

MIL-A-14878A(AR)  
 30 June 1981  
 SUPERSEDING  
 MIL-A-14878(AR)  
 2 MARCH 1970

## MILITARY SPECIFICATION

AMPLIFIER, VIDEO: 10559445

This specification is approved for use by the US Army Armament Research and Development Command (ARRADCOM) and is available for use by all Departments and Agencies of the Department of Defense.

### 1. SCOPE

1.1 Scope. This specification establishes the requirements and quality assurance provisions for the Amplifier, Video: 10559445 which is the A7 component of the Receiver-Transmitter Unit, 11743121.

### 2. APPLICABLE DOCUMENTS

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

#### SPECIFICATIONS

##### MILITARY

MIL-F-13926	Fire Control Materiel: General Specification Governing the Manufacture and Inspection of
MIL-I-45607	Inspection Equipment, Supply and Maintenance of
MIL-STD-45662	Calibration System Requirements

#### STANDARDS

##### MILITARY

MIL-STD-105	Sampling Procedures and Tables for Inspection by Attributes
MIL-STD-810	Environmental Test Methods

Beneficial comments (recommendations, additions, deletions) and any pertinent data which may be of use in improving this document should be addressed to: Commander, US Army Armament Research and Development Command, Attn. DRDAR-QA, Dover, New Jersey 07801 by using the self-addressed Standardization Document Improvement Proposal (DD Form 1426) appearing at the end of this document or by letter.

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DRAWINGS

ARRADCOM

10559445

Amplifier, Video

Inspection Equipment

11750211

Test Set - Video Amplifier

Packaging Data Sheet

P10559445

Amplifier, Video

(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.)

### 3. REQUIREMENTS

3.1 Fabrication. The video amplifier, herein referred to as the assembly, shall be manufactured in accordance with Drawing 10559445 and drawings pertaining thereto and, when assembled, shall meet the requirements of this specification. (See 4.5.1)

3.1.1 Function. The assembly shall provide the following functions:

<u>Designation</u>	<u>Nomenclature</u>
a. + 5 volts	Amplifier gain
b. 2.4 volts	Amplifier recovery time
c. 1 volt	Automatic Gain Control (AGC)
d. + 5 volts	Test video

3.1.2 General specifications. The following provisions of MIL-F-13926 apply: (See 4.5.1)

- a. Order of precedence
- b. Dimensions and tolerances
- c. Inorganic protective surface finishes
- d. Part identification and marking
- e. Workmanship

3.1.3 Ambient conditions. Standard ambient conditions shall be as follows:

- |                         |                                   |
|-------------------------|-----------------------------------|
| a. Temperature          | $73^{\circ} + 18^{\circ}\text{F}$ |
| b. Relative humidity    | 50 percent $\pm$ 30 percent       |
| c. Atmospheric pressure | $28.5 + 2.0 - 3.0$ in. Hg.        |

3.2 First article. When specified (see 6.2), the contractor shall furnish sample units for first article inspection and approval (see 4.4 and 6.2).

3.3 Performance. Unless otherwise specified, the assembly shall meet the performance requirements specified herein under standard ambient conditions of 3.1.3.

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TABLE I. Load, power and signals.

Item	Condition	Characteristic	Connection
1.0	<u>Load</u>		
1.1	Resistor	Not less than 8 megohms	Connected between J1-5 and J1-4
2.0	<u>Power sources</u>	<u>Tolerance</u> <u>Maximum Ripple</u>	Applied between the following pins of J1:
2.1	+5 volts	+0.2 volt      25 mV	2(+) and 4(-)
2.2	+15 volts	+0.7 volt      25 mV	1(+) and 4(-)
2.3	-6 volts	+0.2 volt      25 mV	3(-) and 4(+)
3.0	<u>Signal sources</u>		
3.1	Digital Type A	Logical one: $4 \pm 1$ volts Logical zero: $0.2 \pm 0.2$ volt Pulse width: 1.0 micro-seconds(ms) $\pm 10\%$ Polarity: Negative PRF: 1kHz $\pm 10\%$	Applied to J1-A2 as logical one, unless otherwise specified
3.2	Current Pulse	Maximum peak current: 3 milliamps (ma) Pulse width: 50 nano-seconds (ns) $\pm 10\%$ Polarity: Negative PRF: Variable Source impedance: $10K \pm 5\%$ or constant current source	Applied to P1

