POWERTECH® 4.5 L & 6.8 L 4045 and 6068 Marine Diesel Engines

OPERATOR'S MANUAL

POWERTECH 4.5/6.8L Marine Diesel Engines

OMRG28997 Issue (29Mar02) (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 air cleaner, and instruments are optional equipment on John Deere Marine Engines. These accessories may be provided by the equipment manufacturer instead of John Deere. This operator's manual applies only to the engine and those options available through the John Deere distribution network.

NOTE: This manual covers POWERTECH® 4.5 and 6.8 L Marine heat exchanger engine models 4045DFM50, 4045TFM50 and 6068TFM50. Also covered in this manual is the sea water aftercooled 6068SFM50 engine with electronic controls.

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.

Learn who he 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 a votre concessionnaire John Deere ou point de service le plus proche pour vous adresser a lui.

Renseignez-vous des que possible pour l'identifier et le localiser. A la premiere 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.

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

Proprietario Del Motore John Deere:

Non aspetti fino a quando ha bisogno della garanzia o di un altro tipo di assistenza per incontrarsi con il Suo Concessionario che fornisce l'assistenza tecnica.

Impari a conoscere chi è e dove si trova. Alla Sua prima occasione cerchi d'incontrarlo. Egli desidera farsi conoscere e conoscere 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.

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.

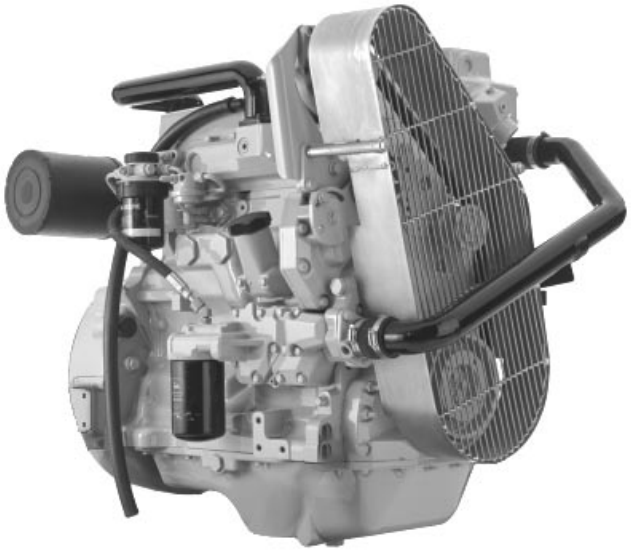
John Deere MotorÄgare:

Vänta inte med att besöka Din John Deere återförsäljare till dess att Du behöver service eller garanti reparation.

Bekanta Dig med var han är och vem han är. Tag första tillfälle att besöka honom. Han vill också träffa Dig för att få veta vad Du behöver och hur han kan hjälpa Dig.

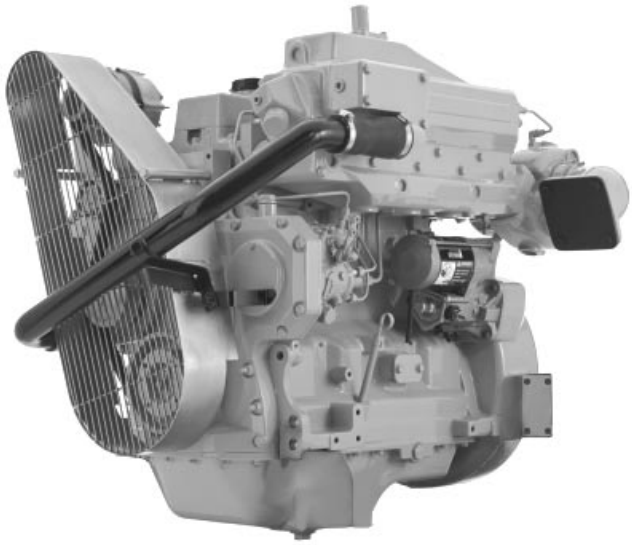
DPSG,OUOE003,2736 –19–11JAN99–1/1

POWERTECH®[1] 4.5 L Marine Engines



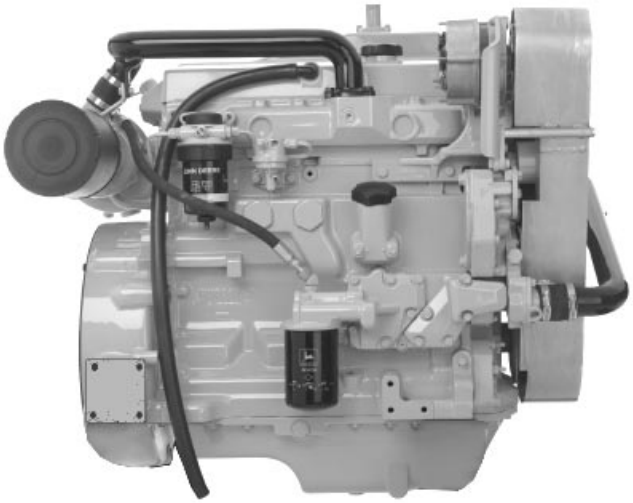
RG9823 –UN–05JAN99

4045TFM50 Engine



RG9824 –UN–05JAN99

4045TFM50 Engine



RG9825 –UN–05JAN99

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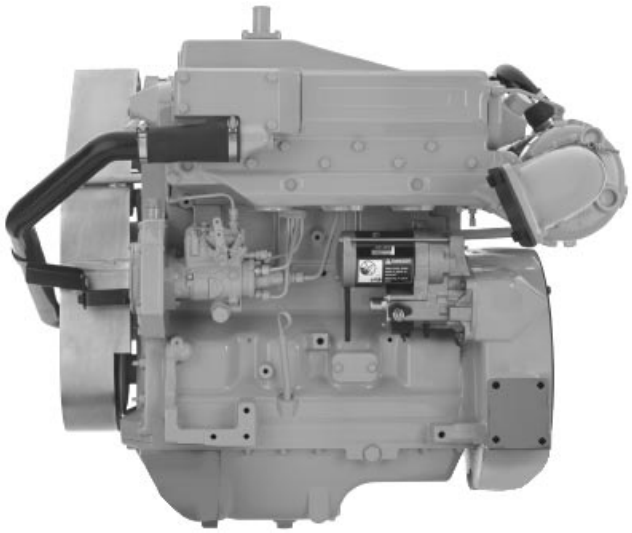


RG9826 –UN–05JAN99

4045TFM50 Engine

[1]*POWERTECH is a registered trademark of Deere & Company.*

RG,RG34710,5501 –19–04JAN02–1/1

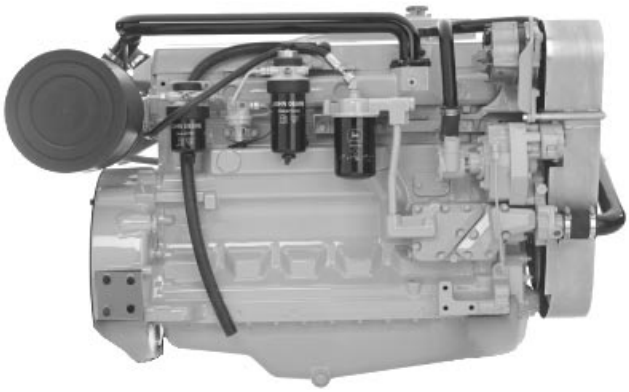
POWERTECH 6.8 L Marine Engines (6068TFM Mechanically Controlled)

RG9827 –UN–05JAN99

6068TFM50 Engine

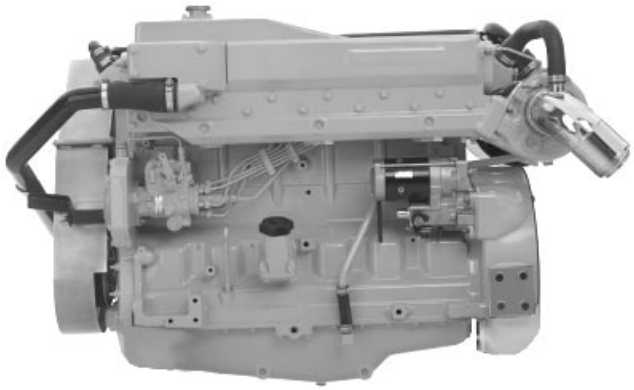
RG9828 –UN–05JAN99

6068TFM50 Engine



RG9829 –UN–05JAN99

6068TFM50 Engine

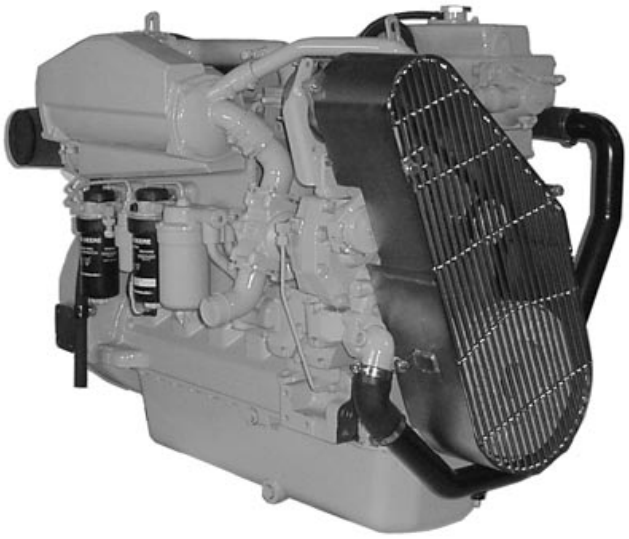


RG9830 –UN–05JAN99

6068TFM50 Engine

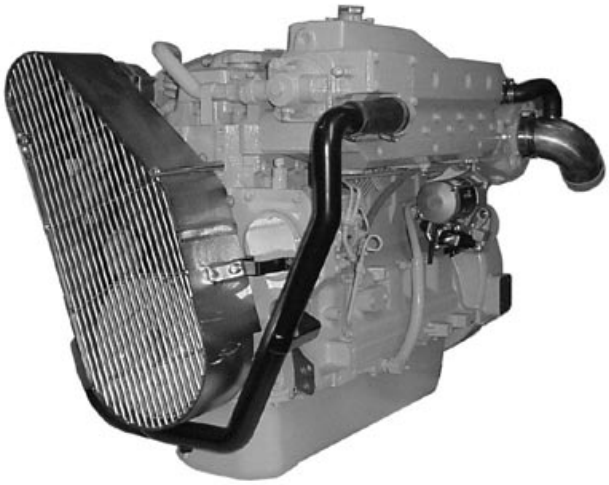
RG,RG34710,5503 –19–03JAN02–1/1

POWERTECH 6.8 L Marine Engines (6068SFM50 Electronically Controlled)



RG12062 –UN–18JAN02

6068SFM50 Engine

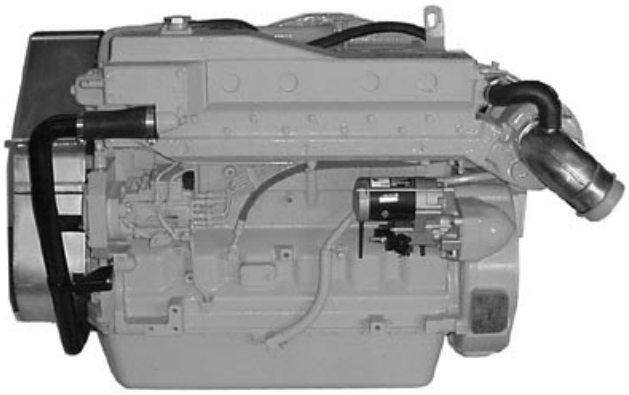


RG12061 –UN–26FEB02

6068SFM50 Engine

RG12064 –UN–18JAN02

6068SFM50 Engine



RG12063 –UN–18JAN02

6068SFM50 Engine

OUOD005,000017A –19–03JAN02–1/1

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.

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Record Keeping

POWERTECH Medallion

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

RG12080 –UN–26FEB02

POWERTECH Medallion

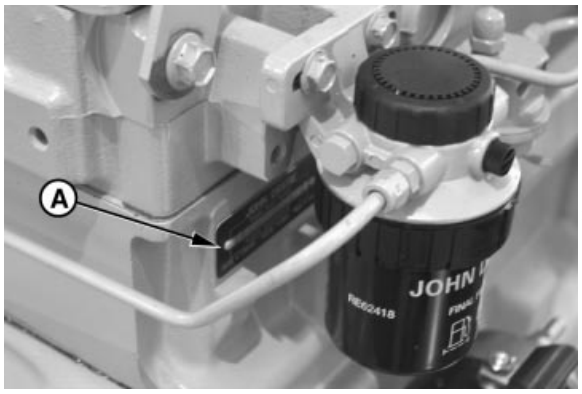
RG,RG34710,5505 –19–11JAN02–1/1

Engine Serial Number Plate

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

- “CD” indicates the engine was built in Saran, France
- “T0” indicates the engine was built in Dubuque, Iowa
- “PE” indicates the engine was built in Torreon, Mexico

Your engine’s serial number plate (A) is located on the right-hand side of cylinder block behind the fuel filter.



RG8007 –UN–15JAN99

Engine Serial Number Plate

A—Serial Number Plate

RG,RG34710,5506 –19–11JAN02–1/1

Record Engine Serial Number

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

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

Engine Serial Number (A)_____

Engine Model Number (B)_____

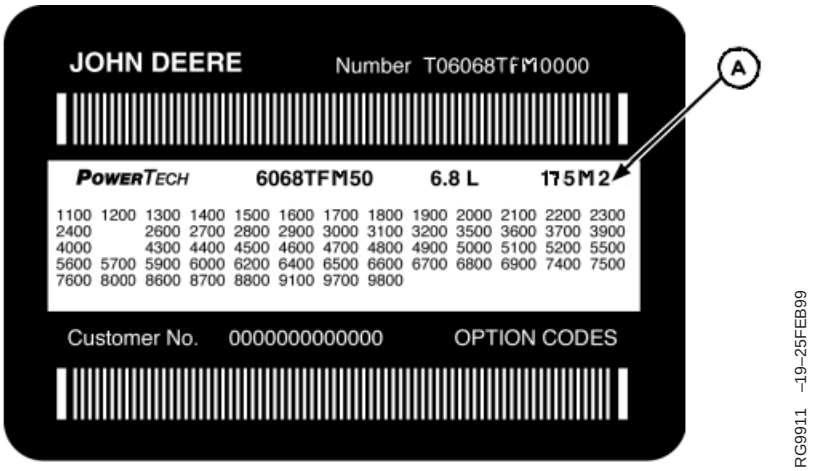
RG9831 –UN–06JAN99

Serial Number Plate

A—Engine Serial Number
B—Engine Model Number

RG,RG34710,5507 –19–20MAY96–1/1

Engine Option Codes



Engine Option Codes

A—Engine Base Code

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

The engine option code label includes an engine base code (A). This base code must also be recorded along with the option codes. At times it will be necessary to furnish this base code to differentiate two identical option codes for the same engine model.

The first two digits of each code identify a specific group, such as alternators. The last two digits of each code identify one specific option provided on your engine, such as a 12-volt, 95-amp alternator.

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

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

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.

RG,RG34710,5508 –19–03JAN02–1/1

Engine Option Codes-Continued

Engine Base Code: _____

Option Codes	Description	Option Codes	Description
11_____	Rocker Arm Cover	50_____	Oil Pump
12_____	Oil Fill Inlet	51_____	Cylinder Head With Valves
13_____	Crankshaft Pulley	52_____	Auxiliary Gear Drive
14_____	Flywheel Housing	53_____	Fuel Heater
15_____	Flywheel	55_____	Shipping Stand
16_____	Fuel Injection Pump	56_____	Paint Option
17_____	Air Inlet	57_____	Coolant Pump Inlet
18_____	Air Cleaner	59_____	Oil Cooler
19_____	Oil Pan	60_____	Add-on Auxiliary Drive Pulley
20_____	Coolant Pump	62_____	Alternator Mounting Bracket
21_____	Thermostat Cover	63_____	Low Pressure Fuel Line
22_____	Thermostat	64_____	Exhaust Elbow
23_____	Belt Drive	65_____	Turbocharger
24_____	Belt	66_____	Temperature Switch
26_____	Engine Coolant Heater	67_____	Electronic Sensors (Base Engine)
27_____	Heat Exchanger	68_____	Crankshaft Rear Damper
28_____	Exhaust Manifold	69_____	Engine Serial Number Plate
29_____	Ventilator System	71_____	Engine Oil Bypass Filter
30_____	Starter Motor	72_____	Engine Control Unit (ECU) and Software
31_____	Alternator	74_____	Air Conditioning (Freon) Compressor
32_____	Instrument Panel	75_____	Air Restriction Indicator
33_____	Tachometer	76_____	Pressure Switches and Sensors
35_____	Fuel Filters	77_____	Timing Gear Cover
36_____	Front Plate	79_____	Engine Certification
37_____	Fuel Transfer Pump	80_____	Sea Water Pump
39_____	Thermostat Housing	81_____	Primary Fuel Filter And Water Separator
40_____	Oil Dipstick	84_____	Electrical Wiring Harness
41_____	Belt-Driven Front Auxiliary Drive	86_____	Drive Pulley
43_____	Starting Aid	87_____	Belt Tensioner
44_____	Timing Gear Cover With Gears	88_____	Oil Filter
45_____	Balancer Shaft	95_____	Special Equipment (Factory Installed)
46_____	Cylinder Block With Liners and Camshaft	96_____	Engine Installation Kit
47_____	Crankshaft and Bearings	97_____	Special Equipment (Field Installed)
48_____	Connecting Rods and Pistons	98_____	Shipping (Engine Hanger Straps)
49_____	Valve Actuating Mechanism	99_____	Service Only Items

DPSG,OUOD007,20 –19–03JAN02–1/1

Record Fuel Injection Pump Model Number

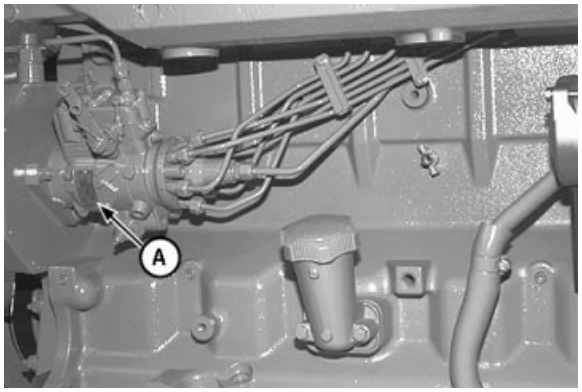
Record the fuel injection pump model and serial information found on the serial number plate (A).

Model No._____ RPM_____

Manufacturer's No._____

Serial No._____

A—Serial Number Plate



Fuel Injection Pump Model Number

RG,RG34710,5511 –19–20MAY96–1/1

Recognize Safety Information

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

Follow recommended precautions and safe operating practices.

T81389 –UN–07DEC88

DX,ALERT –19–29SEP98–1/1

Understand Signal Words

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

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

TS187 –19–30SEP88

DX,SIGNAL –19–03MAR93–1/1

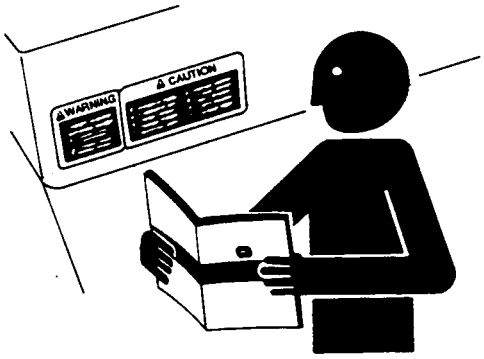
Follow Safety Instructions

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

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

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

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

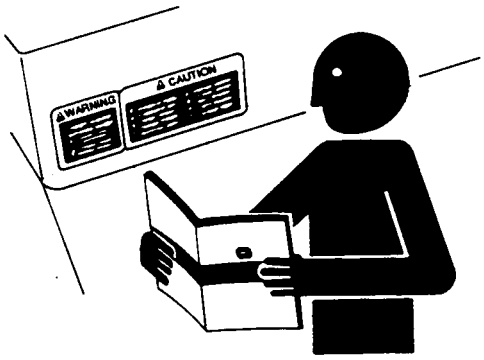


TS201 –UN–23AUG88

DX,READ –19–03MAR93–1/1

Replace Safety Signs

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



TS201 –UN–23AUG88

DX,SIGNS1 –19–04JUN90–1/1

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

RG,RG34710,7508 –19–30JUN97–1/1

Handle Fuel Safely—Avoid Fires

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

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

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

TS202 –UN–23AUG88

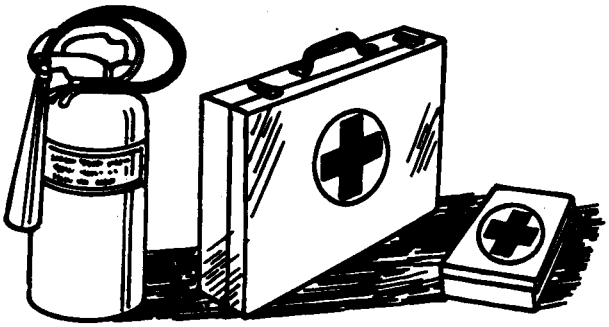
DX,FIRE1 –19–03MAR93–1/1

Prepare for Emergencies

Be prepared if a fire starts.

Keep a first aid kit and fire extinguisher handy.

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



TS291 –UN–23AUG88

DX,FIRE2 –19–03MAR93–1/1

Handle Starting Fluid Safely

Starting fluid is highly flammable.

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

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

Do not incinerate or puncture a starting fluid container.

TS1356 –UN–18MAR92

DX,FIRE3 –19–16APR92–1/1

Handle Fluids Safely—Avoid Fires

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

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

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

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

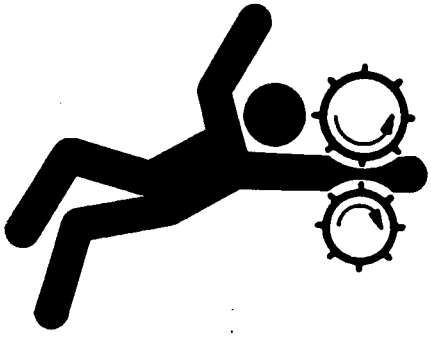
TS227 –UN–23AUG88

DX,FLAME –19–29SEP98–1/1

Service 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

DX,LOOSE –19–04JUN90–1/1

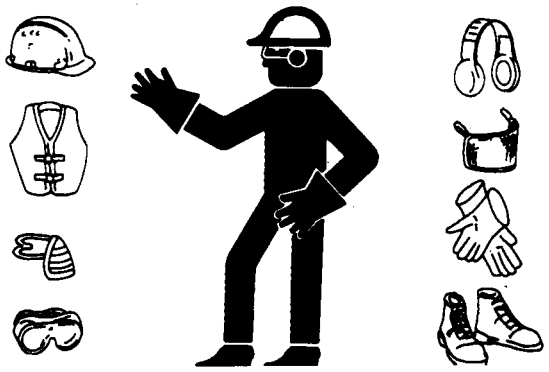
Wear Protective Clothing

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

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

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

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



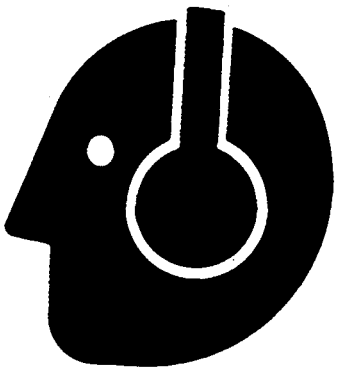
TS206 –UN–23AUG88

DX,WEAR –19–10SEP90–1/1

Protect Against Noise

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

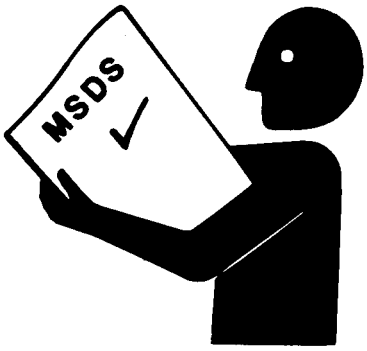
Wear a suitable hearing protective device such as earmuffs or earplugs to protect against objectionable or uncomfortable loud noises.



TS207 –UN–23AUG88

DX,NOISE –19–03MAR93–1/1

Handle Chemical Products Safely



TS1132 –UN–26NOV90

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

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

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

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

DX,MSDS,NA –19–03MAR93–1/1

Stay Clear of Rotating Drivelines

TS1644 –UN–22AUG95

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 cleaning out PTO driven equipment.

DX,PTO –19–12SEP95–1/1

Practice Safe Maintenance

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

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

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

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

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

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

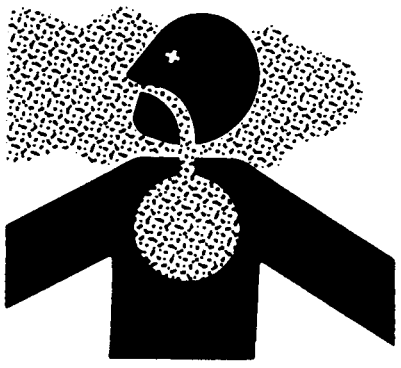
TS218 –UN–23AUG88

DX,SERV –19–17FEB99–1/1

Work In Ventilated Area

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

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



TS220 –UN–23AUG88

DX,AIR –19–17FEB99–1/1

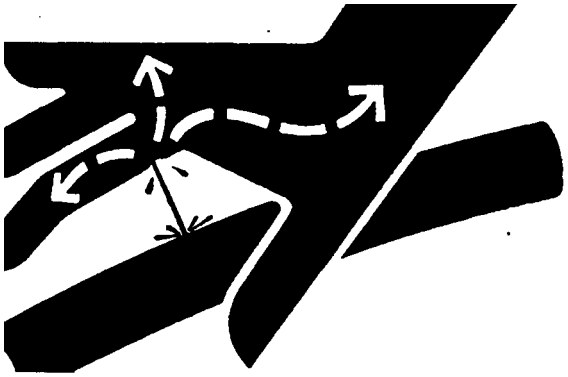
Avoid High-Pressure Fluids

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

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

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

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



X9811 –UN–23AUG88

DX,FLUID –19–03MAR93–1/1

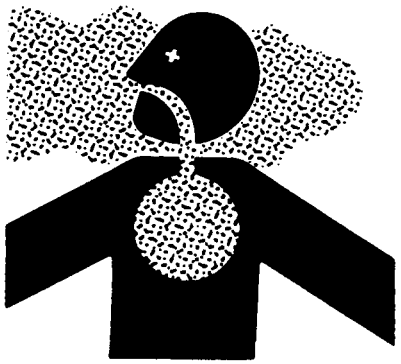
Avoid Heating Near Pressurized Fluid Lines

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

TS953 –UN–15MAY90

DX,TORCH –19–03MAR93–1/1

Remove Paint Before Welding or Heating



TS220 –UN–23AUG88

Avoid potentially toxic fumes and dust.

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

Remove paint before heating:

- Remove paint a minimum of 76 mm (3 in.) from area to be affected by heating.
- If you sand or grind paint, avoid breathing the dust. Wear an approved respirator.
- If you use solvent or paint stripper, remove stripper with soap and water before welding. Remove solvent or paint stripper containers and other flammable material from area. Allow fumes to disperse at least 15 minutes before welding or heating.

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

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

Dispose of paint and solvent properly.

DX,PAINT –19–19JUL01–1/1

Service Cooling System Safely

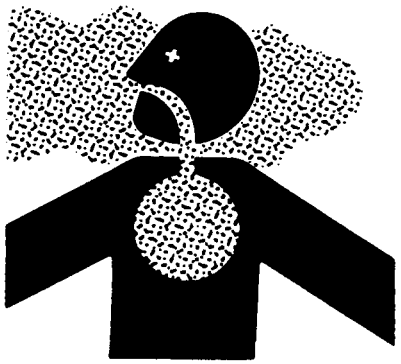
TS281 –UN–23AUG88

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

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

DX,RCAP –19–04JUN90–1/1

Avoid Harmful Asbestos Dust



TS220 –UN–23AUG88

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

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

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

Keep bystanders away from the area.

DX,DUST –19–15MAR91–1/1

Prevent Battery Explosions

TS204 –UN–23AUG88

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).

DX,SPARKS –19–03MAR93–1/1

Prevent Acid Burns

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

Avoid the hazard by:

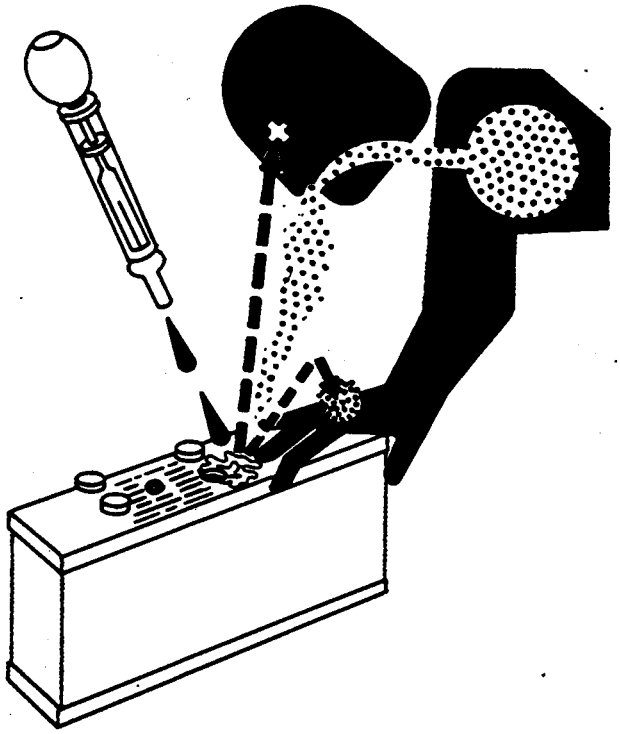
1. Filling batteries in a well-ventilated area.
2. Wearing eye protection and rubber gloves.
3. Avoiding breathing fumes when electrolyte is added.
4. Avoiding spilling or dripping electrolyte.
5. Use proper jump start procedure.

If you spill acid on yourself:

1. Flush your skin with water.
2. Apply baking soda or lime to help neutralize the acid.
3. Flush your eyes with water for 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 quarts).
3. Get medical attention immediately.



TS203 –UN–23AUG88

DX,POISON –19–21APR93–1/1

Protect Against High Pressure Spray

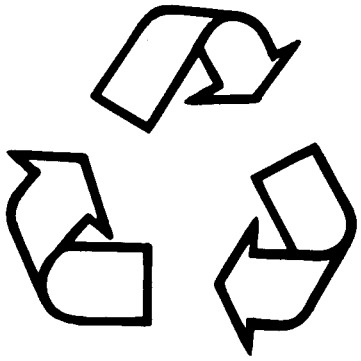
Spray from high pressure nozzles can penetrate the skin and cause serious injury. Keep spray from contacting hands or body.

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

TS1343 –UN–18MAR92

DX,SPRAY –19–16APR92–1/1

Dispose of Waste Properly



TS1133 –UN–26NOV90

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

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

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

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

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

DX,DRAIN –19–03MAR93–1/1

Diesel Fuel

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

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

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

Required fuel properties

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

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

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

Fuel lubricity should pass a minimum load level of 3100 grams as measured by ASTM D6078 or, maximum scar diameter of 0.45 mm as measured by ASTM D6079.

Sulfur content:

- Diesel fuel quality and fuel sulfur content must comply with all existing regulations for the area in which the engine operates.
- Sulfur content less than 0.05% (500 ppm) is preferred.
- If diesel fuel with sulfur content greater than 0.05% (500 ppm) is used, crankcase oil service intervals may be affected. (See recommendation for Diesel Engine Oil.)
- DO NOT use diesel fuel with sulfur content greater than 1.0%.

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

OUOD002,0000171 –19–18DEC01–1/1

Lubricity of Diesel Fuel

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

Diesel fuels for highway use in the United States and Canada require sulfur content less than 0.05% (500 ppm).

Diesel fuel in the European Union requires sulfur content less than 0.05% (500 ppm).

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 gram as measured by the ASTM D6078 or maximum scar diameter of 0.45 mm as measured by ASTM D6079.

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

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

OUOD002,0000179 –19–18DEC01–1/1

Diesel Fuel Storage

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.

IMPORTANT: DO NOT store diesel fuel in galvanized containers. Diesel fuel stored in galvanized containers reacts with zinc coating on container to form zinc flakes. If fuel contains water, a zinc gel will also form. The gel and flakes will quickly plug fuel filters, damage injection nozzles and injection pump.

DO NOT use brass-coated containers for fuel storage. Brass is an alloy of copper and zinc.

Store diesel fuel in plastic, aluminum, and steel containers specially coated for diesel fuel storage.

Avoid storing fuel over long periods of time. If fuel is stored for more than a month prior to use, or there is a slow turnover in fuel tank or supply tank, add a fuel conditioner such as John Deere PREMIUM DIESEL FUEL CONDITIONER or equivalent to stabilize the fuel and prevent water condensation. John Deere PREMIUM DIESEL FUEL CONDITIONER is available in winter and summer formulas. Fuel conditioner also reduces fuel gelling and controls wax separation during cold weather.

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

RG,RG34710,7526 –19–18DEC01–1/1

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

Filling Fuel Tank

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

DO NOT smoke while filling fuel tank or servicing fuel system.

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.

Fill fuel tank at the end of each day's operation to prevent condensation in tank as moist air cools, condenses and freezes during cold weather.

TS202 –UN–23AUG88

Fill Fuel Tank Safely

RG,RG34710,5534 –19–27MAR02–1/1

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.

Fuel Heaters

Two options are available with fuel heaters: one location is at the inlet port of the primary fuel filter, while the other location is at the inlet port of the final fuel filter.

Coolant Heaters

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

Intake Air Heater

6068SFM50 Only - The ECU controlled fuel injection timing and intake air heater combine to eliminate cold starting white smoke. The intake air heater aids in cold starting in low ambient temperature conditions.

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.

RG,RG34710,7529 –19–11JAN02–1/1

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 Classification CD
- API Service Classification CC
- ACEA Specification 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**
- **ACEA E2**

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

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

OUOD002,0000178 –19–17DEC01–1/1

Diesel Engine Oil

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

The following oil is preferred:

- John Deere PLUS-50®

The following oils are also recommended:

- John Deere TORQ-GARD SUPREME®
- Oils meeting ACEA Specification E5

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

- API Service Classification CI-4
- API Service Classification CH-4
- ACEA Specification E3
- ACEA Specification E4

Multi-viscosity diesel engine oils are preferred.

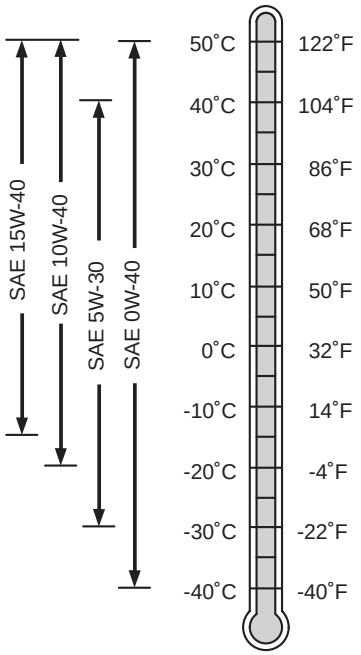
Diesel fuel quality and sulfur content must comply with all existing emissions regulations for the area in which the engine operates.

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%.

Diesel fuel with sulfur content greater than 1.0% (10,000 ppm) is not recommended.

Extended service intervals may apply when John Deere preferred engine oils are used. Consult your John Deere dealer for more information.



Diesel Engine Oil

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

OUOD002,0000172 –19–18DEC01–1/1

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 engine distributor or servicing dealer to obtain specific information and recommendations.

