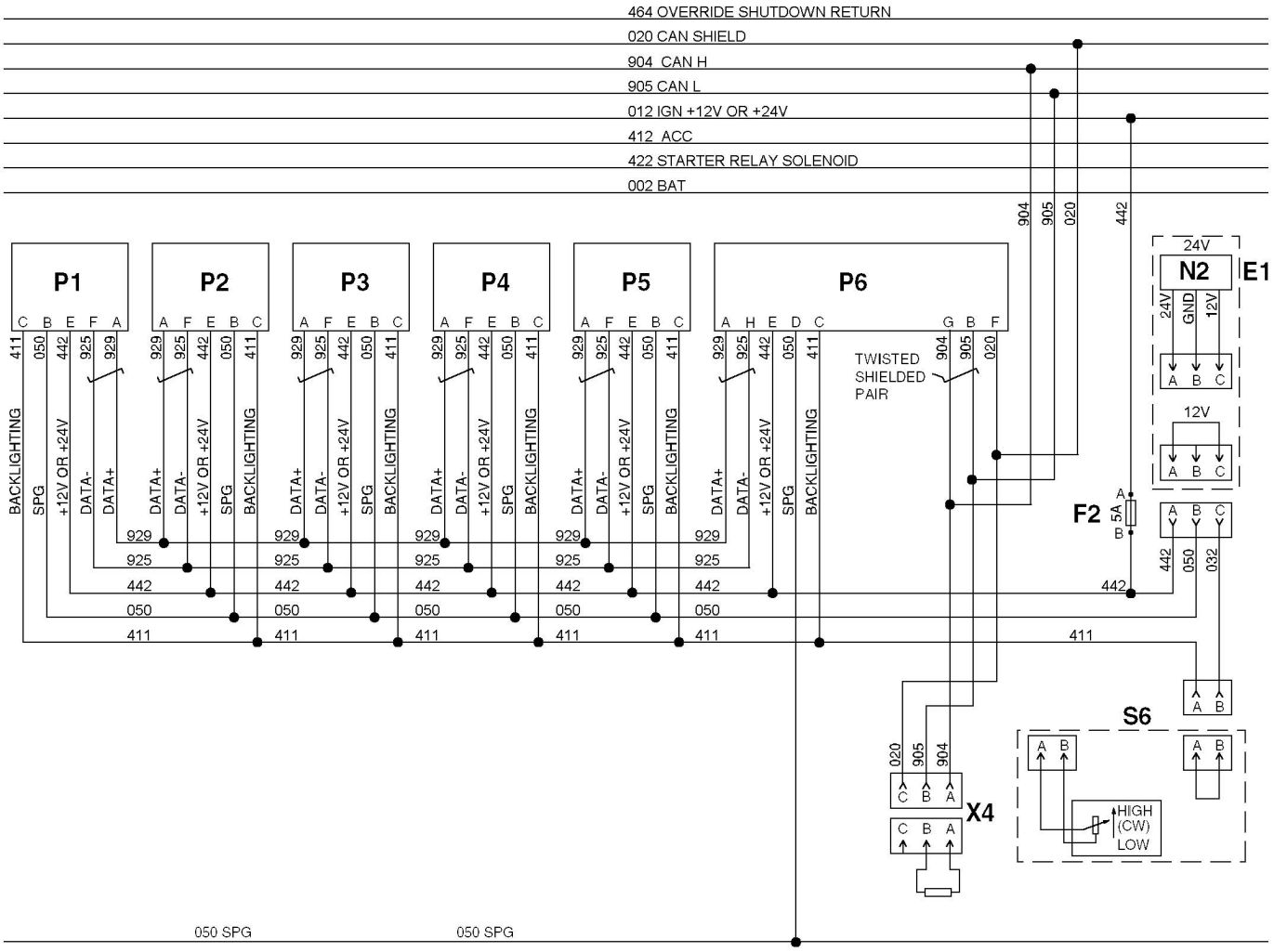
SE-2 INSTRUMENT PANEL (CONTINUED NEXT PAGE)

RG11568 –19–24OCT01

B1—Analog Throttle or Emulator
E1—Back Light Regulator (24V) or Plug (12V)
F1—Fuse (10 Amp) (for harness)
F2—Fuse (5 Amp) (for instrument panel)
G1—Alternator
K1—Starter Relay
M1—Starter Motor
N1—Transient Voltage Protector
N2—Voltage Regulator (for 24V Operation)
P1—Optional Gauge
P2—Optional Gauge
P3—Oil Pressure Gauge
P4—Coolant Temperature Gauge
P5—Tachometer Display
P6—Hourmeter/Diagnostic Meter
S1—Ignition Key Switch
S2—Speed Select Switch (Momentary)
S3—Bump Enable Switch (Momentary)
S4—High Low Speed Switch
S5—Override Shutdown Switch (Momentary)
S6—Dimmer Control or Jumper Plug
V1—Diode
X1—Vehicle Harness Connector
X2—Alternator Harness
X3—Single Point Ground
X4—CAN Terminator
X5—Analog Throttle Connector
X6—Remote On-Off Plug

