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DEPARTMENT OF DEFENSE STANDARD PRACTICE

DISPLAYED MESSAGES FOR AUTOMATIC TEST EQUIPMENT

AMSC A7302 **AREA TMSS**

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FOREWORD

1. This standard 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 (DoD).

2. This standard establishes uniform requirements for displayed messages generated for or presented by automatic test equipment.

3. Comments, suggestions, and questions on this document should be addressed to: Commander, USAMC Logistics Support Activity, ATTN: AMXLS-AP, Redstone Arsenal, AL 35898-7466 or e-mailed to: logsa.tmss@conus.army.mil. Since contact information can change, you may want to verify the currency of this address information using the ASSIST Online database at http://assist.daps.dla.mil.

SUMMARY OF CHANGES

1. The following modifications to MIL-STD-334B have been made:

Paragraph	Modification
2.2.1	Changed
3.1.13	Changed
5.3.2.3b	Changed
5.9.3	Changed
6.1	Changed
6.2	Changed
6.3	Incorporated into 6.2
6.4	Renumbered to 6.3
6.5	Renumbered to 6.4 and Changed

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1. SCOPE

1.1 Purpose. This standard sets uniform requirements for written or graphical information delivered to users of automatic test equipment (ATE) by computer-controlled output devices. Such devices include, but are not limited to, cathode-ray tubes, plasma displays, liquid crystal displays, printers, and plotters. This information, herein called displayed messages, may be directive and/or informative in nature. Displayed messages are included within the definition of official equipment publications.

1.2 Application. The provisions of this standard apply to ATE computer-controlled output devices and to all test program sets (TPS), for use by Department of the Army, that include displayed messages.

2. APPLICABLE DOCUMENTS

2.1 General. The documents listed in this section are specified in sections 3, 4, and 5 of this standard. This section does not include documents cited in other sections of this standard or recommended for additional information or as examples. While every effort has been made to ensure the completeness of this list, document users are cautioned that they must meet all specified requirements documents cited in sections 3, 4, and 5 of this standard, whether or not they are listed.

2.2 Government documents.

2.2.1 Standards. The following standards form a part of this specification to the extent specified herein. Unless otherwise specified, the issue of these documents are those cited in the solicitation or contract.

STANDARDS

DEPARTMENT OF DEFENSE

MIL-STD-1472	Human Engineering
MIL-STD-38784	Standard Practices For Manuals, Technical: General Style and Format Requirements.

(Copies of these documents are available online at http://assist.daps.dla.mil/quicksearch/ or from Standardization Documents Order Desk, 700 Robbins Avenue, Building 4D, Philadelphia, PA 19111-5094.)

2.3 Non-Government publications. The following documents form a part of this document to the extent specified herein. Unless otherwise specified, the issues of these documents are those cited in the solicitation or contract.

AMERICAN SOCETY OF MECHANICAL ENGINEERS

ASME Y14.38 (DoD Adopted)	Abbreviations and Acronyms

(Copies this document may be obtained at www.asme.org or mail your request to the American Society of Mechanical Engineers, 3 Park Avenue, New York, NY 10016-5990.)

2.4 Order of precedence. In the event of a conflict between the text of this document and the references cited herein, the text of this document takes precedence. Nothing in this document, however, supersedes applicable laws and regulations unless a specific exemption has been obtained.

3. DEFINITIONS

3.1 Definitions. The definitions below are applicable to this standard.

3.1.1 Automatic test equipment (ATE). ATE is equipment, usually under control of a software program, which is designed to conduct analysis of functional and static parameters in order to evaluate adherence of a unit under test (UUT) to its performance/test specification. The equipment may also fault isolate to a component of the UUT.

3.1.2 Displayed message. A displayed message is any written or graphical instruction or item of information presented by a computer-controlled output device.

3.1.3 Engineering support (ES) data. The ES data consists of text, schematics, assembly drawings, program listings and computer- generated outputs, functional flow diagrams, test strategy reports, and any relevant information to provide the life cycle support of the test program set (TPS). The purpose of the ES data is to provide all documentation essential to a full comprehension of the intent, design, structure and interrelation of all elements of the TPS.

3.1.4 English language test document (ELTD). The ELTD is a document which presents an overview, through flow charts, operator instructions, and narration, of the test program and interface connecting device (ICD) as they relate to the automatic test system, TPS, and UUT. The ELTD is not supplied to the user (below depot level), but it aids developers and maintainers in understanding, validating, and maintaining test programs. It may or may not include an actual software source listing on the TPS.

