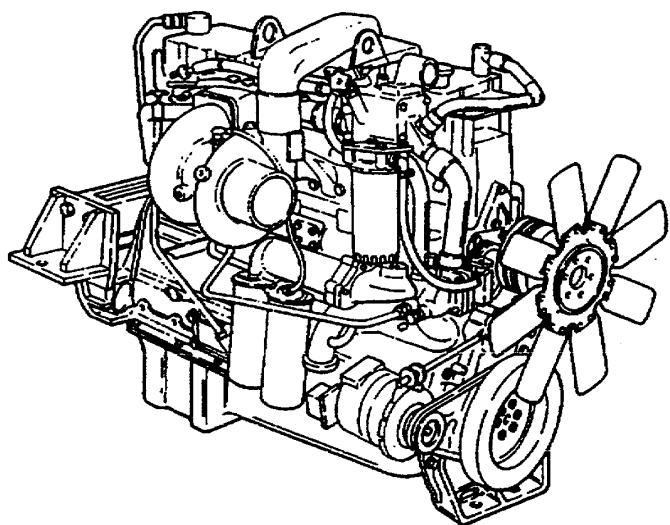


Supersedes TM 9-2815-225-34&P-1, TM 9-2815-225-34&P-2,
TM 9-2815-222-34&P and all changes.

**DIRECT SUPPORT AND GENERAL SUPPORT (DS/GS)
MAINTENANCE MANUAL INCLUDING
REPAIR PARTS AND SPECIAL TOOLS LIST (RPSTL)
FOR**

**ENGINE, DIESEL: 6 CYLINDER
IN-LINE, TURBOCHARGED,
CUMMINS MODEL NTC-400
M915-M920 AND
M915A4*/BIG CAM I
(NSN 2815-01-082-8125)
M915A1 AND M915A4*/BIG CAM III
(NSN 2815-01-142-2745)**



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BIG CAM II SHOWN

*** M915A4 TRUCKS WILL BE EQUIPPED WITH
EITHER BIG CAM I OR BIG CAM III ENGINES**

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**HEADQUARTERS, DEPARTMENT OF THE ARMY
AUGUST 2001**

DIRECT SUPPORT AND GENERAL SUPPORT (DS/GS)
MAINTENANCE MANUAL INCLUDING
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FOR
ENGINE, DIESEL: 6 CYLINDER IN-LINE,
TURBOCHARGED, CUMMINS MODEL NTC-400
M915-M920/BIG CAM I (NSN 2815-01-082-8125)
M915A1/BIG CAM III (NSN 2815-01-142-2745)

REPORTING ERRORS AND RECOMMENDING IMPROVEMENTS

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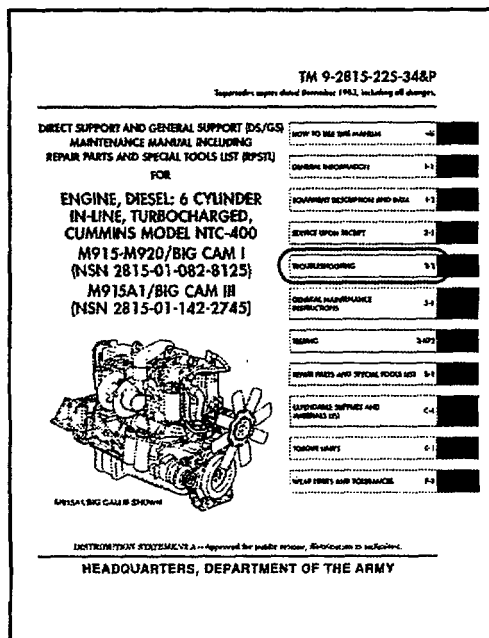
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HOW TO USE THIS MANUAL

ABOUT YOUR MANUAL

Maintenance tasks in this manual are written in sequence for the complete disassembly of the engine. They can also be used in conjunction with troubleshooting to repair a specific engine component or part without performing a complete engine overhaul. In either event, always refer to the maintenance record (or attached instructions if the engine arrives for repair in a container). This will prevent any unnecessary work on your part. Follow the steps listed below under "Using Your Manual" to become familiar with how to use this book.

