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PERFORMANCE SPECIFICATION
VIDEO POSTAMPLIFIER-CONTROL DRIVER, AM-6924/UA

This performance specification is approved for use by USACECOM, Department of the Army and is available for use by all departments and agencies of the Department of Defense.

1. SCOPE

1.1 Scope. This performance specification covers one type of common module, Video Postamplifier-Control Driver, AM-6924/UA herein referred to as the Postamplifier.

2. APPLICABLE DOCUMENTS

2.1 General. The documents listed in this section are specified in sections 3 and 4 of this specification. This section does not include documents 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 sections 3 and 4 of this specification, whether or not they are listed.

2.2 Government documents.

2.2.1 Specifications, standards and handbooks. The following specifications, standards and handbooks form a part of this document to the extent specified herein. Unless otherwise specified, the issues of these documents are those listed in the Department of Defense Index of Specifications and Standards (DoDISS) and supplement thereto, cited in the solicitation (see 6.2). Handbooks are for guidance only and therefore are not mandatory.

Beneficial comments (recommendations, additions, deletions) and any pertinent data which may be of use in improving this document should be addressed to: HQ, USA Communications-Electronics Command, ATTN: AMSEL-LC-LEO-E-EP, Fort Monmouth, NJ 07703 by using the Standardization Document Improvement Proposal (DD Form 1426) appearing at the end of this document or by letter.

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HANDBOOKS

DEPARTMENT OF DEFENSE

MIL-HDBK-454	- Standard General Requirements for Electronic Equipment.

(Unless otherwise indicated, copies of the above specifications, standards and handbooks are available from the Standardization Document Order Desk, 700 Robbins Avenue, Building 4D, Philadelphia, PA 19111-5094).

2.2.2 Other Government documents, drawings and publications. The following other government documents, drawings and publications form a part of this specification to the extent specified herein. Unless otherwise specified, the issues are those cited in the solicitation (see 6.2).

DRAWINGS

USA CECOM

SM-D-773900	- Post Amplifier-Control Driver, Video AM-6924/UA
SM-D-773889	- Printed Wiring Board IR Video Postamp/Control Driver
SM-D-773899	- Schematic Diagram, IR Video Postamp/Control Driver Assy

(Copies of documents, 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).

2.3 Non-Government publications. The following documents form a part of this document to the extent specified herein. Unless otherwise specified, the issues of the documents which are DoD adopted are those listed in the issue of the DoDISS cited in the solicitation. Unless otherwise specified, the issues of documents not listed in the DoDISS are the issues of the documents cited in the solicitation (see 6.2).

AMERICAN NATIONAL STANDARDS INSTITUTE (ANSI)

ANSI/IPC-S-815A	- General Requirements for Soldering Electronic Interconnections

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(Application for copies should be addressed to the American Standards Institute Inc., 1430 Broadway, N.Y., N.Y. 10018).

AMERICAN SOCIETY FOR QUALITY CONTROL (ASQC)

ANSI/ASQC Z 1.4 - Sampling Procedures and Tables for Inspection by Attributes

(Application for copies should be addressed to the American Society for Quality Control, P.O. Box 3005, 611 East Wisconsin Avenue, Milwaukee, Wisconsin 53202).

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

3. REQUIREMENTS

3.1 First article. Where specified in the contract (see 6.2), the contractor shall furnish first article units for inspection (see 4.2).

3.2 Materials. The contractor shall select materials that are fully capable of meeting all of the operational and environmental requirements specified herein. The materials specified in the applicable drawings are recommended, but are not mandatory. Selection of the class, grade or type part shall be that the material will be able to perform its intended function when it is assembled. Verification of the supplier meeting the overall performance requirements shall be the governing acceptance standard. Recovered materials shall be used to the maximum extent possible.

