

ALL SPEEDS INCREASED TO MAX. OF 3000 RPM

DOC	1	DATE	020588	BY	010956
ORIG COMP		OPI	56	TYPE	30
ORIG CLASS	M	PAGES	10	REV CLASS	X
JUST		NEXT REV		AUTH	HR 10-8

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MIL T-9770 (USA-F)

22 November 1957

AIR FORCE/C

MILITARY SPECIFICATION

TELEPRINTER, ELECTROGRAPHIC AN/GMH-2(XD-2)

1. SCOPE

1.1 Scope - This specification covers a service test model of a high speed, electrographic teleprinter capable of serially printing text from 55 alpha-numeric weather symbol and punctuation characters at asynchronous speeds from 60 to 2,000 words per minute (wpm).

2. APPLICABLE DOCUMENTS

2.1 The following documents, of the issue in effect on the date of invitation for bids, form a part of this specification.

SPECIFICATIONS

Military

MIL - E - 4158	Electronic Equipment, Ground; General Requirements For
MIL - E - 4970	Environmental Testing, Ground Support Equipment; General Specifications For
MIL - D - 5028	Drawings and Data Lists; Preparation Of Manufacturers' (For Production Aeronautical and Associated Equipment)
MIL - P - 17555	Preparations For Delivery of Electronic Equipment; Miscellaneous Electrical Equipment (Except Rotating Electrical Equipment) and Associated Repair Parts

STANDARDS

Military

MIL - STD - 129	Marking For Shipment and Storage
MIL - STD - 130	Identification Marking of U.S. Military Property

3. REQUIREMENTS

3.1 This specification makes provision for first article testing.

3.2 General specification. - The requirements of MIL-E-4158 apply as requirements of this specification where practical (3.3.2.3). Where the two

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specifications conflict, this specification shall govern. Special attention shall be given to the interference suppression requirements of MIL-E-4158.

3.3 Design

3.3.1 Operation. - The teleprinter shall accept 5 binary digit (bit) serial teletype code from one of three standard teletype circuits (3.4.2.1) and convert to 6 bit parallel code. This parallel code shall be decoded to energize 1 of the 55 alpha-numeric weather symbol, or punctuation character lines (3.4.2.2). A high speed electronic character switch shall determine the sequential operation of 72 printing heads so that the printing heads shall operate serially, thereby printing across the page. The printing head shall deposit electrostatic charges on white plastic coated paper to form the received character. The paper shall move through the powdered ink and the ink shall be fixed by a heated roller.

3.3.2 Capability for future modifications.

3.3.2.1 The teleprinter shall be constructed of plug-in units so that, at some future date, modifications can be made to the unit so that it shall be capable of the following:

- a. Accepting 6 or 8 bit serial or parallel code
- b. Operating at any one of the following speeds:

- | | | | |
|-----|---------|-----|----------|
| (1) | 60 wpm | (5) | 750 wpm |
| (2) | 75 wpm | (6) | 1000 wpm |
| (3) | 100 wpm | (7) | 1250 wpm |
| (4) | 250 wpm | (8) | 2000 wpm |

3.3.2.2 The unit shall be capable of modification for 50 cps, plus or minus 3 cps operation.

3.3.2.3 Design for production. - It is anticipated that the production version of the teleprinter will meet the requirements of MIL-E-4158. It is the engineering goal of the specification that the service test model specified herein will permit the production design to be derived from the service test configuration with a minimum of modification.

3.3.3 Electrographic technique. - The electrographic technique for applying and fixing the ink to the white plastic coated paper shall consist of the following:

- a. The printing heads shall deposit electrostatic charges on the paper.
- b. The paper shall pass through powdered ink.
- c. The print shall be fixed by a heated roller.
- d. No other process, and no intermediate process shall be permitted.

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3.3.4 Solid state devices. - Where practical, solid state circuitry shall be used.

3.3.5 Electronic switching devices. - No internal mechanical switches, including the character switch, shall be permitted. All internal switching units shall be electronic devices.

3.3.6 Distortion. - Using the code specified in 3.4.2, the circuit shall meet the requirements of 3.3.1 when the received signals contain as much as 40% marking or spacing bias and as much as 35 percent marking or spacing end distortion.

