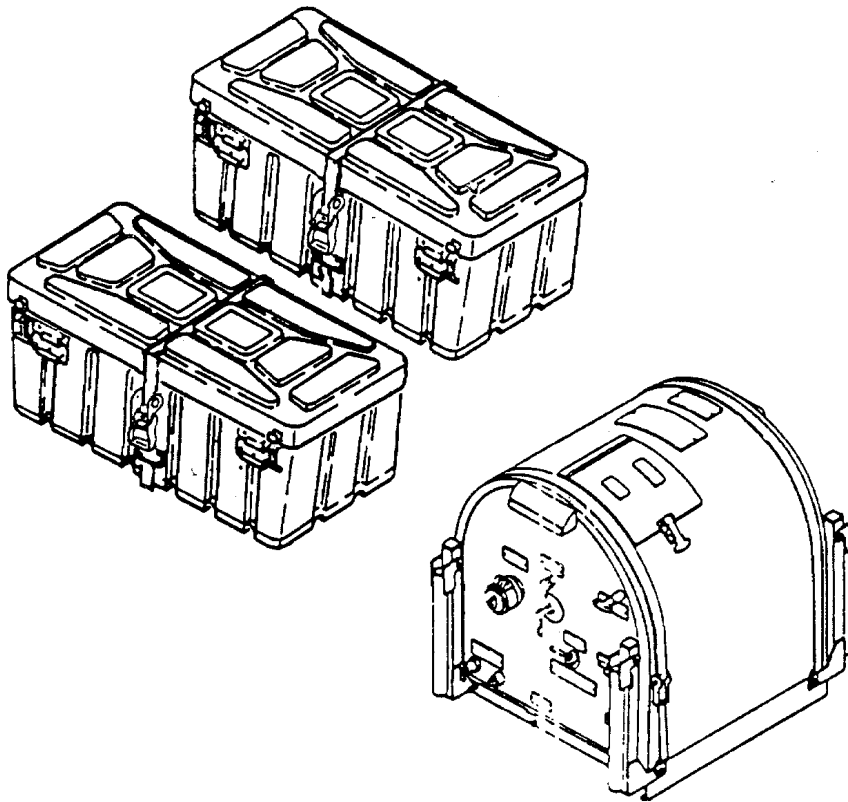


**OPERATOR'S, UNIT
DIRECT SUPPORT, AND GENERAL
SUPPORT MAINTENANCE MANUAL**



**PUMPING ASSEMBLY, FLAMMABLE
LIQUID, BULK TRANSFER,
50 GPM, DIESEL-ENGINE DRIVEN (DED),
MODEL 1-1/2 MP
NSN 4320-01-397-6053**

INTRODUCTION 1-1

**OPERATING
INSTRUCTIONS 2-1**

**OPERATOR
MAINTENANCE
INSTRUCTIONS 3-1**

**UNIT
MAINTENANCE
INSTRUCTIONS 4-1**

**DIRECT SUPPORT
MAINTENANCE
INSTRUCTIONS 5-1**

**GENERAL SUPPORT
MAINTENANCE
INSTRUCTIONS 6-1**

**MAINTENANCE
ALLOCATION CHART B-1**

GLOSSARY

ALPHABETICAL INDEX

Distribution Statement A: Approved for public release; distribution is unlimited.

HEADQUARTERS, DEPARTMENT OF THE ARMY

12 APRIL 1997

TECHNICAL MANUAL

No. 10-4320-348-14

HEADQUARTERS
DEPARTMENT OF THE ARMY
WASHINGTON D.C., 12 APRIL 1997

OPERATOR'S, UNIT, DIRECT SUPPORT, AND
GENERAL SUPPORT MAINTENANCE MANUAL

PUMPING ASSEMBLY, FLAMMABLE LIQUID, BULK TRANSFER,
50 GPM, DIESEL-ENGINE DRIVEN (DED),
MODEL 1-1/2 MP,
NSN 4320-01-397-6053

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 these procedures, please let us know. Mail your letter or DA Form 2028 (Recommended Changes to Publications and Blank Forms), or DA Form 2028-2 located in the back of this manual directly to: Commander, US Army Aviation and Troop Command, ATTN: AMSAT-I-MP, 4300 Goodfellow Blvd., St. Louis, MO 63120-1798. You may also submit your recommended changes by E-mail directly to <mpmt%avma28@st-louis-emh7.army.mil>. A reply will be furnished directly to you. Instructions for sending an electronic 2028 may be found at the back of this manual immediately preceding the hard copy 2028.

