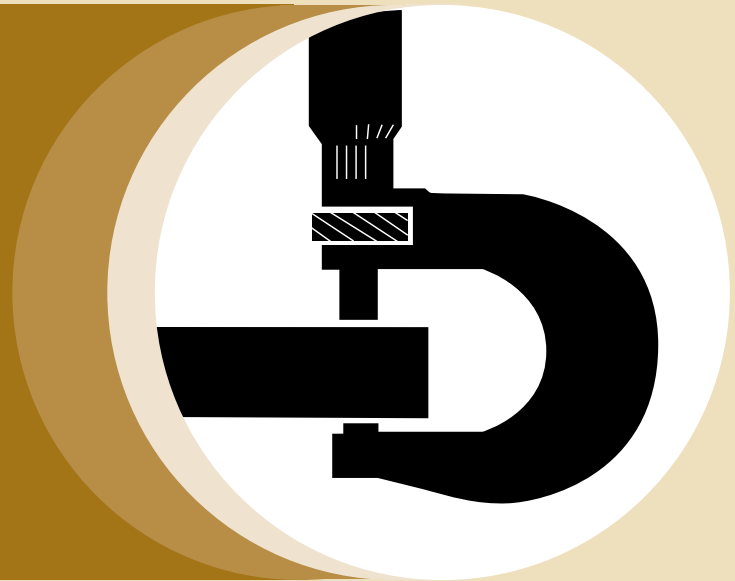


# POWERTECH<sup>®</sup> 8.1 L Diesel Engines

## Base Engine

### COMPONENT TECHNICAL MANUAL



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CTM86 (20MAR01)

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# Introduction

## Foreword

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 (CTM86) covers only the base engine. It is one of five volumes on 8.1 L engines. The following four companion manuals cover fuel system repair and diagnostics:

- CTM243—Mechanical Fuel Systems
- CTM134—Level 3 Electronic Fuel Systems
- CTM255—Level 9 Electronic Fuel Systems
- CTM68—Electronic Injection Fuel Systems

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

A set of all manuals covering the 8.1 L engines, except CTM68, can be obtained by purchasing CTM450 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 the introduction identifies engine-models/applications. See the machine technical manual for information on engine removal and installation, and gaining access to engine components.

Information is organized in sections and groups for the various components requiring service instruction. At the end of the book are summary listings of all

applicable essential tools, service equipment, and other materials needed to do the job, service parts kits, specifications, wear tolerance, and torque values.

Before beginning repair on an engine, clean the engine and mount on a repair stand. (See CLEAN ENGINE in Group 010 and see MOUNT ENGINE ON REPAIR STAND in Group 010..)

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 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.

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 types 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.**

## John Deere Dealers

The changes listed below make your CTM obsolete. Repair, operation, and diagnostics are now covered in five manuals. **Discard CTM86 dated 06JUL99 and replace with the following new manuals:**

- CTM86—Base Engine
- CTM243—Mechanical Fuel Systems
- CTM134—Level 3 Electronic Fuel Systems
- CTM255—Level 9 Electronic Fuel Systems
- CTM68—Electronic Fuel Injection Systems

Also, copy these pages and route through your Service Department.

### SECTION 01, GROUP 001 (Engine Identification)

- Updated engine model designation chart.
- Updated engine application charts.

### SECTION 01, GROUP 002 (Fuels, Lubricants, and Coolants)

- Updated engine oil and coolant application guidelines.

### SECTION 02, GROUP 010 (Engine Rebuild)

- Updated engine disassembly sequence.
- Updated engine assembly sequence.
- Updated sealant application guidelines.

### SECTION 02, GROUP 020 (Cylinder Head and Valves Repair and Adjustment Serial Number (—199,999))

- Repair procedures for cylinder head and valves on engines with serial number (—199,999) are covered in this group.

### SECTION 02, GROUP 021 (Cylinder Head and Valves Repair and Adjustment Serial Number (200,000—))

- Repair procedures for cylinder head and valves on engines with serial number (200,000—) are covered in this group.

### SECTION 02, GROUP 050 (Camshaft and Timing Gear Train Repair and Adjustment)

- Eliminated procedure to check valve lift. Use appropriate procedure from Group 020 or Group 021.
- Revised specifications for installation of crankshaft gear-driven auxiliary drive.
- Revised procedure for installation of thrust washer and timing gear cover.

