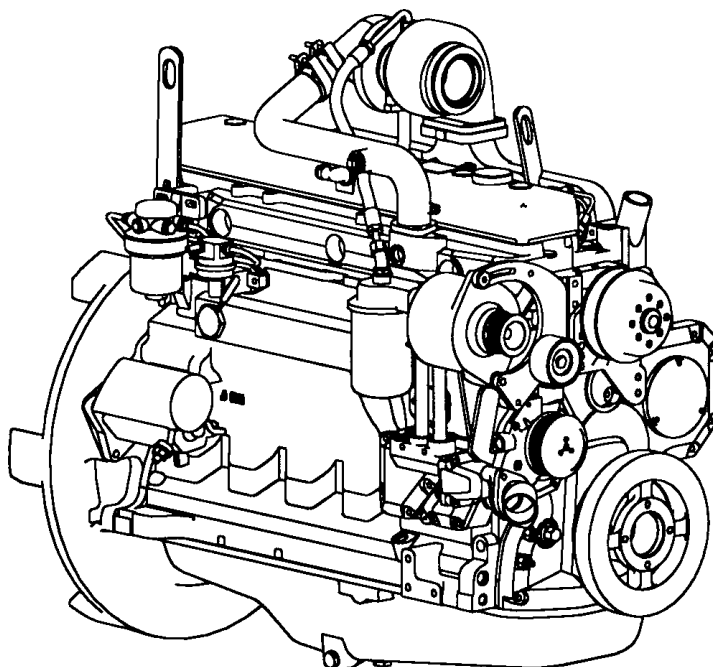


**ARMY TM 9-2815-260-24
AIR FORCE TO 38G1-126-2
MARINE CORPS 09244A/09245A-24**

TECHNICAL MANUAL

**UNIT, DIRECT SUPPORT AND GENERAL SUPPORT
MAINTENANCE MANUAL
DIESEL ENGINE
MODEL 6068TF151
6 CYLINDER 6.8 LITER
(NSN: 2815-01-462-3596) (EIC: N/A)**



DISTRIBUTION STATEMENT A: Approved for public release; distribution is unlimited

**DEPARTMENTS OF THE ARMY AND THE AIR FORCE
AND HEADQUARTERS, MARINE CORPS**

**1 NOVEMBER 2000
PCN: 182 092444 00**

Technical Manual
No. 9-2815-260-24
Technical Order
No. 38G1-126-2
Technical Manual
No. 09244A/09245A-24

DEPARTMENTS OF THE ARMY
AND THE AIR FORCE
AND HEADQUARTERS, MARINE CORPS

Washington, DC, 1 November 2000

**UNIT, DIRECT SUPPORT AND GENERAL SUPPORT
MAINTENANCE MANUAL
FOR
DIESEL ENGINE, MODEL 6068TF151
6 CYLINDER, 6.8 LITER**

(NSN: 2815-01-462-3596) (EIC: N/A)

REPORTING ERRORS AND RECOMMENDING IMPROVEMENTS

You can help improve this manual. If you find any mistakes, or if you know of a way to improve the procedures, please let us know. Mail your letter, DA Form 2028 (Recommended Changes to Publications and Blank Forms) or DA Form 2028-2 located in back of this manual directly to: Commander, US Army Communications-Electronics Command and Fort Monmouth, ATTN: AMSEL-LC-LEO-D-CS-CFO, Fort Monmouth, New Jersey 07703-5006. The fax number is 732-532-1413, DSN 992-1413. You may also e-mail your recommendations to AMSEL-LC-LEO-PUBS-CHG@mail1.monmouth.army.mil.

For Air Force, submit AFTO Form 22 (Technical Order System Publication Improvement Report and Reply) in accordance with paragraph 6-5, Section VI, TO 00-5-1. Forward direct to prime ALC/MST.

Marine Corps units, submit NAVMC 10772 (Recommended Changes to Technical Publications) to: Commanding General, Marine Corps Logistics Base (Code 850), Albany, Georgia 31704-5000.

In any case, we will send you a reply.

