

Workshop manual

John Deere Diesel engines Powertech 4.5L and 6.8L Level 11 Fuel systems with Denso HPCR

POWERTECH[®] 4.5L & 6.8L Diesel Engines

Level 11 Electronic Fuel System With Denso HPCR

TECHNICAL MANUAL *POWERTECH*[®] 4.5 L & 6.8 L Diesel Engines—Level 11 Electronic Fuel System with Denso HPCR

CTM220 21JAN04 (ENGLISH)

For complete service information also see:

POWERTECH[®] 4.5 L and 6.8 L Diesel

Engines—Base Engine CTM104

Alternators and Starter Motors CTM77

OEM Engine Accessories CTM67 (English Only)

John Deere Power Systems

LITHO IN U.S.A.

Introduction

Forward

This manual 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 (CTM220) covers only Level 11 Electronic Fuel System with the Denso High Pressure Common Rail (HPCR). It is one of six volumes on 4.5 L and 6.8 L engines. The following five companion manuals cover the base engine, mechanical fuel system, and other electronic control systems. Each manual covers repair, operation, and diagnostics.

- CTM104—Base Engine
- CTM170—Level 4 Electronic Fuel System with Bosch VP44 Pump
- CTM207—Mechanical Fuel Systems
- CTM284—Level 1 Electronic Fuel System with Delphi (Lucas) DP201 Pump
- CTM331—Level 12 Electronic Fuel System with Stanadyne DE 10 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 summaries of the upcoming 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.

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A John Deere ILLUSTRATION® Manual

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admin@servicemanualperfect.com**

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01

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 -JUN-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 -JUN-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 -JUN-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

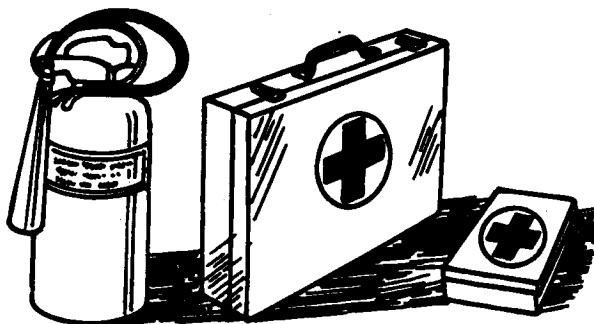
DX,SPARKS -19-03MAR93-1/1

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

! **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.

! **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.

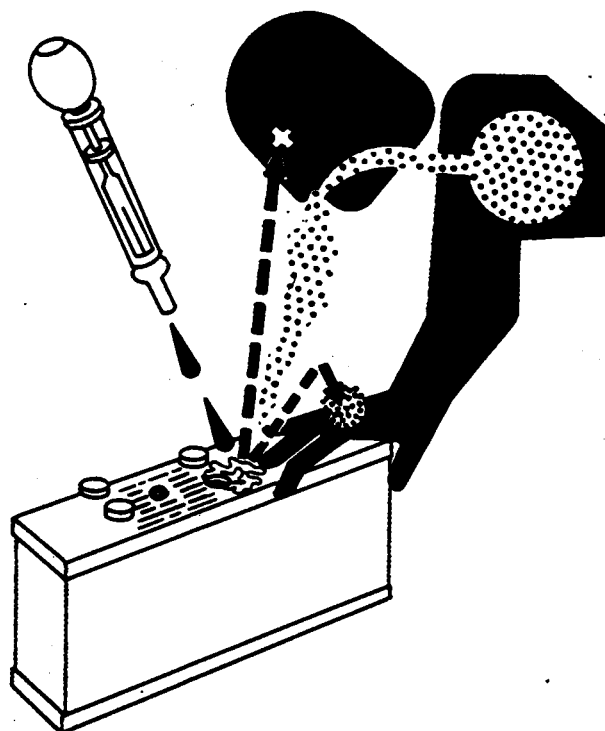
If you spill acid on yourself:

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.**



TS204 -UN-23AUG88

TS203 -UN-23AUG88

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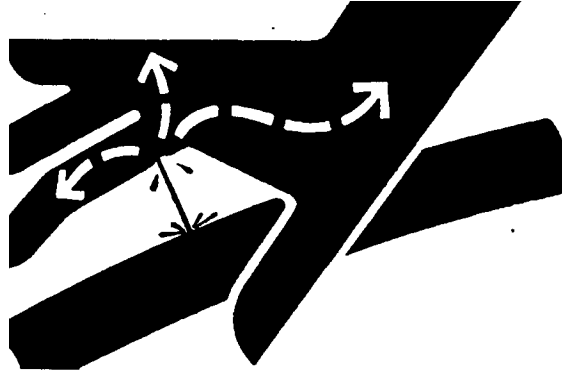
Avoid High-Pressure Fluids

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

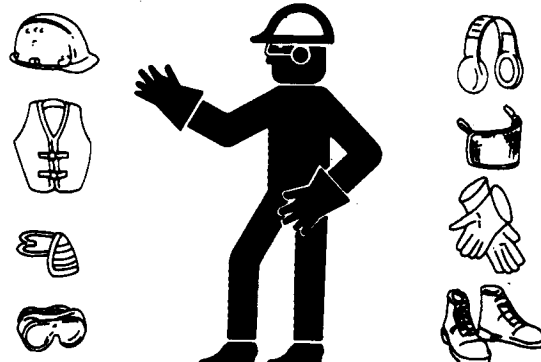
Wear Protective Clothing

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.



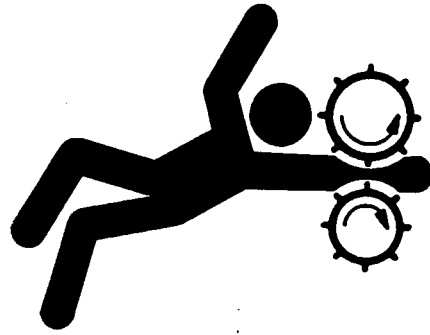
TS206 -UN-23AUG88

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.



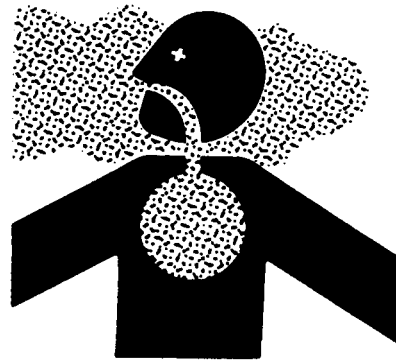
DX,LOOSE -19-04JUN90-1/1

TS228 -JUN-23AUG88

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



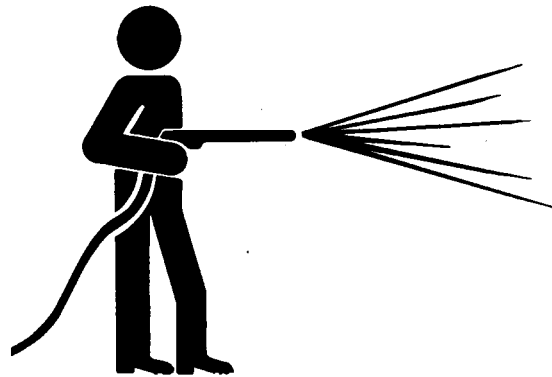
DX,AIR -19-17FEB99-1/1

TS220 -JUN-23AUG88

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.



DX,CLEAN -19-04JUN90-1/1

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Remove Paint Before Welding or Heating

Avoid potentially toxic fumes and dust.

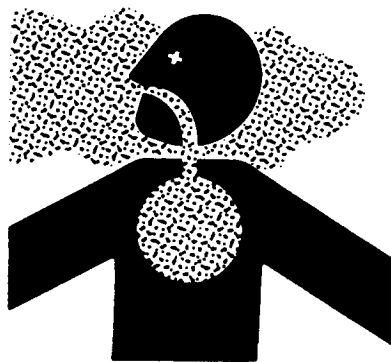
Hazardous fumes can be generated when paint is heated by welding, soldering, or using a torch.

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.

Dispose of paint and solvent properly.



