

**DIRECT SUPPORT AND
GENERAL SUPPORT
MAINTENANCE MANUAL FOR
HULL, POWERPLANT, DRIVE
CONTROLS, TRACKS, SUSPENSION,
AND ASSOCIATED COMPONENTS**

**HOWITZER, MEDIUM,
SELF-PROPELLED, 155MM,
MI 09A2 (EIC: 3EZ)
(NSN 2350-01-031-0586)**

AND

**HOWITZER, MEDIUM,
SELF-PROPELLED, 155 MM,
MI 09A3 (EIC: 3E2)
(NSN 2350-01-031-8851)**

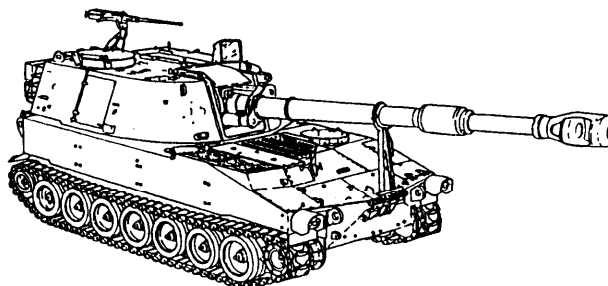
AND

**HOWITZER, MEDIUM,
SELF-PROPELLED, 155MM,
MI 09A4 (EIC: 3E8)
(NSN 2350-01-277-5770)**

AND

**HOWITZER, MEDIUM,
SELF-PROPELLED, 155MM,
MI 09A5 (EIC: 3E7)
(NSN 2350-01-281-1719)**

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Approved for public release; distribution is unlimited.

HEADQUARTERS, DEPARTMENT OF THE ARMY

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DEPARTMENT OF THE ARMY
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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 the back of this manual direct to Commander, U.S. Army Tank-automotive and Armaments Command, ATTN: AMSTA-MMAA, Warren, MI 48397-5000. A reply will be furnished to you.

You may also provide DA Form 2028-2 information to TACOM via datafax or e-mail:

- TACOM's fax number is DSN 786-6323
- TACOM's e-mail address is amsta-mmaa@cc.tacom, army.mil

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HOW TO USE THIS MANUAL

GENERAL

This manual contains direct support and general support maintenance instructions for the M109A2/M109A3/M109A4/M109A5 Howitzers' hull and hull-related components.

The front matter in this manual consists of a cover index, general warnings, and a table of contents.

This manual is divided into 10 chapters **and** 6 appendixes. Each chapter and appendix begins on a right page with the page number of 1. Pages are numbered after the chapter number or appendix letter. For example 1-14 means Chapter 1, page 14, and A-2 means Appendix A, page 2.

At the end of this manual are an alphabetical index, eight schematics, DA Form 2028-2, and a metric conversion chart.

a. Front Matter

The front cover has an index for the major divisions in this manual. The first page of the associated major division has a black edge that lines up with the applicable cover boxed-in area.

There are general warnings that start on the first right page immediately after the cover that should be read before performing any maintenance on the howitzer.

The table of contents indicates the page where each chapter, section, appendix, and paragraph starts.

b. Chapters

Chapter 1 provides general information, equipment description, and principles of operation of the howitzer.

Chapter 2 provides maintenance instructions for the hull.

Chapter 3 provides direct support and general support troubleshooting procedures for the howitzer.

Chapter 4 provides direct support and general support maintenance instructions for separating and assembling the powerplant components.

Chapter 5 provides direct support and general support maintenance instructions for the fuel and air intake systems.

Chapter 6 provides direct support and general support maintenance instructions for the cooling system.

Chapter 7 provides direct support and general support maintenance instructions for the electrical system.

Chapter 8 provides direct support and general support maintenance instructions for the final drive and track suspension.

Chapter 9 provides direct support and general support maintenance instructions for hull-related components.

Chapter 10 provides direct support and general support maintenance instructions for the engine and battery winterization kit.

c. Appendixes

Appendix A provides titles of documents and publications referenced throughout this manual.

Appendix B provides a list of the expendable and durable items necessary to perform the direct support and general support maintenance procedures.

Appendix C provides a tool identification list of common tools necessary to perform the direct support and general support maintenance procedures.

Appendix D provides an illustrated list of manufactured items.

Appendix E provides wet torque limits for screws and fastener information.