TABLE OF CONTENTS

<u>Chapter/Section</u>	<u>Page</u>
HOW TO USE THIS MANUAL.....	viii
CHAPTER 1 INTRODUCTION	1-1
Section I GENERAL INFORMATION	1-1
Section II EQUIPMENT DESCRIPTION AND DATA	1-2
Section III PREPARATION FOR USE	1-8
CHAPTER 2 OPERATING INSTRUCTIONS	2-1
Section I PRINCIPLES OF OPERATION	2-1
Section II OPERATING INSTRUCTIONS	2-2
Section III SPECIAL INSTRUCTIONS	2-2
CHAPTER 3 UNIT MAINTENANCE INSTRUCTIONS	3-1
Section I LUBRICATION INSTRUCTIONS	3-1
Section II REPAIR PARTS; TOOLS; SPECIAL TOOLS; TEST, MEASUREMENT AND DIAGNOSTIC (TMDE); AND SUPPORT EQUIPMENT	3-1
Section III PREVENTIVE MAINTENANCE CHECKS AND SERVICES (PMCS)	3-1
Section IV TROUBLESHOOTING	3-3
Section V MAINTENANCE PROCEDURES	3-15
CHAPTER 4 DIRECT SUPPORT MAINTENANCE INSTRUCTIONS	4-1
Section I TROUBLESHOOTING	4-1
Section II MAINTENANCE PROCEDURES	4-14
CHAPTER 5 GENERAL SUPPORT MAINTENANCE INSTRUCTIONS	5-1
Section I TROUBLESHOOTING	5-1
Section II MAINTENANCE PROCEDURES	5-1
Appendix A References	A-1
Appendix B Maintenance Allocation Chart (MAC)	B-1
Appendix C Components of End Item and Basic Issue Items List	C-1
Appendix D Additional Authorization List	D-1
Appendix E Expendable and Durable Items List	E-1
Appendix F Illustrated List of Manufactured Items	F-1
Appendix G Torque Limits	G-1
Appendix H Mandatory Replacement Parts	H-1
Alphabetical Index	Index-1

LIST OF ILLUSTRATIONS

Figure		Page
Figure 1-1.	Engine Components	1-4
Figure 1-2.	Option Code Label.....	1-5
Figure 3-1.	Thermostat and Water Manifold/Thermostat Cover	3-19
Figure 3-2.	Thermostat Installation	3-21
Figure 3-3.	Water Pump Assembly.....	3-22
Figure 3-4.	Battery Charging Alternator and Mounting	3-24
Figure 3-5.	Starter Solenoid Test Circuit.....	3-25
Figure 3-6.	Starter Assembly.....	3-27
Figure 3-7.	Intake Manifold.....	3-28
Figure 3-8.	Exhaust Manifold.....	3-29
Figure 3-9.	Oil Filter Assembly	3-30
Figure 3-10.	Oil Cooler Assembly.....	3-32
Figure 3-11.	Oil Fill Tube Assembly.....	3-33
Figure 3-12.	Oil Dipstick Tube Assembly	3-34
Figure 3-13.	Oil Dipstick Tube Installation.....	3-35
Figure 3-14.	Oil Pan	3-36
Figure 3-15.	Fuel Filter Assembly	3-39
Figure 3-16.	Fuel Supply Pump.....	3-40
Figure 3-17.	Fuel Injection Assembly	3-41
Figure 4-1.	Battery Charging Alternator Test Circuit.....	4-14
Figure 4-2.	Battery Charging Alternator Assembly	4-16
Figure 4-3.	Stator and Rear Housing Separation	4-17
Figure 4-4.	Testing Brush Assembly	4-17
Figure 4-5.	Testing Exciting Diodes.....	4-18
Figure 4-6.	Testing Positive/Negative Diodes	4-18
Figure 4-7.	Testing Stator Windings.....	4-19
Figure 4-8.	Testing Rotor	4-20
Figure 4-9.	Starter Bench Test Setup.....	4-22
Figure 4-10.	Starter Assembly.....	4-23
Figure 4-11.	Disconnecting Lead Wire (Typical).....	4-24
Figure 4-12.	Removing Through Bolts (Typical)	4-24
Figure 4-13.	Removing Starter End Frame and Yoke Assembly (Typical)	4-25
Figure 4-14.	Removing Brushes	4-25
Figure 4-15.	Removing Armature.....	4-26
Figure 4-16.	Removing Housing (Typical).....	4-26
Figure 4-17.	Removing Overrunning Clutch (Typical).....	4-27
Figure 4-18.	Removing Steel Ball	4-27
Figure 4-19.	Removing Pinion, Retainer, and Rollers (Typical)	4-28
Figure 4-20.	Removing Washer and Spring.....	4-28
Figure 4-21.	Checking Commutator Run-Out.....	4-29
Figure 4-22.	Measuring Commutator OD.....	4-29
Figure 4-23.	Measuring Segment Mica Depth.....	4-30
Figure 4-24.	Inspecting and Replacing Bearings	4-30
Figure 4-25.	Measuring Brush Length.....	4-31