3.3 Description. The postamplifier is a specialized circuit for amplifying video signals in an infrared system.

3.4 Construction. The postamplifier shall meet the form, fit, function and interface requirements specified herein.

3.4.1 Weight. The weight of the postamplifier shall be 0.26, (+0.03 -0.05) pounds as weighed by a scale having an accuracy of 1% or better.

3.4.2 Electronic components. Electronic components shall be consistent with meeting the overall performance requirements listed herein. As described, the postamplifier has 20 channels of amplification; two cascaded sets of four monolithic integrated circuits which provide gain and permit the selection of signal polarity and a third set of four integrated circuits which provide signals for a light emitting diode (LED) array. When the postamplifier is used in a system, potentiometers or other controls shall provide initial gain balancing.

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3.4.3 Dimensions. To ensure accurate interface with existing hardware, dimensions and dimensional tolerances shall be in accordance with Drawing SM-D-773900 for maximum overall height of components from the printed wiring board, dimensions of the printed wiring board shall be in accordance with Drawing SM-D-773889 and pinouts to the connectors shall be in accordance with Drawing SM-D-773899.

3.5 Performance characteristics.

3.5.1 Channel-to-channel tracking. The voltage gain of the postamplifier channels shall track within ± 10 percent of the average gain at ambient temperature ranges of +55°C to +71°C and 0°C to -54°C, and within ±5 percent over the range of 0°C to +55°C.

3.5.2 Gain tracking error. Channel-to-channel gain tracking shall not vary more than ±5 percent over the gain control range (30 dB minimum) at ambient temperature (+23, ±5°C). The gain tracking error shall not vary more than ±5 percent over the temperature range of 0°C to +55°C and shall not vary more than ±10 percent from +55°C to +71°C and from 0°C to -54°C.

3.5.3 Voltage gain. Voltage gain shall be a minimum of 18,000 volts per volt (V/V) in high power mode (see 3.5.8).

3.5.4 Gain control. Gain control range shall be 0 to 30 dB minimum. Gain control range is determined by controlling the positive and negative limits of the externally supplied gain command voltages which determine the maximum and minimum gain, respectively.

3.5.5 Signal bandwidth. The upper 3 dB frequency shall be between 72 kHz and 172 kHz. Midband gain reference: 0 dB at 1 kHz in both high and low power modes (see 3.5.8).

3.5.6 Input impedance. Input impedance shall be 10,000, ± 2,500 ohms.

3.5.7 Output current. Output current capability shall be 10, ±3 milliamperes (mA) peak into a 470 ohm resistive load.

3.5.8 Input power. Supply voltages and currents for low-power and high-power applications are listed as follows:

Low-power mode	High-power mode

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V, volts	I, amperes	Max ripple (mV rms)	V, volts	I, amperes	Max ripple (mV rms)
+4.8 ±0.1	0.152 Max	100	+10.0 ±0.1	0.200 Max	100
-4.8 ±0.1	0.040 Max	100	-6.0 ±0.1 to -7.5 ±0.1	0.050 Max	50
+7.0 ±0.1	0.040 Max	100	+4.25 ±0.1	0.065 Max	0.2
+3.5 ±0.1	0.050 Max	0.2	-4.25 ±0.1	0.065 Max	0.2
-3.5 +0.1	0.050 Max	0.2			

3.5.9 Output impedance. Output impedance shall be 205, ±10 ohms.

3.5.10 Recovery time. Recovery time from a 50-millisecond, 1 volt pulse input, followed by a signal of 10-millisecond width and 50-millivolt (mV) amplitude, shall not be greater than 200 milliseconds.

3.5.11 Polarity. A polarity function shall be provided which allows the output to be in phase or 180 degrees out of phase with the input signal.

3.5.12 AC gain balance. A potentiometer shall be provided in each postamplifier channel which allows a 15 dB minimum ac gain balance range to balance variations in detector responsiveness and amplifier gain variations.

