

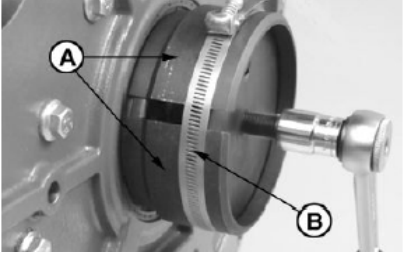
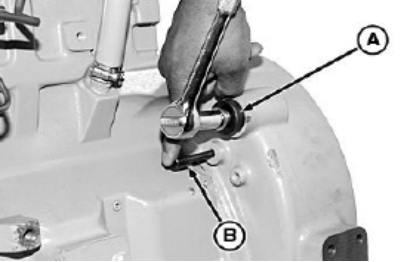
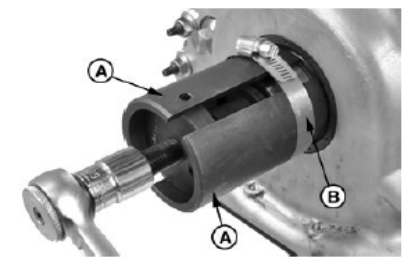
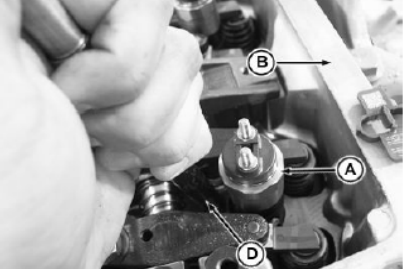
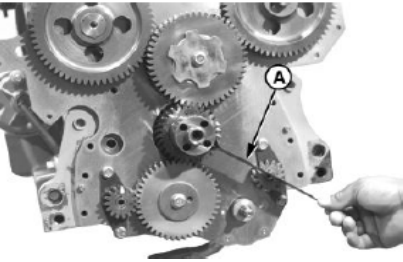
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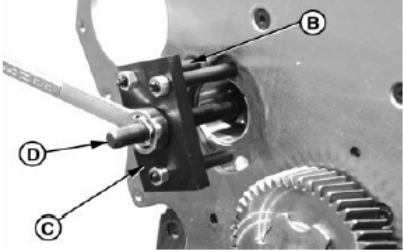
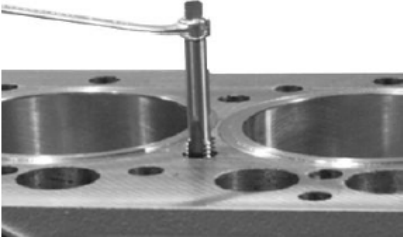
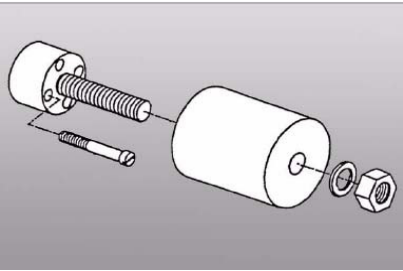
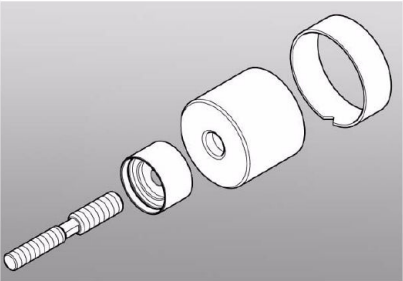
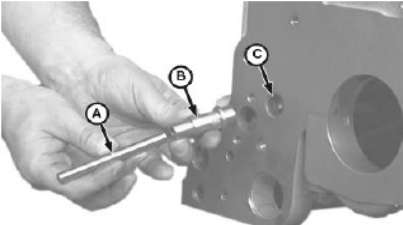



ARION 550-530

Repair manual 01-Engine

SERVICE & PARTS

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|  | <p>JDG11205</p> | <p>00 1147 561 0</p> |
|  | <p>JDE83 JDG820</p> | <p>60 0500 550 1 (4.cyl) 60 0500 552 8 (6.cyl)</p> |
|  | <p>JDG11206</p> | <p>00 1147 384 0</p> |
|  | <p>JDG11186 (D)</p> | <p>00 1147 382 0</p> |
|  | <p>JD254A</p> | <p>00 1135 452 0</p> |

