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MIL-PRF-9994B
1 November 1994

SUPERSEDING
MIL-M-9994A(USAF)
10 February 1969

PERFORMANCE SPECIFICATION

MANUALS, TECHNICAL:

OPERATION AND MAINTENANCE INSTRUCTIONS

(For mobile Training Sets (MTS) and Part Task Trainers)

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

1. SCOPE.

1.1 This specification covers the preparation of technical manuals of operation and maintenance instructions for mobile training sets and part task trainers.

2. APPLICABLE DOCUMENTS.

2.1 The following documents of the issue in effect on the date of the invitation for bids or request for proposal, form a part of this document to the extent specified herein.

SPECIFICATIONS

Military

MIL-M-38807	Illustrated Parts Breakdown, Preparation of.
MIL-M-38784	Manuals, Technical: General Requirements for preparation of.
MIL-P-38790	Printing Production of Technical Manuals: General Requirements for.

(Copies of specifications required by contractors in connection with specific procurement functions should be obtained from the procuring activity or as directed by the contracting officer.)

3. REQUIREMENTS

3.1 Manner of preparation. The general manner of preparation of the technical manual shall be in accordance with MIL-M-38784 and MIL-P-38790.

3.2 Text contents. The technical manual shall contain all instructions essential to the installation, operation, and maintenance of each individual system trainer within the overall mobile training set, or individual part task trainer.

3.2.1 Exclusion. Unless specifically required in the contract, the technical manuals shall not cover maintenance of any equipment that is not an integral operating component of the mobile training set or the individual part task trainer.

3.2.2 Limitations. Repair, replacements, adjustments and recalibration data for electronic equipment shall be limited to that capable of being performed by organizational and intermediate maintenance activities using common tools and test equipment and those specialized tools and test equipment listed in the technical manual.

3.2.3 Model or type reference. Statements as to the applicability of information shall use definite terms, such as serial number range, block designation, code number, or similar identification. If no method of identifying changes on the

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applicable training device is practical, the service change number, or the publication number, authorizing the change may be included. Such terminology as "on later devices", "early serial numbers", etc, shall not be used.

3.2.4 References to other publications. It is not intended that the information contained in the operating and maintenance instructions duplicate information contained in technical manuals applicable to the aircraft, missile, or aerospace ground equipment (AGE) reflected by the mobile training set or individual part task trainer. Any operation or maintenance procedures peculiar to trainer operation or design shall be fully explained. Where either, or both, operation and maintenance of the trainer is identical to that for the reflected aircraft, missile, or AGE system, the applicable technical manual shall be referenced. However, essential information of a page or less from other miscellaneous technical orders shall be extracted, condensed, modified, as necessary, and included in the manual for the trainer.

3.3 Illustrations. Illustrations shall be prepared in accordance with MIL-M-38784. Illustrations shall be those which are essential for locating a specific circuit or part, etc., and for supplementing and clarifying the related text.

3.3.1 Controls. All controls shall be illustrated and referred to exactly as they are marked on the equipment (spelling, abbreviations, capitalization, etc.).

3.3.2 Schematic diagrams. Schematic diagrams shall be provided. The entire circuitry of electrical or electronic system trainers shall be shown. Systems or areas identical to the reflected aircraft, missile, or aerospace ground equipment (AGE) and covered in weapon or AGE technical manuals need not be shown if incorporated by reference to the applicable technical manual. All circuitry peculiar to the trainer shall be detailed and shall include all test points which contain critical voltages. Electrical or electronic circuitry incorporated in hydromechanical and mechanical system trainers shall be depicted and diagrammed in the same fashion as electrical or electronic system trainers. The entire hydrokinetic systems of hydraulic or hydromechanical trainers shall be depicted.