3.5.13 Voltage gain drift. The average voltage gain of the 20 channels on each postamplifier shall not differ by more than ±10 percent from the average reference gain at ambient temperature (T = +23°C, ±5°C) over the operating temperature range of 0°C to +55°C and by not more than ±15 percent over the temperature range of +55°C to +71°C. The average 20-channel gain shall not differ from the average reference gain at ambient by more than ±15 percent over the operating temperature range of 0°C to -54°C.

3.5.14 Output noise. The output noise of each channel shall not be greater than 150 mV rms with the postamplifier gain set at 18,000.

3.5.15 Total signal bandwidth. The upper 3 dB frequency shall be between 72 kHz and 172 kHz. The lower 3 dB frequency shall be 6, ±2Hz. The postamplifier gain shall be flat (±0.5 dB of midband gain) from 30 Hz to 25 kHz. Midband gain reference: 0 dB at 1 kHz in both the high and low power modes (see 3.5.5).

3.6 Environmental conditions.

3.6.1 Temperature shock. The postamplifier shall not be damaged (see 6.3.1) by sudden changes in temperature between -54°C and +95°C.

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3.6.2 High temperature. Damage or performance degradation shall not occur by storage to +95°C or continuous operation to +71°C. The postamplifier shall operate for 30 minutes at +95°C.

3.6.3 Low temperature. The postamplifier shall not be damaged nor shall the performance be degraded by operation to -54°C or storage to -62°C.

3.6.4 Shock. Damage or degradation of specified performance shall not occur by high intensity shocks of 100 g's peak amplitude with 11 milliseconds duration and by bench handling tests.

3.6.5 Vibration. Damage or degradation of performance shall not occur when the postamplifier is subjected to vibration over the frequency spectrum at the specified "g" levels and amplitudes shown in Figure 1.

3.7 Reliability. The postamplifier shall have a mean time between failure (MTBF) of at least 18,000 hours, θ_o.

3.8 Preconditioning. Each postamplifier shall be subjected to at least a 20-cycle preconditioning environment as specified in Figure 2 prior to Group A inspection (For exception to this requirement see 6.2.f).

3.9 Soldering. Unless otherwise specified, soldering shall be in accordance with ANSI/IPC-S-815A.

3.10 Nameplates and product marking. The postamplifier shall be marked with the part number "80063-SM-D-773889" and the manufacturer's CAGE code number. MIL-HDBK-454 may be used for guidance in marking.

3.11 Workmanship. All electronic parts, components, assemblies or sub-assemblies shall be free of smudges, excess solder, metal chips or the existence of any foreign material on any surface. Bearing assemblies shall be free from rust, dirt or tool marks. Wires and integrated circuitry shall be protected from contact with rough or irregular surfaces and be shielded from shorting.

4. VERIFICATION

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

a. First article inspection (see 4.2)

b. Conformance inspection (see 4.4)

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4.2 First article inspection. When specified in the contract, first article inspection shall be performed by the contractor on a number of sample units as indicated in the contract or purchase order. First article reliability (4.2.3) is not required unless specified in the contract (see 6.2.b).

4.2.1 Inspections. All materials, parts, processes and assemblies shall be examined for conformance to the applicable specification or drawing and Table I inspections. Sampling shall conform to ANSI/ASQC Z 1.4.

TABLE I. Visual inspections.

Inspection requirement	Requirement paragraph	Test paragraph
Any part or component missing or damaged	3.2, 3.4	4.2.1
Weight not as specified	3.4.1	4.2.1
Soldering not as specified	3.9	4.2.1
Marking not as specified	3.10	4.2.1
Workmanship not as specified	3.11	4.2.1
Coating not as specified	3.11*	4.2.1
Interface dimensions not maintained	3.4	4.2.1
Solder/lead protrusions causing restrictions	3.4	4.2.1

*In ANSI/ASQC Z 1.4 use inspection level S-3 or objective quality evidence.