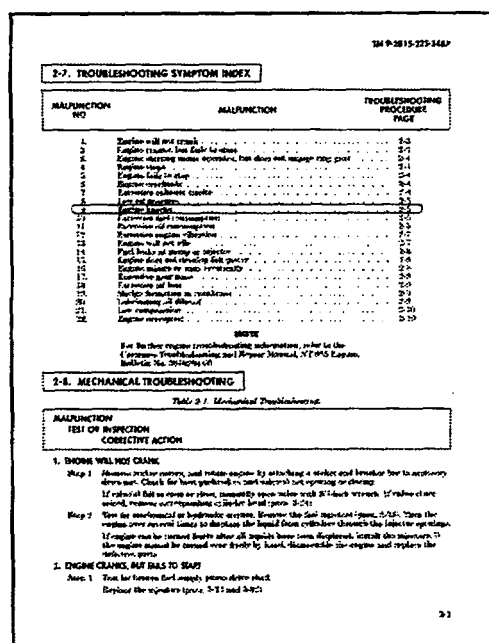
USING YOUR MANUAL



Task: The operator of an M915 series vehicle has complained the engine knocks under a load, and the vehicle has been assigned to you for repair.

TROUBLESHOOTING STEPS:

1. Look at the cover of this manual. You'll see chapter/section titles listed from top to bottom on the right-hand side.
2. Look at the right edge of the manual. On some of the pages you'll see black bars (edge indicators) that are aligned with the chapter/section bars on the cover. These are the locations of the chapters/section in the text.
3. Look for "TROUBLESHOOTING" in the chapter/section list on the cover.
4. Turn to those pages with the edge indicator matching the black bar for TROUBLESHOOTING. Page numbers are also listed next to chapter/section titles.
5. One of the first pages having the mechanical systems troubleshooting edge indicators is the "TROUBLESHOOTING SYMPTOM INDEX."
6. Look down the list until you find "ENGINE KNOCKS."
7. Turn to the page indicated: 2-5.



8. On page 2-5, steps/tests relating to resolving the problem of "Engine Knocks" are listed:

Step 1. You check for a possible damaged piston.

Step 2. During your inspection you discover that a piston is damaged. The part must be replaced. Chapter 3, paras. 29 and 69, are referenced.

9. Before turning to paras. 3-29 and 3-69, turn to chapter 3, section I, "GENERAL MAINTENANCE INSTRUCTIONS," and review the guidelines to be followed during maintenance of engine (paras. 3-2 through 3-10).

10. Because replacement of a piston is extensive, refer to chapter 3, section II, "DISASSEMBLY." Find "Piston, Connecting Rod, and Bearings Removal" in the task summary (para. 3-12.)

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Table 2-5. Methods of Troubleshooting (Cont.)

Malfunction	Test or Inspection	Corrective Action
None	Step 1. Check for loose or worn timing belt.	Adjust or replace timing belt (para. 3-25).
None	Step 2. Check for incorrect valve timing.	Adjust valve timing (para. 3-25).
B. LOW OIL PRESSURE		
None	Step 1. Check pressure regulator.	Adjust or replace pressure regulator (para. 3-13 and 3-14).
None	Step 2. Check for worn mainshaft bearings.	Replace worn mainshaft bearings (para. 3-14).
None	Step 3. Inspect oil pump pickup.	Replace oil pump pickup (para. 3-14).
None	Step 4. Check for worn camshaft.	Replace worn camshaft (para. 3-14).
None	Step 5. Check for worn mainshaft.	Replace worn mainshaft and install new bearings (para. 3-14).
None	Step 6. Inspect main bearings.	Replace worn bearings (para. 3-14).
None	Step 7. Inspect connecting rod bearings.	Replace worn connecting rod bearings (para. 3-14).
None	Step 8. Inspect oil pump pump.	Replace oil pump (para. 3-14 and 3-15).
None	Step 9. Check for high oil resistance.	Inspect and clean oil filter (para. 3-15).
None	Step 10. Check for worn main bearings, connecting rod bearings, and mainshaft. Install new bearings and check resistance (para. 3-14 and 3-15).	
C. ENGINE KNOCKS		
None	Step 1. Check for broken piston.	Replace piston (para. 3-29 and 3-69).
None	Step 2. Check for broken connecting rod.	Replace connecting rod (para. 3-69).
None	Step 3. Check for incorrect valve adjustment.	Adjust valve (para. 3-25).
None	Step 4. Check for incorrect timing adjustment.	Adjust timing (para. 3-25).
None	Step 5. Check for loose connecting rod cap screws.	Tighten connecting rod cap screws (para. 3-69).
None	Step 6. Check for worn connecting rod bearings.	Replace worn connecting rod bearings (para. 3-14, 3-15, and 3-16).

