NOT MEASUREMENT SENSITIVE

PERFORMANCE SPECIFICATION
GENERAL STYLE AND FORMAT,
TEST PROGRAM SETS FOR AUTOMATIC TEST EQUIPMENT

Reinstated after 18 July 2013 and maybe used for new and existing design and acquisitions.

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.

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l. SCOPE

1.1 <u>Purpose</u>. This specification contains the requirements for the preparation of operator instructions and operational features required in Test Program Sets (TPS) for all equipment.

1.2 <u>Applicability</u>. Generally, each item specified herein will be included in the test program (TP) unless the item is not applicable to the particular equipment or an exception has been granted by the contracting activity. Additional information and instructions deemed necessary for a specific item of equipment, but not specified herein, will be included in the test program for that item of equipment, if authorized by the contracting activity.

1.3 <u>Examples/figures</u>. The figures used in this specification are examples only. The text of this specification takes precedence over examples.

Comments, suggestions, or questions on this document should be addressed to U.S. Army Research & Development and Engineering Command, ATTN: RDMR-SET, Redstone Arsenal, AL 35898-5000. Since contact information can change, you may want to verify the currency of this address information using the ASSIST Online database at https://assist.dla.mil

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2. APPLICABLE DOCUMENTS.

2.1 General. The documents listed in this section are specified in section 3 of this specification. This section does not include documents cited in other sections of this specification 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 section 3 of this specification, whether or not they are listed.

2.2 Government documents.

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

STANDARDS

DEPARTMENT OF DEFENSE

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

(Copies of these documents are available online at http://assist.dla.mil/quicksearch/ or from the Standardization Document 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 SOCIETY 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.)

INSTITUTE OF ELECTRICAL AND ELECTRONIC ENGINEERS

IEEE 716-1995	Common/Abbreviated Test Language for All Systems (C/ATLAS)

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(Copies may be obtained from http://www.ieee.org/web/publications/home/index.html or from the Institute of Electrical and Electronic Engineers, IEEE Service Center, 445 Hoes Lane, P.O. Box 1331, Piscataway, NJ 08855-1331.)

2.4 Order of precedence. Unless otherwise noted herein or in the contract, in the event of a conflict between the text of this document and the references cited herein, (except for related specification sheets), the text of this document takes of this document takes precedence. Nothing in this document, however, supersedes applicable laws and regulations unless a specific exemption has document, however, supersedes applicable laws and regulations unless a specific exemption has been obtained.

3. REQUIREMENTS.

3.1 Operator Automatic Test Equipment (ATE) Interface.

3.1.1 Standard design. A test program (TP) (see 6.5.4) shall be written so that:

    a. the system is easy to operate.

    b. the current status of the TP is evident to the operator.

    c. the system responds to each operator input.

    d. the next operation is easily determined.

3.1.2 Software structure. The TP structure shall provide context, consistency, and flexibility to the operator in executing the test program set (TPS) (see 6.5.6).

3.1.3 Display design. The software structure and display design shall be a transparent interface between the operator and the task. It shall appear to the operators that they are directly acting on the screen representations and the Unit Under Test (UUT) without interference from the TPS.

3.1.4 Interface design objectives. The interface design shall be understandable, learnable, controllable, mappable, responsive, tolerant, and flexible.

3.1.4.1 Understandable.

    a. The operator shall be able to move through to. The TP shall provide the operator a means to be able to move through   the various functions of the TP while maintaining and understanding the test.

    b. Information shall be presented in clear representations.

    c. There shall be a consistent use of terminology throughout the TP.

    d. Information that is essential to making a decision or performing an action shall be

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given at one time.

3.1.4.2 <u>Learnable</u>. The TP software shall be designed:

a. to prevent errors to the extent possible.

b. to allow easy recovery from errors.

c. to display a help message or visual indication prompt the user when they make an input errors.

d. to provide instructions at the appropriate time and place.

e. to provide the operator with a dominant, clearly marked path through the operational logic.

f. to reduce the demands on the operators' memory by providing "prompting" information at appropriate times.

3.1.4.3 <u>Controllable</u>. The TP shall promote the sense of operator control over the TP by:

a. keeping the operator informed as to what the test program is doing.

b. keeping the operator oriented as to where the test is, what test has been completed, and where the operator will be allowed to direct the test.

c. responding the same way to the same operator input.

d. ensuring that all system actions have a detectable cause.

3.1.4.4 <u>Mappable</u>. The TP shall provide routing information to the operator. It shall:

a. provide the operator instructions to get started.

b. provide clearly defined landmarks and routes.

c. provide continuity between landmarks.

d. never allow the operator to reach a "dead end" or loop, with no place to go or options to try.

e. keep the operators aware of progress in reaching their goals.

f. support forward and backward movement through the operational logic. Backward

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movement shall be restricted to multiple graphic screens or successful UUT adjustments which allow testing to resume at the original failure.

3.1.4.5 <u>Responsive</u>. The TP shall provide effective, consistent, timely, and meaningful feedback. The TP responses shall reflect what the test program is doing as well as system responses to operator actions.

3.1.4.6 <u>Tolerant</u>. The TP shall facilitate easy recovery from errors. Error handling support features such as "undo" commands, clear and constructive error messages, and help directories shall be used to recover from errors. The TP design shall include procedural verification. This verification shall identify instances where the operator may not have correctly performed a procedure, and prompt the operator to check the previous procedure before the test can continue.

3.1.4.7 <u>Flexible</u>. The TP shall provide for ease of menu/interface upgrades in the future revision releases based upon input from operator filed comments.

3.1.4.8 <u>Language</u>. 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.

3.1.4.9 <u>Equipment identification</u>. 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.

3.1.4.10 <u>Abbreviations and acronyms</u>. 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.

3.1.4.11 <u>Display codes</u>. Approved abbreviations, acronyms, or display codes shall be used where space does not permit plain text.

3.1.4.12 <u>Feedback</u>. 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.

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3.2 <u>Operator Interface Requirements</u>.

3.2.1 <u>Test Program Structure</u>. The test program structure shall be simple, logical, and consistent. The selection of the dialogue used in the TP shall support the design structure.

3.2.2 <u>Types of dialogue</u>. The types of dialogue that shall be used are:

     a. question and answer,

     b. menu selection, and

     c. function keys.

3.2.2.1 <u>Question and answer</u>. Questions shall be presented one at a time and shall not require the operator to answer more than one question at once. When the system must ask a series of questions, and the answer to the current question is dependent upon the answer to a previous question, answers to all questions within the series shall be displayed until all questions have been answered.

3.2.2.2 <u>Menu selection</u>.

     a. Each menu display shall require only one selection by the operator.

     b. The format of menu displays shall present only one option per displayed line.

     c. The active area for menu option selection via touch screen shall be the area of the displayed option label. The selection of a menu option for a non-touch screen shall be accomplished by the operator positioning the cursor or mouse type pointer within the area to be selected (the displayed option label) and then pressing either "RETURN" or "ENTER" on the keyboard, or the left button of the mouse or trackball. If a mouse or trackball is not available, arrow keys on the keyboard shall be used to position an on screen pointer.

     d. The menu display shall provide an immediate acknowledgment that an entry was made.

     e. Menu options shall be phrased as commands to the test set (computer), and not as questions to the operator.

     f. The displayed menu options working structure and syntax shall be consistent for all TPs independent of the defined elements and structure of the command language chosen.

     g. Each option code shall represent the meaning of the option. Codes shall not consist of arbitrary alpha, numeric, or alpha numeric designations.

     h. Menus shall display all options available at the current step in the test sequence.

i. All menu options shall be consistent in their wording, ordering, and location, so that they are readily distinguishable from any other information contained on the display.

j. Menu options shall be listed in a logical sequence or in descending order of frequency of use.

k. Menus shall be formatted to indicate related groups of options rather than an unrelated string of alternatives. Groups of related options shall be given a descriptive label that is distinctive in format from the option labels. Should there be any conflict between this paragraph and j (above), this paragraph takes precedence.

l. A hierarchic sequence of menu selection shall be provided rather than a single multipage menu.

m. As a minimum, the menu hierarchy shall start at a "Main" menu (top most) to the 3 submenus of ATE, ICD, and UUT. After running tests, the hierarchy shall return user to a "Print" menu before returning to the "Main" menu. The structure shall provide immediate access to critical or frequently used options and minimize the number of steps required to complete the sequence. The structure shall also provide the operator with his position within the sequence structure.

n. Options that accomplish control entries shall be distinguished from options that branch to other menu frames.

3.2.2.3 <u>Function keys</u>.

a. Each function key shall be labeled to indicate the function(s) it performs. The labels shall be sufficiently descriptive to prevent operator confusion. Multifunction keys shall indicate to the operator which function is currently active.

b. Function keys shall perform their designated function with a single activation. The function of a key shall not change with repeated activations.

c. The TP shall provide an immediate acknowledgment of function key activation.

d. A key assigned a given function in one test shall be assigned the same function in all other tests.

3.2.2.4 <u>Displays</u>.

a. The TP shall be designed to display all the data that the operator needs at any step in the test sequence. Display screens shall not contain information that is not related to the current task. Data shall be sufficient as to not require the operator to recall data from previous displays.

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b. Data shall be displayed in usable, consistent, and distinctive formats. Once a format has been devised, it shall be maintained to ensure consistent design of the displays. The operator shall not be required to transpose, compute, interpolate, or mentally translate data to other units, numbers, or languages.

c. The wording for test sequences and guidance messages shall be consistent, familiar, and task oriented. Verbs in guidance messages shall be imperative. See Appendix A for recommended terms.

d. Abbreviations shall be kept to a minimum. Words having five letters or less shall not be abbreviated except those established by standard practice (e.g., "V" for volt). The abbreviations approved for use by this specification for single words and word combinations are listed in Appendix B.

3.2.2.5 <u>Conventional text</u>. Conventional text shall be used for data displays. Running text shall be displayed in upper and lower case using conventional punctuation and spacing between letters, words, sentences, and paragraphs. Paragraphs shall be separated by one blank line. Words shall not be broken between lines with a hyphen. Text shall be in the active voice. Instructions shall be numbered in the order they are performed from top down (i.e., Instruction 1 is the top-most and performed 1, instruction 2 is next, etc.). Each numbered instruction shall be separated by a blank line. Test instructions shall line up at the left edge of the screen with an appropriate margin.

3.2.2.6 <u>Titles</u>. Titles shall be displayed at the top of the screen.

a. Titles shall be in capital letters.

b. There shall be at least one blank line separating the title or header from the main body of the display. There shall be at least one blank line separating the main body of the display from the reserved command entries.

3.2.2.7 <u>Command entries</u>. Command entries shall be displayed only on the screens to which they apply. Reserved command entries shall be displayed at the bottom of the screen.

a. Selection of command entries will cause the automatic test equipment (ATE) to perform the following actions:

(1) CONT shall always advance the TP to the next operator instruction or test situation.

(2) EXIT shall return the TP to the TPS Main Menu or the previous menu except as defined in figure 13 and 18.