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3.3.1 Amplifier gain. With the current pulse of table I applied to P1 at a pulse-repetition frequency (PRF) of  $100 \pm 20$  Hz, the input current shall be less than 11.8 microamps (mamp) for an output voltage at J1-A1 as shown on figure 1. (See 4.6.2.1)



FIGURE 1. Output voltage at terminal J1-A1.

3.3.2 Amplifier recovery time. With the current pulse shown on figure 2 applied to P1 and with the photomultiplier tube (PMT) simulating network, figure 4, attached, the output voltage at J1-A1 shall be as shown in figure 3. The amplitudes of the two pulses shall differ by less than one volt. (See 4.6.2.2)

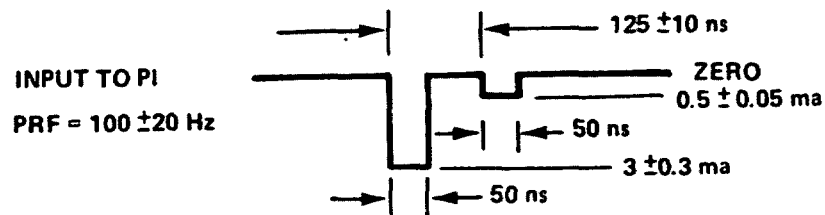
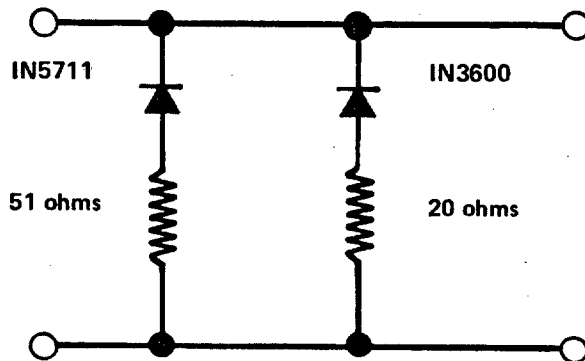


FIGURE 2. Current pulse applied to P1.

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FIGURE 3. Output pulse.FIGURE 4. PMT simulating network.

3.3.3 AGC voltage. With no input signal at P1, the voltage at J1-5 shall be  $-0.7 \pm 0.6$  Vdc. With a current pulse of  $13 \pm 1$  mamp applied to P1 at a PRF of  $220 \pm 20$  pulses per second (pps), the voltage at J1-5 shall be greater than 1 Vdc. (See 4.6.2.3)

3.3.4 Test video. The test video signal at J1-A1 shall be as shown on figure 5. (See 4.6.2.4)

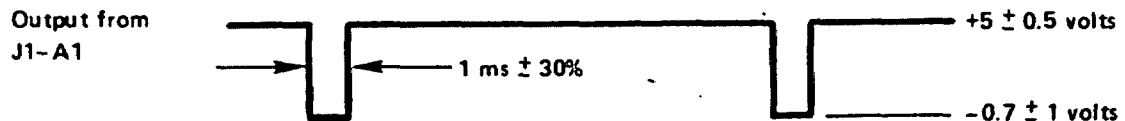


FIGURE 5. Test video signal at J1-A1.