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|  | <p>JDG739B</p> | <p>00 1147 378 0</p> |
|  | <p>JDG680</p> | <p>60 0500 551 7</p> |
|  | <p>JDG954B :</p> <ul style="list-style-type: none"> - JDG954-1 - JDG954-2 | <p>60 0500 553 4</p> |
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|  | <p>JDG1517</p> | <p>60 0500 557 3 (4.cyl)</p> |
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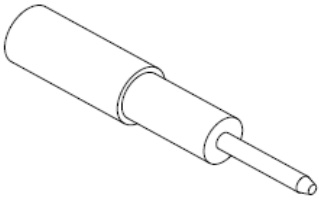
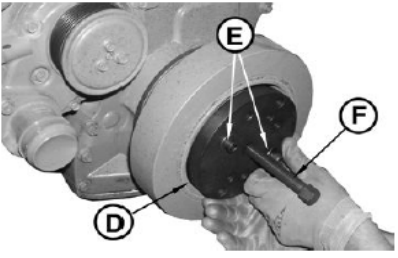
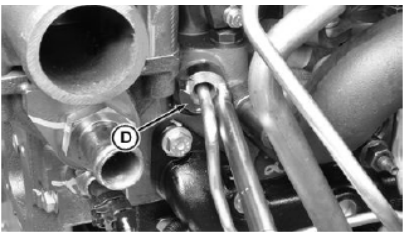
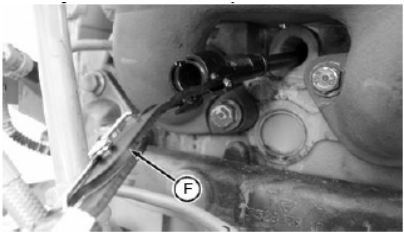
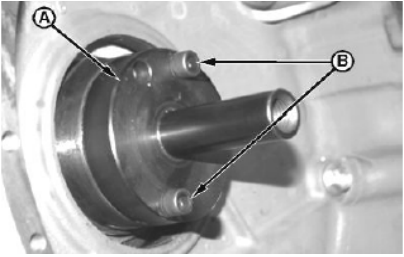
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|  | JDG2074 | 60 0500 559 4 |
|  | JDG11184 | 00 1147 379 0 |
|  | JDG11185 | 00 1147 380 0 |
|  | JT30040B | 00 1147 690 0 |

Introduction

Foreword

This repair manual covers the 4045 <130kW PowerTech™ engines for Interim Tier 4/Stage III B platform.

This manual is written for an experienced technician. Essential tools required in performing certain service work are identified in this manual.

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

⚠ CAUTION: 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.

Information in this manual is organized in sections and sub divided into groups.

Section 01 covers the safety measures to follow while repairing the engine; engine identification features, engine emission and application details, and information about the fuels, lubricants, and coolants.

Section 02 covers the repair and adjustment procedures.

Section 03 explains the theory of operation of each system.

Section 04 is the diagnostics section that provides troubleshooting procedures to find problems.

PowerTech is a trademark of Deere & Company

Section 05 covers other materials needed to do the job.

Section 06 details all specifications, wear tolerances, torque values, and contains the wiring diagrams.

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.

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 component you are working on.

Component Technical Manuals are concise service guides for specific components. Component Technical Manuals are written as stand-alone manuals covering multiple machine applications.

Fundamental service information is available from other sources covering basic theory of operation, fundamentals of troubleshooting, general maintenance, and basic type of failures and their causes.

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.

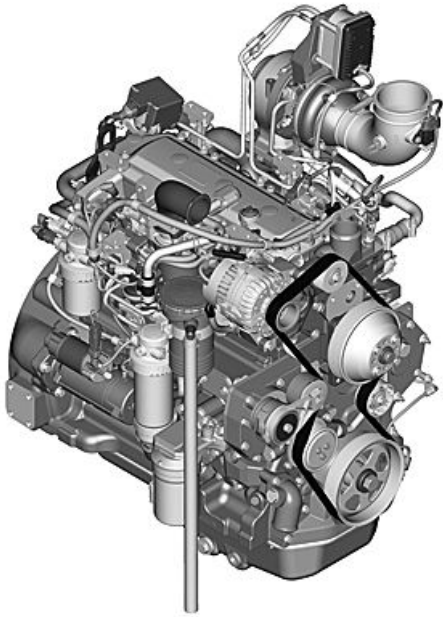
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Record of Changes

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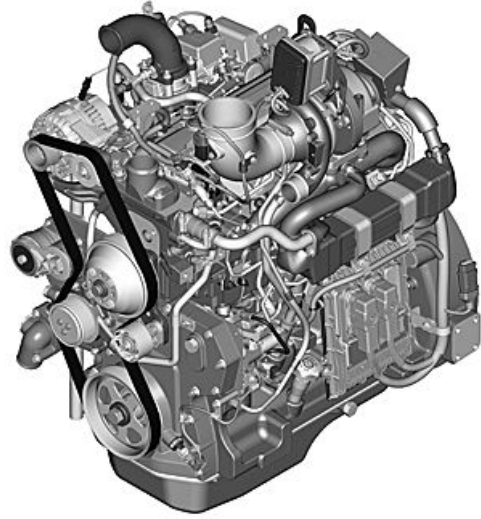
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4045 <130kW PowerTech™ PVX Engine—Interim Tier 4/Stage III B