Appendix F provides a list of the mandatory replacement parts necessary to perform the direct support and general support maintenance procedures.

d. Alphabetical Index

The alphabetical index is located after the last appendix and provides an alphabetical listing of information contained in this manual.

e. Schematics

There are eight electrical schematics in foldout form located at the end of this manual.

f. DA Form 2028-2

DA Form 2028-2 is used to report errors and to recommend improvements for the tasks in this manual.

g. Metric Conversion Chart

The metric conversion chart converts English measurements to metric equivalents. Measurements in this manual are provided in both English and metric units.

WARNINGS, CAUTIONS, AND NOTES

Warnings, cautions, and notes are provided throughout this manual:

Warnings are provided where injury may occur to personnel on or near the howitzer.

Cautions are provided where equipment may be damaged, but no injuries to personnel should result.

Notes provide information, but no personnel injury or equipment damage should result.

INITIAL SETUPS

Before starting a task, you must obtain all the tools, supplies, and personnel listed in the initial setup. Be sure to read the task before performing the maintenance. If any other tasks are referenced, you must go to the initial setup page for each of those tasks to find out what tools, supplies, and personnel will be needed.

LOCATIONAL TERMS

The terms “front,” “rear,” “left,” and “right” are used to indicate where items are located on the howitzer. These locations are from the viewpoint of standing behind the howitzer and facing it.

REFERENCING

In this manual, internal referencing is done by chapter, appendix, paragraph, section, or task. For example, (para 8-15) refers you to Chapter 8, paragraph 15.

Referencing outside this manual is done by the military document or publication number. For example, (TM 9-2350-311-10) refers you to that manual.

LOCATING INFORMATION

- This manual provides five ways by which you can locate information quickly:
- The cover index lists most frequently used major divisions by name and starting page number.
 - The table of contents.
 - The chapter and appendixes indexes list data and information covered within those chapters.
 - The malfunction index (Chapter 3) provides a quick guide to troubleshooting malfunctions.
 - The alphabetical index provides an alphabetical listing of information contained in this manual.

CHAPTER 1

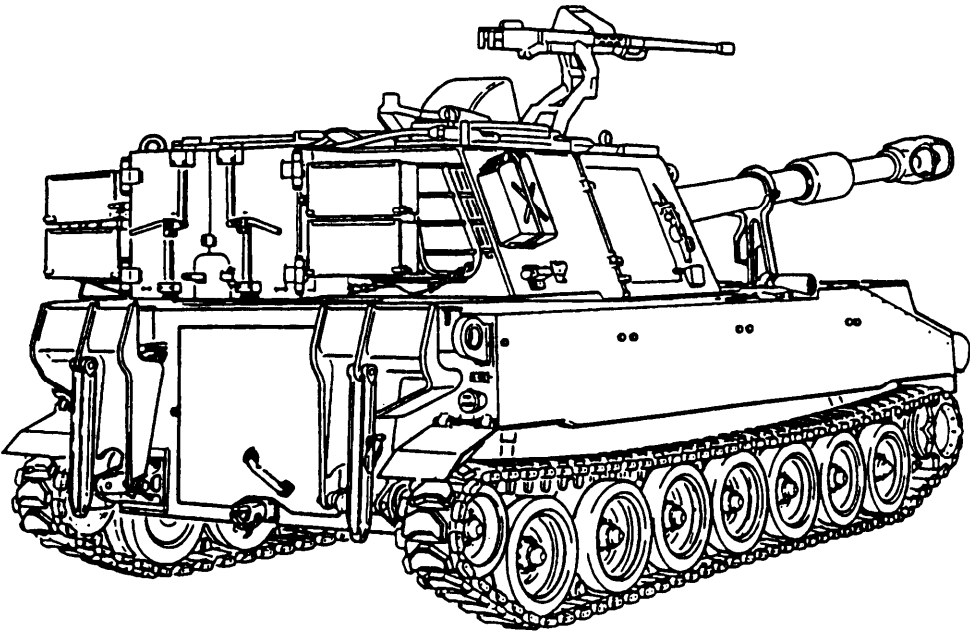
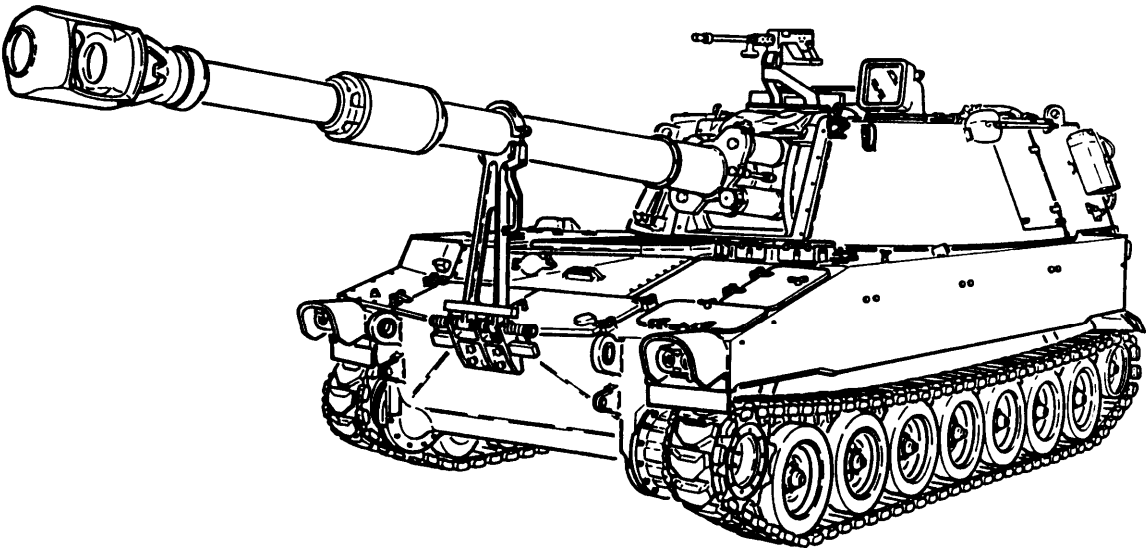
INTRODUCTION