3.1.5 ICD. An ICD is a unit of hardware which physically and electrically interfaces the UUT to the ATE or interfaces with the ATE itself in a wrap around configuration. The ICD may contain active components such as amplifiers, power sources, and signal conditioners to augment the ATE's capabilities.

3.1.6 Maintenance allocation chart (MAC). The MAC is the definitive guide to the selection and assignment of maintenance functions, spare and repair parts, tools, and test equipment to all maintenance levels. The MAC also displays a functional breakdown of equipment, identifying specific functions and worktime standards associated with each functional group for a specific materiel system.

3.1.7 Operator. The ATE operator is the user of the ATE/TPS, who may be functioning in any category of maintenance. For example, the ATE "operator" may be the general support maintainer of the UUT.

3.1.8 Supplemental data (SD). SD consists of any relevant information, text, schematics and logic diagrams necessary for analysis of the TPS and UUT in the event of a problem or anomaly during the testing process.

3.1.9 Target audience. The target audience consists of the users of a given group of test program sets, defined by the Government in terms of specific job-related skills and reading level.

3.1.10 Technical manual (TM). A TM is a publication that contains instructions for the installation, operation, maintenance, training and support of weapon systems, weapon system components, and support equipment. TM information may be presented, according to prior agreement between a contractor and the Government, according to applicable TM military specification.

3.1.11 Test program (TP). A TP is an organized sequence of commands or instructions directing operation of an automatic test system to determine the condition of a UUT or the ATE itself. It evaluates the UUT's/ATE's performance and may also perform fault isolation.

3.1.12 Test program instructions (TPI). The TPI provides information needed for testing (e.g., hookup, probe point locations, or other programmed operator intervention) which cannot be conveniently provided by the ATE under control of the TP. Appropriate contents are largely dependent on the ATE being used.

3.1.13 Test program set (TPS). A collection of hardware, software, and applicable documentation used for testing, fault detection and isolation, maintenance, and any other evaluations of components and equipment.

3.1.14 Test program set documents (TPSD). The TPSD consists of information necessary to enable the user to execute a UUT TP. The TPSD consists of the TPI and SD. The purpose of the TPSD is to provide information necessary to determine the operational condition and perform fault detection and fault diagnostics of a UUT on an ATE.

3.1.15 Unit under test (UUT). Any unit or module subjected to ATE testing.

4. GENERAL REQUIREMENTS

4.1 Style and format.

4.1.1 Style. Messages shall be simple, short, and clear. The general style (but not format) requirements of MIL-STD-38784 shall apply except when in conflict with this document or the physical constraints of the ATE

4.1.2 Format. Format shall be uncluttered. To the extent that format is not constrained by peripheral equipment or pre-existing system software, messages shall be arranged for ease of recognition. Information shall not be crowded so closely nor sequenced so rapidly as to interfere with any necessary operator response..

4.1.3 Format standardization. Format standardization, such as for a specific ATE system or type of output device, is an important factor in operator usability. Message formats shall conform to the detailed requirements in this document as well as any additional system-specific requirements imposed by the Government.

4.2. Content coverage. Messages shall be displayed for the following reasons:

a. to provide instructions to the operator.

b. to elicit operator response.

c. to provide necessary safety information.

d. to provide necessary operator confidence.

e. to provide test results such as UUT acceptance.

f. to provide further instructions such as to make further diagnosis, repair, evacuate, or discard the UUT.

4.3 Usability by the target audience. Messages shall be written for the user in accordance with the applicable target audience description.

4.4 Task complexity. Operator inputs shall be kept uncomplicated, especially when real-time responses are required of the operator. Complex tasks shall be broken into a series of noncomplex tasks. Task sequences shall be logical, with a minimum number of operator actions required for tasks completion.

4.5 Relationship to other technical documentation.

4.5.1 Referenced documents. Reference shall be made to the appropriate equipment publication when an operator decision must be based on more information than can be included in a sequence of displayed messages. Only documents authorized for use by and readily accessible to the operator shall be referenced. No reference shall be made without due consideration of the overall effect on target audience usability.

4.5.2 Training materials. Messages shall not reference training materials.

4.5.3 Source data and documentation. Source data and documentation used in the preparation of the TPSs, ELTDs, ESDs, TPSDs, TPIs and SD shall not be referenced in displayed messages.

4.5.4 Maintenance allocation charts (MACs). All operating or maintenance tasks appearing in displayed message form shall be in agreement with the approved maintenance allocation charts (MACs) for both the UUT and the ATE itself.

4.6 Safety.

4.6.1 WARNING messages. Any message calling for an action that is potentially dangerous to the personnel performing the action shall be immediately preceded by a message entitled "WARNING". The WARNING shall comply with MIL-STD-38784.