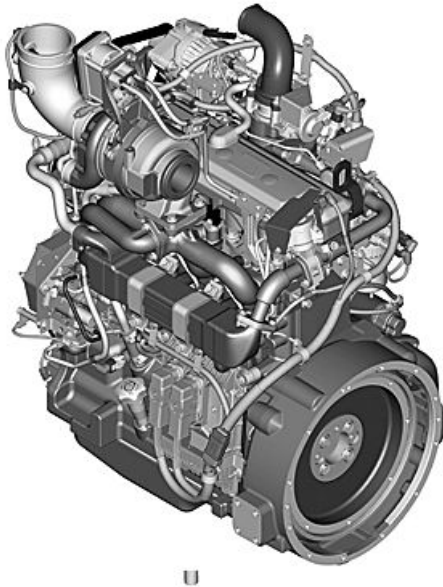
3/4 right front view—4045HFC93 Engine

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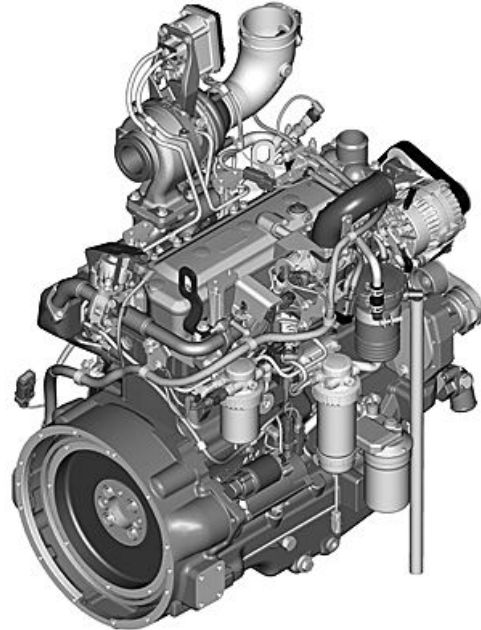
3/4 left front view—4045HFC93 Engine

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3/4 left rear view—4045HFC93 Engine

RG19916 —UN—28JAN11



3/4 right rear view—4045HFC93 Engine

RG19917 —UN—28JAN11

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Definition of Terms

| | |
|-----------------------------------|---|
| Actuator | A device controlled by the ECU to perform a certain function. |
| Analog | Signal which has a continuous range of possible voltages, usually 0 V (low) to 24 V (high). |
| Application | Either a movable or stationary piece of equipment that the engine is placed in. Applications include, Tractors, Harvesters, Loaders, Irrigation Pumps, Generator Sets, and others. |
| BAP | Barometric Air Pressure. Pressure of the atmosphere (atmospheric pressure). |
| Boost | Pressurized air in the intake manifold. |
| CAC | Charge Air Cooler. Cools the compressed air from the turbine before it enters the intake manifold. |
| CAN | Controller Area Network. The network on applications that allows communication between the engine control unit and some components. |
| Circuit Power | Power supplied to a device for use by its internal component circuits. |
| Crankshaft Position Sensor | Used to determine the angular position and velocity of the crankshaft in the 360° field of rotation. |
| Digital | A signal which consists of only two levels of voltage — usually 0 V (low) to 24 V (high). |
| DOC | Diesel Oxidation Catalyst. Part of the exhaust filter or aftertreatment device. Used to help reduce emissions. |
| DPF | Diesel Particulate Filter. Part of the exhaust filter or aftertreatment device. Used to help reduce emissions. |
| DTC | Diagnostic Trouble Code. A code that is stored in ECU memory when it detects a problem in the electronic control system. There are two types of codes: Active and Stored. These codes are displayed on monitor panels and can be recalled by the service tool. |
| ECT | Engine Coolant Temperature. The temperature of the engine coolant. |
| ECU | Engine Control Unit. Computer that controls the fuel, air, and ignition systems on the engine. |
| EGR | Exhaust Gas Recirculation. Used to help reduce emissions. |
| EI | An Electronic Injector that is regulated by the ECU to control the proper amount of fuel on High-Pressure Common rail fuel systems. |
| EOL | This is the abbreviation for End of Line which is where the ECU gets programmed at the factory. |
| EUI | An Electronic Unit Injector that is regulated by the ECU to control the proper amount of fuel on non-High-Pressure Common rail fuel systems. |
| FMI | Failure Mode Identifier. The second part of a two-part code that identifies control system fault codes according to the J1939 standard. This two-digit code identifies the type of failure that has occurred. The first half of the code is the Suspect Parameter Number (SPN). |
| H-Bridge | Circuits in the ECU set up in an H-configuration. This allows for current to be reversed to drive DC motors forward and reverse. |
| HPCR | High-Pressure Common-Rail. A device that distributes high-pressure fuel to the injectors. |
| Input | This identifies a signal as an input to a device or control unit. |
| J1939 | The Society of Automotive Engineers (SAE) standard for communication between the electronic control units on heavy-duty vehicles, both on- and off-highway. |