OURGP11,0000268 –19–19NOV03–1/1

Engine Wiring Diagram (Engine With Earlier Instrument Panel)—Continued

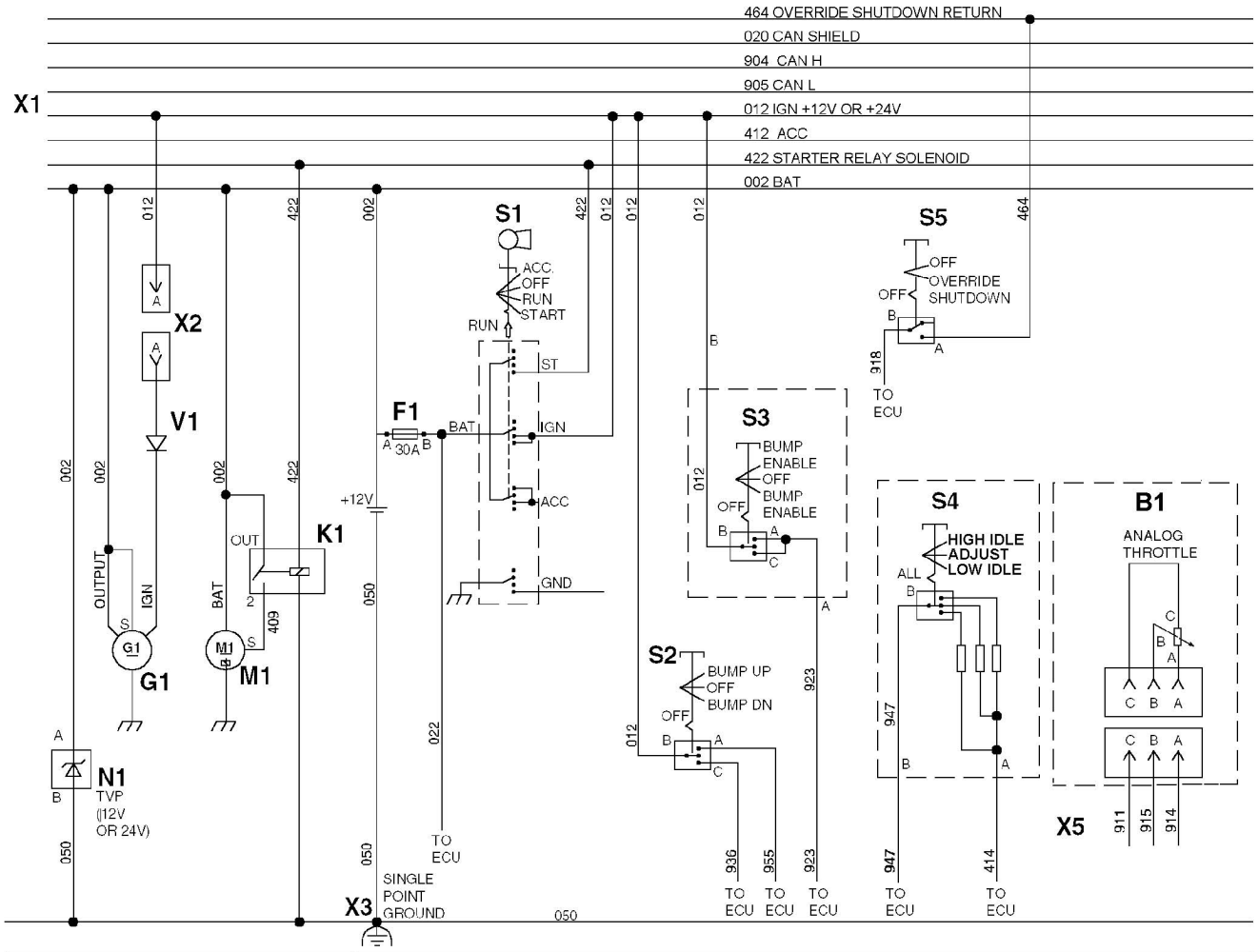


SE-2 INSTRUMENT PANEL (CONTINUED)

B1—Analog Throttle or Emulator
E1—Back Light Regulator (24V) or Plug (12V)
F1—Fuse (10 Amp) (for harness)
F2—Fuse (5 Amp) (for instrument panel)
G1—Alternator
K1—Starter Relay
M1—Starter Motor
N1—Transient Voltage Protector
N2—Voltage Regulator (for 24V Operation)
P1—Optional Gauge
P2—Optional Gauge
P3—Oil Pressure Gauge
P4—Coolant Temperature Gauge
P5—Tachometer Display
P6—Hourmeter/Diagnostic Meter
S1—Ignition Key Switch
S2—Speed Select Switch (Momentary)
S3—Bump Enable Switch (Momentary)
S4—High Low Speed Switch
S5—Override Shutdown Switch (Momentary)
S6—Dimmer Control or Jumper Plug
V1—Diode
X1—Vehicle Harness Connector
X2—Alternator Harness
X3—Single Point Ground
X4—CAN Terminator
X5—Analog Throttle Connector
X6—Remote On-Off Plug

OURGP11,0000269 –19–19NOV03–1/1

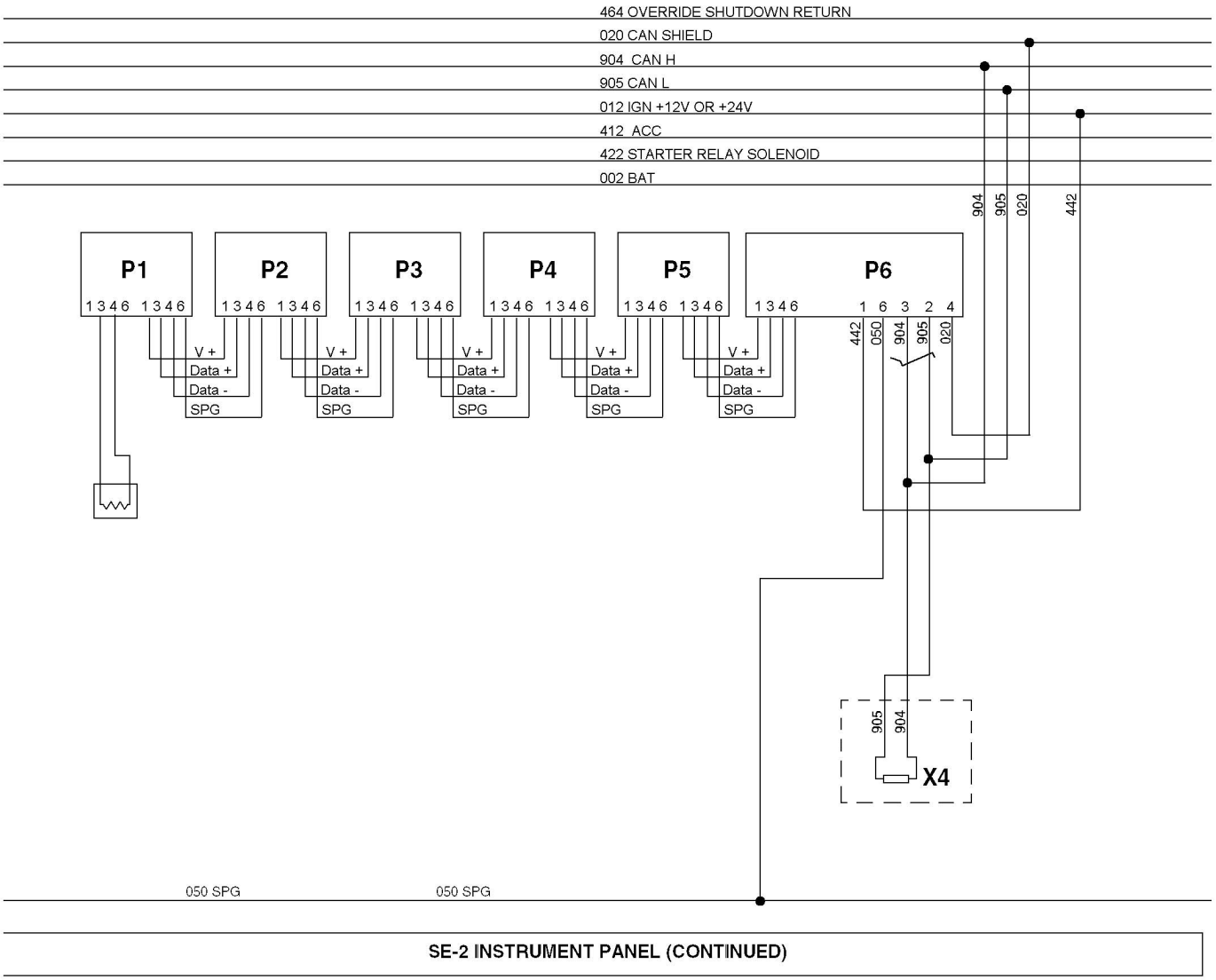
Engine Wiring Diagram (Engines With Later Full-Featured Instrument Panel)



B1—Analog Throttle
F1—Fuse (30 Amp) (Harness)
G1—Alternator
K1—Starter Relay
M1—Starter Motor
N1—Transient Voltage Protector
P1—Optional Gauge
P2—Optional Gauge
P3—Oil Pressure Gauge
P4—Coolant Temperature Gauge
P5—Tachometer Display
P6—Hour Meter/Diagnostic Gauge
S1—Ignition Key Switch
S2—Speed Select Switch (Momentary)
S3—Bump Enable Switch (Momentary)
S4—High-Low Speed Select Switch
S5—Override Shutdown Switch (Momentary)
V1—Diode
X1—Vehicle Harness Connector
X2—Alternator Harness Connector
X3—Single Point Ground
X4—CAN Terminator
X5—Analog Throttle Connector

