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MIL-M-63036D(TM)

MAY 23, 1991

SUPERSEDING

MIL-M-63036C(TM)

14 SEPTEMBER 1989

# MILITARY SPECIFICATION MANUALS, TECHNICAL: OPERATOR'S, PREPARATION OF

This specification is approved for use by the Department of the Army and is available for use by all Departments and Agencies of the Department of Defense.

## 1. SCOPE

1.1 **Scope.** This specification contains the requirements for the preparation of operator's technical manuals (TM).

1.2 **Applicability.** Operator's TMs contain information needed by operators and crewmembers to operate and do maintenance authorized to them. All requirements in this specification are not applicable to all equipment or situations. It is necessary to tailor this specification for each acquisition using appendix B.

1.3 **Limitations.** This specification does not cover the requirements for the preparation of TMs that cover operator and crew instructions for aircraft.

1.4 **Figures/examples.** Figures used in this specification are examples and are applicable only as indicated by the figure title. If there is a conflict between a figure and the text, the text takes precedence.

Beneficial comments (recommendations, additions, deletions) and any pertinent data which may be used in improving this document should be addressed to: USAMC Materiel Readiness Support Activity, ATTN: AMXMD-MP, Lexington, KY 40511-5101 by using the self-addressed Standardization Document Improvement Proposal (DD Form 1426) appearing at the end of this document or by letter.
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AMSC A6143

AREA TMSS

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

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## 2. APPLICABLE DOCUMENTS

2.1 Government documents.

2.1.1 Specifications and standards. The following specifications and standards form a part of this specification to the extent specified herein. Unless otherwise specified, the issues of these documents shall be those listed in the issue of the Department of Defense Index of Specifications and Standards (DODISS) and supplement thereto, cited in the solicitation (see 6.2).

## SPECIFICATIONS

## MILITARY

MIL-M-38784	Manuals, Technical: General Style and Format Requirements
MIL-M-63038	Manuals, Technical: Unit or Aviation Unit, Direct Support, Aviation Intermediate, and General Support Maintenance, Requirements for
MIL-M-85337	Manuals, Technical: Quality Assurance Program, Requirements for

## STANDARDS

## MILITARY

MIL-STD-12	Abbreviations for Use on Drawings, Specifications, Standards, and in Technical Documents
MIL-STD-129	Marking for Shipment and Storage

(Unless otherwise indicated, copies of federal and military specifications, standards, and handbooks are available from Standardization Documents Order Desk, Building 4D, 700 Robbins Avenue, Philadelphia, PA 19111-5094.)

2.1.2 Other Government documents, drawings, and publications. The following other Governmental documents, drawings, and publications form a part of this specification to the extent specified herein. Unless otherwise specified, the issues are those cited in the solicitation.

AMC-P 750-2	Guide to Reliability Centered Maintenance
DOD 5220.22-M	Industrial Security Manual for Safeguarding Classified Information

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(Copies of specifications, standards, handbooks, drawings, publications, and other Government documents required by the contractor in connection with specific acquisition functions should be obtained from the contracting activity.)

**2.2 Non-government standards and other publications.** The following document(s) form a part of this specification to the extent specified herein. Unless otherwise specified, the issue of the documents which are DOD adopted shall be those listed in the issue of the DODISS cited in the solicitation. Unless otherwise specified, the issues of documents not listed in the DODISS shall be the issue of the nongovernment document(s) which is current on the date of the solicitation.

American Society for Testing and Materials (ASTM)

ASTM D3951            Standard Practice for Commercial Packaging

(DOD activities can obtain copies of ASTM D3951 from Standardization Documents Order Desk, Building 4D, 700 Robbins Avenue, Philadelphia, PA 19111-5094. Other Government activities, contractors, and other private concerns must procure copies from the American Society for Testing and Materials, 1916 Race Street, Philadelphia, PA 19103.)

**2.3 Order of precedence.** In the event of a conflict between the text of this specification and references cited herein, the text of this specification shall take precedence. Nothing in this specification, however, shall supersede applicable laws and regulations unless a specific exemption has been obtained.

**3. REQUIREMENTS****3.1 General.**

**3.1.1 Style and format.** Unless otherwise specified herein, the general style and format of an operator's technical manual (TM) shall be in accordance with MIL-M-38784.

**3.1.2 National stock numbers (NSN) and part numbers.** National stock numbers shall not be used in the narrative portion of the TM. Unless essential for identification, manufacturer's part numbers shall not be used in procedures and the narrative portion of the TM.

**3.1.3 Level of coverage.** The information provided in the operator's TM shall be directed to the least experienced personnel expected to use it. The reading grade level shall be the level specified by the contracting activity and evaluated in accordance with MIL-M-38784. When applicable, specific crewmembers shall be identified with their tasks. See figure 1 for example.

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3.1.3.1 **Language.** The text shall be concise, accurate, and in simplified English. The most simple words that will convey the intended message shall be used.

3.1.3.2 **Abbreviations and acronyms.** Abbreviations used throughout the manual shall be in accordance with MIL-STD-12. Use of acronyms shall be consistent throughout the TM, but shall be held to a minimum. The first use of abbreviations and acronyms shall be spelled out completely with the abbreviation or acronym in parentheses immediately after the word(s).

3.1.3.3 **Equipment names and nomenclature.** Only approved names and approved nomenclature shall be used. Terms, names, and nomenclature shall be used consistently throughout the TM.

3.1.4 **Illustrations.** Unless otherwise specified, only line drawing illustrations shall be used. Illustrations shall be integrated with the text and shall be used when text alone cannot adequately communicate the message. Illustrations shall be black and shades of blacks (one color).

3.1.5 **TM divisions.** Operator's TMs shall be divided into volumes, chapters, sections, and paragraphs, as appropriate. There shall be at least two of each division, if used. If there is a volume 1, there shall be a volume 2. If there is a chapter 1, there shall be a chapter 2.

3.1.5.1 **Volumes.** When the thickness of a TM exceeds 1,500 pages or 750 sheets, it shall be divided into volumes. Each volume shall be clearly identified on the volume cover, and each volume shall have its own table of contents. Separate volumes shall not be used to distinguish between models (i.e., -10 for basic model, -10-1 for model A, -10-2 for model B, etc.).

3.1.6 **Referencing.** Reference to other documents and information within the TM shall be held to a minimum. Reference shall not be made to other documents unless they are normally available to the user. If reference to other documents is necessary, reference shall include the document name and publication number only. Reference made within the TM shall include only the necessary information. For example, if the entire chapter is applicable, only the chapter number shall be referenced; if the data needed is found in one or more paragraph(s), reference to the paragraph number(s) shall be made.

3.1.7 **Manual size.** Technical manuals shall be prepared in the size selected from table I as specified by the contracting activity. The maximum printing area given in Table I shall include all printed matter (e.g text, illustrations, change bars, publication numbers, page numbers, etc.).

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TABLE I. Manual sizes (in inches)

Style	Trim Size	Format	Maximum Printing Area
Pocket	4 x 5-1/2	Vertical	3-1/8 x 4-1/2
	5-1/2 x 4	Horizontal	4-1/2 x 3-1/8
Logbook	6-1/2 x 9-1/2	Vertical	5-1/2 x 8-1/2
	9-1/2 x 6-1/2	Horizontal	8-1/2 x 5-1/2
Standard	8-1/2 x 11	Vertical	7-1/4 x 9
	11 x 8-1/2	Horizontal	9 x 7-1/4
Double Standard	17 x 11	Horizontal Only	15-3/4 x 9

3.1.7.1 **Pocket TM.** Pocket TM numbers shall appear on the front and back cover only. Page numbers shall appear on lower outer edge of each page.

3.1.7.2 **Horizontal TM.** Unless otherwise specified by the contracting activity, TMs prepared in horizontal format shall be printed head to foot, with holes punched at the bottom of even numbered pages and at the top of odd numbered pages. Except for pocket TMs, the TM numbers shall appear on the upper right corner of all pages, and page numbers shall appear on the lower right corner of all pages. The upper pages shall have even numbers, and the lower pages shall have odd numbers.

3.1.7.3 **Type size.** Except for pocket size TMs, type size shall be no smaller than 8 point. For pocket size TMs, type size shall be no smaller than 6 point.

3.1.7.4 **No foldout/foldup pages.** Foldout or foldup pages shall not be used.

3.1.8 **Security classification markings.** Security classification markings shall be applied in accordance with MIL-M-38784.

3.2 **Content.** The operator's TM shall consist of the following:

- a. Front matter.
- b. Chapter 1, Introduction.
  - Section I, General information.
  - Section II, Equipment description.
  - Section III, Principles of operation.

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- c. Chapter 2, Operating instructions.
  - Chapter Index (when specified).
  - Section I, Description and use of operators controls and indicators, or Summary of operations (SI manuals only).
  - Section II, Preventive maintenance checks and services.
  - Section III, Operation under usual conditions.
  - Section IV, Operation under unusual conditions.
  - Section V; Functional checks (when specified).
- d. Chapter 3, Maintenance instructions.
  - Chapter Index (when specified).
  - Section I, Lubrication instructions.
  - Section II, Troubleshooting procedures.
  - Section III, Maintenance procedures.
- e. Chapter 4, Maintenance of auxiliary equipment (when applicable).
- f. Chapter 5, Ammunition (when applicable).
- g. Chapter 6, Foreign ammunition (NATO) (when applicable).
- h. Appendix A, References.
- i. Appendix B, Components of end item (COEI) and basic issue items (BII) lists.
- j. Appendix C, Additional authorization list (AAL) items.
- k. Appendix D, Expendable and durable items list.
- l. Appendix E, Stowage and sign guides (for COEI, BII, and AAL items) (when applicable).
- m. Appendix F, On-vehicle equipment loading plan (when applicable).
- n. Appendix G, Lubrication instructions (when applicable).
- o. Index.

3.2.1 **Front matter.** Unless otherwise specified, the front matter shall consist of the following:

3.2.1.1 **Cover.** The front cover of an operator TM shall contain as a minimum the following:

- a. Publication number (provided by contracting activity).
- b. Publication title (official nomenclature).

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- c. National stock number (NSN) for item(s) covered.
- d. End item code (EIC)(as specified in the Army Master Data File (AMDF)).
- e. Publication date.
- f. Distribution statement (as specified in MIL-M-38784).
- g. Supersession notice (revisions only).

When specified, the cover shall also contain an illustration of the equipment and a front cover index. See figures 2 & 3 for examples of technical manual front covers.

3.2.1.1.1 **Front cover equipment illustration.** Unless otherwise specified by the contracting activity, the front cover shall include a line drawing of the equipment/end item. The drawing shall be three dimensional (isometric or equal) and clearly depict pertinent components of the item.

3.2.1.1.2 **Front cover index.** Unless otherwise specified by the contracting activity, the TM shall have a front cover index located on the right edge of the cover (bottom edge for horizontal TMs). The index shall have a separate boxed-in title for each major division of the TM that will be used most frequently by the operator. The boxed-in area shall have a black outer edge not less than a quarter inch wide. The first page of each major division shall have a bleeder edge (a black box) in line with the associated cover boxed-in area. See figure 2 for example.

3.2.1.1.3 **Warning summary.** A warning summary shall appear on the inside front cover to provide the operator with important warnings that appear throughout the manual. If the front cover data extends to the inside of the cover, the summary shall appear on the page immediately after the cover. This summary shall include each general type of warning and symbol used within the manual. The summary shall not be a list of specific warnings that pertain to particular procedural steps but shall include general subject data such as radiation, chemicals, voltage, gas pressure, and laser light. See figure 4 for example.

3.2.1.1.4 **Warning pages.** When warnings cannot be summarized on the inside front cover, warning page(s) shall be prepared instead of a warning summary. Warning page(s) shall include the same data as the warning summary and shall be the first page(s) following the cover. Warning pages(s) shall be identified as "a", "b", "c", and so on.

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3.2.1.2 **Title block/reporting errors and recommending improvements.** The title block shall start on a right hand page and shall contain the same information as specified in 3.2.1.1a-f. See figure 5 for example. A "reporting errors and recommending improvements" (boxed-in) statement shall appear below the title block as shown on figure 5. The address of the responsible proponent shall be inserted in this box.

a. **Unclassified/standard TM.** Except for classified TMs, pocket size TMs, and TMs with less than eight pages, the following statement shall be used:

"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: (address of proponent). A reply will be furnished to you."

One sample copy of DA Form 2028-2, figure 6, and three blank DA Forms 2028-2 with the publication number, date, and title shall be included at the back of every TM. The three blank copies shall be preprinted with the proponent's address printed on the reverse side.

b. **Pocket size TMs and TMs with less than eight pages.** For pocket size TMs and TMs with less than eight pages, the following statement shall be used:

"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 or DA Form 2028 (Recommended Changes to Publications and blank forms), direct to: (address of proponent). A reply will be furnished to you."

c. **Classified TMs.** For classified TMs, the following statement shall be used:

"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 this manual, write or tell us about it. Address your correspondence to (insert address of the proponent). When dealing with classified information, make sure that your correspondence is properly marked and is handled in accordance with AR 380-5."

d. **Distribution statements.** There shall be distribution statements directly below the reporting errors box and the statements shall be in accordance with MIL-M-38784.

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3.2.1.3 **Table of contents.** When space permits, the table of contents shall begin below the reporting errors and recommending improvements statement. If space does not permit, it shall begin on the next page. The table of contents shall be formatted and contain data as shown on figure 5, as applicable to the specific manual. Each major division of the TM shall appear in the table of contents. Each major division boxed-in on the cover index shall be boxed-in or highlighted in the table of contents. Each volume shall contain its own table of contents and shall reference companion volumes in the same TM series.

3.2.1.4 **How to use this manual.** "How to Use This Manual" information shall be located after the table of contents and before the first chapter of the TM. The title, "HOW TO USE THIS MANUAL," shall be centered at the top of the page. The information shall familiarize the operator with special or unusual features of the manual. Coverage shall lead the user through the TM and explain important features of the organization and content. For example, an explanation of the front cover index and its relationship with the boxed-in portion of the table of contents and the bleeder edges of the pages, troubleshooting charts, and maintenance instructions shall be given. How to use information shall not repeat instructions given within the chapters.

3.2.2 **Chapter 1, introduction.** This chapter shall provide the user with information for completing forms and records and familiarize the user with the equipment. Functional and physical descriptions of the major equipment, components, and applicable interface equipment shall be provided. The chapter shall consist of the following sections:

3.2.2.1 **Section I, general information.** This section shall begin with a full view illustration of the equipment showing features pertinent to the equipment operator. See figure 7 for example. This section shall include the following paragraphs:

a. **Scope.** The scope paragraph shall contain a brief statement to tell what is covered in the manual. As applicable, the following information shall be included:

- (1) Type of manual (operator's).
- (2) Equipment name(s) and model number(s).
- (3) Purpose of equipment(s).
- (4) Special inclusions in the manual such as, drill procedures or on-vehicle loading plans.

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b. Maintenance forms and procedures. This paragraph shall contain the following statement:

"Department of the Army forms and procedures used for equipment maintenance will be those prescribed by DA Pam 738-750 as contained in the Maintenance Management Update."

c. Ammunition manuals.

(1) Injury/damage. Conventional and chemical manuals shall have the following statement:

"Accidents involving injury to personnel or damage to material will be reported in accordance with AR 385-40. Explosives and ammunition malfunctions will be reported in accordance with AR 75-1."

(2) Safety, care, and handling. A safety, care, and handling paragraph shall be included which covers general safety and handling precautions for the item. For conventional or chemical ammunition manuals, a paragraph shall be included which describes specific safety, care, and handling procedures for the ammunition. Clear explanations of safety related terms, such as danger zones, hangfire, or cook-off shall be included. This information shall augment the warnings and cautions contained in the rest of the manual.

d. Corrosion prevention and control (CPC). This paragraph shall include instructions for CPC or reference the applicable instructions authorized at the operator level. See MIL-M-63038 for an example of presentation.

e. Destruction of Army materiel to prevent enemy use. This paragraph shall refer to the applicable publication that has crew/operator instructions for destruction of the equipment to prevent enemy use.

f. Reporting equipment improvement recommendation (EIR). This paragraph shall contain the following statement:

"If your (insert equipment short item name) 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 us at (insert address of proponent). We will send you a reply."

g. Warranty information. When the equipment is covered by a warranty technical bulletin (WTB), reference shall be made to the WTB. If a warranty is not applicable or only partially

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applicable, a statement to that effect shall be put in this paragraph. When a WTB is not published, pertinent warranty information shall be provided. The warranty information shall be as follows:

"The (insert name of equipment) is warranted for (insert timeframe, miles, etc.). The warranty starts on the date found in block 23, DA Form 2408-9 in the logbook. Report all defects in material and workmanship to your supervisor, who will take the appropriate action."

h. **Nomenclature cross-reference list.** An appropriate cross-reference list shall be included when non-official nomenclature (common name) is approved by the contracting activity. See figure 8 for example. Once a common name, abbreviation, or acronym is used, it shall be used consistently throughout the manual.

i. **List of abbreviations.** A list of abbreviations, consisting of all abbreviations, acronyms, signs, or symbols used in the TM shall be included. See figure 8 for example.

j. **Glossary.** Unless otherwise specified, the manual shall contain a glossary of terms. The glossary shall include all terms that are not adequately defined in the text or listed in the Dictionary of United States Army Terms (AR 310-25). See figure 8 for example.

3.2.2.2 **Section II, equipment description.** This section shall consist of the following paragraphs:

a. **Equipment characteristics, capabilities, and features.** This paragraph shall contain a summary of the equipment description in either narrative or tabular format. The summary shall include the general characteristics, capabilities, and features of the equipment. As applicable, the description shall show the equipment's relationship to other major components of the end item. Special limitations, environmental features, and operational features shall be included. See figure 9 for example.

b. **Location and description of major components.** This paragraph shall contain external and internal views of the equipment, major components, and accessories. The views shall show all items essential to operation and operator maintenance. Keyed text shall be used to provide a physical description of these essential items for the operator. See figure 10 for example. For simple equipment, these views shall not be shown in this paragraph, but shall be shown with operator's controls and indicators in chapter 2.