GENERAL

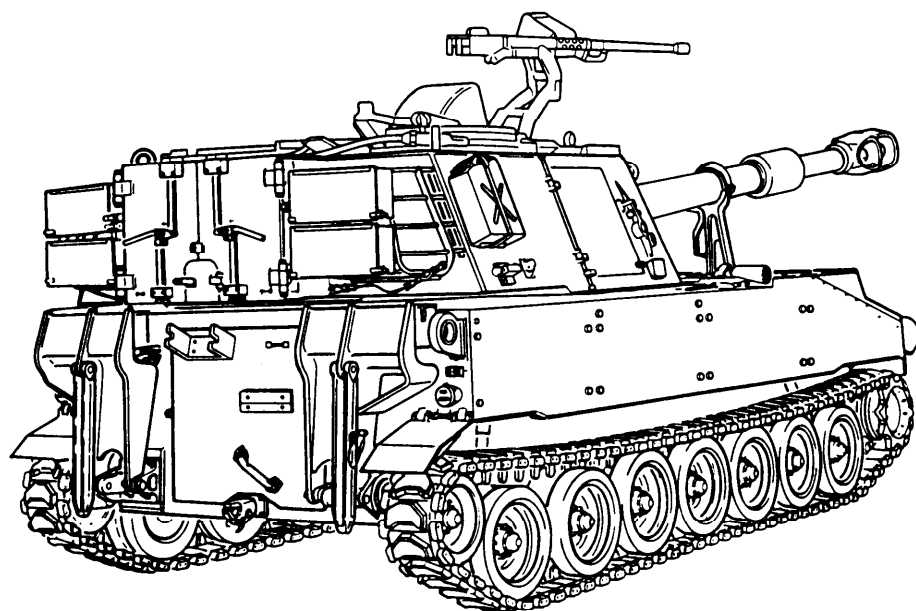
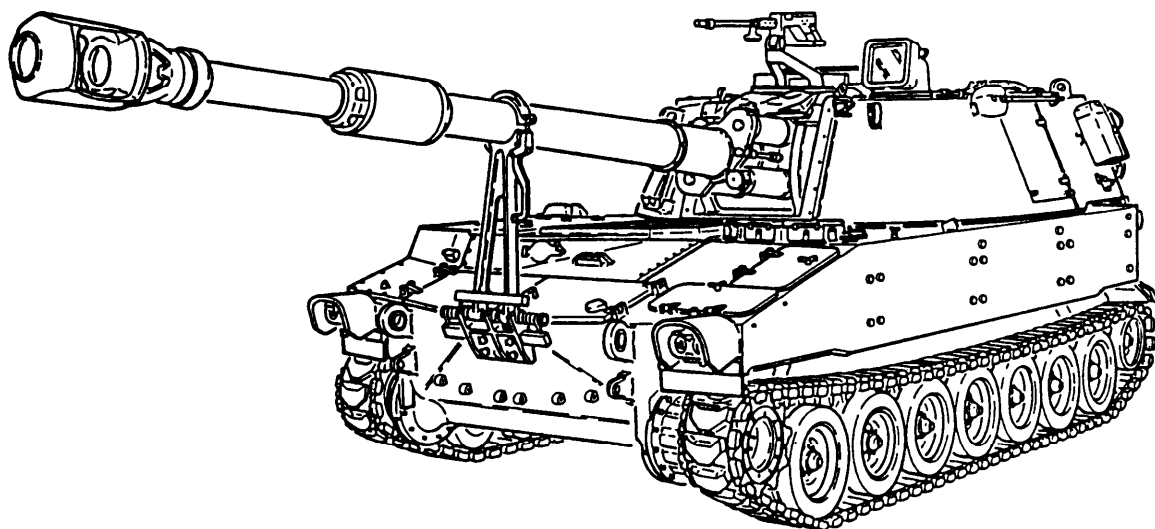
This chapter provides information to familiarize the mechanic with the M1 09A2/M1 09A3/M1 09A4/M1 09A5 Medium, Self-Propelled Howitzer's hull, powerplant, drive controls, tracks, suspension, and other hull-related components. This information is provided through a physical description of the major components, which the technician is required to maintain, service, inspect, replace, or repair.