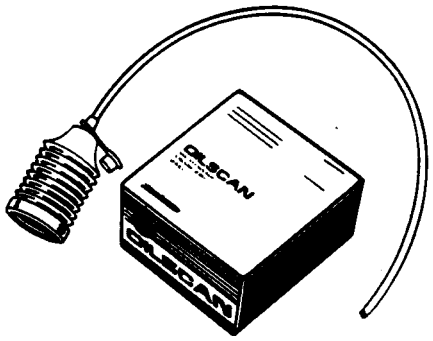
RG,RG34710,5539 –19–20MAY96–1/1

OILSCAN®and COOLSCAN™

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

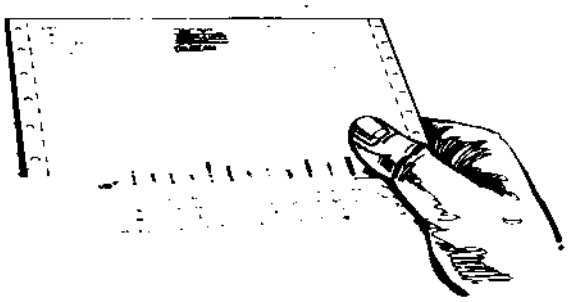
Oil and coolant samples should be taken from each system prior to its recommended change interval.

Check with your John Deere engine distributor or servicing dealer for the availability of OILSCAN,® OILSCAN PLUS,® COOLSCAN™ and, COOLSCAN PLUS™ kits.



T6828AB –UN–15JUN89

Sampling Programs



T6829AB –UN–18OCT88

Recommended Change Interval

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

OUOD002,0000173 –19–23NOV01–1/1

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.

RG,RG34710,5541 –19–20MAY96–1/1

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.

RG,RG34710,5542 –19–20MAY96–1/1

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

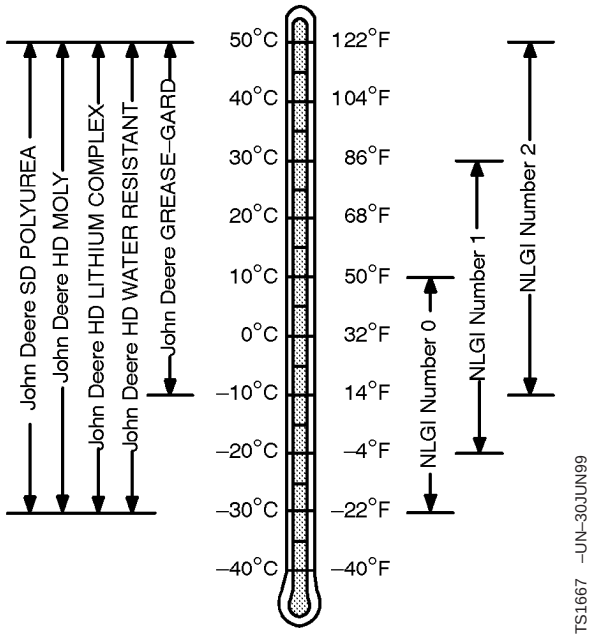
The following greases are also recommended:

- 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.



Grease

DX,GREA1 –19–24JAN00–1/1

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).

The following engine coolant is preferred for service:

- John Deere COOL-GARD Prediluted Coolant

The following engine coolant is also recommended:

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

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

- ASTM D5345 (prediluted coolant)
- ASTM D4985 (coolant concentrate) in a 40 to 60% mixture of concentrate with quality water

Coolants meeting these specifications require use of supplemental coolant additives, formulated for heavy-duty diesel engines, for protection against corrosion and cylinder liner erosion and pitting.

A 50% mixture of ethylene glycol engine coolant in water provides freeze protection to -37°C (-34°F). If protection at lower temperatures is required, consult your John Deere dealer for recommendations.

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

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

Coolant Drain Intervals

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

DX,COOL3 –19–05FEB99–1/1

Diesel Engine Coolants, Supplemental Additive Information

Engine coolants are a combination of three chemical components: ethylene glycol (antifreeze), inhibiting coolant additives, and quality water.

Coolant Specifications

Some products, including John Deere John Deere COOL-GARD Prediluted Coolant, are fully formulated coolants that contain all three components in their correct concentrations. Do not add an initial charge of supplemental coolant additives to these fully formulated products.

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

Coolants meeting ASTM D5345 (prediluted coolant) or ASTM D4985 (coolant concentrate) require an initial charge of supplemental coolant additives.

Replenish Coolant Additives

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

Why Use Supplemental Coolant Additives?

Operating without proper coolant additives will result in increased corrosion, cylinder liner erosion and pitting, and other damage to the engine and cooling system. A simple mixture of ethylene glycol and water will not give adequate protection.

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

Avoid Automotive-Type Coolants

Never use automotive-type coolants (such as those meeting ASTM D3306 or ASTM D4656). These coolants do not contain the correct additives to protect heavy-duty diesel engines. They often contain a high concentration of silicates and may damage the engine or cooling system.

Water Quality

Water quality is important to the performance of the cooling system. Distilled, deionized, or demineralized water is recommended for mixing with ethylene glycol base engine coolant concentrate. All water used in the cooling system should meet the following minimum specifications for quality:

Chlorides	<40 mg/L
Sulfates	<100 mg/L
Total Dissolved Solids	<340 mg/L
Total Hardness	<170 mg/L
pH	5.5 to 9.0

Freeze Protection

The relative concentrations of ethylene glycol and water in the engine coolant determine its freeze protection limit.

Ethylene Glycol	Freeze Protection Limit
40%	-24°C (-12°F)
50%	-37°C (-34°F)
60%	-52°C (-62°F)

DO NOT use a coolant-water mixture greater than 60% ethylene glycol.

DX,COOL7 –19–24JAN00–1/1

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 month 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.

RG7297 –UN–22SEP99

Coolant Test Strips

RG7397 –UN–05DEC97

CoolScan Bellows

COOLSCAN™ and COOLSCAN PLUS™

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

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

OUOD002,0000174 –19–18DEC01–1/1

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 Deere COOL-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.

DX,COOL4 –19–15JUN00–1/1

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

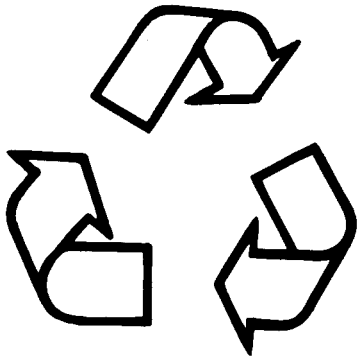
Disposing of Coolant

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.

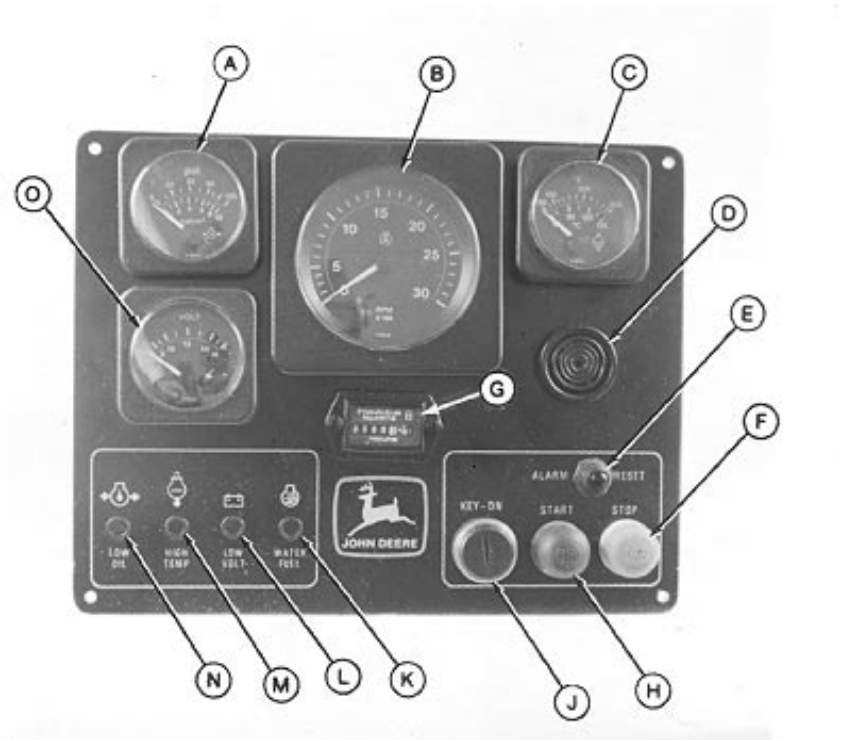
Inquire on the proper way to recycle or dispose of waste from your local environmental or recycling center, or from your John Deere engine distributor or servicing dealer.



TS1133 –UN–26NOV90

RG,RG34710,7543 –19–30JUN97–1/1

Instrument (Gauge) Panel (Propulsion Units Only) (Except 6068SFM50)



RG6097 –UN–30JAN92

A—Oil Pressure Gauge
B—Tachometer
C—Coolant Temperature Gauge
D—Audible Alarm
E—Alarm Reset Switch
F—Stop Switch
G—Hour Meter
H—Start Switch
J—Key Switch
K—Water-in-Fuel Warning Light
L—Low Battery Voltage Warning Light
M—High Coolant Temperature Warning Light
N—Low Oil Pressure Warning Light
O—Voltmeter

All controls and gauges are optional equipment on John Deere Marine Engines. They may be supplied by the boat builder instead of John Deere. The following information applies only to those controls and gauges provided by John Deere. Consult your boat builder for information on instrumentation other than those supplied by John Deere.

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

NOTE: Main station instrument panel shown, flybridge panel is similar except it does not have a key switch (J) or hour meter (G).

The optional instrument (gauge) panel available from your John Deere engine distributor or servicing dealer is recommended for propulsion units only and is not equipped with safety shut-down devices, only audible and visible warning devices provided.

Following is a brief description of the available optional gauges and warning devices:

A—Engine Oil Pressure Gauge

The oil pressure gauge (A) indicates engine oil pressure. It is connected to an audible alarm (D) and a warning light (N) for warning the operator if engine oil pressure falls below a safe operating pressure.

Continued on next page

NOTE: Refer to photo on previous page.

B—Tachometer

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

C—Engine Coolant Temperature Gauge

The engine coolant temperature gauge (C) indicates the engine coolant temperature. It is connected to an audible alarm and a warning light (M) to warn the operator if coolant temperature rises above the preset safe operating temperature.

D—Audible Alarm

The audible alarm (D) will sound (and warning light will appear) whenever low oil pressure, high coolant temperature, low battery voltage, or water-in-fuel condition exists.

E—Reset (Audible Alarm Override) Switch

The reset switch (E) has a button that silences the audible alarm for approximately 2-1/2 minutes when depressed.

F—Stop Switch

The stop switch (F) has a button which when depressed and held in, will stop the engine with key switch at any position. The button must be held in until engine is completely stopped.

G—Hour Meter

The electric hour meter (G) is used to show the operating time of an engine while key switch is in the “ON” position. The hour meter records the time in tenths of an hour and should be used as a guide for scheduling periodic maintenance.

H—Start Switch

The start switch (H) has a button which when depressed and held in, operates the starting motor. The engine will only start with key switch in the “ON” position.

J—Key Switch

The two position (ON—OFF) key switch (J) controls the engine electrical system, it does not start nor stop the engine. When the switch is in the “ON” position, the engine may be started or stopped by depressing each respective button. When the switch is in the ”OFF” position, the engine may be stopped but it can not be started.

K—Water-In-Fuel Warning Light

L—Low Battery Voltage Warning Light

M—High Coolant Temperature Warning Light

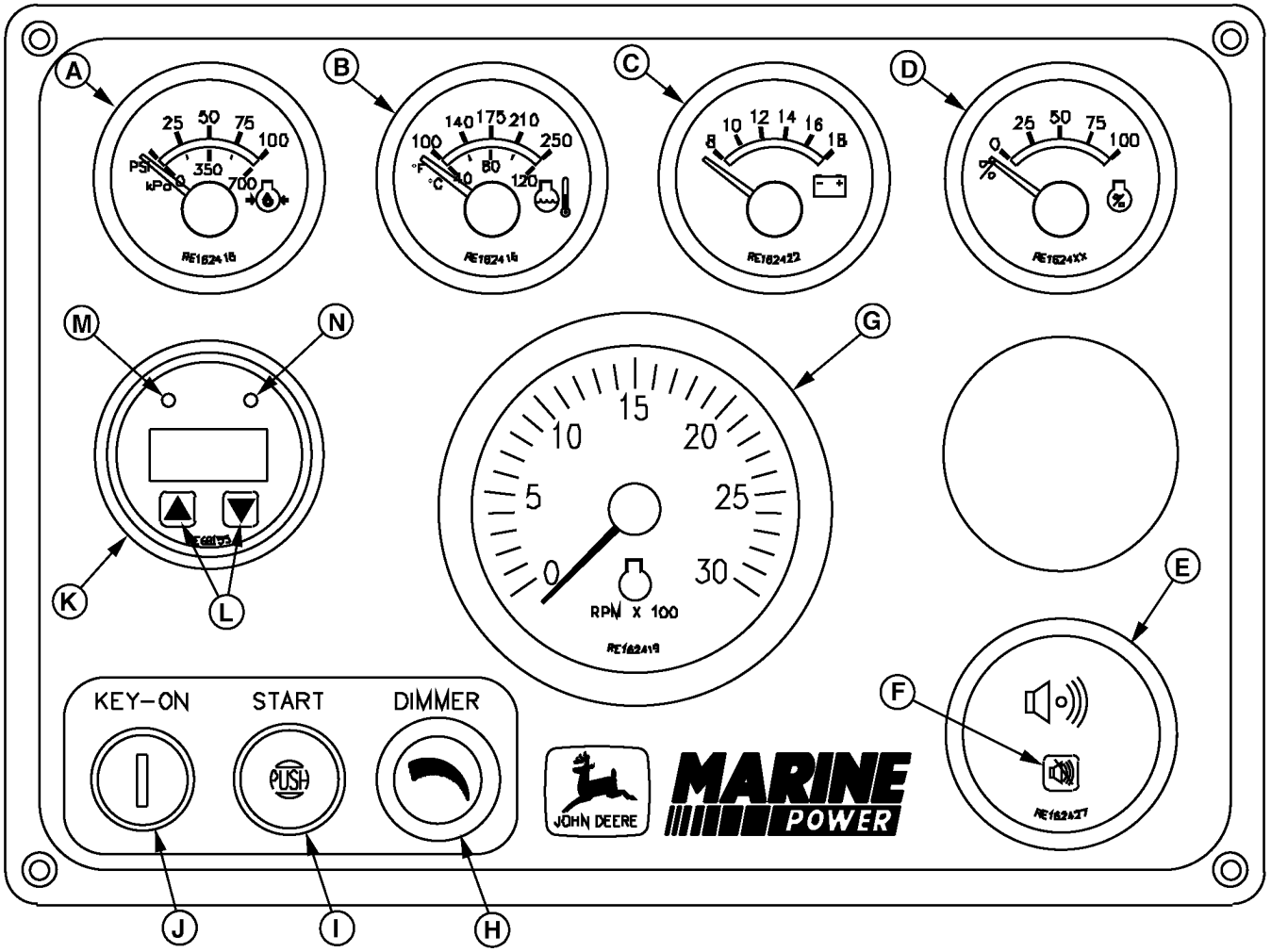
N—Low Oil Pressure Warning Light

O—Voltmeter

The voltmeter (O) indicates system battery voltage.

RG,RG34710,5551 –19–20MAY96–2/2

John Deere Instrument Panel (6068SFM50 Electronically Controlled Engine)



Instrument Panel

A—Oil Pressure Gauge
B—Coolant Temperature Gauge
C—Voltmeter
D—Power Meter
E—Audible Alarm
F—Audible Alarm Override Switch
G—Tachometer
H—Dimmer Switch
I—Start Switch
J—Key Switch
K—Diagnostic Gauge/Hour Meter
L—Touch Switches
M—Amber "WARNING" Indicator
N—Red "STOP ENGINE" Indicator

John Deere 6068SFM50 *POWERTECH*® Marine Engine has an electronic control system, which has the following controls and gauges. The following information applies only to those controls and gauges supplied by John Deere. Refer to your engine application manual or boat builder for specific guidelines if John Deere-sourced controls and instrumentation are not used.

POWERTECH is a trademark of Deere & Company.

Continued on next page

RG,RG34710,20045 –19–03JAN02–1/3

NOTE: For generator - set engines, the gauges required are available from generator - set supplier. The gauges required are hour meter, oil pressure gauge and coolant temperature gauge.

IMPORTANT: Whenever an electronic gauge or sensor does not register a correct reading, replace it with a new one. DO NOT attempt to repair it. Wiring diagram foldouts are located in the TROUBLESHOOTING Section later in this manual.

NOTE: The standard main station (wheel house) instrument panel is shown. An optional flybridge panel is also available that includes the same gauges as the standard panel except there is no diagnostic gauge or audible alarm. Also the flybridge panel has engine start and stop buttons instead of the key start switch found on the standard panel.

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.

A—Engine Oil Pressure Gauge

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

B—Engine Coolant Temperature Gauge

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

C—Voltmeter

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

D—Power Meter

The power meter shows percent of available engine power being used by the vessel.

E—Audible Alarm

The audible alarm (E) 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).

F—Audible Alarm Override Switch

The override switch (F) has a button that silences the audible alarm for approximately 2-1/2 minutes when depressed.

G—Tachometer

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

H—Dimmer Switch

The dimmer switch (H) allows the operator to dim or brighten the illumination of the instrument panel.

I—Start Switch

The start switch (I) has a button which when depressed and held in, operates the starting motor to start the engine. The engine will only start with key switch in the "ON" position.

J—Key Switch

The two-position (OFF/ON) key switch (J) controls the engine electrical system and stops the engine. When the switch is in the "ON" position, the engine may be started by depressing the start switch (I).

Continued on next page

K—Diagnostic Gauge/Hour Meter

The diagnostic gauge (K) displays diagnostic trouble codes (DTCs) as they are accessed. Other information on the engine can be accessed using the touch switches (L). The hour meter feature shows the operating hours of the engine and should be used as a guide for scheduling periodic maintenance. If engine trouble occurs, display will alternately flash from hour meter reading to the message “SrvcCode”. Then the touch switches (L) can be used to access the actual trouble code (DTC) (see following).

L—Touch Switches

Use the touch switches (L) to change the displays on the window of the diagnostic gauge and to access engine performance data.

Pressing the left-hand UP switch or the right-hand DOWN switch will allow you to view various engine parameters and any diagnostic fault codes that occur.

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

M—Amber “WARNING” Indicator Light

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

N—Red “STOP ENGINE” Indicator Light

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

RG,RG34710,20045 –19–03JAN02–3/3

Using Diagnostic Gauge To Access Engine Information (6068SFM50 Engine)

The diagnostic gauge (A) allow 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.

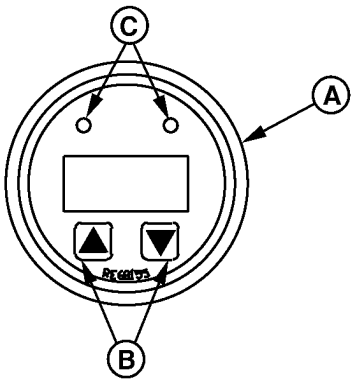
Press the two touch switches (B) to view the various engine functions in sequence. The displays can be selected as either customary English or metric units.

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
- Fuel Economy
- Throttle position
- Current fuel consumption
- Intake manifold temperature
- Active service (diagnostic) codes
- Stored service (diagnostic) codes from the engine
- Set the units for display
- View the engine configuration parameters

NOTE: Some items listed may not be active on all engines.

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 units information, i.e. “80 psi” for oil pressure. 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 fault messages received by the diagnostic gauge.



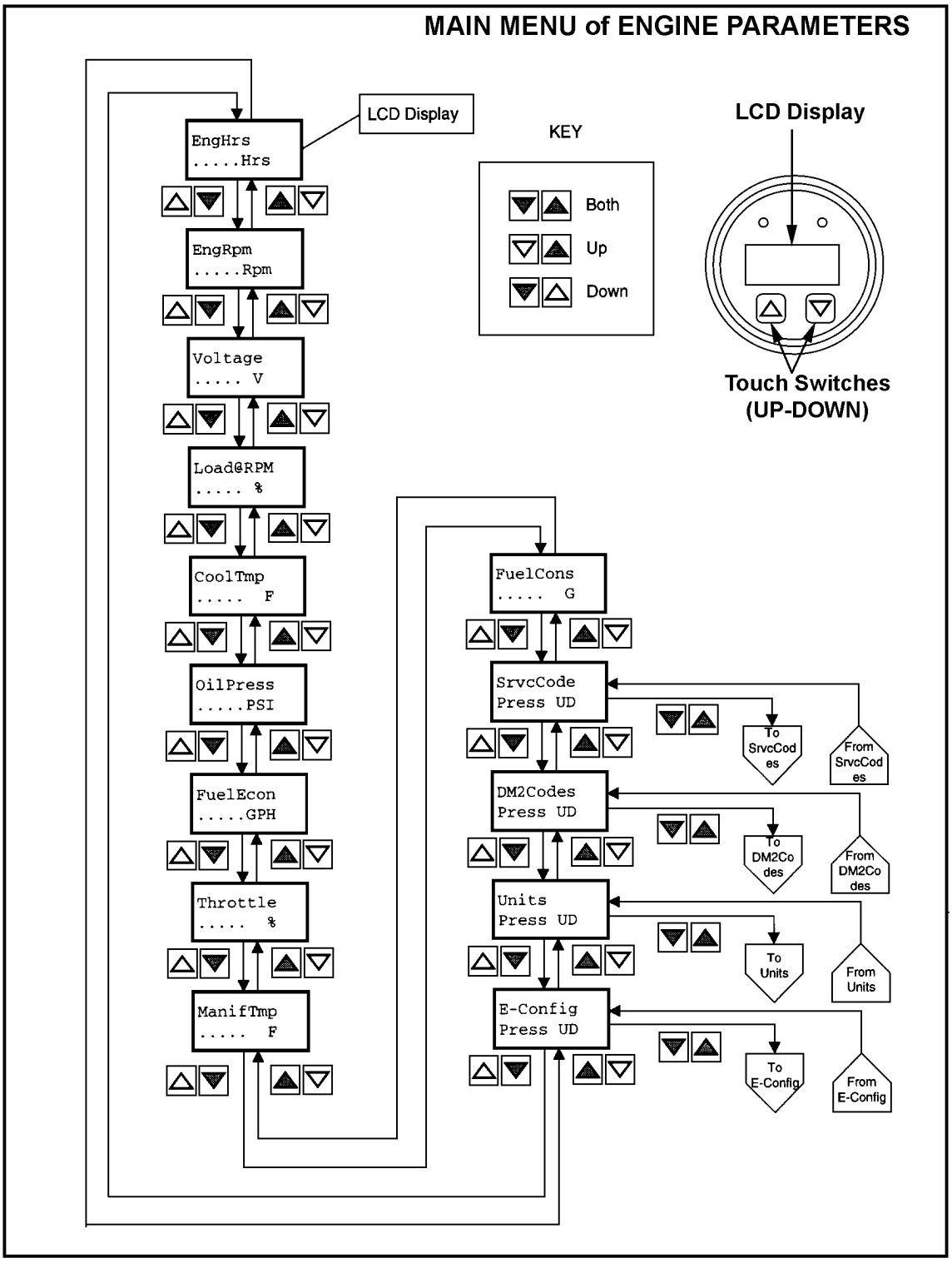
RG10031 –UN–28OCT99

Diagnostic Gauge

A—Diagnostic Gauge
B—Touch Switches
C—Lights

RG,RG34710,20046 –19–25MAR02–1/1

Using Touch Switches To Display Information (6068SFM50 Engine)



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 the 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. 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 switches.

2. To select or exit a sub-menu, ***simultaneously*** press the UP and DOWN switches.

Selecting Engine Data Parameters

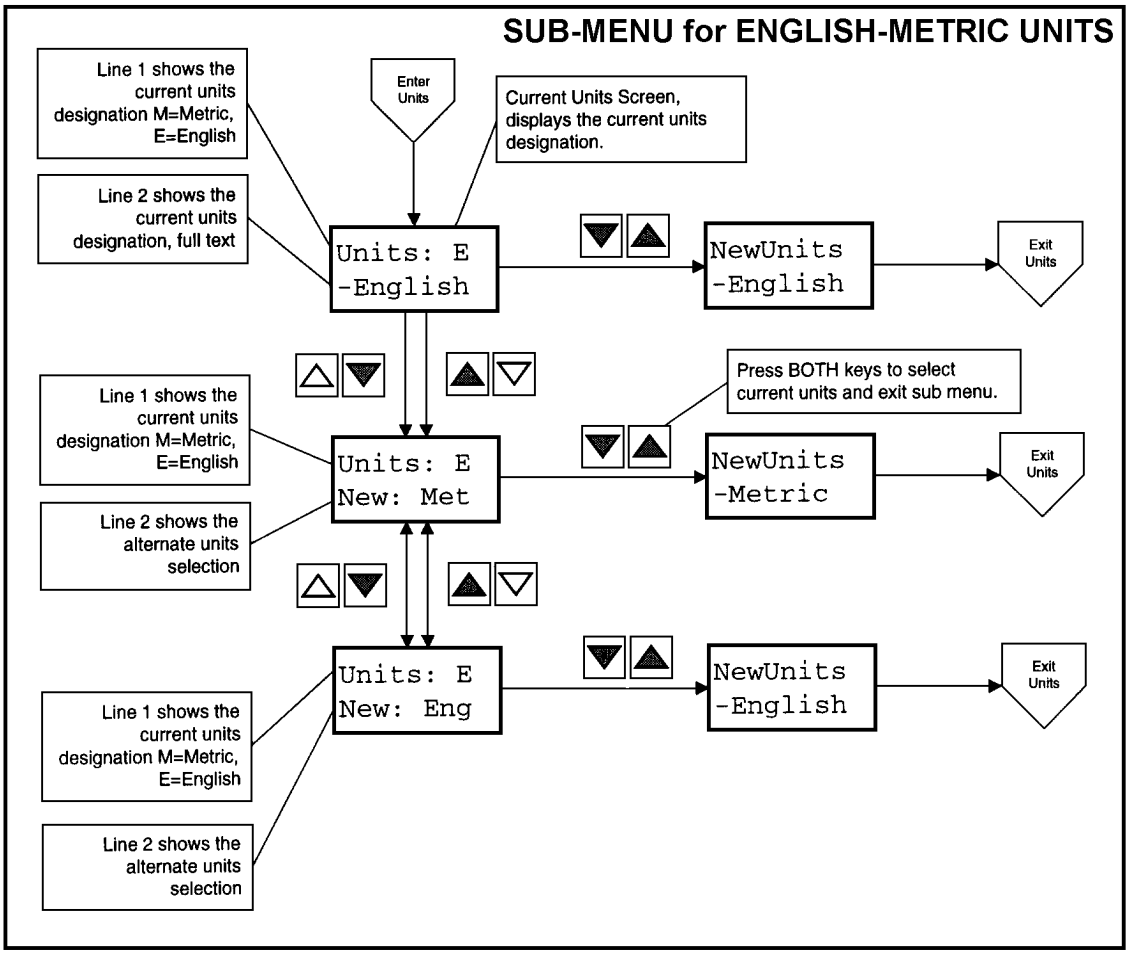
To read any of the engine parameters, press either UP or DOWN switches (as shown on diagram) until the top line of the display shows the desired information.

Selecting Sub-Menus

Press either the UP or DOWN switches 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 Fault Codes (DTCs).

RG,RG34710,20047 –19–25MAR02–2/2

Changing Units Of Measure (English Or Metric) (6068SFM50 Engine)



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.

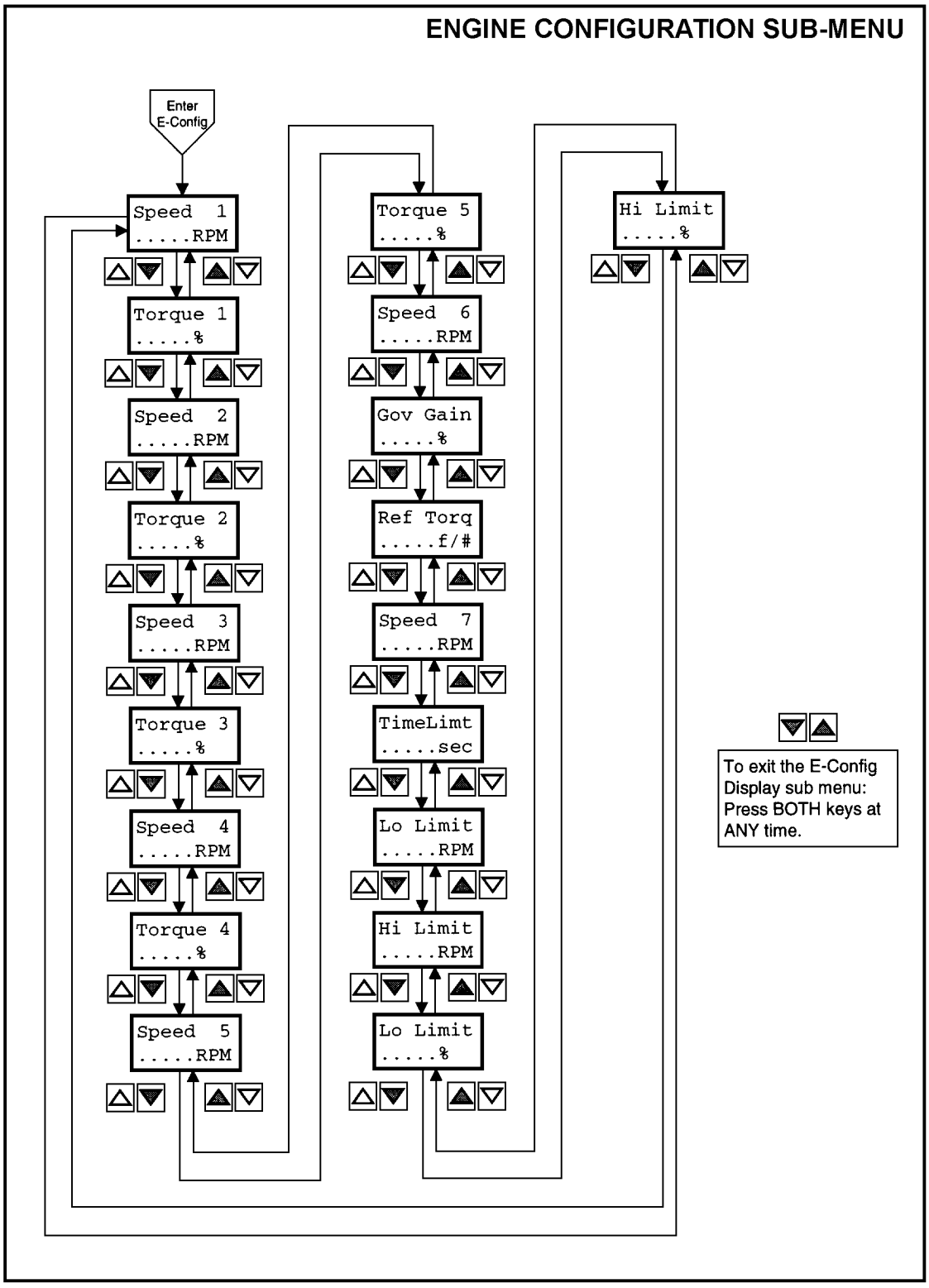
To select the *Units Sub-Menu*, press the UP or DOWN switches until the top line of the display reads “units”.

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 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.

RG,RG34710,20048 –19–25MAR02–1/1

Viewing Engine Configuration Data (6068SFM50 Engine)



Viewing Configuration Data

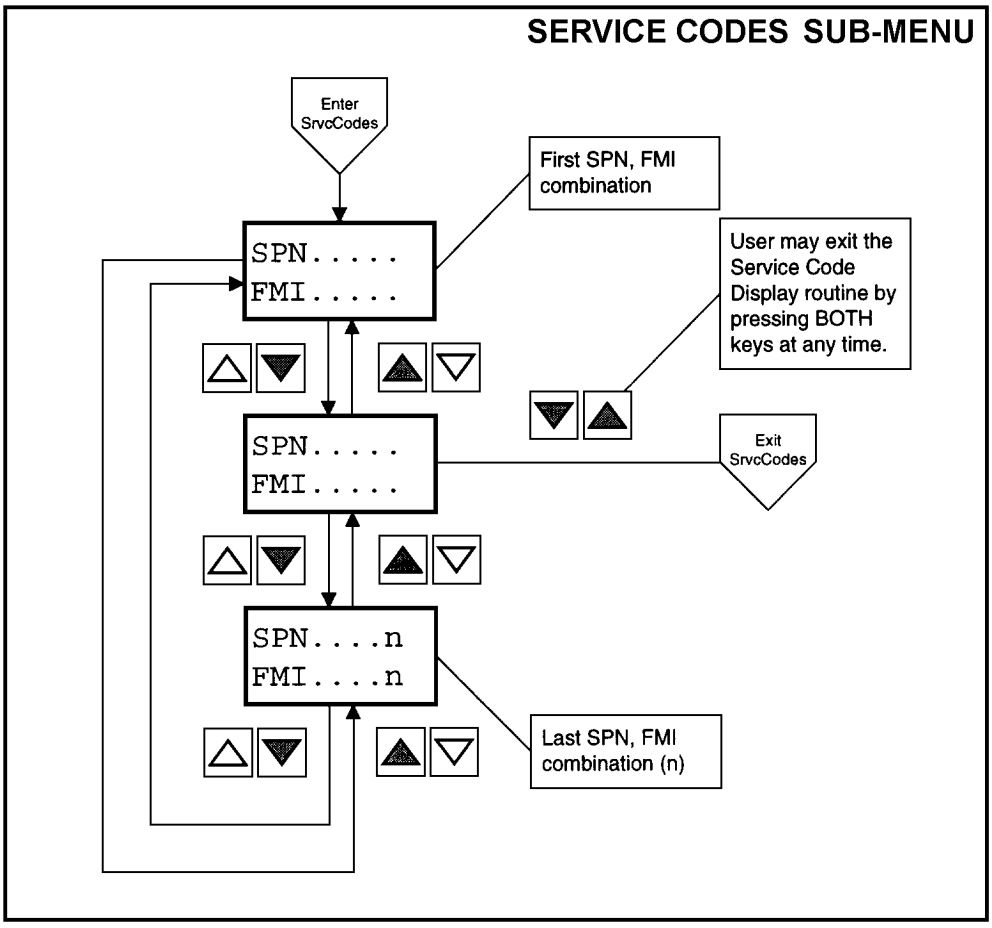
Continued on next page

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 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,OUOE003,8001 –19–25MAR02–2/2

Viewing Active Engine Service Codes (DTC) (6068SFM50 Engine)



Active Service Codes Sub-Menu

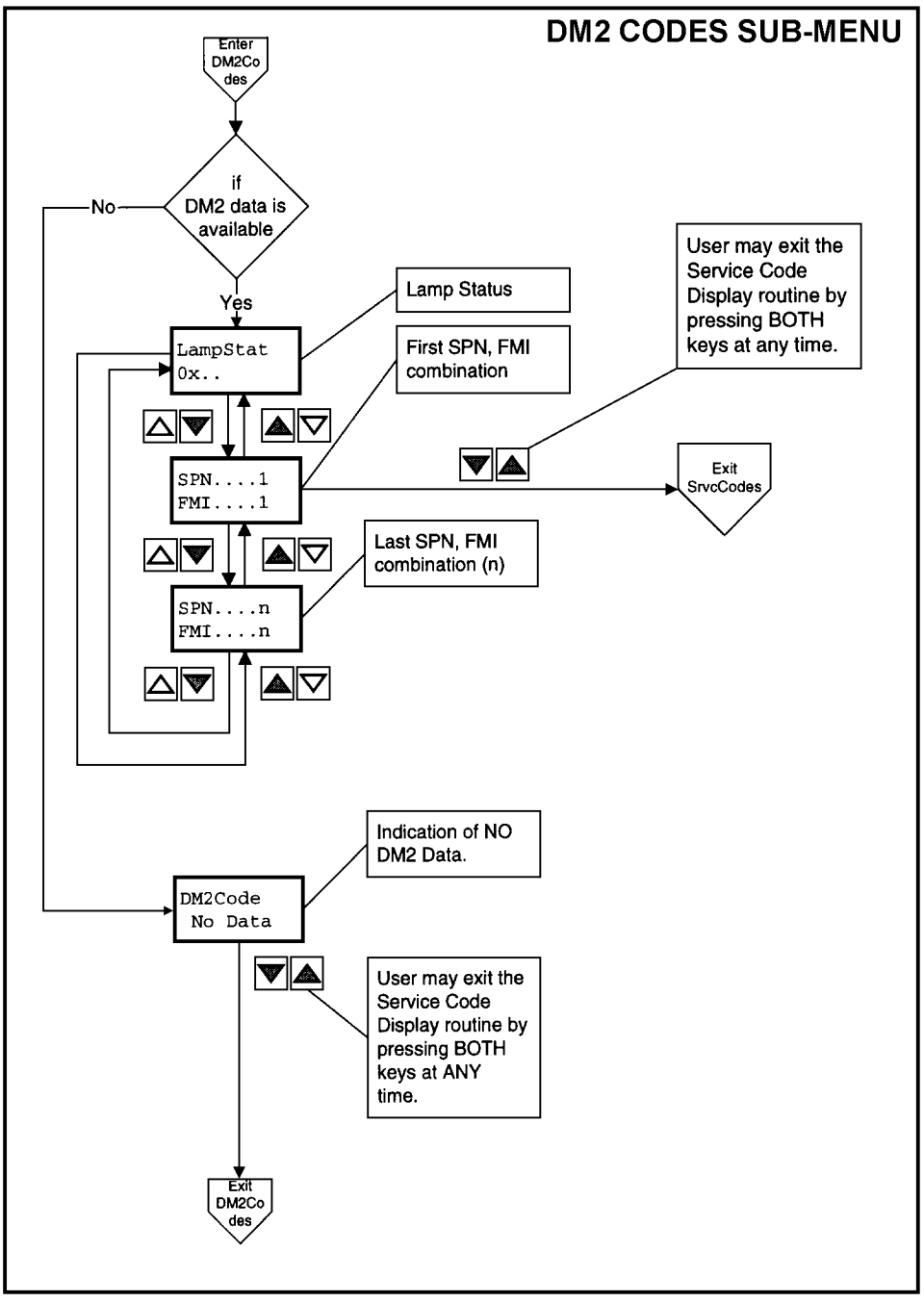
The diagnostic gauge continuously monitors all messages broadcast over the Control Area Network (CAN) and displays all Active Service Codes (DTCs) at the time the message is broadcast. The word “SrvcCode” is displayed on the second line. The display will cycle every five seconds between the currently displayed parameter and the “SrvcCode” message until the active fault code clears. To view the Active Codes, select the *Service Code Sub-Menu* by pressing the UP or DOWN switches until the top line of display reads “SrvcCode”.