4.2.2 Tests. Upon successful completion of inspections specified in 4.2.1, perform the tests of Table II in any order. Failure of any test shall constitute failure of first article inspection.

TABLE II. First article inspection.

Inspection	Requirement paragraph	Test paragraph
Channel-to-channel tracking	3.5.1	4.5.1
Gain tracking error	3.5.2	4.5.2
Voltage gain	3.5.3	4.5.3
Gain control	3.5.4	4.5.4
Signal bandwidth	3.5.5	4.5.5
Input impedance	3.5.6	4.5.6
Output current	3.5.7	4.5.7
Input power	3.5.8	4.5.8
Output impedance	3.5.9	4.5.9
Recovery time	3.5.10	4.5.10

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TABLE II. First article inspection - Continued.

Inspection	Requirement paragraph	Test paragraph
Polarity	3.5.11	4.5.11
AC gain balance	3.5.12	4.5.12
Voltage gain drift	3.5.13	4.5.13
Output noise	3.5.14	4.5.14
Total signal bandwidth	3.5.15	4.5.15
Temperature shock	3.6.1	4.6.1
High temperature	3.6.2	4.6.2
Low temperature	3.6.3	4.6.3
Shock	3.6.4	4.6.4
Vibration	3.6.5	4.6.5
Reliability	3.7	4.7

4.2.3 First article reliability. The lower test MTBF (θ_1) shall be demonstrated in accordance with the following subparagraphs.

4.2.3.1 Test level.

- Temperature: +50°C, (+5 -0)°C
- Temperature cycling: none
- Vibration: 2.2 g's, ±10 percent peak acceleration value at any nonresonant frequency between 20 and 60 Hz measured at the mounting points of the equipment. The duration of vibration shall be at least 10 minutes during each hour of equipment operating time. The vibration shall be perpendicular to the plan of the printed circuit board.
- Equipment on-off cycling: Turn on and let temperature stabilize, hold for 3 hours, then turn off and let temperature stabilize. This cycle shall continue throughout the test.

4.2.3.2 Parameters. The discrimination ratio θ_o/θ_1 shall be 3.

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4.2.3.3 Failure criteria and test length. The tests of Table III shall be performed at least once prior to and once after the tests of 4.2.3.1. Additional testing of Table III may be selected by the contractor. The results of all Table III tests and any physical damage shall be used to determine the success or failure of the reliability test. In the event of a Table III test failure, the time interval between the preceding successful test and the failure shall not contribute to the total cumulative hours. Testing shall continue until the total unit hours together with the total count of relevant equipment failures permit either an accept or reject decision in accordance with Figure 6. Only equipment "on" time shall contribute to the total unit hours. No single equipment's "on" time shall be less than one- half the average operating time of all equipment "on" test.

4.2.4 Disposition of first article samples. First article samples shall not be considered as part of the procurement quantities (see 6.2. g).

4.3 Inspection procedures for quality assurance provisions. The postamplifier shall be operated as specified in Section 3 at an ambient temperature of +23°C, ±5°C. Operational modes not defined in Section 3 may be performed in the high or low power modes. The input power shall be in accordance with 3.5.8. Unless otherwise specified, all test setup and load resistor tolerances shall be ±5 percent.

4.4 Conformance inspection.

4.4.1 Group A inspection. Group A inspection shall be conducted at an ambient temperature of +23°C, ±5°C on all postamplifiers operated in the high power mode following the preconditioning of 3.8 and the inspections of 4.2.1. Group A tests listed in Table III may be performed in any order. Failure of any test shall be cause for rejection of that unit.

TABLE III. Group A inspection.

Inspection	Requirement paragraph	Test paragraph
Voltage gain	3.5.3	4.5.3
Gain control	3.5.4	4.5.4
Signal bandwidth	3.5.5	4.5.5
Input power	3.5.8	4.5.8
Polarity	3.5.11	4.5.11
Output noise	3.5.14	4.5.14

4.4.2 Group B inspection. Not required.

4.4.3 Group C inspection. Group C inspection shall be conducted on postamplifiers selected from units which have passed the tests in 4.4.1. The sample(s) shall be tested in accordance with the inspections listed in Table IV. Samples shall be selected in accordance with the contract (see 6.2.c). Group C tests listed in Table IV may be performed in any order.