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c. **Differences between models.** When the TM covers more than one model, configuration, or differences of the same model that affect the operator, the differences shall be clearly identified. Identification shall be made by text, table, illustrations, or whatever method is most simple and effective for the specific application. See figure 11 for example.

d. **Equipment data.** This paragraph shall include detailed information needed by the operator to use or maintain the equipment. It shall include applicable data such as dimensions, weights, clearances, ranges, and limits. See figure 12 for example.

3.2.2.3 **Section III, principles of operation.** This section shall contain a simple functional description of how the equipment works. The description shall explain what functional effect operation and adjustment of controls, switches, and devices have on other components of the equipment. Principles of operation shall be presented by simplified block diagrams, illustrations, and text as appropriate to provide the necessary information to the operator. See figures 13 and 14 for example.

3.2.3 **Chapter 2, operating instructions.** This chapter shall present instructions needed by the operator to use or operate the equipment. The chapter shall include the following:

3.2.3.1 **Chapter index.** When specified by the contracting activity, this chapter shall begin with an index. The index shall be arranged in the alphanumerical order of the sections and paragraphs within the chapter. Entries shall include the paragraph/section numbers followed by their exact titles. See figure 15 for example.

3.2.3.2 **Section I, description and use of operator's controls and indicators.**

a. Normally, this section shall include line drawing illustrations of all operator controls and indicators. Each control and indicator shall be clearly labeled as it appears on the equipment. Controls and indicators that are not labeled, such as the accelerator or brake pedals, shall be identified. The functional use of each control and indicator shall be explained by use of a table(s), keyed text, or listing that describes each control separately. See figure 16 for example.

b. **Section I (for system integration (SI) manuals only).** For SI manuals (see 6.6.8), section I shall be titled "Summary of Operations". This section shall present an overview of the system. This overview shall describe how the end items that compose the system interrelate to achieve system functionality. When necessary, line drawings shall be used to augment the text and to show signal/data flow, equipment relationships, and

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functional block diagrams for system integration. When the system has some system level controls and indicators that are not covered by other technical manuals, the description and use of operator controls and indicators shall be included for these controls. For systems/equipment not requiring separate SI manuals, this overview shall be part of Chapter 1, Section III, Principles of Operation.

**3.2.3.3 Section II, preventive maintenance checks and services (PMCS).** This section shall contain a PMCS table with checks and services that are based on reliability centered maintenance (RCM), as prescribed in AMC-P 750-2. The table shall contain only those checks and services authorized to the operator by the maintenance allocation chart (MAC) under "inspection" and "service" functions. For SI manuals, the PMCS table shall begin with system level checks (if applicable), then proceed to reference the end item manuals for their PMCS, and shall conclude with referencing the paragraph for the system functional check. The table shall have an introduction which explains to the user its purpose and how to use it. See figure 17 for example. The table shall be arranged in the formats shown on figures 18 and 19.

**3.2.3.3.1 Introduction to PMCS table.** The first paragraph in section II shall be the introduction. The introduction shall contain the following paragraphs:

a. **General.** This paragraph shall contain an explanation of the purpose and use of the PMCS table.

b. **PMCS procedures.** This paragraph shall contain an explanation of each column of the table and any general checks/services that are common to the entire piece of equipment.

c. **Special information paragraphs.** These paragraphs shall contain any special information such as cleaning agents, lubrication, and fluid leakage information that is necessary for the user to know before doing PMCS.

For an example of a PMCS introduction see figure 17.

**3.2.3.3.2 Equipment illustration.** When specified by the contracting activity, the first page after the introduction shall include an illustration of the equipment. The illustration shall include a routine diagram showing the order by which the checks and services will be done.

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3.2.3.3.3 PMCS table. The PMCS table shall include the following:

a. Special instructions.

(1) For equipment that is normally kept in continuous operation, the following note shall be included between the title of the table and the table.

"NOTE

If the equipment must be kept in continuous operation, do only the procedures that can be done without disturbing operation. Make complete checks and services when the equipment is shut down."

(2) When check and service intervals must be shortened because the equipment may be used under unusual conditions, an asterisk shall precede the interval. A footnote shall explain the asterisk and the reason for the shortened interval.

(3) A statement such as the following shall be included when applicable:

When a check and service procedure is required for both weekly and before intervals, it is not necessary to perform the weekly procedure during the same week in which the before procedure was done.

(4) When the equipment contains fluids, such as lubrication oil or hydraulic fluid, leakage criteria shall be included in the introduction to the PMCS and referred to in the NOT MISSION CAPABLE IF column.

b. Title. The table shall have a title as follows:

"Preventive Maintenance Checks and Services for (insert equipment model number)."

c. Arrangement of procedures. PMCS procedures shall be arranged in a logical sequence so that a minimum amount of time and motion is used without crewmembers interfering with each other.

(1) Interval groupings. Check and service procedures shall be grouped according to their intervals. Procedures done first or most frequently, such as "before" checks and services, shall appear before "during" and "after" checks and services. Unless otherwise specified by the contracting activity, intervals beyond weekly shall not be used in the operator's PMCS table. Intervals determined by operation, such as hours of operation,

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shall be expressed in the applicable units of measure. Reference to other procedures shall not be made. Each procedure shall stand alone.

(2) **Crewmember groupings.** When more advantageous to the user, intervals shall be subgrouped by crewmember(s) as shown on figure 19.

d. **Components of end item (COEI) and basic issue items (BII).** All COEI and BII that require individual PMCS procedures shall be separately incorporated into the end item PMCS table under their applicable group/title headings.

e. **Warnings, cautions, and notes.** Warnings, cautions, and notes shall appear in the PMCS table as prescribed by MIL-M-38784.

f. **PMCS table columnar headings.**

(1) **Item No. column.** Unless otherwise specified by the contracting activity, item numbers shall be assigned to procedures in consecutive numerical order.

(2) **Interval column.** The interval column shall indicate when the checks and services are to be done. The intervals shall be represented by complete words such as: "Before" for before operation; "During" for during operation; and "After" for after operation. See section 6 for definitions of these intervals.

(3) **Location, item to check/service column.** This column shall contain the name of the item(s) to be checked or serviced. When appropriate, the location of the item within the equipment/end item shall be provided, underlined, and appear above the item name. The header shall include the word "Location" above "Item to Check/Service." When the location is given, the introduction to the PMCS table shall explain its use.

(4) **Procedure column.** This column shall contain concise procedures required to do the checks and services. The procedure shall begin with an action word and shall be stated in the second person imperative mood. The procedure shall include all the information needed to do the checks and services, including appropriate tolerances, adjustments, limits, and gage and meter readings. The procedure column shall have illustrations as required to identify location or process of task being performed. Unless otherwise approved by the procuring activity, illustrations shall be integrated with the procedures (see figure 18). Unless otherwise specified by the contracting activity, reference to procedures and information in other parts of the document or in other documents shall not be made.

(5) **Not fully mission capable if: column.** Entries in this column shall be keyed specifically to checks and services

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appearing in the procedure column. Entries shall identify the faults of the equipment, determined by the checks and services procedures, that will prevent the equipment from being fully mission capable.

3.2.3.4 **Section III, operation under usual conditions.** This section shall include all the instructions necessary to operate the equipment and auxiliary equipment under usual conditions. These instructions shall include assembly, preparation for use, adjustments, daily checks, self-test (as applicable), operating procedures, and preparation for movement.

3.2.3.4.1 **Assembly and preparation for use.** This paragraph shall include unpacking, assembly, and installation instructions. When the equipment is shipped/delivered in specially designed containers, unpacking instructions shall be provided. If the containers are to be used again, kept for future use, turned in to supply, or if any special disposition is required, the necessary procedures shall be included. Step-by-step assembly and installation procedures shall be provided when needed. These instructions shall be supported by illustrations. As applicable, power requirements, connections, and initial control settings needed for installation purposes shall be included.

3.2.3.4.2 **Initial adjustments, checks, and self-test (as applicable).** This paragraph shall include routine checks, self-test, or adjustments the operator must make before putting the equipment into operation.

3.2.3.4.3 **Operating procedures.** This paragraph shall include procedures to put the equipment into operation, to operate the equipment in each of its modes of operation, and to put the equipment in standby or shutdown status. These procedures must explain how the equipment is operated in conjunction with ancillary and auxiliary equipment and show integration with other equipment, as applicable.

3.2.3.4.4 **Decals and instruction plates.** Decals and operating instruction plates located on the equipment, essential for operation, shall be clearly illustrated so that all data are legible. Related warning and caution decals and plates shall be included. An illustration(s) shall be used to show the location of all applicable decals and plates.

3.2.3.4.5 **Operating auxiliary equipment.** If applicable, this paragraph shall include procedures to put the auxiliary equipment into operation, to operate it, and to put it in standby or shutdown status. If these procedures require more than two pages, and they are published in another manual covering the auxiliary equipment, reference shall be made to that manual.

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3.2.3.4.6 Preparation for movement. If the equipment is designed for movement, and it can be prepared for movement by the operator, preparation procedures shall be provided. These procedures shall include information for actions such as disassembly, folding, and telescoping. Essential illustrations shall be used to support the text.

3.2.3.5 Section IV, operation under unusual conditions. This section shall contain instructions for operation under unusual conditions including special operating instructions for each expected condition. These instructions shall include protective and preventive measures to be taken for these conditions. Measures to be taken beyond the scope of the operator shall be identified and reference or action to be taken by the operator shall be provided. The following conditions shall be covered, as applicable.

3.2.3.5.1 Unusual environment/weather. Instructions shall cover procedures for operation under the following conditions: extreme heat (moist and dry), extreme cold, salt air, sea spray, duststorms, sandstorms, high altitudes, snow, mud, and other similar conditions. Define ranges of environmental/weather operating conditions considered for the system addressed.

3.2.3.5.2 Fording and swimming. As applicable, procedures for fording and swimming the equipment shall be provided.

3.2.3.5.3 Emergency procedures. Instructions shall be provided to meet emergency operating conditions such as reduction in power or partial equipment failure.

3.2.3.5.4 Nuclear, biological, and chemical (NBC) decontamination procedures. As applicable and specified by the contracting activity, interim general NBC decontamination procedures to be performed until NBC decontamination facilities are available shall be provided. Other decontamination documents shall be referenced only when necessary. For an example of an interim general decontamination procedures presentation, see figure 34.

3.2.3.5.5 Jamming and electronic countermeasures (ECM). As applicable, instructions shall be included for operation of the equipment in an ECM environment through transmitted and reflected deception signals and transmitted and reflected jamming.

3.2.3.6 Section V - functional checks. For SI manuals, and when specified by the contracting activity for non-SI manuals, this section shall contain all operational checks that must be performed to confirm that the system/equipment is fully operational.

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3.2.4 **Chapter 3, Maintenance instructions.** This chapter shall include sections covering lubrication, troubleshooting, and corrective maintenance.

3.2.4.1 **Chapter index.** When specified by the contracting activity, this chapter shall begin with an index. The index shall be arranged in the order of presentation within sections and paragraphs of the chapter. Entries shall include the paragraph/section numbers followed by their exact titles. See figure 15 for example.

3.2.4.2 **Section I, lubrication instructions.** This section shall contain one of the two following statements, as applicable.

a. "Lubrication Not Required."

b. "Lubrication instructions are in appendix G, of this TM. All lubrication instructions are mandatory."

3.2.4.3 **Section II, troubleshooting procedures.** This section shall contain information to help the operator recognize, find the cause, and correct the trouble in the equipment and auxiliary equipment. For systems with SI manuals, troubleshooting for any fault shall begin in the SI manual. Troubleshooting shall continue in the SI manual until the fault or symptom can be isolated to a specific component. At this point, further troubleshooting shall be referenced to the system component manual in such a manner that the correct troubleshooting path in the system component manual is easily recognized. The information shall be presented by simplified illustrations, charts, tables, or diagrams in the format most suitable for the equipment.

a. **Arrangement of procedures.** The procedures shall be arranged so that the most probable malfunctions (troubles) appear first. Each procedure, or set of procedures, shall assume the following logic: The malfunction shall be stated first, followed by test or inspection procedure(s) (presented in logical order to isolate and identify the fault), and action required to correct the fault. When corrective action is extensive and detailed instructions appear in section III, reference shall be made to the paragraph(s) covering that information. When the equipment contains several major components, the troubleshooting procedures shall be grouped by major components. See figure 20 for example of a troubleshooting table.

b. **Introductory information.** Tables, charts, and diagrams shall have an introduction and it shall give a brief explanation of the presentation, how to use it, and statements similar to the following:

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(1) This table lists common malfunctions that you may find with your equipment. Perform the tests, inspections, and corrective actions in the order they appear in the table.

(2) This table cannot list all the malfunctions that may occur, all the tests and inspections needed to find the fault, or all the corrective actions needed to correct the fault. If the equipment malfunction is not listed or actions listed do not correct the fault, notify your supervisor.

c. **Malfunction index.** When troubleshooting tables are extensive, and when specified by the contracting activity, a malfunction index shall precede the table. The index shall list the malfunctions that may be observed by the operator. They shall be listed in the same order that they appear in the table. The malfunction listed shall be cross-referenced to the paragraph or location where troubleshooting information can be found. See figure 21 for example.

3.2.4.4 **Section III, operator's maintenance procedures.** This section shall contain procedures for maintenance functions authorized to the operator by the MAC. When this section contains a large number of maintenance functions, and when specified by the contracting activity, this section shall begin with an index of the section. The index shall list the functions as they appear in the section. The functions shall be cross-referenced to the applicable paragraph number. Procedures shall be preceded with an introduction, step-by-step procedures presented in the order in which they should be done, and supported by illustrations. Procedures shall include functions such as inspect, test, install, replace, disassembly and assembly, repair, clean, adjust, lubricate, and align.

3.2.5 **Chapter 4, maintenance of auxiliary equipment.** This chapter shall be included in the TM when there is auxiliary equipment. The chapter shall contain all maintenance information applicable to the auxiliary equipment as required by 3.2.4.

3.2.6 **Chapter 5, ammunition.** This chapter shall be included when the manual covers weapons involving the use of ammunition. An illustration shall be used to clearly show all identifying markings on the equipment. See figure 22 for example. A table shall be included covering classification, identification, care, handling, preservation, transportation, authorized rounds, preparation for firing, fuzes, packing and other pertinent information and references, as applicable. See figure 23 for example.

3.2.7 **Chapter 6, foreign ammunition (NATO).** When specified by the contracting activity, this chapter shall be included. When applicable, this chapter shall be in accordance with the requirements of 3.2.6.

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3.2.8 Appendixes.

3.2.8.1 Appendix A, references. This appendix shall list all publications referenced in the manual and required by the operator to operate and maintain the equipment. The appendix shall have an introduction or scope paragraph to provide a brief statement(s) concerning its use and content. The publications shall be listed in groups by publication types. If the publication is non-Government, the source shall be provided. The complete name of each publication and the publication number shall be used. See figure 24 for example. When a list of applicable publications (LOAP) is published, this appendix shall reference the LOAP.

3.2.8.2 Appendix B, components of end item (COEI) and basic issue items (BII) lists. This appendix shall consist of two lists: the Components of End Item List, and the Basic Issue Items List. Section I of the appendix shall be the introduction to both lists. Section II shall consist of the COEI listing and illustrations of the items, as necessary. Section III shall consist of the BII listing and illustrations, as necessary.

3.2.8.2.1 Section I, Introduction. The introduction shall consist of the following paragraphs:

a. Scope. The scope shall contain the following statement:

"This appendix lists components of the end item and basic issue items for the (insert the short end item name) to help you inventory the items for safe and efficient operation of the equipment."

b. General. This paragraph shall contain the following statements:

"The Components of End Item (COEI) and Basic Issue Items (BII) Lists are divided into the following sections:

a. Section II, Components of End Item. This listing is for information purposes only, and is not authority to requisition replacements. These items are part of the (enter name of end item). As part of the end item, these items must be with the end item whenever it is issued or transferred between property accounts. Items of COEI are removed and separately packaged for transportation or shipment only when necessary. Illustrations are furnished to help you find and identify the items.

b. Section III, Basic Issue Items. These essential items are required to place the (enter name of end item) in operation, operate it, and to do emergency repairs. Although shipped separately packaged, BII must be with

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the (enter name of end item) during operation and when it is transferred between property accounts. This list is your authority to request/requisition them for replacement based on authorization of the end item by the TOE/MTOE. Illustrations are furnished to help you find and identify the items."

c. **Explanation of columns.** This paragraph shall include the following paragraphs:

"a. Column (1), Illus Number, gives you the number of the item illustrated.

b. Column (2), National Stock Number, identifies the stock number of the item to be used for requisitioning purposes.

c. Column(3), Description and Usable On Code, identifies the Federal item name (in all capital letters) followed by a minimum description when needed. The last line below the description is the Commercial and Government Entity Code (CAGEC) (in parentheses) and the part number."

When the equipment comes in different models or configurations and usable on codes have been assigned, statements similar to the following shall be included:

"If the item you need is not the same for different models of the equipment, a Usable On Code will appear on the right side of the description column on the same line as the part number. These codes are identified below:

<u>CODE</u>	<u>USED ON</u>
194	Model M1008
208	Model M1008A1
209	Model M1009

d. Column (4), U/I (unit of issue), indicates how the item is issued for the National Stock Number shown in column two.

e. Column (5), Qty Rqd, indicates the quantity required."

3.2.8.2.2 **Section II, components of end item.** This section shall consist of illustrations and a listing of components of the end item (spare/repair parts that are removed from the major end item and separately packaged or stowed for transportation or movement; includes on-board spares). The illustrations shall be

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line drawings and shall be placed above or precede the listing. The arrangement of the illustrations and listings shall be similar to that shown on figure 25.

a. **Illustrations**. All items appearing in the listing shall be illustrated. Each item shall be identified with a callout. Item number one, or the lowest item number listed on the page, shall be located at the upper left area of the illustration field. The other items shall be placed in numerical order from left to right or in clockwise order.

b. **Listing**. The COEI list shall include the headings and basic content shown on figure 25, applicable to the specific equipment. The description of each item shall consist of the approved Federal item name, followed by a short description when needed. Items shall be listed alphabetically. The CAGEC shall be located below the item name and in parenthesis. The part number shall follow the CAGEC. When more than one model or configuration is involved and usable on codes (UOC) are assigned, the UOC shall appear at the right edge and on the last line of the description column for the applicable component. When on board spares apply, there shall be a break in the text of the listing and new heading "ON BOARD SPARES" shall be used. A listing of the on board spares shall appear in the same format as required for the basic COEI list.

