

MIL-STD-1519 (USAF)
 NOTICE 1
 1 August 1977

MILITARY STANDARD

TEST REQUIREMENTS DOCUMENT,
 PREPARATION OF

TO ALL HOLDERS OF MIL-STD-1519 (USAF):

1. PEN AND INK CHANGE: On self-cover change "MILITARY SPECIFICATION" to "MILITARY STANDARD".
2. THE FOLLOWING PAGES OF MIL-STD-1519 (USAF) HAVE BEEN REVISED AND SUPERSEDE THE PAGES LISTED:

NEW PAGE	DATE	SUPERSEDED PAGE	DATE
Self-cover	17 September 1971	(REPRINTED WITHOUT CHANGE)	
ii	1 August 1977	ii	17 September 1971
1	1 August 1977	1	17 September 1971
2	1 August 1977	2	17 September 1971
3	1 August 1977	3	17 September 1971
4	17 September 1971	(REPRINTED WITHOUT CHANGE)	
5	17 September 1971	(REPRINTED WITHOUT CHANGE)	
6	1 August 1977	6	17 September 1971
7	1 August 1977	7	17 September 1971
8	17 September 1971	(REPRINTED WITHOUT CHANGE)	
27	1 August 1977	27	17 September 1971
28	17 September 1971	(REPRINTED WITHOUT CHANGE)	
31	17 September 1971	(REPRINTED WITHOUT CHANGE)	
32	1 August 1977	32	17 September 1971

3. RETAIN THIS NOTICE AND INSERT BEFORE TABLE OF CONTENTS.

4. Holders of MIL-STD-1519 (USAF) will verify that the pen and ink change and the page changes and additions indicated above have been entered. This notice page will be retained as a check sheet. This issuance, together with appended pages, is a separate publication. Each notice is to be retained by stocking points until the Military Standard is completely revised or cancelled.

FSC MISC

Custodian:
 Air Force - 11

Preparing activity:
 Air Force - 11

Project No. MISC-FC53

MIL-STD-1519 (USAF)
17 September 1971

MILITARY SPECIFICATION

TEST REQUIREMENTS DOCUMENT,
PREPARATION OF



FSC MISC

MIL-STD-1519 (USAF)

1 August 1977

DEPARTMENT OF THE AIR FORCE

Test Requirements Document, Preparation Of

MIL-STD-1519 (USAF)

1. This Military Standard is approved for use by the Department of the Air Force and is available for use by all Departments and Agencies of the Department of Defense.
2. Beneficial comments (recommendations, additions, deletions) and any pertinent data which may be of use in improving this document should be addressed to: ASD/ENESS, Wright-Patterson AFB, OH 45433 by using the self-addressed Standardization Document Improvement Proposal (DD Form 1426) appearing at the end of this document or by letter.

Supersedes page ii of 17 September 1971

MIL-STD-1519 (USAF)

TEST REQUIREMENT DOCUMENT
PREPARATION OF

1. SCOPE

1.1 Scope. This standard establishes the requirements for the preparation and control of the Test Requirements Documents (TRD) used in specifying testing requirements for electronic subsystems, units, and subassemblies herein referred to as Units-Under-Test (UUT). These test requirement shall be independent of any specific test apparatus.

2. REFERENCED DOCUMENTS

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

STANDARD

MILITARY

MIL-STD-12 -Abbreviations For Use on Drawings, Specifications, Standards, And In Technical Documents

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

2.2 Other publications. The following documents form a part of this standard to the extent specified herein. Unless otherwise indicated, the issue in effect on date of invitation for bids or request for proposal shall apply.

AMERICAN NATIONAL STANDARDS INSTITUTE (ANSI)

Y32.2-1975 -Graphic Symbols For Electrical And Electronics Diagrams
(Including Reference Designation Class Designation Letters)

Y32.14-1973 -Graphic Symbols For Logic Diagram (Two State Devices)

Y32.16-1975 -Reference Designations For Electrical And Electronics Parts
And Equipment.