Then press BOTH the UP and DOWN switches at the same time to select the Service (DTC) Code Sub-Menu. The diagnostic gauge has the ability to display all Active Service Codes received. The diagram above titled *Service Codes (DTCs) Sub-Menu* shows the process for selecting Active Service Codes and their values.

NOTE: For a list of Service Codes or Diagnostic Trouble Codes (DTCs), refer to Troubleshooting Section later in this manual.

DPSG,OUOE003,8002 –19–25MAR02–1/1

Viewing Stored Service Codes (DTC) In The Engine ECU (6068SFM50 Engine)



Viewing Stored Service Codes

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 *DM2Codes Sub-Menu* by pressing the UP or DOWN switches until the top line of display reads “DM2Codes”

Continued on next page

Then press BOTH the UP and DOWN switches at the same time to select the *DM2Codes Sub-Menu*. The gauge will display the Stored Service Codes according to the menus shown in the preceding diagram.

DPSG,OUOE003,8003 –19–25MAR02–2/2

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 105°C (221°F), reduce load on engine. Unless temperature drops quickly, stop engine and determine cause before resuming operation.

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

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

- Sudden drop in oil pressure
- Abnormal coolant temperatures
- Unusual noise or vibration
- Sudden loss of power
- Excessive black exhaust
- Excessive fuel consumption
- Excessive oil consumption
- Fluid leaks

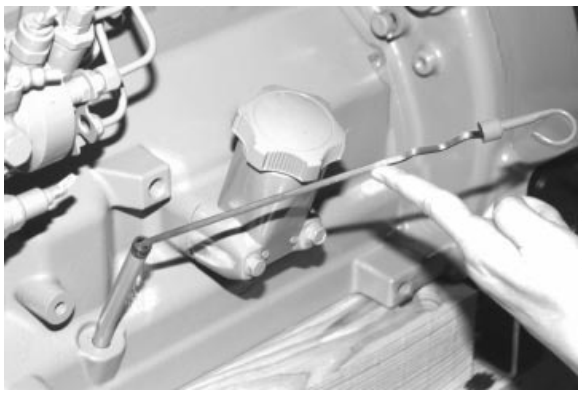
RG,RG34710,5552 –19–25MAR02–1/1

Break-In Service

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

1. This engine is factory-filled with John Deere 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 makeup oil is required in the first 100 hour period, a longer break-in period may be required. In these situations, an additional 100 hour break-in period is recommended using a new change of John Deere Engine Break-In Oil and a new John Deere oil filter.



Check Engine Oil

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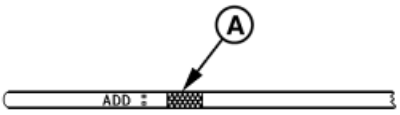
RG,RG34710,5553 –19–27MAR02–1/5

RG8028A –UN–15JAN99



Check Engine Oil

A—Crosshatch Pattern On Dipstick

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

3. Check engine oil level more frequently during engine break-in period. If oil must be added during this period, John Deere Engine Break-In Oil is preferred. See ENGINE BREAK-IN OIL, in Fuels, Lubricants, and Coolant Section.

IMPORTANT: DO NOT use PLUS-50® Engine Oil during the break-in period of a new engine or engine that has had a major overhaul. PLUS-50 oil will not allow a new or overhauled engine to properly wear during this break-in period.

DO NOT fill above the crosshatch pattern (A) or the FULL mark, whichever is present. Oil levels anywhere within the crosshatch are considered in the acceptable operating range.

Specification	
Engine[1]—Oil Pressure at Full Load Rated Speed	345 ± 103 kPa (3.45 ± 1.03 bar) (50 ± 15 psi)
Minimum Oil Pressure at Rated Speed	275 (2.75 bar) (40 psi)
Minimum Oil Pressure at 850 rpm	103 kPa (1.03 bar) (15 psi)
Coolant Temperature Range	82°–94° C (180°–202° F)

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[1]At normal operating temperature of 115 ° C (240 ° F) sump.

Continued on next page

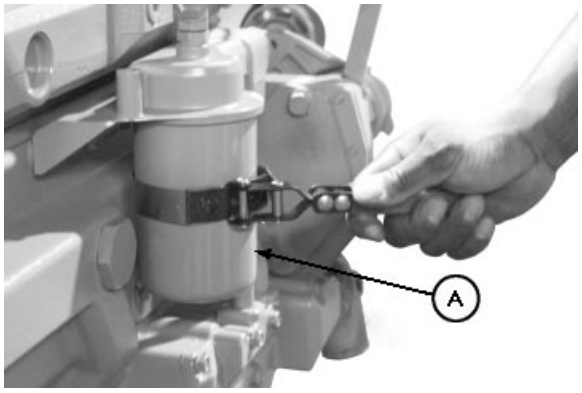
RG,RG34710,5553 –19–27MAR02–2/5

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

5. After the first 100 hours (maximum), change engine oil and replace engine oil filter (A). (See CHANGE ENGINE OIL AND 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.



RG9867 –UN–15JAN99

Remove Oil Filter

A—Oil Filter

RG,RG34710,5553 –19–27MAR02–3/5

6. Watch coolant temperature gauge (A) closely. If coolant temperature rises above 112°C (234°F), reduce load on engine. Check sea (raw) water strainer for plugging on heat exchanger engines. Unless temperature drops quickly, stop the engine and determine the cause before resuming operation.

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

A—Coolant Temperature Gauge

RG6002 –UN–27JAN92

Coolant Temperature Gauge

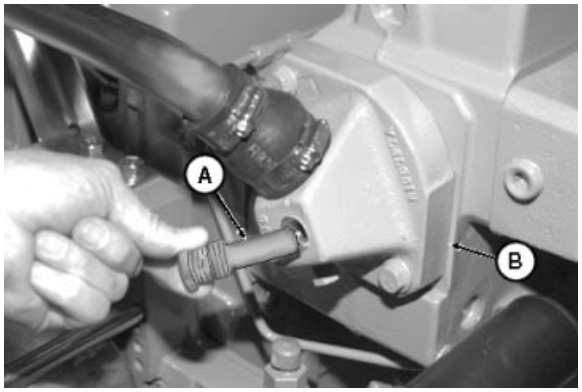
Continued on next page

RG,RG34710,5553 –19–27MAR02–4/5

Two zinc plugs (A) are installed in the sea water cooling system to help neutralize the corrosive action of salt water on internal cavities of marine engine components. The reaction of the zinc, when exposed to the salt water, causes the plugs to deteriorate instead of critical engine components.

8. After the first 50—100 hours or 2—4 weeks of operation, remove zinc plug from each heat exchanger end cap (B) and inspect for corrosion to get an idea of rate of deterioration in sea water.

   If rate of corrosion is slight at 50—100 hours or 2—4 weeks initial inspection, zinc plugs should be inspected at 250 hour intervals thereafter. (See INSPECT AND REPLACE ZINC PLUGS in Lubrication & Maintenance/250 Hour Section)



Zinc Plugs

A—Zinc Plugs
B—End Cap

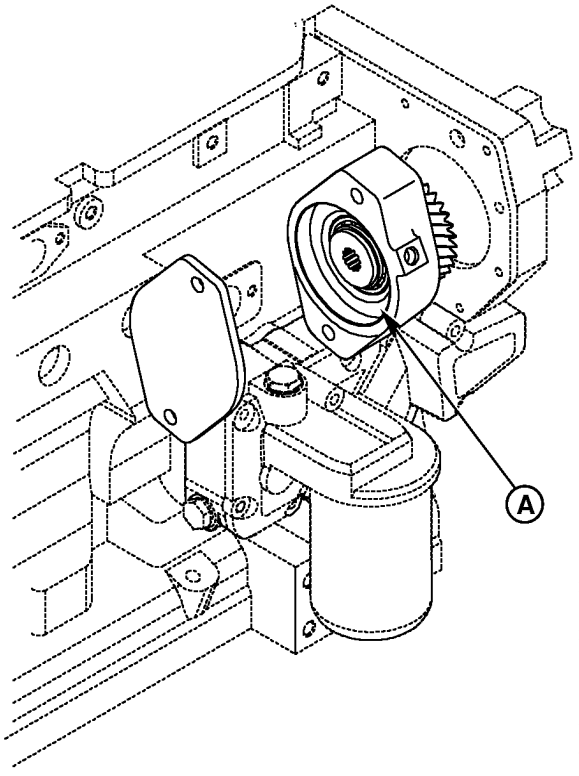
RG,RG34710,5553 –19–27MAR02–5/5

Auxiliary Gear Drive Limitations

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

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

A—Auxiliary Gear Drive



Auxiliary Gear Drive

RG,RG34710,5555 –19–03JAN02–1/1

Generator Set Power Units

To assure that your engine will deliver efficient 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 extended period of time with no load.

RG,RG34710,5556 –19–20MAY96–1/1

Starting the Engine

The following instructions apply to the optional controls and instruments available through the John Deere Parts Distribution Network for propulsion applications only. The controls and instruments for your engine may be different from those shown here; always follow manufacturer's instructions and familiarize yourself with the correct starting procedure.

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

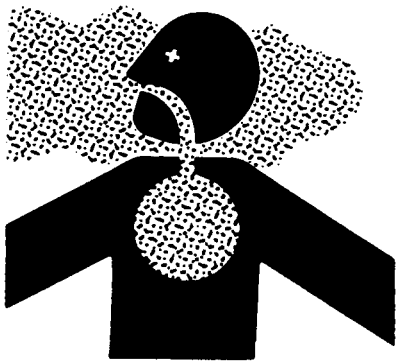
NOTE: If temperature is below 0 °C (32 °F), it may be necessary to use cold weather starting aids available from your authorized servicing dealer or engine distributor. Follow manufacturers recommended procedure when using starting aids.

1. Perform all prestarting checks if starting engine for the first time of the day. (See DAILY PRESTARTING CHECKS in this section).
2. Open the fuel supply shut-off valve.

NOTE: If equipped with PTO clutch, disengage PTO clutch.

3. Set marine gear control lever in the "NEUTRAL" position on propulsion units.
4. Move the throttle control lever approximately 1/3 of the way off the "IDLE" position.
5. Turn key switch (A) to "ON" position. You will hear an audible alarm.
6. Fully depress alarm reset button (B) and release. This silences the audible alarm for about 2-1/2 minutes.

A—Key Switch
B—Reset Button

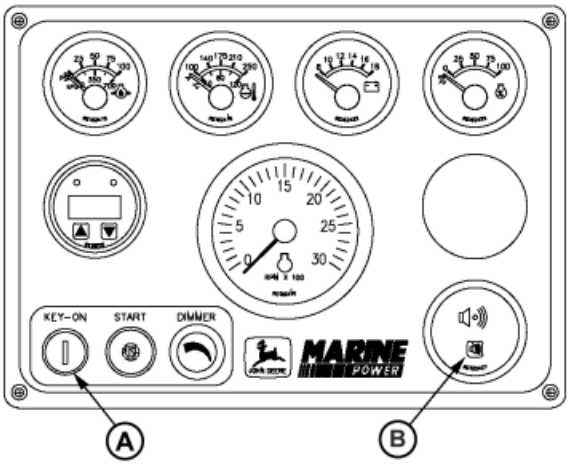


TS220 –UN–23AUG88

Use Proper Ventilation

RG6001 –UN–27JAN92

Instrument Panel - Mechanically Controlled Engines



RG12055 –UN–18JAN02

Instrument Panel - Electronically Controlled Engines

RG,RG34710,5557 –19–03JAN02–1/1

IMPORTANT: Do not crank the starter motor 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 it does not start after four attempts, see Troubleshooting Section.

7. Firmly depress and hold “START” button (A) in until engine starts. Release button as soon as engine starts.

IMPORTANT: If the start button 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.

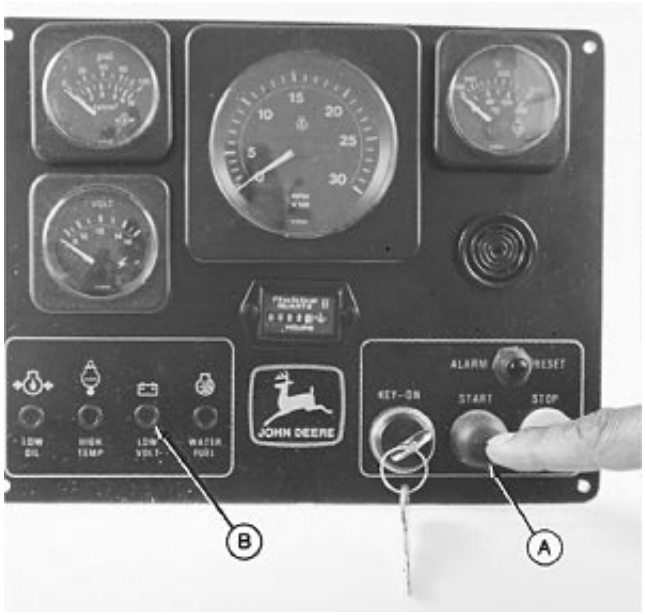
NOTE: Engine oil pressure is usually higher than normal right after start-up. This is normal and there is no cause for concern.

IMPORTANT: Should the engine die when operating under load, immediately disengage PTO clutch (if equipped) and restart the engine. Overheating of turbocharger parts may occur when oil flow is stopped.

8. Observe “LOW VOLTAGE” warning light (B) (on mechanically controlled engines only) immediately after engine starts, if light flashes on and off, stop engine and check V-belt tension and alternator output voltage.

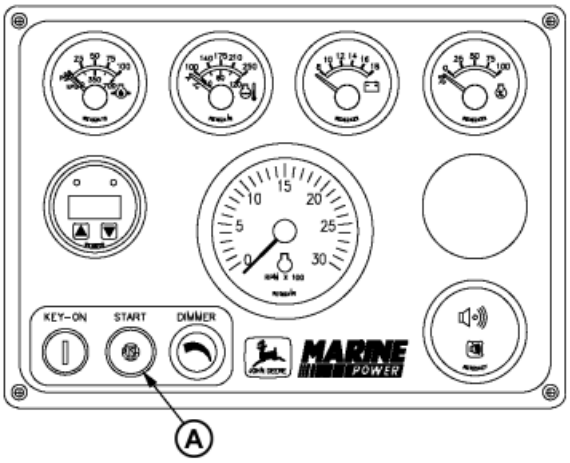
9. Check sea water outlet for water flow. Check exhaust pipe for water flow on engines with wet exhaust systems.

If sea water does not flow within 1 minute after engine starts, stop engine and check sea cock, sea water strainer, and sea water pump for restrictions.



RG6087 –UN–23JAN92

Instrument Panel - Mechanically Controlled Engines



RG12056 –UN–18JAN02

Instrument Panel - Electronically Controlled Engines

A—Start Button
B—Warning Light

DPSG,OUOD007,337 –19–03JAN02–1/1

10. Allow engine to warm at 1200 rpm, no load for 5 minutes to assure proper lubrication and overall operating efficiency.

If audible alarm sounds or either warning light is lit after engine has been running for 10 seconds or more, stop engine and determine the cause.

IMPORTANT: Avoid unnecessary engine idling. Prolonged idling may cause the engine coolant temperature to fall below its normal range. This causes incomplete fuel combustion, which results in crankcase oil dilution, 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.

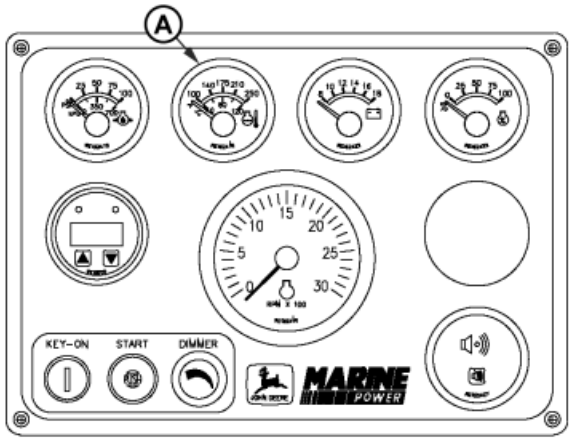
If engine must be left running more than 5 minutes, minimum engine speed should be 1200 rpm.

11. Observe engine coolant temperature gauge (A). Normal engine coolant operating temperature range is 82°—94°C (180°—202°F). Do not place engine under full load until it is warmed to normal operating temperature.

A—Coolant Temperature Gauge

RG6002 –UN–27JAN92

Coolant Temperature Gauge - Mechanically Controlled Engines



RG12057 –UN–18JAN02

Coolant Temperature Gauge - Electronically Controlled Engines

DPSG,OUOD007,338 –19–03JAN02–1/1

Warming Engine

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

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 105 kPa (1.05 bar) (15.0 psi) within 5 seconds, stop the engine and determine the cause. Normal engine oil pressure is 345 kPa (3.45 bar) (50 psi) at rated full load speed (1800–2500 rpm) with oil at normal operating temperature of 115°C (240°F).

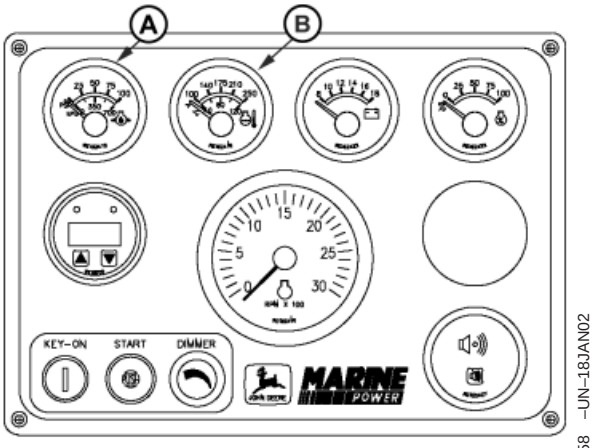
NOTE: On certain engines, the oil pressure and coolant temperature gauges are replaced by indicator warning lights. The lights must be "OFF" when engine is running.

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

RG9836 –UN–05JAN99

Oil Pressure And Coolant Temperature Gauges



RG12058 –UN–18JAN02

Oil Pressure And Coolant Temperature Gauges

A—Oil Pressure Gauge
B—Coolant Temperature Gauge

RG,RG34710,5560 –19–03JAN02–1/1

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 750 rpm at factory. 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,RG34710,5562 –19–20MAY96–1/1

Cold Weather Operation

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

Some engines are equipped with an air intake heater which will make starting the engine easier in cold weather. If equipped, follow steps 1–4 as listed under STARTING THE ENGINE, earlier in this section. Switch on the air intake heater for 30 seconds and then proceed to operate the starter. Follow remaining steps 5–11.

TS1356 –UN–18MAR92

Starting Fluid is Flammable

CAUTION: 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.

RG,RG34710,5559 –19–03JAN02–1/1

Stopping the Engine

IMPORTANT: Stopping the engine immediately after it has been working under load, can result in overheating and accelerated wear of the engine components. ALWAYS allow the engine to cool before shutdown by following the procedures below.

1. Remove load from engine or shift marine gear to “NEUTRAL” and run engine for several minutes at 1000—1200 rpm to allow coolant and oil to carry heat away from the combustion chamber, turbocharger, pistons, and bearings.

2. **For Mechanically Controlled Engines -** Firmly depress the “STOP” button (B) until engine stops. Turn key switch (A) to “OFF” position and remove key from ignition.

   By completely stopping the engine before turning the key switch to “OFF”, tests the alarm and keeps the tachometer working until shutdown.

   For Electronically Controlled Engines - Turn key switch (A) to “OFF” position and remove key from ignition.

3. If vessel will not be used for several days, close fuel valves and sea cock.

4. Turn main electrical power switch to “OFF”, if equipped.

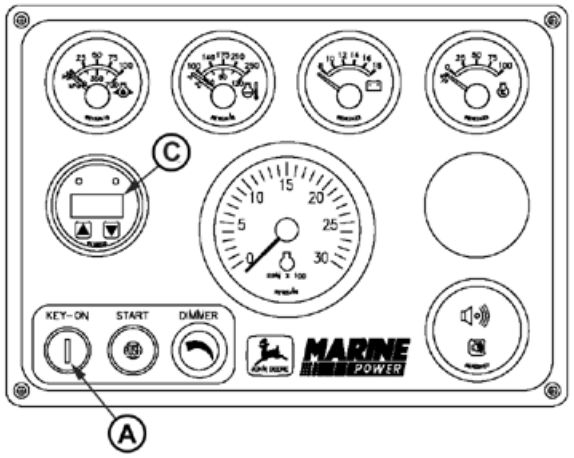
5. Fill the fuel tank to minimize possible water condensation problems. Filling tanks at end of day drives out moisture laden air.

6. Observe the hour meter (C) reading to determine if periodic maintenance is necessary. Make appropriate entries in maintenance logs. (See LUBRICATION AND MAINTENANCE RECORDS section.)

7. Perform required periodic maintenance on all other equipment, as recommended by the equipment manufacturers.

RG6003 –UN–27JAN92

Stopping The Engine - Mechanically Controlled Engines



RG12060 –UN–26FEB02

Stopping The Engine - Electronically Controlled Engines

A—Key Switch
B—Stop Button
C—Hour Meter

RG,RG34710,5563 –19–31JAN02–1/1

Using a Booster Battery or Charger

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

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

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

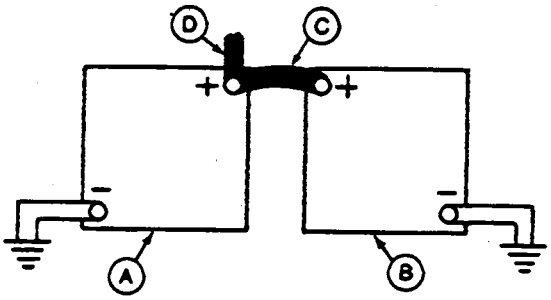
1. Connect booster battery or batteries to produce the required system voltage for your engine application.

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

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

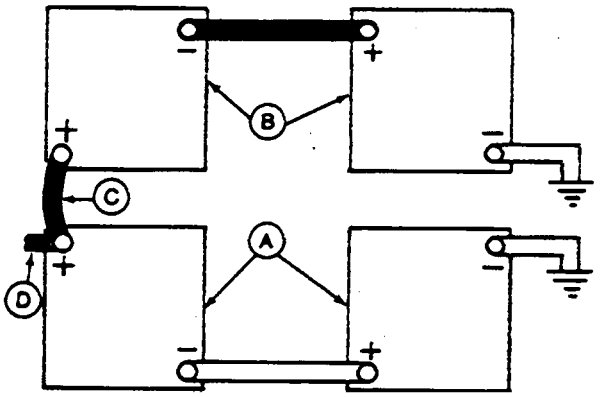
TS204 –UN–23AUG88

Exploding Battery



RG4678 –UN–14DEC88

12-Volt System



RG4698 –UN–14DEC88

24-Volt System

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

RG,RG34710,5564 –19–03JAN02–1/1

Observe Service Intervals

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

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

A—Hour Meter

RG6113 –UN–29JAN92

Hour Meter

DPSG,OUOE003,20 –19–03JAN02–1/1

Use Correct Fuels, Lubricants, and Coolant

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

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

TS100 –UN–23AUG88

Parts Network

DPSG,OUOE003,20 –19–03JAN02–1/1

Lubrication and Maintenance Service Interval Chart

Item	Lubrication and Maintenance Service Intervals						
	Daily	50 Hour/Every 2 Weeks	250 Hour	500 Hour/12 Month	1000 Hour/24 Month	2000 Hour	Service As Required
Check Engine Oil Level and Coolant Level	•						
Check Sea Water Strainer	•						
Check Air Cleaner Dust Unloader Valve & Restriction Indicator Gauge[a]	•						
Visual Walkaround Inspection	•						
Check Fuel Filter		•					
Service Fire Extinguisher			•				
Service Battery			•				
Change Engine Oil and Replace Oil Filter (Except 6068SFM50 Engines)[b]			•				
Inspect and Replace Zinc Plugs			•				
Check Belt Tension and Wear (Manual Tensioner)			•				
Check Engine Mounts			•				
Check Engine Electrical Ground Connection			•				
Change Engine Oil And Replace Oil Filter (6068SFM50 Engines)[c, d]				•			
Clean Crankcase Ventilation Assembly				•			
Check Air Intake Hoses, Connections, & System				•			
Replace Fuel Filter Element				•			
Check Automatic Belt Tensioner and Belt Wear				•			
Check Cooling System				•			
Coolant Solution Analysis-Add SCAs as required				•			
Inspect and Clean Heat Exchanger Core and Aftercooler Core (If Equipped)				•			
Adjust Droop on Generator Set Engines					•		
Check Crankshaft Vibration Damper (6-Cylinder)					•		
Pressure Test Cooling System					•		

[a]Replace primary air cleaner element when restriction indicator shows a vacuum of 625 mm (52 in.) H2O

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

[c]During engine break-in, change the oil and filter for the first time before 100 hours of operation.

[d]If the recommended engine oils, John Deere PLUS-50® or equivalent are not used, the oil and filter change interval is reduced to every 250 hours. If diesel fuel with a sulfur content greater than 0.05% is used, the oil and filter change interval is also reduced.

Continued on next page

Item	Lubrication and Maintenance Service Intervals						
	Daily	50 Hour/Every 2 Weeks	250 Hour	500 Hour/12 Month	1000 Hour/24 Month	2000 Hour	Service As Required
Inspect and Repair Sea Water Pump					•		
Check and Adjust Engine Valve Clearance						•	
Flush Cooling System[e]						•	
Add Coolant							•
Replace Air Cleaner Element							•
Service Dry Air Cleaner Element							•
Replace Drive Belt							•
Inspect Driveline (PTO) (If Equipped)							•
Bleed Fuel System							•

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

DPSG,OUOD007,341 –19–03JAN02–2/2

Daily Prestarting Checks

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

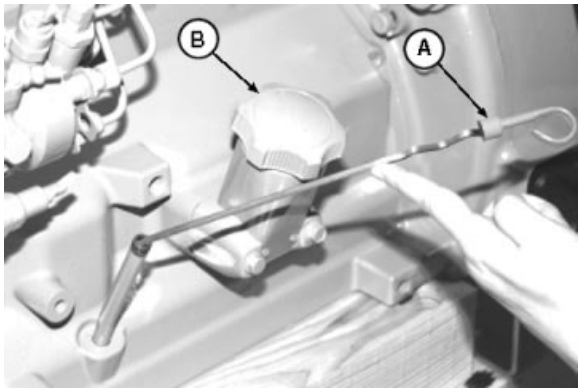
IMPORTANT: DO NOT add makeup oil until the oil level is BELOW the add mark.

Depending on application, oil dipstick (A) and oil filler cap (B) may be located on either the left or the right side of engine. In addition, oil may be added at rocker arm filler cap (C).

1. Check engine oil level on dipstick (A). 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 (D) are considered in the acceptable operating range.

A—Dipstick
B—Left Side Oil Filler Cap
C—Rocker Arm Filler Cap
D—Crosshatch On Oil Dipstick



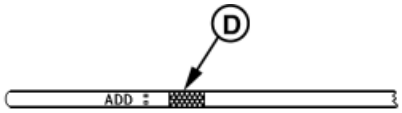
RG9837 –UN–12JAN99

Left Side Oil Filler Cap

RG9838 –UN–05JAN99

Rocker Arm Cover Filler Cap

RG8028B –UN–15JAN99



Crosshatch On Oil Dipstick

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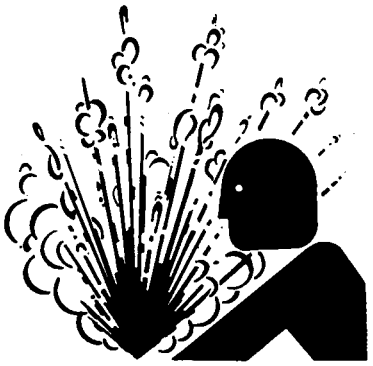
DPSG,OUOE003,20 –19–03JAN02–1/4

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

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



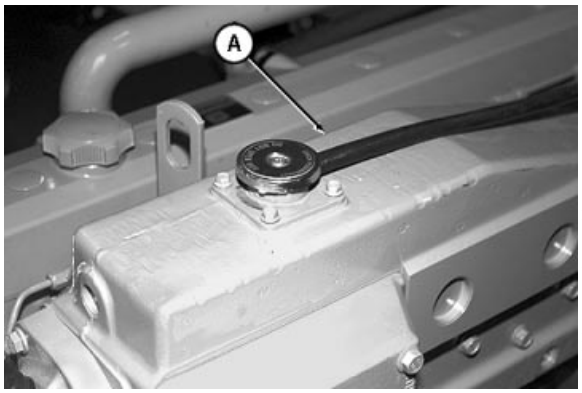
TS281 –UN–23AUG88

High-Pressure Fluids

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

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

A—Engine Top Tank



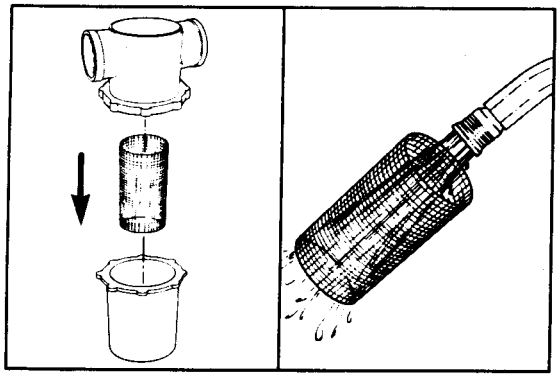
RG9839 –UN–05JAN99

Engine Top Tank

DPSG,OUOE003,20 –19–03JAN02–2/4

IMPORTANT: A restricted or clogged sea water strainer will result in hotter than normal (or overheated) engine coolant and marine gear oil temperatures.

3. The sea water strainer should be checked daily and cleaned as required, depending upon the operating environment.



RG5993 –UN–27JAN92

Sea Water Strainer

Continued on next page

DPSG,OUOE003,20 –19–03JAN02–3/4

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

IMPORTANT: Maximum air intake restriction is 625 mm (25 in. H_2O). A clogged air cleaner element will cause excessive intake restriction and a reduced air supply to the engine.

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

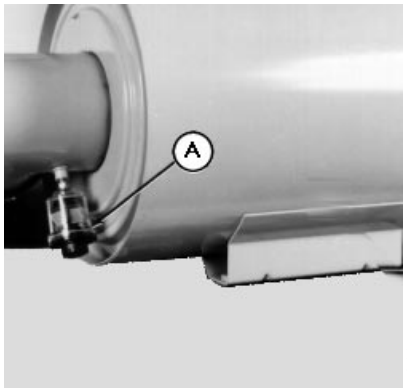
NOTE: Wipe all fittings, caps, and plugs before performing any maintenance to reduce the chance of system contamination.

Inspect:

- Engine shields and guards for trash build-up.
- Air intake system hoses and connections for cracks and loose clamps.
- Alternator drive belt for cracks, breaks or other damage.
- Water pump for coolant leaks.
- Coolant system for leaks.

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

6. Refer to manufacturer's literature for marine gear and generator set daily service recommendations.



Air Intake Restriction Gauge

A—Air Intake Restriction Gauge

DPSG,OUOE003,20 –19–03JAN02–4/4

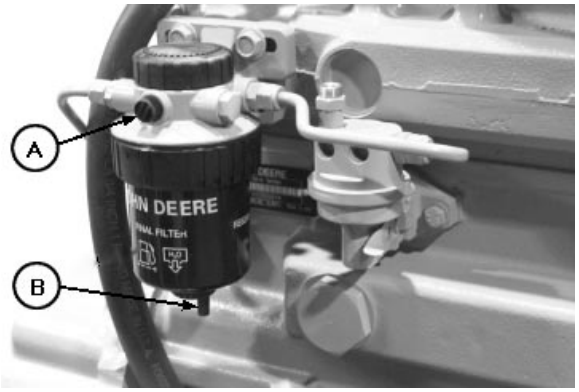
Checking Fuel Filter—4.5 L Engine

Periodically the fuel filter should be checked for water or debris.

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

1. Loosen drain plug (B) at bottom of fuel filter two or three turns.
2. Loosen air bleed plug (A) two full turns and drain water from bottom until fuel starts to drain out.
3. When fuel starts to drain out, tighten drain plug.

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



Drain Fuel Filter

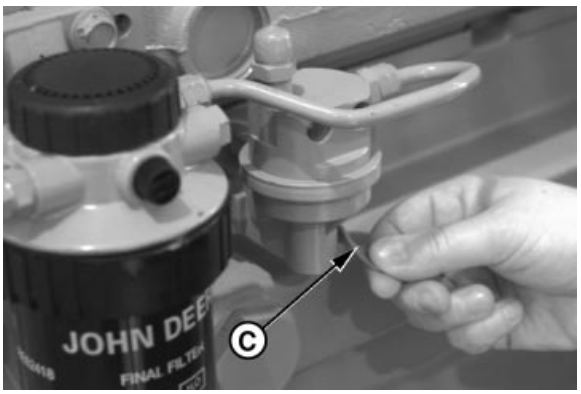
A—Air Bleed Plug
B—Drain Plug

RG,RG34710,5565 –19–04JAN02–1/2

4. Operate primer lever (C) of the fuel supply pump until fuel flow is free from air bubbles.
5. Tighten bleed plug, continue operating hand primer until pumping action is not felt. Leave hand primer in the up position, away from the cylinder block.

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

C—Primer Lever



Primer Lever On Fuel Supply Pump

RG,RG34710,5565 –19–04JAN02–2/2

Checking Fuel Filter—6.8 L Engine

Check the sediment bowl of the primary fuel filter/water separator for water or debris.

1. Loosen thumb screw (A) at bottom of sediment bowl and drain water and debris into a suitable container.

2. Dispose of water and debris in an environmentally safe manner.

A—Thumb Screw

Drain Primary Fuel Filter

DPSG,OUOD007,340 –19–04JAN02–1/1

Servicing Fire Extinguisher

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

Read and follow the instructions which are packaged with it. The extinguisher should be inspected at least every 250 hours of engine operation or once a month. Once extinguisher is operated, no matter how long, it must be recharged. Keep record of inspections on the tag which comes with the extinguisher instruction booklet.