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3-12. TASK SUMMARY (Cont.)

Task	Procedures	Task Para.	Equipment/Tools (See MO, PARA.)
12. Disassemble Piston and Connecting Rod		3-12	3-4
13. Remove Connecting Rod and Bearings for Removal		3-13	3-4
14. Install New Bearings		3-14	3-4
15. Remove Connecting Rod and Main Bearings for Removal		3-15	3-4

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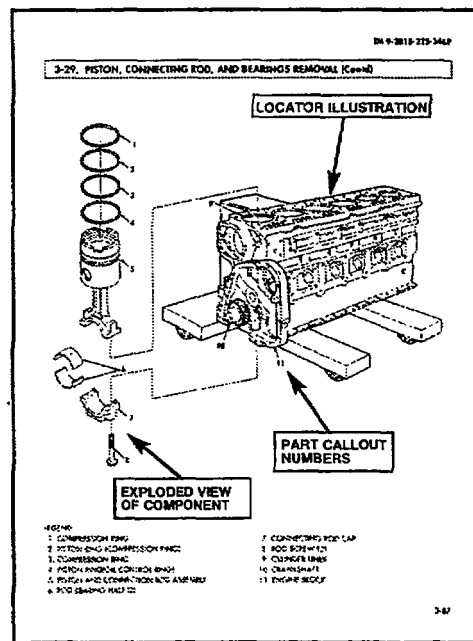
3-29. PISTON, CONNECTING ROD, AND BEARINGS REMOVAL

THIS TASK COVERS:
Removal

INITIAL SETUP:	REFERENCES (TM)
APPLICABLE MODELS: All	None
SPECIAL TOOLS: Torque wrench (34-141) (34-142) Piston ring compressor (16-036-255-253)	TROUBLESHOOTING REFERENCES: None
TEST EQUIPMENT: None	EQUIPMENT CONDITION: Connectors and case disconnects removed - para. 3-25.
MATERIALS/PARTS (P/N): Cush, cover - Applicable C, Series 4-	SPECIAL ENVIRONMENTAL CONDITIONS: Work area clean and away from blowing dirt and dust.
PERSONNEL REQUIRED: One Automotive Technician (OATIS-101)	GENERAL SAFETY INSTRUCTIONS: 1) Piston case must be made of steel making sure break for drawing.

LOCATION/ITEM	ACTION	REMARKS
Removal	WARNING: One protection must be worn when using the cleaning machine to do so may result in injury or equipment. NOTE: The task covers removal of the piston, connecting rod, and bearing assembly. Removal of the connecting rod assembly is the same. Parts are not interchangeable and must be identified with each assembly as it is removed. 1. Engine block (1): a. Place in vertical position with rear of block down. b. Using a torque wrench break out disassembly flange (1) and remove flange (1) and nut (2). c. Remove nut (2) and washer (3) and discard. 2. Piston and connecting rod (1): a. Remove nut (4) and washer (5) and discard. b. Using a torque wrench break out disassembly flange (6) and remove flange (6) and nut (7). c. Remove nut (7) and washer (8) and discard. 3. Piston and connecting rod (1): a. Remove nut (9) and washer (10) and discard. b. Using a torque wrench break out disassembly flange (11) and remove flange (11) and nut (12). c. Remove nut (12) and washer (13) and discard.	Use torque wrench to remove bolts from case (1) and (2).

3-86



11. Turn to para. 3-29 on page 3-89. Here you find the detailed procedure for removing the piston, connecting rod, and bearings.