LIST OF ILLUSTRATIONS (CONTINUED)

Figure		Page
Figure 4-26.	Checking Overrunning Clutch.....	4-31
Figure 4-27.	Growler Test	4-32
Figure 4-28.	Testing for Grounded Windings.....	4-32
Figure 4-29.	Checking for Open Circuit Windings.....	4-33
Figure 4-30.	Checking Brush Holder Assembly	4-33
Figure 4-31.	Checking Field Coils.....	4-34
Figure 4-32.	Checking for Open Field Coil	4-34
Figure 4-33.	Installing Brushes.....	4-35
Figure 4-34.	Installing Cover On Yoke	4-36
Figure 4-35.	Installing Yoke.....	4-36
Figure 4-36.	Turbocharger.....	4-39
Figure 4-37.	Turbocharger Inspection Points	4-40
Figure 4-38.	Inspecting Turbocharger Bearings	4-43
Figure 4-39.	Oil Pressure Regulating Valve Assembly	4-47
Figure 4-40.	Pick-Up Tube Assembly	4-49
Figure 4-41.	Separating Gear and Shaft.....	4-52
Figure 4-42.	Check Timing Marks	4-53
Figure 4-43.	Fuel Injection Pump Pressure Outlet Ports	4-55
Figure 4-44.	Fuel Injection Nozzle Assembly	4-59
Figure 4-45.	Rocker Arm Cover.....	4-65
Figure 4-46.	Engine Timing Hole Location.....	4-66
Figure 4-47.	Rocker Arm Location.....	4-67
Figure 4-48.	Rocker Arm Assembly	4-70
Figure 4-49.	Cylinder Head Assembly	4-75
Figure 4-50.	Fuel Transfer Pump Push Rod Location	4-76
Figure 4-51.	Valve Recess Measurement	4-76
Figure 4-52.	Cylinder Head Capscrew Torque Sequence.....	4-79
Figure 4-53.	Flywheel Flatness.....	4-82
Figure 4-54.	Flywheel Removal	4-82
Figure 4-55.	Flywheel Ring Gear	4-83
Figure 4-56.	Removal of Rear Crankshaft Oil Seal	4-84
Figure 4-57.	Rear Crankshaft Oil Seal Installation.....	4-86
Figure 4-58.	Flywheel and Housing Assembly	4-88
Figure 4-59.	Gasket Application to Cylinder Block	4-89
Figure 4-60.	Crankshaft Pulley	4-91
Figure 4-61.	Fan Drive Assembly.....	4-93
Figure 4-62.	Timing Gear Cover	4-95
Figure 4-63.	Engine Lifting	4-100
Figure 5-1.	Fuel Injection Pump.....	5-6
Figure 5-2.	Clip Removal	5-9
Figure 5-3.	Droop Control Locking Cap Removal	5-9
Figure 5-4.	Control Rod Assembly and Governor Spring Removal	5-10
Figure 5-5.	Cam Advance Pin Removal	5-11
Figure 5-6.	Reed Valve Removal.	5-11
Figure 5-7.	Linkage Hook Disconnection.....	5-12
Figure 5-8.	Hydraulic Head Assembly Removal.	5-12

LIST OF ILLUSTRATIONS (CONTINUED)