OURGP11,000011E –19–22OCT03–1/1

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



SE-2 INSTRUMENT PANEL (CONTINUED)

B1—Analog Throttle
F1—Fuse (30 Amp) (Harness)
G1—Alternator
K1—Starter Relay
M1—Starter Motor
N1—Transient Voltage Protector
P1—Optional Gauge
P2—Optional Gauge
P3—Oil Pressure Gauge
P4—Coolant Temperature Gauge
P5—Tachometer Display
P6—Hour Meter/Diagnostic Gauge
S1—Ignition Key Switch
S2—Speed Select Switch (Momentary)
S3—Bump Enable Switch (Momentary)
S4—High-Low Speed Select Switch
S5—Override Shutdown Switch (Momentary)
V1—Diode
X1—Vehicle Harness Connector
X2—Alternator Harness Connector
X3—Single Point Ground
X4—CAN Terminator
X5—Analog Throttle Connector

OURGP11,000011F –19–22OCT03–1/1

Engine Troubleshooting

Symptom	Problem	Solution
Engine Will Not Crank	Weak battery	Replace battery.
	Corroded or loose battery connections	Clean battery terminals and connections.
	Defective main switch or start safety switch	Repair switch as required.
	Starter solenoid defective	Replace solenoid.
	Starter defective	Replace starter.
Hard to Start or Will Not Start	Poor fuel quality	Drain fuel and replace with quality fuel of the proper grade.
	Slow cranking speed	Check for problem in the charging/starting system.
	Too high viscosity crankcase oil	Drain crankcase oil and replace with correct viscosity oil.
	Electronic Control System Problem or Basic Engine Problem	See your John Deere engine distributor or servicing dealer.
Engine Misfiring or Runs Irregularly	Electronic Control System problem or basic engine problem	See your John Deere engine distributor or servicing dealer.
Lack of Engine Power	Poor fuel quality	Drain fuel and replace with quality fuel of the proper grade.
	Engine overloaded	Reduce engine load.
	Improper crankcase oil	Drain crankcase oil and replace with correct viscosity oil.
	Electronic Control System problem or basic engine problem	See your John Deere engine distributor or servicing dealer.

Continued on next page

Symptom	Problem	Solution
Black or Gray Exhaust Smoke	Engine overloaded	Reduce engine load.
	Engine burning oil	See LUBRICATION SYSTEM TROUBLESHOOTING, later in this section.
	Air cleaner restricted or dirty	Replace air cleaner element as required.
	Defective muffler/exhaust piping (causing back-pressure)	Replace muffler or defective piping.
	Electronic Control System problem or basic engine problem	See your John Deere engine distributor or servicing dealer.
White Exhaust Smoke	Engine compression too low	Determine cause of low compression and repair as required. See your John Deere engine distributor or servicing dealer.
	Defective thermostat(s) (does not close)	Test thermostats; replace thermostats as required.
	Coolant entering combustion chamber (failed cylinder head gasket or cracked cylinder head)	Repair or replace as required. See your John Deere engine distributor or servicing dealer.
	Failed water-to-air aftercooler (6081AF engines only)	Remove and inspect water-to-air aftercooler. See your John Deere engine distributor or servicing dealer.
	Electronic Control System problem or basic engine problem	See your John Deere engine distributor or servicing dealer.
Engine Idles Poorly	Poor fuel quality	Drain fuel and replace with quality fuel of the proper grade.
	Air leak on suction side of air intake system.	Check hose and pipe connections for tightness; repair as required.
	Electronic control system problem or basic engine problem	See your John Deere engine distributor or servicing dealer.

Continued on next page

Symptom	Problem	Solution
Excessive Fuel Consumption	Poor fuel quality	Drain fuel and replace with quality fuel of the proper grade.
	Engine overloaded	Reduce engine load.
	Air cleaner restricted or dirty	Replace air cleaner element as required.
	Compression too low	Determine cause of low compression and repair as required.
	Leaks in fuel supply system	Locate source of leak and repair as required.
	Improper type of fuel.	Use proper type of fuel.
	Clogged or dirty air cleaner.	Service air cleaner.
	Engine overloaded.	Reduce load.
	Improper valve clearance.	See your authorized servicing dealer or engine distributor.
	Fuel injectors defective.	See your authorized servicing dealer or engine distributor.
	Engine out of time.	See your authorized servicing dealer or engine distributor.
	Defective turbocharger.	See your authorized servicing dealer or engine distributor.
	Low engine temperature.	Check thermostat.
Fuel in Oil	Cracked cylinder head	Locate crack, repair/replace components as required. See your John Deere engine distributor or servicing dealer.

Continued on next page

Symptom	Problem	Solution
Low-Pressure System - Fuel Pressure Low	Plugged fuel filter	Replace fuel filter.
	Restricted fuel line	Locate restriction, repair as required.
	Faulty high-pressure fuel pump	Remove fuel pump, repair/replace pump as required. See your John Deere engine distributor or servicing dealer.

Continued on next page

Symptom	Problem	Solution
Abnormal Engine Noise	Worn main or connecting rod bearings	Determine bearing clearance. See your John Deere engine distributor or servicing dealer.
	Excessive crankshaft end play	Check crankshaft end play. See your John Deere engine distributor or servicing dealer.
	Loose main bearing caps	Check bearing clearance; replace bearings and bearing cap screws as required. See your John Deere engine distributor or servicing dealer.
	Worn connecting rod bushings and piston pins	Inspect piston pins and bushings. See your John Deere engine distributor or servicing dealer.
	Scored pistons	Inspect pistons. See your John Deere engine distributor or servicing dealer.
	Worn timing gears or excess backlash	Check timing gear back lash. See your John Deere engine distributor or servicing dealer.
	Excessive valve clearance	Check and adjust valve clearance. See your John Deere engine distributor or servicing dealer.
	Worn camshaft lobes	Inspect camshaft. See your John Deere engine distributor or servicing dealer.
	Worn rocker arm shaft(s)	Inspect rocker arm shafts. See your John Deere engine distributor or servicing dealer.
	Insufficient engine lubrication	See LUBRICATION SYSTEM TROUBLESHOOTING, later in this section.
	Turbocharger noise	See AIR INTAKE SYSTEM TROUBLESHOOTING, later in this section.

Continued on next page

Symptom	Problem	Solution
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.	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 technician check.
	Stretched poly V-belt or defective belt tensioner.	Check automatic belt tensioner and check belts for stretching. Replace as required.
	Low engine oil level.	Check oil level. Add oil as required.
	Cooling system needs flushing.	Flush cooling system.
	Defective or wrong type of thermostat.	Remove and check thermostat.
	Defective temperature gauge or sender.	Check coolant temperature with thermometer and replace, if necessary.
	Incorrect grade of fuel.	Use correct grade of fuel.

OUOD006,000008B –19–16OCT02–7/7

Electrical Troubleshooting

Symptom	Problem	Solution
Undercharged system	Excessive electrical load from added accessories.	Remove accessories or install higher output alternator.
	Excessive engine idling.	Increase engine rpm when heavy electrical load is used.
	Poor electrical connections on battery, ground strap, starter, or alternator.	Inspect and clean as necessary.
	Defective battery.	Test battery.
	Defective alternator.	Test charging system.
Battery used 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 belt or defective belt tensioner.	Adjust belt tension or replace belts.
Starter will not crank	Engine drivelines engaged.	Disengage engine drivelines.
	Loose or corroded connections.	Clean and tighten loose connections.
	Low battery output voltage.	See your authorized servicing dealer or engine distributor.
	Faulty start circuit relay.	See your authorized servicing dealer or engine distributor.
	Blown fuse.	Replace fuse.