#### 3.4 Environmental.

3.4.1 Shock. The assembly shall be capable of operating as specified herein after exposure under the conditions of 3.1.3 to three half sine wave shock pulses of  $40 \pm 4$  gravity unit (g) for a duration of  $18 \pm 3$  milliseconds (msec) applied in each direction along three mutually perpendicular axes. In addition, the assembly shall be capable of withstanding three half sine wave shock pulses of  $100.0 \pm 10.0$  g for a duration of  $1.5 \pm 0.2$  msec applied in each direction along three mutually perpendicular axes. (See 4.6.3.1)

3.4.2 Vibration. The assembly shall be capable of operating as specified herein after exposure under the conditions of 3.1.3 to the vibration profile of figure 6. Duration of exposure shall be not less than 80 minutes in each of three mutually perpendicular axes. (See 4.6.3.2)

3.4.3 Operating temperature. The assembly shall be capable of operating as specified herein over the operating temperature range of  $-25^{\circ}\text{F}$  to  $+125^{\circ}\text{F}$ . (See 4.6.3.3, 4.6.3.4 and 4.6.3.5)

3.4.4 Storage temperature. The assembly shall be capable of operating as specified herein after exposure to storage temperatures ranging from  $-65^{\circ}\text{F}$  to  $160^{\circ}\text{F}$ . (See 4.6.3.3, 4.6.3.4 and 4.6.3.5)