3.4 Arrangement of manual(s). The operation and maintenance instructions for a mobile training set shall normally be divided into a series of separate manuals. The first manual shall be a publication providing a general description of the entire mobile training set. The succeeding manuals shall provide instructions on each individual system trainer within the overall mobile training set. A typical example of the individual manuals in a series to cover a mobile training set would be:

- a. General Manual
- b. Communication System Trainer Manual
- c. Utility Hydraulic System Trainer Manual
- d. Flight Control System Trainer Manual
- e. Electrical System Trainer Manual
- f. Instrument System Trainer Manual
- g. Compass System Trainer Manual
- h. Canopy and Ejection Set Trainer Manual
- i. Mechanical Accessory (Heat and Pressurization System and Liquid Oxygen System) Trainer Manual
- j. Drag Chute System Trainer Manual
- k. Fuel System Trainer Manual
- l. Electronic Navigation System Trainer Manual

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m. Armament System Trainer Manual

n. Nose Gun System Trainer Manual

3.5 Single Manual Arrangement. When approved by the procuring activity, coverage of an entire mobile training set may be in one manual. Under this condition, the General Manual, and coverage of the individual system trainers within a mobile trainer set shall become chapters. Such a manual shall be arranged as follows with one Table of Contents, List of Illustrations, and Introduction for the entire manual, not one for each chapter. Also when approved by the procuring activity, illustrated parts breakdown information, in accordance with MIL-M-38807 requirements, shall be added as the last chapter of the manual; when not specifically approved, this shall be a separate manual.

Front Matter

Title Page

List of Effective Pages

Table of Contents

List of Illustrations

List of Tables

Introduction

Chapter I, General Information

Chapter II, Communication System Trainer

Chapter III, through XIV (same as 3.4.c through 3.4.h)

Chapter XV, Illustrated Parts Breakdown (when approved by the procuring activity)

Glossary (if necessary)

Alphabetical Index (if manual exceeds 100 pages)

3.6 General Manual Arrangement. The General Manual shall be arranged as follows:

Front Matter

Title Page

List of Effective Pages

Table of Contents (if necessary)

List of Illustrations (if necessary)

List of Tables (if necessary)

Introduction

Section I, General Description of the Mobile Training Set

Section II, Equipment Not Part of Any System Trainer

Glossary (if necessary)

Alphabetical Index (if manual exceeds 100 pages)

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3.7 System Trainer Manual Arrangement. Each manual for an individual system trainer shall be arranged as follows:

Front Matter

Title Page

List of Effective Pages

Table of Contents

List of Illustrations

List of Tables

Introduction

Section I, Description and Leading Particulars

Section II, Special Tools and Test Equipment

Section III, Preparation for Use and Reshipment

Section IV, Operation

a. Theory of Operation

b. Operating Instructions

Section V, Maintenance

a. Minimum Performance Standards

b. Maintenance and Lubrication

c. Troubleshooting

d. Removal and Replacement

e. Tests, Repairs and Adjustments

f. Bench Test Setup (when applicable)

g. Test Equipment

h. Voltage and Resistance Chart

Section VI, Diagrams

Section VII, Illustrated Parts Breakdown (when approved by the procuring activity)

Glossary (if necessary)

Alphabetical Index (if total manual, including text, illustrations, etc., exceeds 100 pages).

3.8 Front Matter. The Title Page and List of Effective Pages, Table of Contents, List of Illustrations and List of Tables shall be prepared in accordance with MIL-M-38784.

3.8.1 Introduction. The Introduction shall be an explanation of the purpose of the manual and shall include any relevant information that will be of assistance in the use of the manual. It shall indicate the aircraft, missile, system, or aerospace ground equipment (AGE) type, model, series, and serial numbers that the mobile training set, or system trainer, reflects. It shall also state that coverage in the manual will be limited to trainer peculiar items and that reference should be made to the applicable technical order for information not covered by the manual. The requirements of MIL-M-38784 are also applicable.

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3.9 General Manual Contents.