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

TABLE OF CONTENTS

	PAGE
HOW TO USE THIS MANUAL	viii
CHAPTER 1 INTRODUCTION	
Section I. General Information	1-1
Section II. Equipment Description	1-3
Section III. Principles Of Operation	1-11
CHAPTER 2 OPERATING INSTRUCTIONS	
Section I. Description And Use Of Operator's Controls And Indicators	2-2
Section II. Operator Preventive Maintenance Checks And Services (PMCS)	2-5
Section III. Operation Under Usual Conditions	2-17
Section IV. Operation Under Unusual Conditions	2-30
CHAPTER 3 OPERATOR MAINTENANCE INSTRUCTIONS	
Section I. Lubrication Instructions	3-2
Section II. Operator Troubleshooting Procedures	3-2
Section III. Operator Maintenance Procedures	3-7

TABLE OF CONTENTS - Continued

		PAGE
CHAPTER 4	UNIT MAINTENANCE INSTRUCTIONS	
Section I.	Lubrication Instructions	4-2
Section II.	Unit Repair Parts, Special Tools, Test, Measurement and Diagnostic Equipment (TMDE), and Support Equipment	4-2
Section III.	Unit Service Upon Receipt Of Equipment.....	4-2
Section IV.	Unit Preventive Maintenance Checks and Services (PMCS)	4-6
Section V.	Unit Troubleshooting Procedures	4-12
Section VI.	Unit Maintenance Procedures.....	4-14
Section VII.	Preparation For Movement, Storage, Or Shipment	4-65
CHAPTER 5	DIRECT SUPPORT MAINTENANCE INSTRUCTIONS	
Section I.	Direct Support Troubleshooting	5-2
Section II.	Direct Support Maintenance Procedures	5-2
CHAPTER 6	GENERAL SUPPORT MAINTENANCE INSTRUCTIONS	
Section I.	General Support Maintenance Procedures.....	6-1
APPENDIX A	REFERENCES	A-1
APPENDIX B	MAINTENANCE ALLOCATION CHART	
Section I.	Introduction	B-1
Section II.	Maintenance Allocation Chart	B-4
Section III.	Tools And Test Equipment Requirements	B-7
Section IV.	Remarks.....	B-7
APPENDIX C	COMPONENTS OF END ITEM (COEI) AND BASIC ISSUE ITEMS LISTS (BIIL)	
Section I.	Introduction	C-1
Section II.	Components Of End Items.....	C-2
Section III.	Basic Issue Items	C-2

TABLE OF CONTENTS - Continued

	PAGE
APPENDIX D ADDITIONAL AUTHORIZATION LIST (AAL)	
Section I. Introduction	D-1
Section II. Additional Authorization List.....	D-1
APPENDIX E EXPENDABLE AND DURABLE ITEMS LIST (EDIL)	E-1
Section I. Introduction	E-1
Section II. Expendable and Durable Items List	E-2
APPENDIX F LUBRICATION INSTRUCTIONS	F-1
APPENDIX G ILLUSTRATED LIST OF MANUFACTURED ITEMS	G-1
Section I. Introduction	G-1
Section II. Illustrated List of Manufactured Items	G-1
APPENDIX H TORQUE LIMITS	H-1
APPENDIX I MANDATORY REPLACEMENT PARTS.....	I-1
Section I. Introduction	I-1
Section II. Mandatory Replacement Parts.....	I-2
APPENDIX J ELECTRICAL SCHEMATIC	J-1
 GLOSSARY	
Section I. Abbreviations	Glossary-1
Section II. Definition of Unusual Terms.....	Glossary-2
ALPHABETICAL INDEX	Index-1