4.6.2 CAUTION messages. Any message calling for an action that is potentially damaging to equipment shall be immediately preceded by a message entitled "CAUTION." The CAUTION shall comply with MIL-STD-38784.

4.6.3 Prominence of safety messages. WARNINGS and CAUTIONS shall be prominently displayed and immediately noticeable. Operator acknowledgment of any WARNING or CAUTION shall be required before the program is allowed to continue.

4.7 Abbreviations. See Appendix A for abbreviations.

5. DETAILED REQUIREMENTS

5.1 Language. Common nouns and verbs, as well as special terminology, shall be used consistently. For example, the user shall not be told to "press" a switch in one message and "depress" it in another.

5.1.1 Equipment identification. Items of equipment shall be identified only by nomenclature used in the repair parts and special tools list (RPSTL) or in other terms specifically approved by the Government.

5.1.2 Abbreviations and acronyms. Information shall be displayed in plain concise text wherever possible. Abbreviations and acronyms not peculiar to a specific system shall be from appendix A of this document or from ASME Y14.38.

5.1.3 Display codes. Approved abbreviations, acronyms, or display codes shall be used where space does not permit plain text.

5.1.4 Feedback. Feedback shall be provided to the operator to indicate the status of test program processing and provide for user confidence. Feedback shall conform to the following:

a. Periodic feedback shall be provided to the operator to indicate normal system operation when test program processing requires the operator to stand by for more than 15 seconds without making a response.

b. The operator shall be informed at least once before the test or tests are initiated when a testing event or a series of testing events technically prohibits interruption to inform the operator.

c. Positive indication shall be presented to the operator about the outcome of the process and the requirements for subsequent operator actions when a process or sequence is completed or aborted by the system or TPS.

d. Feedback shall be provided to indicate the reason for rejection and the required corrective action if the system rejects an operator input. Feedback shall be self-explanatory or coded in a manner clearly understood by the target audience.

5.2 Format design.

5.2.1 Display formats. Display formats shall be designed to optimize information coding, grouping, and appropriate information density. Where applicable, the criteria of MIL-STD-1472 shall apply.

5.2.2 Grouping. Displayed data necessary to support an operator activity or sequence of activities shall be grouped together.

5.2.3 Tabular data display. Tabular data shall be captioned.

5.2.3.1 Tabular data. Tabular data shall be presented in a row- column display.

5.2.3.2 Recurring data. Location of recurring data shall be similar among all tabular data displayed.

5.2.3.3 Tables. Tables shall be vertically aligned under their column headings and horizontally aligned with their row headings.

5.2.3.4 Values. All values contained within a table shall be expressed to the same number of decimal places.

5.2.3.5 Alphabetic data. Columns of alphabetic data shall be left-justified.

5.2.3.6 Numeric data. Columns of numeric data, without decimals, shall be displayed right-justified; numeric data with decimals shall be justified with respect to the decimal point.

5.2.4 Information density. At least one line space shall be left blank above and below critical information, and at least two character spaces shall be left blank on each side.

5.3 Prompting and coding.

5.3.1 General. Prompting shall be used to get the operator's attention and explain what to do when an operator action is required during a test sequence. Prompting shall be clear and understandable; designed to aid the operator in executing the required action.

5.3.2 Coding techniques. Display coding shall be used to distinguish between different categories of displayed data. Consistent coding shall be used across displays.

5.3.2.1 Bar coding. Bars shall be rectangular and extend horizontally.

a. The bar width for menu type screens shall be not less than 9/16 inch nor more than 3/4 inch.

b. The bar width for status screens shall be not less than 5/16 inch nor more than ½ inch.

c. The bar length for menu and status screens shall be dictated by the length of the message, in no instance shall the bar be less than 5 inches, nor more than 7-½ inches.

d. The bar width for command entries (CONT, PREV, PRINT, HELP, EXIT, etc.) shall be not less than 5/8 inch nor more than 3/4 inch.

e. Command entries shall be separated by a minimum of 1/16 inch.

5.3.2.2 Color coding. Color coding shall be used when the operator must rapidly distinguish among several categories of data in complex, dense, or critical displays.

a. Colors shall be consistent throughout the displays.

b. No more than 7 colors shall be used per screen when color discrimination is required.

5.3.2.3 Flash coding. Flash coding shall be used only when there is an urgent need to get the operator's attention.

a. The text shall have a flashing underline but the text shall not flash.

b. The blink rate shall be 1 to 2 flashes per second with equal on/off times or at an acceptable rate as specified by the acquiring activity.

c. The operator shall be required to acknowledge flash messages before the test can proceed.