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Introduction

| | |
|------------------------------|--|
| JDCP | John Deere Custom Performance Program allows the customer to select software features and feature combinations prior to loading the software into the ECU. It is also one way by which embedded software is managed and updated in control units without removal of the control unit from the machine. |
| JDPS | John Deere Power Systems. |
| MAP | Manifold Air Pressure. The pressure of the air in the intake manifold, sometimes referred to as "boost" pressure. |
| MAT | Manifold Air Temperature. The temperature of the air in the intake manifold. |
| Meter Zero | This is the value the multimeter reads in the ohm position, when the meter lead tips are held together. |
| Mis-pin | An incorrect placement of male pins or female sockets within an electrical connector. Also known as an incorrect swapping of wires and terminals. |
| OOR | Out-of-Range. The signal received by the ECU is out of the expected range of the device. |
| OORH | Out-of-Range High. Signal sensed by the ECU is higher than the component can produce (outside of acceptable limit). For some circuit types, this could be caused by an open input wire, an open ground wire, or an input wire shorted to a voltage higher than the ECU expects (+ battery). |
| OORL | Out-of-Range Low. Signal sensed by the ECU is lower than the component can produce (outside of acceptable limits). For some circuit types, this could be caused by an input wire or circuit power wire shorted to ground. |
| Output | This identifies a signal as an output from a device or control unit. |
| Pin | A style of terminal that makes the electrical connection to a connector. Also called a male terminal. |
| PWM | Pulse Width Modulation. A digital electronic signal of a fixed frequency. The on-time of the signal is increased or decreased (modulated) to indicate a change in condition. |
| RAM | Random Access Memory. The portion of the computer memory within the ECU that is used when the ECU is running. All data in this memory is lost when the ECU is "OFF". |
| Socket | A style of terminal that makes the electrical connection to a connector. Also called a female terminal or receptacle. |
| Suction Control Valve | Suction Control Valve regulates the amount of fuel that the high-pressure fuel pump supplies the HPCR. |
| SDS | Software Delivery System. Used by JDPS to maintain software and programming records. |
| Sensor | Device used by the ECU to monitor various engine parameters. |
| SPN | Suspect Parameter Number. The first half of a two-part code that identifies control system fault codes according to the J1939 Standard. The SPN identifies the system or component that has the failure. The second half of the code is the Failure Mode Identifier (FMI). |
| TDC | Top Dead Center. Point of uppermost piston travel. |
| Throttle Rate | How quickly the ECU changes the engine fuel rate in response to a throttle signal. Acceleration and deceleration rates are adjustable. Availability of throttle rates may vary, depending on engine model. |
| Trim Options | Options that can be enabled or disabled in the ECU programming, such as throttle selection, torque adjustment, governor gains, derates, and shutdowns, and others. |
| TWV | Two-Way Valve. A component in the Electronic Injector (EI). |
| VGT | Variable Geometry Turbo. Used to reduce emissions. |
| WIF | Water-In-Fuel. The WIF sensor sends a signal to the ECU when water is detected in the fuel. |

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Section 01 General Information

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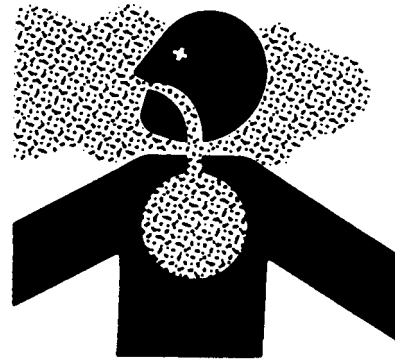
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Avoid Harmful Asbestos Dust

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

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

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



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Keep bystanders away from the area.

DX,DUST -19-15MAR91-1/1

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.



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DX,TORCH -19-10DEC04-1/1

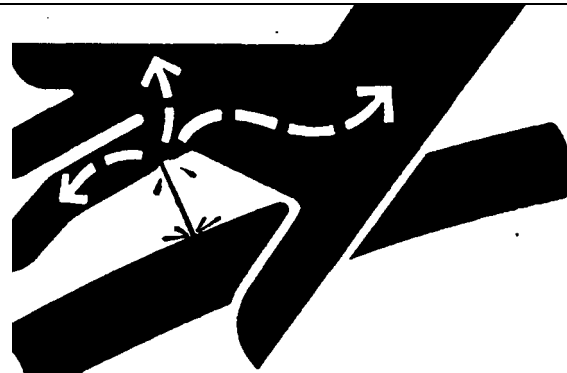
Avoid High-Pressure Fluids

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 in English from Deere & Company Medical Department in



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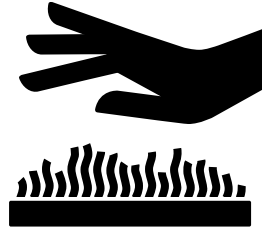
Moline, Illinois, U.S.A., by calling 1-800-822-8262 or +1 309-748-5636.