3.2.8.2.3 **Section III, basic issue items**. This section shall be prepared in the same format and include the same content (tailored to the applicable BII) as required for the COEI list. See figure 26 for example.

3.2.8.2.4 **Stowage location**. The stowage location of COEI and BII shall be included in the description column of the COEI and BII lists. See figure 26 for example.

3.2.8.3 **Appendix C, additional authorization list (AAL)**. This appendix shall list all AAL items (items not issued with the end item, not listed on the end item engineering drawing as part of the end item (NSN) configuration, not required to be turned in with the end item, separately authorized by an MTOE, TDA, CTA, or JTA, and provided for information only). The appendix shall consist of two sections: Section I, Introduction, and Section II, Additional Authorized Items List. No illustrations shall be used.

3.2.8.3.1 **Section I, introduction**. The introduction shall include the same format and general content shown on figure 27 as applicable.

3.2.8.3.2 **Section II, additional authorized items list**. This section shall list additional authorized items. The format and

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general content of the list shall be prepared as shown on figure 28. The headings and subsequent information for this listing shall be the same as the COEI and BII lists except the Illus Number Column required for the COEI and BII lists shall not apply since there are no illustrations used, and the Qty column shall be Qty Recm (quantity recommended). The items shall be listed alphabetically.

**3.2.8.4 Appendix D, expendable and durable items list.** This appendix shall have two sections: Section I, Introduction, and Section II, Expendable and Durable Items List (tabular listing). The introduction shall be prepared and shall include the applicable information as shown on figure 29. This appendix shall not include illustrations. The list shall be formatted and shall include the applicable information under the headings shown on figure 30. This list shall include the items authorized to the operator/crew.

**3.2.8.5 Appendix E, stowage and decal/data plate guide.** This appendix shall include an illustration detailing the location of applicable COEI, BII, and AAL items. As applicable, this appendix shall also include illustrations detailing the locations of all decals and data plates. See figure 31 for example.

**3.2.8.6 Appendix F, on-vehicle equipment loading plan.** This appendix shall be included when specified by the contracting activity. The loading plan shall include information provided by the equipment user representative. The first page of the appendix shall identify the equipment covered and shall include a brief scope statement(s) explaining the purpose of the loading plan. The plan shall include illustrations and tabular listings of the items identified on the illustrations. See figures 32 and 33 for example.

a. **Illustrations.** Line drawing illustrations shall show the location of all applicable equipment. Views (external and internal) shall be used. When applicable, both tactical and non-tactical situation loading configurations shall be shown. Items shall be identified with numerical callouts. The numerical callouts shall be assigned to follow a logical sequential order, such as clockwise, left to right, or top to bottom.

b. **Listing.** The listing (legend) shall be located on the same page or the page adjacent to the associated illustration(s). The list shall have two columns, the item number column (corresponding to the illustration item numbers) and the item name column.

**3.2.8.7 Appendix G, lubrication instructions.** This appendix shall include all lubrication instructions as specified in

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appendix A of this specification. When there are no lubrication requirements, the statement "Lubrication Not Required" shall appear below the appendix title.

3.2.9 **Alphabetical index.** The manual shall include an alphabetical index prepared in accordance with MIL-M-38784.

**4. QUALITY ASSURANCE PROVISIONS**

4.1. **Responsibility for inspection.** Unless otherwise specified in the contract or purchase order, the contractor is responsible for the performance of all inspection requirements (examinations and tests) as specified herein. Except as otherwise specified in the contract or purchase order, the contractor may use his own or any other facilities suitable for the performance of the inspection requirements specified herein, unless disapproved by the government. The government reserves the right to perform any of the inspections set forth in this specification where such inspections are deemed necessary to ensure supplies and services conform to prescribed requirements.

4.1.1 **Responsibility for compliance.** All items must meet all requirements of sections 3 and 5. The inspection set forth in this specification shall become a part of the contractor's overall inspection system or quality program. The absence of any inspection requirements in the specification shall not relieve the contractor of the responsibility of assuring that all products or supplies submitted to the government for acceptance comply with all requirements of the contract. Sampling in quality conformance does not authorize submission of known defective material, either indicated or actual, nor does it commit the government to acceptance of defective material.

4.2 **Quality assurance provisions.** The contractor shall be responsible for quality assurance in the preparation of the TM in accordance with MIL-M-85337 to the extent specified by the contracting activity. See 6.3.

4.3 **Contracting activity inspection.** Technical manuals submitted by the contractor shall be subject to review and verification by the contracting activity.

4.4 **In-process reviews.** When specified by the contracting activity, these reviews will be performed by its representatives during the preparation of the TM. The contractor shall support these reviews by providing access to the TM materials and equipment, facilities, or other support as specified by the contracting activity.

4.5 **Validation.** The contractor shall validate the technical accuracy and adequacy of all operating and maintenance procedures in the TM in accordance with MIL-M-85337. This validation shall

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include a complete review of the associated MAC to ensure that all authorized operator or crew tasks are covered in the TM. It shall include a review of all supply items included in the TM to insure that they are authorized for use at the operator/crew level. When specified by the contracting activity, a simulation of performance may be used to avoid destructive testing. Each individual task shall be validated from start to completion in one session. The technical accuracy and content of all drawings, diagrams, schematics, and other material which supports the task shall be validated as part of the task. The contracting activity reserves the right to witness the validation. The contractor shall correct all errors found in the TM during the validation. Minor corrections may be made on the spot and the performance of the task continued. Numerous corrections that disrupt the performance of the task shall be considered major corrections. In the case of any type of major correction, the entire task performance shall be repeated at another time after the corrections have been made to the TM.

**4.5.1 Records.** The contractor shall maintain quality assurance records that contain, at the minimum, the following information: dates of validations, tasks and material validated, method of validation (simulation or actual), findings and applicable remarks, and action taken. The contracting activity reserves the right to examine these records at the contractor's facility.

**4.5.2 Government furnished information.** The contractor shall validate information furnished by the Government along with the rest of the TM. The contractor shall notify the contracting activity if any government furnished information is inaccurate, inadequate, or inconsistent with the contents of the TM.

**4.6 Verification.** Unless otherwise specified by the contracting activity, the contractor shall participate in the verification by the government and shall provide the following support:

a. Record and maintain records during the verification process. The contractor shall also maintain a master copy of the TM which shall be corrected during the verification process.

b. Provide assistance to the contracting activity during the verification and provide the government with a copy of the discrepancies revealed.

c. Make necessary corrections to discrepancies revealed during the verification process.

d. Provide the contracting activity with a report of the corrective actions taken.

**MIL-M-63036D(TM)****5. PACKAGING**

5.1. **Packaging and marking.** Unless otherwise specified by the contracting activity, the packaging and packing of TMs and associated TM products shall conform to ASTM D3951 (for unclassified) and AR 380-5 (for classified).

5.2. **Marking.** Packages shall be marked in accordance with MIL-STD-129 and ASTM D3951, as applicable, and shall include the appropriate technical manual number and publication date.

5.3. **Classified material.** All classified material shall be safeguarded, packaged, and marked in accordance with DOD 5220.22-M.

**6. NOTES**

(This section contains information of a general or explanatory nature that may be helpful, but is not mandatory.)

6.1. **Intended use.** This specification is intended to be used for acquisition of technical manuals needed by the operator/crew personnel for the operation and maintenance of equipment. The requirements of this specification are normally invoked by contract. When the government prepares the subject manuals, the government preparing activity assumes the role of the contractor, and is responsible for meeting the requirements specified herein.

6.2. **Acquisition requirements.** Acquisition documents should specify the following:

- a. Title, number, and date of this specification.
- b. Title and publication number of the manual to be prepared.
- c. Description of target audience and reading grade level.
- d. Identification of information to be furnished by the Government.
- e. Quality assurance provisions to be invoked (including deliverable data requirements).
- f. Specification tailoring (completed Requirements Selection Summary sheets, appendix C).

6.3. **Data requirements.** The following data item descriptions (DID) must be listed, as applicable, on the Contract Data Requirements List (DD Form 1423) when this specification is applied on a contract, in order to obtain the data, except where DOD FAR Supplement 27.475-1 exempts the requirement for a DD Form 1423.

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<u>Reference Paragraph</u>	<u>DID Number</u>	<u>DID Title</u>
4.2	DI-M-2194	Technical Manual Quality Assurance Program Plan
4.2	DI-M-2195	Validation Plan
4.2	DI-M-2196	Validation Certification
4.2	DI-M-2197	Technical Manual Evaluation Records
4.2	DI-M-2198	Verification Plan
4.2	DI-M-2199	Verification Planning Data Card
4.2	DI-M-2200	Verification Sequence Control Chart
4.2	DI-M-2201	Verification Incorporation Certification

The above DIDs were those cleared as of the date of this specification. The current issue of DOD 5010.12-L, Acquisition Management Systems and Data Requirements Control List (AMSDL), must be researched to ensure that only current, cleared DIDs are cited on the DD Form 1423.

6.4 Technical manuals acquisition. This specification must be listed on the Contract Data Requirements List (DD Form 1423) in order to acquire the technical manuals described by the specification, except where DOD FAR Supplement 27.475-1 exempts the requirement for DD Form 1423.

6.5 Verification responsibility. The Government will always verify PMCS procedures. The Government is responsible for providing user (military) personnel to perform 100 percent verification of PMCS procedures. The extent of verification of the complete TM will be determined by the contracting activity/user representative.

6.6 Definitions. The definitions of terms below apply as they are used in this specification.

6.6.1 After operation checks. After checks are those checks that are performed immediately at the conclusion of the mission and that identify and correct faults that will prevent the next mission, ensure the equipment is fully mission capable, and maintain the equipment to an original condition standard. Faults which render the equipment not mission capable must be corrected prior to

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start of the next mission. All other faults are corrected or if above operator level, reported to unit maintenance and action taken before next mission.

**6.6.2 Before operation checks.** Before checks are those checks that are performed just prior to the start of the mission and that identify faults which will prevent the performance of the mission. The operator/crew member starts at a point outside of the equipment, walks a sequence around the equipment performing checks, enters the crew compartment and performs on board checks. these checks are to be arranged so they can be performed in 20 minutes or less.

**6.6.3 Contracting activity.** An element of an agency designated by the agency head and delegated broad authority regarding acquisition functions.

**6.6.4 During operation checks.** During checks are those checks that are performed during the mission and that identify faults in equipment performance. Faults which render the equipment not mission capable require immediate correction. These checks should be very minimal and observable while operating equipment.

**6.6.5 Fully mission capable.** A condition status of an item of equipment or system meaning it has all essential subsystems installed and operating.

**6.6.6 Monthly checks.** Monthly checks are those checks that are performed for faults which do not need to be checked for weekly but must be checked for more often than at next service by unit maintenance and which must be corrected to sustain equipment to fully mission capable standards until the next service by unit maintenance.

**6.6.7 Operator.** The operator is considered a soldier who actually uses or operates the equipment. In the case of equipment which is crew served, the operator is considered to be each crewmember regardless of function.

**6.6.8 System integration (SI) manual.** A manual that is used when a system is composed of multiple components with each component having its own TM coverage. It is used to provide the system overview and is used as the starting point for all operation, troubleshooting, and maintenance procedures. See paragraphs 3.2.3.2b, 3.2.3.3, 3.2.3.6, and 3.2.4.3 for information pertaining to SI manuals.

**6.6.9 Technical manuals.** Publications that contain instructions for the installation, operation, maintenance, training, support of weapon systems, weapon system components, and support equipment. TM information may be presented in any form or characteristic, including but not limited to hard copy, audio and

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visual displays, magnetic tape, discs, and other electronic devices. They normally include operational and maintenance instructions, parts lists or parts breakdown, and related technical information or procedures exclusive of administrative procedures.

6.6.10 Warning. A statement or some other notification about an operating procedure, practice, or condition that, if not strictly observed, could result in long term health hazard, injury or death of personnel performing the task prescribed in the manual.

6.6.11 Weekly checks. Weekly checks are those checks that are performed to identify faults which must be corrected to sustain equipment to fully mission capable standards until next service by unit maintenance.

6.7 Subject term (key word) listing.

- Additional Authorization List (AAL)
- After operation checks
- Basic Issue Item (BII)
- Before operation checks
- Components of End Item (COEI)
- During operation checks

6.8 Changes from previous issue. Marginal notations are not used in this revision to identify changes with respect to the previous issue due to the extensiveness of the changes.

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PREPARATION FOR HELICOPTER LIFT-OFF - Continued

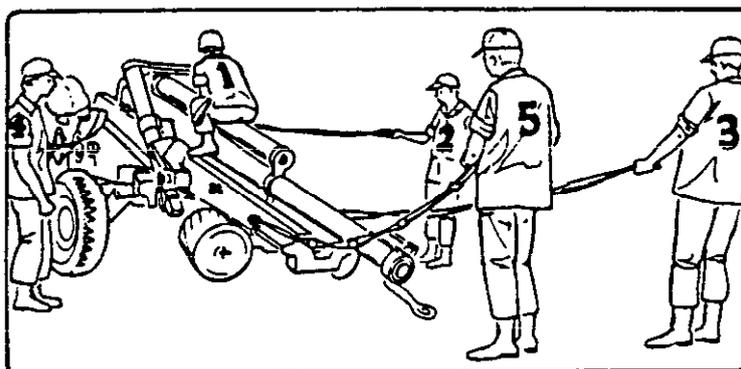
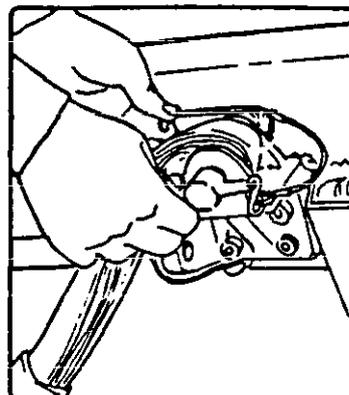
5 Cannoneers 2-3-4-5 start installing slings:

Cannoneer no. 2 applies 11 ft. sling to left rear of weapon.

No. 4 applies 11 ft. sling to right rear of weapon.

No. 3 applies 12 ft. sling to left front of weapon.

No. 5 applies 12 ft. sling to right front of weapon.



6 The cannoneers twist their respective slings 4 times.

7 Cannoneer no. 1 then straddles recuperator cylinder.

FIGURE 1. Example of operating procedures identifying specific crewmembers and tasks.

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TM 9-2350-264-10-1

**OPERATOR'S MANUAL**  
**OPERATOR CONTROLS, PMCS,**  
**AND OPERATION UNDER**  
**USUAL CONDITIONS**

VOLUME 1 OF 2



**TANK, COMBAT, FULL-TRACKED:**  
**120-MM GUN, M1A1**  
**(NSN 2350-01-087-1095)(EIC:AAB)**  
**GENERAL ABRAMS**

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HEADQUARTERS, DEPARTMENT OF THE ARMY

SEPTEMBER 1990

FIGURE 2. An example of a front cover and a front cover index.

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TM 5-1940-271-10

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TECHNICAL MANUAL  
OPERATOR'S MANUAL  
BOAT, RECONNAISSANCE,  
PNEUMATIC 3-PERSON  
(NSN 1940-00-287-6962)(EIC:YAG)

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

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HEADQUARTERS  
DEPARTMENT OF THE ARMY  
8 APRIL 1988

FIGURE 3. Example of a pocket style manual cover.

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**WARNING****RADIATION HAZARD****Co 60**

Tube types 0A2 and 6530/PL 35 (Tr tube) used in this equipment contain radioactive material (para 0-0). These tubes are potentially hazardous when broken, see qualified medical personnel and the Safety Director if you are exposed to or cut by broken tubes. For first aid instructions see TB 750-237 and AR 755-15. Use extreme care in replacing these tubes (para 0-0) and follow safe procedures in their handling, storage, and disposal (para 0-0). Refer to paragraph 0-0 and to TB 750-237 and AR 755-15 for instructions on handling, storage, and disposal of radioactive material.

Never place radioactive tubes in your pocket.

Use extreme care not to break radioactive tubes while handling them.

Never remove radioactive tubes from cartons until ready to use them.

**ELECTROMAGNETIC****RADIATION**

**DO NOT STAND IN THE DIRECT PATH OF THE ANTENNA WHEN THE POWER IS ON! DO NOT WORK ON THE WAVE GUIDES WHILE THE POWER IS ON!**

High frequency electromagnetic radiation can cause fatal internal burns. It can literally "cook" internal organs and flesh if you feel the slightest warming effect while near the equipment **MOVE AWAY QUICKLY!**

**FIGURE 4. Example of a warning summary.**

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**TECHNICAL MANUAL  
NO. 9-2350-310-10**

**HEADQUARTERS  
DEPARTMENT OF THE ARMY  
WASHINGTON, D.C., 8 JULY 1987**

**OPERATION AND MAINTENANCE MANUAL (CREW)****FOR****GUN, AIR DEFENSE ARTILLERY, SELF-PROPELLED, 20-MM, M163A2****(NSN 2350-01-169-2833)(EIC:3JL)****REPORTING OF ERRORS**

Reporting Errors and Recommending Improvements. You can help improve this manual. If you find any mistake or if you know of a way to improve the procedures, please let us know. Mail your letter, DA Form 2028 (Recommended Changes to Publication and Blank Forms), or DA Form 2028-2 located in the back of this manual direct to: Commander, US Army Armament, Munitions and Chemical Command, ATTN: AMSMC-MAS, Rock Island, IL 61299-6000. A reply will be furnished to you.

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**FIGURE 5.** Example of a title block reporting of errors and recommending improvements statement, and table of contents.