Continued on next page

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

RG,RG34710,4090 –19–09OCT02–2/2

Lubrication System Troubleshooting

Symptom	Problem	Solution
Low Oil Pressure	Low crankcase oil level	Fill crankcase to proper oil level.
	Clogged oil cooler or filter	Remove and inspect oil cooler. See your John Deere engine distributor or servicing dealer.
	Excessive oil temperature	Remove and inspect oil cooler. See your John Deere engine distributor or servicing dealer.
	Defective oil pump	Remove and inspect oil pump. See your John Deere engine distributor or servicing dealer.
	Incorrect oil	Drain crankcase and refill with correct oil.
	Oil pressure regulating valve failure	Remove and inspect oil pressure regulating valve. See your John Deere engine distributor or servicing dealer.
	Clogged oil pump screen or cracked pick-up tube	Remove oil pan and clean screen/replace pick-up tube.
	Excessive main or connecting rod bearing clearance	Determine bearing clearance. See your John Deere engine distributor or servicing dealer.
High Oil Pressure	Improper oil classification	Drain crankcase and refill with correct oil.
	Oil pressure regulating valve failure	Remove and inspect oil pressure regulating valve. See your John Deere engine distributor or servicing dealer.
	Stuck or damaged filter bypass valve	Remove and inspect filter bypass valve. See your John Deere engine distributor or servicing dealer.
	Stuck or damaged oil cooler bypass valve	Remove and inspect oil cooler bypass valve. See your John Deere engine distributor or servicing dealer.

Continued on next page

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

Continued on next page

Symptom	Problem	Solution
		See LOW PRESSURE SYSTEM-FUEL PRESSURE LOW TROUBLESHOOTING earlier in this section.
Fuel in Oil		See FUEL IN OIL TROUBLESHOOTING earlier in this section.
Coolant in Oil		See COOLING SYSTEM TROUBLESHOOTING later in this section.

RG,RG34710,7600 –19–30JUN97–3/3

Cooling System Troubleshooting

Symptom	Problem	Solution
Engine Overheats	Lack of coolant in cooling system	Fill cooling system to proper level.
	Radiator core dirty	Clean radiator as required.
	Engine overloaded	Reduce engine load.
	Too low crankcase oil level	Fill crankcase to proper oil level.
	Loose or defective fan belt	Replace fan belt as required. Check belt tensioner. (See Lubrication and Maintenance 500 Hour/12 Month Section.)
	Defective thermostat(s)	Test thermostat opening temperature; replace thermostats as required.
	Damaged cylinder head gasket	Replace cylinder head gasket. See your John Deere engine distributor or servicing dealer.
	Defective coolant pump	Replace coolant pump. See your John Deere engine distributor or servicing dealer.
	Defective radiator cap	Replace radiator cap as required.

Continued on next page

RG,RG34710,7601 –19–09OCT02–1/2

Symptom	Problem	Solution
Coolant in Crankcase	Cylinder head gasket defective	Replace cylinder head gasket. See your John Deere engine distributor or servicing dealer.
	Cylinder head or block cracked	Locate crack, repair/replace components as required.
	Cylinder liner seals leaking	Remove and inspect cylinder liners. See your John Deere engine distributor or servicing dealer.
	Leaking oil cooler	Pressure test oil cooler; repair/replace as required. See your John Deere engine distributor or servicing dealer.
	Defective oil cooler O-rings	Remove and inspect oil cooler O-rings; replace as required. See your John Deere engine distributor or servicing dealer.
	Faulty coolant pump seal; weep hole plugged; coolant leaking through bearing	Replace coolant pump seals. See your John Deere engine distributor or servicing dealer.
Coolant Temperature Below Normal	Defective thermostat(s)	Test thermostats; replace thermostats as required.

RG,RG34710,7601 –19–09OCT02–2/2

Air Intake System Troubleshooting

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

Symptom	Problem	Solution
Hard to Start or Will Not Start		See ENGINE TROUBLESHOOTING earlier in this section.
Engine Misfiring or Runs Irregularly		See ENGINE TROUBLESHOOTING earlier in this section.
Black or Grey Exhaust Smoke		See ENGINE TROUBLESHOOTING earlier in this section.
Lack of Engine Power		See ENGINE TROUBLESHOOTING earlier in this section.
Turbocharger "Screams"	Air leak in intake manifold.	Check intake manifold gasket and manifold; repair as required. See your John Deere engine distributor or servicing dealer.
Turbocharger Noise or Vibration *NOTE: Do not confuse the whine heard during run down with noise which indicates a bearing failure.*	Bearings not lubricated (insufficient oil pressure)	Determine cause of lack of lubrication; repair as required. See your John Deere engine distributor or servicing dealer.
	Air leak in engine intake or exhaust manifold	Check intake and exhaust manifold gaskets and manifolds; repair as required. See your John Deere engine distributor or servicing dealer.
	Improper clearance between turbine wheel and turbine housing	Inspect turbocharger; repair/replace as required. See your John Deere engine distributor or servicing dealer.
	Broken blades (or other wheel failures)	Inspect turbocharger; repair/replace as required. See your John Deere engine distributor or servicing dealer.

Continued on next page

Symptom	Problem	Solution
Oil on Turbocharger Compressor Wheel or in Compressor Housing (Oil Being Pushed or Pulled Through Center Housing)	Excessive crankcase pressure.	Determine cause of excessive crankcase pressure; repair as required. See your John Deere engine distributor or servicing dealer.
	Air intake restriction	Determine cause of intake restriction; repair as required. See your John Deere engine distributor or servicing dealer.
	Drain tube restriction	Determine cause of drain tube restriction; repair as required. See your John Deere engine distributor or servicing dealer.
Oil in Intake Manifold or Dripping from Turbocharger Housing	Excessive crankcase pressure	Determine cause of excessive crankcase pressure; repair as required. See your John Deere engine distributor or servicing dealer.
	Air intake restriction	Determine cause of intake restriction; repair as required. See your John Deere engine distributor or servicing dealer.
	Drain tube restriction	Determine cause of drain tube restriction; repair as required. See your John Deere engine distributor or servicing dealer.
	Damaged or worn housing bearings	Inspect turbocharger; repair/replace as required. See your John Deere engine distributor or servicing dealer.
	Imbalance of rotating assembly	Inspect turbocharger; repair/replace as required. See your John Deere engine distributor or servicing dealer.
	Damage to turbine or compressor wheel or blade	Inspect turbocharger; repair/replace as required. See your John Deere engine distributor or servicing dealer.
	Dirt or carbon build-up on wheel or blade	Inspect turbocharger; repair/replace as required. See your John Deere engine distributor or servicing dealer.