TABLE IV. Group C inspection.

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Inspection	Requirement paragraph	Test paragraph
Channel-to-channel tracking	3.5.1	4.5.1
Gain tracking error	3.5.2	4.5.2

TABLE IV. Group C inspection - Continued.

Inspection	Requirement paragraph	Test paragraph
Input impedance	3.5.6	4.5.6
Output current	3.5.7	4.5.7
Output impedance	3.5.9	4.5.9
Recovery time	3.5.10	4.5.10
AC gain balance	3.5.12	4.5.12
Voltage gain drift	3.5.13	4.5.13
Total signal bandwidth	3.5.15	4.5.15
Vibration	3.6.5	4.6.5

4.4.3.1 Group C failures. Actions required relative to Group C failures shall be specified in the contract (see 6.2.d).

4.4.3.2 Disposition of Group C samples. Group C samples shall be accepted on contract subsequent to the tests of Table III.

4.5 Test methods of inspection.

4.5.1 Channel-to-channel tracking. First, measure voltage gain (4.5.3) adjusted to a gain greater than 7,000 v/v. The postamplifier shall meet the requirements of 3.5.1 without adjustment of channel gain controls over the specified range. Channel-to-channel tracking shall be tested using the postamplifier with an auxiliary control module (see 6.2 i) with both modules placed together in a temperature chamber. This test may be performed in conjunction with the temperature tests of 4.6.1, 4.6.2 and 4.6.3.

Voltage gain of each channel is defined by the following equation:

$$(k_1) \cdot A_T \cdot [(A_{I,T} = 25°C)/(A_T=25°C)] \leq A_{I,T} \leq (k_2) \cdot \bar{A}_T \cdot [(A_{I,T}=25°C/(A_T=25°C)]$$

$$A_T = \sum_{I=1}^{I=20} A_{I,T} \div 20$$

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Where: k_1= 0.95, for 5 percent below average gain; or 0.9, for 10 percent below average gain.

k_2 = 1.05, for 5 percent above average gain; or 1.10 for 10 percent above average gain.

$A_{I,T}$ = voltage gain of channel I at temperature T

A_T = average gain of 20 channels at temperature T

A_T= 25°C = average gain 20 channels at temperature T = 25°C

Note: Brackets = room temperature normalization factor.

4.5.2 Gain tracking error. Channel-to-channel gain control tracking shall be tested using the postamplifier with an auxiliary control module (see 6.2.i) with both modules placed together in a temperature chamber. Voltage gain shall be measured per 3.5.3. At zero (0) dB, the gain of each channel shall be normalized using the following equation:

Normalized gain = $[A_{I,T}(\text{at } 0 \text{ dB})]/[A_T(\text{at } 0 \text{ dB})]$

Where: $A_{I,T}$= voltage gain of channel I at temperature T

A_T = average gain of 20 channels at temperature T

When the gain has been decreased 30 dB, the following equation shall be used to determine gain tracking error.

$(k_1) \cdot A_{I,T}[(\text{at } 0 \text{ dB})/A_T(\text{at } 0 \text{ dB})] \leq A_{I,T}[(\text{at } 30 \text{ dB})/A_T(\text{at } 30 \text{ dB}] \leq (k_2) \cdot A_{I,T}[(\text{at } 0 \text{ dB})/A_T(\text{at } 0 \text{ dB})]$

Where k_1= 0.95, for 5 percent below average gain: or 0.9., for 10 percent below average gain.

(k_2)= 1.05 for 5 percent above average gain: or 1.10 for 10 percent above average gain.