A—Fire Extinguisher

RW4918 –UN–15DEC88

Fire Extinguisher

RG,RG34710,5567 –19–04JAN02–1/1

Servicing Battery

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

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

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

TS204 –UN–23AUG88

Exploding Battery

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

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

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

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

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

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

Continued on next page

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

Avoid the hazard by:

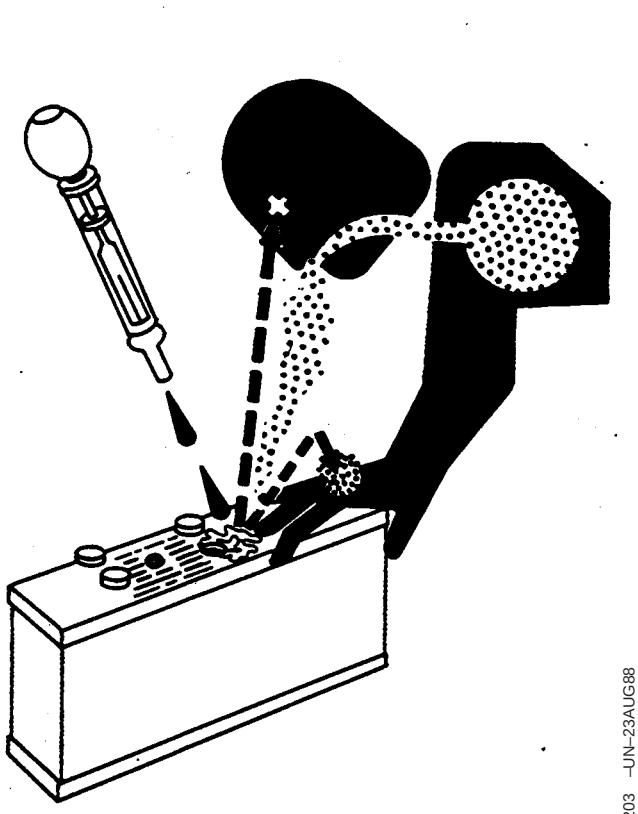
1. **Filling batteries in a well-ventilated area.**
2. **Wearing eye protection and rubber gloves.**
3. **Avoiding breathing fumes when electrolyte is added.**
4. **Avoiding spilling or dripping electrolyte.**
5. **Use proper jump start procedure.**

If you spill acid on yourself:

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

If acid is swallowed:

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



TS203 –UN–23AUG88

Sulfuric Acid

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

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

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

RG,RG34710,5568 –19–20MAY96–2/2

Changing Engine Oil and Replacing Oil Filter (Except 6068SFM50 Engines)

NOTE: For 6068SFM50 engines, the oil and filter is changed at 500 hour/12 month intervals. See next section.

During break-in, change engine oil and filter for the first time before 100 hours maximum of operation, then every 250 hours thereafter.

If John Deere PLUS-50® engine oil and a John Deere oil filter are used, the oil and filter change interval may be extended to 375 hours.

NOTE: If the above recommendations are not followed, the recommended oil and filter change interval is every 250 hours/ or 6 months. If diesel fuel with a sulfur content greater than 0.05% (500 ppm) is used, reduce the oil and filter change interval by 100 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.

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

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

Oil Pan Drain Plug

PLUS-50 is a trademark of Deere & Company

Continued on next page

RG,RG34710,5570 –19–04JAN02–1/3

4. Remove and discard oil filter element (A) using a suitable filter wrench.

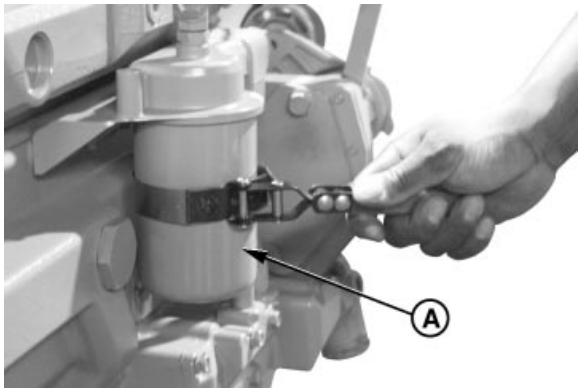
NOTE: Depending on engine application, oil filter may be located on either side of the engine.

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

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

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

7. Install oil pan drain plug with a new seal when equipped. Tighten drain plug to 47 N•m (35 lb-ft) of torque.



RG7961A –UN–22JAN99

Removing Oil Filter

A—Oil Filter Element

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RG,RG34710,5570 –19–04JAN02–2/3

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

   To determine the correct oil fill quantity for your engine, see ENGINE CRANKCASE OIL 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.

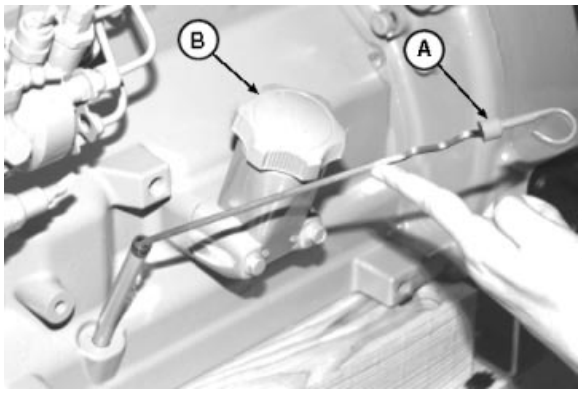
NOTE: Crankcase oil capacity may vary slightly. ALWAYS fill crankcase to full mark or within crosshatch on dipstick, whichever is present. DO NOT overfill.

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

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

RG9838 –UN–05JAN99

Rocker Arm Cover Oil Filler Opening



RG9837 –UN–12JAN99

Side Oil Filler And Dipstick

A—Dipstick
B—Side Oil Filler
C—Rocker Arm Cover Oil Filler Opening

RG,RG34710,5570 –19–04JAN02–3/3

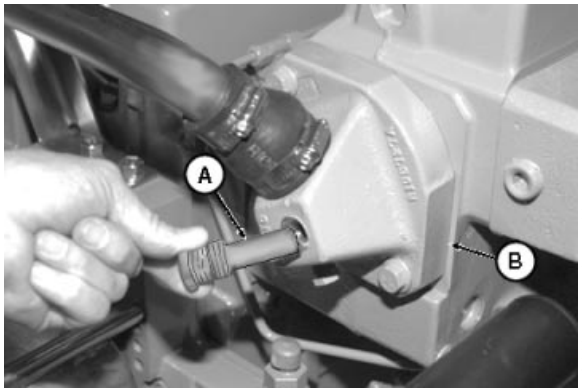
Inspect and Replacing Zinc Plugs

Two zinc plugs (A) are installed in the sea water cooling system to help reduce the corrosive action of salt in the sea water. The reaction of the zinc to sea water causes the plugs to deteriorate, instead of the more critical cooling system parts. Therefore, the zinc plugs MUST BE inspected every 250 Hours.

NOTE: Zinc plugs are located in each heat exchanger end cap and are mounted on hex-head pipe plug.

1. Remove zinc rod from each end cap (B) and observe condition of each.

2. Tap the zinc rods lightly with a hammer. If rod flakes apart when tapped, install a new zinc plug.



Inspect Zinc Plugs

A—Zinc Plugs
B—End Cap

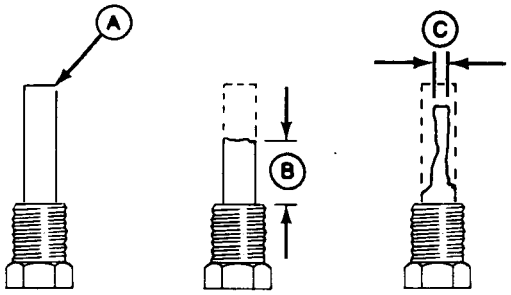
DPSG,OUOD007,311 –19–27MAR02–1/1

3. Measure zinc plugs (A) to determine the amount of erosion on length (B) and outer diameter (C).

If length is less than 15.9 mm (0.63 in.) or outer diameter is less than 4.8 mm (0.19 in.) on either plug, replace all zinc plugs.

NOTE: Zinc plug new part dimensions are 31.8 mm (1.25 in.) long and 9.5 mm (0.38 in.) outer diameter.

A—Measure Zinc Plugs
B—Measure Length
C—Measure Diameter



Zinc Plug Erosion

DPSG,OUOD007,312 –19–18JAN99–1/1

Checking Belt Wear (Manual Tensioner)

Inspect belt for cracks, fraying, or stretched-out areas. Replace if necessary. (See REPLACING BELT (MANUAL TENSIONER) in Service as Required Section.

NOTE: It is not necessary to remove belt guard (A) to check belt wear.

1. Loosen both belt tensioner mounting cap screws (B).

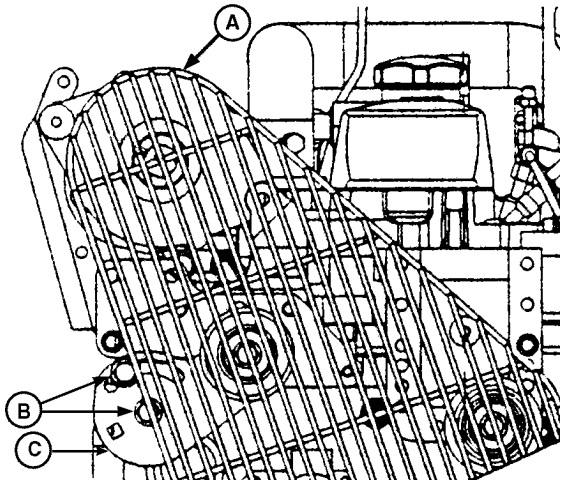
2. Swing tensioner arm (C) to remove all belt slack.

NOTE: Belt adjustment is measured using notched units (D) above the adjusting cap screw slot on the tensioner.

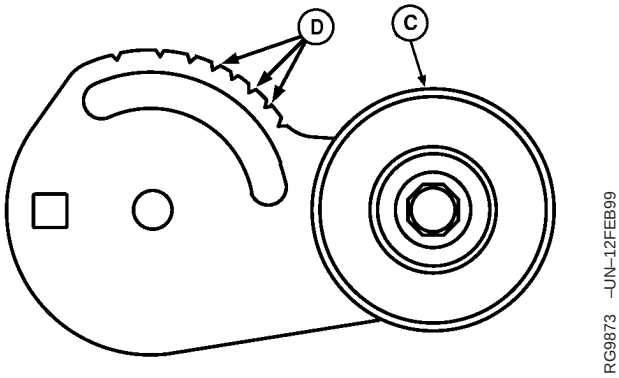
3. Using the notches on tensioner to count units, move the tensioner arm to stretch belt 1-1/2 units for appropriate tension on new belt. (Move arm one unit for used belt.)

4. Tighten tensioner mounting cap screws (B) to 70 N•m (52 lb-ft).

A—Belt Guard
B—Mounting Cap Screws
C—Tensioner Arm
D—Notched Units



Check Belt Tension



Tensioner Arm

DPSG,OUOD013,510 –19–04JAN02–1/1

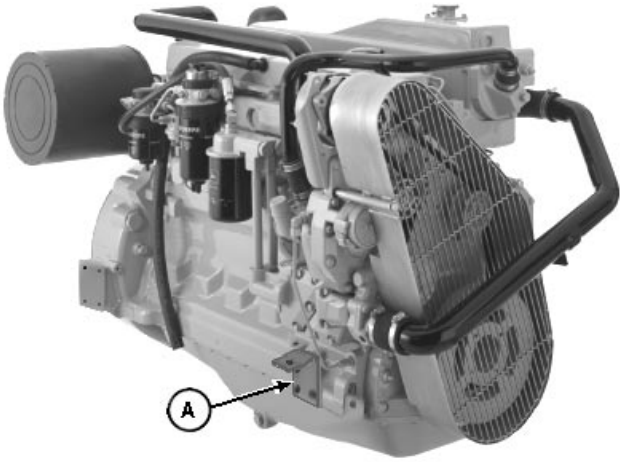
Checking Engine Mounts

Engine mounting is the responsibility of the vessel or generator manufacturer. Follow manufacturer's guidelines for mounting specifications. Front engine mounts (A) only are available from John Deere.

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

1. Check the engine 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.



Check Engine Mounts

A—Engine Mounts

DPSG,OUOD007,313 –19–04JAN02–1/1

Checking Engine Electrical Ground Connections

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

Also see precautions in Troubleshooting Section when welding on engine or machine.

OUOD002,0000169 –19–23NOV01–1/1

Changing Engine Oil and Replacing Filter (6068SFM50 Engines)

Your engine is equipped with a special extended-life oil filter (A).

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

After break-in, if John Deere PLUS-50® engine oil (or equivalent) **and** a John Deere extended-life oil filter are used, the oil and filter change interval is 500 hours or every 12 months, whichever comes first.

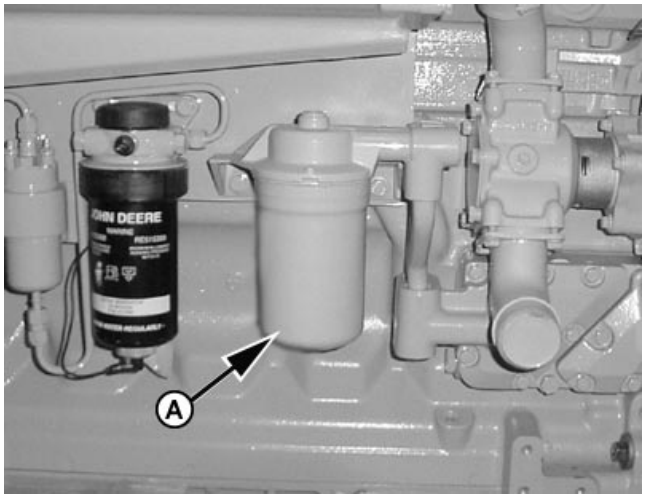
NOTE: If the above recommendations are not followed, the recommended oil and filter change interval is every 250 hours or 6 months. If diesel fuel with a sulfur content greater than 0.05% (500 ppm) is used, the oil and filter change interval is also reduced.

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

To change engine oil and extended-life oil filter:

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

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



RG12196 –UN–13MAR02

Extended-Life Oil Filter

RG4881 –UN–29NOV88

Oil Pan Drain Plug

A—Extended-Life Oil Filter Element

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

Continued on next page

4. Turn filter element (A) using a suitable filter wrench to remove. Discard oil filter element.

NOTE: Depending on engine application, oil filter may be located on either side of the engine in a high- or low-mount location.

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

5. Apply clean engine oil to the new filter at the inner (B) and outer (C) seals and to filter threads.

6. Wipe both sealing surfaces of the header (D, E) with a clean rag. Ensure dust seal (F) is in place, replace if damaged.

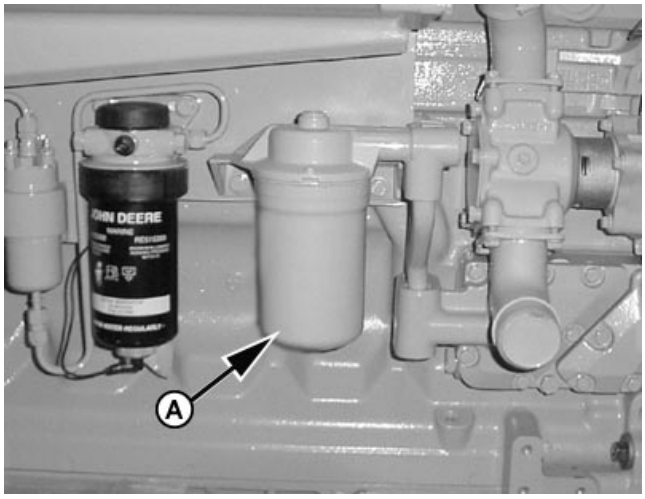
IMPORTANT: When installing filter element, HAND TIGHTEN only. A filter wrench may be used for REMOVAL ONLY.

7. Install and tighten oil filter by hand until firmly against dust seal (F). DO NOT apply an extra 3/4 to 1-1/4 turn after gasket contact as done with standard filters.

8. Tighten drain plug to specifications.

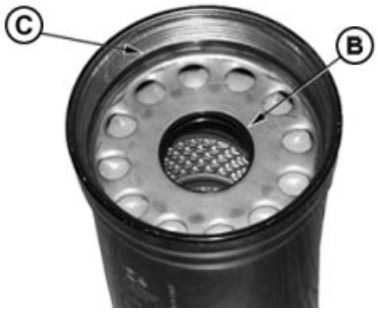
Specification	
Oil Pan Drain Plug With Copper Washer—Torque	70 N•m (52 lb-ft)
Oil Pan Drain Plug With O-Ring—Torque	50 N•m (37 lb-ft)

A—Extended-Life Oil Filter Element
B—Inner Seal
C—Outer Seal
D—Sealing Surface On Header
E—Sealing Surface On Header
F—Dust Seal



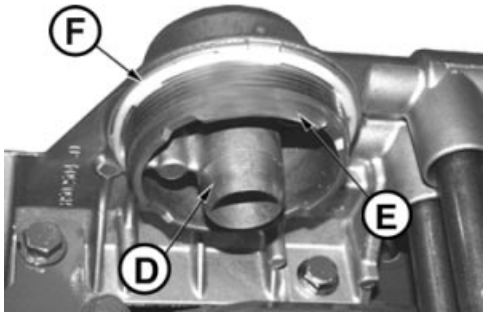
RG12196 –UN–13MAR02

Extended-Life Oil Filter And Mounting Header



RG11617 –UN–24OCT01

Oil Filter Seals



RG11618 –UN–24OCT01

Extended-Life Filter And Mounting Header

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9. Fill engine crankcase with correct John Deere engine oil through rocker arm cover opening (A). (See DIESEL ENGINE OIL in Fuels, Lubricants, and Coolant Section for determining correct engine oil.)

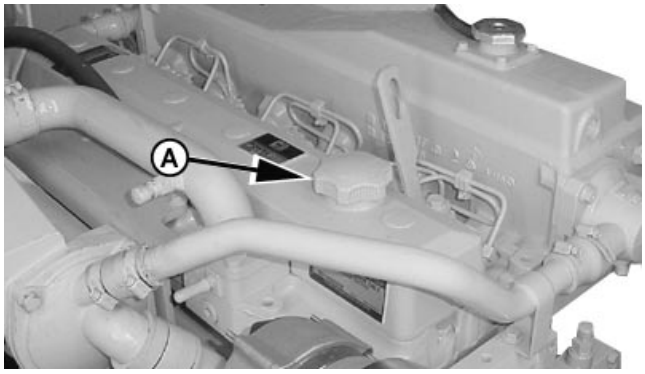
   To determine the correct oil fill quantity for your engine, see ENGINE CRANKCASE OIL FILL QUANTITIES in the Specifications Section of this manual.

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

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

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

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



Rocker Arm Cover Oil Filler Opening

A—Rocker Arm Cover Oil Filler Opening

OUOD002,0000168 –19–13MAR02–3/3

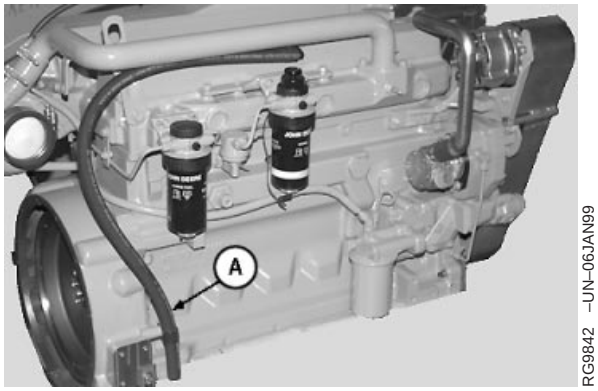
Cleaning Crankcase Vent Tube

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

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

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

A—Crankcase Vent Tube



Check Crankcase Vent Tube

RG,RG34710,5574 –19–04JAN02–1/1

Checking Air Intake System

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

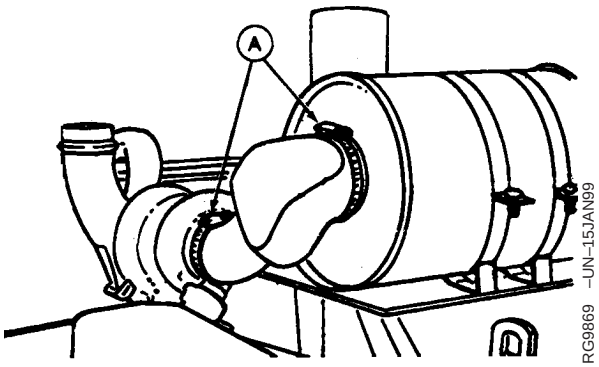
1. Inspect all intake hoses (piping) for cracks. Replace as necessary.
2. Check clamps (A) on piping which connect the air cleaner, engine and, if present, turbocharger. Tighten clamps as necessary. This will help prevent dirt from entering the air intake system through loose connections causing internal engine damage.

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

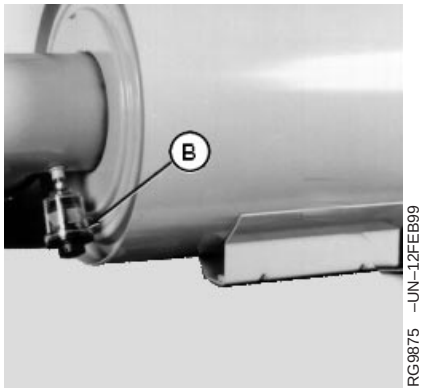
3. Test air restriction indicator (B) for proper operation. Replace indicator as necessary.

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

4. Replace air cleaner element if restriction indicator shows vacuum of 625 mm (25 in.) H_20, is torn or visibly dirty. Service as necessary. (See REPLACING AIR CLEANER in Service As Required Section.)



Check Clamps



Air Restriction Indicator

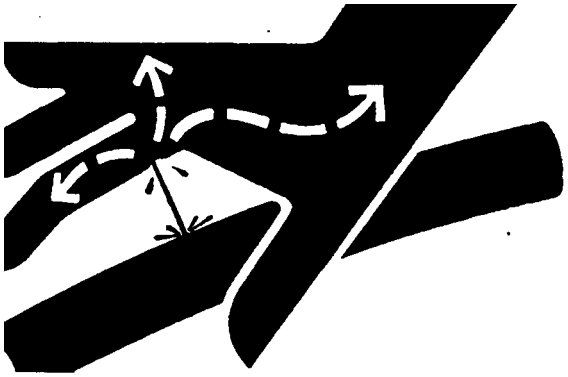
A—Clamps
B—Air Restriction Indicator

RG,RG34710,5575 –19–04JAN02–1/1

Replacing Fuel Filter Element—4.5 L Engine

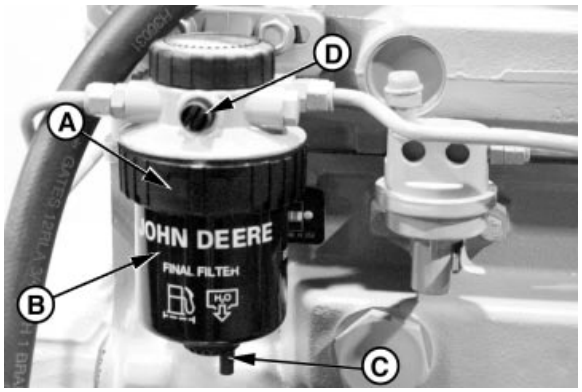
CAUTION: Escaping fluid under pressure can penetrate the skin causing serious injury. Relieve pressure before disconnecting fuel or other lines. Tighten all connections before applying pressure. Keep hands and body away from pinholes and nozzles which eject fluids under high pressure. Use a piece of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

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



X9811 –UN–23AUG88

High-Pressure Fluids



RG7721 –UN–15JAN99

Replace Fuel Filter

A—Retaining Ring
B—Filter Element
C—Drain Plug
D—Bleed Plug

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

NOTE: Lifting up on retaining ring as it is rotated helps to get it past raised locators.

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

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

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

Continued on next page

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

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

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

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

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

9. Open fuel shut-off valve and bleed the fuel system. (See BLEEDING FUEL SYSTEM in Service As Required Section.) Tighten bleed plug (D).

RG,RG34710,5576 –19–04JAN02–2/2

Replacing Primary Fuel Filter/Water Separator—6.8 L Engine

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

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

1. Close fuel shut-off valve at bottom of fuel tank (not illustrated).

2. Clean entire area surrounding fuel filter assembly to keep debris from entering fuel system.

3. Loosen drain plug (A) and air vent screw (B). Drain fuel into a suitable container.

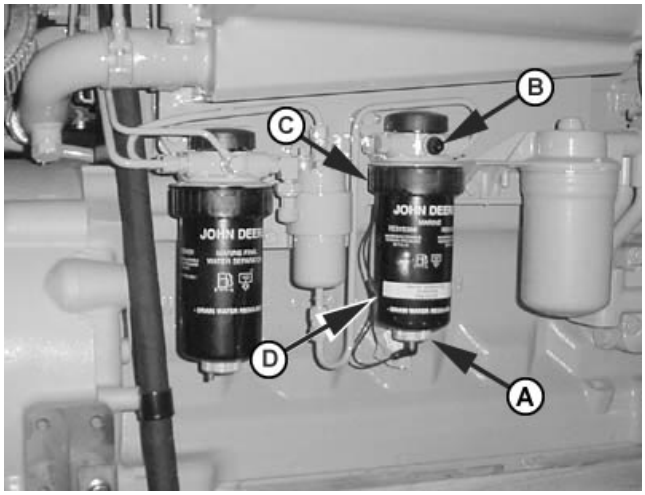
NOTE: Lifting up on retaining ring (C) as it is rotated helps to get it past raised locators.

4. Firmly grasp the retaining ring (C) and rotate it counterclockwise 1/4 turn. Remove ring with filter element (D).

5. Inspect filter mounting base for cleanliness. Clean as required.

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

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



Primary Fuel Filter

A—Drain Plug
B—Air Vent Screw
C—Retaining Ring
D—Filter Element

Continued on next page

DPSG,OUOD007,315 –19–04JAN02–1/2

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

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

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

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

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

9. Open fuel shut-off valve. 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.)

DPSG,OUOD007,315 –19–04JAN02–2/2

Replacing Final (Secondary) Fuel Filter Element—6.8 L Engine

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

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

1. Close fuel shut-off valve at bottom of fuel tank (not illustrated).

2. Clean entire area surrounding fuel filter assembly to keep debris from entering fuel system.

3. Loosen drain plug (A) and air vent screw (B). Drain fuel into a suitable container.

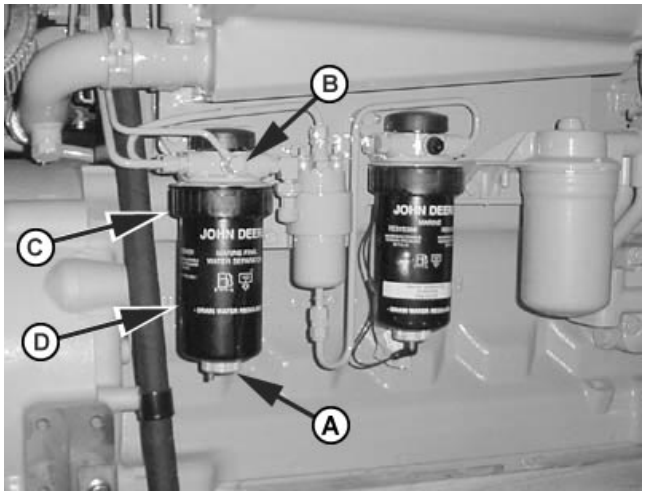
NOTE: Lifting up on retaining ring (C) as it is rotated helps to get it past raised locators.

4. Firmly grasp the retaining ring (C) and rotate it counterclockwise 1/4 turn. Remove ring with filter element (D).

5. Inspect filter mounting base for cleanliness. Clean as required.

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

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



Final Fuel Filter

A—Drain Plug
B—Air Vent Screw
C—Retaining Ring
D—Filter Element

Continued on next page

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

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

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

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

9. Open fuel shut-off valve. 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.)

DPSG,OUOD007,314 –19–04JAN02–2/2

Checking Belt Tensioner Spring Tension and Belt Wear (Automatic Tensioner)

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.

Continued on next page

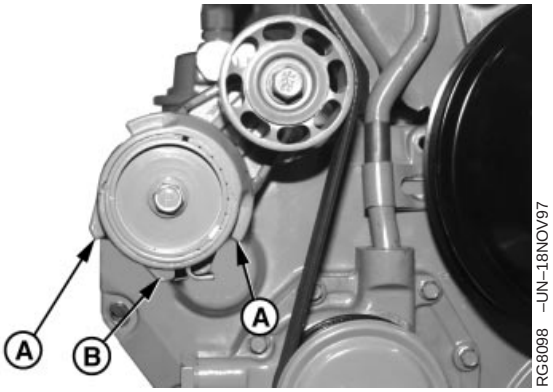
RG,RG34710,5578 –19–25FEB02–1/3

Checking Belt Wear

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

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

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



Cast Stops

A—Cast Stops
B—Cast Stop

Continued on next page

RG,RG34710,5578 –19–25FEB02–2/3

Checking Tensioner Spring Tension

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

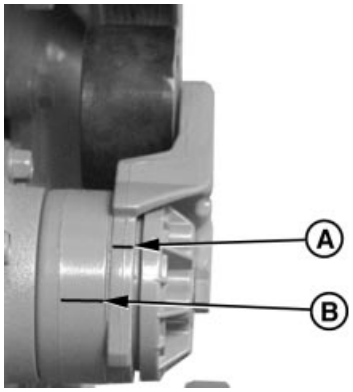
1. Release tension on belt using a breaker bar and socket on tension arm. Remove belt from pulleys.
2. Release tension on tension arm and remove breaker bar.
3. Put a mark (A) on swing arm of tensioner as shown.
4. Measure 21 mm (0.83 in.) from (A) and put a mark (B) on tensioner mounting base.
5. Install torque wrench (C) so that it is aligned with centers of pulley and tensioner. 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—Torque ..... 18-22 N•m (13-16 lb-ft)

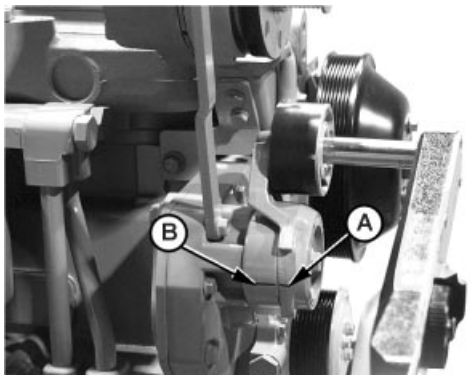
NOTE: Threads on belt tensioner roller cap screw are LEFT-HAND threads

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



RG7977 –UN–14NOV97

Marks on Tensioner



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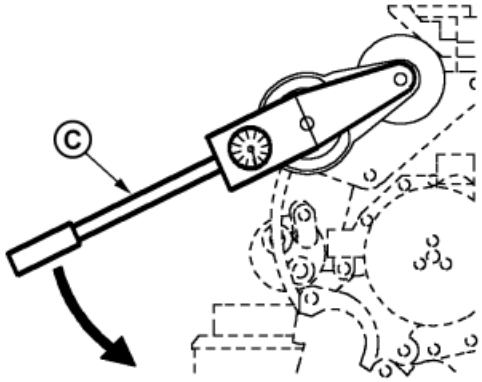
Align Marks



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Align Torque Wrench with Pulley and Tensioner

RG,RG34710,5578 –19–25FEB02–3/3

Checking Cooling System

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

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

IMPORTANT: Air must be expelled from cooling system when system is refilled. Loosen temperature sending unit fitting 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. Replace hoses when hard, flimsy, or cracked.

TS281 –UN–23AUG88

High-Pressure Fluids

RG,RG34710,5580 –19–20MAY96–1/1

Replenishing Supplemental Coolant Additives (SCAs) Between Coolant Changes

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

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

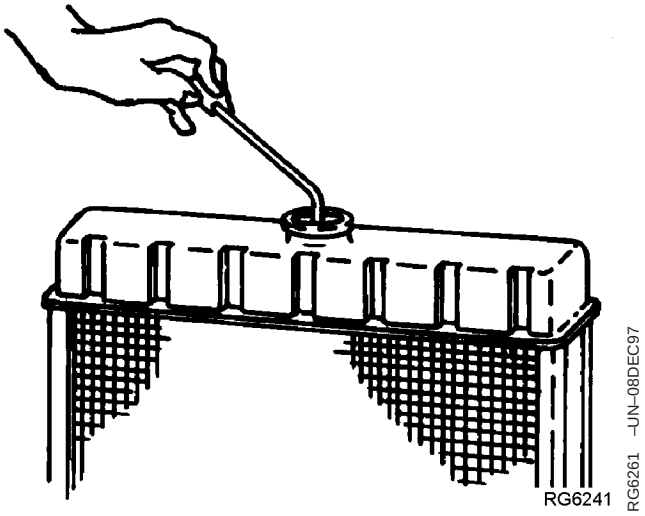
Through time and use, the concentration of coolant additives is gradually depleted during engine operation. Periodic replenishment of inhibitors is required, even when John Deere COOL-GARD® is used. The cooling system must be recharged with additional supplemental coolant additives available in the form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

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

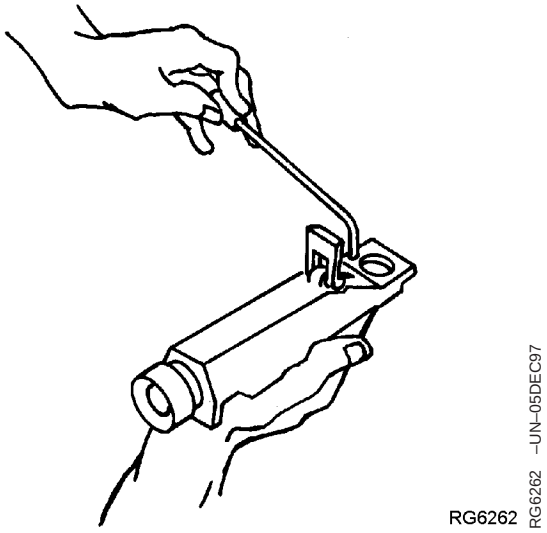
John Deere LIQUID COOLANT CONDITIONER is recommended as a supplemental coolant additive in John Deere engines.

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

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



Radiator Coolant Check



JTO7298 Coolant/Battery Tester

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

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DPSG,OUOD002,1921 –19–23NOV01–1/2

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 JTO7298 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 –19–23NOV01–2/2

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 Or COOLSCAN PLUS

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

OUOD002,0000175 –19–23NOV01–1/1

Remove, Inspect and Clean Engine Heat Exchanger Core

IMPORTANT: Initially remove and inspect the engine heat exchanger core at 250 hour or three month service interval on a new engine. Then, remove and clean at every 500 hour or 12 month interval thereafter.

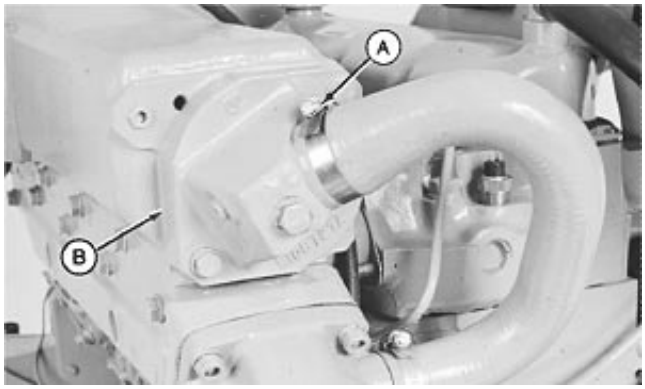
1. Close sea cocks and drain the sea water system.

2. Open drain cock on cylinder block and drain approximately two gallons of engine coolant into a clean container. Close drain cock.

On 4045D Engines Only:

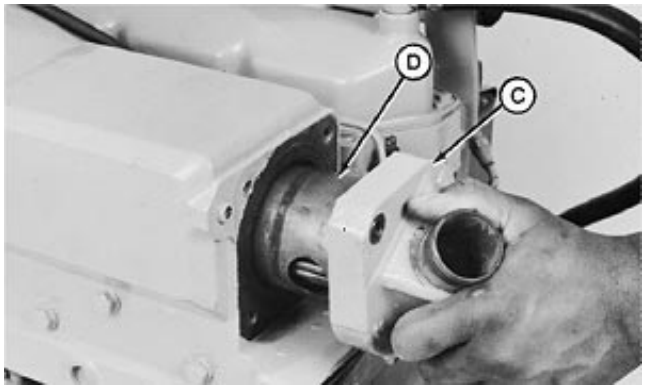
3. Loosen hose clamp (A) and remove hose from rear end cap (B).