Continued on next page

Symptom	Problem	Solution
	Bearing wear	Inspect turbocharger; repair/replace as required. See your John Deere engine distributor or servicing dealer.
	Oil starvation or insufficient lubrication	Determine cause of lack of lubrication; repair as required. See your John Deere engine distributor or servicing dealer.
	Shaft seals worn	Inspect turbocharger; repair/replace as required. See your John Deere engine distributor or servicing dealer.
Turbocharger Turbine Wheel Drag	Carbon build-up behind turbine wheel caused by coked oil or combustion deposits	Inspect turbocharger; repair/replace as required. See your John Deere engine distributor or servicing dealer.
	Dirt build-up behind compressor wheel caused by air intake leaks.	Inspect turbocharger; repair/replace as required. See your John Deere engine distributor or servicing dealer.
	Bearing seizure or dirty, worn bearings	Inspect turbocharger; repair/replace as required. See your John Deere engine distributor or servicing dealer.

RG,RG34710,7602 –19–30JUN97–3/3

Retrieving Diagnostic Trouble Codes

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

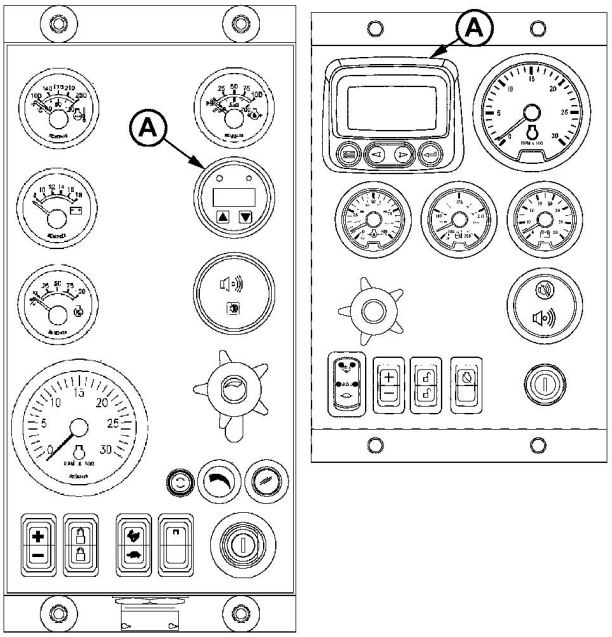
Diagnosis of the electronic control system should be performed according to the following procedure:

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

2. Read and record diagnostic trouble codes DTC(s) displayed on the diagnostic gauge. To access the trouble codes on earlier or later instrument panels, see Section 16 or 17 of this manual.

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

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



RG13287 –UN–30OCT03

Trouble Code Display On Earlier Panel (Left) or Later Panel (Right)

A—Diagnostic Gauge

OURGP11,000028F –19–24DEC03–1/1

Displaying Of Diagnostic Trouble Codes (DTCs)

SPN/FMI CODES

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

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

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

The FMI identifies the type of failure that has occurred; for example FMI 03 indicates value above normal. Combining SPN 000110 with FMI 03 yields engine coolant temperature input voltage too high

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

OURGP11,0000119 –19–20OCT03–1/1

Listing of Diagnostic Trouble Codes (DTCs)

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

SPN	FMI	Description
28	3	Analog Throttle (B) Input High
28	4	Analog Throttle (B) Input Low
29	3	Analog Throttle (A) Input High
29	4	Analog Throttle (A) Input Low
91	3	Multi-State Throttle Input High
91	4	Multi-State Throttle Input Low
91	9	Valid Throttle Message Late Or Not Detected
91	14	Throttle Signal Voltage Out Of Range
94	1	Fuel Delivery PressureVery Low
94	3	Fuel Rail Pressure Input Voltage High
94	4	Fuel Rail Pressure Input Voltage Low
94	10	Fuel Rail Pressure Loss Detected
94	13	Fuel Rail Pressure Higher Than Expected
94	16	Fuel Pressure High
94	17	Fuel Rail Pressure Not Developed
94	18	Fuel Pressure Low
97	0	Water in Fuel Continuously Detected
97	3	Water in Fuel Signal Voltage High
97	4	Water in Fuel Signal Voltage Low
97	16	Water in Fuel Detected
97	31	Water in Fuel Detected
100	1	Engine Oil Pressure Extremely Low
100	3	Engine Oil Pressure Input Voltage High
100	4	Engine Oil Pressure Input Voltage Low
100	16	Engine Oil Pressure Reading Incorrect
100	18	Engine Oil Pressure Moderately Low
105	0	Manifold Air Temperature High
105	3	Manifold Air Temperature Input Voltage High
105	4	Manifold Air Temperature Input Voltage Low
105	16	Manifold Air Temperature Moderately High
107	0	Air Filter Differential Pressure
107	31	Air Filter Differential Pressure
110	0	Engine Coolant Temperature High
110	3	Engine Coolant Temperature Input Voltage High
110	4	Engine Coolant Temperature Input Voltage Low
110	15	Engine Coolant Temperature High
110	16	Engine Coolant Temperature High
111	1	Engine Coolant Level Low
158	2	Intermittent Circuit Error
158	17	ECU Power Down Error
174	0	Fuel Temperature High
174	3	Fuel Temperature Input Voltage High
174	4	Fuel Temperature Input Voltage Low
174	15	Fuel Temperature High
174	16	Fuel Temperature High
174	31	Fuel Temperature Sensor Out Of Range
189	31	Speed Derate Condition Exists Due To Fault

Continued on next page

SPN	FMI	Description
190	0	Engine Overspeed Extreme
190	2	Data Erratic, Intermittent Or Incorrect
190	3	Sensor Voltage Above Normal
190	4	Sensor Voltage Below Normal
190	5	Cirvuit Is Open
190	16	Engine Overspeed Moderate
611	3	Electronic Injector Wiring Shorted to Power Source
611	4	Electronic Injector Wiring Shorted to Ground
620	3	Sensor Supply 1 Voltage High
620	4	Sensor Supply 1 Voltage Low
627	1	Electronic Injector Supply Voltage Problem
627	4	Power Interruption
629	13	ECU Error
629	19	ECU Not Receiving Messages From Pump
632	2	Fuel Shutoff Error Detected
632	5	Fuel Shutoff Non-Functional
632	11	Fuel Shutoff Circuit Open Or Shorted
636	2	Pump Position Sensor Input Noise
636	8	Pump Position Sensor Input Missing
636	10	Pump Position Sensor Input Pattern Error
637	2	Crank Position Input Noise
637	7	ECU/Pump Timing Moderately Out of Sync
637	8	Crank Position Input Missing
637	10	Crank Position Input Pattern Error
639	13	CAN Bus Error
651	5	Cylinder #1 Electronic Injector Circuit Open
651	6	Cylinder #1 Electronic Injector Circuit Shorted
651	7	Cylinder #1 Electronic Injector Mechanical Failure
652	5	Cylinder #2 Electronic Injector Circuit Open
652	6	Cylinder #2 Electronic Injector Circuit Shorted
652	7	Cylinder #2 Electronic Injector Mechanical Failure
653	5	Cylinder #3 Electronic Injector Circuit Open
653	6	Cylinder #3 Electronic Injector Circuit Shorted
653	7	Cylinder #3 Electronic Injector Mechanical Failure
654	5	Cylinder #4 Electronic Injector Circuit Open
654	6	Cylinder #4 Electronic Injector Circuit Shorted
654	7	Cylinder #4 Electronic Injector Mechanical Failure
655	5	Cylinder #5 Electronic Injector Circuit Open
655	6	Cylinder #5 Electronic Injector Circuit Shorted
655	7	Cylinder #5 Electronic Injector Mechanical Failure
656	5	Cylinder #6 Electronic Injector Circuit Open
656	6	Cylinder #6 Electronic Injector Circuit Shorted
656	7	Cylinder #6 Electronic Injector Mechanical Failure
898	9	Vehicle Speed Invalid/Missing
970	2	External Engine Shutdown Switch Intermittent
970	11	External Engine Protective Shutdown Active
970	31	External Engine Protective Shutdown Active
971	31	External Fuel Derate Switch Active
1041	2	Start Signal Missing
1041	3	Start Signal Always Active
1079	3	Sensor Supply 1 Voltage High
1079	4	Sensor Supply 1 Voltage Low
1080	3	Sensor Supply 1 Voltage High
1080	4	Sensor Supply 1 Voltage Low