DX,FLUID -19-20AUG09-1/1

Avoid Hot Exhaust

Servicing machine or attachments with engine running can result in serious personal injury. Avoid exposure and skin contact with hot exhaust gases and components.

Exhaust parts and streams become very hot during operation. Exhaust gases and components reach temperatures hot enough to burn people, ignite, or melt common materials.



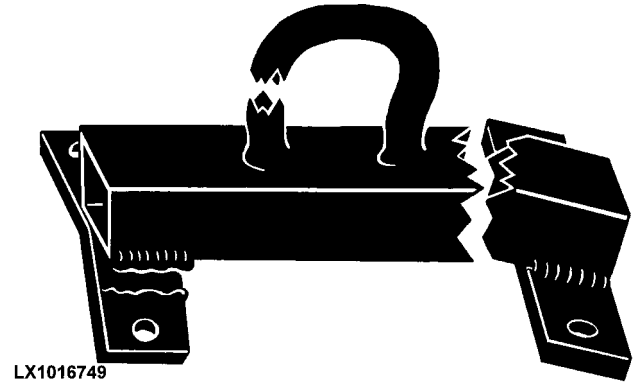
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DX,EXHAUST -19-20AUG09-1/1

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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DX,SAFE,TOOLS -19-10OCT97-1/1

Dispose of Waste Properly

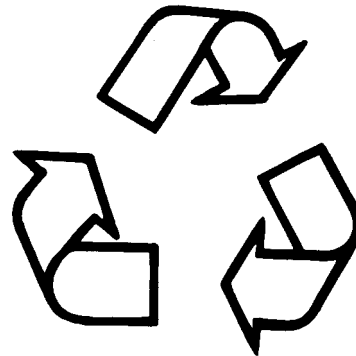
Improperly disposing of waste can threaten the environment and ecology. Potentially harmful waste used with John Deere equipment include such items as oil, fuel, coolant, brake fluid, filters, and batteries.

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

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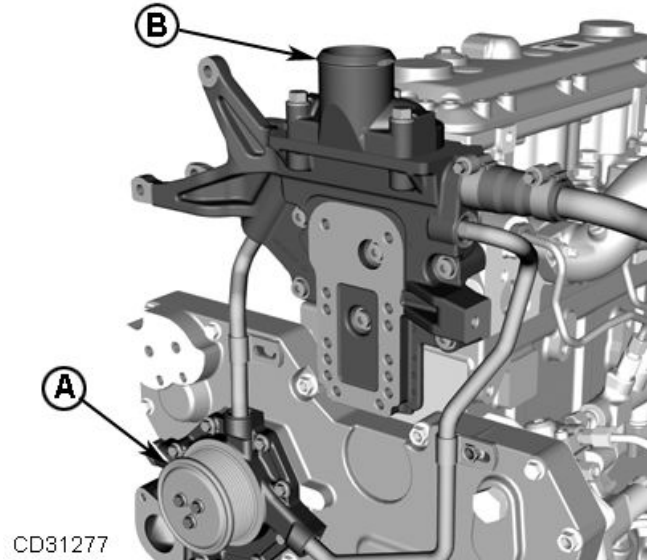
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Check and Service Cooling System

1. Remove debris that has accumulated on or near radiator.
2. Visually inspect entire cooling system and all components for leaks or damage. Repair or replace as necessary.
3. Remove and check thermostat(s). See Thermostat — Testing in Section 02, Group 070.
4. Run engine until it reaches operating temperature. Check entire cooling system for leaks.
5. After engine cools, check coolant level.
6. Check system for holding pressure. See Cooling System Test in Section 04, Group 155.

A—Coolant Pump

B—Thermostat Housing



CD31277

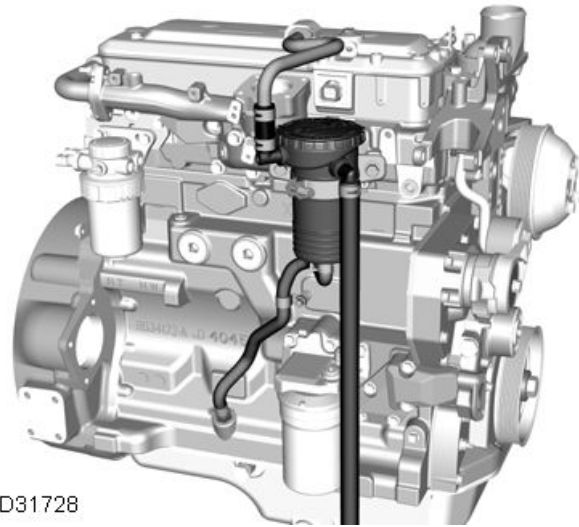
Check Cooling System

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Check Crankcase Vent System

Inspect crankcase ventilation system for restriction. Replace vent filter if necessary. Lack of ventilation causes sludge to form in crankcase. This situation can lead to clogging of oil passages, filters, high crankcase pressure, and screens, resulting in serious engine damage.