3.3.7 Physical characteristics.

3.3.7.1 The unit shall be a console model, no higher than 37 1/2 inches.

3.3.8 Operating temperature characteristics.

3.3.8.1 The temperature of the external surfaces of the unit shall not exceed 125^oF.

3.4 Characteristics of the service test model.

3.4.1 Power input

- a. 105 volts to 125 volts
- b. 57 cps to 63 cps

3.4.2 Code input

3.4.2.1 The input code shall be either 7.42 or 8 baud, 5 bit serial teletype code from one of the following circuits:

- a. Standard 20 milliamperè teletype circuit at 100 wpm.
- b. Standard 60 milliamperè teletype circuit at 100 wpm.
- c. Bell Dataphone at one of the following speeds:
 - (1) 750 wpm
 - (2) 1000 wpm
 - (3) 2000 wpm

NOTE: The output of the Bell Dataphone from an impedance of 2200 ohms is as follows:

- (1) Mark: 0 volts, plus or minus 2 volts
- (2) Space: minus 12 volts, plus or minus 2 volts

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3.4.2.2 The 55 characters which the teleprinter shall receive are the following:

- a. The letters A through Z
- b. The numbers 0 through 9
- c. ~~The 8 wind direction symbols~~
- d. ~~The 4 sky condition symbols~~
- e. The period, the colon, the apostrophe, the space, and the slant mark.
- f. The plus sign and the minus sign

3.4.3 Carriage return and line feed. - The teleprinter shall obey the carriage return signal and the line feed signal when received as a part of the message (4.3.2). ✓

3.4.4 Type and print. - The teleprinter shall be capable of the following type and print characteristics:

- a. 72 characters per line
- b. 5 lines per inch
- c. Print shall approximate 10 point type
- d. Concealing no more than the first 3 inches of copy in the inker
- e. Printing clearly and legibly
- f. Copy shall be reproducible by the ozalid process or a similar process
- g. Handling of copy shall not result in smudging
- h. The ink supply shall be great enough to print one full roll of paper

3.4.5 Indicators. - The following external indicator lights shall be visible to the operator:

- a. Power-on
- b. Broken paper or end of paper roll
- c. Incoming signal

3.4.6 Controls. - The teleprinter shall have the following external controls, easily accessible to the operator:

- a. On-off circuit breaker
- b. Paper advance button

3.4.7 Fuses and interlocks

3.4.7.1 The following circuits shall be fused:

- a. Heated roller
- b. Drive motor
- c. Circulation blower
- d. Power supplies

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3.4.7.2 An interlock, which will stop the teleprinter if the paper breaks or the end of roll is reached, shall be provided for the paper roll.

3.4.8 Paper

a. At least a 500 foot roll shall be mounted within the unit for immediate use.

b. The teleprinter shall be capable of storing at least one spare paper roll internally.

c. To simplify reloading of paper rolls, the teleprinter shall have the following features:

(1) The last 20 feet of paper shall have a green band no less than 1/4 inch wide running along one edge of the paper.

(2) An interlock (3.4.7.2) shall stop the unit when the end of of the paper roll is reached.

(3) The new roll shall be threaded through the machine and the operator will attach the beginning of the new roll to the end of the used roll and advance the paper (3.4.6b).

(4) No auxiliary paper splicing equipment shall be required.

d. The paper drive shall not utilize a sprocket.

e. When actuating the paper advance button (3.4.6b), the minimum paper advance speed shall be 2 inches per second.

3.5 Environmental conditions. - The only environmental conditions that apply are the following:

3.5.1 Equipment, nonoperating. - When packaged for overseas shipment in accordance with MIL-P-17555, the equipment shall comply with the operational requirements of 3.3.1 after being subjected to any of the following nonoperating conditions successively or in combinations likely to be encountered during storage and transit:

a. Temperature. - Continuous exposure in the range of minus 65° F to plus 160° F. Exposure at the high temperature will not exceed 4 hours and at the low temperature will not exceed 24 hours.

b. Relative humidity. - Relative humidity up to 97 percent for an indefinite period of time and exposure at 100 percent relative humidity for 4 hours. The dew point shall not exceed 80° F.