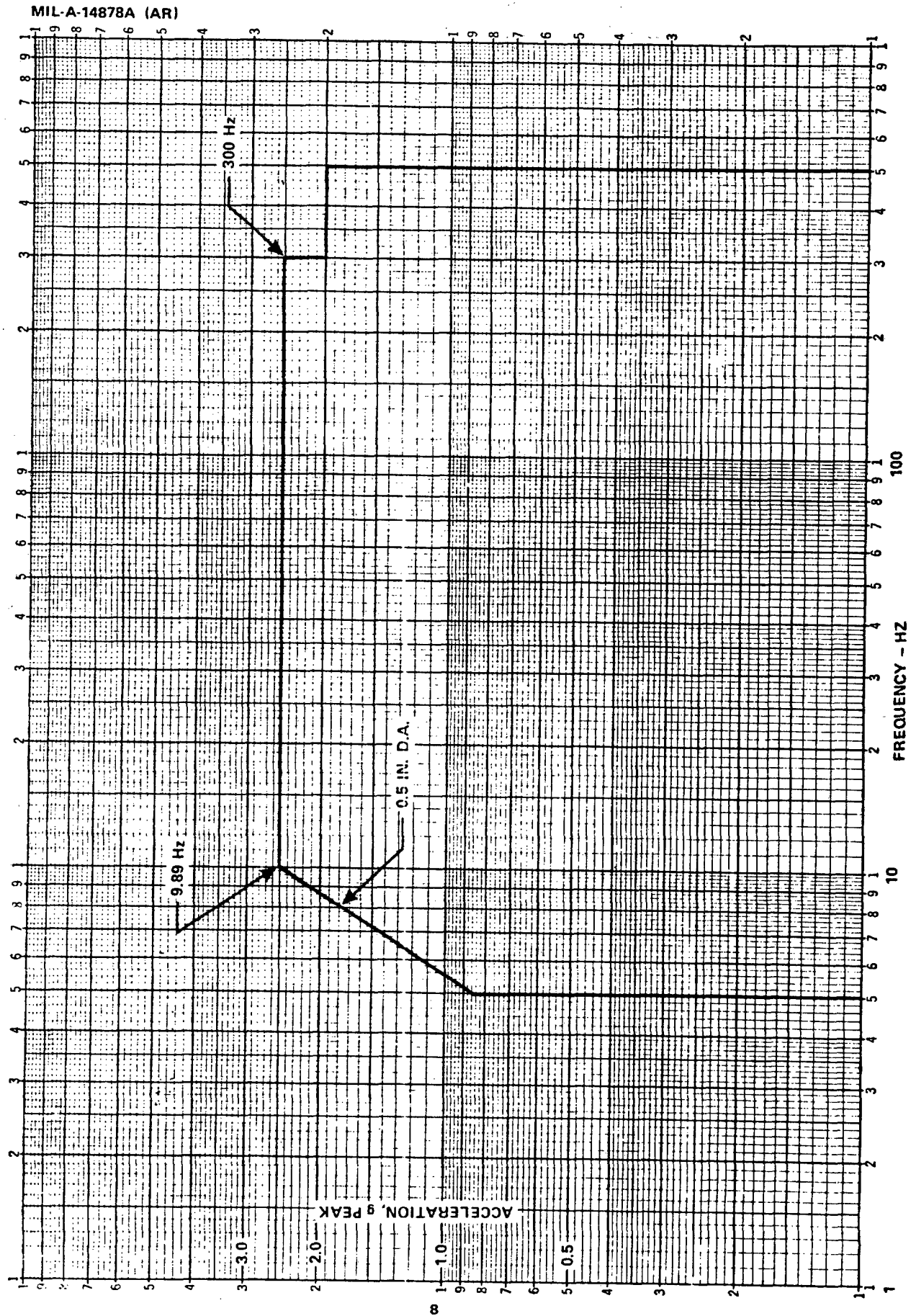


FIGURE 6. Vibration profile.



#### 4. QUALITY ASSURANCE PROVISIONS

4.1 Responsibility for inspection. Unless otherwise specified in the contract, the contractor is responsible for the performance of all inspection requirements as specified herein. Except as otherwise specified in the contract, the contractor may use his own or any other facilities suitable for the performance of the inspection requirements specified herein, unless disapproved by the Government. The Government reserves the right to perform any of the inspections set forth in the specification where such inspections are deemed necessary to assure supplies and services conform to prescribed requirements.

4.2 Classification of inspections. The inspection requirements specified herein are classified as follows:

1. First article inspection (see 4.4).
2. Quality conformance inspection (see 4.5).

4.3 Inspection conditions. Unless otherwise specified, all inspections shall be performed in accordance with the quality assurance provisions of MIL-F-13926 and the conditions of 3.1.3.

4.4 First article. The requirement for first article approval and the designation of responsibility for first article inspection to either the Government or the contractor shall be specified in the contract.

4.4.1 Sample. The first article sample shall be three assemblies selected at random by the Government representative from the first fifteen production assemblies.

4.4.2 Inspection. The sample shall be subjected to all the inspections specified in tables I', III and IV.

4.4.3 Failure. Failure of any assembly to meet any requirement shall be cause for refusal to grant first article approval. The Government reserves the right to terminate first article inspection upon any failure of any assembly to comply with any stated requirement.

4.4.4 Responsibility. The contractor, whether or not responsible, shall inspect the sample for conformance to all contractual requirements and shall submit a record of this inspection with the sample and certificates of conformance for materials. The Government reserves the right to witness inspections performed by the contractor.

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4.5 Quality conformance inspection.

4.5.1 Procurement conditions. The following inspection plans shall apply where the assembly is procured for use as a:

<u>Use</u>	<u>Plan</u>
a. Logistics spare assembly apart from the next higher assembly	A and C
b. Component assembly of the next higher assembly	B and C

4.5.2 Inspection plan A.

4.5.2.1 General sample and tests. One assembly, as a control sample, shall be selected at random by the Government representative from each 100 assemblies produced and shall be subjected to all the tests in table III.

4.5.2.2 Environmental sample and tests. Three assemblies, as a control sample, shall be selected at random by the Government representative from each 50 assemblies produced or from each month's production, whichever occurs first. All the tests in table IV shall be applied separately to each assembly in the sample.

4.5.2.3 Acceptance. Where any one assembly of either sample fails to meet any specified requirement, the lot shall be rejected. Rejected lots shall be subject to the provisions of MIL-STD-105.