Additional information is provided as reference and guidance on the use of forms, maintenance of records, and filing reports.

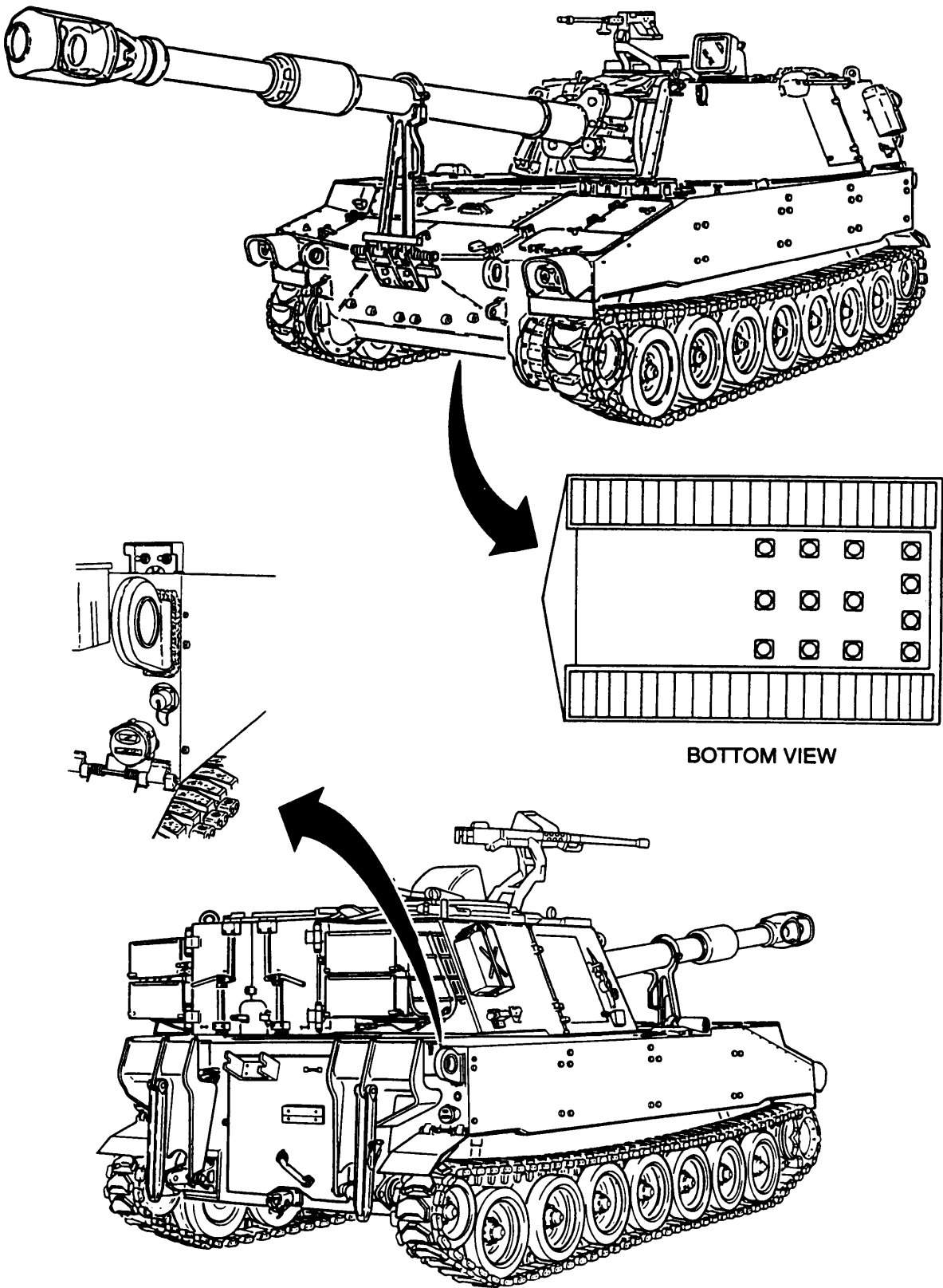
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M109A2