MIL-M-63036D (TM)

**RECOMMENDED CHANGES TO EQUIPMENT TECHNICAL PUBLICATIONS**



**SOMETHING WRONG WITH THIS PUBLICATION?**

THEN JOT DOWN THE DOPE ABOUT IT ON THIS FORM. CAREFULLY TEAR IT OUT, FOLD IT AND DROP IT IN THE MAIL.

FROM (PRINT YOUR UNIT'S COMPLETE ADDRESS)

DATE SENT

PUBLICATION NUMBER: **TM 3-4230-209-10**      PUBLICATION DATE:      PUBLICATION TITLE: **Decontaminating Apparatus, Power-Driven Stand-Mounted 500-Gallon, M12A1**

BE EXACT. PIN-POINT WHERE IT IS				IN THIS SPACE TELL WHAT IS WRONG AND WHAT SHOULD BE DONE ABOUT IT
PAGE NO.	GRAPH	NO.	NO.	
1-3	1-6			<p><i>Tank unit illustration shows suction hose item #3 as two hoses coupled together. Reason: Suction hose is now one hose.</i></p> <p><i>Text refers to cleaning solvent item 7, App. D in Expendable Supplies Section. Reason: Should be item 10, App. D.</i></p> <p><i>Blender hose illustration is not accurate as shown. Reason: Blender hose should show quick disconnect couplings at both ends.</i></p> <p style="font-size: 2em; font-weight: bold; text-align: center;">SAMPLE</p>
3-1	3-3			
3-18	3-10			

PRINTED NAME, GRADE OR TITLE AND TELEPHONE NUMBER: **SSG. TED RYBA 671-3681**      SIGN HERE: *SSG Ted Ryba*

DA FORM 2028-2 1 JUL 79      PREVIOUS EDITIONS ARE OBSOLETE      P.S. - IF YOUR OUTFIT WANTS TO KNOW ABOUT YOUR RECOMMENDATION MAKE A CARBON COPY OF THIS AND GIVE IT TO YOUR HEADQUARTERS

FIGURE 6. Example of a completed DA Form 2028-2.

MIL-M-63036D (TM)

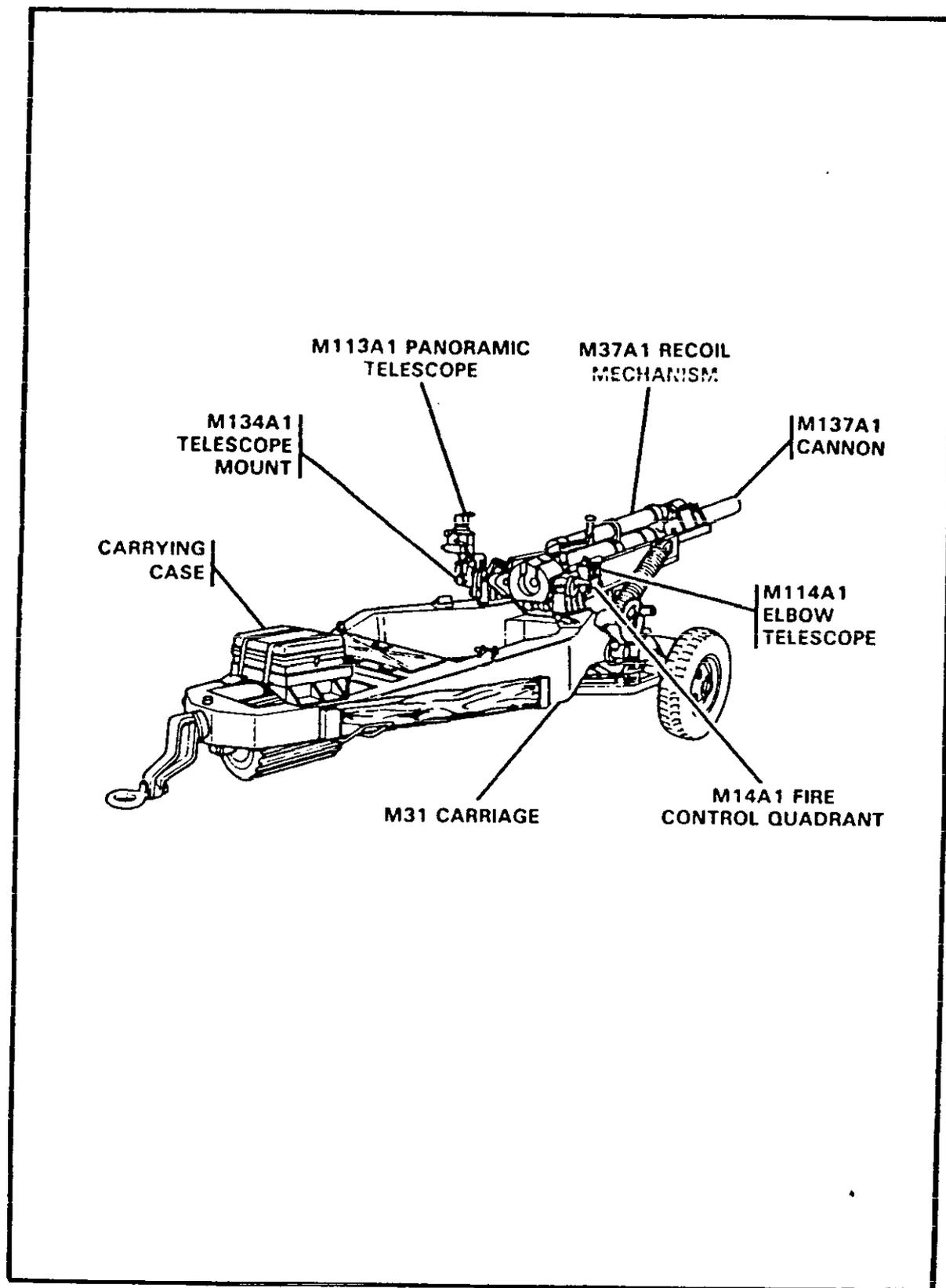


FIGURE 7. Example of a full view illustration of the equipment.

## MIL-M-63036D(TM)

## REFERENCE INFORMATION

This listing includes the nomenclature cross-reference list, list of abbreviations, and explanation of terms (glossary) used in this manual.

## A. NOMENCLATURE CROSS-REFERENCE LIST

<u>Common Name</u>	<u>Official Nomenclature</u>
Loader Transporter (LT)	Launcher, Guided Missile, Carrier, Mounted: M752
Launcher (LZL)	Launcher, Zero Length, Guided Missile: M740
Mobility Kit	Handling Unit, Guided Missile Equipment: M39
Fuel Gage	Liquid level indicator

B. LIST OF ABBREVIATIONS/  
ACRONYMS

BDAR	Battlefield damage assessment and repair
CTA	Common table of allowances
FAT	First article test

## C. GLOSSARY

Hypergolic	Ignite upon contact of components without external aid
Toxic	Poisonous
Ambient	Surrounding on all sides (environment)

**FIGURE 8.** Example of reference information (nomenclature, cross-reference, abbreviations, and glossary.)

**MIL-M-63036D(TM)**

**EQUIPMENT CHARACTERISTICS, CAPABILITIES, AND FEATURES**

**CHARACTERISTICS**

Trailer has two wheels.

Each wheel has a service brake. Control of each brake is independent of the other.

Body is easily removed.

**CAPABILITIES AND FEATURES**

Maximum load: 1500 lb (681 kg)

Maximum speed with maximum load evenly distributed:

Highway: 50 mph (80 kph)

Cross-country: 30 mph (48 kph)

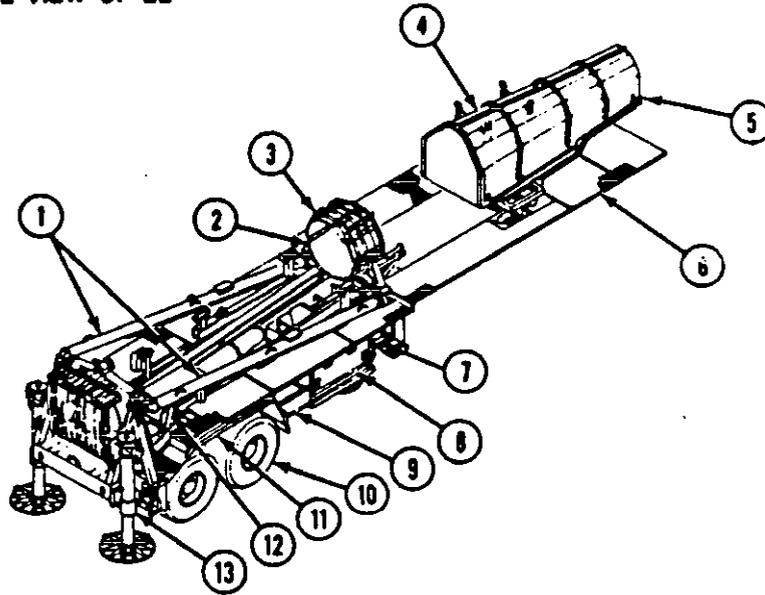
Cargo volume capability may be increased by installing tailgate and rack assembly.

Canvas cover assembly protects cargo from weather.

**FIGURE 9. Example of summary of equipment characteristics, capabilities, and features.**

## MIL-M-63036D (TM)

1-9. LOCATION AND DESCRIPTION OF MAJOR COMPONENTS.  
CURBSIDE VIEW OF EL



- 1 BOOMS. Support missile cradle during erection and recapture of missile.
- 2 MISSILE CRADLE. Supports missile during transport, erection, and recapture of missile.
- 3 RETAINING RING SEGMENTS. Used to retain missile in missile cradle during transport.
- 4 EL PALLET COVER. Protects radar and warhead sections of missile during travel.
- 5 EL PALLET. Platform used to transport and mate warhead and radar sections.
- 6 WORK PLATFORM. Work area for mating reentry vehicle sections.
- 7 FIRE EXTINGUISHER. Provides fire protection for curbside of EL.
- 8 GIEU. Consists of LCA and PCA with protective door.
- 9 HYDRAULIC CONTROL PANEL. Contains controls and indicators for system hydraulic function.
- 10 WHEEL AND TIRE ASSEMBLY. Provides high flotation surface for off-the-road operation of EL.
- 11 UPLOCK RELEASE MECHANISM. Releases azimuth ring uplock allowing missile recapture.
- 12 UPLOCK ASSEMBLY. Locks azimuth ring in erect (firing) position.
- 13 CURBSIDE REAR JACK. Used to raise, lower, and level rear curbside corner of EL.

**FIGURE 10.** Example of external view, location, and description of major components.

## MIL-M-63036D(TM)

**1-27. DIFFERENCES BETWEEN MODELS**

This paragraph shows major equipment and operational differences between models of M44A2 series vehicles. It has been organized in tabular form for easy reference by operators.

Table 1-1. Differences Between Models

Vehicle Characteristics	M35A2	M35A2C	M36A2	M49A2C	M50A2	M50A3	M109A3	M185A3	M275A2	M342A2	M756A2	M764	Description (Para. No.)
<b>Body Features:</b>													
Built-In A-Frame											X		2-31
Cab Protector										X	X	X	2-30,2-31,2-32
Earth Boring Machine												X	2-32
Floodlights											X		2-31
Nonreducible Height							X	X					1-28
Permanent Sides	X		X	X	X	X	X	X		X		X	—
Rear Winch											X	X	2-31, 2-32
Reducible Height	X	X	X	X	X	X			X	X	X	X	1-28
Removable Sides		X									X		2-25, 2-31
<b>Operational Capabilities:</b>													
Cargo/Personnel	X	X	X							X	X		2-25, 2-30.
Dump Operations										X			2-30
Earth Boring/ Poiesetting												X	2-32
Equipment Repair							X	X					2-28
Fifth Wheel Operations									X				2-29
Fuel Servicing				X									2-26
Pipeline Construction											X		2-31
Water Servicing					X	X							2-27
<b>Wheelbases:</b>													
142 in. (360.6 cm)									X				—
154 in. (391.1 cm)	X	X		X	X	X	X	X		X	X	X	—
190 in. (482.6 cm)			X										—

FIGURE 11. Example of a table showing differences between models.

**MIL-M-63036D (TM)****WEIGHTS AND DIMENSIONS****Ready for Travel**

Weight	3150 lbs (1429 Kg)
Length	186 in. (472.4 cm)
Width	79 in. (200.7 cm)
Height	81 in. (205.7 cm)
Maximum Towing Speed	45 mph (72.42 KPH)

**Emplaced with Cannon in Travel Lock**

Length	152 in. (386.1 cm)
Width	146 in. (370.8 cm)
Height	72 in. (182.9 cm)
Clearance (Traversing)	175 in. (444.5 cm)
Height (Cannon Full Elevation)	115 in. (292.1 cm)
Terrain Level	10° max slope

**PERFORMANCE**

Firing Rate-Shots per Minute	
High rate	3000 spm
Low rate	1000 spm
Burst limits-high rate only	10, 30, 60, or 100 rds

**RADAR RANGE**

Minimum	275 yds (250 meters)
Maximum	5500 yds (5000 meters) (1 sq meter target)

**FIGURE 12.** Example of detailed equipment data needed by the operator.

## MIL-M-63036D(TM)

## Section III. PRINCIPLES OF OPERATION

## 1-17. LGM FUNCTIONAL DESCRIPTION

The LGM has five functional groups:

- Multiplex
- Demultiplex
- Control
- BITE
- Power Supply

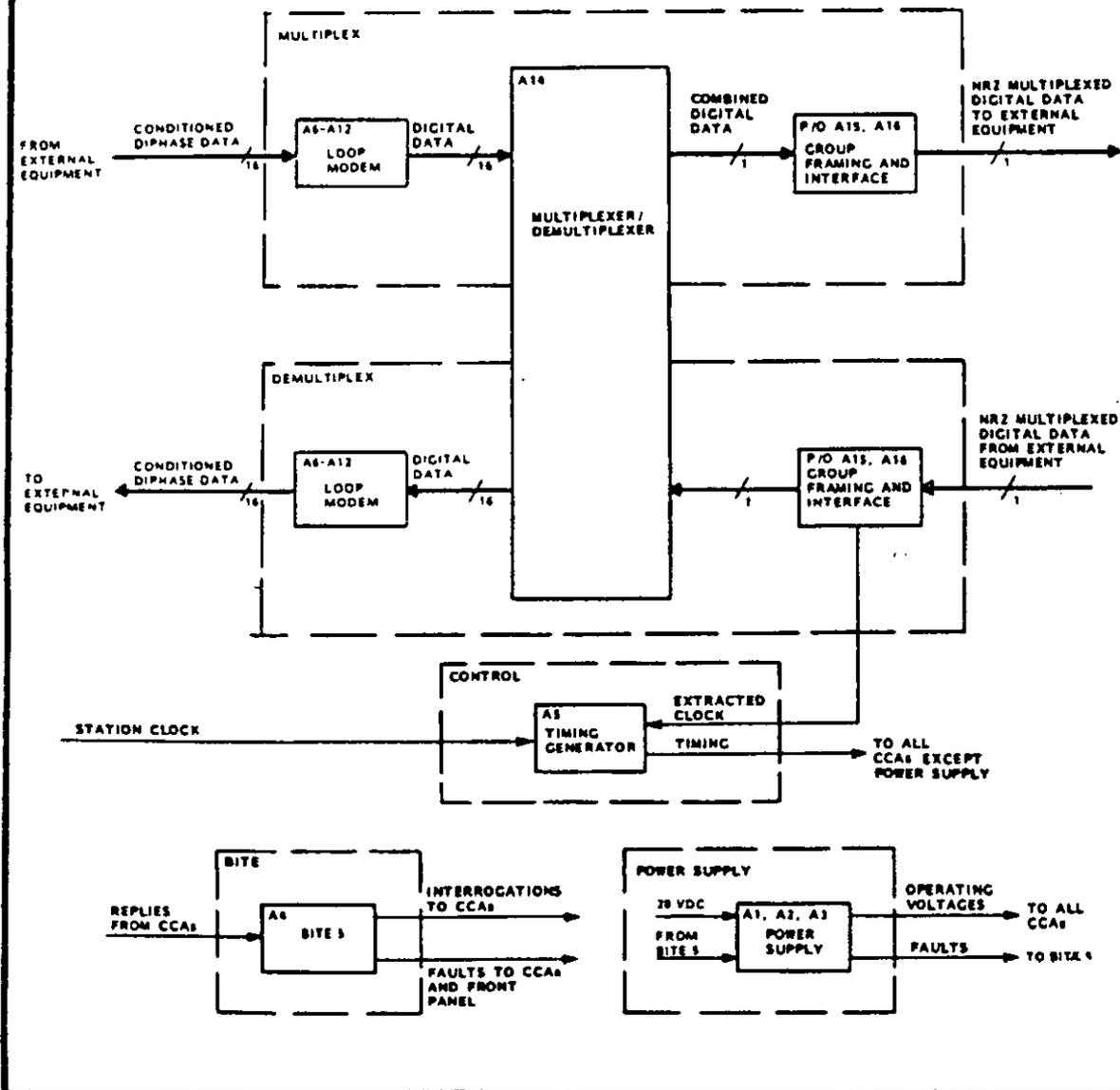
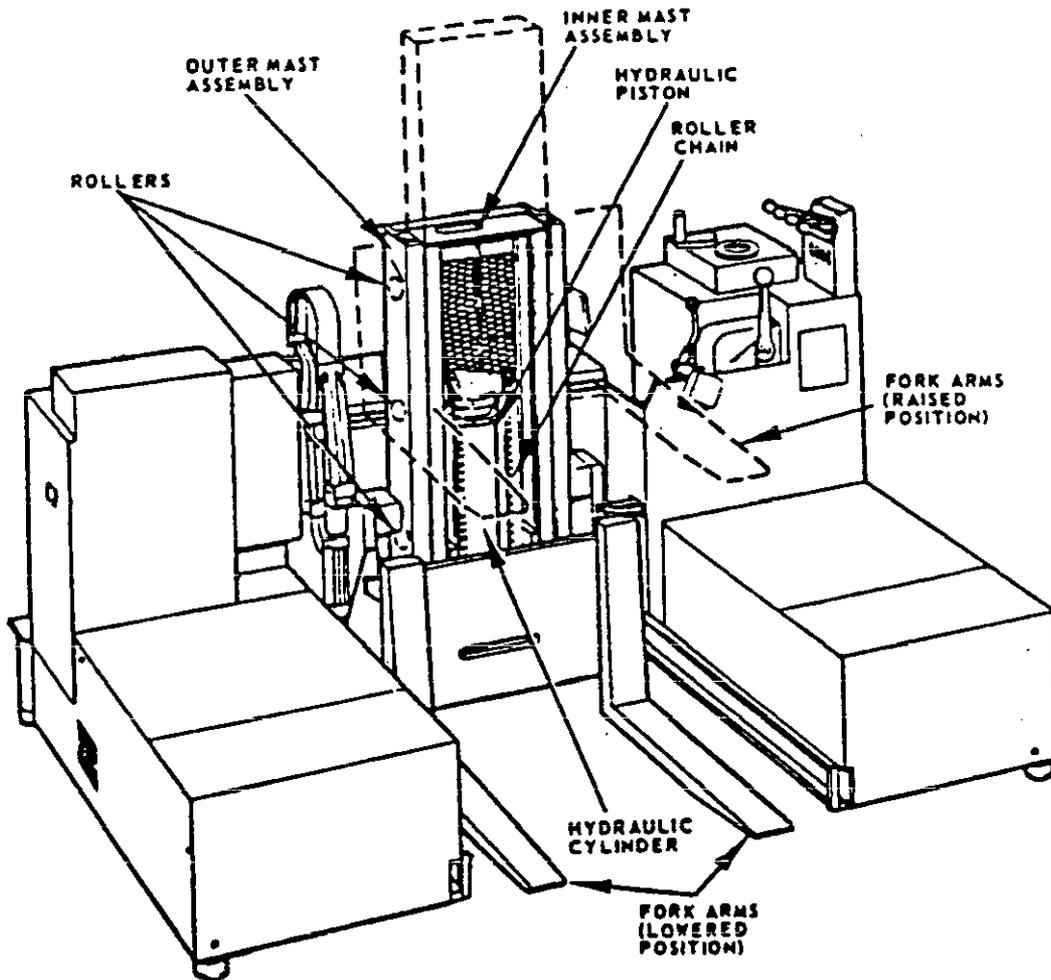


FIGURE 13. Example of a block diagram showing principles of operation.

