PowerTech™ 8.1L Diesel Engines

Level 9 Electronic Fuel System With Denso High Pressure Common Rail

TECHNICAL MANUAL

POWERTECH™ 8.1 L Diesel Engines Level 9 Electronic Fuel System With HPCR

CTM255 19OCT06 (ENGLISH)

For complete service information also see:

John Deere Power Systems

LITHO IN U.S.A.

Introduction

Forward

This manual (CTM 255) is written for an experienced technician. Essential tools required in performing certain service work are identified in this manual and are recommended for use.

This manual covers only Level 9 (Tier II) Electronic Fuel System (200,000—). The following four companion manuals cover other aspects of the 8.1L engine:

- CTM68—Electronic Fuel Injection Systems
- CTM86—PowerTech® 8.1L Diesel Engines Base Engine
- CTM243—PowerTech® 8.1L Diesel Engines Mechanical Fuel Systems
- CTM134—PowerTech® 6.8L and 8.1L Diesel Engines Level 3 Electronic Fuel Systems with Bosch In-Line Pump (—199,999 engines)

Other manuals will be added in the future to provide additional information on electronic fuel systems as needed.

A complete set of all these manuals covering 8.1 L engines, excluding CTM68, is available in a binder by ordering CTM 450 Binder Set.

Live with safety: Read the safety messages in the introduction of this manual and the cautions presented throughout the text of the manual.

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

Use this component technical manual in conjunction with the machine technical manual. An application listing in Section 01, Group 001 identifies product-model/component type-model relationship. See the machine technical manual for information on component removal and installation, and gaining access to the components.

Information is organized in sections and groups for the various components requiring service instruction. At the beginning of each group are summaries of the up coming group.

Before beginning repair on an engine, clean the engine.

This manual contains SI Metric units of measure followed immediately by the U.S. customary units of measure. Most hardware on these engines are metric sized.

Some components of this engine may be serviced without removing the engine from the machine. Refer to the specific machine technical manual for information on components that can be serviced without removing the engine from the machine and for engine removal and installation procedures.

Read each block of material completely before performing service to check for differences in procedures or specifications. Follow only the procedures that apply to the engine model number you are working on. If only one procedure is given, that procedure applies to all the engines in the manual.

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.

DPSG,OUO1004,2760 –19–12MAY00–1/1

Contents

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.

Section 01
General

Contents

Handle Fluids Safely—Avoid Fires

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

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

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

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

TS227 –UN–23AUG88

DX,FLAME –19–29SEP98–1/1

Handle 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

Service Cooling System Safely

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

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

TS281 –UN–23AUG88

DX,RCAP –19–04JUN90–1/1

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Prevent Battery Explosions

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

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

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

TS204 –UN–23AUG88

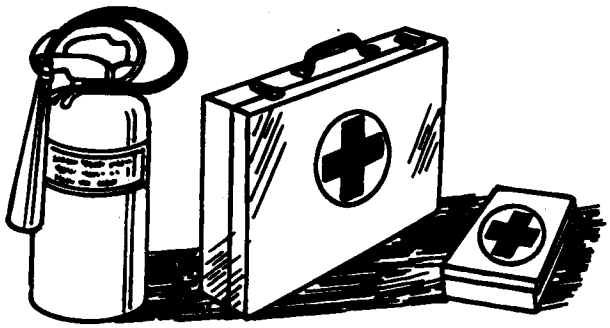
DX,SPARKS –19–03MAR93–1/1

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

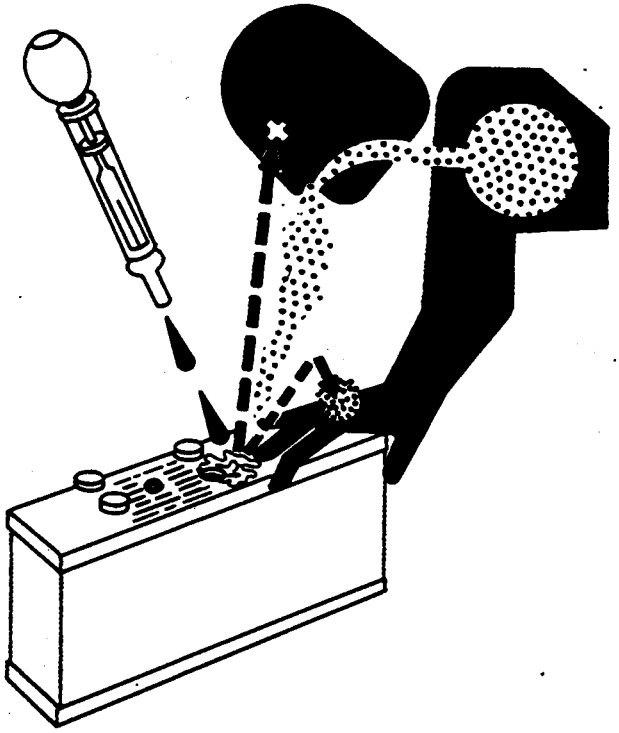
Handling Batteries Safely

TS204 –UN–23AUG88

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

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

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



TS203 –UN–23AUG88

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 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.**

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

DPSG,OUO1004,2758 –19–11MAY00–1/1

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Wait Before Opening High-Pressure Fuel System

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

TS1343 –UN–18MAR92

WL30140,0000007 –19–21JUN05–1/1

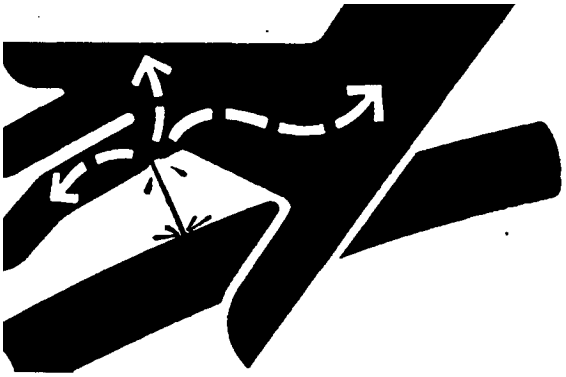
Avoid High-Pressure Fluids

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

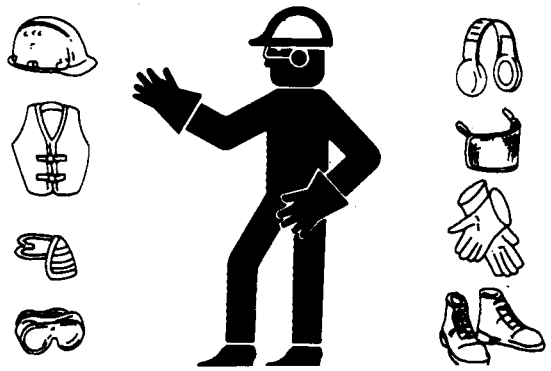
Wear Protective Clothing

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.