4.5.3 Verify voltage gain. Voltage gain shall be measured using a signal generator and oscilloscope or RMS voltmeter. The output load shall be 470 ohms. With a measured voltage input e_{in} of 30 microvolts (V) rms and the signal generator set at the postamplifier midband frequency of 1 kHz, the amplifier rms voltage output e_{out} shall be measured. The midband gain of the amplifier shall be:

$$A_V = \frac{e_{out}}{e_{in}}$$

where: e_{in} = rms input voltage

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e_{out} = rms output voltage

Failure to meet requirements of 3.5.3 shall constitute failure of this test.

4.5.4 Gain control. Gain control range shall be measured using the test setup of 4.5.3 and the requirements of 3.5.4. Gain control voltages 1 and 2 shall be varied from -3.5 Vdc to +3.5 Vdc for high power mode while the output is being monitored with a voltmeter. Gain control range shall be determined from the difference in observed output voltages (gain shall be reduced by 30 dB). Failure to meet requirements of 3.5.4 shall constitute failure of this test.

4.5.5 Signal bandwidth. The signal bandwidth shall be per 3.5.5. Gain control voltages shall be set for a postamplifier gain of 18,000 v/v. The upper 3 dB frequency of the amplifier shall be measured by increasing the frequency of the signal generator beyond the midband reference of 1 kHz until the output voltage measured is down 3 dB.

4.5.6 Input impedance. Input impedance shall be measured using a signal generator with a 50 ohm source resistance and a 30 V RMS sinusoidal signal set at the postamplifier midband frequency of 1 kHz. The input and output voltages shall be monitored simultaneously. The output signal shall be attenuated by inserting a resistor in series with the input signal. The input impedance shall be the value of the resistance required to attenuate the output to 50 percent of the initial value. Failure to meet requirements of 3.5.6 shall constitute failure of this test.

4.5.7 Output current. The output current shall be measured for each channel using a 470 ohm resistive load. The postamplifier shall be biased in accordance with the requirements of 3.5.8. The IR level shall be -0.4, ±0.1 Vdc. The postamplifier input signal shall be increased from 30 mVRms at midband frequency until the output signal begins to saturate. Failure to meet requirements of 3.5.7 shall constitute failure of this test.

4.5.8 Input power. Input power shall be determined by measuring supply current and supply voltage. Postamplifier output load shall be 470 ohms. Postamplifier level control shall be set at -0.4, ±0.1 Vdc. Failure to meet requirements of 3.5.8 shall constitute failure of this test.

4.5.9 Output impedance. The output impedance shall be measured using the test setup of 4.5.6. An input signal of 30 V rms at 1 kHz shall be injected directly into the postamplifier while the no-load-resistance output is monitored. The output signal shall be attenuated by adding a load resistor to the output. The output impedance shall be the value of the load resistor required to attenuate the signal to 50 percent of its unloaded value. Failure to meet requirements of 3.5.9 shall constitute failure of this test.

4.5.10 Recovery time. Recovery time shall be measured with a pulse generator with a source resistance of 10 ohms and a postamplifier output load of 470 ohms. The pulse $V_1(T_1)$, shall be injected into the postamplifier input, with an amplitude V_1 of 1 volt and a width T_1 of 50 milliseconds followed by pulse $V_3(T_3)$ with an amplitude V_3 of 50 mV and a duration of 10 milliseconds. The postamplifier output of V_1 (T_1) is V'_1 and the output from V_3 (T_3) is V'_3. The

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postamplifier input shall be monitored continuously on channel A of a dual channel oscilloscope. The postamplifier output shall be monitored on channel B and synchronized with channel A. The recovery time shall be determined as follows: internal T_2 measured on channel A, shall be reduced until the trailing edge of output pulse V'_3 met. Internal T_2 is the recovery time (see Figure 3). Failure to meet requirements of 3.5.10 shall constitute failure of this test.