3.9.1 Section I. General Description of the Mobile Training Set. This section shall contain the general description and purpose of the mobile training set; also, a chart or table identifying all the system trainers of the mobile training set and other general information of an essential nature. When trainer peculiar and weapon system peculiar items are integrated in one mobile training set, or when system items are employed in the mobile set in a different manner, a block diagram shall be provided. Items on the diagrams shall be identified by part number and noun.

3.9.2 Section II. Equipment Not Part of Any System Trainer. This section shall contain general information and an illustration of equipment groups. Operation or maintenance instructions for these equipment groups shall not be given since such information is not intended for this publication. Only information to familiarize personnel with the equipment and explain how it functions in conjunction with any trainer, shall be covered. The part number and nomenclature of all items in an equipment group shall be listed.

3.9.3 Glossary and Alphabetical Index. The requirements of MIL-M-38784 are applicable.

3.10 System Trainer Manual Contents.

3.10.1 Section I. Description and Leading Particulars. This section shall contain.

a. A figure containing a composite illustration of the trainer, giving names of the components and, if applicable, Government type and serial number designations of the trainer.

b. Overall identification by Government and manufacturer's type designations.

c. A statement of scope which, as a minimum, includes:

(1) That the manual covers the description, operation, and maintenance of items peculiar to _____ (applicable trainer title) _____.

(2) That the manual covers items common to both the trainer and the reflected aircraft, missile, or aerospace ground equipment (AGE), but which are used differently on the trainer.

(3) That the technician should refer to the applicable reflected aircraft, missile or AGE technical manual where the description, operation and maintenance of such items are the same.

(4) A brief statement relative to the technical level of the user.

d. A brief account of the purpose of the trainer, its limitations, and how, in general, it accomplishes its mission.

e. Other general information of an essential nature.

f. Condensed, factual data, in tabular form where possible, which will enable maintenance personnel to become familiar with the characteristics and physical makeup of the trainer. The following are typical trainer peculiar items to be covered, where applicable:

(1) Tube and solid state device complement by component as follows: Quantity, Government type number, and function.

(2) Fuse complement by component as follows: Quantity, type number, and ampere rating.

(3) The DC and AC supply voltage and frequency, as applicable.

(4) Major component current required at specific rated voltage for a dynamotor, inverter, meter; and in addition, other current requirements, such as total normal operating current, standby current, and maximum starting current.

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(5) Data for power generating equipment (rotating, vibrator, battery, converter), including manufacturer's name and type number, output voltage and current rating, permissible ambient temperature, and temperature rise.

(6) Location and function of operating and adjustment controls.

3.10.2, Section II, Special Tools and Test Equipment. This section shall list and illustrate the special tools and test equipment required for the work described. Such items shall be selected from the list of tools and test equipment approved by the Government by means of AGE Listings, Provisioning Conferences, Engineering Change Proposals (ECPs), Procurement Documents. Standard type of tools, such as screwdrivers, pliers, shall not be listed. Standard types of test equipment, such as voltmeters, tube testers, shall be listed. When a contractor cannot obtain an approved list, a manual shall show the contractor's recommended special tools and test equipment. However, these recommendations shall be changed promptly, if necessary, to conform to the official Government list as soon as such information is provided to the contractor.

3.10.2.1 Special Tools List. The list of special tools shall be arranged in the following format. Tools not illustrated in use in other sections of the manual shall be illustrated following the list in this section.

SPECIAL TOOLS LIST

Part (Tool) Number	Mfr Code or Name/ Address	Figure & Index No.	Nomen- clature	Use
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a. Part (Tool Number. Tools shall be listed in sequence by part (tool) number. The part (tool) number shall agree with the drawing number.

b. Manufacturer's (mfr) code or name/address. The manufacturer's code (Cataloging Handbook H4-1), or name and address shall be shown.

c. Figure and index number. The figure and index numbers that appear in other chapters, or this chapter, of the manual, shall be shown.

d. Nomenclature. The nomenclature shall agree with the drawing title.

e. Use. The purpose of each tool shall be stated. If the use is described in any part of the manual, reference to the applicable paragraph will suffice.