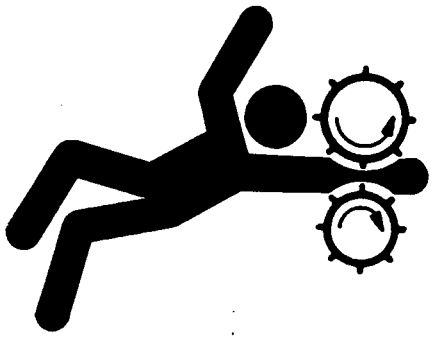
TS206 –UN–23AUG88

DX,WEAR –19–10SEP90–1/1

Service Machines Safely

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

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



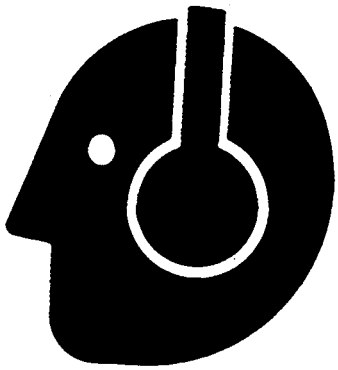
TS228 –UN–23AUG88

DX,LOOSE –19–04JUN90–1/1

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

WL30140,0000006 –19–21JUN05–1/1

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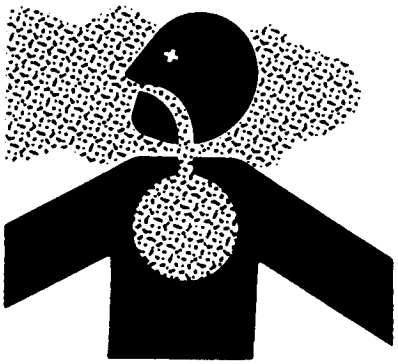
Work In Ventilated Area

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



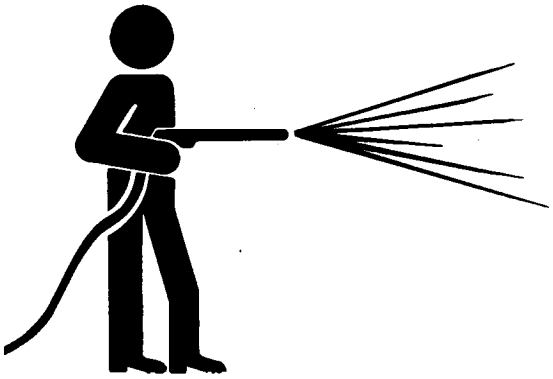
TS220 –UN–23AUG88

DX,AIR –19–17FEB99–1/1

Work in Clean Area

Before starting a job:

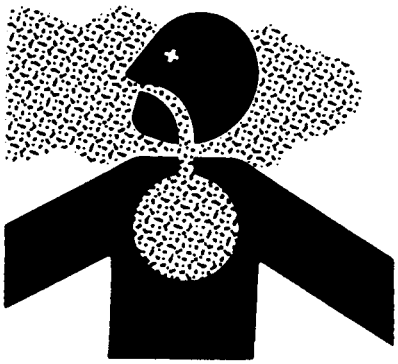
- Clean work area and machine.
- Make sure you have all necessary tools to do your job.
- Have the right parts on hand.
- Read all instructions thoroughly; do not attempt shortcuts.



T6642EJ –UN–18OCT88

DX,CLEAN –19–04JUN90–1/1

Remove Paint Before Welding or Heating



TS220 –UN–23AUG88

Avoid potentially toxic fumes and dust.

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

Remove paint before heating:

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

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

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

Dispose of paint and solvent properly.

DX,PAINT –19–24JUL02–1/1

Avoid Heating Near Pressurized Fluid Lines

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

TS953 –UN–15MAY90

DX,TORCH –19–10DEC04–1/1

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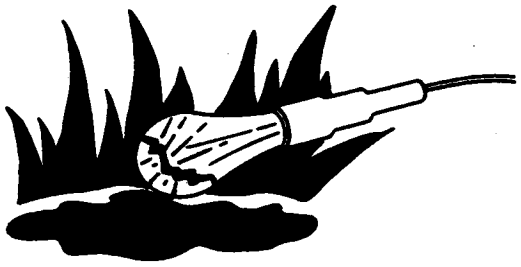
Illuminate Work Area Safely

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



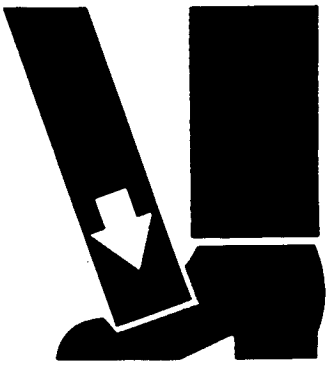
TS223 –UN–23AUG88

DX,LIGHT –19–04JUN90–1/1

Use Proper Lifting Equipment

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

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



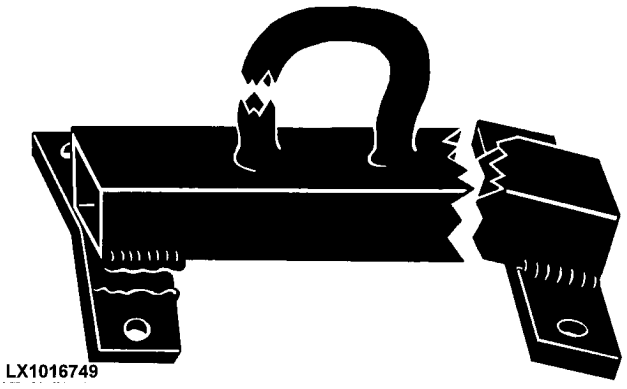
TS226 –UN–23AUG88

DX,LIFT –19–04JUN90–1/1

Construct Dealer-Made Tools Safely

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

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



LX1016749 –UN–01JUL97

Construct Dealer-Made Tools Safely

DPSG,OUO1004,899 –19–19MAY99–1/1

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

Use Proper Tools

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

Use power tools only to loosen threaded parts and fasteners.