CD31728

Crankcase Vent System

CD31728 —JUN—17MAR11

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Check Electrical System

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.

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

1. Clean batteries and cables with damp cloth. If corrosion is present, remove it and wash terminals with a solution of ammonia or baking soda in water. Then flush area with clean water.
2. Coat battery terminals and connectors with petroleum jelly mixed with baking soda to retard corrosion.
3. Test batteries. If batteries are not near full charge, try to find out why.
4. On low-maintenance batteries, check level of electrolyte in each cell of each battery. Level should be to bottom of filler neck. If water is needed, use clean, mineral-free water.



Prevent Battery Explosions

TS204 —UN—23AUG88

If water must be added to batteries more often than every 250 hours, alternator may be overcharging.

NOTE: Water cannot be added to maintenance-free batteries.

5. If batteries appear to be either undercharged or overcharged, check alternator and charging circuit.
6. Check tension of drive belts. See Belt Tensioner — Spring Tension Check in Section 02, Group 070.
7. Check operation of starter motor and instruments.

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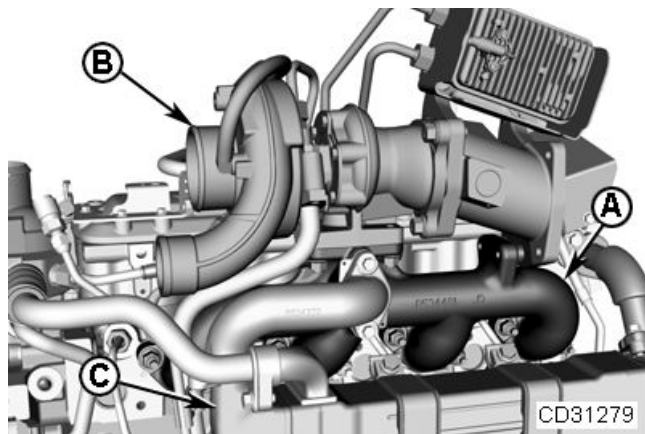
Check Exhaust System

1. Inspect exhaust system for leaks or restrictions. Check manifold for cracks. Repair or replace as necessary.
2. Check that turbocharger-to-exhaust gas recirculator (EGR) cooler, etc, clamps are securely tightened and do not leak.
3. Check exhaust system for evidence of oil leakage past valve stem seals.

Oil in exhaust system may be caused by excessive valve stem-to-guide clearance or excessive light load engine idling.

A—Exhaust Manifold
B—Turbocharger

C—EGR Cooler



Check Exhaust System

CD31279 —UN—17MAR11

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Clean Engine

1. Cap or plug all openings (air intake, exhaust, fuel, coolant, etc.).
2. Remove electrical components (electronic control module-ECM, starter, alternator, etc.). Cover electrical components that are not removed (sensors, wiring harness, ECM connectors, etc.) with plastic and tape securely to prevent moisture damage.

IMPORTANT: Never steam clean or pour cold water on an injection pump while it is still warm. To do so may cause seizure of pump parts. Avoid fuel pumps, injectors, exhaust filter, bearings, belts and hoses, etc.

3. Thoroughly steam clean engine.

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Disconnect Turbocharger Oil Supply Line

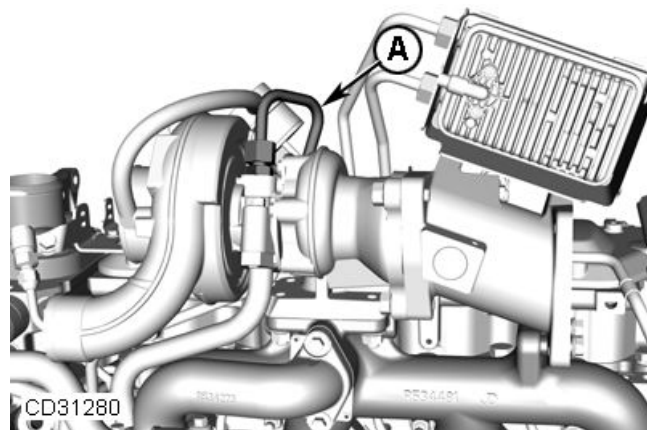
1. Drain all engine oil and coolant, if not previously done.

IMPORTANT: When servicing turbocharged engines on a rollover stand, disconnect turbocharger oil inlet line (A) from oil filter housing or turbocharger before rolling engine over. Failure to do so may cause a hydraulic lock upon starting engine. Hydraulic lock may cause possible engine failure.

Hydraulic lock occurs when trapped oil in the oil filter housing drains through the turbocharger, the exhaust and intake manifolds, and then into the cylinder head.

After starting the engine, the trapped oil in the manifold and head is released into the cylinder(s), filling them with oil, causing hydraulic lock and possible engine failure.