3.10.2.2 Test Equipment List. The list of test equipment shall be arranged in the following format. Test equipment not illustrated in use in other sections of the manual shall be illustrated following the list in this section.

TEST EQUIPMENT LIST

TYPE DESIGNATION	ALTERNATE TYPE DESIGNATION	FIGURE & INDEX NO.	NOMENCLATURE	USE
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a. Type designation. Test equipment shall be listed in alpha-numeric sequence by type designation, using the AN type designation, if assigned, or the commercial or manufacturer's designation if an AN type was not assigned.

b. Alternate type designation. If an alternate item of test equipment can be used, its AN type designation, if assigned, or the commercial or manufacturer's designation, if an AN type was not assigned, shall be listed.

c. Figure and index number. The figure and index numbers that appear in other sections, or this section, of the manual, shall be shown.

d. Nomenclature. The nomenclature shall agree with the drawing title.

e. Use. The purpose of each item of test equipment shall be stated. If the use is described in any part of the manual, reference to the applicable paragraph will suffice.

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3.10.3 Section III, Preparation for Use and Reshipment. This section shall give the instructions for (1) providing facilities for the equipment, (2) uncrating and installation, (3) preparation for use, (4) preparation for reshipment, and (5) dimensions and weight, as follows:

3.10.3.1 Facilities. Minimum conditions and facilities necessary to provide for proper operation of the equipment shall be given, e.g., information regarding humidity, temperature, weather protection, space, etc.

3.10.3.2 Uncrating and installation. Special procedures necessary for uncrating and setting up equipment in a partially assembled state shall be provided. Text and illustrations, however, shall be limited to information needed for field assembly purposes. Installation details shall be omitted for components already fixed in place by the contractor.

3.10.3.3 Preparation for use. There shall be a listing of the cables to be established between components, including intracomponent cabling. Cables are to be identified and their points of connection established. Additional requirements are:

a. A cabling diagram for the complete equipment and an internal wiring diagram for each junction box showing relationship to external wiring, but not to circuit functions.

b. Complete fabrication instructions for any cable assemblies, known to be a requirement, which must be made up by the using activity from bulk supplies, such as wires, terminals, plugs, etc. The part of drawing number for each part, as well as the numerals, letters, or other designators for the cable assembly shall be stated.

c. Such other work and information as required to make the equipment ready for use, including filling with fuel, lubricant, hydraulic fluid, etc.

3.10.3.4 Preparation for reshipment. The instructions shall include detailed information for the disassembly (if required), securing, and cover installation. This shall include any precautions necessary to prevent damage during preparation for reshipment, shipment, and unloading.

3.10.3.5 Dimensions and weight. The dimensions, gross weight, and cube of each trainer shall be given.

3.10.4 Section IV, Operation. This section shall contain the following:

3.10.4.1 Theory of operation. The theory of operation shall be given. Where applicable, reference shall be made to the reflected aircraft, missile or aerospace ground equipment (AGE) technical manuals, trainer circuitry, plumbing, etc., shall be explained where different from the reflected aircraft, missile, or AGE and where such information is necessary to operate, or perform maintenance, on the trainer.

3.10.4.2 Operating instructions. Essential trainer peculiar operating instructions for the equipment shall be presented in a clearly understandable manner, covering the following, where applicable.

a. Preliminary adjustments, control settings, and warmup procedure.

b. Purpose and use of all operating controls.

c. Purpose of each indicating instrument and how to interpret its readings.

d. How to start the equipment.

e. Operation of the equipment in the normal sequence of steps, accompanying each step in its operation with an explanation of the results expected.

f. How to stop the equipment.

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g. Precautions to be observed.