**MIL-M-63036D (TM)**

**FORK ASSEMBLY.** The 48-inch long side reach forks are connected to the fork carriage. The fork carriage moves up and down by roller chains driven by a hydraulic cylinder and piston. The fork carriage is roller-mounted to the inner mast assembly. Rollers mounted on inner mast move in channels which make up the outer mast assembly. As the fork carriage moves up, the top of the hydraulic piston assembly comes in contact with the inner mast. If the hydraulic piston moves up more, it lifts the inner mast along with the fork carriage. Forks can be raised from deck level to 60 inches above the deck by moving the fork carriage.



**FIGURE 14.** Example of principles of operation presentation, illustration with text.

## MIL-M-63036D(TM)

CHAPTER 2  
OPERATING INSTRUCTIONS

		PAGE
Section I	Description and use of operator's controls and indicators.....	2-2
	2-1 Front panel controls and indicators..	2-2
	2-2 Rear panel connections.....	2-2
Section II	Preventive maintenance checks and services.....	2-11
	2-3 Introduction.....	2-11
	2-4 Operator's PMCS table.....	2-12
Section III	Operation under usual conditions.....	2-16
	2-5 Turning on the equipment.....	2-16
	2-6 Operator checks.....	2-17
	2-7 Turning off equipment.....	2-18
Section IV	Operation under unusual conditions..	2-20
	2-8 Operating in inclement weather.....	2-20
	2-9 Electrical interference.....	2-21
	2-10 Emergency procedures.....	2-23

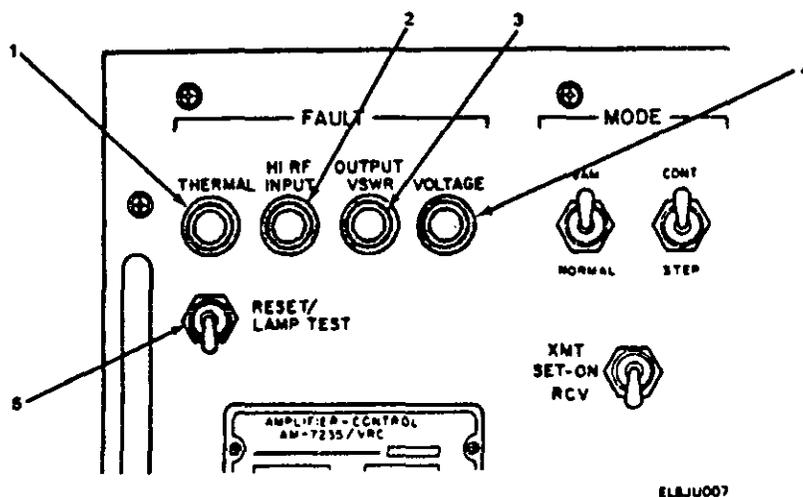
FIGURE 15. Example of a chapter index.

## MIL-M-63036D (TM)

## Section I. DESCRIPTION AND USE OF OPERATOR'S CONTROLS AND INDICATORS

## 2-1. AMPLIFIER-CONTROL.

The controls, indicators, and connectors you need to operate the amplifier-control are located on its front panel.

a. FAULT Control and Indicators.

ELBJU007

- 1 THERMAL indicator  
Lights if rf power amplifier operating temperature goes too high.  
If THERMAL indicator lights, rf signal within amplifier-control turns off automatically.
- 2 HI RF INPUT indicator  
Lights if RT unit is incorrectly set on high power.  
If HI RF INPUT indicator lights, rf signal within amplifier-control turns off automatically and goes to radio antenna.
- 3 OUTPUT VSWR indicator  
Lights if reverse rf power output goes too high.  
If OUTPUT VSWR indicator lights, rf signal within amplifier-control turns off automatically.
- 4 VOLTAGE indicator  
Lights if either input voltage or power supply output voltage goes too high.  
If VOLTAGE indicator lights, rf signal within amplifier-control turns off automatically.
- 5 RESET/LAMP TEST switch (spring-loaded)  
When any fault is corrected and switch is pushed to up position, proper FAULT indicator turns off and internal fault sensor circuits are reset.  
If no faults are present and switch is pushed to up position, all FAULT indicators light to ensure that they are good.

FIGURE 16. Example of operator controls and indicators illustrated and described.

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## Section II. PREVENTIVE MAINTENANCE CHECKS AND SERVICES (PMCS)

### 2-4. GENERAL

Preventive Maintenance Checks and Services (PMCS) means systematic caring, inspecting, and servicing of equipment to keep it in good condition and to prevent breakdowns. As the truck's operator, your mission is to:

- a. Be sure to perform your PMCS each time you operate the truck. Always do your PMCS in the same order, so it gets to be a habit. Once you've had some practice, you'll quickly spot anything wrong.
- b. Do your BEFORE (B) PMCS just before you operate the truck. Pay attention to WARNINGS, CAUTIONS, and NOTES.
- c. Do your DURING (D) PMCS while you operate the truck. During operation means to monitor the truck and its related components while it is actually being operated. Pay attention to WARNINGS, CAUTIONS, and NOTES.
- d. Do your AFTER (A) PMCS right after operating the truck. Pay attention to WARNINGS, CAUTIONS, and NOTES.
- e. Do your WEEKLY (W) PMCS once a week.
- f. Do your MONTHLY (M) PMCS once a month.
- g. Use DA Form 2404 (Equipment Inspection and Maintenance Worksheet) to record any faults that you discover before, during, or after operation, unless you can fix them. You DO NOT need to record faults that you fix.
- h. Be prepared to assist organizational maintenance when they lubricate the truck. Perform any other services when required by organizational maintenance.

### 2-5. PMCS PROCEDURES

- a. Your Preventive Maintenance Checks and Services, Table 2-1, lists inspections and care required to keep your truck in good operating condition. It is set up so you can make your BEFORE (B) OPERATION checks as you walk around the truck.
- b. The "INTERVAL" column of Table 2-1 tells you when to do a certain check or service.
- c. The "PROCEDURE" column of Table 2-1 tells you how to do required checks and services. Carefully follow these instructions. If you do not have tools, or if the procedure tells you to, notify your supervisor.

#### NOTE

Terms "ready/available" and "mission capable" refer to same status: Equipment is on hand and ready to perform its combat missions. (See DA Pam 738-750)

- d. The "EQUIPMENT IS NOT READY/AVAILABLE IF:" column in Table 2-1 tells you when your truck is nonmission capable and why the truck cannot be used.
- e. If the truck does not perform as required, refer to Chapter 3, Section II, Troubleshooting.
- f. If anything looks wrong and you can't fix it, write it on your DA Form 2404. IMMEDIATELY, report it to your supervisor.

FIGURE 17. Example of a PMCS introduction (Sheet 1 of 3).

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g. When you do your PMCS, you will always need a rag or two. Following are checks that are common to the entire truck:

- (1) **Keep It Clean.** Dirt, grease, oil, and debris only get in the way and may cover up a serious problem. Clean as you work and as needed. Use dry cleaning solvent (SD-2) on all metal surfaces. Use soap and water when you clean rubber or plastic material. Upholstery can be cleaned with soap and water and a clean, damp cloth.
- (2) **Rust and Corrosion.** Check truck body and frame for rust and corrosion. If any bare metal or corrosion exists, clean, and apply a thin coat of oil. Report it to your supervisor.
- (3) **Bolts, Nuts, and Screws.** Check them all for obvious looseness, missing, bent, or broken condition. You can't try them all with a tool, but look for chipped paint, bare metal, or rust around bolt heads. If you find a bolt, nut, or screw you think is loose, tighten it or report it to your supervisor.
- (4) **Welds.** Look for loose or chipped paint, rust, or gaps where parts are welded together. If you find a bad weld, report it to your supervisor.
- (5) **Electric Wires and Connectors.** Look for cracked, frayed, or broken insulation, bare wires, and loose or broken connectors. Tighten loose connectors. Report any damaged wires to your supervisor.
- (6) **Hoses and Fluid Lines.** Look for wear, damage, and leaks, and make sure clamps and fittings are tight. Wet spots show leaks, but a stain around a fitting or connector can also mean a leak. If a leak comes from a loose fitting or connector, tighten it. If something is broken or worn out, report it to your supervisor.

h. When you check for "operating condition," you look at the component to see if it's serviceable.

**2-6. CLEANING AGENTS****WARNING**

- **DO NOT** use diesel fuel, gasoline, or benzene (benzol) for cleaning.
- **DO NOT SMOKE** when using cleaning solvent. **NEVER USE IT NEAR AN OPEN FLAME.** Be sure there is a fire extinguisher nearby and use cleaning solvent only in well-ventilated places. Flash point of solvent is 138°F (60°C).
- **USE CAUTION** when using cleaning solvents. Cleaning solvents evaporate quickly and can irritate exposed skin if solvents contact skin. In cold weather, contact of exposed skin with cleaning solvents can cause frostbite.

**CAUTION**

When cleaning underhood areas, engine must be **COLD** (same temperature as outside air). **DO NOT** point water or steam directly at any electrical connection. **DO NOT** point water stream directly at radiator fins. **DO NOT** use high pressure water supply system. Damage to engine, electrical system, and other components may result.

**NOTE**

Only use those authorized cleaning solvents or agents listed in Appendix D.

**a. Cleaning Underhood Areas.**

- (1) When using water to clean the engine compartment, always cover alternators and air cleaner inlet using waterproof material. For M1010 only, also cover air conditioner compressor. Use water pressure and volume similar to a standard household type water supply system (45-70psi, 6.5-10.2 kPa).

**FIGURE 17. Example of a PMCS introduction (Sheet 2 of 3).**

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- (2) After cleaning, allow engine to air dry. Do not use compressed air to dry engine. Do not run engine to decrease drying time.
- (3) Remove all component covers before starting engine.

b. **Treating Mildewed Areas.** Canvas that has mildewed can be cleaned by scrubbing with a dry brush. If it is necessary to use water to remove dirt, it should not be used until mildew has been removed. After removing mildew, examine fabric. Look for evidence of deterioration. If canvas has deteriorated, it should be replaced.

**CAUTION**

Keep cleaning solvents, gasoline, and lubricants away from rubber or soft plastic parts. They will deteriorate material.

c. **Cleaning Rust or Grease.** When cleaning grease buildup or rusty places, use a cleaning solvent. Then apply a thin coat of light oil to affected area.

**2-7. LEAKAGE DEFINITIONS FOR OPERATOR PMCS**

It is necessary for you to know how fluid leakage affects the status of the truck. Following are types/classes of leakage an operator needs to know to be able to determine the status of the truck. Learn these leakage definitions and remember - when in doubt, notify your supervisor.

**CAUTION**

- Equipment operation is allowable with minor leakages (Class I or II). Of course, consideration must be given to fluid capacity in the item/system being checked/inspected. When in doubt, notify your supervisor.
- When operating with Class I or II leaks, continue to check fluid levels as required in your PMCS.
- Class III leaks should be reported immediately to your supervisor.

a. **CLASS I** - Seepage of fluid (as indicated by wetness or discoloration) not great enough to form drops.

b. **CLASS II** - Leakage of fluid great enough to form drops but not enough to cause drops to drip from item being checked/inspected.

c. **CLASS III** - Leakage of fluid great enough to form drops that fall from item being checked/inspected.

**FIGURE 17.** Example of a PMCS introduction (Sheet 3 of 3).

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Table 2-1. Preventive Maintenance Checks and Services for Model M911

Item No.	Interval	Location	Procedure	Not Fully Mission Capable If:
		Item to Check/Service		
1	Before	Vehicle Exterior Left Front Tire	<p><b>WARNING</b></p> <p>Operating a vehicle with a tire in an under-inflated condition or with a questionable defect may lead to premature tire failure and may cause equipment damage, injury or death to personnel.</p> <p>Inspect tire condition for under-inflation, cuts, abrasion, uneven tread wear and general condition. Remove all penetrating objects.</p>	Tire has cuts, gouges, cracks or leaks which would cause tire failure. One or more tires un-serviceable and no spare tire wheel assembly available.

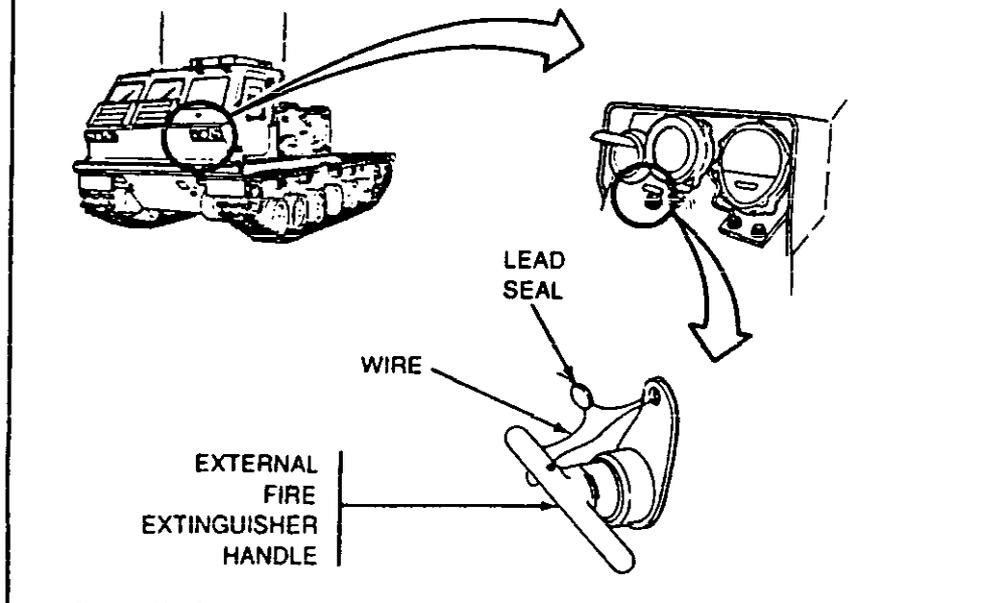
LEFT FRONT TIRE

FIGURE 18. Example of operator's PMCS table format.

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Table 2-1. Preventive Maintenance Checks and Services for Model M993

Item No.	Interval	Location	Crewmember Procedure	Not Fully Mission Capable If:
		Item to Check/Service		
1	Before	Vehicle Exterior	<p><b>DRIVER</b></p> <p>a. Check wire and lead seal on external fire extinguisher handle.</p> <p>b. Check exterior of carrier for damage or missing items. Ensure all equipment is properly stowed.</p> <p>c. Check outside of carrier for signs of fuel or oil leaks.</p>	<p>a. Wire or lead seal on external fire extinguisher handle is missing or broken.</p> <p>c. Any Class III fuel or oil leak is found.</p>



**FIGURE 19.** Example of operator's PMCS table format with crewmember grouping.

MIL-M-63036D(TM)

## TROUBLESHOOTING TABLE 3-1

---

**MALFUNCTION**
**TEST OR INSPECTION**
**CORRECTIVE ACTION**


---

**6. ENGINE OVERHEATS (cont).**
**WARNING**

Hot coolant can burn you. Do not touch hot cap with your bare hand. Let engine cool before removing filler cap.

Step 3. Inspect for low coolant level.

Add coolant as needed (page 3-55). Check for coolant leaks, and notify organizational maintenance if you find any.

Step 4. Check to see if radiator cap is sealing.

Make sure cap is on straight and tight. If cap is damaged, or the seal is broken, notify organizational maintenance.

Step 5. Check to see if there is enough air through radiator.

Remove dirt or other blockage from intake grill, exhaust grill, fan intake, or radiator fins.

Step 6. Check to see if cooling fan is working.

Look for loose or broken fan belt. If belt is loose, or badly worn, notify organizational maintenance.

Step 7. Inspect for low engine oil level.

Add oil as needed (LO 9-1450-300-12).

**7. ENGINE OIL LOW PRESS WARNING LIGHT COMES ON.**
**CAUTION**

A "glowing" engine oil low pressure light is warning of a possible engine oil pressure problem. Engine may be damaged.