(Application for copies should be addressed to the American Standards Institute, 1430 Broadway, New York, NY 10018.)

3. DEFINITIONS

3.1 This section is not required.

Supersedes page 1 of 17 September 1971

MIL-STD-1519 (USAF)
1 August 1977

4. GENERAL REQUIREMENTS

4.1 Format. The TRD format shall be as shown in Appendix A of this standard. Data shall be legible on 8-1/2 by 11-inch paper or 8-1/2 by 11-inch foldouts, except for drawings that cannot be reduced to this size without compromising the legibility requirement.

4.2 Contents. The TRD contents shall include the following items in the sequence shown. The UUT drawings and functional block diagram specified are part of the normal data requirements for the UUT and shall not be prepared specifically for this requirement.

- a. Cover sheet (reference 4.2.1)
- b. Approval sheet (reference 4.2.2)
- c. Revision index sheet (reference 4.2.3)
- d. Configuration data (reference 4.2.4)
- e. General data (reference 4.2.5)
- f. UUT interface requirements (reference 4.2.6)
- g. Detailed performance characteristics (reference 5.3)
- h. Detailed test information (reference 5.4)
- i. Outline installation drawings (LRU TRD's only) (reference 4.2.9.1)
- j. Unit (main) assembly drawings (LRU TRD's only) (reference 4.2.9.2)
- k. Detail and subassembly drawings (reference 4.2.9.3)
- l. Wiring drawings (reference 4.2.9.4)
- m. Functional block diagrams (reference 4.2.9.5)
- n. Test flow chart (reference 4.2.10)

4.2.1 Cover sheet. The cover sheet shall identify the TRD and the UUT to which it applies. The cover sheet format shall be in accordance with figure 1 of the appendix and the following:

- a. Electronic subsystem AN nomenclature: (E.g., AN/APQ-XX Fire Control Radar)
- b. (UUT) name and nomenclature: (E.g., Video Selector IP-1739/APQ-XX)

Supersedes page 2 of 17 September 1971

1 August 1977

c. Supplier UUT unit No. (per ANSI-Y32.16-1975)

d. Security classification: (In lieu of classifying each TRD, all classified data may be incorporated into a single document for each electronic subsystem. This document shall be referenced by paragraph number in applicable TRDs').

4.2.2 Approval sheet. The approval sheet shall contain the appropriate signatures. The approval sheet format shall be in accordance with figure 2 of the appendix.

4.2.3 Revision index sheet. The format for the revision index sheet shall be in accordance with figure 3 of the appendix. No-change sheets shall not carry a revision letter.

4.2.4 Configuration data. The configuration data shall consist of the identification of all engineering data applicable to the UUT. The configuration data format shall be in accordance with figure 4 of the appendix and the following:

a. Drawing numbers shall include the revision used in preparation of the TRD. Unreleased drawings shall not be acceptable.

4.2.5 General data. The format for the required general data shall be in accordance with figure 5 of the appendix and the requirements specified herein.

4.2.5.1 UUT design data. The requirements for the UUT design data shall be as outlined on sheets 1 and 2 of figure 5 (appendix) and the following:

a. Weight: The weight of the UUT shall be specified within 25 percent of actual weight.

b. Special tools: (E.g., card extenders, unusual screwdrivers, etc.)

c. Handling requirements: Any special handling requirements shall be identified.

d. Unique interface/available equipment: Any special test conditions or required fixtures shall be defined. Any pressurization required for bench testing shall be defined.

e. Safety requirements: Special precautions and instructions regarding personnel and equipment (UUT and test equipment) protection in the presence of high voltages, r-f radiation, etc., shall be identified.

f. Power requirements: All UUT input power source requirements shall be specified, including a-c and d-c voltages and tolerances, maximum load

MIL-STD-1519 (USAF)

17 September 1971

current, frequency and tolerances, power supply source impedance, ground returns, and ripple limits on d-c voltages. When three-phase power is required, the line-to-line voltage or line-to-neutral voltage shall be so identified. Maximum allowable line-to-line imbalance and percent distortion shall be specified.

g. Mating connector data: Identification of all electrical power mating connectors shall be accomplished in accordance with sheet 2 of figure 5 (appendix).

