JOHN DEERE
CONFIDENTIAL

POWERTECH® 4.5L & 6.8L Diesel Engines

Level 1 Electronic Fuel Systems With Delphi (Lucas) DP201 Pump

TECHNICAL MANUAL

POWERTECH® 4.5 L & 6.8 L Diesel Engines Level 1 Electronic Fuel Systems With Delphi (Lucas) DP201 Pump

CTM284 22JUL15 (ENGLISH)

For complete service information also see:

John Deere Power Systems
LITHO IN USA

Forward

This manual (CTM 284) 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 1 Electronic Fuel Systems with the Delphi (Lucas) DP201 injection pump. It is one of six volumes on 4.5 L and 6.8 L engines. The following five companion manuals cover the repair, operation and diagnostics for the base engine and various electronic and mechanical fuel systems. These 6 volumes are included in the binder set (CTM350). The following two companion manuals cover the base engine and mechanical fuel system repair, operation and diagnostics:

- CTM104—4.5 L & 6.8 L Base Engine
- CTM134—6.8 L & 8.1 L Level 3 Electronic Fuel Systems with Bosch In-Line Pump
- CTM170—4.5 L & 6.8 L Level 4 Electronic Fuel Systems with Bosch VP44 Rotary Pump
- CTM207—4.5 L & 6.8 L Mechanical Fuel Systems
- CTM284—4.5 L & 6.8 L Level 1 Electronic Fuel Systems with Delphi (Lucas) DP201 Pump
- CTM331—4.5 L & 6.8 L Level 12 Electronic Fuel Systems with Stanadyne DE10 Rotary Pump

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 4.5 L and 6.8 L engines is available in a binder by ordering CTM 350 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 summary listings of all applicable essential tools, service equipment and tools, other materials needed to do the job, service parts kits, specifications, wear tolerances, and torque values.

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 is 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.

RG40854,00000ED -19-10SEP01-1/1

Contents

Original Instructions. 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—15APR13

RG40854,0000049 -19-09JUL15-1/1

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

RG40854,000004A -19-08AUG01-1/1

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—15APR13

RG40854,000004B -19-08AUG01-1/1

Prevent Battery Explosions

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

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

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

TS204 —UN—15APR13

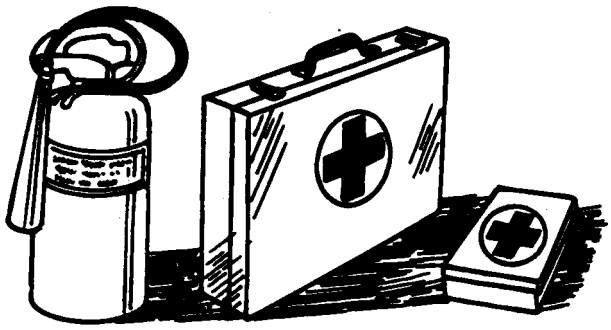
RG40854,000004C -19-08AUG01-1/1

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—15APR13

RG40854,000004D -19-08AUG01-1/1

Handling Batteries Safely

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

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

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

TS204 —UN—15APR13

Continued on next page

RG40854,000004E -19-08AUG01-1/2

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

Avoid the hazard by:

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

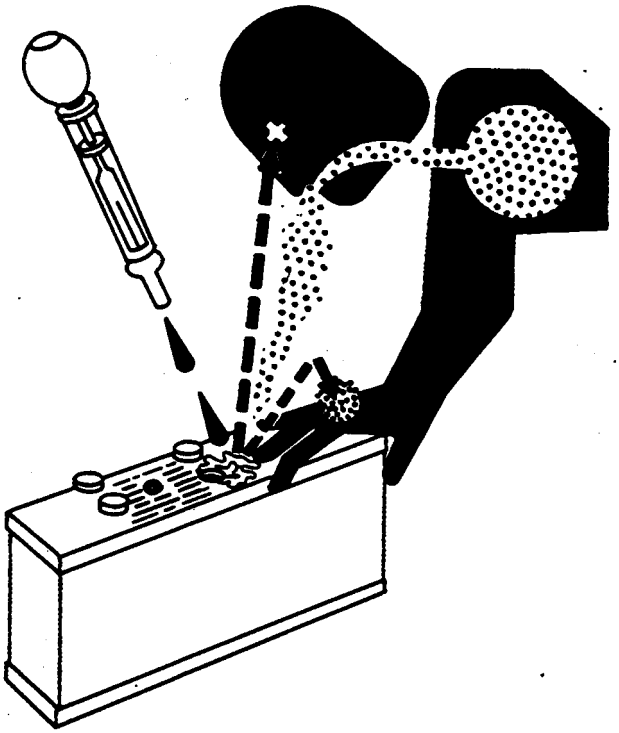
If you spill acid on yourself:

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.**



TS203 —UN—23AUG88

RG40854,000004E -19-08AUG01-2/2

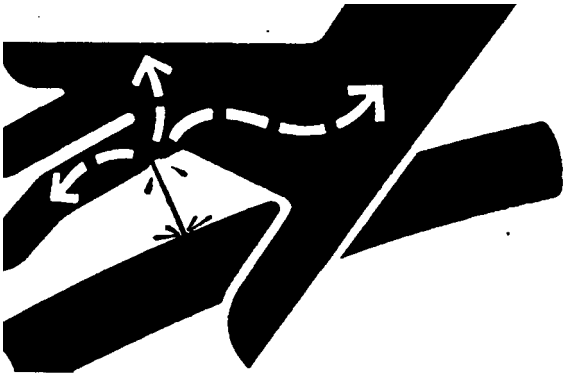
Avoid High-Pressure Fluids

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

RG40854,000004F -19-08AUG01-1/1

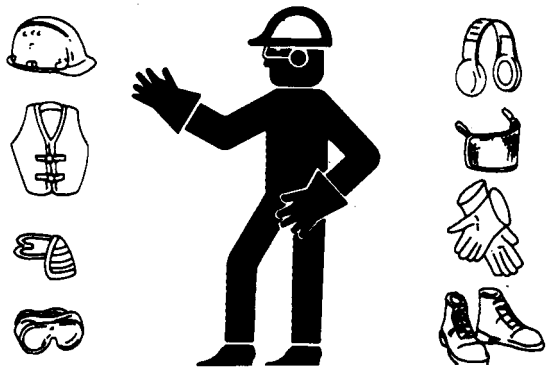
Wear Protective Clothing

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.



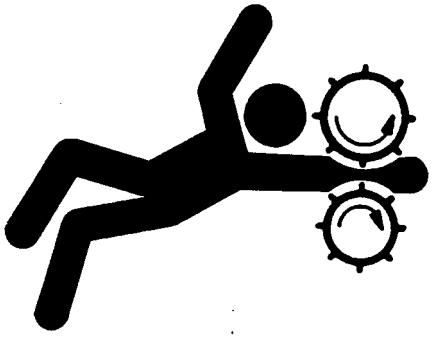
TS206 —UN—15APR13

RG40854,0000050 -19-08AUG01-1/1

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.



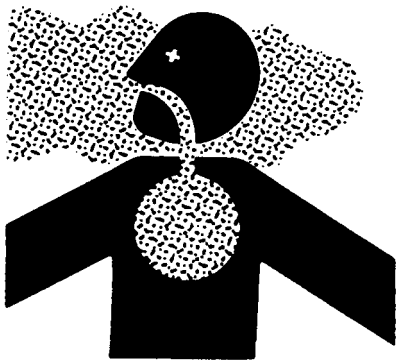
TS228 —UN—23AUG88

RG40854,0000051 -19-08AUG01-1/1

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



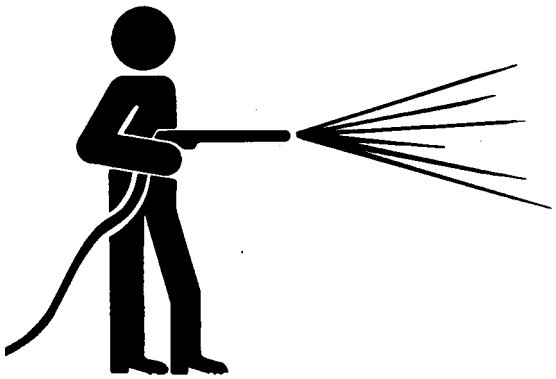
TS220 —UN—15APR13

RG40854,0000052 -19-08AUG01-1/1

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

RG40854,0000053 -19-08AUG01-1/1

Remove Paint Before Welding or Heating

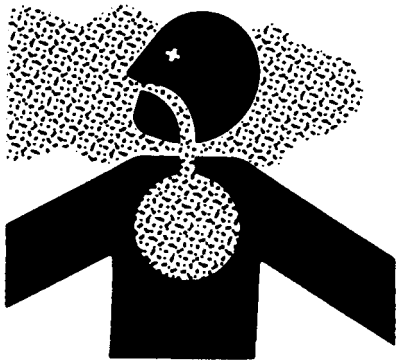
Avoid potentially toxic fumes and dust.