M109A3



BOTTOM VIEW

M109A4/M109A5

SECTION 1. GENERAL INFORMATION

1-1 SCOPE

This manual contains instructions for direct support and general support maintenance of the M1 09A2/M109A3/M1 09A4/M1 09A5 Howitzer's hull, powerplant, drive controls, tracks, suspension, and other hull-related components.

1-2 MAINTENANCE FORMS, RECORDS, AND REPORTS

Department of the Army forms and procedures used for equipment maintenance will be those prescribed by (as applicable) DA PAM 738-750, The Army Maintenance Management System (TAMMS); DA PAM 738-751, Functional Users Manual for The Army Maintenance Management System — Aviation (TAMMS-A); or AR 700-138, Army Logistics Readiness and Sustainability.

Accidents involving injury to personnel or damage to materiel will be reported on DA Form 285, US Army Accident Investigation Report, in accordance with AR 385-40. Explosive ammunition malfunctions will be reported in accordance with AR 75-1.

1-3 DESTRUCTION OF ARMY MATERIEL TO PREVENT ENEMY USE

Destruction of the vehicle, armament, and equipment, when subject to capture or abandonment in a combat zone, will be undertaken by the using army only when the unit commander decides such action is necessary in accordance with orders of, or policy established by, the Army commander.

Read TM 750-244-6, Procedures for Destruction of Tank-Automotive Equipment to Prevent Enemy Use, for information on destruction of all mechanical equipment. In general, destruction of essential components, followed by burning, will usually be sufficient to render the vehicle, armament, and equipment useless. Time is usually critical.

Materiel must be damaged so that it cannot be restored to usable condition by either repair or cannibalization. If a lack of time or personnel prevents destruction of all parts, give priority to destruction of parts hardest to replace. It is important that the same parts be destroyed on all vehicles to prevent construction of one complete vehicle from several damaged ones.

All items of sighting and fire control instruments and equipment, especially telescopes, gunner's quadrants, and binoculars, are costly and difficult to replace. They should be conserved whenever possible. If you cannot carry them with you, destroy them by smashing with your sledgehammer, pick, or mattock. Throw the pieces in all directions.

When time is short, a method of destroying the equipment with materials at hand is as follows:

- Retrieve or smash the sighting and fire control equipment.
- Load the cannon with a projectile and a full powder charge. Attach a 50-ft (15.24-m) or longer lanyard to the firing mechanism. Disconnect all recoil cylinders and fire the weapon.
- Take a sledgehammer and bend the end of the recoil system rods.

1-3 DESTRUCTION OF ARMY MATERIEL TO PREVENT ENEMY USE — CONTINUED

A second method is to close the breechblock, elevate the tube, and toss several thermite grenades down the tube. Elevate the tube so that the grenades will fall against the breechblock. This will melt the breech and the powder chamber, causing them to fuse together.

1-4 PREPARATION FOR STORAGE AND SHIPMENT

Basic requirements for administrative storage are covered in TM 9-2350-311-20-2.

1-5 QUALITY ASSURANCE (QA)

Not applicable.

1-6 OFFICIAL NOMENCLATURE, NAMES, AND DESIGNATIONS

Nomenclature in this manual was chosen in accordance with the terms used for provisioning as they appear in the Repair Parts and Special Tools List (RPSTL) and Maintenance Allocation Chart (MAC). A few tools and hull components are, however, referred to by names more common than those in the RPSTL. In many cases the more common name is a shorter name for the same component.