4.2.5.2 UUT test data. General procedures and special precautions that apply to the test procedures as a whole to assure proper test conditions shall be as outlined on sheet 3 of figure 5 (appendix).

4.2.6 UUT interface requirements. The characteristics of the equipment and circuitry required to test the UUT (excluding test equipment) shall be specified. MIL standard part numbers or component specifications shall be used to specify electrical/electronic circuits in lieu of vendor part numbers. Dimensioned drawings shall be included when the data necessary to design fixtures are not readily available and apparent on outline and other drawings specified herein. Special materials required for fixtures (e.g., nonmagnetic materials) shall be specified. Specification of equipment and circuitry that requires the use of a specific test device shall be avoided where possible. Electrical and mechanical interface data shall provide, as a minimum, a description of the data items specified herein. The format for UUT interface requirements shall be in accordance with figure 6 of the appendix.

4.2.6.1 Electrical interface. Signal conditioning and connector data related to the avionic item shall be provided as follows:

a. UUT connector identification: All UUT connectors and corresponding mating connectors shall be identified. This shall include the connector manufacturers' nomenclature and part numbers and a cross reference designation such that all connectors and pin designations on both the schematics and the drawings may be determined.

b. Descriptive data shall be provided on separate sheets that define each signal conditioning circuit. Descriptive data shall include the following as applicable:

- (1) Minimum wire size
- (2) Maximum wire length
- (3) Wire or coax type

17 September 1971

- (4) Shielding requirements.
- (5) Detailed definition of signal conditioning circuits
- (6) Grounding requirements
- (7) Separation of circuits
- (8) Twist pair or twisted multiples requirements
- (9) Other.

c. Test point connectors: All test point connectors shall be specifically identified. Information provided shall include manufacturer's type, and a cross reference and function designation so that each test point connector and test point can be located on schematics and other drawings.

4.2.6.2 Mechanical interface

a. Mounting, holding, support fixtures: Descriptive data shall be provided for all mounting, holding, and support fixtures required for each UUT that cannot safely be tested on a flat horizontal work surface.

b. Pneumatic, hydraulic, cooling fixtures: Descriptive data shall be provided for all fittings, fixtures, and adapters required to connect pneumatic, hydraulic, and cooling sources to the UUT.

4.2.7 Performance characteristics. The required detailed performance characteristics shall be as specified in 5.3.

4.2.8 Detail test information. The required detail test information shall be as specified in 5.4.

4.2.9 Drawings. The UUT drawings outlined herein shall be supplier when specified in the electronic system contract.

4.2.9.1 Outline drawings. Outline drawings shall be in accordance with the applicable equipment specification.

4.2.9.2 Unit (main) assembly drawings. Unit (main) assembly drawings shall be in accordance with the applicable equipment specification.

4.2.9.3 Detail and subassembly drawings. The items specified herein, prepared in accordance with the requirements of the applicable equipment specification, shall be provided.

MIL-STD-1519 (USAF)

1 August 1977

4.2.9.3.1 Module/subassembly schematics. A schematic shall be provided for each module (including IC's and encapsulated modules) and subassembly. In lieu of this requirement, the portions of circuitry within any module or subassembly may be indicated on the unit schematics.

4.2.9.3.2 Internal/actual wiring diagrams. Wiring diagrams shall be provided for each LRU, module, and subassembly to show the actual physical wiring arrangement. Wire running lists or tables may be used to supplement wiring diagrams. Printed circuit layouts showing the components and modules (symbolically or actual shape) as well as the printed circuitry shall be included in this requirement. Printed circuit layouts shall contain sufficient data to permit any component, module terminal, and junction shown in the schematics to be located.