(3) PREV shall return the TP to the screen displayed immediately prior to the current screen. PREV shall return the user to the previous function if the screens do not change.

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(4) PRINT shall cause the ATE to print the current display screen and/or test data the hard copy printer. This command shall be omitted when the ATE does not have a hardcopy printer.

(5) HELP shall display operator informational help screens.

(6) Additional commands shall cause an action consistent with the represented command title and in accordance with the requirements established in this specification. Additional command keys shall only appear in vacant space on the screen. They shall not be placed in a space occupied by a standard key.

b. No text data shall be displayed in the reserved command area of the screen.

c. Reserved command entries shall be placed as follows:

(1) CONT at the left of the screen.

(2) EXIT at the right of the screen.

(3) PREV to the right of CONT.

(4) PRINT (if applicable) to the right of PREV.

(5) HELP to the left of EXIT.

(6) Additional commands shall be placed between the area of the PRINT and HELP command locations.

3.2.2.8 <u>Display coding</u>. Display coding shall be used to distinguish between different categories of displayed data. Consistent coding shall be used across displays as well as within displays. Bar, color, and flash coding are the types of coding that shall be used.

a. Bar coding. Bars shall be rectangular and extend horizontally. The width for menu type screens shall be not less than 9/16 inch (14 mm) nor more than 3/4 inch (19 mm), and for status screens not less than 5/16 inch (8 mm) nor more than ½ inch (13 mm). The length of the bar shall be dictated by the length of the message but in no instance shall the bar be less that neither 5inches (127 mm), nor more than 7-1/2 inches (190 mm). For command entries, such as CONT,PREV, PRINT, HELP, and EXIT, the width shall be not less than 5/8 inch (16 mm) nor more than 3/4 inch (19 mm) and the length not less than 1 1/8 inches (29 mm) nor more than one and1-1/4 inch (32 mm). Command entries shall be separated by a minimum of 1/16 inch (2 mm). Data on the screen shall be symmetrical and pleasant to the eye.

b. Color coding. Color coding shall be used when the operator must distinguish rapidly

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among several categories of data in complex, dense, or critical displays. The colors used shall be consistent throughout the TP. When color is used there shall be no more than 7 colors utilized. Colors shall be used, with provisions for monochrome, as follows:

(1) WARNINGS AND CAUTIONS.

(a) Red. The word "WARNING" shall be displayed in red and be surrounded by a red box, for monochrome, a warning (see paragraph 6.5.7) shall be displayed so that the word "WARNING" and its associated test are reverse imaged. The word "WARNING" shall appear in upper case on a line by itself. Text of the warning shall be centered and have the right and left margins indented to appear distinct from normal text.

(b) Yellow. The word "CAUTION" shall be displayed in yellow and underlined by a yellow line. For monochrome, a caution (see paragraph 6.5.7.1) shall be displayed so that the word "CAUTION" shall be boxed by a single line.

(c) White. Unless otherwise specified by the contracting activity (see 6.2), explanatory text for warnings and cautions shall be white.

(2) TEXT SCREENS.

(a) White. White shall be used for all text, to include the text in touch sensitive areas, and general display purposes. All touch sensitive areas shall turn white when touched to indicate activation.

(b) Black. Black shall be used as the primary background color for all screens. Also for text in activated touch screen areas and for areas with a light color background such as yellow or light blue.

(c) Dark blue. A dark blue background shall be used for all touch sensitive areas. Text in touch sensitive areas shall change to dark blue after activation and the background area turns white. For monochrome, the box shall be slash marked and reverse image when activated.

(d) Red. Red shall be used to indicate a warning. For monochrome, warnings shall be reverse imaged.

(e) Yellow. Yellow shall be used to indicate a caution. For monochrome, the word "CAUTION" shall be boxed by a single line.

(3) TEST SET UP SCREENS. Unless otherwise specified by the contracting activity, the following colors shall be used:

(a) Green. The ATE and Interconnecting Device (ICD) receiver box shall

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be green. For monochrome, the ATE and ICD receiver box shall contain a slash pattern.

(b) Yellow. The ICD (see 6.5.2) box shall be yellow. For monochrome, the ICD shall contain a cross-hatched pattern.

(c) White. Cables and cable connectors shall be white.

(d) Light blue. The UUT box shall be light blue. For monochrome, the UUT box shall be outlined by a dashed line.

(e) Other colors. Other colors may be used as specified by the contracting activity to accurately represent the actual hardware. If other colors are used, they shall be used consistently throughout the TPS.

(f) Photographic, video, more realistic images, etc. As specified by the contracting activity, photographic or other more realistic images as well as video may e used if they are available.

(4) TEST STATUS SCREENS.

(a) Light blue. Item to be tested or test was bypassed shall be light blue. For monochrome, the item shall be underlined.

(b) Yellow. A yellow status bar shall indicate that the test is in progress. For monochrome, the status bar shall be dim.

(c) Green. When a test has passed, the status bar shall change from yellow to green. For monochrome, the status box shall clear. If the bar is the last bar on the screen, the screen shall remain on display for 3 to 10 seconds, after which the TP shall advance to the next screen.

(d) Red. When a test has failed, the status bar shall change from yellow to red (for monochrome from dim to reverse image) and remain red (reverse image) as the test continues. If the bar is the last bar on the screen, or the test must be interrupted as a result of the failure, then the screen shall remain on display for 3 to 10 seconds, after which the TP shall advance to the next screen.

c. Flash coding. Flash coding shall only be used when there is an urgent need to get the operator's attention. The text shall have a flashing underline but the text shall not flash. The rate of blinking shall be 1 to 2 flashes per second or as specified by the contracting activity with a duty cycle of 50 percent. The operator shall be required to acknowledge flash messages before the test can proceed.

d. Alternate coding such as upper case lettering, underlining, indentation, image

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polarity, shading, and brightness contrast shall be used when the use of color is not possible due to equipment capabilities.

e. 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.

f. 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:

(1) 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.

(2) 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.

(3) Audio levels shall be consistent throughout.

(4) Audible signals shall be easily discernible from any ongoing input.

3.2.2.9 Display generation. The TP shall acknowledge the command execution whenever the operator requests a data display or a new display. This shall be accomplished by either performance of the requested action, or by an advisory message such as "PLEASE WAIT".

3.2.2.9.1 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.

3.2.2.9.2 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.

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

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

3.2.2.10 Error messages. Error messages shall be brief, specific, task oriented, clear, and understandable. The messages shall be constructive and neutral in tone. Messages that suggest a judgment of the operator's behavior shall not be used. The error message shall not imply blame to the operator nor attempt humor. The TP shall display an error message only after a completed entry. When possible, the operator shall be prompted to re-enter only that portion of the command entry that is not correct; however, the operator shall have the option of correcting the entire entry. The TP shall require the operator to confirm potentially destructive data or command entries before execution.

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

3.2.2.12 <u>Replace statement</u>. 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").

3.2.2.13 <u>Adjustment messages</u>. These messages shall identify a required adjustment procedure or provide additional maintenance instructions to determine a malfunction.

3.3 <u>Standard Screens</u>.

3.3.1 <u>Format</u>. Format for presentation to the operator shall be consistent throughout the TP. Figures 1 through 22 are standard screen samples that the TP programmer shall utilize when developing the TP. These standard screens establish the format the programmer shall follow if it is necessary to develop additional screens for a peculiar implementation. Standard screens are divided into six (6) categories which are menu, TPS data sheet, status, test set-up, operator instruction, and help. Text contained in Menu Bars, Status Bars, etc., shall begin one character width from the left of the bar and shall not extend past a one character width margin on the right side of the bar. See figures 3 and 5. 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.

3.3.1.1 <u>Format standardization</u>. 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.

3.3.1.1.2 <u>Style</u>. 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

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

3.3.1.1.4 <u>Grouping</u>. Displayed data necessary to support an operator activity or sequence of activities shall be grouped together.

3.3.1.1.5 <u>Tabular data display</u>. Tabular data shall be captioned.

3.3.1.1.6 <u>Tabular data</u>. Tabular data shall be presented in a row- column display.

3.3.1.1.7 <u>Recurring data</u>. Location of recurring data shall be similar among all tabular data displayed.

3.3.1.1.8 <u>Tables</u>. Tables shall be vertically aligned under their column headings and horizontally

aligned with their row headings.

3.3.1.1.9 <u>Values</u>. All values contained within a table shall be expressed to the same number of decimal places.

3.3.1.1.10 <u>Alphabetic data</u>. Columns of alphabetic data shall be left-justified.

3.3.1.1.11 <u>Numeric data</u>. Columns of numeric data, without decimals, shall be displayed right-justified; numeric data with decimals shall be justified with respect to the decimal point.

3.3.1.1.12 <u>Information density</u>. 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.

3.3.1.1.13 <u>Content coverage</u>. 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.

3.3.1.1.14 <u>Usability by the target audience</u>. Messages shall be written for the user in accordance with the applicable target audience description.

3.3.1.1.15 <u>Task complexity</u>. 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.

3.3.2 <u>Menu screens</u>. The primary means of operator interaction with the TP shall be by utilization of the TPS menu, figure 3. However, when multiple entry points are required, additional menus or hierarchical menus shall be utilized. In cases where the descriptive text cannot be contained in the menu bar, the text shall be a selection (option) bar on the right side of the screen, figure 20. These selection bars shall be considered command entries and shall be subject to all requirements in paragraph 3.2.

3.3.3 <u>TPS data sheet</u>. The TPS data sheet (figure 4) shall be used to display relevant data to the operator. The CONT function key shall be used on all but the last screen when more than one screen is required. The PREV function key shall be used as necessary. The PRINT function key shall appear on all screens, and when activated, the printout shall be in the same format as displayed on the screen. The PRINT function shall print out the entire data sheet. The EXIT function key shall appear on all screens.

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3.3.4 <u>Status screens</u>. Status screens shall be utilized whenever the ATE is performing ATE Survey Tests (figure 5), ICD Tests (figure 7), UUT Preliminary Tests (figure 14), or UUT Functional Tests (figure 15). These screens shall display all tests to be performed using the color coding in accordance with paragraph 3.2.2.8. Each bar on the screen shall contain on the far right side, an estimate to the closest minute (one minute minimum) of the time required to perform the test. The interactive test step number shall be displayed on the upper part of the screen. When multiple entry points are used, the status screen shall display only the test(s) selected from the menu.

3.3.5 <u>Test set-up screens</u>. Test set-up screens shall be used to provide instruction to the operator for installing the ICD (Figure 6), or the UUT (figure 13). Additional samples for ICD Installations are at Appendix C. The ATE system interface shall be represented on the right side, the ICD in the center, and UUT on the left unless otherwise specified in the contract statement of work. Narrative text shall be kept to a minimum on these screens; however, there shall be help screens available for all test set-up screens to supplement the data on the test set-up screens.