Step 1. Shut down engine (page 2-67).

**FIGURE 20.** Example of a troubleshooting table.

## MIL-M-63036D(TM)

## MALFUNCTION INDEX

	Troubleshooting Procedure (Para)
<b>COOLING SYSTEM</b>	
Radiator	
Boils over .....	3-12
Leaks .....	3-17
Temperature Gage	
No indication .....	3-29
Runs cold .....	3-11
Runs hot .....	3-13
<b>ENGINE</b>	
Misses .....	3-34
Overheats .....	3-72
Won't start .....	3-27
<b>EXHAUST SYSTEM</b>	
Excessive smoke .....	3-33
Water vapor .....	3-33

FIGURE 21. Example of a troubleshooting malfunction index.

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# 20 MM AMMUNITION FOR XM167

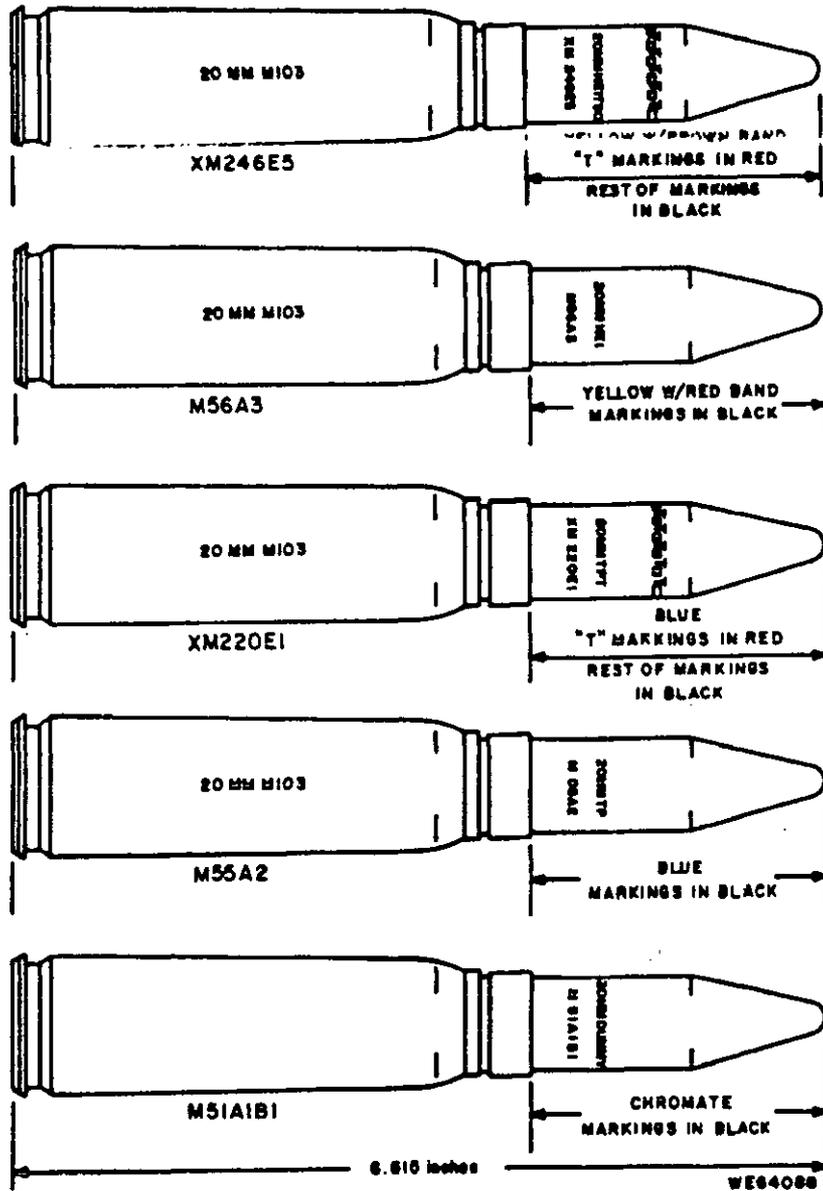


FIGURE 22. Example of identifying ammunition markings.

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**20 MM AMMUNITION TABLE FOR XM167**

**Care:** Keep ammunition clean of dirt and grease. Do not use deformed ammunition.

**Handling:** Avoid excessive shock, electrical discharge, or excess temperature.

**Preservation:** Do not open sealed ammunition containers until just before use.

**Packing:** Pack unused shells in original containers and use first in subsequent firings.

Authorized Rounds:	Classification:	Identification:	Fuzes:	Remarks:
HEIT-SD. XM246E5	High-explosive incendiary tracer self-destruct	<ul style="list-style-type: none"> <li>• Yellow w/brown band projectile</li> <li>• "T" in red on black markings on case</li> </ul>	P.D.	For aerial targets
HEI. M56A3	High-explosive incendiary	<ul style="list-style-type: none"> <li>• Yellow w/red band projectile</li> <li>• Black markings on case</li> </ul>	P.D.	For ground targets
TP-T, XM220E1	Target practice tracer	<ul style="list-style-type: none"> <li>• Blue projectile</li> <li>• "T" in red on black markings on case</li> </ul>	Dummy	
TP, M55A2	Target practice	<ul style="list-style-type: none"> <li>• Blue projectile</li> <li>• Black markings on case</li> </ul>	Dummy	

**FIGURE 23.** Example of a table showing ammunition classifications, identification, care, etc.

## MIL-M-63036D(TM)

## APPENDIX A

## REFERENCES

**Scope**

This appendix lists all forms, field manuals, and technical manuals referenced in this manual.

**Forms**

Recommended Changes to Publications .....	DA Form 2028
Recommended Changes to Equipment	
Technical Manuals .....	DA Form 2028-2
Equipment, Inspection, and Maintenance	
Worksheet .....	DA Form 2404
Maintenance Requests .....	DA Form 2407

**Field Manuals**

NBC Decontamination .....	FM 3-5
Operation and Maintenance of Ordnance	
Material in Cold Weather .....	FM 9-207
Tank Gunnery (How to Fight) .....	FM 17-12
Vehicle Recovery Operations .....	FM 20-22
First Aid for Soldiers .....	FM 21-11
Basic Cold Weather Manual .....	FM 31-70
Northern Operations .....	FM 31-71
Mountain Operations (How to Fight) .....	FM 90-6 (HTF)

**Firing Table**

Cannon, 165-MM Gun, M35 On Combat Engineer	
Vehicle, Full-Track, M728 .....	FT 165-A-2

**Lubrication Order**

Lubrication Order for Vehicle Combat Engineer,	
Full-Track, M728 .....	LO 9-2350-222-12

**Technical Manuals**

Operator's Manual, Mask, Chemical-Biological:	
Aircraft ABC-M24 and Accessories and	
Mask, Chemical-Biological Tank M25/M25A1	
and Accessories .....	TM 3-4240-280-10
Evaluation of Cannon Tubes .....	TM 9-1000-202-14
Operator's and Organizational Maintenance	
Manual (Including Repair Parts and Special	
Tools List): Sub-Machine Gun Caliber .45	
M3 W/E and M3A1 W/E .....	TM 9-1005-229-12
Operator's Manual: M85 Machine Gun .....	TM 9-1005-231-10
Operator's Manual: M73, M73A1, and	
M219 Machine Guns .....	TM 9-1005-233-10

FIGURE 24. Example of Appendix A, references.

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## Section II. COMPONENTS OF END ITEM

(1) Illus Number	(2) National Stock Number	(3) Description CAGEC and Part Number	(4) U/M	(5) Qty Rqr
1	2950-00-898-6771	COVER, PERISCOPE (on peri- scope, M17) (19207) 10866115	EA	5
2	2450-00-679-8035	HOOK, TOW (on rear slope) (19207) 10861607	EA	2
3	1005-01-050-2105	MOUNT, MACHINE GUN ARM ASSEMBLY (gunner's station) (19207) 12266287	EA	1
4	6550-00-704-3549	PERISCOPE, M17 (in driver's station) (19207) 7043549	EA	5
5	1240-01-005-6035	PERISCOPE, M19A1 (on wall left of driver) (19200) 11747126	EA	1
6	5315-00-598-5808	PIN, LOCK, TOW CABLE (on tow hook) (19207) 7752865	EA	2
7	5135-00-862-2683	PIN, STRAIGHT, TOW CABLE (on tow hook) (19207) 10890323	EA	2
8	6650-00-768-8875	PERISCOPE, T25 (one in top deck, left side) (one in top deck, right side) (19200) 768875	EA	2
9	1240-01-064-7204	PERISCOPE, SQUAD LEAD- ER'S (in deck, rear of driver) (19207) 12266851	EA	1
10	5830-00-856-3273	INTERCOMMUNICATIONS SET, AN/VIC-1(V) (on wall, left center) 12265191	EA	1

FIGURE 25. Example of Appendix B, Section II, components of end item (Sheet 1 of 2).

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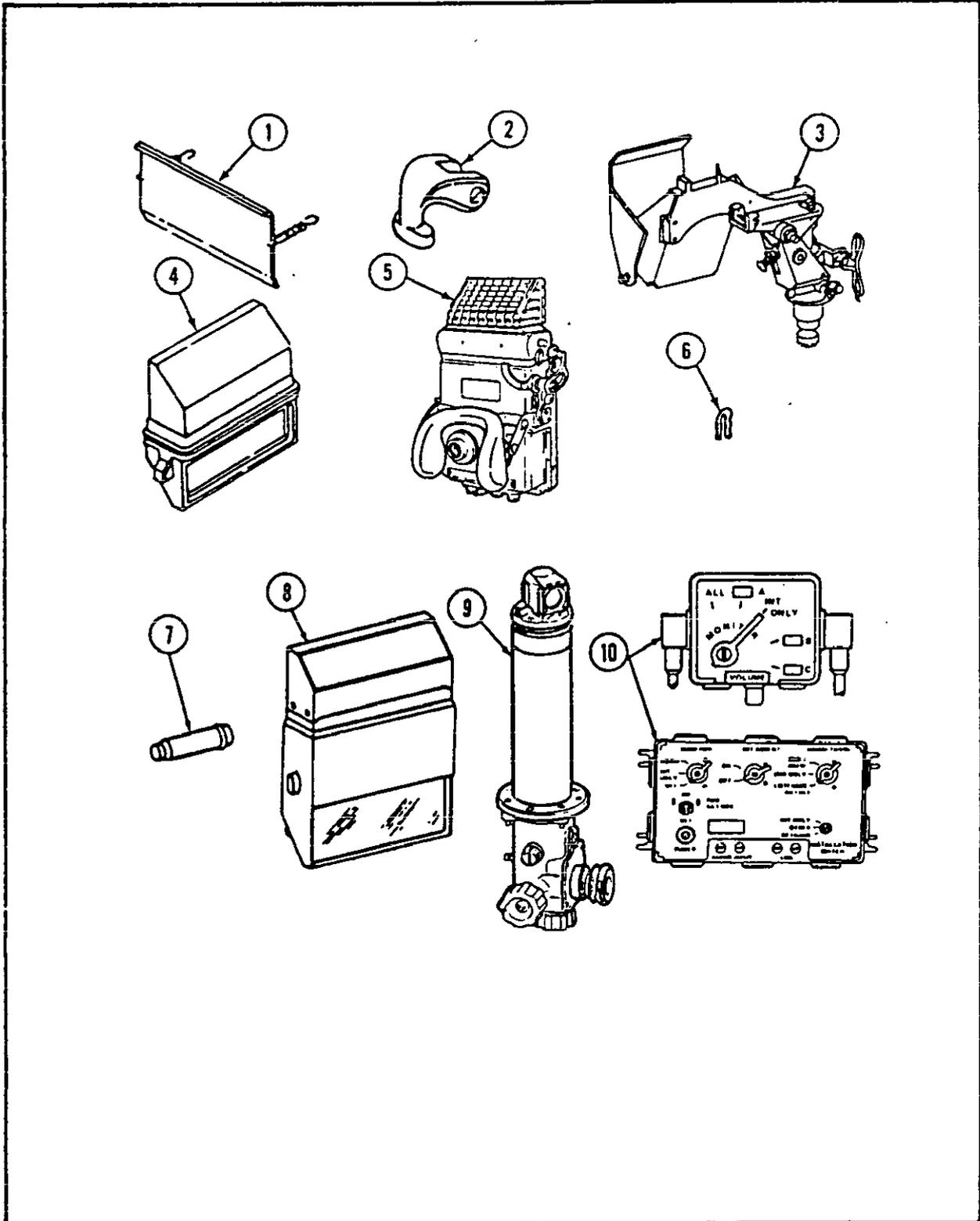
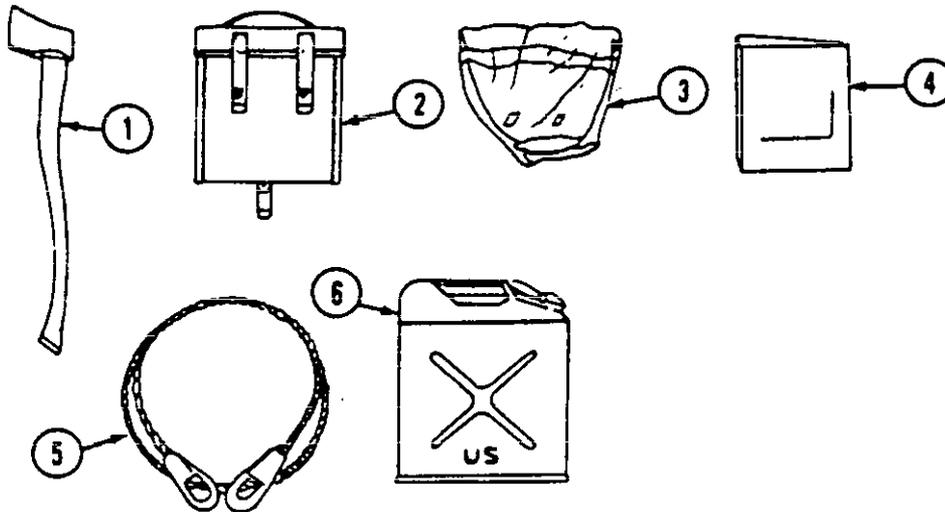


FIGURE 25. Example of Appendix B, Section II, components of end item (Sheet 2 of 2).

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## Section III. BASIC ISSUE ITEMS



(1) Illus Number	(2) National Stock Number	(3) Description CAGEC and Part Number	(4) U/M	(5) Qty Rqr
1	5120-00-293-2336	AXE, SINGLE BIT (on deck, top rear) (19207) 6150925	EA	1
2	2540-00-670-2459	BAG, PAMPHLET (on engine rear access door) (19207) 7961712	EA	1
3	5140-00-473-6256	BAG, TOOL (on sponson, left front) (19207) 11655979	EA	1
4	7510-00-889-3494	BINDER, LOOSE LEAF (in pamphlet bag) (19207) 11677003	EA	1
5	4010-00-767-3149	CABLE, TOW (on ramp, outside) (19207) 10861718	EA	1
6	7240-00-242-6153	CAN, WATER (outside, right or left side) (19207) 11655980	EA	1

FIGURE 26. Example of Appendix B, Section III, basic issue items.

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## APPENDIX C ADDITIONAL AUTHORIZATION LIST

### Section I. INTRODUCTION

#### C-1. SCOPE

This appendix lists additional items that you are authorized for the support of the Truck, Cargo, Tactical, 4X4, M1008, M1008A1, M1009, M1010, M1028, M1028A1, M1028A2, and M1031 trucks.

#### C-2. GENERAL

This list identifies items that do not have to accompany the truck and that do not have to be turned in with it. These items are authorized to you by STA, MTAC, TDA, or JTA.

#### C-3. EXPLANATION OF LISTING

National Stock Numbers, description, and quantities are provided to help you identify and request the additional items you require to support this equipment. If the item required differs for different models of this equipment, see the "Used On Code" column for the applicable model or models. Codes used are:

USED ON CODE	MODEL
ALL	ALL
194	M1008
208	M1008A1
209	M1009
210	M1010
230	M1028
231	M1031
252	M1028A1
254	M1028A2

**FIGURE 27.** Example of Appendix C, Section I, additional authorization list, introduction.

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## Section II. ADDITIONAL AUTHORIZATION LIST

(1) National Stock Number	(2) Description CAGEC & Part Number	Used On Code	(3) U/M	(4) Qty Auth
5935-00-322-8959	Adapter, Connector (19027) 11677570	ALL	ea	2
4730-00-808-5089	Adapter, Straight Pipe (81361) B5-19-1676-2	210	ea	23
4730-00-808-5090	Adapter, Straight Pipe (81361) B5-19-1676-1	210	ea	2
6665-00-935-6555	Alarm, Chemical Agent (81361) C5-15-8803	ALL	ea	1
5110-00-293-2336	Ax: Single Bit, 4 lb. Head Weight, 36-1/2" Long, Type 1, Class 1, Design A (19207) 6150925	209	ea	1
2540-00-670-2459	Bag Assembly, Pamphlet Cotton Duck, 3' x 9-1/4' x 11-1/4' (19207) 11676920	ALL	ea	1
5140-00-473-6256	Bag, Tool, Cotton Duck, 10' x 20' with Flap (34623) 11655979	ALL	ea	1
2540-00-791-3343	Block, Chock (19207) 10860840	ALL	ea	2
5340-00-595-5208	Bracket, Angle (81361) B5-19-1831	210	ea	7
2590-00-148-7961	Cable, NATO Slave, 20' with Adapter, Connector, 2 Prong (19207) 11682379-1	ALL	ea	1
6150-01-022-6004	Cable, NATO Slave with End Connectors (19207) 11682336-1	ALL	ea	1
2590-00-398-6527	Cable, 20' without End Connectors (19207) 11682337-1	ALL	ea	1
2540-01-185-8306	Chain, Tire, 15' (16457) 3210	209	se	1
2540-00-528-7360	Chain, Tire, 16' (72671) V2812	ALL EXC 209	se	1
4730-00-554-7208	Clamp, Hose (98441) 10181-20	210	ea	16
4730-00-554-7208	Clamp, Hose (98906) MS 22064-5	210	ea	30
1025-00-007-9453	Connector, Orifice (81361) B5-19-1829	210	ea	7
2510-00-567-0128	Connector, Slave Cable End (19207) 11682338	ALL	ea	2

FIGURE 28. Example of Appendix C, Section II, format for additional authorized items.