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

Use only service parts meeting John Deere specifications.

TS779 –UN–08NOV89

DX,REPAIR –19–17FEB99–1/1

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Dispose of Waste Properly

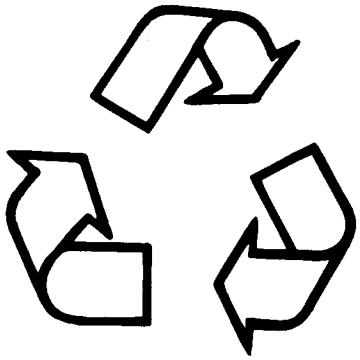
Improperly disposing of waste can threaten the environment and ecology. Potentially harmful waste used with John Deere equipment include such items as oil, fuel, coolant, brake fluid, filters, and batteries.

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

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

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

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



TS1133 –UN–26NOV90

DX,DRAIN –19–03MAR93–1/1

Live With Safety

Before returning machine to customer, make sure machine is functioning properly, especially the safety systems. Install all guards and shields.

TS231 –19–07OCT88

DX,LIVE –19–25SEP92–1/1

Engine Model Designation

JOHN DEERE ENGINE MODEL—6081

John Deere engine model designation includes number of cylinders, displacement in liters, aspiration, user code, and application code. For example:

6081 HRW01 Engine

6 ..... Number of cylinders
8.1 ..... Liter designation
H ..... Aspiration code
RW ..... User code
01 ..... Application Code

Aspiration Code

D ..... Naturally aspirated
T ..... Turbocharged, no aftercooling
A ..... Turbocharged and water-to-air aftercooled
H ..... Turbocharged and air-to-air aftercooled

User Factory Code

AT ..... Agritalia srl (Vittoria, Sicily, Italy)
CQ ..... S.L.C. Horizontina (Brazil)
DW ..... John Deere Davenport Works
F ..... OEM (Outside Equipment Manufacturers)
FF ..... Kernersville Deere-Hitachi (North Carolina)
FG ..... Goldoni S.P.A. (Modena, Italy)
FM ..... Marine Engines
H ..... John Deere Harvester Works
KV ..... John Deere Commercial Worksite Products (Knoxville TN)
L ..... John Deere Werke—Mannheim, Germany
LA ..... Hohn Deere Werke—Mannheim, Germany
..... (eng. with Bosch VP44 Injection Pump)
LV ..... John Deere Commercial Products (Augusta, Georgia)
N ..... John Deere Des Moines Works
P ..... Industrias John Deere Mexico S.A. de C.V.
..... (Saltillo/Monterrey, Mexico
PY ..... Larson & Toubro Ltd. (Pune, India)
RW ..... John Deere Waterloo Tractor Works
T ..... John Deere Dubuque Works
T8 ..... Cameco—Deere (Thibodaux, Louisiana)
TJ ..... Timberjack—Deere (Sweden/Finland/Canada)
YC ..... John Deere Lialian Harvester Co. Limited (China)
Z ..... John Deere Werke Zweibrucken (Germany)

Application Code

001, etc. ..... See later in this Group

RG,RG34710,1021 –19–23OCT97–1/1

Engine Serial Number Plate Information

IMPORTANT: The engine serial number plate can be easily destroyed. Remove the plate or record the information elsewhere, before "hot tank" cleaning the block.

Engine Serial Number (A)

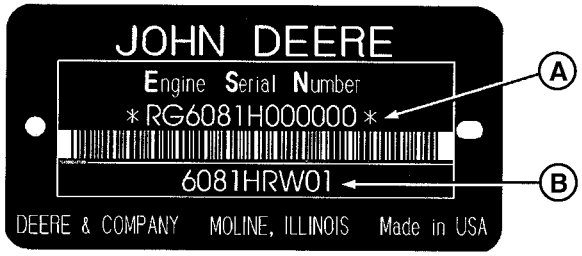
Each engine has a 13-digit John Deere engine serial number identifying the producing factory, engine model designation, and a 6-digit sequential number. The following is an example:

RG6081H000000
RG ..... Factory code producing engine
6081H ..... Engine model designation
000000 ..... Sequential serial number
Factory Code
RG ..... Waterloo Engine Works
Engine Model Designation
6801H ..... See ENGINE MODEL DESIGNATION earlier in this Group.
Sequential Number
000000 ..... 6-digit sequential number

The engine serial number plate is located either on the right-hand side of engine between the oil filter base and the high pressure fuel pump (viewed from flywheel end) or on the left-hand side of the engine directly above the starter motor.

Engine Application Data (B)

The second line of information on the engine serial number plate identifies the engine/Deere machine or OEM relationship. See ENGINE APPLICATION CHART.

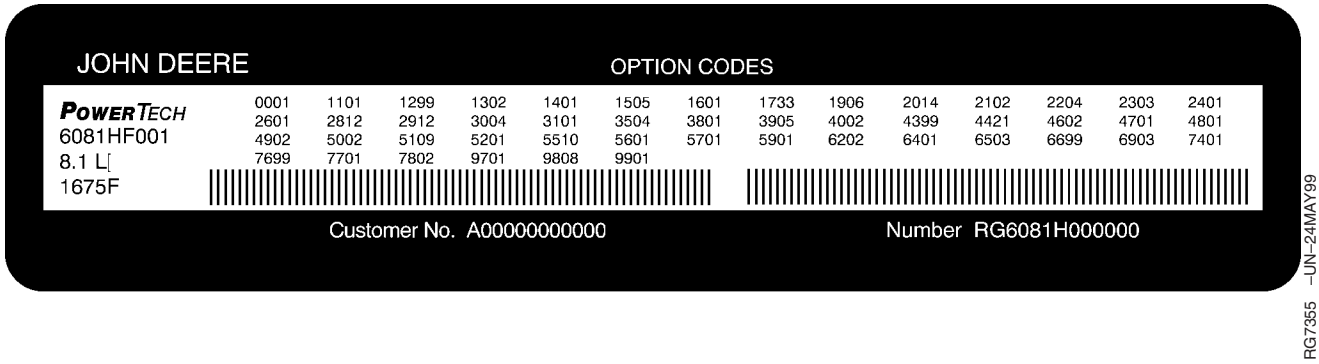


Engine Serial Number Plate

A—Engine Serial Number
B—Engine Application Data

RG41221,0000074 –19–21DEC00–1/1

Engine Option Code Label



Option Code Label

In addition to the serial number plate, later OEM engines have an engine option code label affixed to the rocker arm cover. These codes indicate which of the engine options were installed on your engine at the factory.