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

Remove paint before heating:

- Remove paint a minimum of 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 all work in an area that is ventilated to carry toxic fumes and dust away.



TS220 —UN—15APR13

Dispose of paint and solvent properly.

RG40854,0000054 -19-08AUG01-1/1

Avoid Heating Near Pressurized Fluid Lines

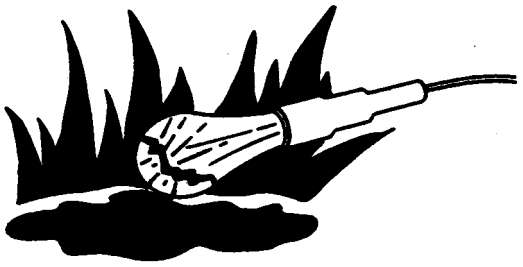
Flammable spray can be generated by heating near pressurized fluid lines, resulting in severe burns to yourself and bystanders. Do not heat by welding, soldering, or using a torch near pressurized fluid lines or other flammable materials. Pressurized lines can be accidentally cut when heat goes beyond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

TS953 —UN—15MAY90

RG40854,0000055 -19-08AUG01-1/1

Illuminate Work Area Safely

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



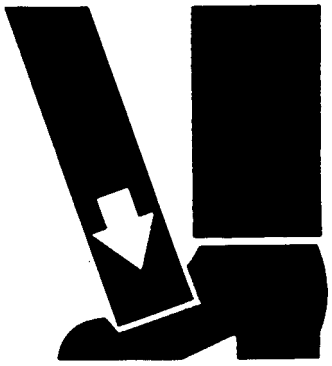
TS223 —UN—23AUG88

RG40854,0000056 -19-08AUG01-1/1

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.



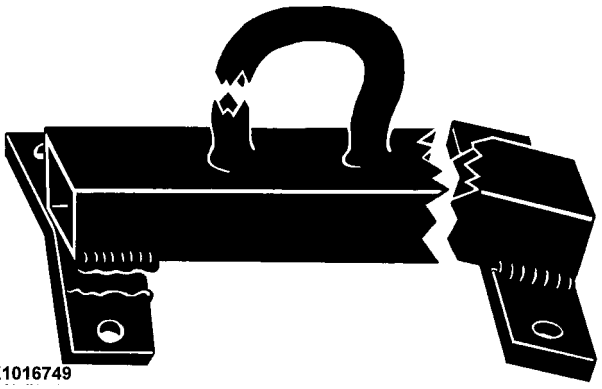
TS226 —UN—23AUG88

RG40854,0000057 -19-08AUG01-1/1

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

RG40854,0000058 -19-08AUG01-1/1

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

RG40854,0000059 -19-08AUG01-1/1

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

RG40854,000005A -19-08AUG01-1/1

Dispose of Waste Properly

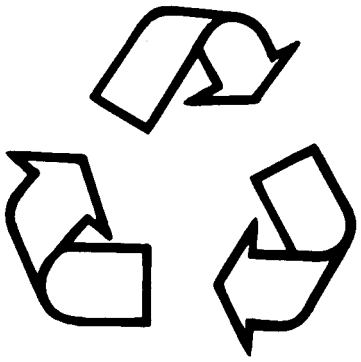
Improperly disposing of waste can threaten the environment and ecology. Potentially harmful waste used with John Deere equipment include such items as oil, fuel, coolant, brake fluid, filters, and batteries.