Continued on next page

SPN	FMI	Description
1109	31	Engine Protection Shutdown Warning
1110	31	Engine Protection Shutdown
1347	5	Pump Control Valve #1 Error
1347	7	Fuel Rail Pressure Control Error
1347	10	Pump Control Valve #1 Fuel Flow Not Detected
1348	5	Pump Control Valve #2 Error
1348	10	Pump Control Valve #2 Fuel Flow Not Detected
1485	2	Pump Power Relay Fault
1569	31	Fuel Derate
2000	6	Fuel Injection Pump Control Valve Error
2000	13	Proper Controller Not Installed

NOTE: The Diagnostic Gauge on the electronic instrument panel can have communication problems that result in Error Codes being shown on its LCD display window. The following Error Codes all indicate that there is a Diagnostic Gauge communication error with the ECU. Contact your servicing dealer for help in correcting these codes:

EE — Error

ACP — Err
No Addr

ACP — Err
BUS — EP

XXXXX — EP
No Data

XXXXX — BO
No Data

XXXXX — BR
No Data

NOTE: Later instrument panels will display text for communication faults, such as “CAN BUS FAILURE”.

OURGP11,0000153 –19–08JAN04–3/3

Intermittent Fault Diagnostics

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

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

Suggestions for diagnosing intermittent faults:

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

Possible causes of intermittent faults:

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

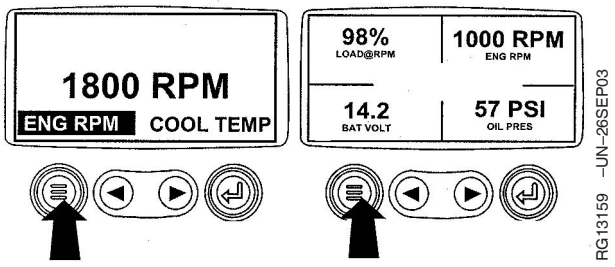
NOTE: Refer to wiring diagrams earlier in this section as a guide to connections and wiring.

OUO1004,0000BB5 –19–06DEC02–1/1

Displaying Diagnostic Gauge Software (Later Engines)

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

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

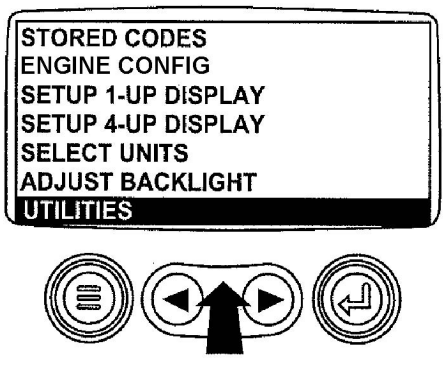


Menu Key

Continued on next page

OURGP11,000012B –19–30OCT03–1/4

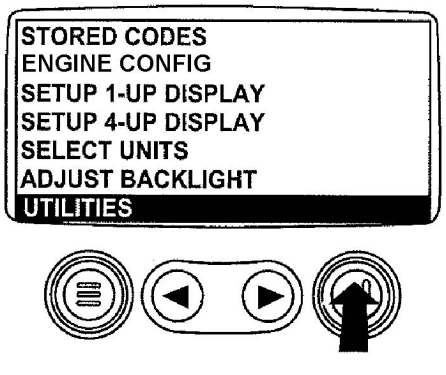
2. The main menu will be displayed. Use the "Arrow" key to scroll through the menu until "Utilities" is highlighted.



Select Utilities

OURGP11,000012B –19–30OCT03–2/4

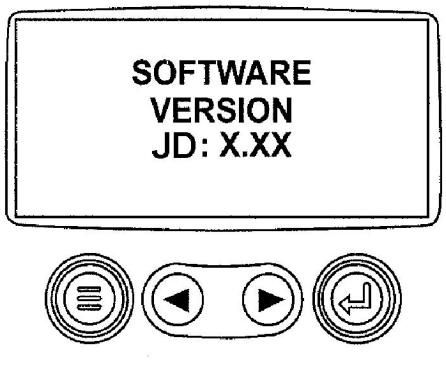
3. Once "Utilities" is highlighted, press "Enter" to activate the utilities function.



Select Utilities

OURGP11,000012B –19–30OCT03–3/4

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



Software Version

OURGP11,000012B –19–30OCT03–4/4

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 WATER PROOF 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, warehoused, for up to six (6) months with no long term preparation.
4. John Deere engines expected to be stored more than six (6) months, long term storage preparation MUST BE taken. (See PREPARING ENGINE FOR LONG TERM STORAGE, later in this section.)

RG,RG34710,4091 –19–09OCT02–1/1

Preparing Engine for Long-Term Storage

The following storage preparations are good 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. Used oil will not give adequate protection. (See CHANGE ENGINE OIL AND FILTER in Lubrication and Maintenance/250 Hour/6 Month Section.)
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. Remove fan/alternator belt, if desired.
5. Remove and clean batteries. Store them in a cool, dry place and keep them fully charged.
6. Disengage the clutch to any engine drivelines.
7. Clean the exterior of the engine with salt-free water and touchup any scratched or chipped painted surfaces with a good quality paint.
8. Coat all exposed (machined) metal surfaces with grease or corrosion inhibitor if not feasible to paint.
9. Seal all openings on engine with plastic bags and tape.
10. Store the engine in a dry protected place. If engine must be stored outside, cover it with a water proof canvas or other suitable protective material and use a strong water proof tape.

RG,RG34710,4093 –19–09OCT02–1/1

Removing Engine from Long-Term Storage

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

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

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

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

RG,RG34710,4094 –19–01JAN96–1/1

General OEM Engine Specifications

NOTE: For John Deere vehicle engines, see Machine Technical Manual.