Always provide option code information and engine base code when ordering repair parts. A listing of option codes is given in Parts Catalogs and Operator's Manuals.

NOTE: Before "hot tank" cleaning, ensure that option codes are recorded elsewhere. Record this information in the spaces provided in the Operation and Maintenance Manual.

DPSG,OUO1004,900 –19–17AUG01–1/1

Engine Application Chart

JOHN DEERE AGRICULTURAL EQUIPMENT	
Application	**Engine Model**
Tractors	
7710/7810 Tractor	6081HRW43
7820 Tractor	6081HRW41
7920 Tractor	6081HRW42
8120/8220 Tractors - FSA North America	6081HRW31
8120/8220 Tractors - FSA Region 2	6081HRW32
8120/8220 Tractors - Wheels/Tracks (Worldwide)	6081HRW23
8320 Tractor - FSA North America	6081HRW33
8320 Tractor - FSA Region 2	6081HRW34
8320 Tractor - Wheels/Tracks (Worldwide)	6081HRW25
8420 Tractor - FSA North America	6081HRW35
8420 Tractor - FSA Region 2	6081HRW36
8420 Tractor - Wheels/Tracks (Worldwide)	6081HRW27
8520 Tractor - FSA North America	6081HRW37
8520 Tractor - FSA Region 2	6081HRW38
8520 Tractor - Wheels/Tracks (Worldwide)	6081HRW28
9120 Tractor	6081HRW30
Cane Harvester	
CH3500 Sugar Cane Harvester	6081HT801
CH3500 Australian Cane Harvester	6081HT802
Combine	
9550 STS Combine	6081HH019
9560 STS Combine	6081HH019
9650 STS Combine	6081HH013
9650/9650 CTS Combine	6081HH017
9750 STS Combine	6081HH012
9760 STS Combine	6081HH025
Combine (Germany)	
9560/9560HM Combine	6081HZ008
9580/9580HM Combine	6081HZ009
9640/9640HM Combine	6081HZ009
9660/9660HM Combine	6081HZ010
9680/9680HM Combine	6081HZ011
9780/9780HM Combine	6081HZ012
9040/9040HM Combine	6081HZ017
9580/9580HM Combine	6081HZ017
9640 Combine	6081HZ017
9640 HM Combine	6081HZ017
9660/9660HM Combine	6081HZ018
9680 Combine	6081HZ019
9780 CTS Combine	6081HZ019

Continued on next page

JOHN DEERE CONSTRUCTION AND FORESTRY EQUIPMENT

Application	Engine Model
Loader/Grader	
644H/644J Loader	6081HDW08
724J Loader	6081HDW09
770/870 D-Series Grader	6081HDW
Sprayer (Antares)	
4920 Self-Prop. Sprayer	6081HN005
Forage Harvester (Germany)	
7200 Self Propelled Forage Harvester	6081HZ013/016
Cotton Picker	
9996 Cotton Picker	6081HN006
Crawler	
850J Crawler	6081HT006
Excavator (Japan)	
330CLC Excavator	6081HT002
370C Excavator	6081HT002
Forestry	
608B Feller Buncher - LP (Timberjack)	6081HTJ07
608L Feller Buncher - (Timberjack)	6081HTJ08
608S Feller Buncher - (Timberjack)	6081HTJ08
753G Feller Buncher - LP (John Deere)	6081HTJ08
850 Feller Buncher/Harvester (Timberjack)	6081HTJ05
950 Feller Buncher/Harvester (Timberjack)	6081HTJ09
853G/953G Feller Buncher/Harvester (John Deere)	6081HTJ05
1710/1710D Forwarder	6081HTJ02
1270D Harvester	6081HTJ03
1470D Harvester	6081HTJ04
560 Skidder (Timberjack)	6081HTJ06
748 Skidder (John Deere)	6081HTJ06
Dump Truck (Bell)	
250D/300D Articulated Dump Truck	6081HT005

Continued on next page

RG,RG34710,1023 –19–02APR03–2/3

OUTSIDE EQUIPMENT MANUFACTURERS ENGINES

Application	Engine Model	Fuel System Option Code
OEM		
OEM Engine (200 HP)	6081HF070	72A1 - 72A2
OEM Engine (225 HP)	6081HF070	72B1 - 72B2
OEM Engine (250 HP)	6081HF070	72C1 - 72C2 - 72C3
OEM Engine (275 HP)	6081HF070	72D1 - 72D2
OEM Engine (300 HP)	6081HF070	72E1 - 72E2
OEM Engine (325 HP - Standard Torque)	6081HF070	72F1 - 72F2
OEM Engine (325 HP - Low Torque)	6081HF070	72G1 - 72G2
OEM Engine (350 HP - Genset)	6081HF070	722A - 722B
OEM Engine (413 HP - Genset)	6081HF070	723A - 723B
Marine		
S450 Marine OEM	6081AFM75	

RG,RG34710,1023 –19–02APR03–3/3

Lubricants and Coolant

NOTE: Refer to Section 01, Group 002 of CTM86 Base Engine Manual for information on lubricants and coolants.

RG41221,000000E –19–22SEP00–1/1

Diesel Fuel - Tier 1

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

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

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

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

Cetane number of 40 minimum. Cetane number greater than 50 is preferred, especially for temperatures below -20°C (-4°F) or elevations above 1500 m (5000 ft).

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

Fuel lubricity should pass a minimum of 3100 gram load level as measured by the BOCLE scuffing test.

Sulfur content:

- Sulfur content should not exceed 0.50%. Sulfur content less than 0.05% is preferred.
- If diesel fuel with sulfur content greater than 0.50% sulfur content is used, reduce the service interval for engine oil and filter by 50%.
- DO NOT use diesel fuel with sulfur content greater than 1.0%.