### SECTION 02, GROUP 060 (Lubrication System Repair and Adjustment)

- Added information for top-load oil filter.

### SECTION 02, GROUP 070 (Cooling System Repair and Adjustment)

- Added belt routing diagrams.
- Revised procedure for installation of coolant pump.

### SECTION 02, GROUP 080 (Air Intake and Exhaust System Repair and Adjustments)

- Revised procedure for turbocharger inspection techniques.
- Eliminated procedure for adjusting turbocharger wastegate actuator.
- Revised specifications for installing turbocharger.

### SECTION 02, GROUP 090 (Fuel System Repair and Adjustments)

*NOTE: Repair procedures for fuel systems have been moved to Section 02, Group 090 in the three following technical manuals:*

- CTM243—Mechanical Fuel Systems
- CTM134—Level 3 Electronic Fuel Systems
- CTM255—Level 9 Electronic Fuel Systems

### SECTION 02, GROUP 100 (OEM Starting and Charging Systems)

- Starting and charging systems are covered in this new group.

### **SECTION 03, GROUP 120 (Base Engine Operation)**

- Base engine theory of operation is covered in this new group.

*NOTE: Fuel system theory of operation has been moved to Section 03 in the three following technical manuals:*

- *CTM243—Mechanical Fuel Systems*
- *CTM134—Level 3 Electronic Fuel Systems*
- *CTM255—Level 9 Electronic Fuel Systems*

### **SECTION 04, GROUP 150 (Observable Diagnostics and Tests)**

- Base engine observable diagnostics and tests are covered in this new section/group.

*NOTE: Fuel system diagnostics and testing has been moved to Section 04 in the three following technical manuals:*

- *CTM243—Mechanical Fuel Systems*
- *CTM134—Level 3 Electronic Fuel Systems*
- *CTM255—Level 9 Electronic Fuel Systems*

### **SECTION 05 (Tools and Other Materials)**

- All essential tools, service tools, dealer fabricated tools, and other materials listed throughout this manual are consolidated in this section for ease of reference.

### **SECTION 06 (Specifications)**

- All repair, test, and diagnostic specifications listed throughout this manual are consolidated in this section for ease of reference.
- Updated bolt and cap screw torque values.
- Updated General OEM specifications.
- Updated dynamometer specifications.
- Updated turbocharger boost specifications

## About this Manual

This component technical manual (CTM) covers the base engine for *POWERTECH*<sup>®</sup> 8.1 L (494 cu. in.) diesel engines produced in Waterloo, Iowa.

**This manual is a complete revision of CTM86 (06JUL99).** Replace earlier manual with the following new manuals:

- CTM86 — *POWERTECH*<sup>®</sup> 8.1 L Diesel Engines—Base Engine
- CTM243 — *POWERTECH*<sup>®</sup> 8.1 L Diesel Engines—Mechanical Fuel Systems
- CTM134 — *POWERTECH*<sup>®</sup> 6.8 L & 8.1 L Diesel Engines—Level 3 Electronic Fuel Systems with Bosch In-Line Pump
- CTM255 — 8.1 L Diesel Engines—Level 9 Electronic Fuel Systems with Denso In-Line Pump
- CTM68 —Electronic Fuel Injection Systems

Direction of engine crankshaft rotation in this manual is referenced facing the flywheel looking toward the fan. Front of engine is fan drive end.

Read each procedure completely before performing any service.

**IMPORTANT: For repair, diagnostics, and testing procedures on the fuel system, refer to the companion manuals:**

- **CTM243 — *POWERTECH*<sup>®</sup> 8.1 L Diesel Engines—Mechanical Fuel Systems**
- **CTM134 — *POWERTECH*<sup>®</sup> 6.8 L & 8.1 L Diesel Engines—Level 3 Electronic Fuel Systems with Bosch In-Line Pump**
- **CTM255 — 8.1 L Diesel Engines—Level 9 Electronic Fuel Systems with Denso In-Line Pump**
- **CTM68 —Electronic Fuel Injection Systems**



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for your reading.  
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to get more information.