Figure		Page
Figure 5-9.	Governor Arm and Linkage Hook Removal	5-13
Figure 5-10.	Drive Shaft Bearing and Seal Removal (Shown Removed)	5-14
Figure 5-11.	Transfer Pump End Cap Seal Removal (Typical).	5-14
Figure 5-12.	Cam Ring Removal.	5-15
Figure 5-13.	Pumping Plunger Removal.....	5-15
Figure 5-14.	Delivery Valve Removal.....	5-16
Figure 5-15.	Retaining Clip Removal.....	5-16
Figure 5-16.	Fuel Injection Housing.....	5-17
Figure 5-17.	Drive Shaft.....	5-18
Figure 5-18.	Cam Ring	5-19
Figure 5-19.	Hydraulic Head Assembly (Typical).....	5-20
Figure 5-20.	Distributor Rotor Assembly (Typical)	5-20
Figure 5-21.	Shoes and Rollers.....	5-21
Figure 5-22.	Leaf Springs.....	5-21
Figure 5-23.	Transfer Pump Blades.....	5-22
Figure 5-24.	Transfer Pump Liner	5-23
Figure 5-25.	Transfer Pump Regulating Piston and Adjusting Screw	5-23
Figure 5-26.	Transfer Pump Regulator Assembly	5-24
Figure 5-27.	Metering Valve and Arm Assembly.....	5-25
Figure 5-28.	Delivery Valve	5-25
Figure 5-29.	Fuel Side Seal Installation.....	5-26
Figure 5-30.	Oil Side Seal Installation.....	5-27
Figure 5-31.	Drive Shaft Bearing Installation.....	5-27
Figure 5-32.	Seal Protection Tube	5-28
Figure 5-33.	Thrust Bearing and Thrust Washer	5-28
Figure 5-34.	Spring Washer and Retaining Ring	5-29
Figure 5-35.	Timing Mark Locator.....	5-29
Figure 5-36.	Weight Retaining Assembly.....	5-30
Figure 5-37.	Tightening Delivery Valve Stop Screw.....	5-30
Figure 5-38.	Pumping Plunger Installation.....	5-31
Figure 5-39.	Installing Rollers and Shoes (Typical)	5-31
Figure 5-40.	Measuring Roller to Roller Dimension	5-32
Figure 5-41.	Transfer Pump Liner Installation (Typical).....	5-33
Figure 5-42.	Transfer Pump Blade Installation (Typical).....	5-33
Figure 5-43.	Regulator Assembly Installation (Typical)	5-34
Figure 5-44.	Governor Weight Installation (Typical).....	5-35
Figure 5-45.	Thrust Washer Installation (Typical)	5-35
Figure 5-46.	Thrust Sleeve Installation (Typical).....	5-36
Figure 5-47.	Head and Rotor Assembly Installation (Typical).....	5-36
Figure 5-48.	Control Spring Installation.....	5-37
Figure 5-49.	Control Rod Installation.....	5-38
Figure 5-50.	Droop Control Locking Cap Installation.....	5-38
Figure 5-51.	Damper Barrel and Piston	5-39
Figure 5-52.	Throttle Installation.....	5-39
Figure 5-53.	Setting Governor Linkage Gap	5-40
Figure 5-54.	Reed Valve Assembly	5-41
Figure 5-55.	Piston and Piston Ring Seal	5-41
Figure 5-56.	Piston Ring.....	5-42

LIST OF ILLUSTRATIONS (CONTINUED)