4.2.9.3.3 Logic diagrams. Detailed logic diagrams as described in ANSI-Y32.14-1973 shall be provided for each UUT in the system, if applicable. Simple UUT's whose function is readily apparent from the schematic shall be excluded from this requirement. Items that are not normally represented by logic diagrams (e.g., receivers) shall be depicted by functional block diagrams.

4.2.9.3.4 Subassembly drawings. Subassembly drawings shall be provided for each module and subassembly. These drawings shall show physical configuration, connector identification (part number and reference number) and location, test point location and identification, controls, and other features necessary for testing. (In some cases, this requirement may be satisfied by printed circuit layout drawings, (reference 4.2.9.3.2.)

4.2.9.4 Wiring diagrams. Wiring diagrams shall be in accordance with the applicable equipment specification.

4.2.9.5 Functional block diagram. Functional block diagrams shall be in accordance with the applicable equipment specification.

4.2.10 Test flow chart. A test flow chart shall be provided. The test flow chart shall graphically depict the sequencing and branching of the TRD performance and diagnostic tests. The chart presentation shall be in the form of a tree chart.

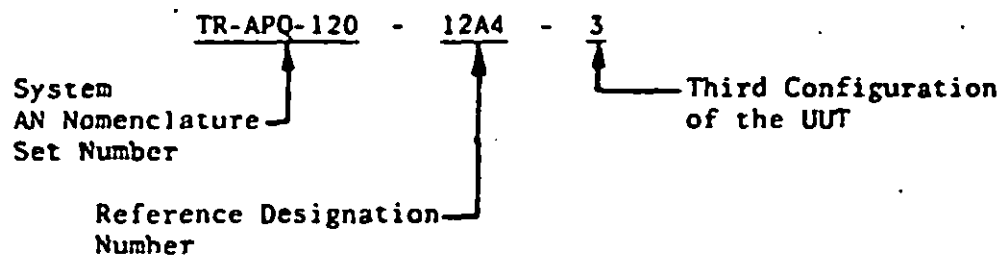
4.3 Configuration changes. A TRD shall be required for each subsequent UTT configuration that differs from the baseline configuration. If two or more UTT configurations have identical test requirements, the TRD for the first configuration shall be used for each configuration; however, the TRD shall be revised to reflect the additional configurations supported. If the additional configurations are not identical with the prior configuration, the test number of each test that is different shall be specified in the general test data section.

Supersedes page 6 of 17 September 1971

MIL-STD-1519 (USAF)
1 August 1977

4.4 TRD revisions. Changes to the TRD that are necessary due to errors, omissions, or improvements shall be submitted as revisions to the applicable document. These changes shall include a new cover page, a new revision index, and all changed pages. A "letter" shall be used to designate the particular TRD revision. The first revision shall be designated by "A".

4.5 TRD number assignment. A document identification number shall be assigned to each TRD. This number shall consist of the prefix "TR" followed by the system AN nomenclature set number (i.e., the set number for the AN/APQ-120 radar is "120"), the UUT reference designation number, and a dash number. The reference designation number shall be in accordance with ANSI-Y32.16-1975. The dash number shall designate the UUT configuration. The dash number assigned to the baseline TRD shall be -1. Following is an example:



4.6 TRD completion. The TRD shall initially be prepared to reflect the configuration of the preproduction model of the UUT. This version of the TRD shall be complete when the configuration of the first preproduction model is established. The TRD shall be revised to reflect the configuration of the first production model when this configuration is established. ~~The scheduling of TRD completion dates for TRD's reflecting configurations that~~ are subsequent to the first production model shall be as specified by the procuring activity.