3.5.2 Equipment, operating. - After a warm-up period of 1 hour, the equipment shall operate in such a way that it will meet or exceed the minimum requirements of this specification while being subjected to any of the following conditions successively or in combinations likely to be encountered during world-wide operations:

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a. Temperature: Any ambient temperatures in the range of plus 32° F to plus 125° F (0° C to plus 51.7° C).

b. Relative humidity: Relative humidity up to 97 percent for an indefinite period of time and exposure at 100 percent relative humidity for 4 hours. The dew point shall not exceed 80° F.

c. Low pressure: 22.58 inches of mercury.

3.6 Interchangeability. - All parts having the same manufacturer's part number shall be functionally and dimensionally interchangeable. The drawing number requirements of MIL-D-5028 shall govern changes in the manufacturer's part numbers.

3.7 Identification of product. - Equipment, assemblies, and parts shall be marked for identification in accordance with MIL-STD-130.

3.8 Workmanship. - All components shall be constructed in a thoroughly workmanlike manner. Particular attention shall be given to freedom from blemishes and defects; accuracy of dimensions, markings, and freedom of parts from burrs and sharp edges. Metal shall form clean, smooth, and unstrained bends and turns where such shaping is necessary.

3.9 Government loaned property. - When provided for in the contract or purchase order, the Government will loan a suitable signal source to the contractor, upon his request (6.2.2).

4. QUALITY ASSURANCE PROVISIONS

4.1 Classification of tests. - The inspection and testing of the teleprinter shall be classified as follows:

- a. Acceptance tests (4.2)
- b. First article tests (4.5)

4.2 Acceptance tests. - Acceptance tests shall consist of:

- a. Individual tests (4.2.1)

4.2.1 Individual tests. - Each teleprinter shall be subjected to the following tests as described under 4.4, Test methods, of this specification:

- a. Examination of product (4.4.1)
- b. Functional tests (4.4.2)

4.3 Test Conditions

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4.3.1 Atmospheric conditions. - Unless otherwise specified, all tests required by this specification shall be made at an atmospheric pressure of 28 to 32 inches of mercury and at a temperature of 25° C, plus or minus 10° C, and a relative humidity of 80 percent or less.

4.3.2 Paper advance at high speed. - For all tests using speeds greater than 100 wpm, the paper advance shall be accomplished by utilizing a line feed signal and multiple carriage return signals. ✓

4.4 Test methods

4.4.1 Examination of product. - Each teleprinter shall be inspected to determine compliance with this specification with respect to material dimensions, marking and workmanship.

4.4.2 Functional tests

a. Each teleprinter shall be operated for not less than 5 minutes at a code speed of not less than 1,000 wpm, and for not less than 1 hour at a code speed of not less than 60 wpm.

b. The controls of 3.4.6 shall be actuated to insure satisfactory operation.

c. The paper interlock (3.4.7.2) shall be manually actuated to insure satisfactory operation.

d. The indicators of 3.4.5 shall be actuated to insure satisfactory operation.

4.4.3 Environmental tests

4.4.3.1 The teleprinter shall be tested for compliance with the requirement listed below using the following procedure specified in MIL-E-4970.

Requirement

Title of Test Procedure
in MIL-E-4970

Low Pressure Test (3.5.2c)

Low pressure test Class A
(Delete portion at 3.44 inches
of mercury)

4.4.3.2 Measurements and observations shall be made to prove compliance with 3.5.1a, 3.5.1b, 3.5.2a and 3.5.2b.

4.4.3.3 The unit shall be operated at the various combinations of conditions specified in 3.4, and shall meet the requirements of 3.3.1.

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4.4.3.4 The teleprinter, when operating for the tests of 4.4.3, shall operate at a code speed of not less than 1000 wpm.

4.4.4 High speed tests

4.4.4.1 The teleprinter shall be operated by the input code of 3.4.2 at a speed of not less than 1,000 wpm for a total of not less than 24 hours.

4.4.4.2 Since the tests of 4.4.3 require the equipment to be operating, the durations of the printing time in the tests of 4.4.3 may be considered a part of the 24 hour high speed tests.

4.4.4.3 After a 30 minute warm-up period, the teleprinter shall be operated by the input code of 3.4.2 at a speed of not less than 2,000 wpm for not less than 10 minutes.