4.5.3 Inspection plan B.

4.5.3.1 Sample and tests. The sample shall be selected by the Government representative in accordance with the provisions of MIL-STD-105. All the tests in table III and only the test of item 307 in table IV shall be applied.

4.5.3.2 Acceptance. Acceptance and rejection shall be in accordance with MIL-STD-105.

4.5.4 Inspection plan C.

4.5.4.1 Sample and tests. Each assembly in every lot shall be subjected to all the tests in table II and shall be examined visually for completeness, improper assembly and evidence of poor workmanship.

4.5.4.2 Acceptance. Where any one assembly fails to meet any specified requirement, the defective assembly shall be removed from the lot and resubmitted only after all defects have been corrected.

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4.5.5 Inspection equipment. Unless otherwise specified in the contract, the contractor shall supply, maintain and calibrate inspection equipment in accordance with the provisions of MIL-I-45607 and MIL-STD-45662.

4.5.6 Packaging inspection. The sampling and inspection of the preservation - packaging, packing and container marking shall be in accordance with the provisions of packaging data sheet P10559445.

TABLE II. Performance tests.

Item	Characteristic	Requirement	Test Procedure
101	Amplifier gain	3.3.1	4.6.2.1
102	Amplifier recovery time	3.3.2	4.6.2.2
103	AGC voltage	3.3.3	4.6.2.3
104	Test video	3.3.4	4.6.2.4

TABLE III. General tests.

Item	Characteristic	Requirement	Test Procedure
301	Fabrication	3.1	Applicable drawings- visual
302	General specification	3.1.2	MIL-F-13926 - visual

TABLE IV. Environmental tests.

Item	Characteristic	Requirement	Test Procedure
303	Shock	3.4.1	4.6.3.1
304	Vibration	3.4.2	4.6.3.2
305	High Temperature	3.4.3 and 3.4.4	4.6.3.3
306	Low Temperature	3.4.3 and 3.4.4	4.6.3.4
307	Temperature cycling	3.4.3 and 3.4.4	4.6.3.5

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4.6 Methods of inspection.

4.6.1 Test equipment. Unless the assembly is procured apart from the next higher assembly, the test equipment in table V shall be used where specified to perform the required test.

TABLE V. Test equipment.

Item	Part Number	Nomenclature
1	11750211	Test Set - Video Amplifier

4.6.2 Performance tests.

4.6.2.1 Amplifier gain. Use item 1 of table V or suitable equipment to determine compliance with 3.3.1.

4.6.2.2 Amplifier recovery time. Use item 1 of table V or suitable equipment to determine compliance with 3.3.2.

4.6.2.3 AGC voltage. Use item 1 of table V or suitable equipment to determine compliance with 3.3.3.

4.6.2.4 Test video. Use item 1 of table V or suitable equipment to determine compliance with 3.3.4.

### 4.6.3 Environmental tests.

#### 4.6.3.1 Shock.

4.6.3.1.1 Basic design. Mount the assembly in a suitable shock fixture and subject it to the shock test specified in MIL-STD-810, method 516.2, procedure I figure 516.2-2. Apply three half sine wave shock pulses in each direction along the three axes. Peak amplitude shall be  $40 \pm 4$  g with a time duration of  $18 \pm 3$  msec measured at the 10 percent amplitude points. At the conclusion of this test, subject the assembly to the performance tests of table II.

4.6.3.1.2 High intensity. Mount the assembly in a suitable shock fixture and subject it to the shock test specified in MIL-STD-810, method 516.2, procedure IV, figure 516.2-2. Apply three half sine wave shock pulses in each direction along the three axes. Peak amplitude shall be  $100.0 \pm 10.0$  g with a time duration of  $1.5 \pm 0.2$  msec measured at the 10 percent amplitude points. At the conclusion of this test, subject the assembly to the performance tests of table II.

4.6.3.2 Vibration. Vibration A as specified in 4.6.3.2.1 shall be conducted only for first article inspection. Vibration B as specified in 4.6.3.2.2 shall be conducted only for quality conformance inspection.