DETAILED MAINTENANCE PROCEDURES:

12. Detailed procedures: Include everything you must do to accomplish a basic maintenance task.
- Before beginning the maintenance task, look through the procedure. You must familiarize yourself with the entire maintenance procedure before beginning the maintenance task. The entire procedure of para. 3-29, "Piston, Connecting Rod, and Bearings Removal," include the task REMOVAL under the heading "THIS TASK COVERS."
 - The ten basic headings listed under "INITIAL SETUP" outline the task conditions, materials, manpower requirements, and special conditions or tools. They are:
 - Applicable Models: Any models that require that particular maintenance task.
 - Special Tools: Those special tools required to finish a maintenance task. The use of common tools is not explained.
 - Test Equipment: Test equipment required to complete a task.
 - Materials/Parts: All materials or parts required to complete a task.
 - Personnel Required: The number and type of personnel needed to accomplish a task.
NOTE: If you think an assistant will be necessary to correctly or safely complete a task (perhaps as the result of unusual conditions, etc.), alert your supervisor and ask for help.
 - References (TM): Those manuals required to complete the task.
 - Troubleshooting References: Specific troubleshooting symptom or those manuals required to complete the task.
 - Equipment Condition: Notes the conditions that must exist prior to starting the task.
 - Special Environmental Conditions: Outlines specific environmental conditions necessary to perform a task. For example: Work area clean and away from blowing dirt and dust.
 - General Safety Instructions: Summarizes all safety warnings for the maintenance task.

- c. A step-by-step maintenance procedure follows the INITIAL SETUP. Three columns "Location/Item," "Action," and "Remarks" give detailed instructions for the procedure. They are:
 - Location/Item: Indicates the general location and specific part(s) you are working on in a step. For example, the location/item of step 2 is the "crankshaft (10)." The number(s) in parentheses correspond to that part(s) callout number(s) in the accompanying illustration.
 - Action: Specifies the action to be taken with the part(s) listed in the Location/Item column. In our example, you are directed to "Rotate [the crankshaft (10)] until rod cap (7) is accessible."
 - Remarks: Provide additional information. Our example notes: "Use lint-free paper to remove loose debris from cylinder liner (9)."
 - d. At the end of a procedure, "FOLLOW-ON TASK(S)" will list additional task(s) that must be performed to complete the procedure. The Follow-On Tasks for our example procedure is: "For repair or installation of piston, connecting rod, and bearings, refer to para. 3-69 or 3-39."
13. Refer to the example pages for para. 3-29, "Piston, Connecting Rod, and Bearings Removal," as we review the following points:
 - a. **Modular Text**: Both pages of text and illustrations are to be used together. This manual was designed so the two pages Would be visible at once, making part identification and procedure sequence easy to follow.
 - b. **Legend**: Use the legend found at bottom of each illustration page to find part name and callout number in relation to text and illustration.
 - c. **Illustrations**: A locator illustration of the cylinder block is provided. An exploded view of the component, removed from the cylinder block, shows specific part locations, attachments, and spatial relationships.
 14. You can also use the Table of Contents (page ii) to find more information about the engine. For example: Appendix E, Torque Values.
 15. Refer to Appendix B, Direct Support and General Support Maintenance Repair Parts and Special Tools List (RPSTL) when requisitioning parts, special tools, and equipment for organizational maintenance.
 16. Your manual is easier to use once you understand its design and we hope this will encourage you to use it more often.

CHAPTER 1 INTRODUCTION

Section I. GENERAL INFORMATION

Section I. General Information (page 1-1)

Section II. Equipment Description and Data (page 1-2)

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1-1. OVERVIEW

NOTE

All information contained in this manual applies to both M915 and M915A4/Big Cam I and M915A1 and M915A4/Big Cam III engines except where differences are specifically noted.

This chapter familiarizes the technician with standard forms, record data, and the equipment to be maintained at the direct support and general support maintenance levels. This information is covered in the following sections:

Section I. General Information

Section II. Equipment Description and Data

1-2. SCOPE

- a. Type of Manual: Direct Support and General Support Army Maintenance.
- b. Model Number and Name: NTC-400, Cummins, six-cylinder, in-line, turbocharged diesel engine.
- c. Purpose of Equipment:
 - Engine for M915 through M920 and M915A4 Truck, Big Cam I.
 - Engine for M915A1 and M915A4 Truck, Big Cam III.

1-3. MAINTENANCE FORMS, RECORDS, AND REPORTS

Department of the Army forms and procedures used for equipment maintenance will be those prescribed by DA Pam 738-750, The Army Maintenance Management System (TAMMS).

1-4. DESTRUCTION OF ARMY MATERIEL TO PREVENT ENEMY USE

Procedures for destruction of Army equipment to prevent enemy use can be found in TM 750-244-6.