5. DETAIL REQUIREMENTS

5.1 General requirements. The TRD shall provide the information necessary to test the UUT in the most efficient manner possible and with a minimum of UUT interface. Sufficient tests shall be included so that all required performance characteristics can be verified. A TRD shall be provided for each Replaceable unit (RU), RU chassis, and RU subassembly.

5.2 TRD general test requirements. The TRD shall provide the information necessary to:

a. Test the performance of the UUT in accordance with the characteristics described in 5.3, and detect and indicate all faults and out-of-tolerance conditions.

Supersedes page 7 of 17 September 1971

MIL-STD-1519 (USAF)
17 September 1971

- b. Adjust and align the UUT (when applicable).
- c. If the UUT is an RU, isolate all faults to the faulty module or RU chassis (if it contains electrical components).
- d. If the UUT is a reparable RU subassembly or RU chassis containing electrical components, isolate each fault to an individual component or to the smallest group of components consistent with the established maintenance concept. Tests shall be as simple as possible, independent from each other, and logically arranged to simplify testing and to eliminate redundancies.

5.2.1 Test sequence. Tests shall be arranged such that, after a no-go is encountered and the replacement action determined, the remaining tests not influenced by the fault can be conducted.

5.2.2 Types of tests. The following types of tests shall be documented:

- a. Power/stimuli short tests. Power input and stimuli input short checks, to verify that these inputs are not operating into a short circuit, shall be made prior to the application of power or stimuli.
- b. Performance tests. These shall be end-to-end tests that exercise the UUT ~~in various modes of operation~~ to reveal any degradation in performance characteristics. Further, any components that are not adequately exercised by the end-to-end tests shall be verified by an alternative means such as impedance tests. These tests shall also be designated performance tests.
- c. Diagnostic tests. Diagnostic tests shall be required to isolate a fault(s), detected during performance testing, to the specified level.

5.3 Detailed performance characteristics. A detailed description of the performance characteristics shall be provided for the UUT. As a minimum, the following information shall be provided:

- a. Functional name of the UUT and vendor's part numbers.
- b. Input data: All inputs, electrical, optical, mechanical, etc., shall be defined and their range and tolerance specified.
- c. Output data: All outputs shall be specified in terms of their range, accuracy, and relationship to the input conditions.
- d. Test point data: The test points shall be identified by function, and the signal (input or output) conditions shall be specified.

MIL-STD-1519 (USAF)
1 August 1977

5.4.3.6 Resistance measurements involving semiconductor devices shall include polarity requirements and the current at which the semiconductor impedance was determined.

5.4.3.7 Measurements that require longer than the standard measurement delay, specified in 4.2.5.2, for stabilization after input insertion or other action shall be so noted on the individual test specification sheets.

5.4.3.8 If a specific test parameter requires the measurement of several characteristics, such as rise time, fall time, and pulse width, and the replacement action for an out-of-tolerance condition for these characteristics is identical, then all of the measurements should be specified as one TRD test.

5.4.3.9 It is recognized that certain component failure or degradation may not be readily detectable during performance testing, such as failure of power input filters and relay coil noise suppressors. The TRD shall include tests to ensure that all such items are checked and failures isolated.

5.4.3.10 Input/output test requirements shall be specified at the UUT instead of at interface hardware test points.

5.4.3.11 Diagnostic tests shall ignore extremely remote failure modes e.g., carbon resistors shorting. The failure modes that are ignored shall be specified in the general test data section of the TRD.

5.4.3.12 A single fault shall be assumed when a no-go is encountered.

5.4.3.13 Standard engineering terms, symbols (per ANSI-Y32.2-1975), abbreviations (per MIL-STD-12) and designations (per ANSI-Y32.16-1975) shall be used in the TRD. Special cases not to be overlooked shall include; the meaning of high and low out-of-tolerance conditions for a zero volt measurement, and a negative voltage measurement.

5.4.3.14 Stimuli that vary in discrete or incremental steps shall be specified in lieu of continuously variable stimuli if possible. The steps specified shall be as large as possible.