4.5.11 Polarity. The polarity reversal function of the postamplifier shall be tested using a signal generator, oscilloscope and a dc power supply connected to the polarity command inputs. When the power supply is adjusted to -2 Vdc, the output of the postamplifier shall be in phase with the input signal. When the power supply is adjusted to +0.6 Vdc, the output signal shall be 180 degrees out of phase with the input signal. Failure to meet requirements of 3.5.11 shall constitute failure of this test.

4.5.12 AC gain balance. AC gain balance range shall be measured using the test setup of 4.5.3. AC gain balance range of at least 15 dB shall be observed when the gain balance potentiometer of each channel is adjusted through its limits. Failure to meet requirements of 3.5.12 shall constitute failure of this test.

4.5.13 Voltage gain drift. Voltage gain shall be measured using the test setup of 4.5.3 adjusted to a midrange gain greater than 7,000 V/V. The voltage gain drift compensation circuitry is located on the auxiliary control module and varies gain command 1 output to the postamplifier. Voltage gain drift shall be tested using the postamplifier with an auxiliary control module built in accordance with 6.2.i, with both modules placed together in a temperature chamber. The test shall be performed with a postamplifier source resistance of 10 ohms and output load of 470 ohms. This test may be performed in conjunction with temperature tests 4.6.1, 4.6.2 and 4.6.3. Failure to meet requirements of 3.5.13 shall constitute failure of this test.

4.5.14 Output noise. Output noise shall be measured using a true-RMS voltmeter with a postamplifier input source resistance of 10 ohms, the output terminated with a 470-ohm load and the gain of each of the 20 channels set at 18,000 volts per volt. Failure to meet requirements of 3.5.14 shall constitute failure of this test.

4.5.15 Total signal bandwidth. Total signal bandwidth shall be measured using the test setup of 4.5.3. Gain command voltages shall be set for a postamplifier gain of 18,000 volts per volt. The upper voltages shall be set for a postamplifier gain of 18,000 volts per volt. The upper 3 dB frequency of the postamplifier shall be measured by increasing the frequency of the signal generator beyond the midband reference of 1 kHz until the output voltage measured is down 3 dB. The lower 3 dB frequency of the postamplifier shall be measured by decreasing the frequency of the signal generator below the midband reference of 1 kHz until the output voltage is down 3 dB. Postamplifier flatness shall be determined by measuring the frequencies above and below the midband reference of 1 kHz. Failure to meet the requirement of 3.5.15 shall constitute failure of this test.

4.6 Environmental tests. Environmental testing shall be performed in accordance with the requirements of this specification, except when a contractor's test plan showing equivalent

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methods has been approved by the contracting office. When the contractor's test plan deviates from the test procedures prescribed, the contractor shall be required to show where his own tests and methods for verifying the specified performance are equivalent. Also, measurements taken by the contractor during verification testing of all environmental requirements shall be accomplished using testing apparatus such as an environmental test chamber, vibration test table, pendulum shock device or similar equipment for which the technical capabilities to properly simulate extreme climatic or environmental conditions are scientifically documented. In general, the methods for testing to verify compliance with all stated performance characteristics selected by the contractor shall be equivalent or better than the recommended procedures specified herein.

4.6.1 Temperature shock. Measure compliance with the requirement of 3.6.1. Use of the procedures prescribed in 6.3 is recommended. Failure to meet the requirement shall constitute failure of the sample.

4.6.2 High temperature. Measure compliance with the requirement of 3.6.2. Use of the procedures prescribed in 6.3 is recommended. Failure to meet the requirement shall constitute failure of the sample.

4.6.3 Low temperature. Measure compliance with the requirement of 3.6.3. Use of the procedures prescribed in 6.3 is recommended. Failure to meet the requirement shall constitute failure of the sample.

4.6.4 Shock. Measure compliance with the requirement of 3.6.4. Use of the procedures prescribed in 6.3 is recommended. Failure to meet the requirement shall constitute failure of the sample.