ITEM	UNIT OF MEASURE	ENGINE MODEL 6081HF070
General Data		
Engine Type	——	In-line, 4 cycle diesel
Aspiration	——	Turbocharged and air-to-air after cooled
Number of Cylinders	——	6
Bore	mm (in.)	116 (4.56)
Stroke	mm (in.)	129 (5.06)
Displacement	L (cu in.)	8.1 (496)
Combustion System	——	Direct Injection
Compression Ratio	——	15.7:1
Physical Dimensions:		
Width	mm (in.)	597 (23.5)
Height	mm (in.)	1152 (45.3)
Length	mm (in.)	1200 (47.6)
Basic Dry Weight	kg (lb)	776 (1710)
Performance Data (Industrial Applications)		
Net Rated Power (Continuous) at 2200 rpm	kW (hp)	206 (276)
Net Peak Torque (Continuous) at 1200 rpm	N•m (lb-ft)	928 (1259)
Net Rated Power (Intermit.) at 2200 rpm	kW (hp)	242 (325)
Net Peak Torque (Intermit) at 1200 rpm	N•m (lb-ft)	1280 (944)
Low Idle Speed	rpm	800
Fast Idle Speed	rpm	2200
Performance Data (Generator Applications)		
Net Rated Power (Prime) at 1800 rpm	kW (hp)	308 (413)
Net Rated Power (Standby) at 1800 rpm	kW (hp)	345 (462)
Net Rated Power (Prime) at 1500 rpm	kW (hp)	220 (295)
Net Rated Power (Standby) at 1500 rpm	kW (hp)	259 (347)
Low Idle Speed	rpm	850
Fast Idle Speed	rpm	1900/1600
Lubrication System		
Oil Pressure at Rated rpm	kPa (psi)	345 (50)
Oil Pressure at Low Idle	kPa (psi)	140 (20) (Minimum)
In-Crankcase Oil Temp at Full Load Speeds	°C (°F)	115°C (240°F)
Cooling System (Liquid, pressurized with centrifugal pump)		
Recommended Pressure Cap	kPa (psi)	69 (10)
Coolant Temperature Operating Range	°C (°F)	82°-94°C (180°-202F°)
Coolant Flow (Industrial)	L/min (gal/min)	330 (87)
Coolant Flow (Generator)		
at 1800 rpm	L/min (gal/min)	270 (71)
at 1500 rpm	L/min (gal/min)	210 (55)

Continued on next page

ITEM	UNIT OF MEASURE	ENGINE MODEL 6081HF070
Base Engine Operation		
Hot Cylinder Compression Pressure with Injectors Removed	kPa (psi)	2380-2790 (345-405)
Valve Clearance (Cold)		
Intake	mm (in.)	0.46 (0.018)
Exhaust	mm (in.)	0.71 (0.028)
Fuel System		
Injector Opening Pressure		
New	kPa (psi)	ECU Programed
Injector Opening Pressure		
Used (min.)	kPa (psi)	ECU Programed
Electrical System		
Battery Capacity (Minimum)- 12 Volt System	CCA	800
Reserve Capacity- 12 Volt System	Minutes	350
Battery Capacity (Minimum)- 24 Volt System	CCA	570
Reserve Capacity- 24 Volt System	Minutes	275
Air System		
Maximum Air Intake Restriction	in. H_2O	25
	(kPa)	(6.25)
	(bar)	(0.06)
	(psi)	(1.0)
Injection Pump Timing	Timing pin inserted with flywheel at TDC	

OUOD006,000008C –19–16OCT02–2/2

Engine Power and Speed Rating Specifications[1]

ENGINE MODEL	FUEL SYSTEM OPTION CODES	POWER RATING @RATED SPEED WITHOUT FAN kW (hp)	RATED SPEED[2] (rpm)	SLOW IDLE (rpm)	FAST IDLE[3] (rpm)
Industrial Units 6081HF070	166A, 166B, 166C, 166D, 166E, 166F, 166G, 166H, 166J, 166K, 166L, 166M	149 (200)[4]	2200	800	2350
	166L, 166M, 166N, 166P, 166R, 166S, 166T, 166U	168 (225)	2200	800	2350
	16GA, 16GB, 16GC, 16GD,	187 (250)	2200	850	2350
	16JA, 16JB, 16JC, 16JD	205 (275)	2200	850	2350
		224 (300)	2200	850	2350
		242 (325)	2200	850	2350
		261 (350)	2200	850	2350
Generator Sets 6081HF070		231 (310)	1800	—	1890
		259 (347)	1800	—	1890
		260 (349)	1800	—	1890
		289 (388)	1800	—	1890
		308 (413)	1800	—	1890
		318 (426)	1800	—	1890

[1] Engine speeds listed are preset to factory specification for application. Therefore, speeds may vary depending upon specific vehicle application requirements. Refer to your machine operator's manual for engine speeds that are different from those preset at the factory.
[2] Generator set engines (3-5% governor) usually run at 1500 rpm (50 Hz) or 1800 (60 Hz) when operating under load depending on cycles of AC current.
[3] For engines with standard governor, fast idle is 7-10% above rated speed. For engines with generator set governors, fast idle is 3-5% above rated speed.
[4] These engines have a 7% power bulge which allows for INTERMITTENT operation of 7% above rated power.

Continued on next page

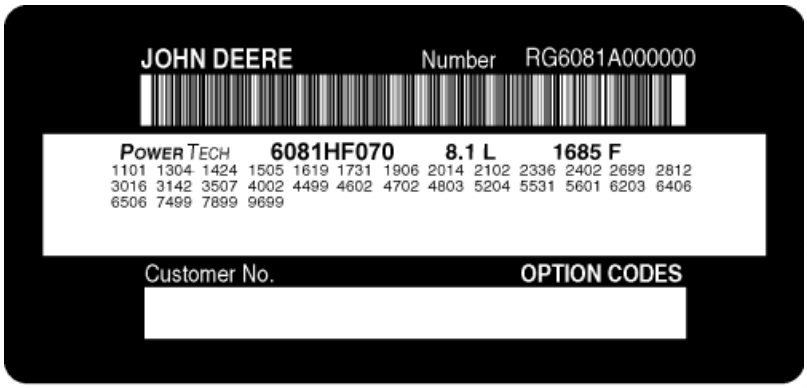
NOTE: Some Option Codes appear more than once. This is because the option number was used on earlier engines, then used on later engines with a different power rating.

NOTE: Cruise Control option is available with the following injection pump option codes:

6081HF070: 166E, 166F, 166G, 166H.

OURGP11,000028C –19–18DEC03–2/2

Engine Crankcase Oil Fill Quantities



Option Code Label

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

"RG" indicates the engine was built in Waterloo, Iowa.

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

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

Listed below are engine crankcase oil fill quantities:

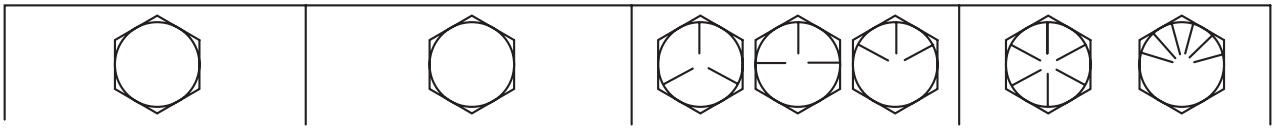
Engine Model-6081HF070	Oil Pan Option Code(s)	Crankcase Oil Capacity
Without Rear PTO With Rear PTO	1905, 1910 1905, 1910	28 L (29.6 qts) 32 L (33.8 qts)
Without Rear PTO With Rear PTO	1906, 1908, 1911, 1912, 1913, 1916 1906, 1908, 1911, 1912, 1913, 1916	28.5 L (30.1 qts) 32.5 L (34.3 qts
Without Rear PTO With Rear PTO	1901, 1909 1901, 1909	32 L (33.8 qts) 36 L (38.0 qts)

NOTE: Crankcase oil capacities are based on installing a new (dry) oil filter and then filling crankcase with oil to "FULL" mark on dipstick.

OURGP11,000026A –19–19NOV03–1/1

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.