OFFICIAL PROVISIONING NOMENCLATURE	MORE COMMON NAME
Ammunition rack	Ammo rack
Cable assembly	Wiring harness
Gage rod	Dipstick
Intercommunications power harness	Intercom wiring harness
Intercommunications system	Intercom system
155mm, medium, self-propelled howitzer	Howitzer
Safety wire or nonelectrical wire	Lockwire

1-7 REPORTING EQUIPMENT IMPROVEMENT RECOMMENDATIONS (EIRs)

If your howitzer 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, Product Quality Deficiency Report. Mail it to the address specified in DA PAM 738-750.

NOTE

When equipment failure occurs, but is not caused by normal wear, poor operation, or accidental damage, an EIR must be submitted.

1-8 WARRANTY INFORMATION

The M1 09 Howitzer series is no longer warranted.

1-9 SAFETY, CARE, AND HANDLING

WARNING

Nuclear, Biological, and Chemical (NBC) agents can kill you. If NBC exposure is suspected, all air filter media must be handled by personnel wearing full NBC-protective equipment (FM 21-1 1).

WARNING

M1 40 alignment device and A1 A1 collimator are illuminated by sealed, radioactive sources of tritium gas (H_3). As long as these sources remain sealed, they do not emit any harmful radiation. There is no limit on handling time. Radioactively illuminated collimators are indicated by the radioactive sign shown above. If the seal is broken, see below.

- a. Refer to warning page inside front cover of manual.
- b. Prior to purging or charging, make the following checks:
 - (1) Lift cover assembly and check for cracks or loss of illumination.
 - (2) Look through objective end of collimator and check for broken/cracked reticle and loss of illumination. If reticle is intact, no cracks are observed, and collimator is illuminated, proceed with maintenance actions.
 - (3) If cracks are observed, but collimator is still illuminated, remove collimator scope and notify the local Radiation Protection Officer (RPO). Seal collimator scope in a double plastic bag (item 4, Appx B) and return it to depot for disposal.
 - (4) If no illumination is observed, remove collimator scope and check for illumination in a dark room. If a slight glow/haze appears, follow procedure in paragraph (3) above. If illumination still is not detected, notify local RPO. Return collimator scope to depot as follows for disposal.
 - (a) Seal collimator scope in a double plastic bag (item 4, Appx B) and place in a strong, tight container (such as a fiberboard box) (item 5, Appx B) with all seams secured using tape (item 26, Appx B) (masking tape is not authorized).
 - (b) Label the container: CAUTION — BROKEN H_3 SOURCE. DO NOT OPEN.

1-10 CORROSION PREVENTION AND CONTROL (CPC)

CPC of Army materiel 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 rusting of metals, it can also include deterioration of other materials, such as rubber and plastic. Unusual cracking, softening, swelling, or breaking of these materials may be a corrosion problem. If a corrosion problem is identified, it can be reported using SF 368, Product Quality Deficiency Report.

Use of keywords such as "corrosion," "rust," "deterioration," or "cracking" will ensure that the information is identified as a CPC problem. The form should be submitted to the address specified in DA PAM 738-750.

SECTION II. EQUIPMENT DESCRIPTION AND DATA

1-11 CAPABILITIES AND FEATURES

NOTE

Refer to TM 9-2350-311-10 for further equipment descriptions and data.

1-11.1 Electrical System

The howitzers' electrical power is provided through a 24-Vdc (nominal) generating system consisting of the following components:

- a. Four 12-Vdc (nominal) batteries connected in series/parallel that provide 24 Vdc (nominal) to the master relay.
- b. M109A2/M109A3 Howitzers have a 3-phase, 100-amp alternator that maintains 24-Vdc (nominal) electrical power through the voltage rectifier, voltage regulator, and to the master relay for systems operation. M109A4/M109A5 Howitzers have a 3-phase, 180-amp alternator.
- c. Master relay that delivers electrical power to electrically operated systems/equipment in the howitzers (hull and cab) by turning on the MASTER switch. The MASTER switch, located on the driver's portable instrument panel, actuates the vehicles' electrical system. With the powerplant off (engine not running), activation of the MASTER switch provides delivery of electrical power direct through the alternator, voltage rectifier, voltage regulator, and master relay circuit.

1-11.2 Powerplant (Engine and Transmission)

The powerplant (engine and transmission) provides the mobility for the howitzers.