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

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Diesel Fuel - Tier 2

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 –19–17DEC02–1/1

Bio-Diesel Fuel

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

Bio-diesel fuels may be used ONLY if the bio-diesel fuel properties meet the latest edition of ASTM PS121, DIN 51606 or equivalent specification.

It has been found that bio-diesel fuels may improve lubricity in concentrations up to a 5% blend in petroleum diesel fuel.

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

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

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

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

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

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

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

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Testing Diesel Fuel

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

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

DIESELSCAN is a trademark of Deere & Company

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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

Section 02
Repair and Adjustments

Contents

Fuel System - General Information

The low-pressure side of the fuel system exists in two configurations, the “single filter” (—246269) and the newer “dual filter” (246270—). The single filter design uses a 250-micron cleanable strainer and a 2-micron final filter. The dual filter design uses a 10-micron filter and a 2-micron filter. The newer dual-filter configuration is also different in the following ways:

- A diagnostic port is on the oil filter head (—246269) or fuel pump overflow valve fitting (246270—).
- Fuel return line from the injectors is routed to tank instead of a fitting on the primary filter pressure relief valve.
- Use of flexible hose.
- Check valve on fuel pump inlet.
- Check valve on primary fuel filter inlet.
- Bypass fuel from the final filter is directed to the transfer pump via a T-fitting on the primary filter.

Separate procedures and illustrations are provided where necessary.

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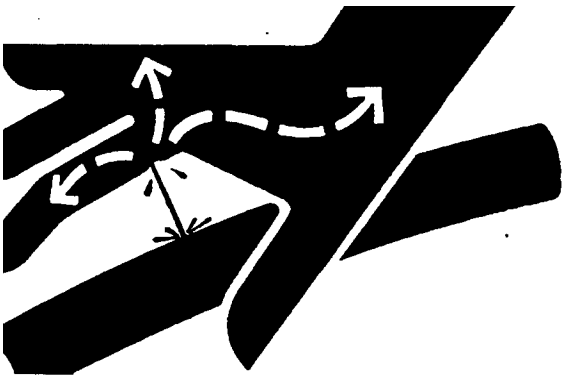
Relieve Fuel System Pressure

CAUTION: Escaping diesel fuel under pressure can have sufficient force to penetrate the skin, causing serious injury. Before disconnecting lines, be sure to relieve pressure. Before applying pressure to the system, be sure ALL connections are tight and lines, pipes and hoses are not damaged. Keep hands and body away from pinholes and nozzles which eject fluid under pressure. Use a piece of cardboard or wood, rather than hands, to search for suspected leaks.

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.



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High Pressure Fluids

The engine must be allowed to sit for at least 5 minutes before beginning work on the fuel system. This allows the fuel system to bleed off internal high pressure.

Any time 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 BLEED THE FUEL SYSTEM (—246269) or BLEED THE FUEL SYSTEM (246270—) in Section 04, Group 150 later in this manual.

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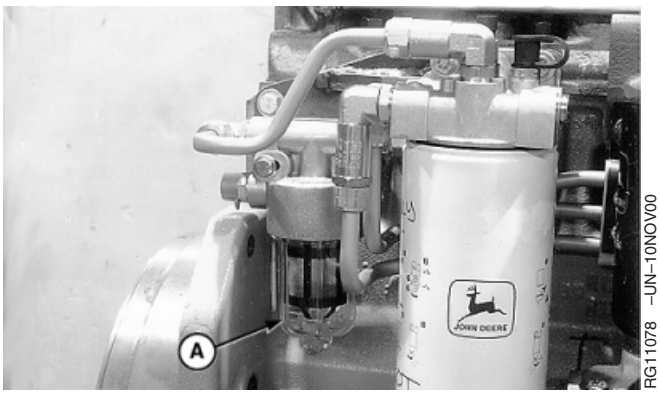
Clean Primary Fuel Filter (Strainer) (— 246269)

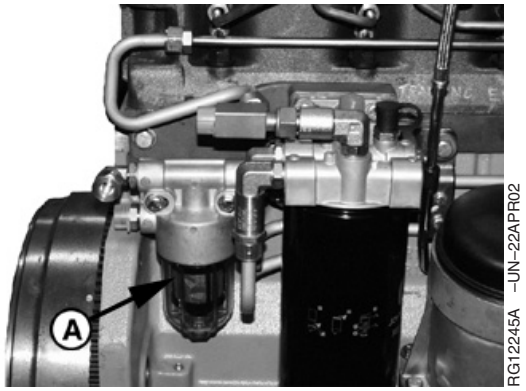
NOTE: Do not clean fuel strainer and change final fuel filter at the same time. Clean fuel strainer and run engine before changing final fuel filter.

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

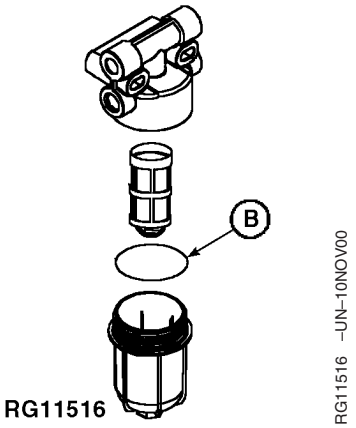
A—Fuel Strainer
B—O-Ring



Fuel Strainer



Fuel Strainer



Fuel Strainer Parts

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Remove and Install Fuel Filter Head (— 246269)

Remove Fuel Filter Head

1. Clean exterior of the final fuel filter/water separator assembly.

CAUTION: Fuel in filter may be under pressure. Open valve on bottom of water separator bowl to relieve pressure prior to removing filter.

2. Drain water and contaminants from water separator bowl into a suitable container.
3. Disconnect WIF sensor connector from bottom of filter.
4. Remove filter element using suitable filter wrench.
5. Disconnect fuel lines from inlet (A) and outlet (B) ports.
6. Disconnect fuel line fitting (C) from pressure relief valve.
7. Remove 2 capscrews (D) from filter head and remove head from mounting bracket on engine.