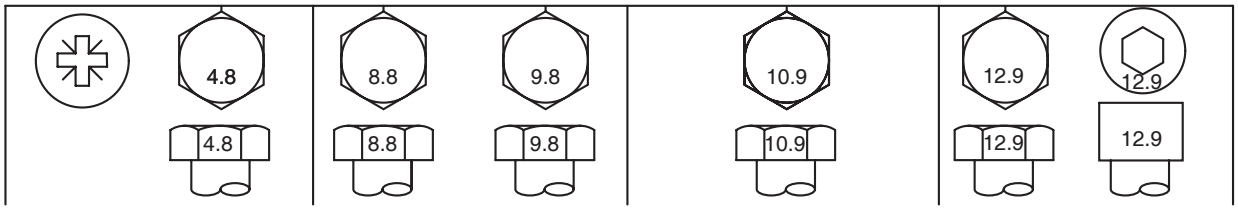
[a]Grade 2 applies for hex cap screws (not hex bolts) up to 6. in (152 mm) long. Grade 1 applies for hex cap screws over 6 in. (152 mm) long, and for all other types of bolts and screws of any length.

[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.

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 not supplied by Deere.

RG,RG34710,4100 –19–01JAN96–1/1

Daily (Prestarting) Service

NOTE: Refer to DAILY PRESTARTING CHECKS in Engine Operating Guidelines Section for detailed procedures.

Check engine oil level.

Check (primary) fuel filter/water separator

Check coolant level.

Check air cleaner dust unloader valve and air restriction indicator, if equipped.

Perform visual walk around inspection.

RG,RG34710,4101 –19–09OCT02–1/1

250 Hour/6 Month Service

Service fire extinguisher.

Change engine oil and filter.[1]

Service battery.

Check coolant pump weep hole foam filter.

Replace single fuel filter (earlier engines)

Check engine mounts.

Hours									
Date									
Hours									
Date									
Hours									
Date									
Hours									
Date									

[1]If John Deere PLUS-50 or ACEA-E4/E5 oil is used along with the specified John Deere oil filter, the oil change interval may be extended by 50 percent or to 375 hours.

OURGP11,000026B –19–20NOV03–1/1

500 Hour/12 Month Service

Clean crankcase vent tube.

Check automatic belt tensioner and belt wear.

Check cooling system

Coolant solution analysis - add SCA's as needed.

Check air intake hoses, connections, and system.

Replace dual fuel filter elements (later engines).

Check engine speeds.

Check crankshaft vibration damper.

Pressure test cooling system.

Hours									
Date									
Hours									
Date									
Hours									
Date									
Hours									
Date									

OURGP11,000026C –19–20NOV03–1/1

2000 Hour/24 Month Service

Have your authorized servicing dealer or engine distributor adjust valve clearance.

Flush cooling system.[1]

Hours									
Date									
Hours									
Date									
Hours									
Date									
Hours									
Date									

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

RG,RG34710,4105 –19–01JAN96–1/1

Service as Required

Drain water separator bowl.

Clean fuel strainer.

Add coolant.

Service air cleaner.

Replace fan-alternator belt.

Check fuses.

Check electrical wiring and connectors.

Bleed fuel system.

Check air compressors (if equipped). (See your John Deere dealer.)

Check freon (A/C) compressors (if equipped). (See your John Deere dealer.)

Check rear PTO (if equipped). (See your John Deere dealer.)

Hours									
Date									
Hours									
Date									
Hours									
Date									

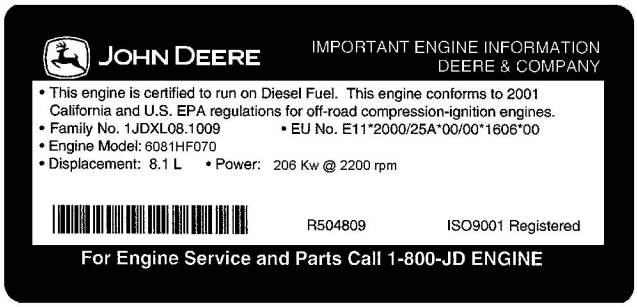
OURGP11,000026D –19–20NOV03–1/1

Emissions Control System Certification Label

CAUTION: Statutes providing severe penalties for tampering with emissions controls may apply at the user's location.

The emissions warranty described below applies only to those engines marketed by John Deere that have been certified by the United States Environmental Protection Agency (EPA) and/or California Air Resources Board (CARB); and used in the United States and Canada in non-road mobile (self-propelled or portable/transportable[1]) equipment. The presence of an emissions label like the one shown signifies that the engine has been certified with the EPA and/or CARB. The EPA and CARB warranties only apply to new engines having the certification label affixed to the engine and sold as stated above in the geographic areas. The presence of an EU number in the third line of the label signifies that the engine has been certified with the European Union countries per Directive 97/68/EC. The emissions warranty does not apply to the EU countries.

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



Emissions Label

[1]*Equipment moved at least once every 12 months.*

RG,RG34710,7628 –19–14NOV02–1/1

U.S. Emissions Control Warranty Statement

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

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

RG,RG34710,4108 –19–18DEC03–1/1

John Deere Service Literature Available

Technical Information

Technical information is available from John Deere. Some of this information is available in electronic as well as printed form. Order from your John Deere dealer or call **1-800-522-7448**. Please have available the model number, serial number, and name of the product.

Available information includes:

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

TS189 –UN–17JAN89

TS191 –UN–02DEC88

TS224 –UN–17JAN89

TS1663 –UN–10OCT97

DX,SERVLIT –19–11NOV97–1/1

021304
PN=219

Publications for This Engine

Technical information is available from John Deere in support of our products. Some of this information is available in electronic as well as printed form. Order from your John Deere dealer or call **1-800-522-7448**. Please have available the model number and serial number, and name of your John Deere engine.

Title		Order Number
POWERTECH 8.1 L OEM Engines (200,000-)		
Operation and Maintenance Manual (English)		OMRG34944
Parts Catalog		PC2876
Component Technical Manuals		
	Base Engine	CTM86
	Level 9 Electronic Fuel System	CTM255
OEM Engine Accessories		CTM67
Alternators and Starter Motors		CTM77

OUOD006,000009C –19–11NOV02–1/1

Index

John Deere Service Keeps You On The Job

John Deere Parts

We help minimize downtime by putting genuine John Deere parts in your hands in a hurry.

That's why we maintain a large and varied inventory–to stay a jump ahead of your needs.

TS100 –UN–23AUG88

RG,RG34710,4115 –19–01JAN96–1/1

The Right Tools

Precision tools and testing equipment enable our Service Department to locate and correct troubles quickly . . . to save you time and money.

TS101 –UN–23AUG88

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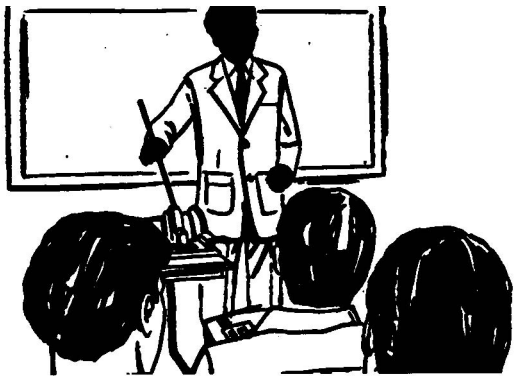
Well-Trained Technicians

School is never out for John Deere service technicians.

Training schools are held regularly to be sure our personnel know your equipment and how to maintain it.

Result?

Experience you can count on!



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Prompt Service

Our goal is to provide prompt, efficient care when you want it and where you want it.

We can make repairs at your place or at ours, depending on the circumstances: see us, depend on us.

JOHN DEERE SERVICE SUPERIORITY: We'll be around when you need us.

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