5.4.3.15 The addition of external feedback loops to the UUT to simulate the environment in which the UUT normally operates shall be avoided and open loop tests made whenever possible. The external interconnection of elements on the UUT shall be avoided when these elements can be individually tested.

5.4.3.16 All test points specified on the detailed test information sheet shall be identifiable on the UUT schematic.

Supersedes page 27 of 17 September 1971

MIL-STD-1519 (USAF)

17 September 1971

5.4.3.17 If a test point and a connector pin are electrically common, the connector pin shall be used if it is accessible.

5.4.3.18 Only the power and stimulus required to perform a test shall be applied during the test. If adherence to this requirement will cause an active device on the UUT to be partially powered, it is permissible to add the power necessary to fully power the device.

5.4.3.19 It is understood that some characteristics of the UUT input signals may not be critical; i.e., any value within a specified range can be used for test purposes. An allowable range shall be specified for these non-critical characteristics instead of a specific value. If an output characteristic is a function of an input characteristic for which a range is specified, then the relationship between the input and output characteristics should be specified. An example of the above would be the test of a linear amplifier. The input voltage amplitude is a non-critical characteristic and might be specified as 0-10 volts. The output voltage, since it is a function of the input voltage, would be $V_{out} = 5 V_{in}$ (assuming an amplification of 5).

5.4.3.20 Complex output waveforms shall be avoided whenever possible. The complexity of an output waveform can frequently be reduced by the proper selection of the input signals and still permit adequate testing of the UUT. A number of simple waveform tests is preferable to one complex waveform test.

5.4.3.21 The requirements for electrical interface shall be held to a minimum. As an objective, the electrical interface shall consist of only a cable that interconnects the UUT and the test equipment. The use of external circuitry or loads in TRD tests shall be avoided where possible in order that the above objective can be met.

5.4.3.22 UUT loads shall be specified in terms of impedance required.

5.4.3.23 When a test requires stimuli with tolerances of less than one percent, the possibility of using a ratio (output to input) test shall be considered. If a ratio test could be used, the additional information necessary to conduct a ratio test shall be specified in the supplemental data section.

5.4.3.24 Time or phase - dependent relationships, if applicable, shall be defined using diagrams as needed. If the exact value of an input or output is not known, a range shall be specified.

5.4.3.25 Individual test requirements such as signal conditioning, loads and impedance-matching terminations shall include nominal values, power ratings, voltage standing wave ratio (VSWR), etc. Complex loads shall be specified in standard engineering units.

APPENDIX

FORMAT FOR THE PREPARATION OF A TEST REQUIREMENTS DOCUMENT

10. SCOPE

10.1 This appendix covers the required format for the submittal of a contractor-prepared test requirements document (TRD). This format requirement may be waived by the procuring activity when the TRD information already exists in another acceptable format.

20. REFERENCED DOCUMENTS

20.1 There are no referenced documents.

30. REQUIREMENTS

30.1 TRD contents. The TRD contents shall be prepared in accordance with the following figures:

- a. Figure 1: Cover sheet
- b. Figure 2: Approval sheet
- c. Figure 3: Revision index sheet
- d. Figure 4: Configuration data sheet
- e. Figure 5: General data sheets
- f. Figure 6: UUT interface requirements sheets
- g. Figure 7: Detailed test information sheet
- h. Figure 8: Digital pattern data sheets

MIL-STD-1519 (USAF)
1 August 1977

PAGE

TRD NO.

REV.

DATE

(ELECTRONIC SUBSYSTEM AND NOMENCLATURE)

TEST REQUIREMENTS DOCUMENT (TRD)

FOR

(UT) Name and Nomenclature

SUPPLIER UT UNIT NO. _____

SUPPLIER UT PART NO. _____

Security Classification)

PREPARED BY

USAF CONTRACT NO. _____

FIGURE 1. Cover sheet.

Supersedes page 32 of 17 September 1971