5.3.2.4 Brightness intensity coding. Brightness intensity coding shall be used primarily to differentiate between an item of information and adjacent information. No more than 2 levels of brightness shall be used.

5.3.2.5 Underline coding. When a line is added to mark or emphasize a displayed item, it shall be placed under the designated item.

5.3.2.6 Analog Coding. Analog coding shall be used when required to provide feedback on an analog action (such as adjustment) being done by the operator. For example, if the operator is instructed to adjust a potentiometer to read a certain voltage, the display shall present the current voltage and show the voltage change as the potentiometer is adjusted.

5.3.2.7 Location, pattern, color, graphical, and symbol coding. These techniques shall be used where appropriate to save time for the operator or the ATE. For example, if a UUT test path schematic is presented on the screen, the signal flow will be highlighted by color or pattern to aid the operator in tracing the signal flow.

5.3.2.8 Audio prompting. Audio codes may be used, as appropriate, to satisfy or supplement a requirement for video prompting. The choice of specific audio codes shall be consistent with the following principles:

a. The number of sound signals shall be limited to four (bell, beep, buzz, etc.). Steady signals that resemble hisses, static, or sporadic radio signals shall not be used.

b. Each sound shall have only one meaning. Once a particular sound signal code is established for a given operating situation, the same signal shall not be designated for some other display.

c. Audio levels shall be consistent throughout.

d. Audible signals shall be easily discernible from any ongoing input.

5.4 Display updating.

5.4.1 Display update rates. The update rates of system information being displayed in a tabular form shall be neither so slow nor so fast as to render the data unusable in the intended manner.

5.4.2 Visual integration. Graphic displays requiring operator visual integration of rapidly changing patterns shall be updated at a rate that shall be neither so slow nor so fast as to render the data unusable in the intended manner.

5.4.3 Display freeze. If possible, a display freeze option shall be provided to stop the program and allow close scrutiny of a selected frame.

5.4.4 Freeze feedback. An appropriate feedback label shall be provided to remind the operator when the display is in the freeze mode.

5.5 General information. General information shall be displayed before the start of testing and shall include all WARNINGS and CAUTIONS applicable during the test, as well as the following information:

a. A list of supporting programs, if applicable.

b. ICD accessory equipment.

c. Related equipment publications.

d. Special operator requirements for UUT testing.

e. Program date and revision identifier.

f. Identification numbers of compiler, run time system, and equipment tables required.

g. Serial number of the ATE system used.

5.6 Error control.

5.6.1 Error correction. Where operators are required to make entries into the system, the display sequence shall provide an easy means for correcting erroneous entries.

5.6.2 Internal software checks. The operator shall be notified, to the maximum practical extent, of any input errors detectable by internal software checks for validity of item, sequence of entry, completeness of entry, etc.

5.6.3 Critical entries. The user shall be required to acknowledge critical entries prior to their being implemented by the system.

5.7 Fault messages.

5.7.1 Diagnostic responses. Responses, directed primarily toward the repairman (not necessarily an ATE operator), shall occur as either replace statements or adjustment messages.

5.7.2 Replace statement. Replace statements must identify a specific defective component or a component ambiguity group. The defective components called out in an ambiguity group shall be listed in descending order of failure probability; however, high-cost components may be placed last or separately, upon Government approval. The tern\m last or separately, upon Government approval. The term “REPLACE” shall be used in all fault statements, (e.g., “REPLACE SUBASSEMBLY A1” or “REPLACE R1, C1, VR1”).

5.7.3 Adjustment messages. These messages shall identify a required adjustment procedure or provide additional maintenance instructions to determine a malfunction.

5.8 Peripheral device limitation.

5.8.1 Input and output constraints. When a specific requirement of this standard exceeds the physical constraints of an ATE system, (e.g., small formal displays such as narrow paper tape or short read outs), the ATE shall be exempt from that requirement only. All other requirements shall remain in effect.

5.8.2 Clarity. Regardless of format or type of peripheral equipment, the basic requirements of clarity and usability by the target audience shall be the same for all displayed messages.

5.9 Provisions for multiple experience level coverage.

5.9.1 General. Messages shall be suitable for the entire range of probable users.

5.9.2 Selective underlining. Key words and critical data shall be highlighted by underlining except where such information has been emphasized in another manner for reasons other than providing for multiple experience levels.

5.9.3 Option to suppress. The user shall not be given the option of viewing or suppressing lengthy displays or familiar information.

5.10 Usability criterion. Displayed messages shall be technically accurate, complete, properly sequenced, compatible with related hard-copy equipment publications and understandable by all levels of the target audience.