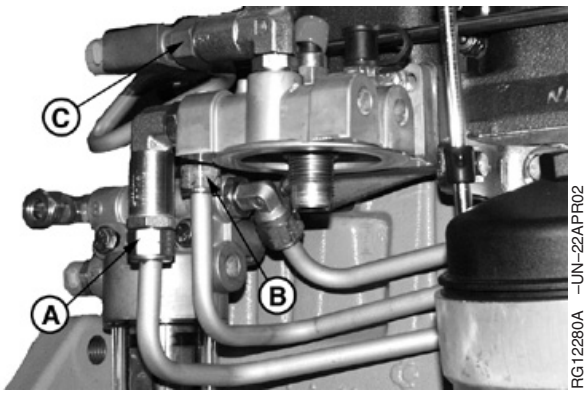
Install Fuel Filter Head

1. Loosely install filter head to filter mounting bracket. Do not tighten cap screws.
2. Loosely connect fuel lines to fuel filter inlet and outlet ports. Do not tighten.
3. Tighten filter head to mounting bracket on engine to specification.

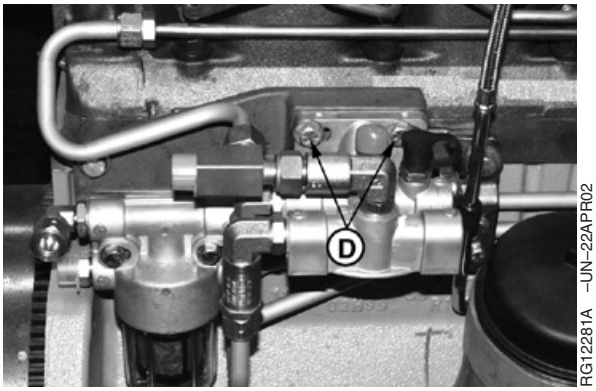
Specification	
Fuel Filter Head to Mounting Bracket Cap Screws—Torque	40 N•m (30 lb-ft.)

4. Tighten fuel lines on the final filter inlet and outlet ports to specification.

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



Final Fuel Filter Fuel Lines



Filter Head Cap Screws

A—Fuel Inlet Line
B—Fuel Outlet Line
C—Relief Valve
D—Filter Head Cap Screws

Continued on next page

5. Connect and tighten fuel line to pressure relief valve to specification.

Specification	
Fuel Line - Attach to Final Fuel Filter Relief Valve—Torque	27 N•m (20 lb-ft.)

6. Lubricate gasket and install filter element onto base. Tighten 3/4 turn after packing contacts base.

7. Make sure that drain valve is closed on the bottom of the filter element.

8. Connect WIF sensor connector.

9. Bleed the fuel system. See BLEED THE FUEL SYSTEM (—246269) in Section 04, Group 150 later in this manual.

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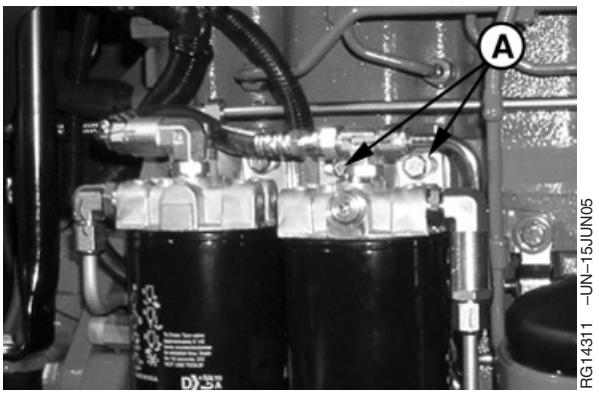
Remove and Install Fuel Filter Heads (246270—)

Remove Fuel Filter Heads

1. Clean exterior of filter assemblies.
2. Drain water and contaminants from filters into a suitable container.
3. Disconnect WIF sensor connector from bottom of filter.
4. Disconnect fuel temperature sensor connector from filter head.
5. Remove filter elements using suitable filter wrench.
6. Disconnect all fuel hoses and lines from fittings on filter heads.
7. Remove 2 capscrews (A) from each filter head and remove heads from mounting bracket on engine.



A—Filter Head Cap Screws

Install Fuel Filter Heads

1. Loosely install filter heads to filter mounting bracket. Do not tighten cap screws.
2. Loosely connect fuel lines and hoses to fuel filter head fittings. Do not tighten.
3. Tighten filter heads to mounting bracket on engine to specification.

Specification	
Fuel Filter Head to Mounting Bracket Cap Screws—Torque	40 N•m (30 lb-ft.)

4. Tighten fuel hoses and lines on filter fittings to specification.

Specification	
Fuel Hoses—Torque	24 N•m (18 lb-ft.)