4.6.3.2.1 Vibration A. Mount the assembly in a suitable vibration fixture and subject the assembly to the vibration test specified in MIL-STD-810, method 514.2, procedure VIII, except that the test level shall be the vibration curve shown in figure 6 and duration of exposure shall be not less than 80 minutes per axis. At the conclusion of this test, subject the assembly to the performance tests of table II.

4.6.3.2.2 Vibration B. This test shall be conducted as in 4.6.3.2.1 except that the period of vibration shall be not less than 15 minutes in each axis.

4.6.3.3 High temperature. Subject the assembly to the high temperature test specified in MIL-STD-810, method 501.1, procedure I. The highest operating temperature shall be  $125^{\circ}\text{F}$ . The performance tests of table II shall be applied.

4.6.3.4 Low temperature. Subject the assembly to the low temperature test specified in MIL-STD-810, method 502.1, procedure I. The storage temperature shall be  $-65^{\circ}\text{F}$ . The lowest operating temperature shall be  $-25^{\circ}\text{F}$ . The performance tests of table II shall be applied.

4.6.3.5 Temperature cycling. With power and loads of table I applied, subject the assembly to the temperature profile specified in figure 7. At the conclusion of this test, subject the assembly to the performance tests of table II.

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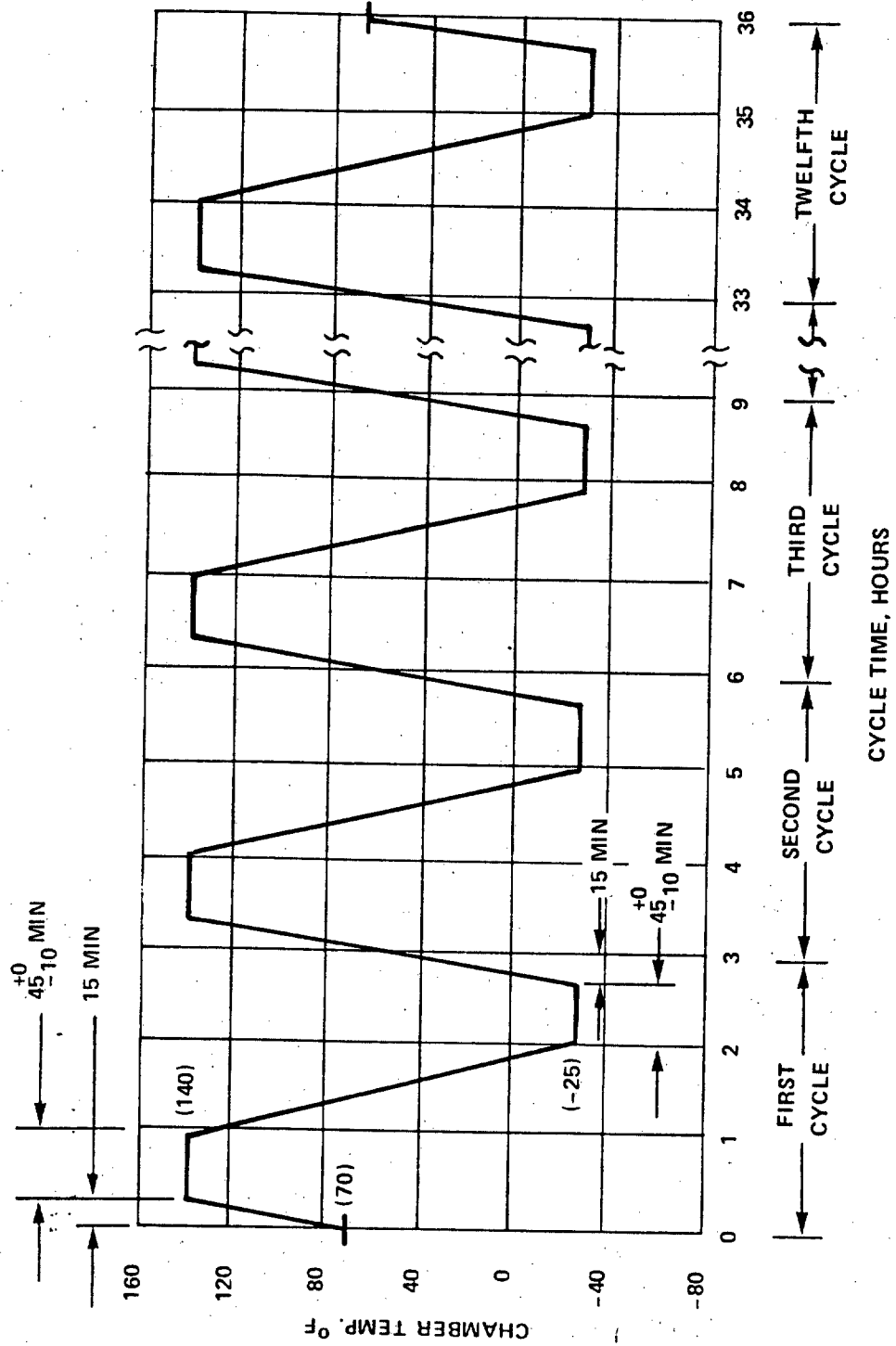