3.3.6 <u>Operator instruction screens</u>. Operator instruction screens shall be used to obtain required operator input (figures 8 through 12), and to provide information to the operator that requires a response (figures 1, 2, 16, 17, 18, and 20). The operator shall only be required to input one element of data for the input type. If the entry is made from a keyboard, the prompt shall be a question mark in the lower left of the screen. If the entry is made from a keypad, the keypad must be displayed. When responses are required, it shall be through the use of reserved function keys (figure 20 provides an example of how user defined function keys may be used). User defined function keys shall be supplemented by an explanation on a help screen. When graphics are used to facilitate operator manual intervention for tasks such as alignment, adjustment, and probing, a help screen shall provide a detailed explanation of the graphic.

3.3.6.1 <u>Conventions</u>. The following conventions shall apply to operator instruction screens.

      a. The following colors with provisions for monochrome shall be utilized:

           (1) green (monochrome, a solid line) for UUT topology (illustration);

           (2) light blue (monochrome, dim) for component label;

           (3) yellow (monochrome, a dashed line) for the outline of alternative views; and

           (4) white for probe, adjustment, or alignment points, and instructional text.

      b. The topology display shall be the same orientation as is normally viewed by the operator and shall include view identifiers such as TOP, BOTTOM, FRONT, BACK, INTERNAL, RIGHT REAR, etc.

      c. Topology displays shall be designed with the minimum amount of clutter, and designed so that graphic generation by the ATE will be as fast as possible.

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d. The displays shall present the minimum graphics required to positively identify the UUT and the location of all components. The topology shall represent the entire UUT from the selected view when possible. If the selected view presents excessive clutter, the view shall be represented as an alternative view. See 3.3.6.2.

e. Accompanying operator instructional text shall be outside the image of the topology display.

f. Probe, adjustment, and alignment points shall be displayed when operator action is required. The point and associated text shall be erased from the screen when the required action by the operator has been accomplished.

g. The preferred order for presentation of tolerances shall be: upper limit (UL), nominal value (NOM), and lower limit (LL). NOM may be omitted as applicable and as specified by the contracting activity. Fractional notation shall not be used. All tolerances shall include the unit of measure. Dimensions if provided may be listed after each value. The following are examples of tolerance presentations.

      TEST POINT 14 UL = 25 Vdc NOM = 24.5 Vdc LL = 24 Vdc

      SPRING FREE LENGTH UL = 53.55mm NOM = 50.05mm LL = 46.55mm

h. When an adjustment is being performed by the operator, the value of the item being adjusted shall be to the right of the tolerance information, and shall be constantly updated automatically as the adjustment is being performed.

i. Line drawings may be substituted by photographic/video images and include vocal instructions which are captured/scanned and inserted in the TPS code. These images must provide the same clarity to the operator as provided by the line drawings. Probe, adjustment, and alignment points should only be displayed when operator action is required. The exploded view will be utilized when the complexity of the UUT is such that the desired probe point or adjustment point cannot be identified clearly, without doubt, to the operator. Vocal guidance may be added for clarification or when they will enhance the instructions.

3.3.6.2 Alternative views. When alternative views are required for graphical representations, the following conventions shall apply.

a. Alternative views shall conform to the requirements of 3.3.6.1. These views shall employ the following techniques.

      (1) The appropriate UUT outline shall be displayed to provide correct identification of components and test points.

      (2) The desired view to be broken out, enlarged, simplified, etc., shall be

surrounded by a broken or dashed line.

(3) The view shall provide sufficient detail to enable recognition of the UUT and the area of interest in the alternative view.

(4) A PREV function key shall be provided for all alternative views so that the operator may view the overall UUT topology on demand.

b. Sectional views shall be used whenever the complexity of the UUT topology is such that a clearly discernible representation of the UUT area of interest is not possible.

c. Subassembly breakout views shall be used to identify a portion of the UUT which is not readily visible from the primary topology orientation display.

d. Exploded views shall be used to breakout discrete components or areas to be adjusted or probed when the complexity of the UUT is such that these items cannot be readily identified from the UUT topology.

3.3.7 <u>Help screens</u>. Help screens (figure 19) shall be used to provide additional information to the operator. They shall not be used to solicit input from the operator. Help screens shall be provided to supplement test set-up and operator instruction screens.

3.4 <u>Safety</u>.

3.4.1 Test program instructions (TPI). TPIs (see paragraph 6.5.5) shall provide detailed descriptions of dangers encountered during testing.

3.4.2 <u>Test programs (TP)</u>. TPs shall warn operators of hazards via the ATE display. A warning message shall precede application of potentially dangerous power and individual messages shall precede all test processes where an inherent hazard is present. The TP shall also minimize operator contact with hazardous UUTs. Warnings, cautions and notes shall be in accordance with MIL-STD-38784.

3.4.3 <u>Supplementary data (SD)</u>. Supplementary data (see 6.5.3) shall provide detailed descriptions of TPS and UUT hazards. Operator warnings concerning special or unique dangers which may result from improper handling or analysis of the TPS or UUT shall be emphasized.

3.5 <u>Coding and commentary techniques</u>.

3.5.1 <u>Coding techniques</u>. The TPs shall be developed utilizing Common Abbreviated Test Language for All Systems (IEEE 716-1995 C/ATLAS), be modular in style, and utilize strict control of program branching.

3.5.1.1 <u>Statement numbering</u>. A standard statement numbering system shall be used for all TPs.

3.5.1.1.1 <u>Statement numbers</u>. Statement numbers shall consist of six digit numbers, where the

test statement number is the first four digits and the step number is the last two digits.

a. Statement numbers used prior to the beginning of the ATE survey tests shall range from 000100 to 099999.

b. Statement numbers used in the ATE survey test shall range from 100000 to 149999.

c. Statement numbers for the ICD survey test shall range from 150000 to 199999.

d. Statements in the sections for UUT connection, signature tests, safe to turn on tests and static tests shall range from 200000 to 209999.

e. UUT functional test statements shall range from 210000 to 499999.

f. UUT diagnostic tests statements shall range from 500000 to 899999, and when possible, be a test number which is 3000 greater than the failed functional test, e.g., a failure at functional test 2508.00 enters diagnostic test 5508.00.

g. Any statements in the TP after the diagnostic tests shall be numbered from 900000 to 999999.

3.5.1.1.2 Increments. When assigning statement numbers during the development of the TP, they shall be assigned in increments of not less than 10 to provide room for later corrections or modifications to the TP. If increments of 10 are not feasible due to the number of tests required, the number of increments shall be maximized (less than 10) between tests. Statement numbers shall be in sequential order and shall not be resequenced after acceptance for configuration management. There shall be at least one statement number on each page of the program source list. The first statement of each subroutine procedure definition shall have a statement number.

3.5.1.2 Names for variables. Names for variables shall be selected to reflect the primary attribute of the data which the variable represents. Names shall be selected to enhance the readability to the ATLAS statements in which the variable is used. Variable names that represent a unit of measurement, i.e., volts, volts direct current, ohms, inch, etc., shall be in accordance with ASME Y14.38. Names that represent an attribute or element of the UUT shall be generic names.

3.5.1.3 Looping statements. To prevent the inability to decipher the nesting of looping statements in TPs, such as the IF and WHILE statements in ATLAS, TPs shall utilize indentation of each ATLAS statement within each loop by two spaces until the termination of each loop. The END statement for each loop shall be aligned with the initiation of the loop. A simple identifying statement shall be added to the END statement to clearly identify the connection to the beginning of the loop.

3.5.2 Commentary techniques. Comments shall provide the vehicle to link the UUT and the ICD functions that are being tested to the ATE oriented ATLAS statements, and used to separate major sections of coding which have independent functions within the program. The types of

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comments that shall be used are major comment headers, minor comment headers, functional comments, and procedural comments.

3.5.2.1 Major comment headers. Major comment headers shall be used to identify major sections of coding throughout the test program. The format of the major comment header shall be a rectangle of asterisks, with a minimum dimension of 5 by 50 asterisks, containing a short, underlined, functional description of the block of code. At least one blank line shall appear before and after each major comment header (figure 21).

3.5.2.2 Minor comment headers. Minor comment headers shall be used to identify the function of each module of code within the test program. These headers (figure 22) shall consist of one or more lines of text, as necessary, to convey the function of the code. Each line of text shall consist of five asterisks, followed by five spaces, followed by a line of text, then five spaces, followed by five asterisks. At least one blank line shall appear before and after each minor comment header. Minor headers shall be provided for each test in the following applications:

   a. ATE survey tests, to identify the instrument being tested;

   b. ICD survey tests, to identify the circuitry of the ICD which is being tested;

   c. UUT preliminary tests, to identify the circuitry or components being tested;

   d. UUT functional tests, to identify the UUT function being tested and to reference the applicable testing specification revision and paragraph; and

   e. UUT diagnostic tests, to identify the area of the diagnosis and the functional test that routed the TP to the particular diagnostic test.

3.5.2.3 Functional comments. Functional comments shall be used within a module of code to enhance the readability of the code. Functional comments shall be UUT oriented. These comments shall always be used to explain the logic flow of UUT diagnostic tests, and the stimuli applications and evaluations of measurements.

3.5.2.4 Procedural comments. Procedural comments shall be used to explain program flow and enhance the readability of the code. Branching statements shall require procedural comments to explain the branch. Procedural comments shall also be used to explain the programmer's objectives when the TP uses looping statements if the code is not explained by a functional comment. Procedural comments shall show the statement number location of that procedure definition wherever a procedure is called by the program.

3.6 Administrative Software.

3.6.1 Purpose. The administrative software shall be used to generate reports and to provide utility functions to the operator. Two files are required to generate reports, a UUT log record file and a system configuration file. The UUT log record file is a historical file containing UUT test records. The TP must communicate with both of these files.

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3.6.2 <u>Data elements</u>. The four data element inputs (see figures 8 through 11) required for the operator to obtain reports shall be displayed via the UUT LOG RECORD screen (figure 12). The programmer shall ensure that these four data elements, together with the other data for which the TP is responsible, are stored in the UUT log file at the conclusion of testing each UUT. Administration software data element definitions are at appendix D.

3.7 <u>Test Program Preamble</u>.

3.7.1 <u>Title block</u>. The first element of the preamble shall be the title block (figure 23). It shall appear immediately after the termination of the ATLAS statement BEGIN. The entire title block shall be bordered by asterisks so that it is further emphasized. The program name shall also be bordered by asterisks within the title block. The title block shall be spaced so that with the ATLAS statement BEGIN, it shall occupy the entire first page of the source listing when it is printed on a standard hard copy device. See figure 23. The title block shall be a section of comments that identifies the:

        a. program name,

        b. UUT name and part number,

        c. next higher assembly, when applicable, and

        d. weapon system(s) of which the UUT is a component.

3.7.2 <u>UUT configuration data</u>. Configuration data shall follow the test program title block. Preceded by a major comment header, this section shall list all of the configuration data packages used to provide source data for the development of the TPS. For each item of the source data, this comment shall list the drawing, revision level of the drawing, the latest date of the acceptance specification, military specification, and product specification. If the drawing is an original (no revision level), this shall be designated by the term "ORIG" or a dash in the revision column. An example of the UUT configuration data comment is provided in figure 24.