TS220 -UN-23AUG88

DX,PAINT -19-22OCT99-1/1

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

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.



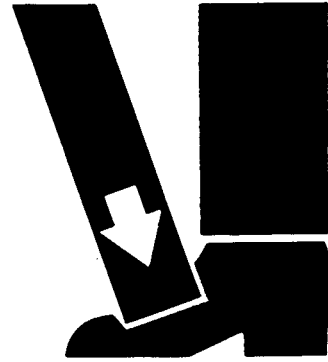
TS223 -UN-23AUG88

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.



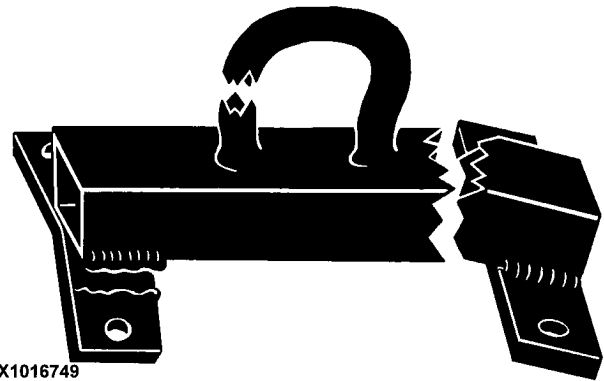
TS226 -JUN-23AUG88

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.



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Construct Dealer-Made Tools Safely

DPSG,OUO1004,899 -19-19MAY99-1/1

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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

Dispose of Waste Properly

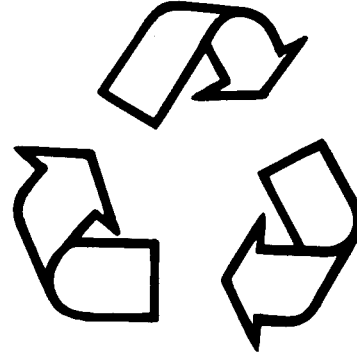
Improperly disposing of waste can threaten the environment and ecology. Potentially harmful waste used with John Deere equipment include such items as oil, fuel, coolant, brake fluid, filters, and batteries.

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—4045 and 6068 Engines

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

4045TF275 Engine

4 Number of cylinders
 4.5 Liter displacement
 T Aspiration code
 F User code
 275 *POWERTECH*[®] application code

Aspiration Code

D Naturally aspirated
 T Turbocharged, no aftercooling
 A Turbocharged and Air-to-Coolant Aftercooled
 H Turbocharged and Air-to-Air Aftercooled

User Factory Code

AT Agritalia srl (Vittoria, Sicily, Italy)
 CQ John Deere Brazil (Horizontina, Brazil)
 DW John Deere Davenport Works (Davenport, Iowa)
 E John Deere Ottumwa Works (Ottumwa, Iowa)
 F OEM (Outside Equipment Manufacturers)
 FF Deere-Hitachi (Kernersville, North Carolina)
 FG Goldoni S.P.A. (Modena, Italy)
 FM Marine Engines
 H John Deere Harvester Works (East Moline, Illinois)
 KV John Deere Commercial Worksite Products (Knoxville, Tennessee)
 L John Deere Werke Mannheim (Germany)
 LA John Deere Werke Mannheim (Germany) (Engines with Bosch VP44 Injection Pump)
 LV John Deere Commercial Products (Augusta, Georgia)
 N John Deere Des Moines Works (Des Moines, Iowa)
 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 (Waterloo, Iowa)
 T John Deere Dubuque Works (Dubuque, Iowa)
 T8 Cameco Industries (Thibodaux, Louisiana)
 TJ Timberjack (Deere) (Sweden/Finland/Canada)
 YC John Deere Jialian Harvester Co. Limited (China)
 Z John Deere WERKE Zweibrucken (Germany)

Application Code

001, etc. See ENGINE APPLICATION CHARTS, later in this Group

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RG40854,0000004 -19-10APR02-1/1

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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:

CD4045T000000

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

Factory Code (Engine Manufacturer)