FIGURE 7. Temperature cycling.

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## 5. PACKAGING

5.1 Packaging, packing and marking. Packaging, packing and marking shall be in accordance with packaging data sheet P10559445. The level of protection shall be as specified in the procurement document. (See 4.5.6)

## 6. NOTES

6.1 Intended use. The assembly is a functional module of the Laser Receiver-Transmitter, intended for use in the Laser Range Finder AN/VVS-1. The assembly receives the small signals from the photomultiplier and amplifies them to the level needed to drive the logic circuitry and reply gating circuits. The assembly also controls the gain of the photomultiplier by means of an AGC circuit which senses the pulses rate of the receiver amplifier output. (Common to AN/VVG-2 L.R.F.)

6.2 Ordering data. Procurement documents should specify the following:

- a. Title, number and date of this specification.
- b. Applicable packaging data sheet number (see 5.1).
- c. Selection of applicable levels of preservation, packaging and packing.
- d. Applicable stock number.
- e. Requirement of first article submission.

6.3 Changes to previous issue. Asterisks are not used in this revision to identify changes with respect to the previous issue, due to the extensiveness of the changes.

Custodian:  
Army - AR-

Preparing activity:  
Army - AR  
Project No: 1240-A791

**STANDARDIZATION DOCUMENT IMPROVEMENT PROPOSAL***(See Instructions - Reverse Side)*

1. DOCUMENT NUMBER MIL-A-14878A		2. DOCUMENT TITLE AMPLIFIER, VIDEO: 10559445	
3a. NAME OF SUBMITTING ORGANIZATION		4. TYPE OF ORGANIZATION <i>(Mark one)</i>	
b. ADDRESS <i>(Street, City, State, ZIP Code)</i>		<input type="checkbox"/> VENDOR <input type="checkbox"/> USER <input type="checkbox"/> MANUFACTURER <input type="checkbox"/> OTHER <i>(Specify):</i> _____	
5. PROBLEM AREAS			
a. Paragraph Number and Wording:			
b. Recommended Wording:			
c. Reason/Rationale for Recommendation:			
6. REMARKS			
7a. NAME OF SUBMITTER <i>(Last, First, MI) - Optional</i>		b. WORK TELEPHONE NUMBER <i>(Include Area Code) - Optional</i>	
c. MAILING ADDRESS <i>(Street, City, State, ZIP Code) - Optional</i>		8. DATE OF SUBMISSION <i>(YYMMDD)</i>	

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