LIST OF ILLUSTRATIONS

Figure No.	Title	Page No.
1-1.	Pumping Assembly, Major Components	1-5
1-2.	Pump Unit, Major Components	1-6
1-3.	Storage Chest 1 and Related Pump Accessories	1-8
1-4.	Storage Chest 2 and Related Pump Accessories	1-10
1-5.	Diesel Engine, Major Components and Principles of Operation	1-11
2-1.	Operators View of Internal Controls and Indicators Front Sound Enclosure Panel Removed).....	2-2
2-2.	Operators View of External Controls and Indicators	2-3
2-3.	Opening Storage Chests	2-17
2-4.	Components of Pumping Assembly	2-19
2-5.	Refueling Pumping Unit.....	2-20
2-6.	Starting Procedures.....	2-21
2-7.	Pumping Assembly Information Plates.....	2-24
2-8.	Preparation for Movement.....	2-29
2-9.	Heater Power Connection	2-30
2-10.	Heater Control	2-31
2-11.	Cold Weather Starting Aid.....	2-31
2-12.	Emergency Procedures.....	2-34
3-1.	Replacing Air Filter Element.....	3-8
3-2.	Fuel Filter.....	3-10
4-1.	Ground Rod and Auxiliary Fuel Line Installation	4-4
4-2.	Oil Dipstick	4-5
4-3.	Nozzle Assembly	4-16
4-4.	Suction/Discharge Hose Assembly	4-17
4-5.	Drum Suction Stub Unloader Assembly	4-18
4-6.	Storage Chests.....	4-19

LIST OF ILLUSTRATIONS - Continued

Figure No.	Title	Page No.
4-7.	Sound Enclosure Cover Assembly	4-22
4-8.	Sound Enclosure Rear Panel Assembly	4-24
4-9.	Electrical Connector and Terminal Block Replacement	4-27
4-10.	Lights, Toggle Switches, and Circuit Breaker Replacement	4-28
4-11.	Sound Enclosure Front Panel Assembly	4-33
4-12.	Fuel Selection Valve	4-34
4-13.	Recoil Starter Rope T-Handle	4-35
4-14.	Throttle	4-35
4-15.	Fuel Selector Valve	4-38
4-16.	Air Intake Heater	4-40
4-17.	Crankcase Oil Heater	4-41
4-18.	Suction and Discharge Piping	4-43
4-19.	Fuel Tank Assembly Repair and Replacement	4-45
4-20.	Recoil Starter Removal	4-47
4-21.	Cooling Case Cover	4-50
4-22.	Air Intake System Repair and Replacement	4-52
4-23.	Cleaning Spark Arrestor	4-54
4-24.	Exhaust System Assembly	4-55
4-25.	Alignment of Flywheel With Cylinder Block	4-58
4-26.	Adjusting Valve Clearance	4-58
4-27.	Lube Oil Strainer	4-60
4-28.	Handles and Posts	4-62
4-29.	Y-Connectors and Couplings	4-63

LIST OF ILLUSTRATIONS - Continued

Figure No.	Title	Page No.
4-30.	Ground Rod and Attaching Hardware	4-64
4-31.	Ground Rod and Auxiliary Fuel Line Removal	4-65
5-1.	Inlet (Suction) Flange and Check Valve Assembly	5-4
5-2.	Volute	5-5
5-3.	Replacing Impeller, Shaft Seal, and Shaft Adapter	5-6
5-4.	Pump Casing Assembly	5-10
5-5.	Engine Mounting Assembly	5-12
5-6.	Replace Fuel Injection Nozzle	5-13
5-7.	Replace Fuel Injection Pump	5-16
5-8.	Align Control Lever Pointer With Fuel Injection Pump Access Hole	5-17
5-9.	Top Dead Center Position	5-18
5-10.	Fuel Injection Volume Limitation Adjustment	5-20
5-11.	Speed Control Device Assembly	5-21
5-12.	Speed Control Device Springs	5-22
6-1.	Removing Cylinder Head	6-3
6-2.	Cylinder Head Assembly	6-4
6-3.	Valve Recess	6-5
6-4.	Spring Inclination	6-6
G-1.	Acoustical Foam, Sound Enclosure, Front Panel Assembly	G-2
G-2.	Acoustical Foam, Sound Enclosure, Rear Panel Assembly	G-3
G-3.	Acoustical Foam, Sound Enclosure, Cover Assembly	G-4
G-4.	Acoustical Foam, Storage Chest	G-5
G-5.	Acoustical Foam, Storage Chest	G-6
G-6.	Bulk Hose	G-7
G-7.	Bulk Wire	G-7
G-8.	Terminal Kit	G-7

LIST OF TABLES

Table No.	Title	Page No.
1-1.	Equipment Data.....	1-9
2-1.	Operator Preventive Maintenance Checks and Services for Pumping Unit.....	2-7
3-1.	Operator Troubleshooting	3-3
4-1.	Unit Preventive Maintenance Checks and Services.....	4-7
4-2.	Troubleshooting by Exhaust Color	4-12
4-3.	Unit Troubleshooting	4-13
5-1.	Direct Support Troubleshooting Table.....	5-2

HOW TO USE THIS MANUAL

GENERAL. This technical manual provides you with the information needed to operate and to maintain the DED Pumping Assembly. By properly using this manual, you will be able to identify any problem you may have in operating the pump assembly and then locate the proper procedure needed to correct any problem found.