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APPENDIX D  
EXPENDABLE AND DURABLE ITEMS LIST

## Section I. INTRODUCTION

## D-1. SCOPE

This appendix lists expendable and durable items that you will need to operate and maintain the (enter item name.) This listing is for information only and is not authority to requisition the listed items. These items are authorized to you by CTA 50-790, Expendable/Durable Items (except medical, class V repair parts, and heraldic items), or CTA 8-100, Army Medical Department Expendable/Durable Items.

## D-2. EXPLANATION OF COLUMNS.

a. Column 1. Item number. This number is assigned to the entry in the listing and is referenced in the narrative instructions to identify the item (e.g. "Use cleaning compound, item 5, Appendix D".)

b. Column 2. Level. This column identifies the lowest level of maintenance that requires the item.

c. Column 3. National stock number. This is the national stock number assigned to the item which you can use to requisition it.

d. Column 4. Item name, description, Commercial and Government Entity Code (CAGEC), and part number. This provides the other information you need to identify the item.

e. Column 5. Unit of measure. This code shows the physical measurement or count of an item, such as gallon, dozen, gross, ect.

FIGURE 29. Example of Appendix D, expendable and durable items list, Section I, introduction.

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## Section II. EXPENDABLE/DURABLE SUPPLIES AND REQUIREMENTS LIST

(1) ITEM NUMBER	(2) LEVEL	(3) NATIONAL STOCK NUMBER	(4) ITEM NAME, DESCRIPTION CAGEC, PART NUMBER	(5) U/M
1.	C	6850-00-174-1806	Antifreeze: Arctic 55 Gallon Drum (81349) MIL-A-11755	gl
2.	C	6850-00-181-7929	Antifreeze: Ethylene Glycol, Inhibited, Heavy Duty, Single Package, 1 Gallon Can (81349) MIL-A-46153	gl
3.	C	6850-00-181-7933	Antifreeze: Ethylene Glycol, Inhibited, Heavy Duty, Single Package, 5 Gallon Can (81349) MIL-A-46153	gl
4.	C	6850-00-181-7940	Antifreeze: Ethylene Glycol, Inhibited, Heavy Duty, Single Package, 55 Gallon Drum (81349) MIL-A-46153	gl
5.	C	9150-01-102-9455	Brake Fluid: Silicone, Automotive, All Weather Operational and Preservative, 1 Gallon Can (81349) MIL-B-46176	gl
6.	C	9150-01-123-3152	Brake Fluid: Silicone, Automotive, All Weather Operational and Preservative, 5 Gallon Can (81349) MIL-B-46176	gl

FIGURE 30. Example of Appendix D, Section II, format for expendable and durable items.

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## APPENDIX E STOWAGE AND SIGN GUIDE

### E-1. SCOPE

This appendix shows the location for stowage of equipment and material required to be carried on M998 series vehicles.

### E-2. GENERAL

The equipment stowage locator is designed to help inventory items required for safe and efficient operation. This equipment locator is representative of BII and applicable AAL stowage on M996, M997, M998, M1035, M1037, M1038, and M1042 vehicles. Refer to appendix F for specific deviations from this equipment locator for other vehicles and to para. 2-2 for additional information concerning stowage of equipment.

### E-3. STOWAGE LOCATIONS

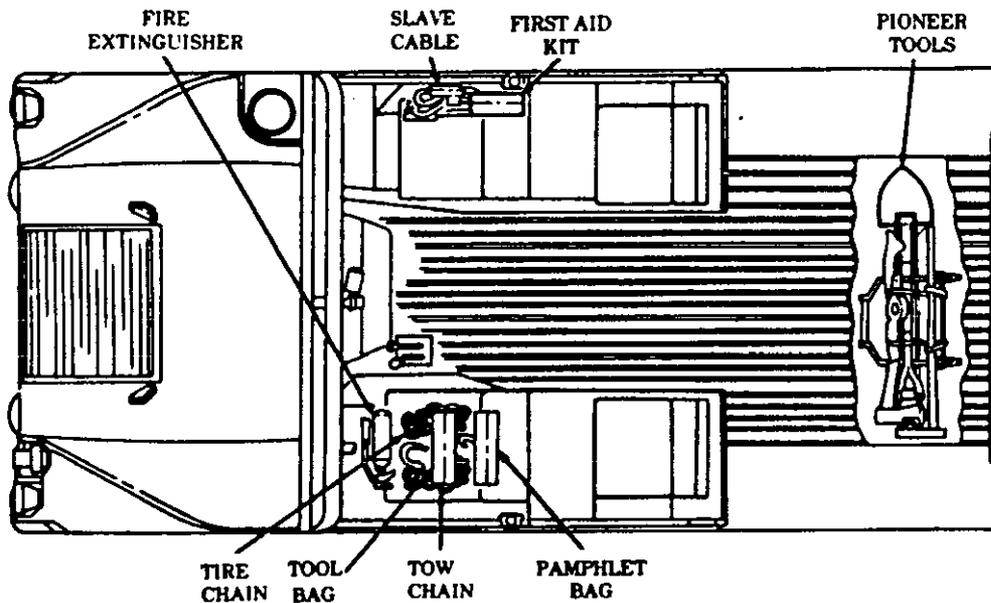


FIGURE 31. Example of Appendix E, stowage and decal/data plate guide (Sheet 1 of 3).

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**E-4. SIGN GUIDE**

LOCATION OF CREW AREA AND EXTERIOR DECALS AND DATA PLATES		
KEY	ITEM	VEHICLE APPLICATION
1	Decal, caution, windshield cleaning	M966, M997, M1025, M1026, M1036, M1043, M1044, M1045, M1046
2	Plate, identification, ignition	All
3	Decal, neutral start, warning	All
4	Plate, instruction, steering wheel lock	All
4.1	Decal, speedometer	All
4.2	Decal, warning, hand throttle	All
5	Plate, identification, heater, defroster, temperature, fan	All
6	Decal, identification, M16 rifle, front	M966, M1025, M1026, M1036, M1043, M1044, M1045, M1046
6.1	Decal, identification, M16 rifle, rear	M1043, M1044
7	Plate, instruction, heater air control	All
8	Decal, service and data manuals	All
9	Decal, procedures, tiedown	All
10	Plate, instruction, seatbelt retractor (front)	All
11	Plate, instruction, operating	All
12	Plate, instruction, seatbelt retractor (rear)	All except M996, M997, M1035, M1037, M1042
13	Plate, instruction, driver's seat adjustment	All
14	Plate, identification, vehicle	All
15	Decal, identification, fire extinguisher	All
16	Plate, information, deep water fording	Vehicles so equipped
17	Decal, parts data	All
18	Plate, sling and tiedown/weights and dimensions data	All
19	Plate, instruction, battery cable connections	All
20	Decal, 24V	All
21	Plate, identification, slave receptacle	All

**FIGURE 31.** Example of Appendix E, stowage and decal/data plate guide (Sheet 2 of 3).

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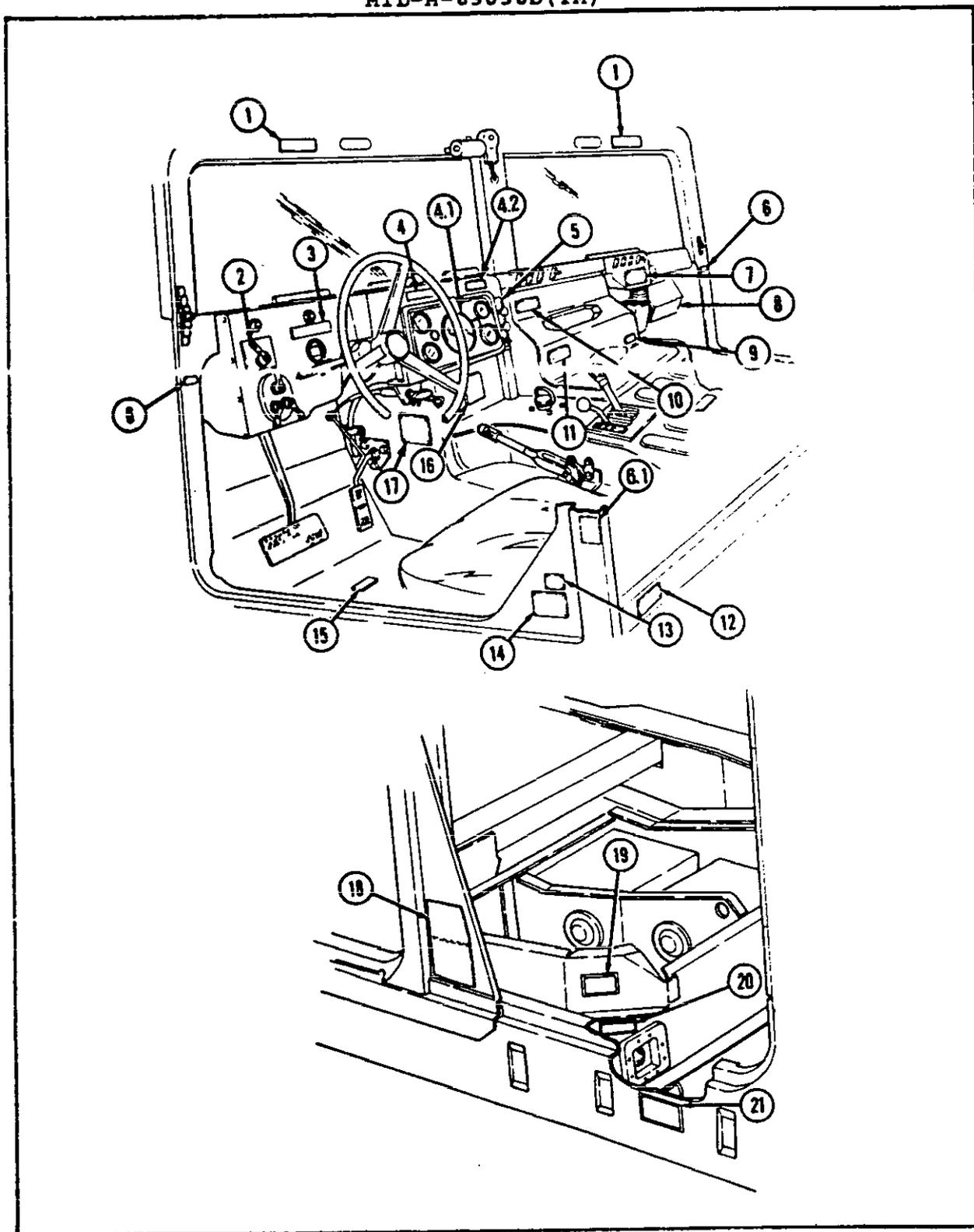
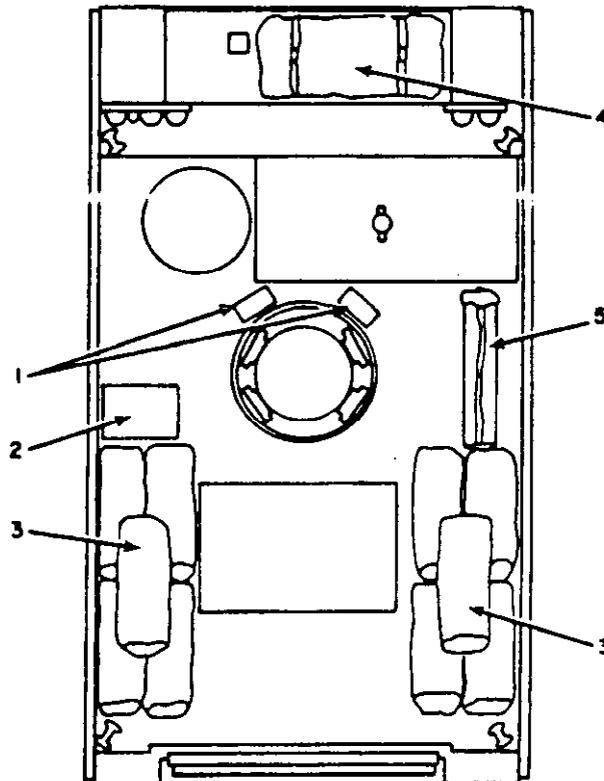


FIGURE 31. Example of Appendix E, stowage and decal/data plate guide (Sheet 3 of 3).

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**M113A1 CARRIER**

EXTERNAL TOP VIEW (TACTICAL)

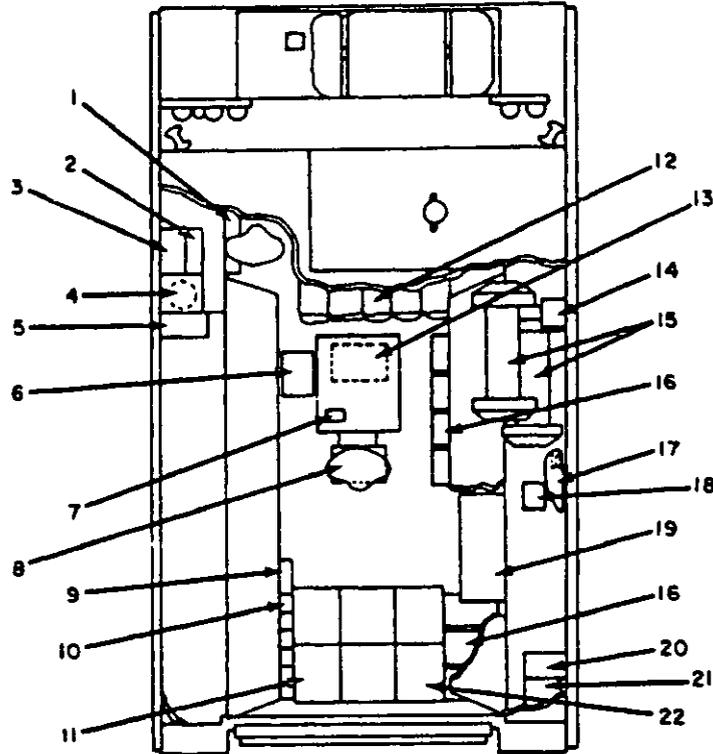
**LOAD PLAN**

NO.	ITEM
1	AMMO BOXES, 50 CAL (2)
2	C-RATION CASE (2)
3	DUFFEL BAGS W/ BEDROLLS (10)
4	CAMOUFLAGE SCREEN
5	CAMOUFLAGE SUPPORT SYSTEM

**FIGURE 32.** Example of Appendix F, on-vehicle equipment loading plan (tactical).

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**M113A1 CARRIER**  
(NON-TACTICAL)  
INTERNAL TOP VIEW



## LOAD PLAN

NO.	ITEM
1	MAP CANISTER
2	TELEPHONE SET, TA-1/PT
3	TELEPHONE SET, TA-312/PT
4	CABLE TELEPHONE, WD-1/TT, DR-8, 1320 FT
5	BINOCULAR, MOD CONST MIL SCALE RETICLE 7K50 MM W/F

CONTINUED ON PAGE 4

FIGURE 33. Example of Appendix F, on-vehicle equipment loading plan (non-tactical).

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## NOTE

DETAILED DECON PROCEDURES CAN BE FOUND  
IN: FM 3-3, FM 3-4, AND FM 3-5.

### GENERAL:

THE FOLLOWING EMERGENCY PROCEDURES CAN BE PERFORMED UNTIL FIELD NBC DECON FACILITIES ARE AVAILABLE. TANK COMMANDER WILL SUPERVISE, ASSIGN CREW DUTIES, AND ASSIST THE SUPPORTING NBC UNIT. FOR LOCATION OF DECON EQUIPMENT MOUNTED ON VEHICLE, SEE PAGE XX-XX.

### EMERGENCY PROCEDURES:

IF NBC ATTACK IS KNOWN OR SUSPECTED, MASK AT ONCE AND CONTINUE MISSION. IF INSIDE, DO NOT LEAVE TANK. IF OUTSIDE, FOLLOW DECON PROCEDURES BELOW TO AVOID TAKING CONTAMINATION INTO THE TANK. DO NOT UNMASK UNTIL TOLD TO DO SO.

### NUCLEAR DECONTAMINATION -

BRUSH FALLOUT FROM SKIN, CLOTHING, AND EQUIPMENT WITH AVAILABLE BRUSHES, RAGS, AND TREE BRANCHES. WASH SKIN AND HAVE RADIATION CHECK MADE AS SOON AS TACTICAL SITUATION PERMITS. (YOU CAN FIND INSTRUCTIONS FOR THE CHECK IN FM XX-XXX).

### BIOLOGICAL DECONTAMINATION -

THE TANK CREW HAS NO METHOD TO DETECT OR DECON BIOLOGICAL AGENTS. REMAIN MASKED AND CONTINUE MISSION UNTIL TOLD TO UNMASK.

FIGURE 34. Example of NBC presentation (sheet 1 of 2).

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**EMERGENCY PROCEDURES: (CONTINUED)**  
**CHEMICAL DETECTION AND DECONTAMINATION**

**WARNING**

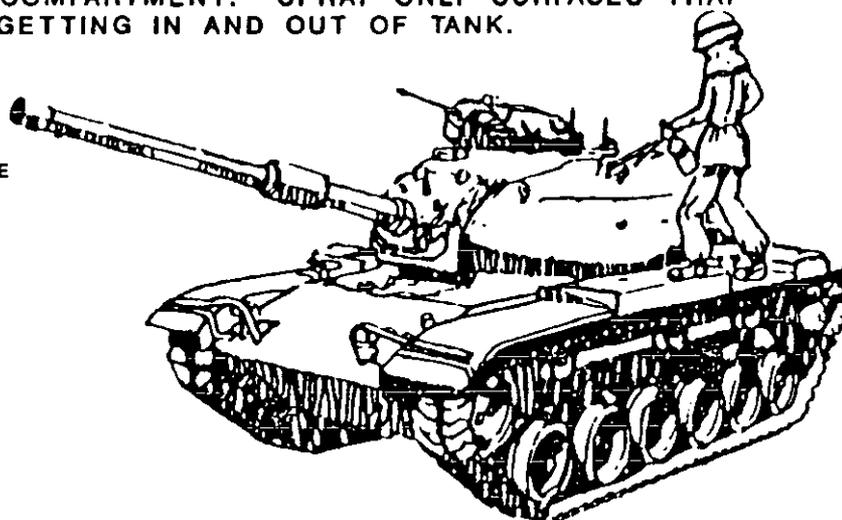
**DO NOT USE DECONTAMINATION SPRAY ON PERSONNEL. IT COULD CAUSE PERSONAL INJURY.**

USE M8 PAPER FROM THE M256 CHEMICAL AGENT DETECTOR KIT OR M9 PAPER TO DETERMINE IF LIQUID AGENT IS PRESENT ON THE VEHICLE SURFACE.