3.10.5 Section V. Maintenance. This section shall be prepared presupposing that maintenance technicians have been trained in the operational characteristics, physical makeup, capabilities, limitations, and circuit theory of operation. Instructions contained in this section shall be for trainer peculiar items. The section shall contain the following, where applicable.

3.10.5.1 Minimum performance standards. A check chart shall be provided giving adjustment procedures and minimum performance standards, and outlining the indications, readings, and tests required to enable operating personnel and organizational maintenance technicians to determine whether systems or components are in a condition to provide satisfactory results. This chart shall be made up from indications of equipment characteristics, such as over-all receiver sensitivity, frequency tracking, continuous wave performance, transmitter power output, receiver audio output, modulation patterns, radar indicator presentations, accuracy of computer test problems, and other characteristics or functions. In addition to the chart of the conditions necessary for satisfactory operation, there shall be data required for localizing the causes of improper indications of a component or a subassembly which has been designed for easy replacement. There shall be sufficient illustrations, if needed, to permit visual identification of the means of connection between the test equipment and the equipment being tested.

3.10.5.2 Maintenance, Inspection and Lubrication. Instructions for performing required periodic maintenance, daily inspections, calendar inspections, servicing, cleaning and lubrication shall be provided. There shall be one or more illustrations of the equipment showing all points requiring lubrication or periodic servicing, such as pneumatic or hydraulic systems. The kind of lubricants required, Government specification numbers thereof, and methods of application, and minimum time/operating hour requirements for periodic lubrication and servicing shall be included.

3.10.5.3 Troubleshooting. Step-by-step procedures for identifying or isolating faulty components, groups of components, or subassemblies, by means of test points shall be provided.

3.10.5.4 Removal and replacement. Instructions shall be given for separating or disconnecting and replacing subassemblies, if the method to be employed is not obvious.

3.10.5.5 Tests, repairs, and adjustments. Instructions for tests, repairs, and adjustments, within the capabilities of assigned personnel and equipment, such as replacing fuses, pilot lamps, tubes, subassemblies, parts, shall be provided. There shall be, in step-by-step procedure, alignments, adjustments, or calibrations necessary to make the repaired component function as intended within the overall system.

3.10.5.6 Bench test setup (when applicable). An illustration of the recommended bench test setup shall be included for each performance procedure showing the details of intercomponent cabling, and the inter-equipment cabling between the test equipment and the equipment being tested. Where a number of performance procedures utilize identical test setups, one illustration shall be given to serve all such procedures. This illustration shall be appropriately labeled and not repeated, and reference to the figure number of the illustration shall be made for each affected performance procedure.

3.10.5.7 Test equipment. Instructions for use of test equipment for diagnosing specific troubles shall be given within each performance procedure.

3.10.5.8 Voltage and resistance chart. Voltages and resistance data shall accompany each circuit breakdown. The charts shall show voltages measured under normal operating conditions with a 20,000 ohm-per-volt voltmeter or a vacuum tube voltmeter.

3.10.6 Section VI. Diagrams. Schematic diagrams shall be included in this section, as required, for reference purposes during actual maintenance work. This section shall begin with an explanation of the section's content and its proper use, such as

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its working relationship to material in other sections, how to locate a particular diagram, and explanation of the wiring identification system used on the diagrams, and any other information considered essential for proper understanding and use. A symbol chart shall be provided to explain all graphic symbols. These symbols shall be limited to those which are not covered in the standards cited in MIL-M-38784, but are authorized by the procuring activity. Following the explanatory test, an index of the titles of all diagrams in this section shall be listed in numerical order by the figure number of each diagram. The diagrams should be arranged in the same sequence as that portion of the text to which they pertain in preceding sections of the manual.