Figure		Page
Figure 5-57.	Piston Ring Compressor.....	5-42
Figure 5-58.	Piston in Power Side Piston Hole	5-43
Figure 5-59.	Power Side Piston Hole Plug Installation	5-43
Figure 5-60.	Aligning Pin Hole in Piston	5-44
Figure 5-61.	Camshaft	5-47
Figure 5-62.	Measuring Camshaft Lobe Height	5-50
Figure 5-63.	Idler Gears	5-55
Figure 5-64.	Spring Pin Protrusion.....	5-56
Figure 5-65.	Front Plate.....	5-57
Figure 5-66.	Front Plate Sealant Application	5-59
Figure 5-67.	Crankshaft and Main Bearings.....	5-60
Figure 5-68.	Critical Areas of Crankshaft Load Stress	5-63
Figure 5-69.	Measuring Main Thrust Journal and Thrust Bearing Width.....	5-65
Figure 5-70.	Fastening Cylinder Liners	5-71
Figure 5-71.	Removing Carbon From Cylinder Liners	5-71
Figure 5-72.	Pistons, Connecting Rods and Cylinder Liners	5-74
Figure 5-73.	Piston Inspection (Defects Exaggerated)	5-75
Figure 5-74.	Checking Piston Keystone Ring Groove Wear	5-75
Figure 5-75.	Measuring Piston Ring Groove Clearance	5-76
Figure 5-76.	Measuring Piston Skirt.....	5-76
Figure 5-77.	Measuring Rod Center-to-Center Bores	5-80
Figure 5-78.	Inspecting Cylinder Liner Pitting.....	5-85
Figure 5-79.	Inspecting Piston Cooling Orifice	5-92
Figure 5-80.	Oil Gallery Plugs.....	5-92
Figure 5-81.	Inspecting Cylinder Block.....	5-94
Figure 5-82.	Measuring Main Bearing Bore.....	5-95
Figure 5-83.	Measuring Cam Follower Bore Diameter	5-95
Figure 5-84.	Measuring Camshaft Bore Diameter	5-96
Figure 5-85.	Measuring Cylinder Block Top Deck Flatness	5-96
Figure 5-86.	Oil Pump Assembly	5-99
Figure 5-87.	Oil Pump Axial Clearance	5-101
Figure 5-88.	Oil Pump Radial Clearance Measurement	5-101
Figure 5-89.	Oil Bypass Valve.	5-103
Figure 5-90.	Valve Face Angle.....	5-106
Figure 5-91.	Measuring Cylinder Head Thickness	5-108
Figure 5-92.	Valve Seat Removal Chisel.....	5-111
Figure 5-93.	Removal of Valve Seat Insert	5-111
Figure 5-94.	Valve Seat Bore in Cylinder Head	5-112
Figure 5-95.	Valve Guide Installation	5-113

LIST OF TABLES

Table		Page
Table 1-1.	Table of Specifications	1-5
Table 1-2.	Engine Option Codes - 6 Cylinder, 6.8 Liter	1-6
Table 3-1.	Preventive Maintenance Checks and Services (PMCS)	3-2
Table 3-2.	Unit Troubleshooting.....	3-4
Table 4-1.	Direct Support Troubleshooting.....	4-2
Table 4-2.	Valve Clearance Specification (Rocker Arm-To-Valve Tip).....	4-68
Table 4-3.	Valve Lift Specifications at 0.00 in. (mm) Valve Clearance.....	4-69
Table 4-4.	Valve Recess Specifications	4-77
Table 4-5.	Cylinder Block Top Deck Specifications.....	4-78
Table 4-6.	Flywheel Face Flatness Specifications	4-82
Table 5-1.	Procedural Index for General Support Maintenance	5-1
Table 5-2.	Fuel Injection Pump Checks	5-5
Table 5-3.	Camshaft Lobe Height Specifications	5-51
Table 5-4.	Camshaft and Timing Gear Train Specifications	5-53
Table 5-5.	Crankshaft and Main Bearings Specifications	5-64
Table 5-6.	Connecting Rod Journal and Bearing Specifications	5-77
Table 5-7.	Connecting Rod Bore (Without Bearing Inserts) Specifications.....	5-78
Table 5-8.	Connecting Rod Piston Pin Bushing Specifications.....	5-79
Table 5-9.	Cylinder Liner Height Specifications.....	5-83
Table 5-10.	Cylinder Liner Thickness Specifications.....	5-87
Table 5-11.	Piston and Cylinder Liner Specifications	5-87
Table 5-12.	Valve Seat Bore Insert Specifications	5-113

HOW TO USE THIS MANUAL

In this manual (TM 9-2815-260-24) paragraphs are underlined and sections and chapters appear in capital letters. The location of additional material that must be referenced is clearly marked. Illustrations in this text are located as close as possible to their references.

Chapter 1 - INTRODUCTION. This section contains general information, equipment description and data, and principles of operation for the engine.

Chapter 2 - OPERATING INSTRUCTIONS. This section contains functional descriptions of the engine systems and how they are connected to the end item. For operation, refer to end item operator's manual.