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

5. Prefill filters using prefill cups provided with filters.

Continued on next page

6. Lubricate filter gasket and install filter element onto base. Tighten 3/4 turn after packing contacts base.

7. Make sure that the drain valves are closed on the bottom of the filter elements.

8. Connect WIF sensor connector and the water-in-fuel sensor connector.

9. Bleed the fuel system. See BLEED THE FUEL SYSTEM (246270—) in Section 04, Group 150 later in this manual.

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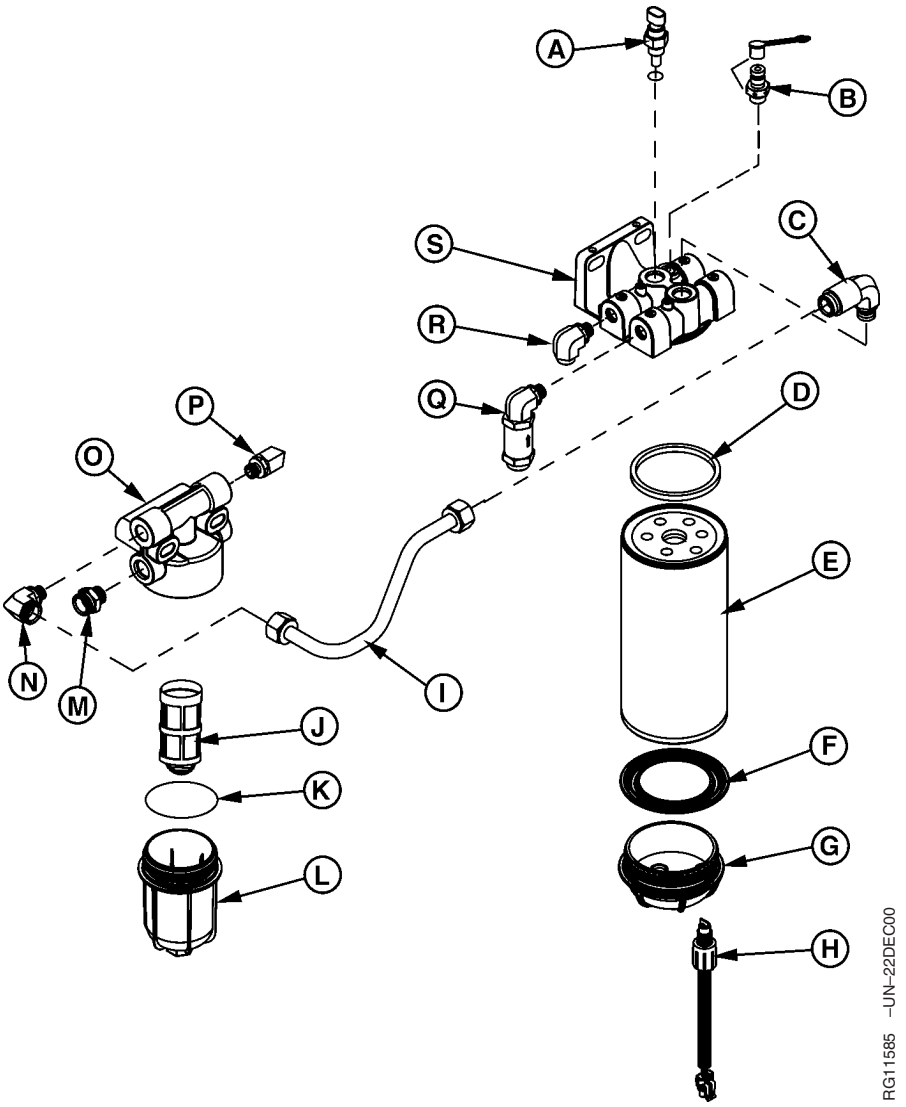
Fuel Filter Assemblies (—246269)



Fuel Filter Assemblies, Bypass Fuel Directed to Transfer Pump

A—Temperature Sensor
B—Diagnostic Port
C—Pressure Relief Valve
D—Gasket
E—Final Fuel Filter Element
F—O-ring
G—Water Separator Bowl
H—Water in Fuel Sensor
I—Fuel Line
J—Primary Fuel Filter
K—O-ring
L—Primary Fuel Filter Bowl
M—Fitting
N—Fitting
O—Primary Fuel Filter Header
P—Fitting
Q—Check Valve
R—Fitting
S—Final Fuel Filter Header

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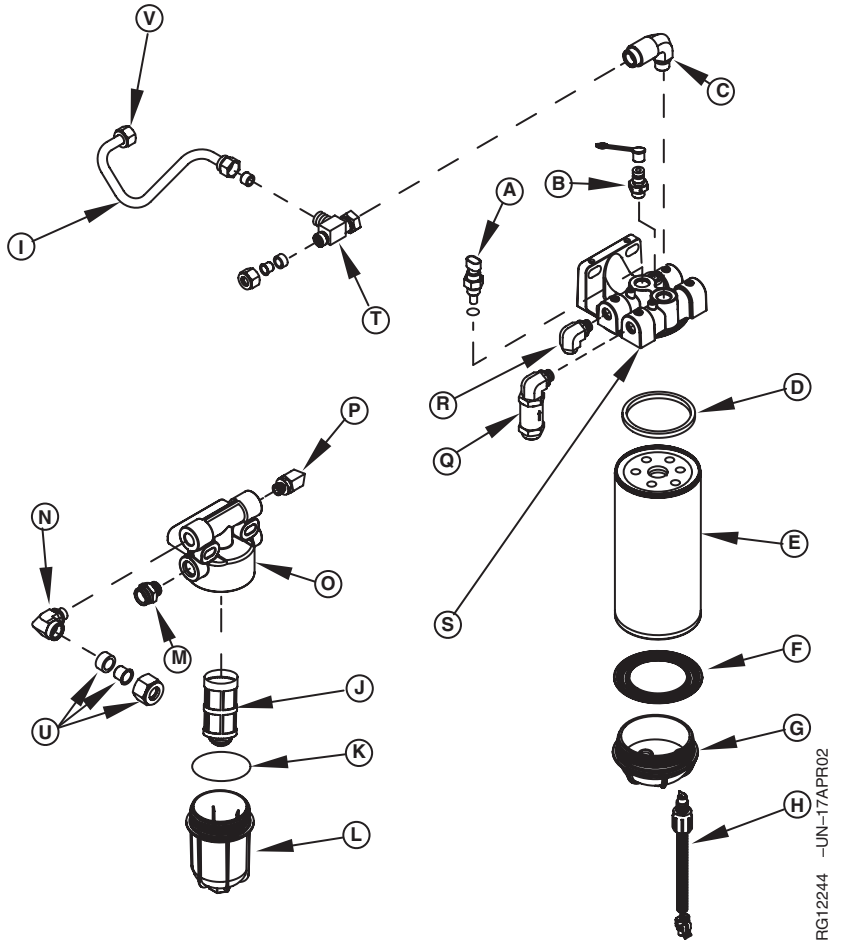

Fuel Filter Assemblies, Bypass Fuel Directed to Tank

A—Temperature Sensor
B—Diagnostic Port
C—Pressure Relief Valve
D—Gasket
E—Final Fuel Filter Element
F—O-ring
G—Water Separator Bowl
H—Water in Fuel Sensor
I—Fuel Line
J—Primary Fuel Filter
K—O-ring
L—Primary Fuel Filter Bowl
M—Fitting
N—Fitting
O—Primary Fuel Filter Header
P—Fitting
Q—Check Valve
R—Fitting
S—Final Fuel Filter Header
T—T-fitting
U—Fitting cap
V—Fitting to fuel leak-off line