4. Remove two end cap mounting cap screws and remove end cap (C) with heat exchanger core (D) from rear of engine.



RG6063 –UN–23JAN92

Heat Exchanger End Cap



RG6064 –UN–23JAN92

Remove Heat Exchanger Core

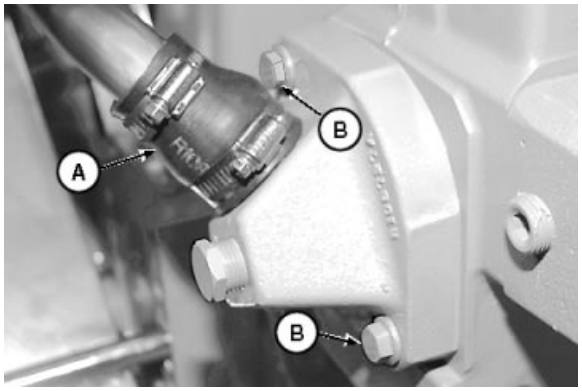
A—Clamp
B—End Cap
C—End Cap
D—Heat Exchanger Core

DPSG,OUOD007,319 –19–25MAR02–1/1

On 4045T, 6068T And 6068SFM50 Engines Only:

3. Loosen hose clamps and remove sea water pump-to-front end cap connecting hose (A) from heat exchanger end cap.

4. Remove two end cap mounting cap screws (B) and remove end cap with heat exchanger core from front of engine.



RG9847 –UN–06JAN99

Heat Exchanger End Cap

DPSG,OUOD007,320 –19–18FEB02–1/1

On all engines:

NOTE: The heat exchanger core may be removed from housing when either end cap is removed. It is strongly recommended that both end caps be removed for cleaning when cleaning the heat exchanger core.

5. Remove remaining end cap from water manifold/heat exchanger housing. Remove end cap from heat exchanger core.

6. Thoroughly clean all buildup from both end caps and inspect zinc plug in each. Replace plugs as needed. (See INSPECT AND REPLACE ZINC PLUGS in 250 Hour Section.)

7. Use a 4.76 mm (3/16 in.) diameter brass rod to clean out any buildup in each heat exchanger tube. Run the rod the entire length of each tube to push debris out.

8. Flush the heat exchanger tubes with clean water, making sure all tubes are cleared of debris. Clean (with brass rod) and flush heat exchanger again if necessary to remove any remaining debris from tubes.

If you suspect that your heat exchanger core is defective, have your authorized servicing dealer or engine distributor pressure test for leaks. Replace heat exchanger core as required.

9. Remove and thoroughly clean water manifold/heat exchanger housing if needed.

RG6066 –UN–23JAN92

Clean Heat Exchanger

DPSG,OUOD007,321 –19–04JAN02–1/1

Install Heat Exchanger Core

Thoroughly inspect condition of end cap sealing O-rings (A). Sealing O-rings may be reused if not excessively worn or damaged during disassembly. Replace sealing rings as necessary.

Lubricate front and rear end cap O-rings with clean multi-purpose grease.

On 4045D Engines:

1. Install front end cap, install cap screws and evenly tighten until end cap (B) is about 6.4 mm (0.25 in.) from housing (C). Index end cap in same position as removed.

2. Install heat exchanger core from rear of engine. Make sure core is properly seated in front end cap to avoid cutting O-ring.

3. Install rear end cap with heat exchanger core properly seated in cap and cap properly indexed in same position as removed.

4. Install and evenly tighten rear end cap screws until cap contacts housing. Evenly tighten front end cap screws until cap contacts housing. Tighten front and rear end cap screws to 24 N•m (18 lb-ft).

5. Connect all water piping and tighten hose clamps securely. Fill cooling system with the proper amount and concentration of ethylene-glycol base antifreeze.

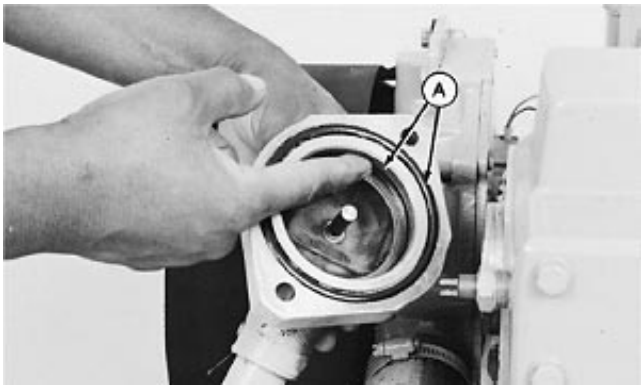
6. Open sea cock, start engine and check for leaks.

On 4045T, 6068T and 6068SFM50 Engines:

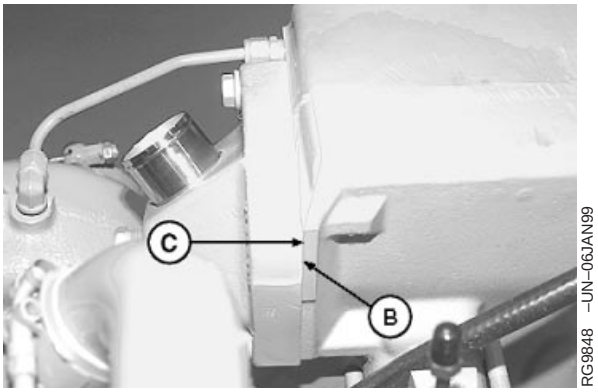
1. Install rear end cap, install cap screws and evenly tighten until end cap (B) is about 6.4 mm (0.25 in.) from housing (C). Index end cap in same position as removed.

2. Install heat exchanger core from front of engine. Make sure core is properly seated in rear end cap to avoid cutting O-ring.

3. Install front end cap with heat exchanger core properly seated in cap and cap properly indexed in same position as removed.



Inspect Heat Exchanger End Cap



Install Heat Exchanger

A—O-Rings
B—End Cap
C—Housing

Continued on next page

4. Install and evenly tighten front end cap screws until cap contacts housing. Evenly tighten rear end cap screws until cap contacts housing. Tighten front and rear end cap screws to 24 N•m (18 lb-ft).

5. Connect all water piping and tighten hose clamps securely. Fill cooling system with the proper amount and concentration of ethylene-glycol base antifreeze.

6. Open sea cock, start engine and check for leaks.

DPSG,OUOD007,322 –19–04JAN02–2/2

Remove, Inspect and Clean Engine Aftercooler Core (6068SFM50)

IMPORTANT: Initially remove and inspect the aftercooler core at 250 hour or three month service interval on a new engine. Then, remove and clean at every 500 hour or 12 month interval thereafter.

1. Close sea cocks and drain the sea water system.

2. Loosen clamp (A) and remove air filter.

3. Loosen clamps (B), remove mounting bolt (C) and remove water line from rear of aftercooler.

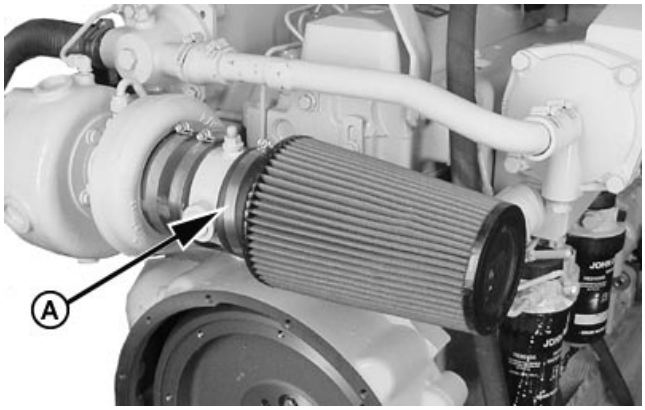
4. Remove four cap screws (D) and remove rear cap and O-ring.

5. Remove clamps (E) and remove hoses from front cap.

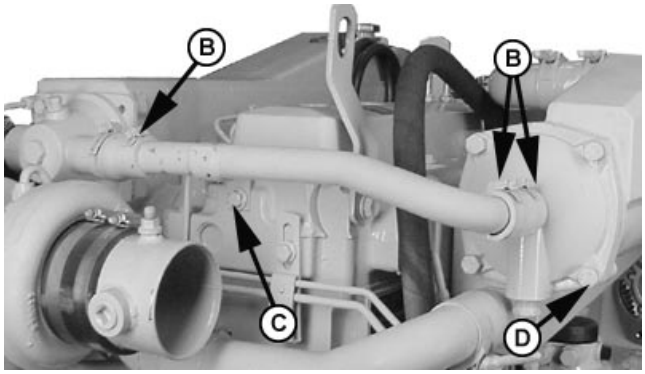
6. Remove four cap screws (F), front cap and O-ring.

7. Remove aftercooler core from the rear of the engine.

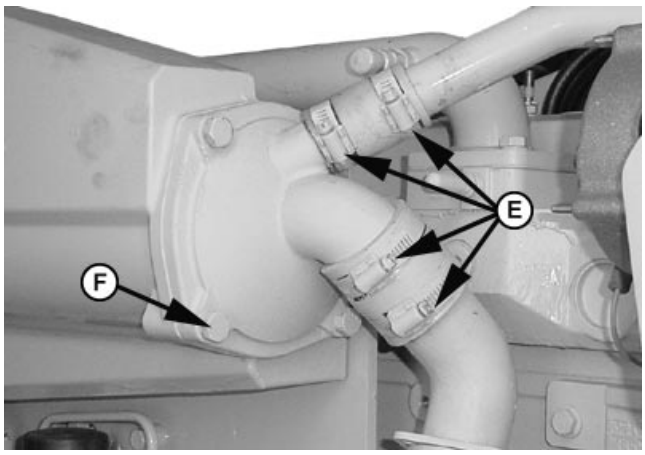
A—Clamp
B—Clamps
C—Mounting Bolt
D—Cap Screws
E—Clamps
F—Cap Screws



Remove Clamp And Air Filter Element



Remove Rear Cap



Remove Front Cap

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OUOD005,000017C –19–18FEB02–1/2

8. Thoroughly clean all buildup from both end caps.

9. Use a 4.76 mm (3/16 in.) diameter brass rod to clean out any buildup in each tube. Run the rod the entire length of each tube to push debris out.

10. Flush the tubes with clean water, making sure all tubes are cleared of debris. Clean (with brass rod) and flush aftercooler core again if necessary to remove any remaining debris from tubes.

If you suspect that your aftercooler core is defective, have your authorized servicing dealer or engine distributor pressure test for leaks. Replace aftercooler core as required.

RG12181 –UN–25FEB02

Clean Aftercooler Core

OUOD005,000017C –19–18FEB02–2/2

Install Aftercooler Core (6068SFM50)

Thoroughly inspect condition of end cap sealing O-rings (A). Sealing O-rings may be reused if not excessively worn or damaged during disassembly. Replace sealing rings as necessary.

Lubricate front and rear end cap O-rings with clean multi-purpose grease.

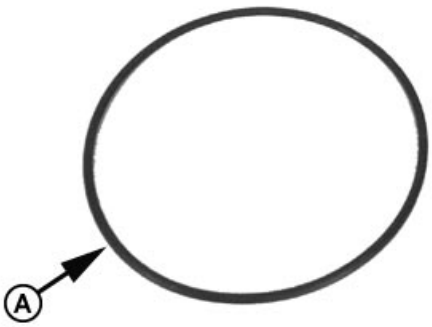
1. Install aftercooler core (B) from rear of engine.

2. Index end cap in same position as removed. Install O-ring and rear end cap, install cap screws and evenly tighten until snug.

3. Install O-ring and front end cap with aftercooler core properly seated in cap and cap properly indexed in same position as removed.

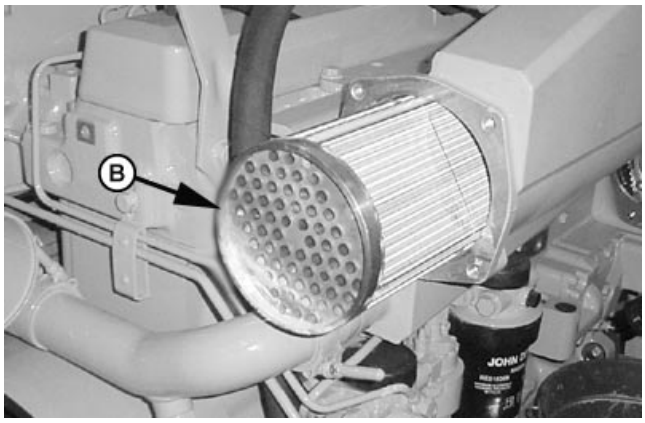
4. Install and evenly tighten front cap screws until cap contacts housing. Tighten front and rear end cap screws to 24 N•m (18 lb-ft).

5. Connect all water piping and tighten water line-to-cylinder head cap screw to 50 N•m (37 lb-ft). Tighten hose clamps securely. Open sea cocks.



RG12184 –UN–25FEB02

End Cap O-Ring



RG12185 –UN–25FEB02

Install Aftercooler Core

A—O-Ring
B—Aftercooler Core

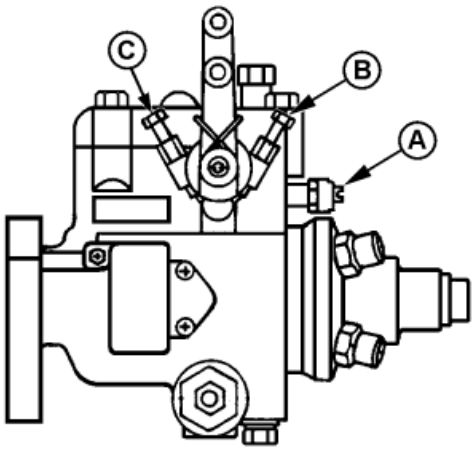
OUOD005,000017D –19–18FEB02–1/1

Adjusting Variable Speed (Droop) on Generator Set Engines

NOTE: This adjustment is not required on 6068SFM50 electronically-controlled engines.

Stanadyne Mechanical Injection Pumps Only

1. Warm engine to normal operating temperature.
2. When necessary, disconnect throttle linkage or cable.
3. Adjust slow idle (C) and adjust fast idle (B) speed when necessary.
4. Run engine at fast idle, then apply load until reaching rated speed.
5. Check power. Adjust with the screw (A) if needed.
6. Remove load from engine.
7. Again check and adjust fast idle if screw (A) has been turned.
8. Repeat procedure until both the engine power and the fast idle speed are correct.
9. Reinstall throttle linkage if previously removed.



RG12066 –UN–29JAN02

Droop Adjustment Screw

A—Adjustment Screw
B—Fast Idle Adjustment
C—Slow Idle Adjustment

Continued on next page

RG,RG34710,5583 –19–25MAR02–1/3

DENSO In-Line Injection Pumps Only

1. Check for specified no-load (frequency). If governor regulation is within 5–7% range, no adjustment is necessary.

2. If governor regulation is above 7% or below 5%, stop engine and remove cap nuts from adjusting screws before making adjustments.

3. Remove droop adjusting screw access plug (B, shown removed) from top of governor housing.

4. Back out slow idle (adjusting) screw (D) and bumper screw. Pull back on throttle lever (F, toward rear of governor housing) by hand until the droop adjusting screw (C) inside housing can be adjusted through the access plug hole.

5. Screw the droop screw in (clockwise), counting the turns until screw bottoms out. Then, return screw to original setting.

NOTE: A noticeable click will occur at each 1/4 turn of droop adjusting screw. One click clockwise will increase no-load speed approximately 10 rpm, counterclockwise will reduce speed by 10 rpm.

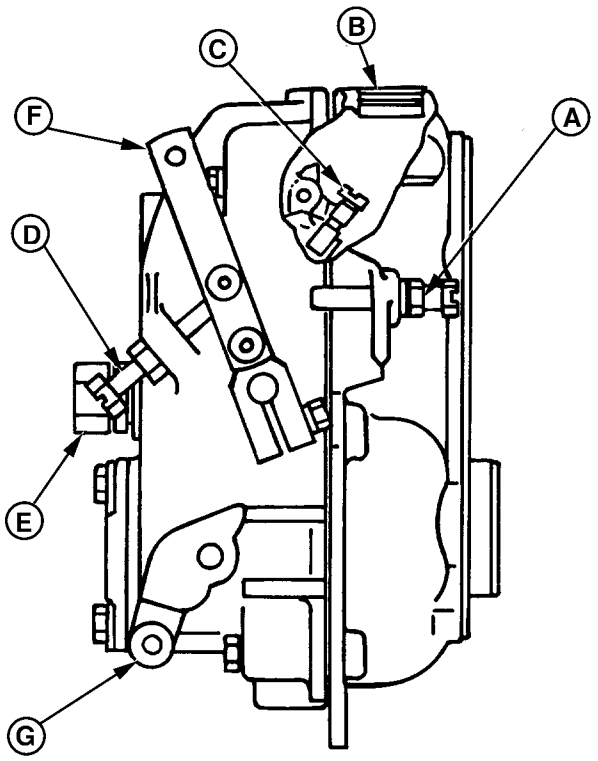
6. Screw in the droop screw (clockwise) no more than 1/2 turn (two clicks) at a time to reduce governor droop. Turn counterclockwise no more than two clicks at a time to increase governor droop (to reduce governor sensitivity).

7. Replace access plug in top of governor housing. Start engine, apply full (100%) load, and readjust high idle adjusting screw until 1500 rpm is obtained at the specified power.

8. Screw in idle (bumper) spring until engine speed increases 5–10 rpm.

9. Repeat steps 4 through 7 until governor regulation is within the 5–7% range.

10. Replace all cap nuts onto adjusting screws and tighten lock nuts securely.



RG5752 –UN–03NOV97

DENSO In-Line Injection Pump

A—Fast Idle (Stop) Screw
B—Droop Adjusting Screw Access Plug Location
C—Droop Adjusting Screw
D—Slow Idle (Adjusting) Screw
E—Idle (Bumper) Spring
F—Throttle Lever
G—Mechanical Shutoff Lever

Continued on next page

RG,RG34710,5583 –19–25MAR02–2/3

Delphi (Lucas) Injection Pumps Only

See your authorized Delphi (Lucas) Repair Station for speed droop adjustment. This service requires that an internal pump adjustment be made.

RG,RG34710,5583 –19–25MAR02–3/3

Checking Crankshaft Vibration Damper (6-Cylinder Engine Only)

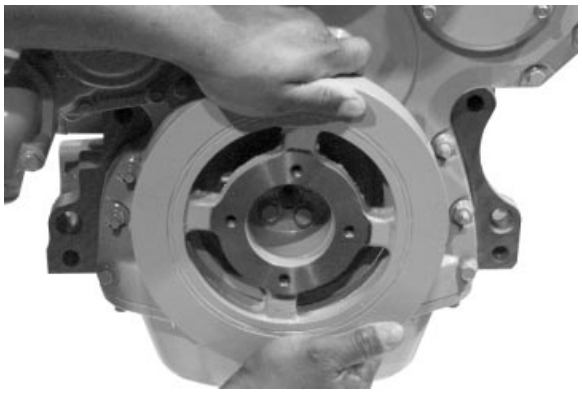
1. Remove belts (shown removed).
2. Grasp vibration damper with both hands and attempt to turn it in both directions. If rotation is felt, damper is defective and should be replaced.

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

3. Check vibration damper radial runout by positioning a dial indicator (A) so probe contacts damper outer diameter.
4. With engine at operating temperature, rotate crankshaft using either JDE83 or JDE81-1 Flywheel Turning Tool.
5. Note dial indicator reading. If runout exceeds specifications given below, replace vibration damper.

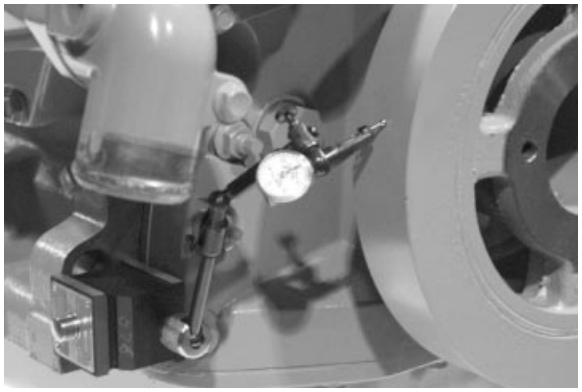
Specification

Vibration Damper—Maximum Radial Runout..... 1.50 mm (0.060 in.)



RG8018 –UN–15JAN99

Grasp Vibration Damper

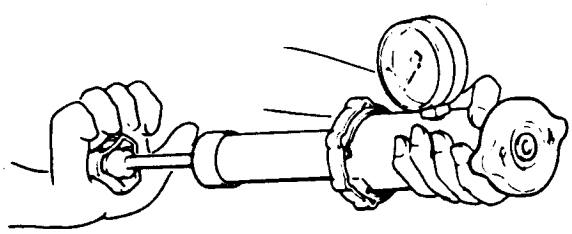


RG7508 –UN–23NOV97

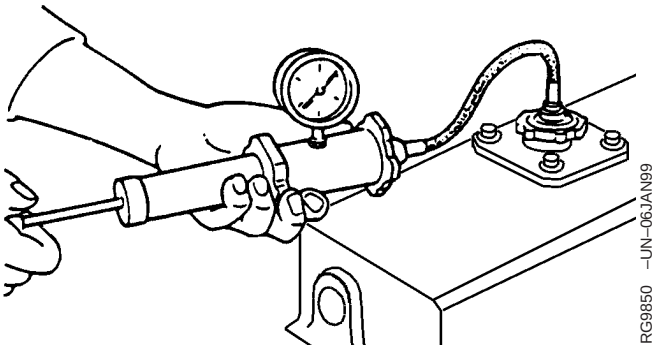
Check Runout

RG,RG34710,5585 –19–12NOV01–1/1

Pressure Testing Cooling System



RG6557 –UN–20JAN93



RG9850 –UN–06JAN99

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 Coolant Filler Cap

1. Remove coolant filler cap and attach to an appropriate tester as shown.
2. Pressurize cap to 70 kPa (0.7 bar) (10 psi). Gauge should hold pressure for 10 seconds within the normal range if cap is acceptable.

   If gauge does not hold pressure, replace pressure 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

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

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

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

3. Connect gauge and adapter to filler neck. Pressurize system to 70 kPa (0.7 bar) (10 psi).
4. With pressure applied, check all cooling system hose connections, coolant tank, and overall engine for leaks.

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

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

RG,RG34710,5586 –19–20MAY96–1/1

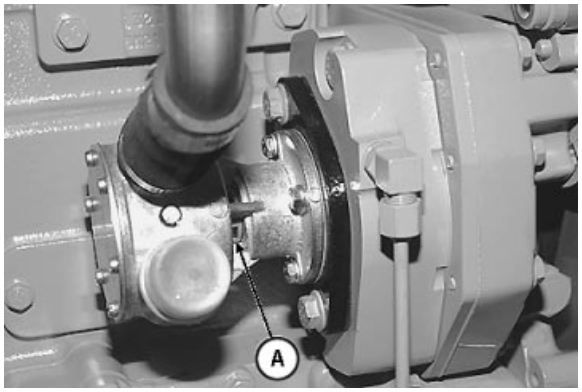
Inspect and Repair Sea Water Pump (Except 6068SFM50)

- **Inspect pump housing for seal leakage**

1. Inspect the sea water pump housing weep hole (A) for evidence of water or oil indicating seal leakage.

If water leakage is evident, order a RE49490 Impeller Repair Kit and replace impeller and front housing/shaft seal.

If oil leakage is evident, order a RE49491 Major Repair Kit and replace all internal components except shaft. An arbor press and drivers are needed to install this kit. Have an experienced repairman install this kit.



Inspect Sea Water Pump

A—Weep Hole

DPSG,OUOD007,323 –19–04JAN02–1/1

• **Remove and Inspect Impeller**

1. Close sea cock and drain sea water system if not previously done.

2. Remove six cover plate cap screws with washers and remove cover plate (A) with O-ring. Remove impeller end cap from end of impeller bore.

NOTE: Normally the impeller can be removed by using two pair of pliers to grip impeller vanes on opposite sides of impeller. A spray penetrating lubricant will help loosen a stuck impeller. Also, rotating the pump shaft by hand may help free the impeller.

3. Carefully remove impeller with cam plate. Be careful not to damage impeller if in reusable condition. Remove key from shaft keyway.

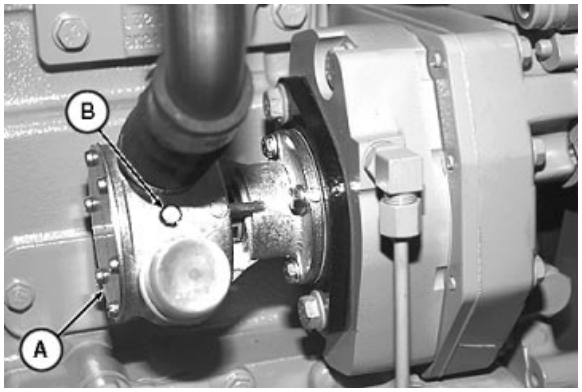
The impeller must be installed in the same direction as removed. Mark the impeller to ensure installation in proper direction of rotation if impeller is reused.

4. Inspect impeller for damages such as tears, stress cracks, excess abrasions on vane ends, or chunks of material missing. If impeller replacement is necessary, order an impeller repair kit.

IMPORTANT: If impeller has chunks of material missing, the heat exchanger, marine gear oil cooler and any other circuit that are cooled by raw water should be thoroughly cleaned and flushed.

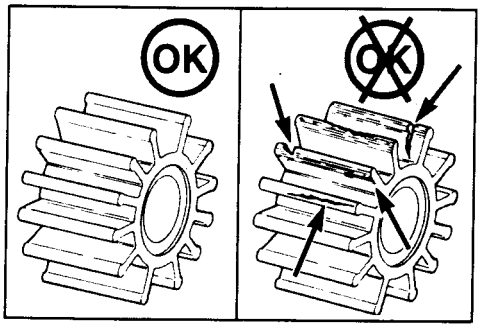
5. Remove cam screw (B) holding cam plate to impeller housing bore.

6. Thoroughly clean impeller housing bore and cam plate (if cam plate is reused).



RG9853 –UN–05JAN99

Remove Cover Plate



RG6243 –UN–23MAR92

Inspect Sea Water Pump Impeller

A—Cover Plate
B—Cam Screw

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DPSG,OUOD007,324 –19–19JAN99–1/2

- **Install Impeller**

1. Apply LOCTITE® 242 (Deere Part No. TY9370) to curved side of cam plate near threaded hole and install cam plate into impeller housing bore, be sure holes in cam plate and housing are aligned. Apply LOCTITE® 242 to cam screw (B), install, and tighten.

The cam plate should be inspected to insure that none of the cam fingers are protruding which could cause impeller damage. The cam screw should also be inspected to insure that it does not protrude below the cam plate. Replace cam plate and cam screw or grind screw flush as needed.

2. Lubricate impeller blades with a non-petroleum based lubricant such as silicone or soapy water. Install impeller using a twisting motion and be sure the impeller blades are bent in the same direction as they were upon removal.

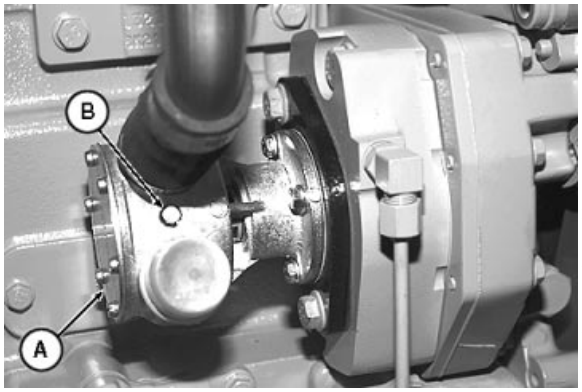
Be sure impeller is installed in same direction as removed if reusing existing impeller.

3. Rotate impeller to align keyway and slide the key in place. Install impeller end cap in end of impeller bore.

4. Using a new O-ring, install cover plate (A) onto impeller housing. Install six screws with washers. Tighten screws evenly.

5. Reconnect all water piping, if disconnected.

6. Close sea cock, start engine, and check for leaks.



Install Cover Plate

A—Cover Plate
B—Cam Screw

LOCTITE is a registered trademark of Loctite Corp.

DPSG,OUOD007,324 –19–19JAN99–2/2

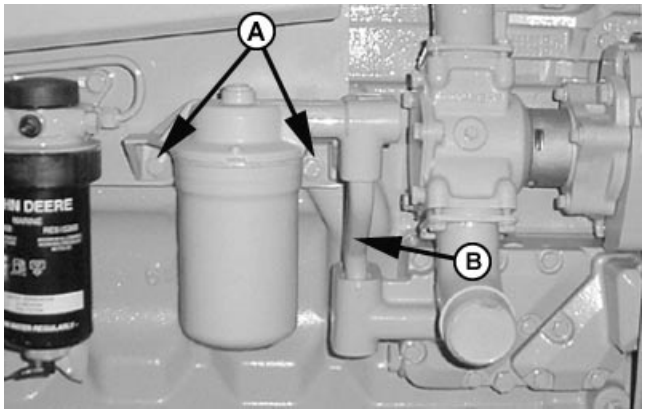
Inspect And Repair Sea Water Pump (6068SFM50)

NOTE: On 6068SFM50 engines, the sea water pump must be removed from the engine for inspection and repair.

If engine is equipped with a remote oil filter, steps 2 and 16 are not necessary.

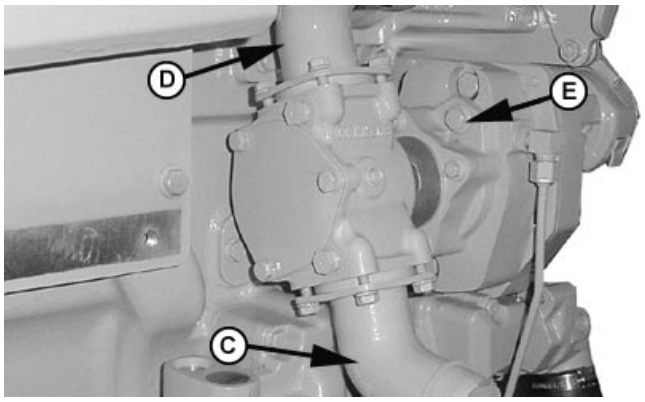
1. Close sea cocks and drain sea water system.
2. Remove two cap screws (A) and remove oil filter housing and oil tubes (B).
3. Remove flange mount cap screws and remove sea water inlet tube (C) and outlet tube (D).
4. Remove mounting cap screws (E) and remove sea water pump.
5. Clean all gasket material from both mating surfaces.

A—Cap Screws
B—Oil Tubes
C—Sea Water Inlet Tube
D—Sea Water Outlet Tube
E—Mounting Cap Screws



RG12186 –UN–25FEB02

Remove Oil Filter Housing (If Necessary)



RG12187 –UN–25FEB02

Remove Sea Water Pump

Continued on next page

DPSG,OUOD005,3475 –19–04FEB02–1/3

6. Remove cover plate (A) from sea water pump.

NOTE: Normally the impeller can be removed using two pair of pliers to grip impeller vanes on opposite sides of impeller. A spray penetrating lubricant will help loosen a stuck impeller.

7. Remove impeller (B) and shaft key (C) from pump housing.

8. Remove O-ring (D).

9. Inspect cam plate (E) for evidence of heavy pitting or wear. Replace as needed.

10. Inspect impeller for cracks, tears or excess abrasion on vane ends. Replace if either condition exists.

IMPORTANT: If impeller has chunks of material missing, the heat exchanger, aftercooler, marine gear oil cooler and any other circuit that are cooled by raw water should be thoroughly cleaned and flushed.

11. Install shaft key (C) on shaft.

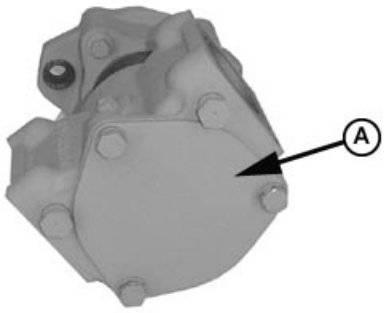
12. Lubricate new impeller blades with a non-petroleum based lubricant such as silicone or soapy water. Install impeller using a twisting motion and be sure the impeller blades are bent in the same direction as they were upon removal to prevent damage at startup. Rotate impeller on shaft to align keyways and slide the impeller onto the shaft.

13. Using a new O-ring (D), install cover plate and tighten cap screws with washers securely.

14. Install sea water pump and tighten cap screws to 73 N•m (54 lb-ft).

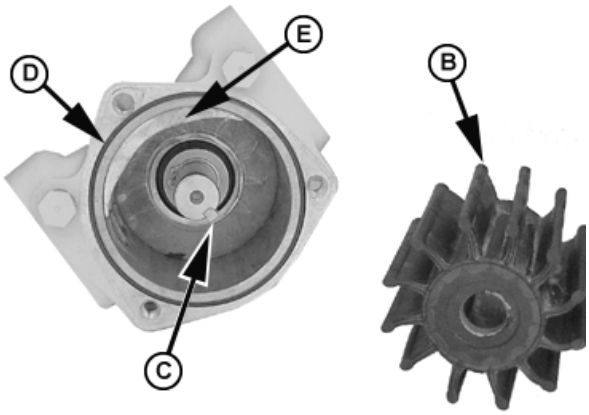
15. Connect sea water inlet and outlet tubes. Tighten mounting cap screws **evenly** until secure.

16. Replace O-rings on oil tubes and install oil filter housing and oil tubes. Tighten mounting cap screws to 35 N•m (26 lb-ft).



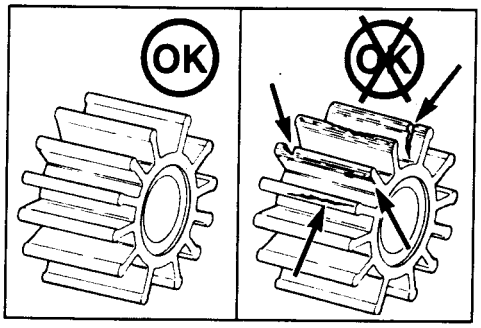
RG12188 –UN–25FEB02

Remove Impeller



RG12189 –UN–25FEB02

Remove and Inspect Components



RG6243 –UN–23MAR92

Inspect Sea Water Pump Impeller

A—Cover Plate
B—Impeller
C—Shaft Key
D—O-Ring
E—Cam Plate

Continued on next page

17. Open sea cocks, start engine and check pump operation.

DPSG,OUOD005,3475 –19–04FEB02–3/3

Checking and Adjusting Engine Valve Clearance

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

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

NOTE: If desired, have your authorized servicing dealer or engine distributor adjust the engine valve clearance.

1. Remove rocker arm cover and crankcase ventilator 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.

Continued on next page

RG,RG34710,5589 –19–04JAN02–1/5

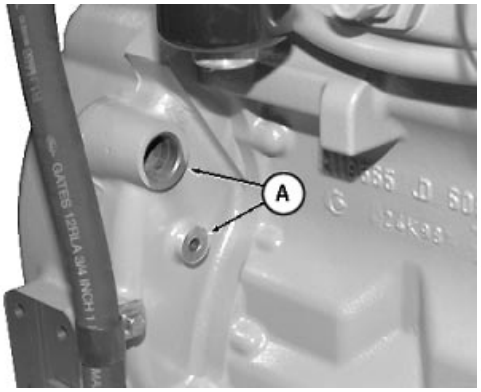
2. Remove plastic plugs or cover plate from flywheel housing timing holes (A).

3. Using either JDG820 or JDE83 Flywheel Turning Tool and JDE81-4 or JDG1571 Timing Pin, rotate engine in running direction (clockwise viewed from front) until Number 1 (front) cylinder is at Top Dead Center (TDC) Compression stroke. Insert JDE81-4 or JDG1571 timing pin in flywheel.

   If Number 1 cylinder rocker arms are loose, the engine is at Number 1 "TDC Compression".

   If No. 1 cylinder rocker arms are not loose, rotate engine one full revolution (360°) to Number 1 "TDC Compression".

4. With engine lock-pinned at “TDC” of Number 1 piston’s compression stroke, check and adjust (as needed) valve clearance to following specifications, as directed in the procedures (following page) for 4 or 6-cylinder engines.