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 standard provides the minimum requirements of displayed messages for automatic test equipment. This document, in conjunction with applicable military specifications cited in the contract statement of work and listed in the ASSIST database, form the basis for contractual instruments.

6.2 Acquisition requirements. Acquisition documents should specify the following:

a. Title, number, and date of the standard.

b. Tailoring guidance. To ensure proper application of this standard, invitations for bids, requests for proposals, and contractual statements of work should tailor the requirements in section 4 or 5 of this standard to exclude any unnecessary requirements.

6.3 Subject term (key word) listing.

Test Program Set (TPS)

6.4 Changes from previous issue. The margins of this standard are marked with vertical lines to indicate where changes from the previous issue were made. This was done as a convenience only and the Government assumes no liability whatsoever for any inaccuracies in these notations. Bidders and contractors are cautioned to evaluate the requirements of this document based on the entire content irrespective of the marginal notations and relationship to the last previous issue.

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APPENDIX A

APPROVED ABBREVIATIONS

A.1. GENERAL

A.1.1 Scope. This appendix is a mandatory part of this standard and establishes uniform use of abbreviations and acronyms required for displayed messages.

A.1.2 Application. This appendix is applicable for abbreviations and acronyms not peculiar to a specific system. ASME Y14.38 applies when abbreviations are not system peculiar or listed herein.

LIST OF APPROVED ABBREVIATIONS

WORD OR WORD COMBINATIONS	ABBREVIATIONS
ADJUSTMENT/ADJUST	ADJ
ALTERNATING CURRENT	AC
ALTERNATE	ALT
AMPERES	A
APPROXIMATELY/APPROXIMATE	APPROX (≈)
ASSEMBLY	ASSY
AUXILIARY	AUX
AVAILABLE	AVAIL
BUILT-IN-TEST	BIT
CALIBRATE	CAL
CAPACITANCE/CAPACITOR	CAP
CATHODE RAY TUBE	CRT
CHANNEL	CHAN
CHECK	CHK
CIRCUIT	CKT
CONFIGURATION	CONFIG

APPENDIX A

WORD OR WORD COMBINATIONS	ABBREVIATIONS
CURRENT	CUR
DECIBELS	DB
DEGREES	DEG (°)
DIAGNOSTIC	DIAG
DIRECT CURRENT	DC
DISPLAY	DSPL
ELECTRONIC MODULE	EM
EQUAL TO	EQ (=)
EXTERNAL	EXT
FAILURE	FLR
FARADS	F
FEET	FT
FILTER	FL
FREQUENCY	FREQ
GIGA	G
GREATER THAN	GT (>)
GROUND	GND
HERTZ	HZ
HENRIES	H
HORIZONTAL	HORIZ
IDENTIFY/IDENTIFICATION	IDENT
INDICATOR	IND
INITIAL/INITIALIZE/INITIATE	INIT

APPENDIX A

WORD OR WORD COMBINATIONS	ABBREVIATIONS
INSTRUCTION	INSTR
INTERFACE CONNECTING DEVICE	ICD
INTERFACE	INTFC
INTERMEDIATE FREQUENCY	IF
INTEGRATED CIRCUIT	IC
LESS THAN	LT (<)
LINE REPLACEABLE UNIT	LRU
LOWER LIMIT	LL
MAXIMIZE/MAXIMUM	MAX
MINIMIZE/MINIMUM	MIN
MONITOR	MON
NEGATIVE	NEG (-)
NOT EQUAL TO	NE (≠)
NOMINAL	NOM
NUMBER	NO. (#)
OPERATE/OPERATOR	OPR
OSCILLOSCOPE	SCOPE
OVERFLOW	OVFL
PARAMETER	PRMTR
PERCENT	PCT
POSITION	POSN
POSITIVE	POS (+)
POTENTIOMETER	POT

APPENDIX A

WORD OR WORD COMBINATIONS	ABBREVIATIONS
POWER	PWR
PRINTED CIRCUIT BOARD	PCB
RADIO FREQUENCY	RF
REFERENCE	REF
REPEAT	RPT
REQUIRED	REQD
RESISTOR/RESISTANCE	RES
SHOP REPLACEABLE UNIT	SRU
SIGNAL	SIG
UPPER LIMIT	UL
VERTICAL	VERT
VOLT	V

CONCLUDING MATERIAL

Custodian:

Army - TM

Review Activities:

Army - AC1, AR, AV, CR, EA, MI, SM

Preparing Activity

Army TM

Project TMSS 2006-015

NOTE: The activities listed above were interested in this document as of the date of this document. Since organizations and responsibilities can change, you should verify the currency of the information above using the ASSIST Online database at http://assist.daps.dla.mil.