3.10.6.1 General requirements.

a. Where the equipment's nature, relative complexity, and number of components permit, a single schematic diagram shall be prepared to cover all signal circuits, power circuits and control circuits. When single schematic diagrams are used, intercomponent circuits, connections, and terminals, properly numbered shall be shown.

b. When a single diagram is impractical, a separate diagram shall be prepared for each major component, or system of interrelated subassemblies. Any circuit left in "mid-air" due to being picked up on other diagrams shall be labeled as to the part of the circuit to which it pertains. Any wiring not included in diagrams shall be listed in point-to-point tabular form.

c. The principal electrical characteristics of each circuit part, expressed in actual values (ohms, microfarads, microhenrys, etc.). Electrical values may be tabulated on the apron and indexed by reference designation to applicable points on the diagram when sufficient space is not available on the diagram itself. Values normally shall be expressed numbers, omitting the unit of measurement (such as ohms). The symbol for "mu" and "omega" shall not be used. However, the units used shall be given in a general note.

3.10.7 Section VII. Illustrated Parts Breakdown. When approved by the procuring activity, the last section of the manual shall contain illustrated parts breakdown information in accordance with the requirements of MIL-M-38807. When not specifically approved, this information shall be in a separate manual.

3.10.8 Glossary and alphabetical index. The requirements of MIL-M-38784 are applicable.

3.11 Technical manuals for individual part task trainers. Operation and maintenance instruction manuals shall be prepared for individual part task trainers (not a part of a mobile training set) in accordance with the instructions in this specification for arrangement of a system trainer manual. When this specification applies to a trainer which is not a part of a mobile training set, the manual shall be divided into sections only.

4. QUALITY ASSURANCE PROVISIONS

4.1 Quality assurance provisions shall be in accordance with MIL-M-38784 and MIL-P-38790.

4.2 Validation and verification shall be in accordance with MIL-M-38784.

5. PREPARATION FOR DELIVERY

5.1 Packaging, packing and marking for shipment shall be in accordance with MIL-M-38784.

5.2 Security classification markings for classified technical manuals shall be in accordance with MIL-M-38784.

6. NOTES

6.1 Intended use. Technical manuals prepared in accordance with this specification are intended to provide instructions for the operation and maintenance of mobile

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training sets and part task trainers by the organizations that operate the devices. They are not for depot maintenance or overhaul organizations.

6.2. Ordering data. Procurement documents should specify:

- a. Title, number, and data of this specification.
- b. The equipment, if any, that is not an integral operating component that shall be covered. (3.2.1)
- c. Whether the manual shall contain an Illustrated Parts Breakdown section. (3.5 and 3.10.7)

6.3. Definitions.

6.3.1 Mobile training set. A set of system oriented trainers, training devices, special tools, test equipment, and training accessories designed for portability and use in the field.

6.3.2 Part task trainers. Trainers which provide student or crew practice on one or more operator, maintenance, or control functions. Such trainers permit selected aspects of a task or operation to be practiced independently of other aspects.

6.4 Review activities. In addition to the Review Activities noted below, HQ Air Training Command is also responsible for review of drafts of this specification.

Custodian:

Air Force - 16
Army - TM

Preparing Activity

Air Force - 16

Reviewers:

Air Force 01, 10, 16, 70
Army - TM

Project No.

TMSS 0227

STANDARDIZATION DOCUMENT IMPROVEMENT PROPOSAL

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1. DOCUMENT NUMBER		2. DOCUMENT TITLE	
3a. NAME OF SUBMITTING ORGANIZATION		4. TYPE OF ORGANIZATION (Mark one)	
b. ADDRESS (Street, City, State, ZIP Code)		<input type="checkbox"/> VENDOR	
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		<input type="checkbox"/> OTHER (Specify): _____	
5. PROBLEM AREAS			
a. Paragraph Number and Wording:			
b. Recommended Wording:			
c. Reason/Rationale for Recommendation:			
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7a. NAME OF SUBMITTER (Last, First, MI) - Optional		b. WORK TELEPHONE NUMBER (Include A Code) - Optional	
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