MANUAL ORGANIZATION. This manual has been organized in a manner that groups together the information that an operator or a maintenance technician will need to perform their duties. The following list indicates how this information has been organized.

- Chapter 1** This chapter contains a complete description of the pump assembly and includes such information as general equipment data, location/descriptions of major pump assembly components, and general theory of operations for the pump assembly.
- Chapter 2** The information needed to set up and to operate the pump assembly are included in this chapter. It includes assembly information, operator PMCS, and special instructions for unusual or emergency conditions.
- Chapter 3** All operator maintenance procedures have been placed within this chapter.
- Chapter 4** In the event that unit maintenance is required for the pump assembly, the required maintenance instructions can be found in this chapter.
- Chapter 5** The required maintenance instructions authorized for direct support maintenance can be found in this chapter.
- Chapter 6** This chapter contains the maintenance procedures for general support maintenance personnel.
- Appendix A** Some of the procedures in this manual have references to other military technical manuals and forms. A Complete list of all these Reference Documents is included in this appendix
- Appendix B** This appendix contains the Maintenance Allocation Chart for the pump assembly. This chart defines which of the items on the pump assembly will likely require maintenance and what military maintenance level is authorized to perform these maintenance procedures.
- Appendix C** The Components of End Item List contains a complete listing of all of the items required for a complete pump assembly and the Basic Issue Items List showing the essential items needed to operate the pump assembly are contained in this appendix.
- Appendix D** If any additional items are authorized for support of the pump assembly, they will be shown on the Additional Authorization List contained in this appendix.

- Appendix E** As you operate and maintain the pump assembly you will be required to use some special expendable items. The Expendable and Durable Items List in this appendix is a complete list of these items which appear elsewhere in the operating and maintenance procedures in this manual.
- Appendix F** Some components of the pump assembly require periodic lubrication. This appendix shows what parts need lubrication and types of lubricants needed.
- Appendix G** Some components of the pump assembly must be manufactured from bulk or stock material before they can be replaced on the unit. A complete set of instructions required to manufacture these items from bulk stock is included in this Illustrated List of Manufactured Parts.
- Appendix H** It is very important to properly tighten all fasteners used in the pump assembly to insure proper operation of the pump assembly and to protect operating personnel. To assist you in properly tightening these fasteners, this appendix contains the standard Torque Limits for the fasteners used on the pump assembly.
- Appendix I** During the maintenance of the pumping assembly, some parts are not re-usable if removed from the unit. A complete list of these parts is included in the manual.
- Appendix J** Electrical Schematic

AIDS TO FINDING INFORMATION. The following aids have been placed within this technical manual to help you quickly locate the information you may need.

- | | |
|---|--|
| Front Cover Index | To provide you with a quick reference to the most used portions of this manual, an index has been placed on the cover of this manual. |
| Bleeder Edges On Page | On the right edge of the front cover index of this manual you will see a black box area that goes to the edge of the front cover page. If you hold this manual with your left hand and bend back the outer right edges of the pages with your right hand, you will find that there are pages inside the technical manual that also have black boxes in the right edges of the page and that these boxes line up with the boxes on the front cover index. By turning to the page in the technical manual that lines up with the box on the front cover, you will be able to quickly turn to the topic shown in the front cover index. |
| Table of Contents and Boxed Titles | In the event that the front cover has been removed from this manual, the items that appear in the front cover index have also been placed in a box where they appear in the Table of Contents of this manual. |
| Alphabetical Index | To Assist you in locating any other information not found in the front cover index or the Table of Contents, an alphabetical index has been placed in the back of this manual to help you find any information you may need. |

GENERAL MAINTENANCE METHOD. Although your local standard operating and maintenance procedure may vary, a simple method of using this technical manual to operate and maintain the pump assembly is shown in the following steps.