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

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

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

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



TS1133 —UN—15APR13

RG40854,000005B -19-08AUG01-1/1

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

RG40854,000005C -19-08AUG01-1/1

Engine Model Designation

John Deere Engine Model—4045 and 6068 Engines

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

4045TF150 Engine	
4	Number of cylinders
4.5	Liter displacement
T	Aspiration code
F	User code
1	Internal engine configuration type
50	***POWERTECH***® application code
Aspiration Code	
D	Naturally aspirated
T	Turbocharged and Air-to-Coolant Aftercooled
H	Turbocharged and Air-to-Air Aftercooled
User Factory Code	
AP	Saltillo (Mexico)
CQ	S.L.C. Horizontina (Brazil)
DW	John Deere Davenport Works
E	John Deere Ottumwa Works
F	OEM (Outside Equipment Manufacturers)
FF	Kernersville Deere-Hitachi (North Carolina)
FG	Goldoni (Italy)
FM	Marine Engines
H	John Deere Harvester Works
KV	John Deere Knoxville (Tennesee)
L	John Deere Werke Mannheim (Germany)
LA	John Deere Werke Mannheim (Germany) (Engines with Bosch VP44 Injection Pump)
LV	John Deere Augusta, Georgia
N	John Deere Des Moines Works
P	Saltillo/Monterrey (Mexico)
RW	John Deere Waterloo Tractor Works
T	John Deere Dubuque Works
TJ	Forestry (Sweden/Finland/Canada)
T8	Cameco (Deere) (Louisiana)
YC	John Deere Jialian Harvester Co. Limited (China)
Z	John Deere WERKE Zweibrucken (Germany)
Model Designation	
1 or 2	Indicates different internal engine components
Application Code	
50 or above	***POWERTECH***® code for specific application

RG40854,000005D -19-08AUG01-1/1

Engine Serial Number Plate Information

IMPORTANT: The engine serial number plate (A) can be easily destroyed. Before "hot tank" cleaning the block, remove the plate.

Engine Serial Number (B)

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:

T04045T000000

T0	Factory producing engine
4045T	Engine model designation
000000.....	Sequential serial number

Factory Code (Engine Manufacturer)

T0	Dubuque, Iowa
CD	Saran, France
PE.....	Torreon, Mexico

Engine Model Designation

4045T	Definition explained previously. See ENGINE MODEL DESIGNATION earlier in this Group.

Sequential Number

000000.....	6-digit sequential serial number

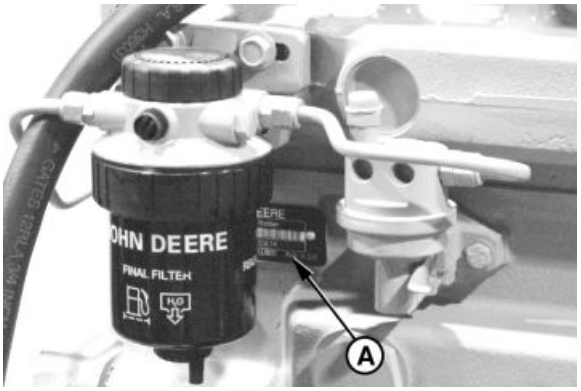
Engine Application Data (C)

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

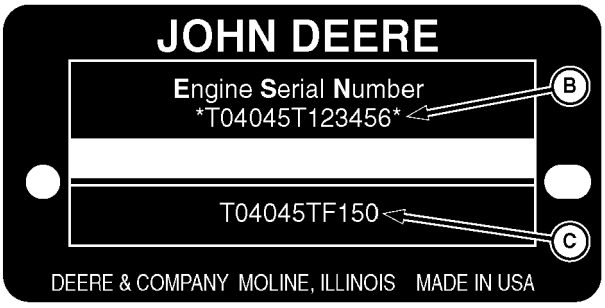
Coefficient of Absorption (D) — (Saran-Built Engines Only)

The second line of information on Saran serial number plate also contains the coefficient of absorption value for smoke emissions.

A—Engine Serial Number Plate
B—Engine Serial Number
C—Engine Application Data
D—Coefficient of Absorption (Saran Engines Only)