Chapter 3 - UNIT MAINTENANCE INSTRUCTIONS. This section contains troubleshooting procedures used to recognize and correct engine malfunctions at the unit level, and all maintenance procedures authorized to be performed on the engine the unit level.

Chapter 4 - DIRECT SUPPORT MAINTENANCE INSTRUCTIONS. This section contains direct support level troubleshooting procedures used to recognize and correct engine malfunctions at the direct support level, and all maintenance procedures authorized to be performed on the engine at the direct support level.

Chapter 5 - GENERAL SUPPORT MAINTENANCE INSTRUCTIONS. This section contains general support maintenance instructions which are limited to the disassembly, cleaning, inspection and assembly of components after troubleshooting has already been accomplished.

APPENDICES.

Appendix A lists all forms, field manuals, technical manuals and miscellaneous publications referenced in this manual and should be used in conjunction with this manual.

Appendix B is the Maintenance Allocation Chart (MAC) which designates all maintenance and repair functions authorized to be performed at the different maintenance levels.

Appendix C lists the Components of End Item (COEI) and Basic Issue Items (BII) lists.

Appendix D. Refer to End Item Maintenance Manual Appendix D for lists of items authorized for use with the generator set, but not issued with it or supported by generator set engineering drawings.

Appendix E lists expendable supplies and materials required to operate and maintain the generator set. These items are authorized by CTA 50-970, Expendable Items (except medical, Class V, repair parts, and heraldic items).

Appendix F includes complete instructions for fabricating or assembling parts as required for the engine.

Appendix G provides torque limits for fasteners used in maintenance of the engine.

Appendix H lists parts that must be replaced if removed during maintenance.

CHAPTER 1 INTRODUCTION

Section I. GENERAL INFORMATION

1.1. SCOPE.

- a. Type of Manual. This manual contains unit, direct support, and general support maintenance instructions for the Model TO6068TF151 Diesel Engine, hereafter referred to as engine. Also included are descriptions of major systems/components and their functions in relation to other systems/components.
- b. Purpose of Equipment. The engine provides a driving force for generators or other equipment requiring this size (HP rating) and compatibility.

1.2. MAINTENANCE FORMS, RECORDS, AND REPORTS.

- a. Reports of Maintenance and Unsatisfactory Equipment. Department of the Army forms and procedures used for equipment maintenance will be those prescribed by DA Pam 738-750, Army Maintenance Management System (TAMMS). Air Force personnel will use AFR 66-1, Air Force Maintenance Management Policy, for maintenance reporting and TO-OO-35D54 for unsatisfactory equipment reporting.
- b. Reporting of Item and Packaging Discrepancies. Fill out and forward SF 364 (Report of Discrepancy (ROD)) as prescribed in AR 735-11-2/DLAR 414-55/SECNAVINST 4355.18/AFR 400-54/MCO 4430.3J.
- c. Transportation Discrepancy Report (TDR) (SF 361). Fill out and forward Transportation Discrepancy Report (TDR) (SF361) as prescribed in AR 55-38/NAVSUPINST 4610.33C/AFR 75-18/MCO P4610.19D/DLAR 4500.15.

1.3. REPORTING EQUIPMENT IMPROVEMENT RECOMMENDATIONS (EIR).

Army - If your equipment needs improvement, let us know. Send us an EIR. You, the user, are the only one who can tell us what you don't like about your equipment. Let us know why you don't like the design or performance. Put it on a SF 368 (Product Quality Deficiency Report). Mail it to us at the address below. We'll send you a reply. The fax number is 908-532-1413, DSN 992-1413. You may also e-mail your recommendations to AMSEL-LC-LEO-PUBS-CHG@cecom3.monmouth.army.mil.

Commander
U.S. Army Communications and Electronics Command (CECOM)
ATTN: AMSEL-LC-LEO-D-CS-CFO
Fort Monmouth, New Jersey 07703-5008

(AF) USAF Deficiency Reporting and Investigating System, TO 00-35D-54, Appendix A procedures will be used for electronic submission. Submit mailed forms to:

SMALC/LHCABD
5029 Dudley Boulevard
McClellan AFB, CA 95652-1095