3.7.3 <u>Test program configuration data</u>. The TP configuration data shall follow the UUT configuration data. Preceded by a major comment header, the TP configuration data block (figure 25) shall identify all changes made to the TP after it is submitted for design verification for the first time. The version submitted for initial verification shall be designated revision 01 or with a dash or the term "ORIG".

3.7.4 <u>Entry point directory</u>. The entry point directory (figure 26) shall follow the TP configuration data block. The directory shall be bordered by asterisks and shall list all entry points that can be used by the TP developer or maintainer to speed access to certain sections of the TP. To the extent possible entry points shall be designed into the TP at the beginning of each functional block of tests and shall not be dependent upon stimuli application nor indicator initialization which occurs prior to the entry point. The TP documentation shall contain the procedure to replace the operator TPS menu with the entry point directory and back to the menu.

The directory shall function for the TP programmer or maintainer in the same manner the TPS menu functions for the operator.

3.7.5 INCLUDE statements. A block of code shall be reserved for any ATLAS INCLUDE statements which may be necessary. This section shall be preceded by a major comment header, containing the underlined words "INCLUDE STATEMENTS". The header shall be followed by the appropriate ATLAS constructs.

3.7.6 REQUIRE statements. A block of code shall be reserved for any ATLAS REQUIRE statements which may be necessary. This section shall be preceded by a major comment header, containing the underlined words "REQUIRE STATEMENTS". The header shall be followed by the appropriate ATLAS constructs.

3.7.7 Variables. Following the REQUIRE statements, there shall be a section for the declaration of variables. This section shall be preceded by a major comment header, containing the underlined words "DECLARE STATEMENTS". The header shall be followed by the appropriate ATLAS constructs for the declaration of all variables used globally throughout the program as well as those local variables used within that module.

3.7.8 Interface definition. The next section of coding shall contain the ATLAS DEFINE INTERFACE statement. This section shall be preceded by a major comment header, containing the underlined words "INTERFACE DEFINITION".

3.7.9 Fill statements. Data initialization for all global variables as well as those local variables used within that module shall be included in this section of coding. This section shall be preceded by a major comment header, containing the underlined words "FILL STATEMENTS".

3.7.10 Message definition. This section of code shall be allocated to the definition of ATLAS DEFINE MESSAGE statements. This section shall be preceded by a major comment header, containing the underlined words "MESSAGE DEFINITION".

3.7.11 Procedures. The last section of the preamble shall be used to define each procedure to be used globally as well as those local procedures used within that module using the appropriate ATLAS constructs. This section shall be preceded by a major comment header, containing the underlined words "PROCEDURES". Prior to each procedure there shall be a minor comment header, providing specific information as to the function or utilization of the procedure, and statement number locations of calling procedures. A procedure shall not be defined unless there is more than one calling procedure.

3.8 UUT Verification.

3.8.1 Structure. This section shall be preceded in the source code by a major comment header, containing the underlined words "UUT VERIFICATION". This shall be followed by the executable ATLAS code that generates the standard TPS MENU screen, figure 3. This screen shall verify the UUT by displaying to the operator the UUT name and part number. This screen shall also serve as an entry point directory by displaying the six options described in the

following paragraphs. The test programmer shall ensure that the TP is properly coded to execute the option selected by the operator.

3.8.2 <u>View TPS data sheet</u>. When the option VIEW TPS DATA SHEET is selected, the TP shall display the TPS data screen, figure 4. This screen shall provide the operator the information needed to successfully complete the TPS. In addition, this screen shall provide the operator a listing of all ATE measurement and stimuli devices needed to execute the TPS, to include the ICD, cabling, expendable/ durable items, TMs, or other devices not normally part of the test set. This screen shall present a print and exit option to the operator. The print option shall activate the printer to print the entire data sheet and the exit option shall return the operator to the TPS menu.

3.8.3 <u>Run all tests</u>. When the option RUN ALL TESTS is selected the TP shall execute in sequence the ATE Survey tests, the ICD Tests, and the UUT Tests. Only a failure during the testing sequences shall interrupt the flow of the testing.

3.8.4 <u>Run ATE survey tests</u>. When the option RUN ATE SURVEY TESTS is selected, the TP shall execute only the ATE Survey Tests. Upon successful completion the TP shall return to the TPS Main Menu.

3.8.4.1 <u>Initiation of ATE survey test</u>. The ATE survey test shall be preceded in the source code by a major comment header, containing the underlined words "ATE SURVEY TESTS". Only those measurement and stimulus devices, at the specific ranges and tolerances, used by the TP shall be tested. When initiated, the ATE SURVEY TEST STATUS screen (figure 5) shall be displayed to the operator.

3.8.4.2 <u>ATE survey test fault detection</u>. In the event the ATE survey test detects a fault, the TP shall display an OPERATOR INSTRUCTION screen (figure 16). This display shall identify the fault(s) detected by the survey tests. This data shall be printed on hard copy if the operator selects this option, while maintaining the display. When the operator selects the CONT option, a second OPERATOR INSTRUCTION SCREEN (figure 17) shall be displayed. An EXIT command shall return the TP to the TPS MENU.

3.8.5 <u>Run ICD tests</u>. When the option RUN ICD TEST is selected, the TP shall execute only the ICD tests. Upon successful completion the TP shall return to the TPS Main Menu.

3.8.5.1 <u>ICD tests parts</u>. The ICD tests shall be preceded in the source code by a major comment header, containing the underlined words "ICD TESTS". The ICD tests shall consist of four parts: the ICD test set-up diagram; the ICD signature test; the ICD Safe-To-Turn-On (STTO) tests (if required) and the ICD survey test. Each of these parts shall be preceded in the source code by a minor comment header, identifying the section of code.

3.8.5.2 <u>Initiation of ICD tests</u>. Upon initiation of the ICD tests, the ICD TEST SET-UP screen, figure 6, shall be displayed to the operator. This screen shall include the part number of the ICD and identify the required cabling, by reference designator. A HELP screen (figure 19) shall be available to provide specific installation instructions to the operator and a reference designator to

part number cross reference. When CONT is activated, the TP shall execute the ICD signature test. An EXIT command shall return the TP to the TPS MENU. Appendix C contains additional examples of ICD set-up diagrams to be used when load boxes or load card assemblies are included as part of the ICD.

3.8.5.3 <u>Initiation of ICD signature test</u>. Upon initiation of the ICD signature test, the TP shall display the ICD TEST STATUS screen, figure 7. The signature test shall consist of measuring the ICD identification resistors to determine that the correct ICD is properly installed. If the test fails, an OPERATOR INSTRUCTION SCREEN shall notify the operator that the correct ICD may not be installed. The operator shall be instructed to verify the correct ICD is installed, and if so, reinstall the ICD, and if not, install the correct ICD. If the failure persists, the TP shall Identify the problem on an OPERATOR INSTRUCTION SCREEN, figure 16. When the TP is   instructed to continue, a second OPERATOR INSTRUCTION SCREEN, figure 18, shall be displayed. An EXIT command shall return the TP to the TPS MENU. Upon successful completion of the ICD signature test, the TP shall begin the ICD STTO test, then the ICD Survey Test while maintaining the ICD TEST STATUS SCREEN (figure 7) for the operator. If any of these tests fail, the TP shall identify the failure using an OPERATOR INSTRUCTION screen (figure 16). Upon selection of the CONT option, a second OPERATOR INSTRUCTION screen (figure 18) shall be displayed. Upon selection of the EXIT option, the program shall return to the TPS Main Menu.

3.8.5.4 <u>ICD STTO test</u>. The ICD STTO test shall confirm that full power and signals may be applied to the ICD without damage to the equipment nor injury to personnel. Successful completion shall initiate the ICD survey test.

3.8.5.5 <u>ICD survey test</u>. The ICD survey test shall verify the operational capabilities of all cables, ancillary items, and those portions of the ICD required to test the particular UUT. In cases where an ICD is used to test several UUTs, a separate program shall be developed to test all functions of the ICD. Upon successful completion, an OPERATOR INSTRUCTION screen shall direct the operator to return to the TPS Main Menu.

3.8.6 <u>Run UUT tests</u>. When the option RUN UUT TESTS is selected, the TP shall execute the UUT tests. The TP shall measure the ICD for the correct identification resistors before continuing with the UUT tests since the ICD has not been previously identified. If the TP determines that the ICD is incorrect, the TP shall display the appropriate ICD and the connecting instructions before continuing with the UUT tests. Upon successful completion of the UUT tests, the TP shall return to the TPS Main Menu.

3.8.6.1 <u>UUT testing parts</u>. UUT testing shall be divided into five parts: Administrative data; UUT Test Set-up; UUT Preliminary Tests; UUT Functional Tests and UUT Diagnostic Tests. The beginning of each part shall be preceded in the source code with a major comment header, containing the underlined title of the section.

3.8.6.2 <u>Administrative data section</u>. The administrative data section of the TP shall consist of acquiring certain data from the operator for the administrative software in the operating system. The operator shall enter the UUT serial number, work order number, end item code (EIC), etc.

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Figures 8 through 12 describe the method that shall be used. After the four administrative data elements have been entered, the TP shall display the data to the operator using an Operator Instruction screen, figure 12. This data shall be output to the hard copy device after a page command has been given. If the operator initiates an EXIT command, the TP shall return to the TPS menu. When the operator initiates a continue (CONT) the TP shall proceed to the UUT test set-up.

3.8.6.3 <u>UUT test set-up</u>. The UUT test set-up shall be accomplished as described by the UUT test set-up diagram, figure 13. When the operator initiates a CONT the TP shall proceed to the UUT preliminary tests. If the operator initiates an EXIT command, the TP shall return to the TPS menu.

3.8.6.4 <u>UUT preliminary tests</u>. The UUT preliminary tests shall consist of the UUT signature test, UUT STTO tests, and the UUT static tests as required. Each of these sections of code shall be denoted in the source code by a major comment header, containing the appropriate title. Individual tests within each of the categories shall be denoted in the source code by a minor comment header, identifying the section of code.

3.8.6.4.1 <u>Preliminary test display</u>. Upon entering the UUT preliminary tests, the TP shall display the UUT PRELIMINARY TEST STATUS SCREEN, figure 14. Preliminary testing shall consist of the UUT signature test and the UUT STTO test.

     a. The UUT signature test shall consist of a selected impedance measurement to identify that the correct UUT is properly installed. The TP shall display an OPERATOR INSTRUCTION screen which shall instruct the operator to verify the UUT part number and installation, if the signature test fails. The TP shall return to the UUT TEST SET-UP screen if the operator acknowledges a problem. If a problem is not acknowledged, the TP shall display an OPERATOR INSTRUCTION SCREEN, figure 16, with the failure data formatted in accordance with Appendix E. Upon selection of the CONT function, a second OPERATOR INSTRUCTION screen, figure 2, shall be displayed. The TP shall return to the TPS menu when the operator executes an EXIT command.

     b. The TP shall display an OPERATOR INSTRUCTION screen, figure 16, if the UUT STTO test or static test fail. This screen shall display the failure data in accordance with Appendix E. The TP shall output the data to the hard copy device when the operator selects the print option. Upon selection of the CONT function, a second OPERATOR INSTRUCTION screen, figure 2, shall be displayed. The TP shall return to the TPS menu when the operator executes an EXIT command.