Flywheel Housing Timing Holes

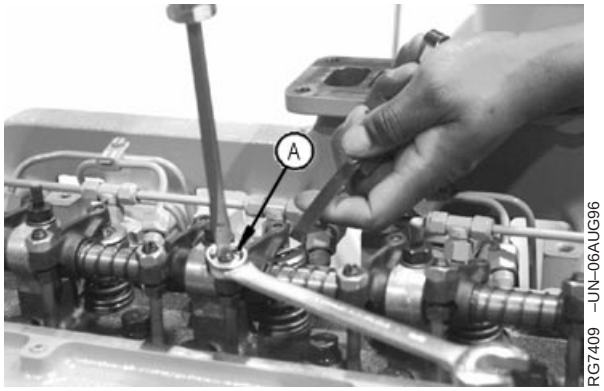
A—Timing Holes

Specification	
Intake Valve Clearance Checking (Rocker Arm-to-Valve Tip) (Engine Cold)—Clearance	0.31-0.38 mm (0.012-0.015 in.)
Exhaust Valve Clearance Checking (Rocker Arm-to-Valve Tip) (Engine Cold)—Clearance	0.41-0.48 mm (0.016-0.019 in.)

RG,RG34710,5589 –19–04JAN02–2/5

5. If valves need adjusting, loosen the locknut (A) 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 locknut to 27 N•m (20 lb-ft). Recheck clearance again after tightening locknut. Readjust clearance as necessary.

6. Replace rocker arm cover and crankcase ventilator tube.



Adjust Valves

A—Locknut

Specification	
Intake Valve Clearance Adjustment (Rocker Arm-to-Valve Tip) (Engine Cold)—Clearance	0.36 mm (0.014 in.)
Exhaust Valve Clearance Adjustment (Rocker Arm-to-Valve Tip) (Engine Cold)—Clearance	0.46 mm (0.018 in.)

Continued on next page

RG,RG34710,5589 –19–04JAN02–3/5

4-Cylinder Engine

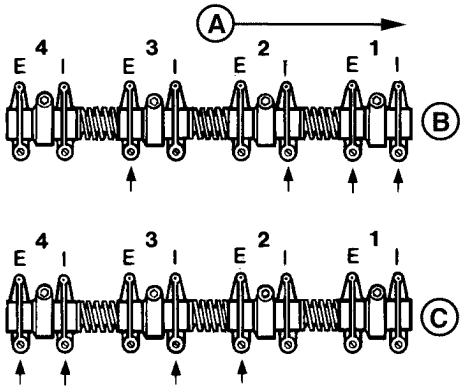
NOTE: Firing order is 1-3-4-2.

Lock No. 1 piston at TDC compression stroke (B).

Adjust valve clearance on No. 1 and 3 exhaust valves and No. 1 and 2 intake valves.

Rotate flywheel 360°. Lock No. 4 piston at TDC compression stroke (C).

Adjust valve clearance on No. 2 and 4 exhaust valves and No. 3 and 4 intake valves.



RG4776 –UN–31OCT97

4-Cylinder Engine Valve Adjustment

A—Front of Engine
B—No. 1 Piston at TDC Compression Stroke
C—No. 4 Piston at TDC Compression Stroke
E—Exhaust Valve
I—Intake Valve

RG,RG34710,5589 –19–04JAN02–4/5

6-Cylinder Engine

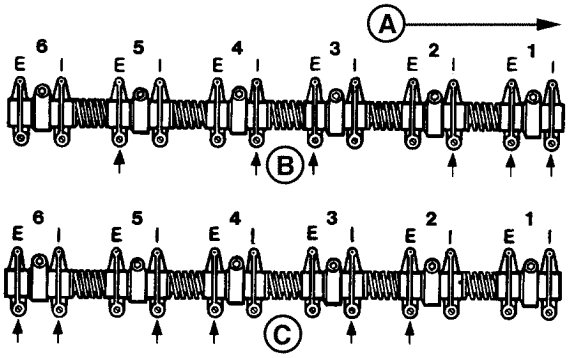
NOTE: Firing order is 1-5-3-6-2-4.

Lock No. 1 piston at TDC compression stroke (B).

Adjust valve clearance on No. 1, 3, and 5 exhaust valves and No. 1, 2, and 4 intake valves.

Rotate flywheel 360°. Lock No. 6 piston at TDC compression stroke (C).

Adjust valve clearance on No. 2, 4, and 6 exhaust valves and No. 3, 5, and 6 intake valves.



RG4777 –UN–31OCT97

6-Cylinder Engine Valve Adjustment

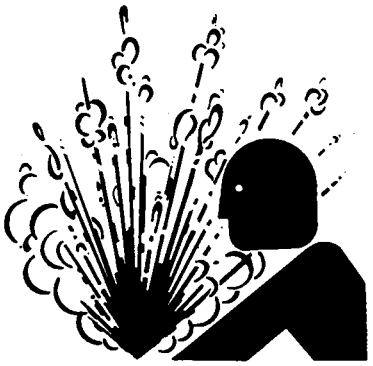
A—Front of Engine
B—No. 1 Piston at TDC Compression Stroke
C—No. 6 Piston at TDC Compression Stroke
E—Exhaust Valve
I—Intake Valve

RG,RG34710,5589 –19–04JAN02–5/5

Flushing 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.



TS281 –UN–23AUG88

High-Pressure Fluids

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

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

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

1. Pressure test entire cooling system and pressure cap if not previously done. (See PRESSURE TESTING COOLING SYSTEM, in the Lubrication and Maintenance/500 Hour/12 Month Section.)
2. Slowly open the engine cooling system filler cap or radiator cap to relieve pressure and allow coolant to drain faster.

Continued on next page

RG,RG34710,5587 –19–15FEB02–1/3

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

4. Open radiator drain valve. Drain all coolant from radiator.

5. Remove thermostats at this time, if not previously done. Install cover (without thermostats) using old gasket and tighten cap screws to 47 N•m (35 lb-ft).

6. Close all drain valves after coolant has drained.

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

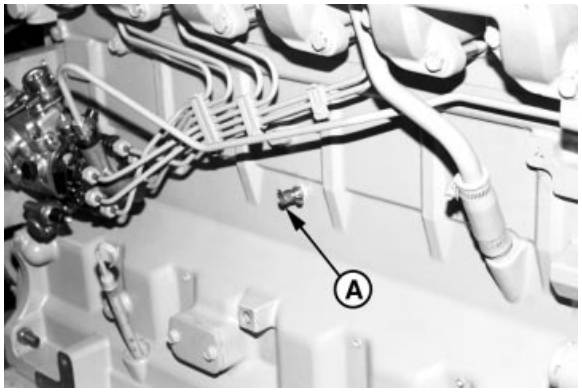
7. Fill the cooling system with clean water. Run the engine about 10 minutes to stir up possible rust or sediment.

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

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

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

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



Engine Block Drain Valve

A—Engine Block Drain Valve

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

Continued on next page

RG,RG34710,5587 –19–15FEB02–2/3

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

12. Add coolant to radiator until coolant touches bottom of filler neck. (See ADDING COOLANT in Service As Required Section.) Install radiator cap.

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

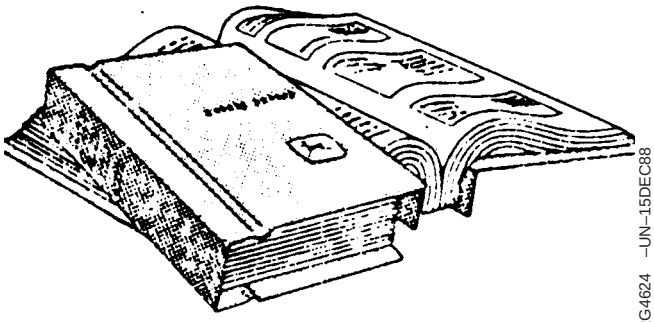
14. After running engine, check coolant level and entire cooling system for leaks.

RG,RG34710,5587 –19–15FEB02–3/3

Service as Required

Additional Service Information

This is not a detailed service manual. If you want more detailed service information, use the form in the back of this manual to order a component technical manual.



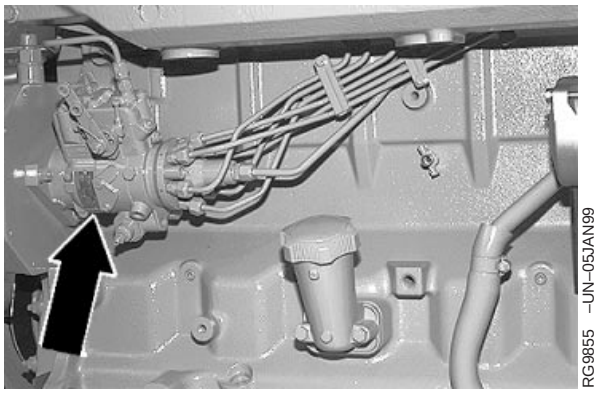
RG,RG34710,5591 –19–20MAY96–1/1

Do Not Modify Fuel System

IMPORTANT: Modification or alteration of the injection pump (arrow), 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.)



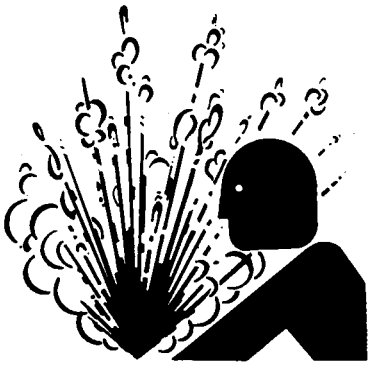
Injection Pump

RG,RG34710,5592 –19–11JAN02–1/1

Adding Coolant

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

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



TS281 –UN–23AUG88

High-Pressure Fluids

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

John Deere TY15161 Cooling System Sealer may be added to the cooling system to stop leaks. DO NOT use any other stop-leak additives in the cooling system.

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

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

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

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

2. Fill until coolant level touches bottom of coolant tank filler neck.

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

RG,RG34710,5593 –19–04JAN02–1/1

Replacing Dry Air Cleaner Element (Enclosed Element Installations)

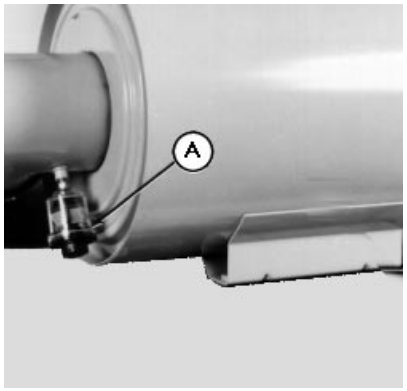
IMPORTANT: ALWAYS REPLACE primary air cleaner element when air restriction indicator (A) shows vacuum of 625 mm (25 in.) H_2O, is torn, or visibly dirty.

1. Loosen band clamp (B) securing air cleaner-to-intake elbow. Remove air cleaner.

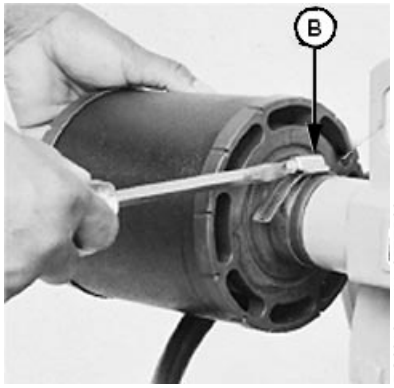
IMPORTANT: Tighten all air intake connections securely to prevent ingestion of abrasive dirt and dust into the system, causing possible engine damage.

2. Install a new air cleaner and tighten band clamp securely.

A—Air Restriction Indicator
B—Band Clamp



Air Restriction Indicator



Loosen Band Clamp

RG,RG34710,5594 –19–04JAN02–1/1

Servicing Dry Air Cleaner Element (Open Element Installations)

IMPORTANT: Always service primary air cleaner element when air restriction indicator (A) shows a vacuum of 625 mm (25 in.) H_2O, or element 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.

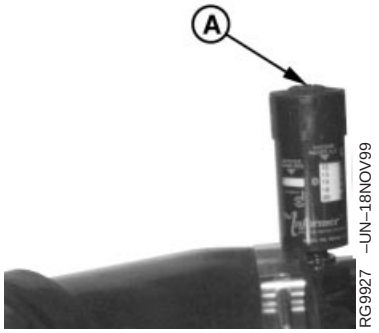
1. Loosen clamp (B) and remove filter element.

IMPORTANT: Replace filter element after 10 cleanings. (See following procedure.)

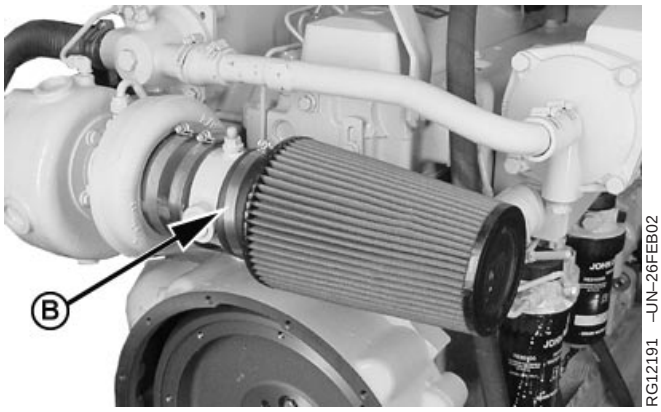
2. Tap end of filter GENTLY on hard surface to dislodge loose dirt.

3. Brush dirt side of filter GENTLY with soft bristle brush.

A—Air Restriction Indicator
B—Clamp



Air Filter Restriction Indicator



Remove Filter Element

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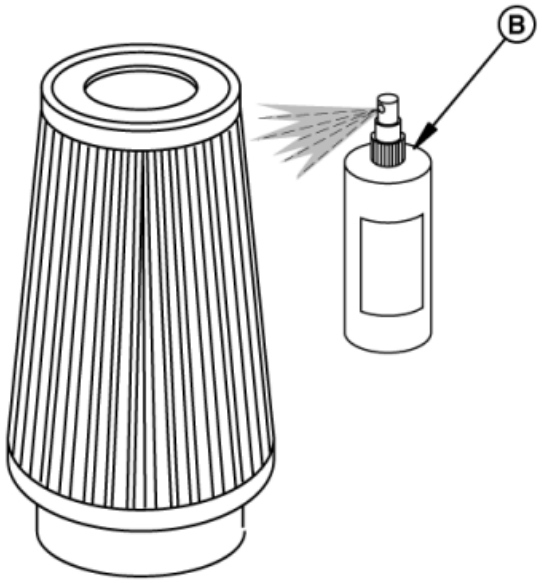
IMPORTANT: Use kit RE504585 to service filter element. DO NOT clean element with gasoline, solvents, parts cleaners, strong detergents, or caustic cleaning solutions. DO NOT steam clean or use high-pressure washers to clean element. These processes will damage filter media and/or rubber base or end cap.

4. Spray air filter cleaner (B) (from kit RE504585) liberally onto entire element. Let soak into filter media for 10 minutes.

B—Air Filter Cleaner



RG9943 –UN–17NOV99

Spray Filter with Cleaner

Continued on next page

DPSG,OUOD002,1407 –19–04JAN02–2/3

5. Rinse filter with low pressure water, flushing opposite the direction of air flow (from clean side to dirty side).

IMPORTANT: Let element dry at room temperature. Compressed air will damage filter media. Heat will shrink filter media and may damage rubber base or end cap.

6. Shake off excess water and let the element dry at room temperature.

IMPORTANT: Never put filter in service without oiling it. The filter will not function properly without being oiled with oil provided in kit RE504585.

Do not use automatic transmission fluid, motor oil, diesel fuel, or any type light-weight spray lubricant. These products will damage filter or degrade its performance.

NOTE: Red dye is added to oil to show areas of oil application.

RG9944 –UN–17NOV99

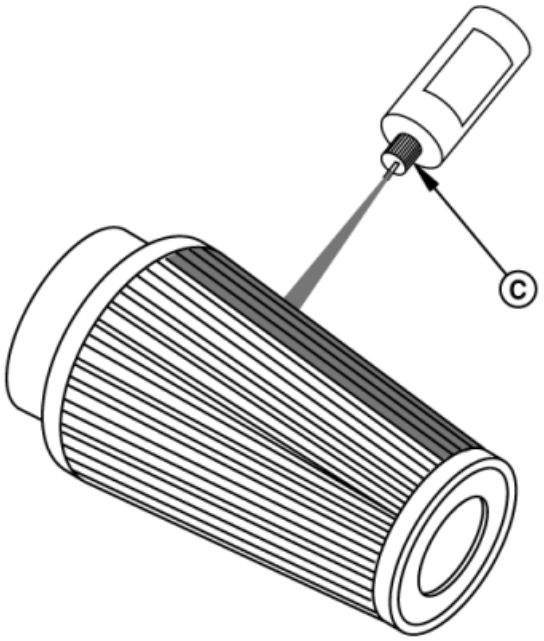
Rinse Filter

DPSG,OUOD002,1407 –19–04JAN02–3/3

7. Spray air filter oil from squeeze bottle (C) in kit from distance of 25 cm (10 in.) onto a group of pleats until the pleats become reddish in color. Respray any areas that are still white 10 minutes after initial application.

8. Install filter and tighten clamp.

C—Squeeze Bottle



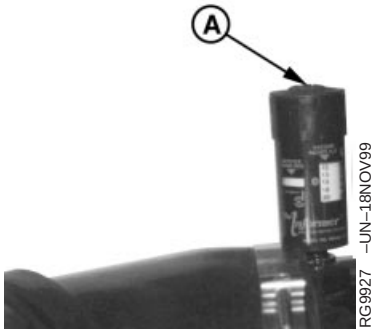
Apply Oil To Filter

DPSG,OUOD002,1408 –19–04JAN02–1/1

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

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

A—Reset Button



Air Filter Restriction Indicator Reset Button

DPSG,OUOD002,1409 –19–04JAN02–1/1

Replacing Air Filter Element (Open Element Installations)

IMPORTANT: Replace the element after 10 cleanings.

1. Loosen clamp (A) and remove filter element.

2. Install new filter element and tighten clamp.

A—Clamp

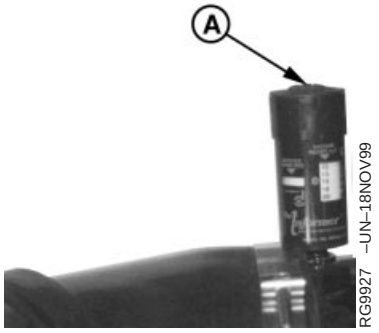
Remove Filter Element

DPSG,OUOD002,1410 –19–04JAN02–1/1

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

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

A—Reset Button



Air Filter Restriction Indicator Reset Button

DPSG,OUOD002,1411 –19–04JAN02–1/1

Replacing Alternator Belt (With Automatic Tensioner)

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

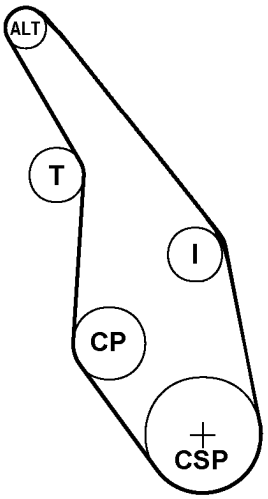
CAUTION: Belt guard should be in place at all times when engine is running.

1. Remove cap screws (A) and carefully remove belt guard from engine.
2. Release tension on belt using a breaker bar and socket on tension arm and remove poly-vee belt from pulleys.
3. Inspect belts for cracks, fraying, or stretched out areas. Replace if necessary.
4. Install new belt, making sure belt is correctly seated in all pulley grooves. Refer to belt routing at right.
5. Apply tension to belt with tensioner. Remove socket.
6. Start engine and check belt alignment.

A—Cap Screws
ALT—Alternator
CSP—Crankshaft Pulley
I—Idler Pulley
T—Tensioner
CP—Coolant Pump

RG9856 –UN–05JAN99

Remove Belt Guard



RG12077 –UN–26FEB02

Belt Routing

RG,RG34710,5599 –19–13FEB02–1/1

Replacing Alternator Belt (With Manual Tensioner)

Inspect belt for cracks, fraying or stretched-out areas. If belt is worn or damaged, replace it as follows.

NOTE: It is not necessary to remove belt guard (A) to replace belt.

1. Loosen both belt tensioner mounting cap screws (B).

2. Swing tensioner arm (C) away from belt to loosen belt.

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

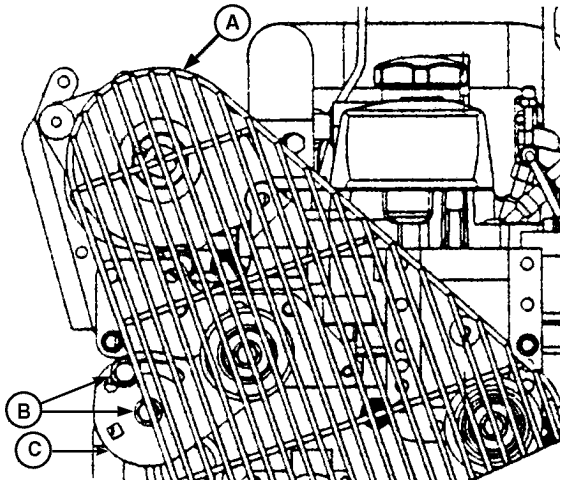
4. Install new belt, making sure belt is correctly seated in all pulley grooves.

5. Swing tensioner arm into belt to remove all belt slack.

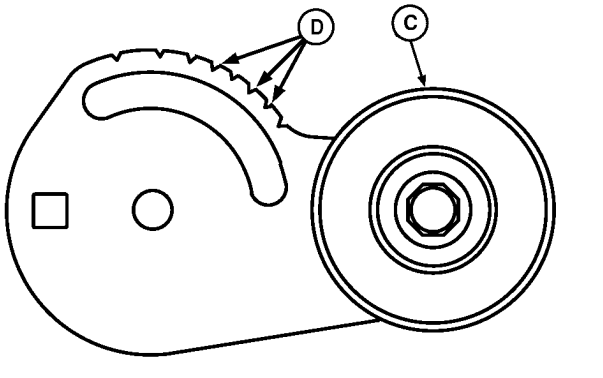
NOTE: Belt adjustment uses notched units (D) above the adjusting cap screw slot on the tensioner.

6. Using notches on tensioner to count units, move tensioner arm to stretch belt 1-1/2 units (new belt) or one unit (used belt) for appropriate tension.

7. Tighten tensioner mounting cap screws (B) to 70 N•m (52 lb-ft).



Remove Belt Guard



Tension With Swing Arm

A—Belt Guard
B—Mounting Cap Screws
C—Tensioner Arm
D—Notched Units

DPSG,OUOD013,511 –19–04JAN02–1/1

Inspect Driveline (PTO) (If Equipped)

CAUTION: Entanglement in rotating driveline can cause serious injury or death. Keep shield on PTO drive shaft between the 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.

TS198 –UN–23AUG88

Avoid Entanglement

Proper performance of the power take-off (PTO) unit will be related to the care it is given. Lubricate it periodically and keep the clutch properly adjusted. (See Service Literature provided by manufacturer.)

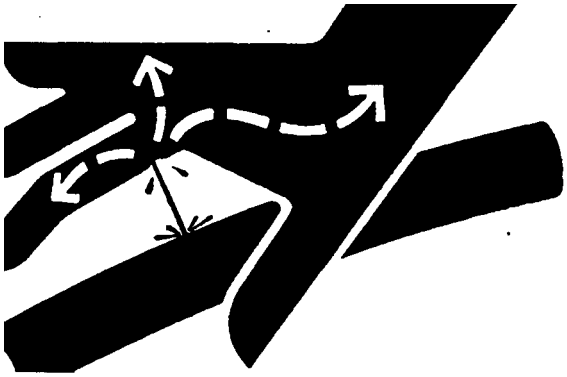
If the power take-off does not work properly after adjustment and lubrication, contact your authorized servicing dealer.

RG,RG34710,5600 –19–04JAN02–1/1

Bleeding the Fuel System

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

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



X9811 –UN–23AUG88

High-Pressure Fluids

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.

RG,RG34710,5602 –19–04JAN02–1/1

Bleeding Fuel System—4.5 L Engine

1. Loosen the air bleed vent screw (A) two full turns by hand on fuel filter base.

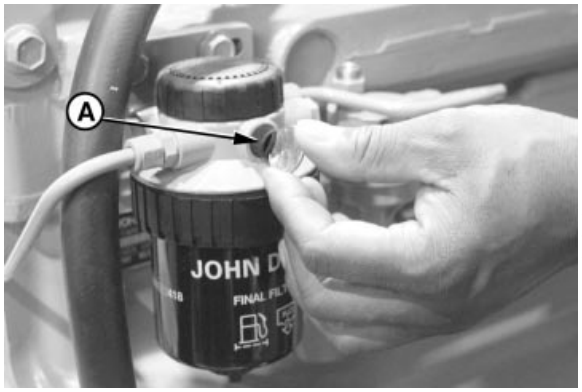
2. Operate supply pump primer lever (B) until fuel flow is free from air bubbles.

3. Tighten bleed plug securely, continue operating hand primer until pumping action is not felt. Leave hand primer in the up position, away from the cylinder block.

4. Start engine and check for leaks.

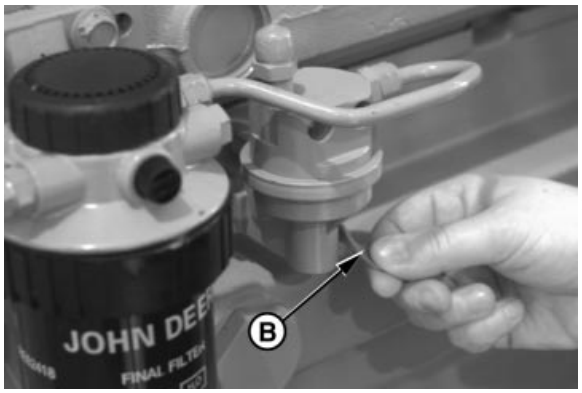
If engine will not start, it may be necessary to bleed air from fuel system at fuel injection pump or injection nozzles as explained next.

A—Bleed Vent Screw
B—Primer Lever



RG7947 –UN–13NOV97

Fuel Filter Bleed Vent Screw



RG8013A –UN–15JAN99

Fuel Supply Pump Primer Lever

DPSG,OUOD007,326 –19–04JAN02–1/1

Bleeding Fuel System—6.8 L Engine (Except 6068SFM50 Engines)

1. Drain water and contaminants from water separator sediment bowl (B) on primary fuel filter (A).

2. Loosen secondary (final) fuel filter outlet line (C).

3. Pump hand primer (D) on primary filter until a steady flow of fuel (without bubbles) comes out of connection.

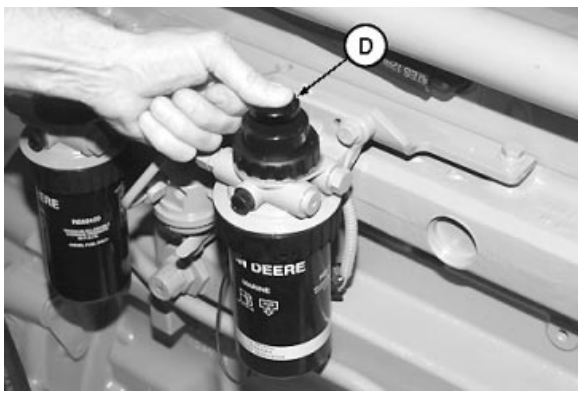
4. Continue pumping hand primer and simultaneously tighten outlet line connection to 25 N•m (18 lb-ft). DO NOT overtighten.

5. Start engine and run at high idle for 3-5 minutes.

A—Primary Fuel Filter
B—Bowl
C—Outlet Line
D—Hand Primer

RG9858 –UN–06JAN99

Bleed Fuel System



RG9845 –UN–06JAN99

Pump Hand Primer

DPSG,OUOD007,327 –19–04JAN02–1/1

Bleeding Fuel System at Fuel Injection Pump (Except 6068SFM50 Engines)

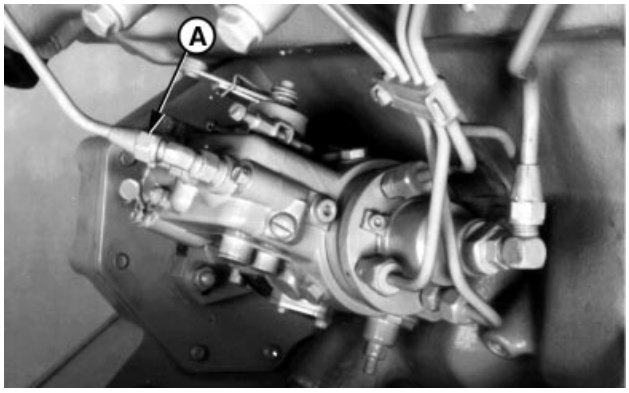
1. Slightly loosen fuel return line connector (A) at fuel injection pump.

2. Operate fuel supply pump primer until fuel, without air bubbles, flows from fuel return line connection.

3. Tighten return line connector to 16 N•m (12 lb-ft).

4. On 4.5 L Engines, leave hand primer in the up position away from the cylinder block.

A—Fuel Return Line Connector



Bleed Fuel At Injection Pump

DPSG,OUOD007,328 –19–04JAN02–1/1

Bleeding Fuel System At Fuel Injection Nozzles (Except 6068SFM50 Engines)

1. Move the speed control lever to half throttle position. On engines equipped with electronic fuel shut-off solenoid, energize solenoid.

IMPORTANT: Always use a backup wrench when loosening or tightening fuel lines at nozzles and/or injection pump to avoid damage.

2. Using two open-end wrenches, loosen fuel line connection at injection nozzle.

3. Crank engine over with starting motor, (but do not start engine), until fuel free from bubbles flows out of loosened connection. Retighten connection to 27 N•m (20 lb-ft).

4. Repeat procedure for remaining injection nozzles (if necessary) until all air has been removed from fuel system.

If engine still will not start, see your authorized servicing dealer or engine distributor.

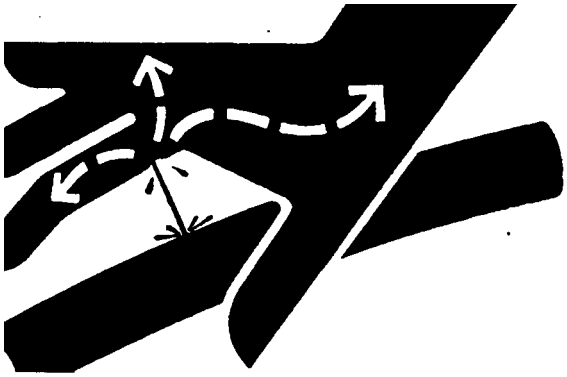
Loosen Fuel Pressure Line

DPSG,OUOD007,329 –19–19JAN99–1/1

Bleeding Fuel System—6.8 L Engines (6068SFM50 Engines)

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

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



X9811 –UN–23AUG88

High-Pressure Fluids

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.

This fuel system can only be bled by the electronic transfer pump or at the injection nozzles. **BLEEDING SHOULD NOT BE PERFORMED** at any location on the Bosch VP44 injection pump.

Continued on next page

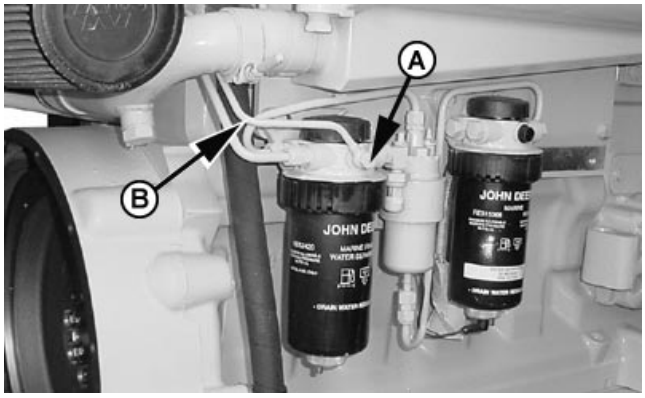
Bleed Using Electronic Transfer Pump

The bleed is automatically performed by a small orifice (A) inside the final fuel filter base connected to the overflow valve on injection pump. The system allows air to escape continually through the fuel return line (B) when ignition is ON.

1. Ignition ON.

2. Allow 40 seconds for electronic transfer pump to complete priming.

3. If additional system bleeding is required, bleed the circuit by loosening fuel line connections at injection nozzles. See the next procedure, BLEED FUEL SYSTEM AT FUEL INJECTION NOZZLES.



Bleed Fuel System

A—Bleed Orifice in Final Fuel Filter Base
B—Fuel Return Line

OUOD002,000016A –19–04JAN02–2/3

Bleed Fuel System at Fuel Injection Nozzles

IMPORTANT: Always use a backup wrench when loosening or tightening fuel lines at nozzles and/or injection pump to avoid damage.

1. Using **two** open-end wrenches, loosen two fuel line connections at injection nozzles.

2. Crank engine over with starter motor for 15 seconds (but do not start engine) until fuel free from bubbles flows out of loosened connection. Retighten connection to specifications.

Specification	
Fuel Injection Nozzle Delivery Line—Torque	27 N•m (20 lb-ft)

3. Repeat procedure for remaining injection nozzles (if necessary) until all air has been removed from fuel system.

Bleed At Fuel Injection Nozzles

OUOD002,000016A –19–04JAN02–3/3

Remove and Install Auxiliary Gear Driven Sea Water Pump (Except 6068SFM50)

• **Remove Sea Water Pump:**

1. Close sea cock and drain sea water system, if not previously done.

2. Remove water inlet tube (shown removed) and outlet tube (A) from sea water pump.

3. Remove two cap screws (B) attaching sea water pump to gear housing. Withdraw pump from housing until splined shaft (C) is free from splined drive gear ID (D).

4. Clean all gasket material from both mating surfaces.

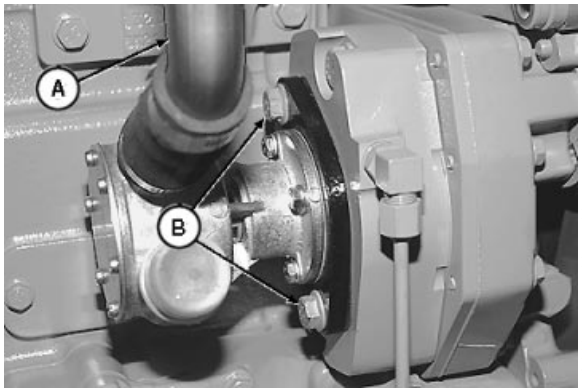
• **Install Sea Water Pump:**

1. Position a new gasket on water pump mounting flange. Install splined pump shaft in splined ID of drive gear.

2. Align mounting holes in water pump flange and gasket with threaded holes in gear housing. Install cap screws with washers and tighten cap screws to 47 N•m (35 lb-ft).

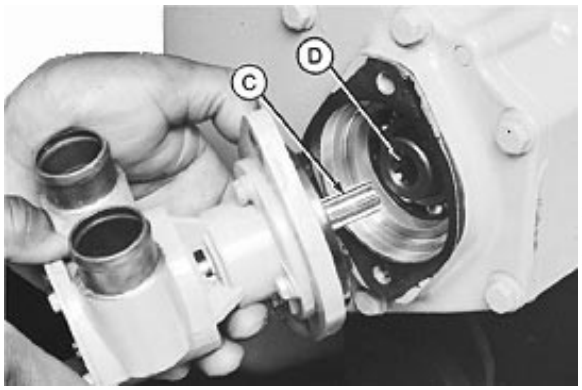
3. Connect water piping and tighten clamps.