2. Disconnect turbocharger oil inlet line at turbocharger or oil filter housing.



CD31280

Turbocharger Oil Supply Line

A—Turbocharger Oil Supply Line

CD31280—UN—17MAR11

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Engine Break-In Guidelines

Engine break-in should be performed after overhaul or when the following repairs have been made:

- Main bearings, rod bearings, crankshaft, or any combination of these parts have been replaced.
- Pistons, rings, or liners have been replaced.

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Engine Overhaul Guidelines

Engine life and performance will vary depending on operating conditions and the level of regular engine maintenance. Engines can be brought back to original performance standards through proper overhaul procedures and replacement of parts with genuine John Deere service parts. Overhauling the engine prior to failure can avoid costly repairs and downtime.

Consider installing a John Deere overhaul kit when:

- The engine begins to experience power loss and there are no known engine component failures.

- The engine is hard to start due to low cranking compression.
- The engine begins to smoke and there are no known engine component failures.
- The engine begins to use oil. Refer to Section 04 for acceptable oil consumption.
- The engine has high usage hours and the owner wants to take preventive measures to avoid high-cost repairs and costly downtime.

Overhaul kits may be available for John Deere engines in your area.

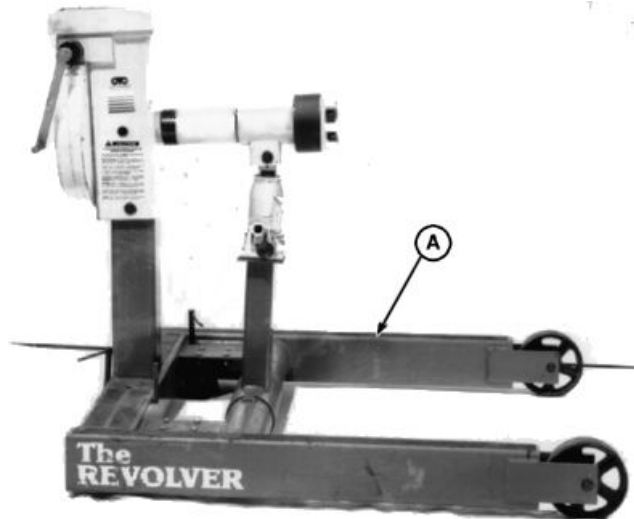
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Engine Repair Stand

NOTE: Only the 2722 kg (6000 lb) heavy duty engine repair stand (A) No. D05223ST manufactured by Owatonna Tool Co., Owatonna, Minnesota, is referenced in this manual. When any other repair stand is used, consult the manufacturer's instructions for mounting the engine.

Refer to machine technical manual for steps to remove engine from machine.

A—D05223ST Engine Repair Stand



Engine Repair Stand

PU00210,00000C3 -19-18MAR09-1/1

General Tune-Up Recommendations

As a general rule, an engine tune-up is not necessary if ALL recommended operator's manual hourly service procedures are performed on schedule. If your engine performance is not within the rated application guidelines, the following service procedures are recommended to help restore engine to normal operating efficiency.

IMPORTANT: Engines are equipped with electronically-controlled fuel systems

that have a diagnostic feature that will display detailed codes to alert operator of specific performance problems. Refer to the **DIAGNOSTICS** Section in this manual for diagnostic code troubleshooting procedures on electronically controlled fuel systems.

Operation

Detailed Reference

| | |
|---|-------------------------------|
| Change engine oil and filters. | Operator's Manual |
| Lubricate PTO clutch internal levers and linkage, if equipped. | Operator's Manual |
| Replace fuel filter. | This Manual/Operator's Manual |
| Clean crankcase vent tube. | This Manual/Operator's Manual |
| Check air intake system. Replace air cleaner elements. | This Manual/Operator's Manual |
| Check exhaust system. | This Manual |
| Check and service engine cooling system. | This Manual/Operator's Manual |
| Check and adjust fan and alternator belts. | Operator's Manual |
| Check electrical system. | This Manual |
| Check crankshaft vibration damper. | This Manual/Operator's Manual |
| Check fuel injection system. | This manual |
| Check engine oil pressure. Correct as necessary. | This manual |
| Check engine valve clearance. Adjust if necessary. | This manual |
| Check engine speeds. Correct as necessary. | Authorized Servicing Dealer |
| Check fuel quality. | Operator's Manual |

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Install Adapters on Repair Stand

Tools:

- No special tools required

Consumables:

- No consumables

1. Attach the D05226ST Special Adapter (B) to mounting hub (A) of the engine repair stand, using SAE Grade 8 socket head cap screws (D), to the following specifications.