3.8.6.5 Functional tests. The TP shall enter the UUT functional tests once the preliminary tests are successfully completed. The TP shall display the UUT FUNCTIONAL TEST STATUS screen, figure 15. This screen shall have one status bar for each functional test. When there are too many functional tests for one screen, the last bar shall be labeled "CONTINUED ON NEXT SCREEN". The TP shall advance to the next screen once the last test on that screen is completed. The labels on the test bars shall relate to the test being performed.

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a. An OPERATOR INSTRUCTION screen shall be displayed if a manual action is required during a test. The operator shall acknowledge that the action has been completed by executing the CONT option, the TP operation shall resume and the test status screen shall appear. Upon successful completion of the functional tests, the TP shall display an OPERATOR INSTRUCTION screen, figure 1.

b. When PRINT is selected, the TP shall output the message "UUT HAS PASSED ALL TESTS" and the administrative data to the hard copy device. If the operator selects the CONT option, the TP shall return to the administrative data section of the program and display the operator instruction screen for entering the UUT serial number, figure 8, of the next UUT to be tested.

c. The TP shall return to the TPS menu if the operator selects the EXIT option. If a failure is detected during the functional tests, the TP shall enter the diagnostic tests.

3.8.6.6 Diagnostic testing. To determine if the TP shall enter diagnostic testing immediately upon encountering a functional test failure or completing as many of the functional tests as possible shall be determined by the design of the UUT on a case by case basis. If the design is such that additional testing can be performed even though one circuit has failed, the functional tests shall continue. However, if the circuitry is interdependent, diagnostics shall begin at the first functional failure. In any case, the TP shall ensure that the UUT functional test status screen displays the fact that a failure has occurred by displaying the associated status bar in red for a minimum of three seconds before beginning diagnostics. If during the diagnostic testing manual action is required by the operator, an operator instruction screen shall be used and the operator continue button, by pressing the probe button, at which time the diagnostics shall resume. Upon successful detection of the failure, diagnostics are complete and the TP shall display an OPERATOR INSTRUCTION screen, figure 16, on which the repair message shall be displayed in accordance with Appendix E. When the operator selects the print option, the repair message shall be output to the hard copy device. The TP shall also output the administrative data at this time. If the operator selects the CONT option, the TP shall return to the administrative data section of the program and display the operator instruction screen for entering the UUT serial number screen, figure 8, of the next UUT to be tested. If the operator selects the EXIT option, the TP shall return to the TPS menu.

3.8.6.7 Exit. When the EXIT option of the TPS Menu is selected, the TP shall cease operation and return to the test set operating software.

3.9 Program flow.

3.9.1 Initial entry. The TPS shall not skip any menus. It shall be designed to "detect" initial entry and then steer the TPS through the proper required test code sequences. ATE and ICD survey tests shall always be run prior to initial UUT testing (figure 3).

3.9.2 Structure. When specified by the acquiring activity (see 6.2), the TPS shall be structured to permit the operator to run individual or groups of functional tests. These tests shall allow the operator to verify a repair action. When user entry points are required, a specific TPS structure

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is required for implementation.

3.9.2.1 <u>Initial flow</u>. The initial program flow shall not change. If the TPS is being executed for the first time, the ATE survey tests and ICD tests must be executed first, followed by the UUT preliminary tests. If the TPS is not being executed for the first time, and the operator has selected RUN ALL TESTS from the TPS Main Menu, the flow proceeds as normal through the execution of the UUT preliminary tests. At the beginning of the UUT functional tests, a menu shall be presented to the operator instead of the UUT functional test status screen. This menu will provide the operator with the options of running all functional tests, in which case the flow proceeds normally, or of running individual functional groups of tests. Upon selection of the option to run an individual functional group, additional menus, following the requirements of paragraph 3.3.2, shall be presented to determine what tests the operator wishes to perform. Upon completion of a particular functional test group, the program shall return to the TPS Main Menu. Under no circumstances will the TPS output any message to the hard copy device or to the administrative data files, indicating that the UUT has passed all tests when this option is employed. Failure messages shall be output to the hard copy device and the administrative data files.

3.9.2.2 <u>Implementation</u>. When employing this option, it is essential that each functional group be self-contained in its own modular structure (see 3.5.1). Each modular construct must be logically independent of all other modules, with the only permissible assumptions being that the ATE Survey tests, the ICD tests, and the UUT preliminary tests have passed. The UUT and ICD STTO tests shall always be executed prior to power-on testing.

3.9.2.3 <u>UUT repair</u>. Maintenance instructions (see paragraph 6.5.8) to repair the UUT shall be accessible from the TPS. This shall be accomplished by either a link to an electronic technical manual or by having a hardcopy of the manual available.

3.10 <u>Relationship to other technical documentation</u>.

3.10.1 <u>Referenced documents</u>. 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.

3.10.2 <u>Training materials</u>. Messages shall not reference training materials.

3.10.3 <u>Source data and documentation</u>. Source data and documentation used in the preparation of the TPSs, ELTDs, ESDs, TPSDs, TPIs and SD shall not be referenced in displayed messages.

3.10.4 <u>Maintenance allocation charts (MACs).</u> 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. VERIFICATION

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4.1 Verification and quality provisions shall be as specified by the contracting activity in the contract or order (see 6.2).

5. PACKAGING

5.1 Packaging or acquisition purposes, the packaging requirements shall be as specified in the Contract order (see 6.2). When packaging of material is to be performed by DoD or in-house contractor personnel, these personnel need to contact the responsible packaging activity to ascertain packaging requirements. Packaging requirements are maintained by the Inventory Control Point's packaging activities within the Military Service or Defense Agency, or within the military service's system commands. Packaging data retrieval is available from the managing Military Department's or Defense Agency's automated packaging files, CD-ROM products, or by contacting the responsible packaging activity.

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 TPS needed by maintenance personnel for the operation and maintenance of equipment. The requirements of this specification is normally invoked by contract. When the Government prepares the subject TPS, 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. DELETED.

    c. Title and number of the TPS to be prepared.

    d. Identification of information to be furnished by the Government.

    e. Description of target audience and reading grade level.

    f. Color coding of explanatory text for cautions and warnings, unless otherwise specified (see 3.2.2.8b(1)(c)).

    g. Structure of TPS to permit operator to run individual or groups of functional tests (see 3.9.2).

    h. Verification requirements (see 4.1).

    i. Packaging requirements (see 5.1).

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j. Specification tailoring by selection of operational requirements on content/format selection summary (see Appendix F).

6.3 <u>Technical manuals</u>. The requirement for technical manuals should be considered when this specification is applied on a contract. If technical manuals are required, specifications and standards that have been authorized and assigned an Acquisition Management Systems Control (AMSC) number must be listed on a separate Contract Data Requirements List (DD Form 1423), which is included as an exhibit to the contract? The technical manuals must be acquired under separate contract line item in the contract.

6.4 <u>TPS acquisition</u>. This specification must be listed on the Contract Data Requirements List (DD Form 1423) in order to acquire the TPS described by the specification, except where DOD FAR Supplement exempts the requirement for DD Form 1423.

6.5 <u>Definitions</u>. The definition of terms below applies as they are used in this specification.

6.5.1 <u>Contracting activity</u>. An element of an agency designated by the agency head and delegated broad authority regarding acquisition functions.

6.5.2 <u>Interconnecting device (ICD)</u>. The ICD provides the required mechanical, electrical, and optical interconnections between the UUT and ATE system to allow execution of the TP.

6.5.3 <u>Group test program set (GTPS)</u>. The GTPS is a Test Program Set that has several standalone Test Programs that share a common Interface Device (ID) for the purpose of testing different Units Under Test (UUTs)

6.5.4 <u>Supplementary data</u>. Supplementary data consists of information, text, schematics, and logic diagrams necessary for the analysis of the TPS and UUT in the event of a problem or anomaly during the testing process. The amount and content of the supplementary data is contingent upon the capability of the ATE to store and display required information automatically.

6.5.5 <u>Test program (TP)</u>. The TP contains a coded sequence which, when executed by the ATE, provides the stimuli and evaluation of the measurements required to test the UUT.

6.5.6 <u>Test program instruction (TPI)</u>. The TPI provides the TPS related information needed for testing (e.g., hook-up, probe point locations, or other programmed operator intervention) which cannot be conveniently provided or displayed by the ATE under program control.

6.5.7 <u>Test program set (TPS)</u>. The TPS consists of those items required to test a UUT on ATE, which includes all the necessary electrical, mechanical, electro-optical, instructional, and logical? decision elements. It includes the TP on a storage media such as magnetic tape, hard disk, memory cassette, optical disk, etc.; the ICD; the TPI; and the supplemental data. The TPS provides the capabilities for UUT performance verification, fault detection, and isolation.

6.5.7.1 <u>Warning</u>. An operating or maintenance procedure, practice, condition, statement, or other

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notification, that if not strictly observed, could result in injury or death of personnel doing the task.

6.5.7.2 CAUTION. An operating or maintenance procedure, practice, condition, statement, or other notification, that if not strictly observed, could result in damage to equipment.

6.5.8 Maintenance instructions. Maintenance instructions enable an operator/maintainer to effect repair of the UUT. These instructions are technical manual information. Normally there will be a link to an ETM or reference to a TM.

6.5.9 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.

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

6.5.11 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.

6.5.12 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.

6.5.13 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.

6.5.14 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.

6.5.15 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.

6.5.16 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.

6.5.17 Test program set documents (TPSD). The TPSD consists of information necessary to enable

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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.

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

6.6 Subject term (key word) listing.

> Coding techniques
> Diagnostic testing
> Fault detection
> Fault isolation
> Status screens

6.7 Changes from previous issue. The margins of this specification 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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*** OPERATOR INSTRUCTION ***

P/N: XXXXX
S/N: XXXXX

1. UUT has passed all tests
2. Remove UUT from ICD
3. To test another UUT of the same part number select: CONT
4. To end testing remove ICD and select: EXIT

| CONT | PRINT | EXIT |

FIGURE 1. <u>**Example of an operator instruction screen**</u>.

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*** OPERATOR INSTRUCTION ***

1. UUT Failed Performance Tests
2. Remove UUT from ICD
3. To Test Another UUT of the Same Part
Number Select: CONT
4. To End Testing Remove ICD and
Select: EXIT

FIGURE 2. <u>Example of an operator instruction screen</u>.

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*** TPS MENU ***
(UUT PART NUMBER)
(UUT NAME)

View TPS Data Sheets

Run UUT Tests

Run All Tests

Run ATE Survey Tests

Run ICD Survey Tests

FIGURE 3. <u>Example of a TPS menu</u>.

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TPS DATA SHEET

SOFTWARE IS: XXXXX   UUT P/N: XXXXX
SOFTWARE REVISION: XXXXX   UUT NAME: XXXXX
PROGRAM NAME: XXXXX   NSN: XXXXX

NOTES: (Operator actions that may be required prior to
            running the TPS.