4. Open sea cock, start engine, and check for leaks.



RG9861 –UN–06JAN99

Remove Sea Water Pump



RG9864 –UN–06JAN99

Install Sea Water Pump

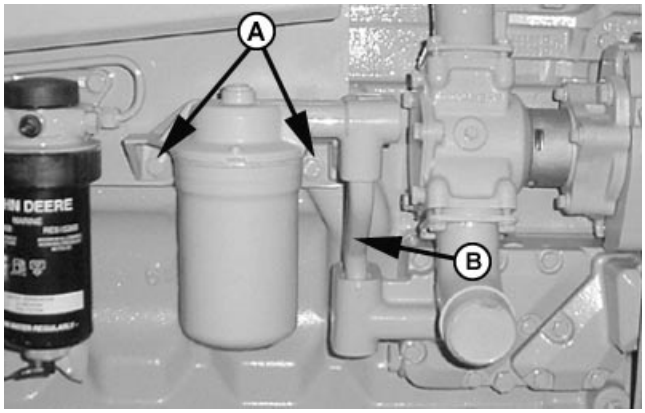
A—Outlet Tube
B—Mounting Screws
C—Splined Shaft
D—Drive Gear Splined ID

DPSG,OUOD007,330 –19–19JAN99–1/1

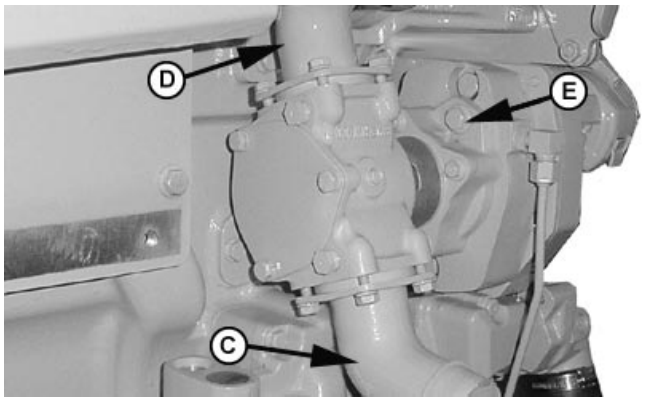
Remove And Install Sea Water Pump (6068SFM50)

NOTE: If engine is equipped with a remote oil filter, steps 2 and 10 are not necessary.

1. Close sea cock and drain sea water system.
2. Remove two cap screws (A) and remove oil filter housing and tubes (B).
3. Remove four flange mount cap screws and remove sea water inlet tube (C) and outlet tube (D).
4. Remove two cap screws (E) and remove sea water pump.
5. Clean all gasket material from both mating surfaces.
6. Position a new gasket on sea water pump mounting flange. Install splined pump shaft in splined ID of drive gear.
7. Align mounting holes in water pump mounting flange and gasket with threaded holes in drive gear housing. Install cap screws with washers and tighten cap screws to 73 N•m (54 lb-ft) of torque.
8. Inspect condition of O-ring in sea water pump inlet and outlet tubes determine if they are reusable. Replace O-rings as needed.
9. Connect sea water inlet and outlet tubes and install and tighten cap screws **evenly** until secure. Tighten hose clamps.
10. Replace O-rings on oil tubes and install oil tubes and oil filter housing. Tighten mounting cap screws to 35 N•m (26 lb-ft).
11. Open sea cock, start engine and check for leaks.



Remove Oil Filter Housing (If Necessary)



Remove Sea Water Pump

A—Cap Screws
B—Oil Tubes
C—Sea Water Inlet
D—Sea Water Outlet
E—Cap Screws

DPSG,OUOD005,3476 –19–20MAR00–1/1

General Troubleshooting Information

Troubleshooting engine problems can be difficult. Engine wiring diagrams are provided in this section to help isolate electrical problems on power units using John Deere wiring harness and instrument (gauge) panels.

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.

For the electronically-controlled 6068SFM50 engine, diagnosis is aided by the Electronic Control Unit (ECU) which can display trouble codes (DTC's) on the instrument panel. These codes are listed later in this section.

If the ECU detects a problem with the electronic control system, a Diagnostic Trouble Code (DTC) specific to the failed system will be stored in the ECU"s memory.

There are two types of DTC's:

- Active
- Inactive (Stored)

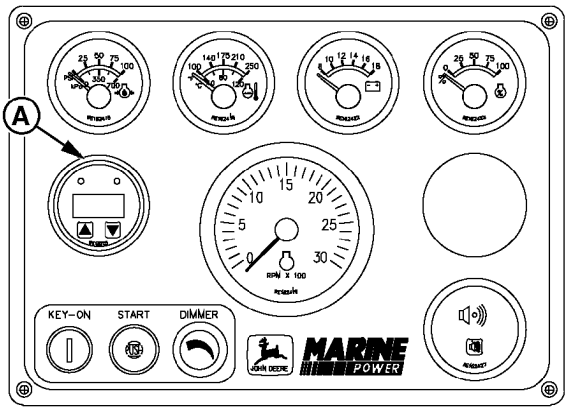
Continued on next page

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

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

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

A list of DTCs is given later in this section with a description of each. Contact your engine servicing dealer to correct any DTCs which are displayed on the instrument panel.

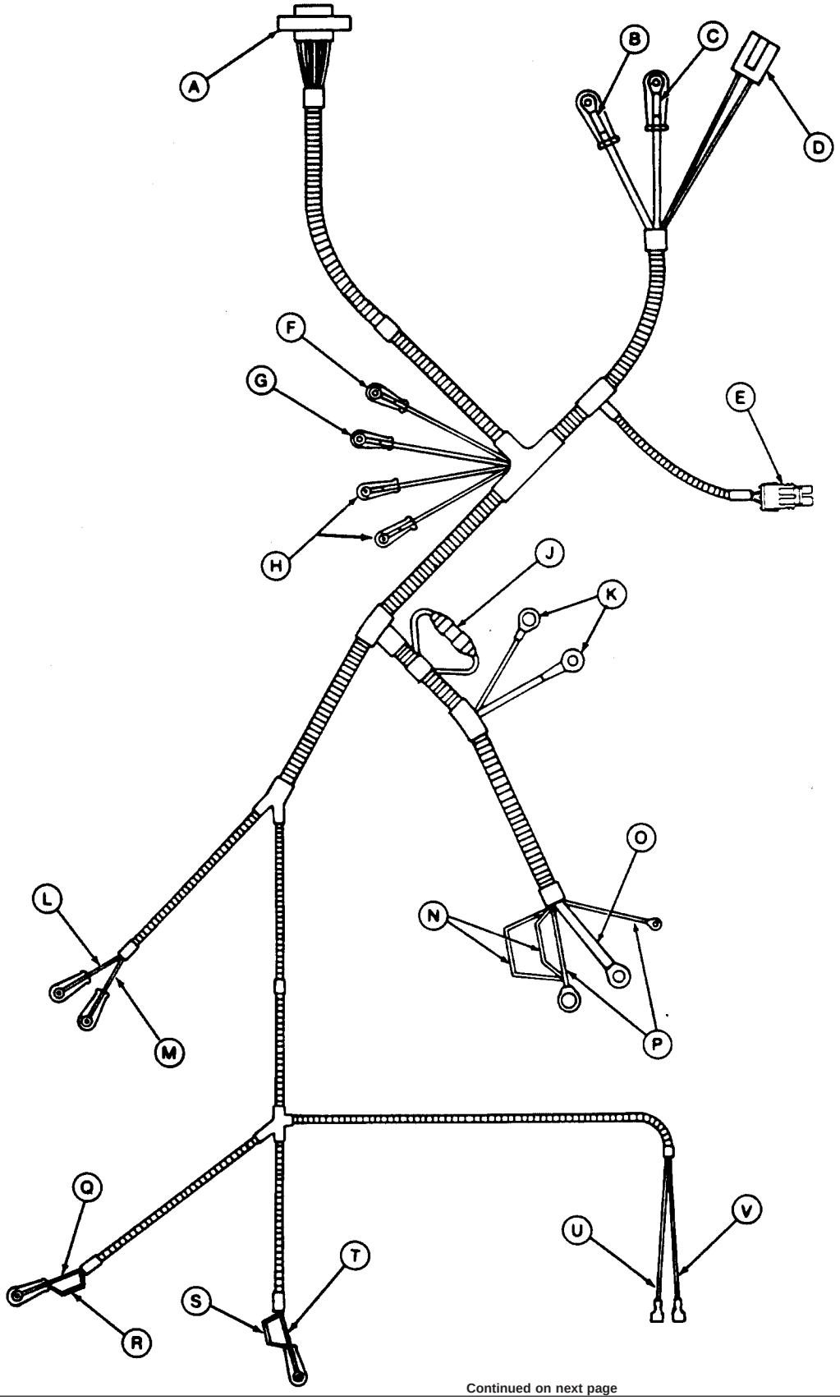


Diagnostic Gauge (6068SFM50 Engines)

A—Diagnostic Gauge

RG,RG34710,5605 –19–04JAN02–2/2

Propulsion Engine Wiring Harness (Except 6068SFM50)



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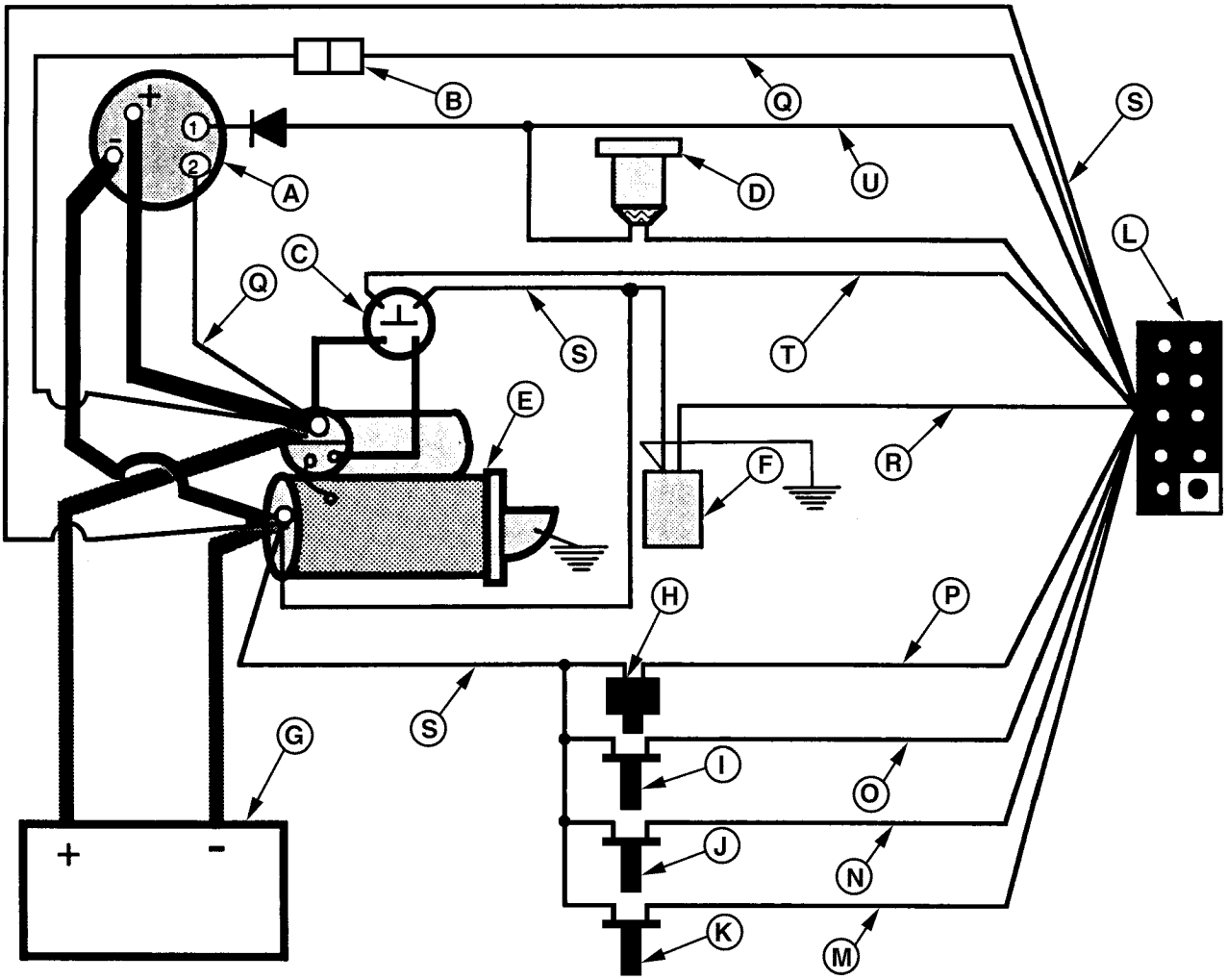
RG6728 –UN–14APR93
080282
PN=142

A—10-Way Molded Connector
B—6 Ga. Red (Alternator)
C—6 Ga. Black (Alternator)
D—14 Ga. Yellow and Red (Alternator)
E—14 Ga. Pink/Black and Black (Fuel Filter/Water Separator)
F—14 Ga. Yellow/Red (Start Circuit Relay)
G—14 Ga. Black (Start Circuit Relay)
H—12 Ga. Red (Start Circuit Relay)
J—14 Ga. Red (Fuse Holder)
K—6 Ga. and 12 Ga. Black (Ground)
L—14 Ga. Lt. Blue (Oil Sender)
M—14 Ga. Black (Oil Sender)
N—14 Ga. Red (Starting Motor)
O—6 Ga. Red (Starting Motor)
P—12 Ga. Red (Starting Motor)
Q—14 Ga. Black/Yellow (Fuel Shut-Off Solenoid)
R—14 Ga. Black (Fuel Shut-Off Solenoid)
S—14 Ga. Gray (Tachometer Pick-Up)
T—14 Ga. Black (Tachometer Pick-Up)
U—14 Ga. Tan (Coolant Temperature Sender)
V—14 Ga. Black (Coolant Temperature Sender)

DPSG,OUOD007,331 –19–19JAN99–2/2

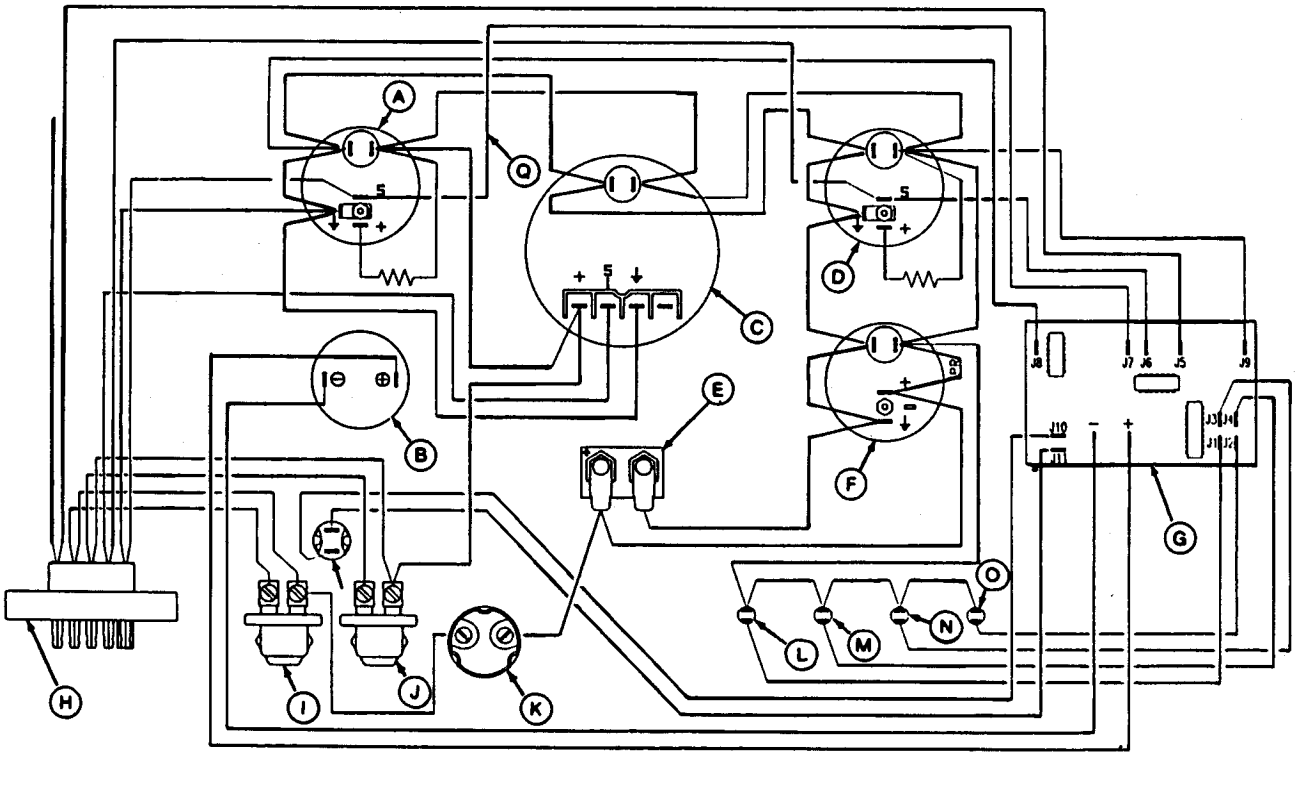
Wiring Diagram—Propulsion Engine Wiring Harness (Except 6068SFM50)



A—Alternator
B—20-Amp Fuse with Holder
C—Start Circuit Relay
D—Fuel Filter/Water Separator
E—Starting Motor
F—Fuel Shut-Off Solenoid
G—Battery
H—Tachometer Pick-up
I—Coolant Temperature Sensor
J—Engine Oil Pressure Sensor
K—Spare Sensor
L—10-Way Molded Connector
M—White
N—Lt. Blue
O—Tan
P—Gray
Q—Red
R—Black/Yellow
S—Black
T—Yellow/Red
U—Purple

DPSG,OUOD007,332 –19–19JAN99–1/1

Wiring Diagram—Propulsion Engine Instrument Panel (Except 6068SFM50)



A—Coolant Temperature Gauge
B—Audible Alarm
C—Tachometer
D—Oil Pressure Gauge
E—Hourmeter
F—Voltmeter
G—Alarm Circuit Board
H—10-Way Molded Connector
I—Stop Switch
J—Start Switch
K—Key Switch
L—Water-in-Fuel Warning Light
M—Low Battery Voltage Warning Light
N—High Coolant Temperature Warning Light
O—Low Oil Pressure Warning Light

DPSG,OUOD007,333 –19–19JAN99–1/1

NOTE: The following precautions apply only to the 6068SFM50 electronically-controlled engine.

OUOD005,000017E –19–25MAR02–1/1

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

IMPORTANT: ALWAYS disconnect Electronic Control Unit (ECU) connectors and engine control system-to-machine ground before welding on engine or machine. High currents or electro-static discharge in electronic components from welding may cause permanent damage.

1. Remove the ground connection for the engine control system-to-machine frame.

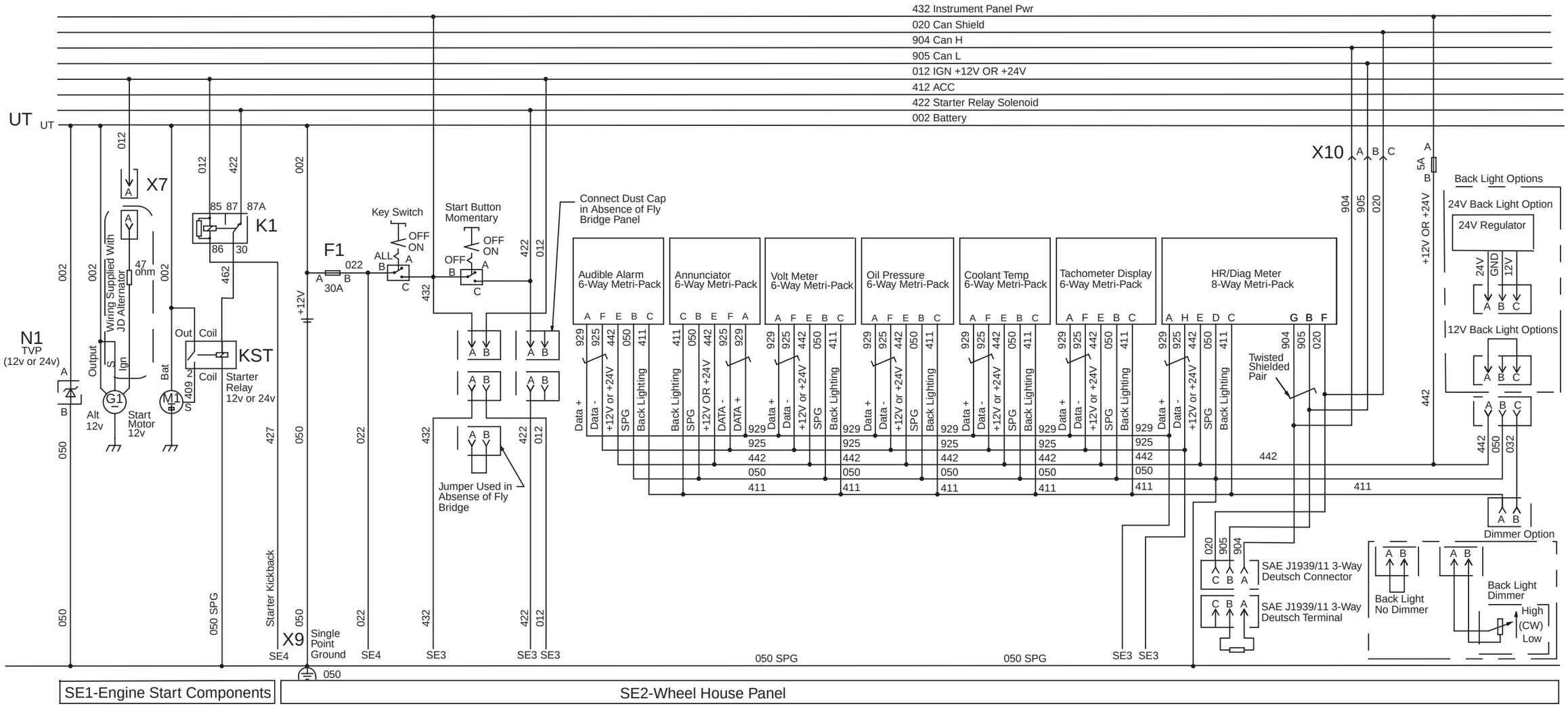
2. Disconnect the connectors from the ECU.

3. Connect the welder ground close to the welding point and be sure ECU or other electronic components are not in the ground path.

OUOD002,000016B –19–08OCT01–1/1

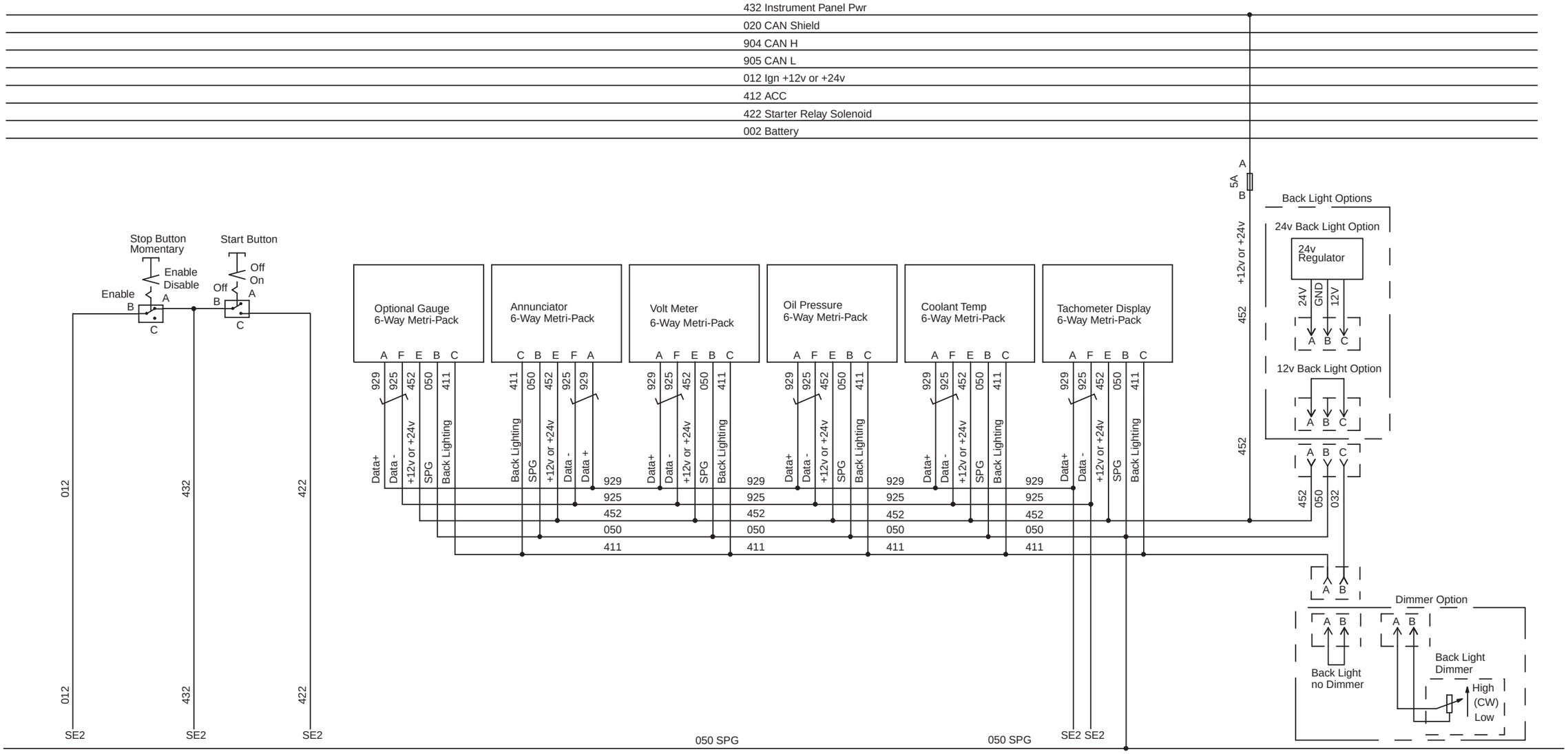
Wiring Diagram For John Deere Main (Wheel House) Instrument Panel (6068SFM50)

RG9812 –UN–05NOV99



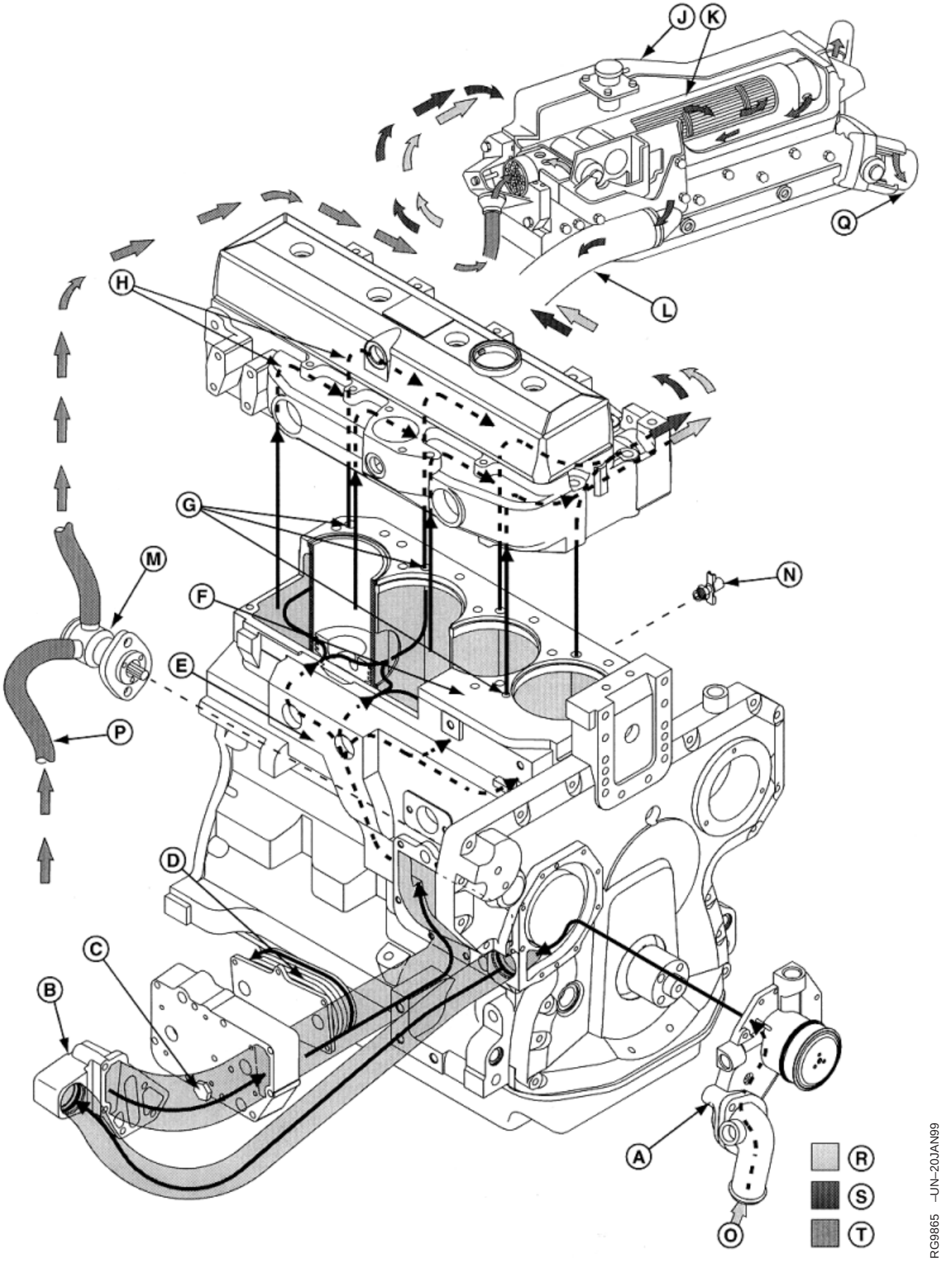
Wiring Diagram For John Deere Optional Flybridge Instrument Panel (6068SFM50)

RG9813 –UN–05NOV99



SE3-Fly Bridge Panel

Engine Coolant and Sea Water Flow (Except 6068SFM50)



Engine Coolant And Sea Water Flow

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DPSG,OUOD007,334 –19–19JAN99–1/2

A—Coolant Pump
B—Coolant Passage Adapter
C—Oil Cooler Drain Plug
D—Oil Cooler Plates
E—Main Coolant Gallery
F—Coolant Jacket
G—Block Deck Passages
H—Passages
I—Thermostat(s)
J—Heat Exchanger/Thermostat Housing
K—Heat Exchanger Core
L—Coolant Outlet Hose
M—Sea Water Pump
N—Drain Valve (Coolant)
O—Coolant Inlet to Water Pump
P—Sea Water Inlet
Q—Sea Water Outlet
R—High-Temperature Coolant
S—Low-Temperature Coolant
T—Sea Water

Coolant is circulated from the coolant pump (A) into the coolant passage adapter (B) and circulates around the oil cooler plates (D). From the oil cooler, coolant flows into the main coolant gallery (E). From the gallery, coolant flows into the coolant jacket (F), around the cylinder liners, up through the block deck passages (G), and into the cylinder head. In the cylinder head, the coolant flows through passages (H) around the intake and exhaust ports, valve seats, and injection nozzles. Coolant flows toward the front end of the cylinder head and exits into the heat exchanger/thermostat housing (J).

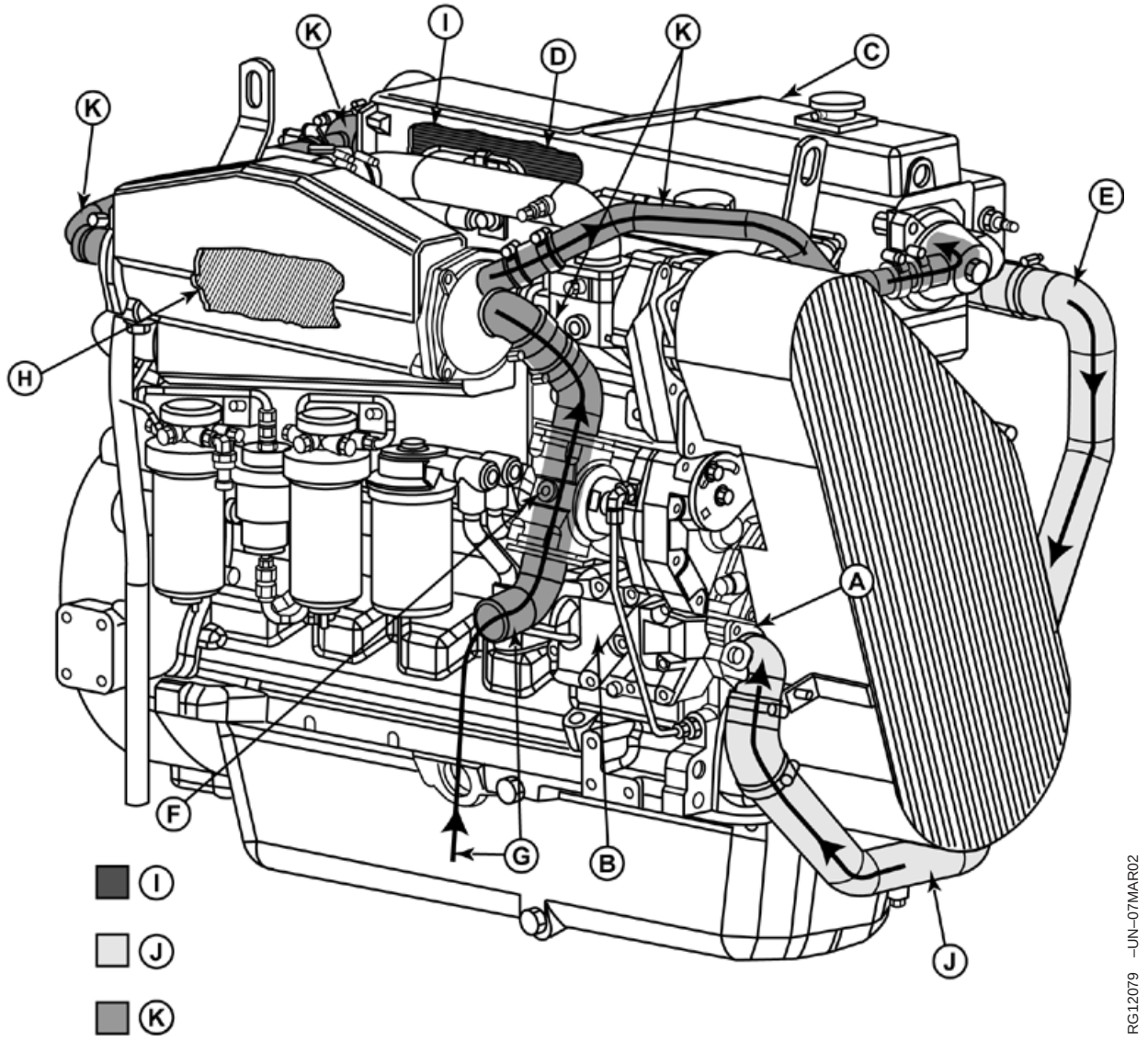
During the warm-up period, thermostats (I) are closed and coolant bypasses heat exchanger core (K), exiting through hose (L) into the coolant inlet side (O) of the coolant pump. The coolant continues circulating through the cylinder block, cylinder head, heat exchanger and coolant pump to provide a uniform and fast warm-up period.

Once the engine has reached operating temperature, the thermostats open and allow high-temperature coolant to flow around tubes in the heat exchanger core (K), dissipating heat. Low-temperature coolant flows out coolant outlet hose (L) and into coolant inlet side (O) of the coolant pump. Coolant continues flowing through the engine and heat exchanger circuit until the coolant temperature drops below the thermostat opening temperature.

Sea water flows into sea water pump (M) at inlet (P). Water then flows through tubing in the heat exchanger core (K). It absorbs heat from high-temperature coolant flowing around the tubing and exits through the sea water outlet (Q), or is discharged overboard.

DPSG,OUOD007,334 –19–19JAN99–2/2

Engine Coolant and Sea Water Flow (6068SFM50)



Engine Coolant And Sea Water Flow

A—Coolant Pump
B—Oil Cooler
C—Heat Exchanger/Thermostat Housing
D—Heat Exchanger Core
E—Coolant Outlet Hose
F—Sea Water Pump
G—Sea Water Inlet
H—Aftercooler Core
I—High-Temperature Coolant
J—Low-Temperature Coolant
K—Sea Water

Coolant is circulated from the coolant pump (A) into the oil cooler (B) and circulates around the oil cooler plates. From the oil cooler, coolant flows into the main coolant gallery. From the gallery, coolant flows into the coolant jacket, around the cylinder liners, up through the block deck passages, and into the cylinder head.

In the cylinder head, the coolant flows through passages around the intake and exhaust ports, valve seats, and injection nozzles. Coolant flows from the cylinder head and exits into the heat exchanger/thermostat housing (C).