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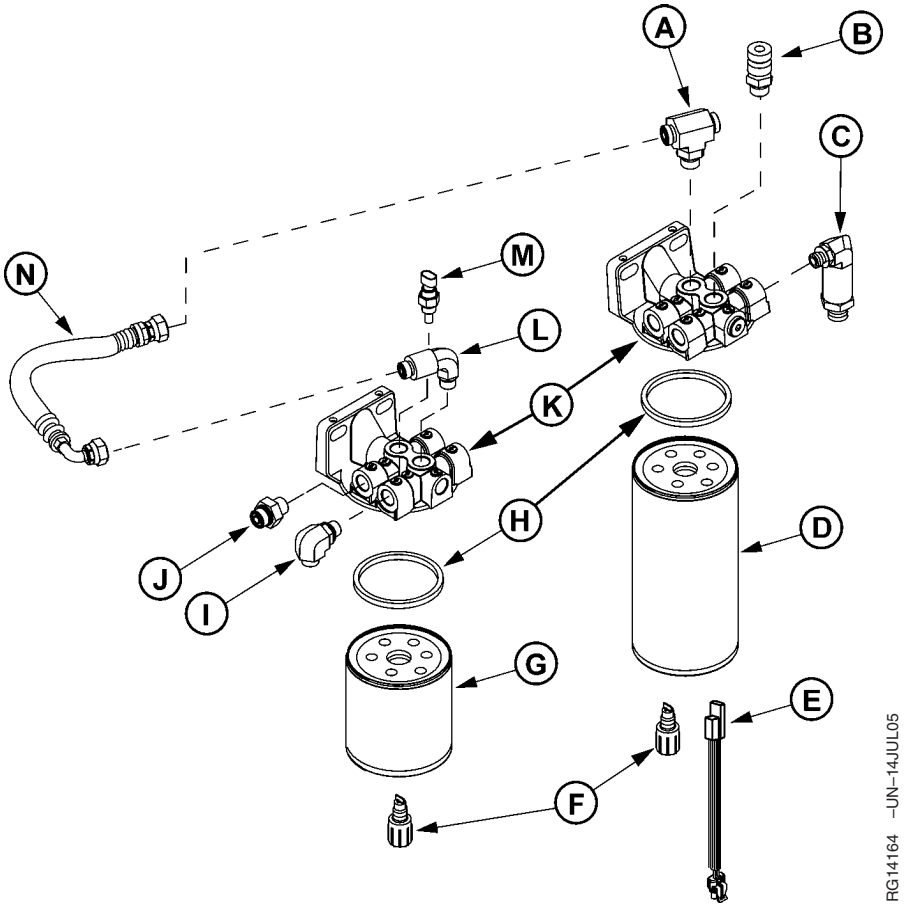
Fuel Filter Assemblies (246270—)



A—T-Fitting
B—Diagnostic Port
C—Check Valve
D—Fuel Filter Element, 10-Micron
E—Water-in-Fuel Sensor
F—Drain Valve
G—Fuel Filter Element, 2-Micron
H—Gasket
I—Adapter
J—Fitting
K—Fuel Filter Header
L—Pressure Relief Valve
M—Temperature Sensor
N—Fuel Line, Bypass

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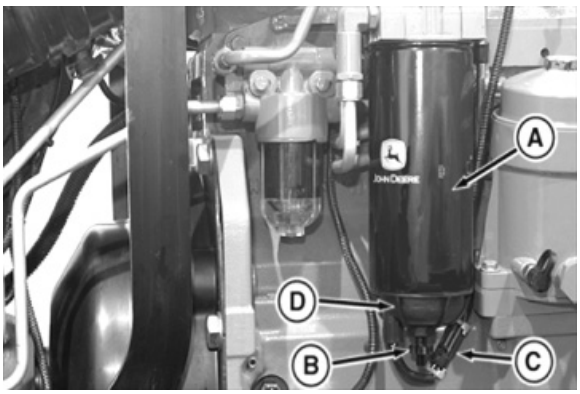
Replace Final Fuel Filter Element (—246269)

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

1. Thoroughly clean exterior of fuel filter/water separator assembly and surrounding area.

CAUTION: Fuel in filter may be under pressure. Open valve on bottom of water separator bowl to relieve pressure prior to removing filter.

2. Drain water and contaminants from water separator bowl into a suitable container by opening the drain valve (B) on bottom of filter.
3. Disconnect the WIF sensor connector (C).
4. Remove water separator bowl (D) from filter element and remove O-ring (E). Clean separator bowl and dry with compressed air.
5. Inspect bowl (D). Replace if necessary.
6. Install new O-ring (E) on separator bowl. Do not reuse old O-ring.
7. Lubricate O-ring (E) and install separator bowl onto new filter element. Tighten 1/2 turn after O-ring contacts filter.
8. Remove the old filter element (A) using a suitable filter wrench.



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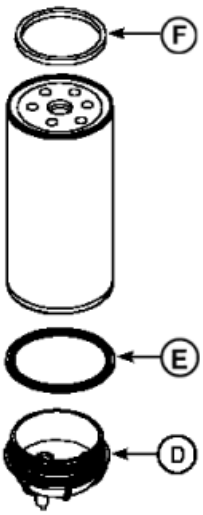
Final Fuel Filter



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Final Fuel Filter Parts

A—Filter Element
B—Drain Valve
C—WIF Sensor Connector
D—Water Separator
E—O-ring
F—Packing

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

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

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

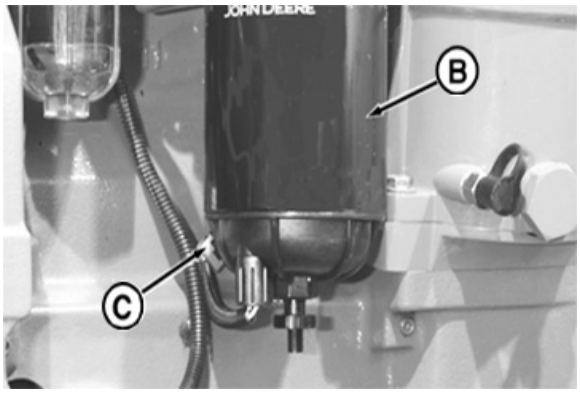
10. Remove and dispose of filler cup.

11. Lubricate packing (F) (on previous page) and install filter onto base. Tighten 3/4 turn after packing contacts base. Connect sensor.

12. Start and run engine at fast idle for 2 minutes. If engine won't start or dies, bleed the fuel system. See BLEED THE FUEL SYSTEM (—246269) in Section 04, Group 150 later in this manual. If engine will not start after bleeding the fuel system, prime the fuel system. See RESTARTING ENGINE THAT HAS RUN OUT OF FUEL (—246269) in Section 04, Group 150 later in this manual.

A—Filler Cup
B—Fuel Filter Element
C—Water Separator

Filling Fuel Filter



Filter Element/Water Separator

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