I. SUPPORT ITEMS: (List all support items necessary)
II. TECH MANUAL REQUIREMENTS: (List all TMs required)
III. PERSONNEL REQUIREMENTS: (List any specific requirements
necessary)
IV. UUT TEST RUN-TIME (GO-NO GO ONLY)

| CONT | PREV | PRINT | EXIT |
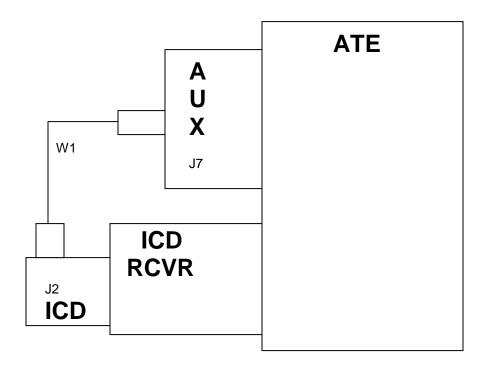
FIGURE 4. <u>Example of a TPS data screen</u>.

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*** ATE SURVEY TEST STATUS ***
Executing TN _____

Counter/Timer	**xmin**

Digitizer	**xmin**

Digital Multimeter	**xmin**

ARB, Function Generator 1	**xmin**

FIGURE 5. <u>Example of an ATE survey test status</u>.

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*** ICD TEST SET-UP DIAGRAM ***

ATE

A
U
X

J7

ICD
RCVR

W1

J2
ICD

For Detailed Instructions TOUCH: HELP

CONT

HELP

EXIT

FIGURE 6. <u>Example of an ICD test set-up diagram</u>.

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*** ICD TEST STATUS ***
Executing TN _____

ICD Signature Test	**xmin**

ICD STTO Test	**xmin**

ICD Survey Test	**xmin**

FIGURE 7. <u>Example of an ICD test status</u>.

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*** OPERATOR INSTRUCTION ***

Enter the UUT Serial Number:

?

FIGURE 8. <u>Example of an operator instruction screen</u>.

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*** **OPERATOR INSTRUCTION** ***

Enter the Work Order Number:

?

FIGURE 9. <u>Example of an operator instruction screen</u>.

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*** OPERATOR INSTRUCTION ***

Enter the End Item Code:

?

FIGURE 10. <u>Example of an operator instruction screen</u>.

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*** **OPERATOR INSTRUCTION** ***

Enter the UUT owning unit UIC:

?

FIGURE 11. <u>Example of an operator instruction screen</u>.

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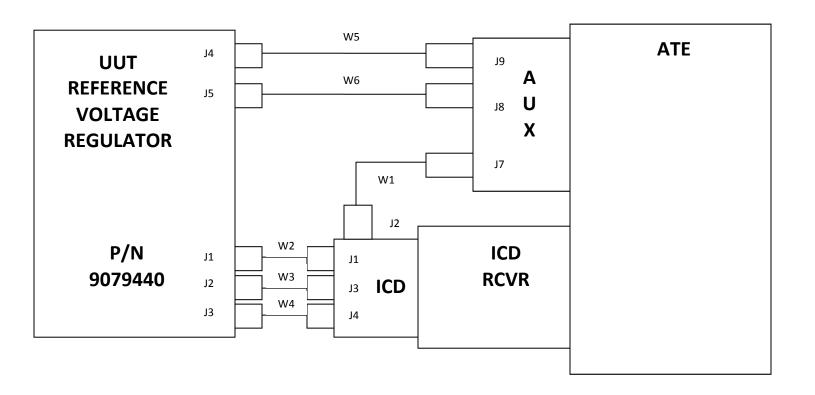
*** OPERATOR INSTRUCTION ***

1. UUT Serial Number: XXXX
2. Work Order Number: XXXXX
3. End Item Code: XXXXX
4. UUT owning unit UIC: XXXXX

CONT		EXIT

FIGURE 12. **Example of an operator instruction screen**.

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*** ICD TEST SET-UP DIAGRAM ***

For Detailed Instructions TOUCH: HELP

| CONT | | HELP | | EXIT |

FIGURE 13. <u>Example of UUT test set-up diagram</u>.

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*** UUT PRELIMINARY TEST STATUS ***
Executing TN _____

UUT Signature Test	xmin

UUT STTO Test	xmin

UUT Static Test	xmin

FIGURE 14. <u>Example of an UUT preliminary test status</u>.

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*** UUT FUNCTIONAL TEST STATUS ***
Executing TN _____

Low Voltage Test	**xmin**

Ripple Voltage Test

+15 Volt Test	**xmin**

Over Current Production Test	**xmin**

Amplifier Gain Test	**xmin**

FIGURE 15. <u>Example of an UUT functional test status</u>.

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*** OPERATOR INSTRUCTION ***

(Repair message)

| CONT | | PRINT |

FIGURE 16. <u>Example of an operator instruction screen</u>.

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*** OPERATOR INSTRUCTION ***

1. ATE failed survey tests

2. Select: EXIT

| PRINT | | EXIT |

FIGURE 17. <u>Example of an operator instruction screen</u>.

*** OPERATOR INSTRUCTION ***

1. ICD failed ICD tests

2. Remove ICD and select: EXIT

| CONT | | PRINT | | EXIT |

FIGURE 18. <u>Example of an operator instruction screen</u>.

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*** HELP ***

(Operator Information)

| CONT | PREV | PRINT |

FIGURE 19. **Example of a help screen.**

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*** OPERATOR INSTRUCTION ***

Touch Appropriate Block For A Copy Of:

1. All Tests Results

| OPTION 1 |

2. Failure Data

| OPTION 2 |

3. Test Status (Go/No Go)

| OPTION 3 |

4. When Complete Select: CONT

| CONT |

| HELP |

FIGURE 20. <u>Example of an operator instruction screen</u>.

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```
+-------------------------------------------------+
|                                                 |
|                                                 |
|          COMMENT TEXT GOES HERE                  |
|                                                 |
|                                                 |
+-------------------------------------------------+
```

FIGURE 21. <u>Example of a major comment heading</u>.

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* * * * * COMMENT TEXT GOES HERE * * * *

FIGURE 22. <u>Example of a minor comment heading</u>.

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PROGRAM 12345678

TEST PROGRAM FOR THE

(UUT NOMENCLATURE)
P/N (UUT PART NUMBER)

A COMPONENT OF THE
(UUT NEXT HIGHER ASSEMBLY)

(WEAPON SYSTEM NAME)
WEAPON SYSTEM

FIGURE 23. <u>Example of a test program title block</u>.

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```
┌ ─ ─ ─ ─ ─ ─ ─ ─ ─ ─ ─ ─ ─ ─ ─ ─ ─ ─ ─ ┐
│          UUT CONFIGURATION DATA          │
└ ─ ─ ─ ─ ─ ─ ─ ─ ─ ─ ─ ─ ─ ─ ─ ─ ─ ─ ─ ┘
```

DRAWING NO.	REV	DATA	TYPE
12345678	ORIG	01/25/88	ASSEMBLY
12347890	A	01/31/88	SCHEMATIC
12348905	D	02/10/88	MIL SPEC

FIGURE 24. <u>Example of UUT configuration data</u>.

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```
┌ ─ ─ ─ ─ ─ ─ ─ ─ ─ ─ ─ ─ ─ ─ ─ ─ ─ ─ ─ ─ ─ ─ ─ ─ ┐
│                                                   │
│                                                   │
│        TEST PROGRAM CONFIGURATION DATA            │
│                                                   │
│                                                   │
└ ─ ─ ─ ─ ─ ─ ─ ─ ─ ─ ─ ─ ─ ─ ─ ─ ─ ─ ─ ─ ─ ─ ─ ─ ┘
```

REVISION	DATE	PROGRAMMER	REASON FOR CHANGE
01	01/25/88	C. SMITH	SUBMITTED TO TRR
02	01/31/88	C. SMITH	TRR COMMENTS
03	02/10/88	J. DOE	INCORPORATE REV B
			OF SCHEMATIC

FIGURE 25. <u>Example of test program configuration data</u>.

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ENTRY POINT DIRECTORY