WARNING and CAUTION

Always Read, Understand, and Perform ALL WARNINGS and CAUTIONS Found In This Technical Manual BEFORE Performing The Step Immediately Following The WARNING or CAUTION.

Throughout this technical manual there are certain procedures and operations that are hazardous to you or to the pump assembly. If you see a WARNING, pay special attention to the information stated in it because all WARNINGS provide you with data that will prevent serious injury to you or others around you. When you see a CAUTION read it carefully because the information given in it will keep you from damaging the pump assembly and making the pump assembly unable to fulfill its mission.

Equipment Set Up And Operation. Unpack and set up the pump assembly in accordance with the procedures shown in Chapter 2.

Preventive Maintenance Checks And Services (PMCS). Perform the PMCS procedures shown in Chapter 2 and Chapter 4.

Troubleshooting Procedures. If the pump assembly should not operate properly, refer to either the operator troubleshooting procedures in Chapter 3, the unit troubleshooting procedures in Chapter 4, or the direct support troubleshooting procedures in Chapter 5. The most likely pump assembly malfunctions have been placed within these troubleshooting procedures and a test and/or repair procedure paragraph has been indicated to correct the malfunction found. If a repair is required, refer to the maintenance paragraph shown in the troubleshooting procedure.

Maintenance Procedures. The complete repair procedures needed to correct a problem found with the pump assembly have been included in Chapters 3, 4, 5, and 6.

CHAPTER 1

INTRODUCTION

SECTION I. GENERAL INFORMATION

1.1 SCOPE. This manual is for use by personnel responsible for operation and maintenance of the Pumping Assembly, Flammable Liquid, Bulk Transfer, 50 GPM, Diesel-Engine Driven, Model 1-1/2 MP hereafter referred to as the pumping assembly. This manual provides the operator with the necessary instructions to setup this equipment, operate it, and perform required operator maintenance in accordance with the Maintenance Allocation Chart (MAC) in Appendix B. Additionally, troubleshooting and maintenance instructions for unit, direct support, and general support maintenance echelons are provided.

- a. Type of Manual. Operator's, Unit, Direct Support, and General Support Maintenance Manual.
- b. Model Number and Equipment Name. This technical manual covers the operation and maintenance of the Pumping Assembly, Flammable, Centrifugal, 50 GPM, Diesel Engine Driven (DED); Model Number 1-1/2 MP.
- c. Purpose of Equipment. This equipment consists of a portable pump unit, two storage chests to contain the pump accessories, and the pump accessories (three suction hoses, three discharge hoses, Y-connectors, couplings, ground rod with attachments, drum suction stub unloader assembly, and two nozzle assemblies). The purpose of the pumping assembly is to provide a method of safely pumping flammable liquid with self-contained and easily transportable equipment.

1.2 MAINTENANCE FORMS AND PROCEDURES. 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).

1.3 CORROSION PREVENTION AND CONTROL (CPC). Corrosion Prevention and Control (CPC) of Army Material is a continuing concern. It is important that any corrosion problems with this item be reported so that the problem can be corrected and improvements can be made to prevent the problem in future items.

While corrosion is typically associated with the rusting of metals, it can also include deterioration of other materials such as rubber and plastic. Unusual cracking, softening, and swelling, or breaking of the materials may be a corrosion problem.

If a corrosion problem is identified, it can be reported using Standard Form 368, Product Quality Deficiency Report. Use of key words such as "rust", "deterioration", "corrosion", or "cracking" will insure that the information is identified as a CPC problem. The form should be submitted to the address specified in the DA PAM 738-750.

1.4 DESTRUCTION OF ARMY MATERIAL TO PREVENT ENEMY USE. For destruction procedures for material, refer to TM 750-244-3.

1.5 PREPARATION FOR STORAGE OR SHIPMENT. Refer to Chapter 4, Unit maintenance instructions for procedures developed to ensure safe storage and shipment of the pumping assembly.

1.6 REPORTING EQUIPMENT IMPROVEMENT RECOMMENDATIONS (EIR'S). If your pumping assembly 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 an SF 368 (Quality Deficiency Report). Mail it to: Commander, U.S. Army Aviation and Troop Command, ATTN: AMSAT-I-MDO, 4300 Goodfellow Blvd., St. Louis, MO 63120-1798. We'll send you a reply.