T0 Dubuque, Iowa
CD Saran, France
PE Torreon, Mexico
J0 Rosario, Argentina

Engine Model Designation

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

Sequential Number

000000 6-digit sequential serial number

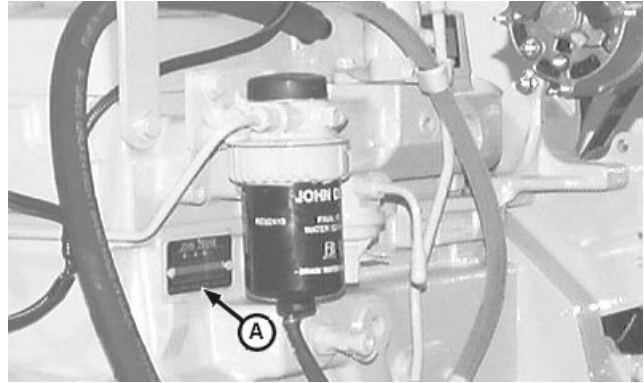
Engine Application Data (C)

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

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

The second line of information on the 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)



Engine Serial Number Plate

RG11816 -UN-15NOV01



Dubuque Engine Serial Number Plate

RG9060 -UN-16MAR98



Saran Engine Serial Number Plate

RG11949 -UN-07NOV01



Torreon Engine Serial Number Plate

RG11948 -UN-06NOV01

OEM Engine Option Code Label

An option code label is secured to the top of the valve cover and identifies the factory installed options on each OEM engine to ensure correct parts acquisition.

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.



RG12027 -UN-03DEC01

RG40854,0000006 -19-10APR02-1/1

Information Relative to Emissions Regulations

Depending on the final destination, engines can meet the emissions regulations according to the US Environmental Protection Agency (EPA), California Air Resources Board (CARB) and for Europe, the Directive 97/68/EC relating the measures against the emissions of particles and gaseous pollutant from internal combustion engines. Such engines are called "CERTIFIED" and receive an emission label stuck on the engine.

The regulations prohibit tampering with the emission-related components listed below which would render that component inoperative or to make any adjustment on the engine beyond published specifications. It is also illegal to install a part or

component where the principle effect of that component is to bypass, defeat, or render inoperative any engine component or device which would affect the engine's conformance to the emission regulations. **To summarize, it is illegal to do anything except return the engine to its original published specifications.**

List of emission-related components:

- Fuel injection system
- Intake manifold
- Turbocharger
- Charge air cooling system
- Piston

RG40854,0000007 -19-10APR02-1/1

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Engine Application Charts

JOHN DEERE AGRICULTURAL EQUIPMENT

Machine Model	Engine Model
Waterloo - Tractors	
7220 Tractor	PE6068HRW61
7320 Tractor	PE6068HRW61
7420 Tractor	PE6068HRW62
7520 Tractor	PE6068HRW62
7720 Tractor	
7820 Tractor	PE6068HRW54 PE6068HRW56

Mannheim - Tractors	
6120	
6220	
6420 Tractor Premium (NA/R11)	CD4045HL473
64XX Tractor Premium (R11) IVT, 40K/50K	CD4045HL474
6520 Tractor Premium (NA/R11)	CD6068HL470
6520L Tractor Premium (NA)	CD4045HL475
6620 Tractor Premium (NA/R11)	CD6068HL471
6820 Tractor Premium (R11)	CD6068HL472
6920 Tractor Premium (R11)	CD6068HL473
69XX Tractor Premium (R11) IVT, 40K/50K	CD6068HL474

Moline - Combines	
9550LP Combine	T06068HH054
9550HP Combine	T06068HH055
9965 Amadas Peanut Combine	PE6068HH057

Zweibrucken - Combines	
9560/9560HM Combine	CD6068HZ070

JOHN DEERE CONSTRUCTION AND FORESTRY EQUIPMENT

Machine Model	Engine Model
Davenport	
624 Loader	PE6068HDW57
670 Motor Grader	PE6068HDW61
672 Motor Grader	PE6068HDW61

JOHN DEERE OEM (OUTSIDE EQUIPMENT MANUFACTURERS)

PE4045HF475
CD4045HF475
PE6068HF475
CD6068HF475