```
TPS MAINTENANCE ENTRY POINT DIRECTORY


    ENTRY POINT                        APPLICATION

    010000                             UUT IDENTIFICATION
    100000                             ATE SURVEY TESTS
    150100                              ICD CONNECTION
    150200                              ICD SURVEY TESTS
    200100                              UUT CONNECTION
    200200                             UUT STTO TESTS
    201000                             UUT STATIC TESTS
    210100                             (FUNCITONAL TEST #1)
    210200                             (FUNCTIONAL TEST #2)
```

FIGURE 26. <u>Example of an entry point directory</u>.

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APPENDIX A

GLOSSARY

A.1. SCOPE

A.1.1 Scope. This appendix lists the terms that shall be used in the preparation of the test
program. This appendix is a mandatory part of
this specification. The information contained herein is intended for compliance.

A.2. APPLICABLE DOCUMENTS.

This section is not applicable to this appendix.

A.3. GLOSSARY.

Terms	Definitions
ADJUST	Changing the setting on a variable component, other than a switch.
CANCEL	Instruct the operator to invalidate a keyboard entry other than a soft key.
CLOSE	Reverse of the 'OPEN' procedure.
COMPARE	Used to establish the relationship between a labeled value and specified limits.
COMPLETE	Used to signify that the operator has satisfactorily accomplished all required actions of a specific display.
CONNECT	Actions calling for the attachment of a cable or cables.
CONT	The word CONTINUE is used to allow the operator to progress to the next screen.
CORRECT	Shall indicate positive status of a condition.
DATA	The raw materials from which the user extracts information. Data may include numbers, words, pictures, etc.
DISCONNECT	Reverse of the 'CONNECT' procedure.
END	If the UUT is successfully repaired, the user can terminate the TPS.
ENTER	Allow operator to input alphanumeric either through a keyboard or touch panel.

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APPENDIX A

Terms	Definitions
ERROR	A message to instruct operator of an incorrect action.
EXIT	Normally returns to the TPS Main Menu, from the Main Menu, returns to the System.
FUNCTION KEY	A key or touch panel instructing the computer to perform a series of steps.
HARD COPY	A printed paper display output by the computer.
HELP	A capability that displays information in response to the user request for on-line guidance.
HIGHLIGHTING	Emphasizing displayed data or format features in some way, for example, through the use of underlining, bolding, or reverse video.
INCORRECT	Indicate a negative result.
INFORMATION	Organized data that users need to successfully perform their tasks. Information serves as an answer to a users question about data.
INPUT	The data entered into a computer for processing.
INSERT	The installation or mating of a ICD or card assembly into a test setup.
INSTALL	Actions requiring the mating of a card assembly, shorting plugs, protective covers, etc.
KEYBOARD	A data entry device geared toward entering alphanumeric data into the computer system.
LABEL IDENTITY	A title or description that helps user identify displayed data.
OPEN	Used for gaining access to items behind hinged panels or covers.
OUTLINE	Each of the components of the test setups display (such as ATE, ICD, ICD, RCVR, etc.) shall be outlined in color.
POSITION	Actions requiring the physical orientation of a test assembly.
PREPARE	Shall be used to direct the configuration of an item through the completion of two or more instructions.

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APPENDIX A

Terms	Definitions
PRESS	Operator actions concerning the activation/deactivation of keyboard rocker type switches on the UUT or ATE system.
PREV	Takes operator back to previous screen.
PRINT	The operator can order a hard copy of screen displays, messages, etc.
PROBE	All actions directing use of the ATE probe.
PROMPT	A cue or a reminder. Also known as a user-prompt.
QUESTION AND ANSWER	A type of dialogue in which the computer ANSWER displays questions, one at a time for a user to answer.
READ	Used to direct the operator to visually note information from a display or assembly for possible systems input via a subsequent instruction.
READY	Used to indicate that the probe is making good electrical contact at the desired test point and the operator desires to proceed with the measurement, or for a display containing information only.
REMOVE	Reverse of the 'INSTALL' procedure.
REPLACE	Shall be used to direct the removal of a particular item and installation of another like item in its place.
RESTART	A capability that returns a user to the first display in a defined transaction sequence.
RUN	Initiate particular test programs or tests.
SWITCH	Direct operation of all types of switches, other than keyboard/rocker type.
TOUCH	A capability that allows the user to communicate with the computer by touching the screen. Feedback shall be provided to indicate activation.
VERIFY	When the operator is directed to identify the correctness of test information or to indicate the status of a test condition.

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APPENDIX A

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APPENDIX B

APPROVED ABBREVIATIONS

B.1. SCOPE

B.1.1 <u>Scope</u>. This appendix lists the abbreviations approved for use with TPS. This appendix is a mandatory part of this specification. The information contained herein is intended for compliance.

B.2. APPLICABLE DOCUMENTS.

This section is not applicable to this appendix.

B.3. ABBREVIATIONS.

<u>WORD OR WORD COMBINATIONS</u>	<u>ABBREVIATION</u>
ABBREVIATED TEST LANGUAGE FOR ALL SYSTEMS	ATLAS
ALTERNATE	ALT
ALTERNATING CURRENT	AC
AMPERES	A
ANALOG	ANA
APPROXIMATELY: APPROXIMATE	APPROX
ARBITRARY	ARB
ASSEMBLY	ASSY
AUTOMATIC TEST EQUIPMENT	ATE
AUXILIARY	AUX
AVAILABLE	AVAIL
BASE SHOP TEST FACILITY	BSTF
BASE SHOP TEST STATION	BSTS
BUILDING BLOCK	BB

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APPENDIX B

WORD OR WORD COMBINATIONS	ABBREVIATION
BUILT IN TEST	BIT
BUILT IN TEST EQUIPMENT	BITE
CALIBRATE	CAL
CAPACITANCE: CAPACITOR	CAP
CATHODE RAY TUBE	CRT
CHANNEL	CHAN
CIRCUIT	CKT
COMMERCIAL EQUIVALENT EQUIPMENT	CEE
CONFIGURATION	CONFIG
CURRENT	CUR
DATA TRANSFER UNIT	DTU
DECIBELS	DB
DEGREES	DEG
DIAGNOSTIC	DIAG
DIGITAL	DIG
DIGITAL MULTIMETER	DMM
DIGITAL SUBSYSTEM	DSS
DIRECT CURRENT	DC
DISPLAY	DSPL
ELECTRONIC MODULE	EM

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APPENDIX B

WORD OR WORD COMBINATIONS	ABBREVIATION
EQUAL TO	EQ
EXTERNAL	EXT
FAILURE	FLR
FARADS	F
FEET	FT
FILTER	FL
FREQUENCY	FREQ
GIGA (PREFIX)	G
GREATER THAN	GT
GREATER THAN OR EQUAL TO	GE
GROUND	GND
HENRIES	H
HERTZ	HZ
HORIZONTAL	HORIZ
IDENTIFICATION	IDENT
INDICATOR	IND
INSTRUCTION	INST
INTEGRATED CIRCUIT	IC
INTERCONNECTING DEVICE	ICD
INTERFACE	INTFC
INTERMEDIATE FREQUENCY	IF

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WORD OR WORD COMBINATIONS	ABBREVIATION
INITIAL/INITIALIZE/INITIATE	INIT
KILO (PREFIX)	K
LESS THAN	LT
LESS THAN OR EQUAL TO	LE
LIMIT	LIM
LINE REPLACEABLE UNIT	LRU
LOWER LIMIT	LL
MAXIMUM	MAX
MEGA (PREFIX)	M
MICRO (PREFIX)	U
MILITARY OCCUPATION SPECIALTY	MOS
MILLI (PREFIX)	MILLI
MINIMUM	MIN
MISSION	MSN
MONITOR	MON
NANO (PREFIX)	N
NEGATIVE	NEG
NOT EQUAL TO	NE
NO-GO HI	NH
NO-GO LO	NL
NOMINAL	NOM

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WORD OR WORD COMBINATIONS	ABBREVIATION
NUMBER	NO.
OPERATOR	OPER
OSCILLOSCOPE	SCOPE
OVERFLOW	OVFL
PARAMETER	PRMTR
PERCENT	PCT
PICO (PREFIX)	P
POSITION	POSN
POSITIVE	POS
POTENTIOMETER	POT
POWER	PWR
PRINTED CIRCUIT BOARD	PCB
PROBABLE CAUSE OF FAILURE	PCOF
PROCEDURE	PROC
RADIO FREQUENCY	RF
RECEIVER	RCVR
REFERENCE	REF
REMOVE AND REPLACE	R/R
REPEAT	RPT
REQUIRED	REQD
RESISTOR: RESISTANCE	RES

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APPENDIX B

WORD OR WORD COMBINATIONS	ABBREVIATION
SAFE TO TURN ON	STTO
SECOND (TIME)	SEC
SENSITIVE	SENS
SHOP REPLACEABLE UNIT	SRU
SIGNAL	SIG
SIGNATURE	SIGNTR
STATION	STA
STATUS	STAT
SWITCH (NOUN)	SW
SYSTEM	SYS
TEMPERATURE	TEMP
TEST POINT	TP
TEST PROGRAM INSTRUCTION	TPI
TEST PROGRAM SET	TPS
TESTING DATA TABLE	TDT
TOLERANCE	TOL
TRANSFORMER	XFMR
TRIGGER	TRIG
UNIT IDENTIFICATION CODE	UIC
UNIT-UNDER-TEST	UUT
UNKNOWN	UNK

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APPENDIX B

WORD OR WORD COMBINATIONS	ABBREVIATION
UPPER LIMIT	UL
VERTICAL	VERT
VOLTMETER	VM
VOLTS: VOLTAGE	V

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APPENDIX C

ICD SET-UP DIAGRAMS

C.1. SCOPE.

C.1.1 <u>Scope</u>. This appendix contains examples of screens which may be used to provide the operator with installation & set-up instructions. The information contained herein is intended for guidance only.
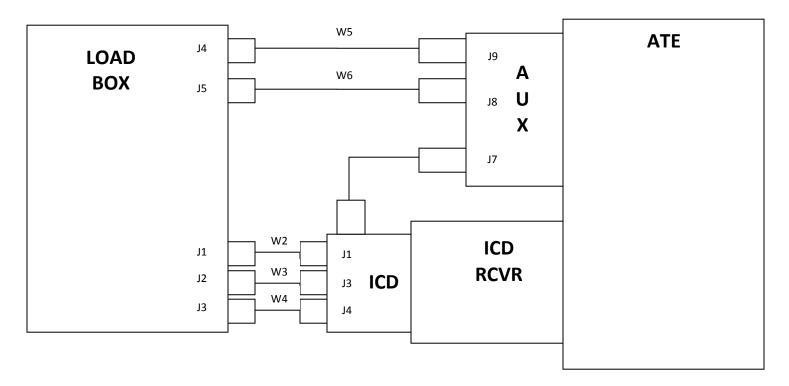
C.2. APPLICABLE DOCUMENTS.
This section is not applicable to this appendix.

C.3. SET-UP DIAGRAMS.

C.3.1 <u>Set-Up Diagrams</u>. Figures C-1 and C-2 are examples of screens which may be used to instruct the operator in the proper installation and set-up of the ICD. Figure C-1 is an illustration which includes an external load box? Figure C-2 is an illustration which includes an external load card assembly.

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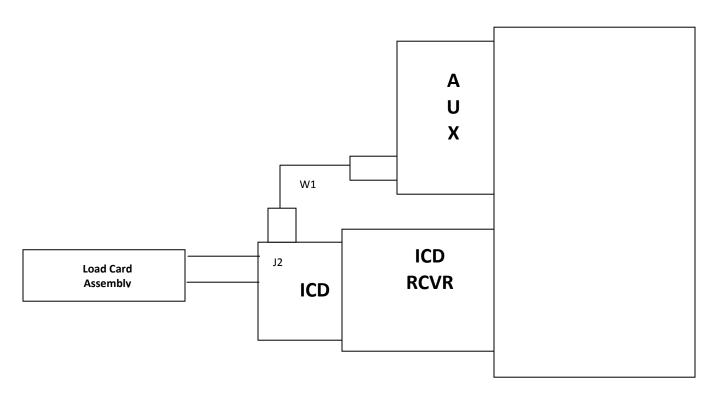
APPENDIX C

*** ICD TEST SET-UP DIAGRAM ***

For Detailed Instructions TOUCH: HELP

| CONT | | HELP | EXIT |

FIGURE C-1. Example of an ICD test set-up diagram.

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APPENDIX C

*** ICD TEST SET-UP DIAGRAM ***

For Detailed Instructions TOUCH: HELP

CONT   HELP   EXIT

FIGURE C-2. <u>Example of an ICD test set-up diagram</u>.

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APPENDIX D

ADMINISTRATIVE SOFTWARE DATA ELEMENT DEFINITIONS

D.1. SCOPE.

D.1.1 Scope. This appendix lists the administration software data element definitions. This appendix is a mandatory part of this specification. The information contained herein is intended for compliance.

D.2. APPLICABLE DOCUMENTS.
This section is not applicable to this appendix.

D.3. DEFINITIONS.

Data Element	Source	Size	Definition
Record Type	TPS	2	Defines type of record.
Record Length	TPS	2	Sets the number of (field count) elements allowed in a record.
Work Order	OPER	15	Identifies a specific job record including retest number. For example, a PCB to be tested is a job. The first 6 digits are the field UIC. The last 9 make up the sequence number of the work order for that field unit.
UUT NSN	TPS	16	UUT National Stock Number.
UUT Part Number	TPS	21	UUT Assembly or Part Number.
UUT Serial No.	OPER	15	UUT Serial Number.
End Item Code	OPER	9	A code identifying the system from which (Source of UUT)the UUT was removed.
Defective Part	TPS	5X12	Identifies up to 5 failed components.

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APPENDIX D

Data Element	Source	Size	Definition
Circuit Designator in a UUT			These are identified by the circuit part designator (e.g., R1, U25, C4, etc.).
UUT Owning	OPER	6	The unit identification code of Unit the UIC it turning in or owning the UUT to be tested.
Software Rev	TPS	2	Version number of the TPS software. No.
Failure Test	TPS	6	ATLAS statement number of the test step within the TPS.
Failure Value	TPS	10	Readout/failure value/test limitation, at test step of failure.
Diagnostic	SYS	6	Defined as the time from the start Time of a TPS run to completion of the run.
Date and Time	SYS	12	Date and time (local) at start of test (mo, day, yr, hr, min, sec).
Test Station	SYS	10	The test station MOS code with Skill Level Oper. MOS/Skill identifier, if applicable.
Test Station Model Number	SYS	13	ATE model number.
Test Station Serial Number	SYS	4	ATE serial number.