Specification

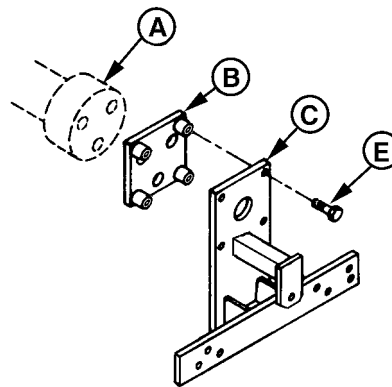
D05226ST Special
 Adapter-to-Mounting Hub
 SAE Grade 8 Socket
 Head Cap Screws.
 —Torque..... 600 N·m (443 lb-ft).

2. Attach the 62835¹ Engine Adapter (C) to the special adapter, using four M12 Class 10.9 caps screws (E), to the following specifications.

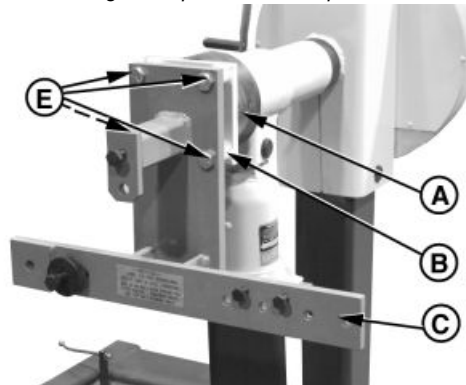
Specification

62835¹ Engine
 Adapter-to-Special
 Adapter M12 Class 10.9
 Cap Screws.—Torque..... 135 N·m (100 lb-ft).

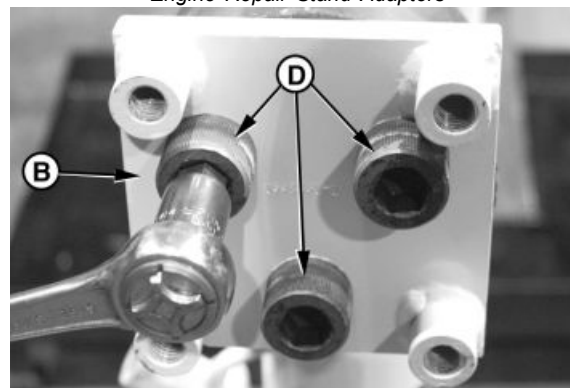
- | | |
|-----------------------------------|---------------------------------|
| A—Mounting Hub | D—Socket Head Cap Screws |
| B—D05226ST Special Adapter | E—Cap Screws |
| C—62835 Engine Adapter | |



Engine Repair Stand Adapters



Engine Repair Stand Adapters



Engine Repair Stand Adapters

¹Part of JT07268 Engine Repair Stand Adapter Kit

Lifting Procedure

CAUTION: The only recommended method for lifting the engine is with JDG23 Engine Lifting Sling and safety approved lifting straps that come with engine. Use extreme caution when lifting and NEVER permit any part of the body to be positioned under an engine being lifted or suspended.

NOTE: If engine lifting straps are misplaced, they can be procured through service parts.

1. Install lifting straps and tighten cap screws to the following specifications.

Specification

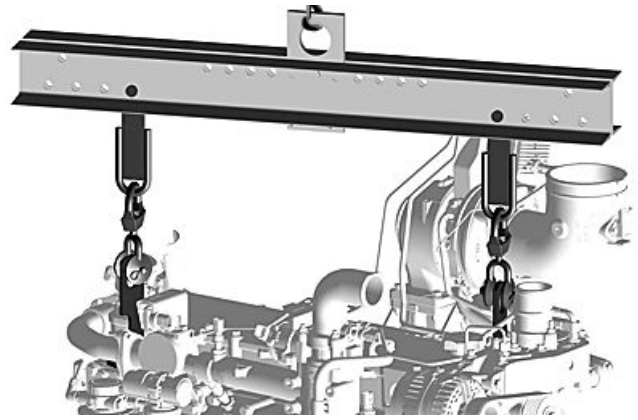
Engine Lifting Strap Cap
Screws—Torque..... 125 N·m (92 lb·ft)

IMPORTANT: Lift engine with longitudinal loading on lifting sling and lifting brackets only. Angular loading greatly reduces lifting capacity of sling and brackets.

Lift spacing on sling is adjustable. Position each lifting point so that engine hangs level when lifted.

2. Attach the JDG23 Engine Lifting Sling to engine lifting straps and overhead hoist or floor crane.

Lifting straps are designed to lift the engine and small accessories, such as hydraulic pumps and



Lifting Engine with Lifting Sling

RG20087—UN—28FEB11

air compressors mounted to the engine auxiliary gear drive, or belt-driven components, such as air conditioning compressors and alternators. If larger components, such as PTOs, transmissions, generators, structural oil pan, or air compressors, are attached to other locations on the engine, the lifting straps provided with the engine are not intended for this purpose. Technician is responsible for providing adequate lifting devices under these situations. See machine technical manual for additional information on removing engine from machine.

NOTE: Use of an engine lifting sling (as shown) is the ONLY APPROVED method for lifting engine.

3. Carefully lift engine and slowly lower to desired location.

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