4.4.5 Bias and end distortion. - At a code speed of 100 wpm, the unit shall be actuated by the code of 3.4.2 containing:

- a. As much as 40 percent marking or spacing bias.
- b. As much as 35 percent marking or spacing end distortion.

4.4.5.1 Not less than one full page of print shall be required for the test of 4.4.5.

4.4.6 Life test. - At a site designated by the procuring activity, a teleprinter shall be installed on a 60 milliamperere, standard teletype line, with a code speed of 100 wpm. The equipment shall be operated continuously by the Government for no less than 42 days. During the testing period, the teleprinter shall operate as described in 3.3.1. Total "off" time shall not exceed 24 hours per month.

4.5. First article tests

4.5.1 First article test sample. - The first article test sample shall consist of one model representative of the service test model. It shall be tested at a laboratory designated by the procuring activity or, when so stated in the contract, at the contractor's plant under the supervision of the procuring activity.

4.5.2 First article tests. - First article tests shall consist of all tests described under 4.4, Test methods.

5. PREPARATIONS FOR DELIVERY

5.1 Preservation, packaging, and packing. - Preservation, packaging, and packing shall be as specified in MIL-P-17555.

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5.2 Marking for shipment. - Interior packages and exterior shipping containers shall be marked in accordance with MIL-STD-129. The shipment marking nomenclature shall be as follows: Teleprinter, Electrographic AN/GMH-2(XD-2).

6. NOTES

6.1 Use. - The Teleprinter, Electrographic AN/GMH-2(XD-2) covered by this specification is intended to print at speeds up to 2,000 words per minute. It shall be capable of serially printing text from 55 alpha-numeric and weather characters. An electrographic printing technique is used, no moving carriages are employed, and the unit is essentially noiseless when operating.

6.2.1 Ordering data. - Procurement documents should specify the following:

6.2 Title, number, and date of specification.

6.2.2 The type of signal source to be provided to the contractor upon his request (3.9).

6.2.3 Level of preservation, packaging, and packing desired.

6.3 First article sample. - It is expected that the contract or purchase order will specify that one set will be required as a first article sample and that this sample will be subjected to the first article tests to determine compliance with the requirements of this specification. The invitation for bids and the contract should specify the point of inspection for these tests.

NOTICE: When government drawings, specifications, or other data are used for any purpose other than in connection with a definitely related Government procurement operation, the United States Government thereby incurs no responsibility nor any obligation whatsoever; and the fact that the Government may have formulated, furnished, or in any way supplied the said drawings, specifications, or other data is not to be regarded by implication or otherwise as in any manner licensing the holder or any other person or corporation, or conveying any rights or permission to manufacture, use, or sell any patented invention that may in any way be related thereto.

JLM/cot
CRZDP

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Spares + parts peculiar
Instruction manual
Drawings

PREPARING ACTIVITY
AFCRC

REVISIONS TO MIL-T-9770

3.3.8.1 ADD: The temperature of the external surfaces of the unit shall not exceed 125 F or 30 F above ambient, whichever is higher.

3.5.1 ADD: _____, the equipment shall, after being unpacked for at least one hour, comply with _____:

3.5.1 (a) CHANGE: 160 F to 150 F.

4.4.2 (a) ADD: Not more than .0025% error will be allowed in the printed copy. Errors are defined as those printed characters which do not conform to the incoming data, and those characters which are not legible.

4.4.4.1 ADD: The 24 hour period need not be continuous; however, no maintenance, other than normal additions of supplies, will be allowed during the course of the test. Not more than .0025% error, as defined under 4.4.2 (a), will be allowed in the printed copy.

4.4.4.3 ADD: Not more than .0025% error, as defined under 4.4.2 (a), will be allowed in the printed copy.

4.4.5.1 ADD: A page is defined as (50) lines of single-spaced copy.

4.4.6 CHANGE LAST LINE TO READ: Total down time for malfunction of the machine shall not exceed (24) hours in any calendar month. Paper and ink loading time shall be included in the (42) day period, and not a part of the (24) hour down time. Not more than .0025% error, as defined under 4.4.2 (a), will be allowed in the printed copy.

6.1 CHANGE LAST SENTENCE TO READ: An electrographic printing technique is used, no moving carriages are employed, and the unit will not produce objectionable noise when used in an office space.