IF EXPOSURE TO LIQUID AGENT IS KNOWN OR SUSPECTED, CLEAN EXPOSED SKIN, CLOTHING, AND PERSONAL GEAR, IN THAT ORDER, USING M258A1 KIT. USE THE BUDDY SYSTEM. WASH EXPOSED SKIN AND THOROUGHLY DECONTAMINATE AS SOON AS TACTICAL SITUATION PERMITS.

IF THE M8 OR M9 PAPER INDICATES THAT LIQUID CHEMICAL AGENT IS PRESENT ON THE VEHICLE SURFACE USE THE ABC-M11 DECON APPARATUS FOR PARTIAL DECON OF VEHICLE. USE LOADER'S HATCH FOR EXIT/ENTRY. AVOID GETTING LIQUID AGENT INTO CREW COMPARTMENT. SPRAY ONLY SURFACES THAT WILL BE TOUCHED GETTING IN AND OUT OF TANK.

DECON PROCEDURES TAKE TIME. DO AS MUCH AS YOU CAN BASED ON THE TACTICAL SITUATION.



LOADER USING M11 DECON APPARATUS TO SPRAY AN ENTRY/EXIT PATH

**FIGURE 34.** Example of NBC presentation (sheet 2 of 2).

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**APPENDIX A**

**LUBRICATION INSTRUCTIONS**

**10. SCOPE**

10.1 **Scope.** This appendix is a mandatory part of this specification and is intended for compliance when the equipment covered by the technical manual contains operator/crew lubrication requirements.

**20. APPLICABLE DOCUMENTS**

20.1 **Government documents.**

20.1.1 **Specifications, standards, and handbooks.** The following specifications, standards, and handbooks form a part of this document to the extent specified herein. Unless otherwise specified, the issues of these documents are those listed in the issue of the Department of Defense Index of Specifications and Standards (DODISS) and supplement thereto, cited in the solicitation (see 6.2).

**HANDBOOKS**

**Military**

MIL-HDBK-113	Guide for the Selection of Lubricants, Functional, Fluids, Preservatives and Specialty Products for Use in Ground Equipment Systems
MIL-HDBK-275	Guide for Selection of Lubricants, Fluids, and Compounds for Use in Flight Vehicles and Components

(Unless otherwise indicated, copies of federal and military specifications, standards, and handbooks are available from Standardization Documents Order Desk, Building 4D, 700 Robbins Avenue, Philadelphia, PA 19111-5094.)

**30. REQUIREMENTS**

30.1 **General.** Lubrication instructions shall include all lubrication procedures and information on authorized lubricants, lubrication intervals, man-hour requirements, and the Army Oil Analysis Program (AOAP).

30.1.1 **Reliability centered maintenance (RCM).** Unless otherwise specified by the contracting activity, lubrication instructions shall be based upon the principles of RCM logic.

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30.2 Format.

30.2.1 Grouped sequence (hardtime, on condition). Unless otherwise specified by the contracting activity, the lubrication instructions shall be presented in grouped sequence by interval.

30.3 Content.

30.3.1 General statement(s). General statement(s) applicable to the overall understanding of requirements shall be provided. The statement(s) shall include such information as adherence to lubrication intervals, explanation of interval symbols, maintenance levels, exceptional operational requirements, abbreviations, fittings and parts cleaning. A statement concerning corrosion control shall be used as applicable. The statement shall provide instructions or reference corrosion control requirements provided in the applicable narrative TM.

30.3.1.1 Oil filter statement. As applicable, a statement similar to the following shall be included:

Oil filters shall be serviced/cleaned/changed as applicable, when:

- a. They are known to be contaminated, or clogged;
- b. Service is recommended by AOAP laboratory analysis, or
- c. At prescribed hardtime intervals.

30.3.1.2 AOAP sampling interval statement. A statement similar to the following shall be included:

Engine oil/transmission oil/hydraulic fluids must be sampled at (insert applicable hour/mileage timeframe) as prescribed by (insert TB 43-0106 or DA Pam 738-750).

30.3.1.3 AOAP not available/non-enrolled statement. When a component/equipment is not enrolled in the AOAP, or oil analysis support is not available, a statement similar to the following shall be used:

This (enter name of component/equipment) is not enrolled in the Army Oil Analysis Program. HARDTIME INTERVALS APPLY.

30.3.1.4 Warranty hardtime statement. When applicable, the following statement shall be used:

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"For equipment under manufacturer's warranty, hardtime oil service intervals shall be followed. Intervals shall be shortened if lubricants are known to be contaminated or if operation is under adverse conditions (such as longer than usual operating hours, extended idling periods, extreme dust)."

30.4 Illustrations. Illustrations shall be used to show the location of grease fittings and, when applicable, shall indicate the number of grease points. A minimum number of views shall be used (see figure 35).

30.4.1 Multiple illustrations. When it is necessary to provide a multiple number of illustrations to show separate component parts, each illustration shall have an individual title.

30.4.2 Grouped lubrication points. When grouped lubrication points require the same lubricant at the same interval, the type and number of points shall be identified and described by one of the following methods:

a. Multi-headed arrows. Multi-headed, solid-shafted arrows shall point to each of the lubrication points.

b. Lubrication point notes. Lubrication point notes shall provide instructions for applying lubricants, taking into account the following factors: type, grade, availability, and properties of the prescribed lubricant; expected temperature; lubrication guns and tools available to authorized maintenance level; types of lubrication fittings; and possible ill effects of excessive or, insufficient lubrication. Caution shall be stressed where over-or-under lubrication of a part will damage that part or closely associated parts. Such cautionary notes shall be included either as a portion of the point note, or as a special note.

30.4.3 Disassembling and handpacking. If applicable, disassembling and handpacking instructions shall be provided for medium and high speed antifriction bearings which are sensitive to the amount of lubrication applied and do not have bleed holes or relief valves.

30.4.4 Cleaning, disassembling, and reassembling. Cleaning, disassembling, and reassembling instructions required before or after lubrication shall be provided. If instructions are extensive and contained in a technical manual, the TM shall be referenced.

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## APPENDIX A

30.4.5 Washing and natural drying. If applicable, instructions shall be given for washing and natural drying of finely machined and dirt-sensitive parts before relubricating. Use of compressed air jets or temperatures above 212 degrees Fahrenheit shall not be prescribed.

30.4.6 Preservative material. Crew instructions shall not specify a coating of preservative material, either before or after packing parts that are lubricated with grease; nor shall they specify an application of oil, solvent, or additional grease to a "sealed-for-life" or prepacked antifriction bearing.

30.5 Lubricants and military symbols. Lubricants shall be identified by standard military symbols, in accordance with MIL-HDBK-113 and MIL-HDBK-275 (see figure 36). The lubricant symbols and interval symbols shall be printed in separate vertical columns on the inner side of the point names. These columns shall be headed by the words "LUBRICANT" and "INTERVAL." Those lubrication points which are serviced or lubricated by checking level, replenishing lubricant, or draining and refilling shall be indicated by the lubricant's symbol at the point on the illustration which is designated for replenishing or refilling. The amount of lubricant required shall be given either in the point note or in the "Capacity" column of the table, if applicable.

30.5.1 Lubrication interval symbols. Unless otherwise specified by the contracting activity, the following lubrication interval symbols shall be used as applicable:

D - daily	B - biannually
W - weekly	H - hours (operated)
M - monthly	MI - miles (operated)
Q - quarterly	km - kilometers (operated)
S - semiannually	RDS - rounds fired
A - annually	OC - on condition

30.6 Measurements. Unless otherwise specified by the contracting activity, all measurements expressed in text, in tables, or on illustrations shall be expressed in both U.S. standard units and metric units. The order of precedence shall be in accordance with equipment markings.

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30.6.1 **Lubricant table**. As applicable, a table(s) shall be prepared to provide information needed to select the proper lubricant for various temperature ranges and uses. The size and location of the table(s) shall be tailored to meet the layout requirements and shall include, as applicable, information on temperature range, lubricant, military symbol, NATA code, specification, NSN, capacity, interval between services, and man-hours required to complete all services and shall be stated to the nearest tenth for all prescribed lubrication (see figure 36).

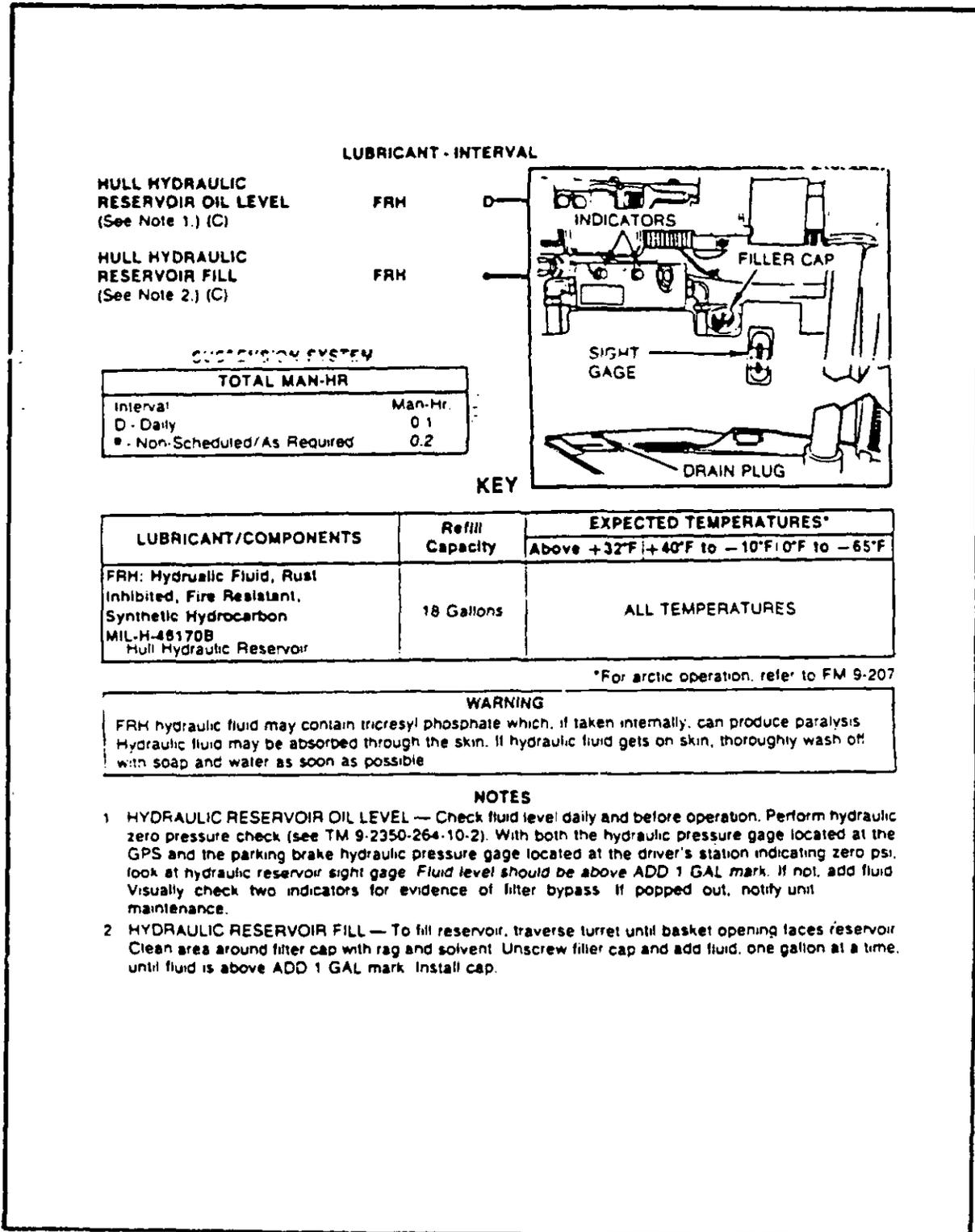
30.6.2 **Notes to tables**. As necessary, when specific restrictions, preferred grades, and other conditions exist, notes shall be annotated on tables(s) in accordance with MIL-M-38784. For example: 1/"When MIL-L-2104 lubricant is authorized, use 15W-40 (OE/HDO-15/40) when available temperature range exists," or 2/"15W-40 oil is not authorized in this particular (enter component name)."  
Where applicable, the statement "For Arctic operation, refer to FM 9-207" shall be included as a note.

30.7 **Special notes**.

30.7.1 **Pertinent lubrication point information**. As applicable, the instructions shall contain additional pertinent lubrication point information in a section titled "Notes." When applicable, the instructions shall contain a special note referencing, but not repeating, instructions in maintenance chapters.

30.7.2 **Effect of extreme humidity**. If applicable, pertinent instructions relevant to the effect of extreme humidity on lubrication requirements for the equipment shall be included as a note.

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**FIGURE 35.** Example - identification of lubricant, symbol, and lubrication points, interval and note.

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TABLE I. Lubricant Table for Engine XXX

Temperature Range	Lubricant Mil. Symbol (NATO Code) Specification	Capacity	Interval	Man-hour
-18C to +49C(zero to +120F)	OE/HDO 15/40 (O-1236) MIL-L-2104	5 QTS	200 MI	.5
-25C to +04C(-15F to +40F)	OE/HDO-10 (O-237) MIL-L-2104	5 QTS	200 MI	.5
-10C to +49C(+15F to +120F)	OE/HDO-30 (O-238) MIL-L-2104	5 QTS	200 MI	.5
-05C to +49C(+25F to +120F)	OE/HDO-40 (N/A) MIL-L-2104	5 QTS	200 MI	.5
-57C to +04C(-70F to +40F)	OEA (D-183) MIL-L-46167	5 QTS	100 MI	.5

FIGURE 36. Example of lubricant table.

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APPENDIX B

CONTENT/FORMAT SELECTION SUMMARY  
(OPERATOR'S TM)

10. SCOPE

10.1 Scope. This appendix is to be used by the contracting activity to specify which optional requirements of this specification are to be contractually imposed in the acquisition of an operator's TM. This appendix is a mandatory part of this specification, and the information contained herein is intended for compliance.

10.2 Application. This appendix is intended to be copied/reproduced, completed, signed, and become part of the Technical Manual Contract Document Summary List for solicitation/contract application. A separate content/format selection summary sheet(s) is required for each acquisition of a specific TM.

10.3 Explanation of columns - Content/Format Selection Summary.

- a. Column (1), (Item No.) - self explanatory.
- b. Column (2), (Requirement) - identifies the requirement.
- c. Column (3), (Applicable Paragraph Number) - identifies the paragraph where the requirement shown in column (2) is described.
- d. Column (4), subcolumn (a), (Requirement Selected-(yes)) - is marked with an "X" if the requirement shown in column (2) is required.
- e. Column (4), subcolumn (b), (Requirement Selected-(no)) - is marked with an "X" if the requirement shown in column (2) is not required.
- f. Column (4), subcolumn (c), (Explanation/Remarks) - is used when a yes or a no alone is not adequate to completely identify the requirement. If necessary, additional explanation/information may be provided on a separate sheet(s) of paper and attached to this summary list when completed.

20. **APPLICABLE DOCUMENTS.** This section is not applicable to this appendix.

## MIL-M-63036D(TM)

## APPENDIX B

CONTENT/FORMAT SELECTION SUMMARY  
(OPERATOR'S TM)

Equipment name/nomenclature \_\_\_\_\_

(1)	(2)	(3)	(4)		(c)
			(a)	(b)	
Item No.	Requirement	Applicable Paragraph Number	Requirement Selected (Yes)	(No)	Explanation/Remarks
1	Illustration Type	3.1.4			
2	Manual Size	3.1.7			
3	Horiz. Format Printed Head to Foot	3.1.7.2			
4	Front Cover Illustration	3.2.1.1a			
5	Front Cover Index	3.2.1.1b			
6	Glossary	3.2.2.1j			
7	Chapter 2 Index	3.2.3.1			
8	Routing Diag. (PMCS)	3.2.3.3.2			
9	PMCS Intervals Beyond Wkly	3.2.3.3.3c(1)			

## MIL-M-63036D(TM)

## APPENDIX B

CONTENT/FORMAT SELECTION SUMMARY - Continued  
(OPERATOR'S TM)

Equipment name/nomenclature \_\_\_\_\_

(1)	(2)	(3)	(4)		
			(a)	(b)	(c)
Item No.	Requirement	Applicable Paragraph Number	Requirement Selected (yes)	(no)	Explanation/Remarks
10	PMCS Item Nos. Consecutive	3.2.3.3.3f	(1)		
11	Interim NBC Decontamination Procedures	3.2.3.5.4			
12	Functional Checks	3.2.3.5.6			
13	Chapter 3 Index	3.2.4.1			
14	Malfunction Index	3.2.4.3c			
15	Chapter 3, Section III Index	3.2.4.4			
16	Foreign Ammun. (NATO) Chapter	3.2.7			
17	Appendix F	3.2.8.6			

**NOTE:** The above selected requirements, identified by an "X" in the Requirement Selected column 4, subcolumn 4(a) or 4(b), with an explanation provided in the Explanation/Remarks subcolumn 4(c), are a mandatory part of this contract.

Completed by: \_\_\_\_\_  
(authorized signature)

Publications Activity \_\_\_\_\_ Date \_\_\_\_\_

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