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APPENDIX E

STANDARDIZATION OF MESSAGES FOR
AUTOMATIC TEST EQUIPMENT (ATE)

E.1 SCOPE.

E.1.1 <u>Scope</u>. This Appendix contains the requirements for standardizing the format of operator Instructions and messages specified by the test engineer for display on the Cathode Ray Tube (CRT), printer or other ATE I/O media. The Test Program Instruction (TPI) section of the Test Program Set Document (TPSD) shall contain those messages which are not capable of being readily supplied on the ATE communication media. This Appendix establishes standardized display format statements developed to deal with most situations encountered by the operator in the functioning of an ATE station. The 1/0 device shall display those messages necessary for the execution of the program. This appendix is a mandatory part of this standard. The information contained herein is intended for compliance.

E.2 REFERENCED DOCUMENTS.

This section is not applicable to this appendix.

E.3 GENERAL REQUIREMENTS.

E.3.1 <u>Message format</u>. Messages shall be designed in a manner consistent with the capabilities of the ATE I/O media and in a format which facilitates ease in reading. Messages shall be separated into single steps or instructions which require a response prior to the next instruction being supplied. Detailed requirements and specific examples of standardized messages and formats are provided in Section F.4. Formats shall be arranged to avoid the splitting of words or symbols between lines.

E.3.2 <u>Abbreviations</u>. All message statements must be concise and unambiguous. Clarity is of prime consideration in using any abbreviation. If the items to be abbreviated appear on the approved list (see Appendix B), only the approved abbreviation is to be used.

E.3.2.1 <u>Individual words</u>. Individual words and word combinations can only be abbreviated when there meaning is unquestionably clear. When in doubt, the word(s) must be spelled out.

E.3.2.2 Five letter words. In general, words having five (5) letters or less are not abbreviated' except those established by long-standing practice, e.g., the letter V is used to abbreviate "Volts."

E.3.2.3 <u>Word combinations</u>. Word combinations in general are not abbreviated; there are, however, some exceptions. Approved abbreviations for word combinations are listed in Appendix B.

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E.3.2.4 <u>Abbreviations in Appendix B</u>. Only the abbreviations identified in Appendix B are to be displayed. This appendix will be updated to include new abbreviations, as deemed necessary.

E.3.3 <u>Instructions</u>. Keep the display message simple. Instructions should be easily remembered and executed.

E.3.4 <u>Operator intervention</u>. There shall be an "-OPR ACTION-" statement when operator intervention is required.

E.3.5 <u>Readability</u>. An effort should be made to increase readability whenever possible. As an additional aid to readability, vertical and horizontal centering of the message should be used.

E.3.6 <u>Failure message</u>. "Failure" messages must indicate the "failed" test.

E.3.7 Printed displays. All displays containing information necessary for the documentation of the test in process should be printed out.

E.3.8 <u>Operator message</u>. When the required operator action is described in the TPI section of the TPSD, the following message, properly centered, should be displayed:

SEE TPSD TABLE 1-1 TXXX FOR INST

E.4 STANDARDIZED MESSAGES

E.4.1 General. Standardized display messages have been developed for most common situations faced by the programmer. When a special message is necessary, standardized messages should be used as guidelines for preparing the special message. The use of a standardized message, where applicable, is mandatory.

E.4.2 <u>Identity checks</u>. The identity checks verify that the proper UUT/ID(s) is (are) connected to the ATE for the selected test program. When the identity check results in a NOGO condition,. the program shall display a message and execute an, instruction to halt the test program. Then the operator is informed of the improper ID or UUT signature on the CRT display.

E.4.3 <u>Operator intervention</u>. The operator action statement requires operator intervention during test program execution and will generally fall into one of the following categories: UUT adjustment, UUT response monitoring or end of program. Standard message formats for each of these categories are described in the subsequent paragraphs.

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E.4.3.1 UUT adjustment. If the UUT and/or ID contains switches, calibration controls an or other adjustment features, display statements will generally have to be composed to manually change their position during the execution of a test program. Unless otherwise indicated, it is assumed that, all controls and switches to be repositioned/adjusted are located on the UUT. If they are elsewhere, their location must be identified on the displayed instructions. If more than one switch or control must be repositioned, the required settings shall be described in the TPI section of the TPSD or displayed. The operator display shall provide the direction for repositioning settings one switch or control at a time with an operator action required to resume program execution after each section. The designations shown in these messages should be the marking engraved on the UUT (or the ID) and shall be highlighted by asterisks.

    EXAMPLE 1

        -OPERATOR ACTIONCHANGE
        SWITCH A1 POSITION TO ON
        FOR GAIN TEST
        SEE TPI TABLE 1-2 TXXX FOR INST

    EXAMPLE 2

        -OPERATOR ACTIONADJUST
        "GAIN" POT FOR
        1.9v to 2.lv OUTPUT
        CONTINUE.
        DEPRESS YES
        ADJUSTMENT IS NOT POSSIBLE
        DEPRESS NO

Note: It is preferable to provide the actual voltage between which an adjustment can be made, than to indicate a nominal voltage and tolerance.

    EXAMPLE 3

        -OPERATOR ACTIONPRESS
        AND HOLD "LAMP TEST" SWITCH
        CHECK IF ALL LAMPS ARE LIT AND
        REPLACE ALL LAMPS NOT LIT
        DEPRESS YES TO CONTINUE

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E.4.3.2 <u>UUT response monitoring</u>. When the UUT contains indicator lights and/or meters, statements will likely have to be generated for visual response monitoring.

    EXAMPLE

        -OPERATOR ACTIONCHECK
        "BIT FAIL" LIGHT
        IF OFF, DEPRESS YES
        IF ON, DEPRESS NO
        SEE TPI TABLE l-I TXXX FOR INST

E.4.3.3 <u>"End Of Program" messages</u>. In the "end of program" message it is understood that the required repairs will be accomplished off-line. The following examples of "end of program" messages are for TPS without fault isolation.

    EXAMPLE I

        END OF PROGRAM
        UUT FAULTY
        TEST XXX FAILED
        EXAMPLE 2
        END OF PROGRAM
        UUT GOOD

E.4.4 <u>Fault isolation</u>. "End of program" messages when fault isolation is provided are describe in the following paragraphs. In both examples shown, any other component which could be the source of the problem will be listed in the TPI section of the TPSO or the display in order of lowest MTBF (Highest Failure Rate) to highest MTBF (Lowest Failure Rate).

E.4.4.1 <u>Isolation to one component</u>. In cases where fault isolation is provided and isolates to one component, the "end of program" message is:

    EXAMPLE

        END OF PROGRAM
        UUT FAULTY
        TEST XXX FAILED
        (PERFORMANCE ROUTINE TEST NUMBER)
        R/R ZI

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E.4.4.2 <u>Isolation to two or more components</u>. In cases where fault isolation is provided and isolates to a group of two or more components, the "end of program" message is:

    EXAMPLE

        END OF PROGRAM
        UUT FAULTY
        TEST XXX FAILED
        (PERFORMANCE ROUTINE TEST NUMBER)
        PROBABLE ORDER OF FAILURER/
        R ZI, Z3, Z9

E.4.5 <u>Probe message</u>. A probe message shall contain, as a minimum, the component name and pin number to be probed. A period is to be used to separate the component reference designator from the pin number. For example, a message would read as follows:

    EXAMPLE

        PROBE U1.2

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APPENDIX F

CONTENT/FORMAT SELECTION SUMMARY FOR GENERAL STYLE
AND FORMAT FOR TEST PROGRAM SETS FOR AUTOMATIC TEST EQUIPMENT

F.1   GENERAL.

F.1.1 <u>Scope</u>. This appendix facilitates the tailoring of general style and format requirements for test program sets for automatic test equipment contained in the body of this specification. This appendix is a mandatory part of this specification. The information contained herein is intended for compliance when the Content/Format Selection Summary is completed by the Government.

F.1.2 <u>Application</u>. This appendix is intended to be copied/reproduced, completed, used for contract solicitation, and incorporated into the contract.

F.1.3 <u>Tailoring</u>. The contracting activity should evaluate the individual requirements of this specification to determine the extent to which they are most suitable for the acquisition and modify the requirements to ensure that each achieves the optimal balance between operational needs and cost. Exclusions of sections, paragraphs, or sentences shall be indicated on the Content/Format Selection Summary. When necessary, remarks should be expanded and included on a separate sheet of paper attached to the Summary List. In all cases, tailoring shall be compatible with this specification.

F.1.4 <u>Explanation of columns - content/format selection summary</u>. Column (1), Item no., self explanatory. Column (2) is the type of requirement and column (3) identifies the applicable paragraph in the specification. Column (4) Options Selected, subcolumn (a) "yes", should be marked with an "X" for each item/requirement applicable to the solicitation/acquisition as written. Column (4), subcolumn (b), "no" should be marked with an "X" for each item that is not applicable as written, but is applicable as specified in subcolumn (c). Subcolumn (c), Explanation/Remarks is/are provided for clarity.

F.2   APPLICABLE DOCUMENTS.

        This section is not applicable to this appendix.

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CONTENT/FORMAT SELECTION SUMMARY SHEET

EQUIPMENT NAME/NOMENCLATURE

CONTRACT NO.

NOTE: Applicable requirements are indicated by an "X" in column 4a or explained in column 4b.

(1) Item No.	(2) Requirements	(3) Applicable Paragraph No.	(4) (a) Options Selected (yes)	(b) (no)	(c) Explanation/ Remarks
1	Explanatory text for warnings and cautions in white	3.2.2.8b(1)(c)			
2	Structure TPS for individual or groups of functional tests	3.9.2			
3	Test setup screens (colors, photos, videos)	3.2.2.8b(3) 3.2.2.8b(3)(e) 3.2.2.6b(3)(f)			
4	Flash coding	3.2.2.8c			
5	Presentation of tolerances	3.3.6.1g			
6	Designation of original version of UUT Configuration Data	3.7.2			
7	Designation of original version of Test Program Configuration Data	3.7.3			

NOTE: The above selected requirements tailoring options identified by an "X" in the Options Selected column 4, subcolumn 4(a) or 4(b), or the explanation provided in the Remarks subcolumn 4(c) is a mandatory part of this contract.

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COMPLETED BY:_____

(authorized signature)

PUBLICATIONS ACTIVITY: _____DATE:_____

CONCLUDING MATERIAL

CUSTODIAN: PREPARING ACTIVITY:
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          EA

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