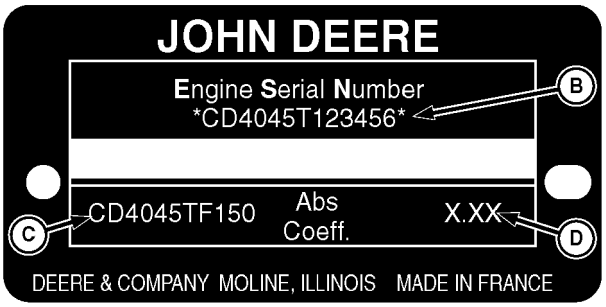


RG7778 —UN—11NOV97



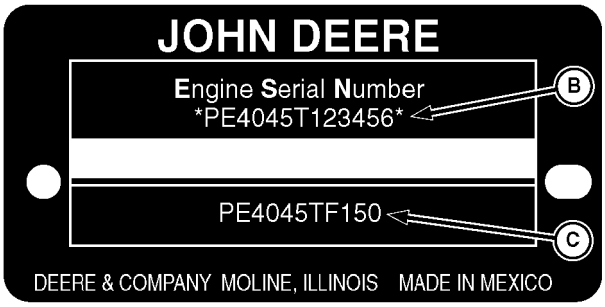
RG9060 —UN—16MAR98

Dubuque Engine Serial Number Plate



RG9061 —UN—16MAR98

Saran Engine Serial Number Plate



RG9062 —UN—16MAR98

Torreon Engine Serial Number Plate

RG40854,000005E -19-08AUG01-1/1

Engine Application Chart

JOHN DEERE AGRICULTURAL EQUIPMENT (MANNHEIM, GERMANY)	
Machine Model	**Engine Model**
6310 (European version)	CD4045TL052
6410 (European version)	CD4045TL053
6310 (N.A. version)	CD4045TL055
6410 (N.A. version)	CD4045TL056
6510 (European version)	CD6068DL050
6610	CD6068TL050
6810	CD6068TL051
6910	CD6068TL052, CD6068TL054
6320 (European version)	CD4045HL072
6320 (N.A. version)	CD4045HL073
6420 (European and N.A. version)	CD4045HL070
6520 (European version)	CD6068DL070
7220	CD6068TRW01

RG40854,000005F -19-08AUG01-1/1

Lubricants and Coolant

NOTE: For information on lubricants and coolants, refer to Section 01, Group 002 of CTM104 Base Engine Manual for information on lubricants and coolants.

RG40854,0000061 -19-08AUG01-1/1

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.

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

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

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

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

Sulfur content:

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

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

RG40854,0000060 -19-08AUG01-1/1

Diesel Fuel Additive Products

John Deere diesel engines with high pressure fuel systems rely on high quality diesel fuel to maintain the performance, reliability, and durability customers demand. A variety of diesel fuel aftermarket products may be used to ensure diesel fuel meets those needs:

- Fuel-Protect Diesel Fuel Conditioner
- Diesel Fuel System Clean-Up
- Fuel-Protect Keep Clean
- Performance Formula Conditioner
- Biodiesel Protect 100
- Fuel Test Kits
- FUELSAVER™

These products are available through John Deere Merchandise.

NOTE: Not all products will be available in all markets.

VN40298,00000FB -19-14MAY12-1/1

Bio-Diesel Fuel

Bio-diesel fuels may be used ONLY if the fuel properties meet the provisional ASTM PS121 (U.S.) or DIN 51606 (German) specification. It has been shown that bio-diesel fuels have been found to improve lubricity in concentrations up to 5% blend in petroleum diesel fuel.

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

While a major environmental benefit of a biodiesel fuel is its ability to biodegrade, users must recognize that storage and handling is of prime importance as indicated below:

- Ensure the quality of the biodiesel fuel (fuel meets the specifications).
- Keep storage and vehicle tanks as full as possible to prevent moisture from collecting inside.
- Ensure all tank caps and covers are installed properly to prevent water from entering.
- Monitor water content of the fuel regularly (Bonds with water, creating acids).
- Limit the storage tanks from extreme temperatures (i.e. Direct sun or frost).
- Limit the storage to under 1 year due to shelf life (degrades quickly, microbes, oxidation).
- Wash down spills with clean water immediately to prevent corrosion and damage to paint.
- Fuel filter may need to be replaced more often due to premature plugging.
- Check engine oil sump level daily prior to starting, a rising level may indicate lubricating oil dilution. This check is important for all engines and even more critical for engines equipped with rotary fuel injection pumps.
- Instability resulting from blending biodiesel with mineral diesel fuel.
- Consult your fuel supplier for additives to improve storage and performance of biodiesel fuels.

Blending biodiesel fuel above a 5% concentration could have some adverse affects to the engine, such as:

- Power loss and deterioration of performance
- Fuel leakage through seals and hoses
- Corrosion of fuel injection equipment
- Lubricity of biodiesel and the fuel injection equipment
- Coked/blocked injector nozzles, leading to poor atomization of fuel
- Filter plugging
- Lacquering/seizure of internal injection system components
- Sludge and sediments
- Reduced service life

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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, Canada, and the European Union require sulfur content less than 0.05%.

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

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.

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Section 02
Repair and Adjustments

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