Continued on next page

During the warm-up period, thermostats are closed and coolant bypasses heat exchanger core, exiting through hose (E) into the coolant inlet side of the water pump. The coolant continues circulating through the cylinder block, cylinder head, heat exchanger and coolant pump to provide a uniform and fast warm-up period.

Once the engine has reached operating temperature, the thermostats open and allow high-temperature coolant (I) to flow around tubes in the heat exchanger core (D), dissipating heat. Low-temperature coolant (J) flows out coolant outlet hose (E) and into coolant inlet side of the coolant pump. Coolant continues flowing through the engine and heat exchanger circuit until the coolant temperature drops below the thermostat opening temperature.

Sea water (K) flows into sea water pump (F) at inlet (G). Sea water then flows into the aftercooler core (H) and into the heat exchanger core (D). In the aftercooler core, the sea water flowing through the aftercooler core tubes absorbs heat from the turbocharged air passing around the core, and exits through the sea water outlet on the turbocharger. In the heat exchanger core (C), sea water (K) flowing through the heat exchanger core absorbs heat from high-temperature coolant (I) flowing around the core and exits through the sea water outlet on the turbocharger.

DPSG,OUOD007,334 –19–19JAN99–2/2

Engine Troubleshooting

Symptom	Problem	Solution
Engine cranks but will not start	Incorrect starting procedure.	Verify correct starting procedure.
	No fuel.	Check fuel in tank and manual shut-off valve.
	Exhaust restricted.	Check and correct exhaust restriction.
	Fuel filter plugged or full of water.	Replace fuel filter or drain water from filter.
	Injection pump not getting fuel or air in fuel system.	Check fuel flow at supply pump or bleed fuel system.
	Faulty injection pump or nozzles.	Consult authorized diesel repair station for repair or replacement.

Continued on next page

RG,RG34710,5608 –19–04JAN02–1/7

Symptom	Problem	Solution
Engine hard to start or will not start	Engine starting under load.	Disengage PTO (if equipped).
	Improper starting procedure.	Review starting procedure.
	No fuel.	Check fuel tank.
	Air in fuel line.	Bleed fuel line.
	Cold weather.	Use cold weather starting aids.
	Slow starter speed.	See “Starter Cranks Slowly”.
	Crankcase oil too heavy.	Use oil of proper viscosity.
	Improper type of fuel.	Consult fuel supplier; use proper type fuel for operating conditions.
	Water, dirt, or air in fuel system.	Drain, flush, fill, and bleed system.
	Clogged fuel filter.	Replace filter element.
	Dirty or faulty injection nozzles.	Have authorized servicing dealer or engine distributor check injectors.
	Electronic fuel system problem (6068SFM50 Only)	See your authorized servicing dealer
	Injection pump shut-off not reset.	Turn key switch to “OFF” then to “ON”.
Engine knocks	Low engine oil level.	Add oil to engine crankcase.
	Injection pump out of time.	See your authorized servicing dealer or engine distributor.
	Low coolant temperature.	Remove and check thermostat.
	Engine overheating.	See “Engine Overheats”.

Continued on next page

Symptom	Problem	Solution
Engine runs irregularly or stalls frequently	Low coolant temperature.	Remove and check thermostat.
	Clogged fuel filter.	Replace fuel filter element.
	Water, dirt, or air in fuel system.	Drain, flush, fill, and bleed system.
	Dirty or faulty injection nozzles.	Have authorized servicing dealer or engine distributor check injectors.
	Electronic fuel system problem (6068SFM50 Only	See your authorized servicing dealer
Below normal engine temperature	Defective thermostat.	Remove and check thermostat.
	Defective temperature gauge or sender.	Check gauge, sender, and connections.

Continued on next page

RG,RG34710,5608 –19–04JAN02–3/7

Symptom	Problem	Solution
Lack of power	Engine overloaded.	Reduce load.
	Intake air restriction.	Service air cleaner.
	Clogged fuel filter.	Replace filter elements.
	Improper type of fuel.	Use proper fuel.
	Overheated engine.	See “Engine Overheats”.
	Below normal engine temperature.	Remove and check thermostat.
	Improper valve clearance.	See your authorized servicing dealer or engine distributor.
	Dirty or faulty injection nozzles.	Have authorized servicing dealer or engine distributor check injectors.
	Injection pump out of time.	See your authorized servicing dealer or engine distributor.
	Turbocharger not functioning. (Turbocharger engines only.)	See your authorized servicing dealer or engine distributor.
	Leaking exhaust manifold gasket.	See your authorized servicing dealer or engine distributor.
	Defective aneroid control line.	See your authorized servicing dealer or engine distributor.
	Restricted fuel hose.	Clean or replace fuel hose.
	Low fast idle speed.	See your authorized servicing dealer or engine distributor.
	Damaged propeller	Have propeller checked.
	Marine growth	Clean hull.
Low oil pressure	Low oil level.	Add oil.
	Improper type of oil.	Drain, fill crankcase with oil of proper viscosity and quality.

Continued on next page

Symptom	Problem	Solution
High oil consumption	Crankcase oil too light.	Use proper viscosity oil.
	Oil leaks.	Check for leaks in lines, gaskets, and drain plug.
	Restricted crankcase vent tube.	Clean vent tube.
	Defective turbocharger.	See your authorized servicing dealer or engine distributor.
Engine emits white smoke	Improper type of fuel.	Use proper fuel.
	Low engine temperature.	Warm up engine to normal operating temperature.
	Defective thermostat.	Remove and check thermostat.
	Defective injection nozzles.	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.
	Injection nozzles 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.
	Electronic fuel system problem (6068SFM50 Only)	See your authorized servicing dealer

Continued on next page

Symptom	Problem	Solution
Engine overheats	Engine overloaded.	Reduce load.
	Low coolant level.	Fill coolant tank to proper level, check coolant tank and hoses for loose connections or leaks.
	Faulty coolant tank cap.	Have serviceman check.
	Stretched poly-vee belt or defective belt tensioner.	Check automatic belt tensioner and check belts for stretching. Replace as required.
	Faulty sea (raw) water pump.	Check/replace impeller/pump.
	Low engine oil level.	Check oil level. Add oil as required.
	Cooling system needs flushing.	Flush cooling system.
	Defective thermostat.	Remove and check thermostat.
	Defective temperature gauge or sender.	Check water temperature with thermometer and replace, if necessary.
	Electronic fuel system problem (6068SFM50 Only)	See your authorized servicing dealer
	Incorrect grade of fuel.	Use correct grade of fuel.
	Plugged heat exchanger.	Clean heat exchanger and core.
	Plugged keel cooler.	Flush and clean keel cooler. Check for marine growth on O.D. of keel cooler tubes.
	Trash or debris in engine compartment.	Clean engine compartment.

Continued on next page

Symptom	Problem	Solution
High fuel consumption	Improper type of fuel.	Use proper type of fuel.
	Clogged or dirty air cleaner.	Service air cleaner.
	Engine overloaded.	Reduce load.
	Improper valve clearance.	See your authorized servicing dealer or engine distributor.
	Injection nozzles dirty.	See your authorized servicing dealer or engine distributor.
	Engine out of time.	See your authorized servicing dealer or engine distributor.
	Defective turbocharger.	See your authorized servicing dealer or engine distributor.
	Low engine temperature.	Check thermostat.

RG,RG34710,5608 –19–04JAN02–7/7

Electrical Troubleshooting

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

DPSG,OUOD007,335 –19–04JAN02–2/2

Diagnostic Trouble Code Procedure (6068SFM50 Electronically-Controlled Engine)

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.

Continued on next page

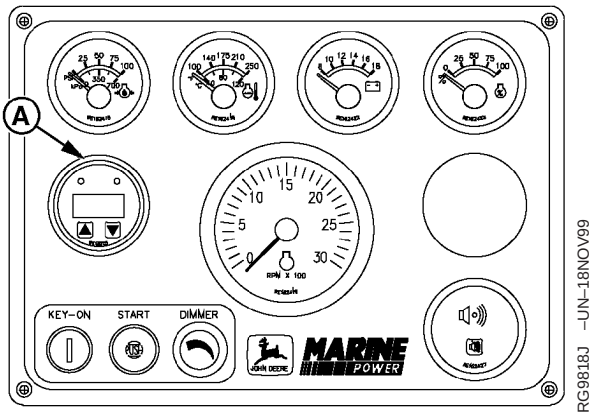
RG,RG34710,20112 –19–04JAN02–1/2

NOTE: Liquid Crystal Display [LCD] on diagnostic gauge (A) will always default to show an hour meter reading. If an active Diagnostic Trouble Code (DTC) is present, display will alternately flash from hour meter reading to DTC(s). The code number will appear on the first line, with the words "SrvcCode" on the second line.

2. Read and record DTC(s) displayed on LCD of diagnostic gauge (A). For procedure to access diagnostic codes, refer to USING DIAGNOSTIC GAUGE TO ACCESS ENGINE INFORMATION, earlier in this manual

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



Diagnostic Gauge

A—Diagnostic Gauge

RG,RG34710,20112 –19–04JAN02–2/2

Listing Of Diagnostic Trouble Codes (DTC) (6068SFM50 Engine)

The Diagnostic Trouble Codes (DTCs) are output on the diagnostic gauge according to the J1939 standard as a two-part code. The first part is a two to four-digit Suspect Parameter Number (SPN) followed by a one or two-digit Failure Mode Identifier (FMI) code. When a trouble code appears, it will be on the first line of the gauge readout, followed by "SrvcCode" on the second line.

Following is a list of SPNs, FMIs, and description of the diagnostic trouble codes that can occur in the various engine systems. Not all of these codes will be present in all engine applications.

When trouble codes appear on the diagnostic gauge, see your engine dealer for repairs as soon as possible.

Continued on next page

RG,RG34710,20113 –19–04JAN02–1/3

Displayed Code SPN	FMI	Definition
28	3	Analog Throttle (A) No. 3 Voltage High
	4	Analog Throttle (A) No. 3 Voltage Low
29	3	Analog Throttle (B) No. 2 Voltage High
	4	Analog Throttle (B) No. 2 Voltage Low
84	2	Vehicle Speed Mismatch
91	3	Multistate Throttle Input High
	4	Multistate Throttle Input Low
94	1	Fuel Supply Pressure Extremely Low
	3	Fuel Supply Pressure Input Voltage High
	4	Fuel Supply Pressure Input Voltage Low
	18	Fuel Supply Pressure Moderately Low
100	1	Engine Oil Pressure Extremely Low
	3	Engine Oil Pressure Input Voltage High
	4	Engine Oil Pressure Input Voltage Low
	18	Engine Oil Pressure Moderately Low
105	0	Manifold Air Temperature Extremely High
	3	Manifold Air Temperature Input Voltage High
	4	Manifold Air Temperature Input Voltage Low
	16	Manifold Air Temperature Moderately High
107	0	Air Filter Differential Pressure
110	0	Engine Coolant Temperature Extremely High
	3	Engine Coolant Temperature Input Voltage High
	4	Engine Coolant Temperature Input Voltage Low
	15	Engine Coolant Temperature High Least Severe
	16	Engine Coolant Temperature Moderately High
111	1	Engine Coolant Level Low
158	17	ECU Power Down Error
174	0	Fuel Temperature High-Most Severe
	15	Fuel Temperature High-Least Severe
	16	Fuel Temperature High-Moderately Severe
	31	Fuel Temperature Sensor Faulty
189	0	Fuel temperature Sender Faulty
	31	Engine Speed Derate
190	0	Engine Overspeed Extreme
190	16	Engine Overspeed Moderate
620	3	Sensor Supply Voltage High
	4	Sensor Supply Voltage Low
627	4	ECU Unswitched, Power Missing
629	13	ECU Error
629	19	ECU to Pump Communication Error
632	2	Fuel Shutoff Error
	5	Fuel Shutoff Not Functioning
636	2	Pump Position Sensor Input Noise
	8	Pump Position Sensor Input Missing
	10	Pump Position Sensor Input Pattern Error
637	2	Crankshaft Position Input Noise
	8	Crankshaft Position Input Missing
	10	Crankshaft Position Input Pattern Error
729	3	Inlet Air Heater Signal High
	5	Inlet Air Heater Signal Low
810	2	Calculated Vehicle Speed Input Noise
898	9	Vehicle Speed Invalid/Missing
970	2	Auxiliary Engine Shutdown Switch Signal Invalid

Continued on next page

	31	Auxiliary Engine Shutdown Switch Active
971	31	External Engine Derate Switch Active
1069	2	Tire Size Error
1076	2	Injection Pump Detected Defect
1077	7	Attempting to Fuel Without Command
	11	Pump Supply Voltage Out of Range
	12	Pump Self Test Error
	19	Pump Detected Communication Error
	31	Pump Initiated Engine Protection
1078	7	ECU/Pump Timing Moderately Out of Sync
	11	ECU/Pump Speed Out of Sync
	31	ECU/Pump Timing Extremely Out of Sync
1079	3	Sensor Supply 1 Voltage High
	4	Sensor Supply 1 Voltage Low
1080	3	Sensor Supply 2 Voltage High
	4	Sensor Supply 2 Voltage Low
1109	31	Engine Shutdown Warning
1110	31	Engine Shutdown
1485	2	Pump Power Relay Fault
1569	31	Fuel Derate
2000	13	Security Violation

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

RG,RG34710,20113 –19–04JAN02–3/3

Intermittent Fault Diagnostics (6068SFM50 Engine)

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

NOTE: The Engine Control Unit (ECU) is the component LEAST likely to fail.

Suggestions for diagnosing intermittent faults:

If the problem is intermittent, try to reproduce the operating conditions that were present when the Diagnostic Trouble Code (DTC) set. When a DTC sets, the ECU stores a Freeze Frame of the data parameter values the instant the DTC sets. Observing these values on the diagnostic gauge can help determine the operating conditions when the fault occurred. In addition, the diagnostic gauge includes a function called Snap Shot. The Snap Shot function permits the recording of data parameter values during a diagnostic session. The Snap Shot mode can be set up so that its recording is “triggered” by the setting of a fault code.

If a faulty connection or wire is suspected to be the cause of the intermittent problem: clear DTCs, then check the connection or wire by wiggling it while watching the diagnostic gauge to see if the fault resets.

Possible Causes of Intermittent Faults:

1. Faulty connection between sensor or actuator and harness.
2. Faulty contact between terminals in connector.
3. Faulty terminal/wire connection.

Electromagnetic interference (EMI) from an improperly installed 2-way radio, etc. can cause faulty signals to be sent to the ECU.

NOTE: Refer to wiring diagram foldouts earlier in this section as a guide to connections and wires.

RG,RG34710,20115 –19–04JAN02–1/1

Engine Storage Guidelines

1. John Deere engines can be stored outside for up to three (3) months with no long term preparation IF COVERED BY WATERPROOF COVERING.
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,RG34710,5610 –19–23NOV01–1/1

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 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. Drain and completely clean the sea water strainer. Close sea water drain cock and fill the sea water system with (premixed) RV antifreeze.
5. Crank the engine several revolutions with starter (do not allow the engine to start).
6. Loosen alternator poly-vee belt. Remove, if desired.
7. Remove and clean batteries. Store them in a cool, dry place and keep them fully charged.
8. Disengage the PTO clutch (if equipped).
9. Clean the exterior of the engine with salt-free water and touch up any scratched or chipped painted surfaces with a good quality paint.
10. Coat all exposed (machined) metal surfaces with grease or corrosion inhibitor if not feasible to paint.
11. Seal all openings on engine with plastic bags.
12. Store the engine in a dry protected place. If engine must be stored outside, cover it with a waterproof canvas or other suitable protective material and use a strong waterproof tape.

RG,RG34710,5612 –19–20MAY96–1/1

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 alternator poly-vee belt if removed. Adjust belt tension. (See CHECKING BELT TENSIONER SPRING TENSION AND BELT WEAR in Lubrication and Maintenance/500 Hour/12 Month Section.) Install belt guard.
4. Perform all appropriate prestarting checks. (See DAILY PRESTARTING CHECKS in Lubrication and Maintenance/Daily Section.)
5. Open sea water valve and prime the sea water system.
6. Open fuel valve, fill fuel filter/water separator with clean fuel and bleed the fuel system. (See BLEEDING THE FUEL SYSTEM in Service as Required 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.

7. 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.
8. 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.
9. On the first day of operation after storage, check overall engine for leaks and check all gauges for correct operation.

RG,RG34710,5613 –19–20MAY96–1/1

General Engine Specifications—4.5 L Engines

ITEM	UNIT OF MEASURE	4045DFM	4045TFM
Number of Cylinders	—	4	4
Fuel	—	Diesel	Diesel
Bore	mm (in.)	106 (4.19)	106 (4.19)
Stroke	mm (in.)	127 (5.00)	127 (5.00)
Displacement	L (cu in.)	4.5 (276)	4.5 (276)
Compression Ratio	—	17.6:1	17.0:1
Rated Speed: Std. Governor 3—5% Governor	 RPM RPM	 2500 1800	 2400 1800
Fast Idle Speed (Std. Governor)	RPM	2700	2675
Slow Idle Speed: Propulsion Engines Gen-Set Engines	 RPM RPM	 700 850	 700 850
Propulsion/Auxiliary Power Rating @ Rated Speed M1 M2 M3 M4	 kW (hp) kW (hp) kW (hp) kW (hp)	 56 (76) 63 (85) — —	 78 (105) 90 (120) 101 (135) 112 (150)
Gen-Set Prime Power Rating*: @ 1800 RPM @ 1500 RPM Gen Set Recommended Power Rating	 kW (hp) kW (hp) kW (hp)	 48 (64) 40 (54) 38-40 (51-54)	 76 (102) 60 (80) 67-70 (90-94)
Oil Pressure @ Rated Speed	kPa (psi)	345 (50)	345 (50)
Flywheel and Housing	SAE No.	3,4	2,3,4
Injection Nozzles	mm	9.5	9.5
Physical Dimensions: Width Height Length Basic Dry Weight	 mm (in.) mm (in.) mm (in.) kg (lb)	 712 (28) 902 (35.5) 885 (35) 437 (961)	 712 (28) 911 (36) 885 (35) 462 (1017)

RG,RG34710,5614 –19–20MAY96–1/1

General Engine Specifications—6.8 L Engines

ITEM	UNIT OF MEASURE	6068TFM50[a]	6068SFM50[b]
Number of Cylinders	—	6	6
Fuel	—	Diesel	Diesel
Bore	mm (in.)	106 (4.19)	106 (4.19)
Stroke	mm (in.)	127 (5.00)	127 (5.00)
Displacement	L (cu in.)	6.8 (414)	6.8 (414)
Compression Ratio	—	17.2:1	17.2:1
Rated Speed: Std. Governor 3—5% Governor	 RPM RPM	 2400—2600 1800	 2200—2600 —
Fast Idle Speed	RPM	2600	2600
Slow Idle Speed: Propulsion Engines Gen-Set Engines	 RPM RPM	 650 850	 650 —
Propulsion/Auxiliary Power Rating @ Rated Speed M1 Engines M2 Engines M3 Engines M4 Engines M5 Engines	 kW (hp) kW (hp) kW (hp) kW (hp) kW (hp)	 115 (154) 130 (175) 150 (200) 168 (225) —	 134 (180) 153 (205) 175 (235) 198 (265) 224 (300)
Gen-Set Prime Power Rating*: @ 1800 RPM (60 Hz) @ 1500 RPM (50 Hz)	 kW (hp) kW (hp)	 115 (154) 89 (119)	 — —
Gen Set Recommended Power Rating*: @ 1800 RPM @ 1500 RPM	 kW (hp) kW (hp)	 99—106 (133—142) 83—88 (111—118)	 — —
Oil Pressure @ Rated Speed	kPa (psi)	345 (50)	345 (50)
Flywheel and Housing	SAE No.	2,3,4	2,3
Injection Nozzles	mm	9.5	9.5
Physical Dimensions: Width Height Length Basic Dry Weight	 mm (in.) mm (in.) mm (in.) kg (lb)	 703 (28) 882 (35) 1286 (51) 590 (1298)	 721 (28) 947 (37) 1324 (52) 636 (1400)
[a]Mechanically-controlled engine			
[b]Electronically-controlled engine			

DPSG,OUOD007,336 –19–19JAN99–1/1

Fuel Injection Pump Specifications[1]

Engine Model	Injection Pump Option Codes	Power Rating @ Rated Speed Without Fan kW (hp)	Rated Speed[a] (rpm)	Slow Idle (rpm)	Fast Idle[b](rpm)
4045DFM50	16HR, 16HS	63 (85)	2500	700	2700
	16HT, 16HU	40 (54)	1800		1870
4045TFM50	16HP, 16HQ	101 (135)	2500	700	2700
	16HM, 16HN	65 (87)	1800	700	1870
	16LK, 16LL	112 (150)	2600	700	2800
6068TFM50	16FA, 16FB	168 (225)	2600	700	2800
	16FC, 16FD	130 (175)	2400	700	2600
	16FE, 16FF	115 (154)	1800	—	1870
6068SFM50	161E (7238), 162K (7247)	224 (300)	2600	650	2700
	161E (7248), 162K (7249)	198 (266)	2500	650	2600
	161E (7250), 162K (7251)	175 (235)	2400	650	2500
	161E (7252), 162K (7253)	153 (205)	2300	650	2400
	161E (7254), 162K (7255)	134 (180)	2200	650	2300

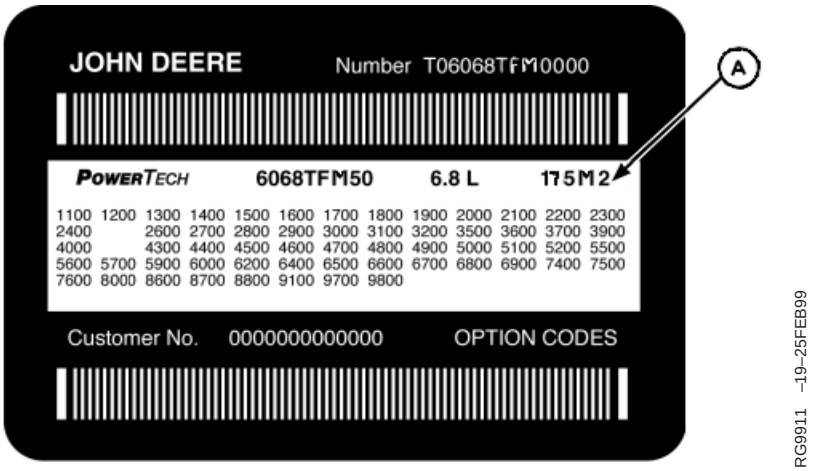
[a]Generator set engines (3-5% governor) usually run at 1500 rpm (50 Hz) or 1800 (60 Hz) when operating under load depending on cycles of AC current.

[b]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.

[1]Engine speeds listed are preset to factory specification. Slow idle speed may be reset depending upon specific boat application requirements. Refer to your boat operator's manual for engine speeds that are different from those preset at the factory.

RG,RG34710,5616 –19–26MAR02–1/1

Engine Crankcase Oil Fill Quantities



Option Code Label

A—Engine Base Code

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

"T0" indicates the engine was built in Dubuque, Iowa, while "CD" means that the engine was buit in Saran, France and "PE" indicates Torreon, Mexico

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

The engine option code label includes an engine base code (A). At times it will be necessary to furnish this base code to differentiate two identical option codes for the same engine model.

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 (40) identify the dipstick tube group. The last two digits of each code identify the specific dipstick and tube assembly on your engine.

Listed below are engine crankcase oil fill quantities:

Engine Model	Oil Pan Option Code (s)	Crankcase Oil Capacity
4045DFM50	1901,1902	8.5 L (9.0 qt.)
4045DFM50, 4045TFM50	1903	13.0 L (14.0 qt.)
4045DFM50, 4045TFM50	1904	13.5 L (14.5 qt.)
4045TFM50	1954	13.0 L (14.0 qt.)
6068TFM50	1907, 1908, 1909, 1945	19.6 L (20.7 qt.)
6068SFM50	1987	31.5 (33.3 qt.)

NOTE: Crankcase oil capacity may vary slightly from amount shown. ALWAYS fill crankcase to full mark or between arrows on dipstick, whichever is present. DO NOT overfill.

RG,RG34710,5617 –19–04JAN02–1/1

Unified Inch Bolt and Cap Screw Torque Values

SAE Grade and Head Markings	NO MARK	1 or 2[b]	5, 5.1, 5.2	8, 8.2
SAE Grade and Nut Markings	NO MARK	2	5	8

Size	Grade 1				Grade 2[b]				Grade 5, 5.1, or 5.2				Grade 8 or 8.2			
	Lubricated[a]		Dry[a]		Lubricated[a]		Dry[a]		Lubricated[a]		Dry[a]		Lubricated[a]		Dry[a]	
	N·m	lb-ft	N·m	lb-ft	N·m	lb-ft	N·m	lb-ft	N·m	lb-ft	N·m	lb-ft	N·m	lb-ft	N·m	lb-ft
1/4	3.7	2.8	4.7	3.5	6	4.5	7.5	5.5	9.5	7	12	9	13.5	10	17	12.5
5/16	7.7	5.5	10	7	12	9	15	11	20	15	25	18	28	21	35	26
3/8	14	10	17	13	22	16	27	20	35	26	44	33	50	36	63	46
7/16	22	16	28	20	35	26	44	32	55	41	70	52	80	58	100	75
1/2	33	25	42	31	53	39	67	50	85	63	110	80	120	90	150	115
9/16	48	36	60	45	75	56	95	70	125	90	155	115	175	130	225	160
5/8	67	50	85	62	105	78	135	100	170	125	215	160	240	175	300	225
3/4	120	87	150	110	190	140	240	175	300	225	375	280	425	310	550	400
7/8	190	140	240	175	190	140	240	175	490	360	625	450	700	500	875	650
1	290	210	360	270	290	210	360	270	725	540	925	675	1050	750	1300	975
1-1/8	400	300	510	375	400	300	510	375	900	675	1150	850	1450	1075	1850	1350
1-1/4	570	425	725	530	570	425	725	530	1300	950	1650	1200	2050	1500	2600	1950
1-3/8	750	550	950	700	750	550	950	700	1700	1250	2150	1550	2700	2000	3400	2550
1-1/2	1000	725	1250	925	990	725	1250	930	2250	1650	2850	2100	3600	2650	4550	3350

DO NOT use these values if a different torque value or tightening procedure is given for a specific application. Torque values listed are for general use only. Check tightness of fasteners periodically.

Shear bolts are designed to fail under predetermined loads. Always replace shear bolts with identical grade.

Fasteners should be replaced with the same or higher grade. If higher grade fasteners are used, these should only be tightened to the strength of the original.

Make sure fasteners threads are clean and that you properly start thread engagement. This will prevent them from failing when tightening.

Tighten plastic insert or crimped steel-type lock nuts to approximately 50 percent of the dry torque shown in the chart, applied to the nut, not to the bolt head. Tighten toothed or serrated-type lock nuts to the full torque value.

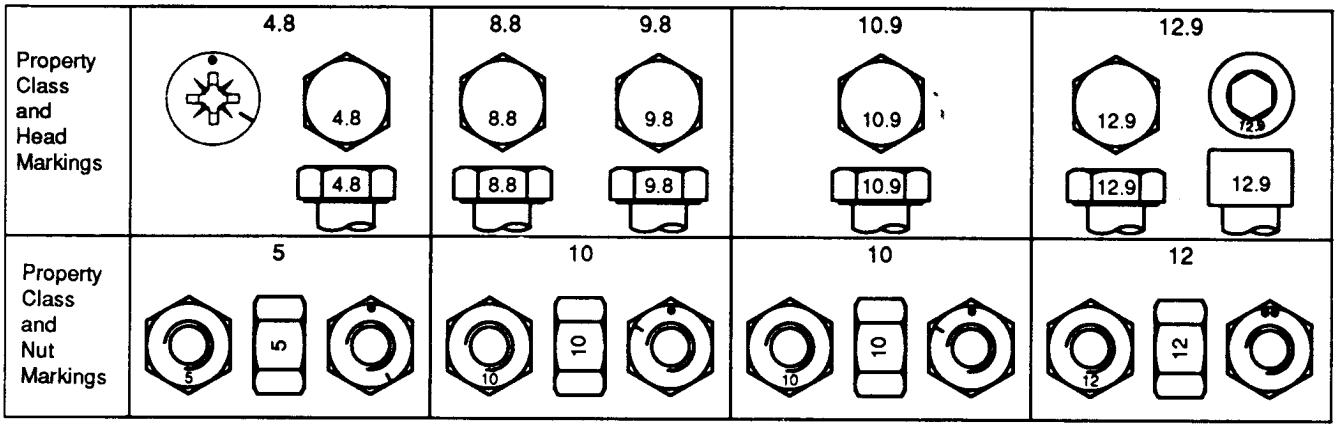
[a] "Lubricated" means coated with a lubricant such as engine oil, or fasteners with phosphate and oil coatings. "Dry" means plain or zinc plated without any lubrication.

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

TS1656 –19–02APR97

DX,TORQ1 –19–20JUL94–1/1

Metric Bolt and Cap Screw Torque Values



Size	Class 4.8				Class 8.8 or 9.8				Class 10.9				Class 12.9			
	Lubricated[a]		Dry[a]		Lubricated[a]		Dry[a]		Lubricated[a]		Dry[a]		Lubricated[a]		Dry[a]	
	N·m	lb-ft	N·m	lb-ft	N·m	lb-ft	N·m	lb-ft	N·m	lb-ft	N·m	lb-ft	N·m	lb-ft	N·m	lb-ft
M6	4.8	3.5	6	4.5	9	6.5	11	8.5	13	9.5	17	12	15	11.5	19	14.5
M8	12	8.5	15	11	22	16	28	20	32	24	40	30	37	28	47	35
M10	23	17	29	21	43	32	55	40	63	47	80	60	75	55	95	70
M12	40	29	50	37	75	55	95	70	110	80	140	105	130	95	165	120
M14	63	47	80	60	120	88	150	110	175	130	225	165	205	150	260	190
M16	100	73	125	92	190	140	240	175	275	200	350	255	320	240	400	300
M18	135	100	175	125	260	195	330	250	375	275	475	350	440	325	560	410
M20	190	140	240	180	375	275	475	350	530	400	675	500	625	460	800	580
M22	260	190	330	250	510	375	650	475	725	540	925	675	850	625	1075	800
M24	330	250	425	310	650	475	825	600	925	675	1150	850	1075	800	1350	1000
M27	490	360	625	450	950	700	1200	875	1350	1000	1700	1250	1600	1150	2000	1500
M30	675	490	850	625	1300	950	1650	1200	1850	1350	2300	1700	2150	1600	2700	2000
M33	900	675	1150	850	1750	1300	2200	1650	2500	1850	3150	2350	2900	2150	3700	2750
M36	1150	850	1450	1075	2250	1650	2850	2100	3200	2350	4050	3000	3750	2750	4750	3500

DO NOT use these values if a different torque value or tightening procedure is given for a specific application. Torque values listed are for general use only. Check tightness of fasteners periodically.

Shear bolts are designed to fail under predetermined loads. Always replace shear bolts with identical property class.

Fasteners should be replaced with the same or higher property class. If higher property class fasteners are used, these should only be tightened to the strength of the original.

Make sure fasteners threads are clean and that you properly start thread engagement. This will prevent them from failing when tightening.

Tighten plastic insert or crimped steel-type lock nuts to approximately 50 percent of the dry torque shown in the chart, applied to the nut, not to the bolt head. Tighten toothed or serrated-type lock nuts to the full torque value.

[a] *"Lubricated" means coated with a lubricant such as engine oil, or fasteners with phosphate and oil coatings. "Dry" means plain or zinc plated without any lubrication.*

TS1657 –19–02APR97

DX,TORQ2 –19–20JUL94–1/1

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,RG34710,5620 –19–20MAY96–1/1

Daily (Prestarting) Service

- Check engine oil level.
- Check coolant level.
- Check sea water strainer.
- Check air cleaner dust unloader valve and air restriction indicator, if equipped.
- Visual walkaround inspection.

RG,RG34710,5621 –19–25MAR02–1/1

50 Hour/Every 2 Weeks Service

- Check fuel filter.

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RG,RG34710,5622 –19–25MAR02–1/1

250 Hour Service

- Service fire extinguisher.
- Service battery.
- Change engine oil and filter (Except 6068SFM50).[1]
- Inspect zinc plugs.
- Check belt tension and wear.
- Check engine mounts.
- Check engine electrical ground connections

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[1]If John Deere PLUS-50 oil is used along with a John Deere oil filter, the oil change interval may be extended by 50 percent to 375 hours.

RG,RG34710,5623 –19–25MAR02–1/1

500 Hour/12 Month Service

- Change engine oil and filter (6068SFM50 engine only).
- Clean crankcase vent tube.
- Check air intake hoses, connections, and system.
- Replace fuel filter element.
- Check automatic belt tensioner and belt wear.
- Check cooling system.
- Coolant solution analysis – add SCAs as needed.
- Inspect and clean heat exchanger and aftercooler core.

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RG,RG34710,5624 –19–25MAR02–1/1

1000 Hour/24 Month Service

- Adjust droop on generator set engines (Except 6068SFM50).
- Check crankshaft vibration damper (6-cylinder only).
- Have your authorized servicing dealer or engine distributor pressure test overall cooling system and cap.
- Inspect and repair sea water pump.

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RG,RG34710,5625 –19–25MAR02–1/1

2000 Hour Service

- Have your authorized servicing dealer or engine distributor adjust valve clearance.
- Flush cooling system.[1]

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[1]If John Deere Cool-Gard is used, the flushing interval may be extended to 5000 hours or 60 months, whichever occurs first, provided the coolant is tested annually AND additives are replenished by adding supplemental coolant additives (SCAs).

RG,RG34710,5626 –19–25MAR02–1/1

Service As Required

- Adding coolant.
- Replace dry air cleaner element (Enclosed element installations).
- Service dry air cleaner element (Open element installations).
- Replace dry air cleaner element (Open element installations).
- Replace poly-vee belt.
- Inspect driveline.
- Bleed fuel system.
- Remove and install sea water pump.

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RG,RG34710,5627 –19–25MAR02–1/1

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

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 name of the product.

Title	Order Number
POWERTECH 4.5 L and 6.8L Marine Engines	
Operation and Service Manual (English)	OMRG28997
Parts Catalogs:	
POWERTECH 4.5 L Marine	PC2758
POWERTECH 6.8 L Marine	PC2727
Component Technical Manuals	
Base Engine	CTM104
Mechanical Fuel Systems	CTM207
Electronic Fuel Systems (6068SFM50)	CTM170
OEM Engine Accessories	CTM67
Alternators and Starter Motors	CTM77

DPSG,OUOD002,524 –19–04JAN02–1/1

John Deere Parts

We help minimize downtime by putting genuine John Deere parts in your hands in a hurry.

That's why we maintain a large and varied inventory—to stay a jump ahead of your needs.

TS100 –UN–23AUG88

DX,IBC,A –19–04JUN90–1/1

The Right Tools

Precision tools and testing equipment enable our Service Department to locate and correct troubles quickly . . . to save you time and money.

TS101 –UN–23AUG88

DX,IBC,B –19–04JUN90–1/1

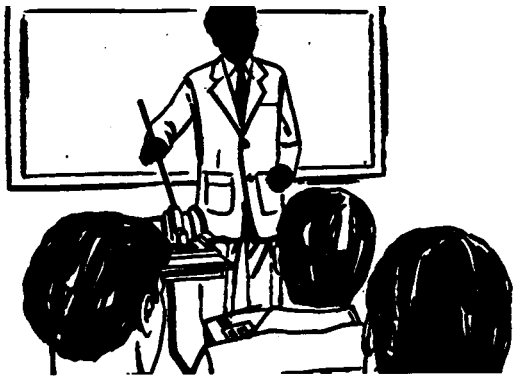
Well-Trained Technicians

School is never out for John Deere service technicians.

Training schools are held regularly to be sure our personnel know your equipment and how to maintain it.

Result?

Experience you can count on!



TS102 –UN–23AUG88

DX,IBC,C –19–04JUN90–1/1

Prompt Service

Our goal is to provide prompt, efficient care when you want it and where you want it. We can make repairs at your place or at ours; see us, depend on us.

JOHN DEERE SERVICE SUPERIORITY: We'll be around when you need us.

TS103 –UN–23AUG88

DPSG,OUOD007,38 –19–02MAR99–1/1

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