4.6.5 Vibration. Measure compliance with the requirement of 3.6.5. Use of the procedures prescribed in 6.3 is recommended. Failure to meet the requirement shall constitute failure of the sample.

4.7 Reliability testing.

4.7.1 First article reliability. The lower test MTBF (θ) shall be demonstrated in accordance with the following subparagraphs.

4.7.1.1 Test level.

Temperature - +50°C, (+5 -0)°C

Temperature cycling - none

Vibration - 2.2 g's, ±10 percent peak acceleration value at any nonresonant frequency between 20 and 60 Hz measured at the mounting points of the equipment. The duration of vibration shall be at least 10 minutes during each hour of equipment

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operating time. The vibration shall be perpendicular to the plane of the printed circuit board.

Equipment ON-OFF cycling - turn on and let temperature stabilize, hold for 3 hours, then turn off and let temperature stabilize. This cycle shall continue throughout the test.

4.7.1.2 Parameters. The discrimination ratio θ_0/θ_1 shall be 3.

4.7.1.3 Failure criteria and test length. The test of Table III shall be performed at least once prior to and once after the tests of 4.7.1.1. Additional testing of Table III may be selected by the contractor. The results of all Table III tests and any physical damage shall be used to determine the success or failure of the reliability test. In the event of a Table III test failure, the time interval between the preceding successful test and the failure shall not contribute to the total cumulative hours. Testing shall continue until the total unit hours together with the total count of relevant equipment failures permit either an accept or reject decision in accordance with Figure 6. Only equipment "on" time shall contribute to the total unit hours. No single equipment's "on" time shall be less than one-half the average operating time of all equipment on test.

4.8 Preconditioning. Each preamplifier, in a non-operating mode, shall be subjected to at least 20 cycles as specified in Figure 2. Preconditioning may be performed before or after conformal coating.

5. PACKAGING

5.1 Packaging. For acquisition purposes, the packaging requirements shall be as specified in the contract or purchase order (see 6.2.e). When actual packaging of material is to be performed by DoD personnel, these personnel need to contact the responsible packaging activity to ascertain requisite packaging requirements. Packaging requirements are maintained by the Inventory Control Point's packaging activity within the Military Department of Defense Agency, or within the Military Department's System Command. 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. The postamplifier is intended for use in infrared systems.

6.2 Acquisition requirements. Acquisition documents should specify the following:

a. Title, number and date of this specification.

b. First article tests are required:

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(1) Time frame for submission of first article test reports are required.

(2) Time frame for approval of first article test reports are required.

(3) First article reliability testing, if required.

c. Sampling plans for Group C.

d. Necessary action by the contractor in the event of a Group C failure (see 4.4.3.1).

e. Packaging requirements.

f. Preconditioning (see 3.8) is required for procurement of all modules to this specification made directly for the Government. Implementation of 3.8 may be waived by systems contractors ordering modules to this specification for use in the manufacture of complete systems if these systems or subassemblies thereof are subjected to equivalent preconditioning.

g. Deliver all first article samples as specified by the procuring activity's contracting officer.

h. Issue of DoDISS to be cited in the solicitation, and if required, the specified issue of individual documents referenced (see 2.2.1 and 2.2.2).

i. Auxiliary control module PL-1402/UA, drawing DLSM-B-773228 may be necessary for the first article inspection.

j. Environmental pollution prevention measures are contained in the packaging material specifications or provided by preparing activity for recommended disposability methods.

6.3 Definitions.

6.3.1 Damage. Breakage, loosening, shifting, evidence of corrosion, failure of any finish, hardware, connection or component; and degradation of postamplifier performance to values less than specified herein.

6.4 Environmental inspection procedures. The test methods and procedures of MIL-STD-810 listed below are recommended, but are not mandatory for determining compliance with the environmental requirements of this specification.

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TABLE VI. Environmental inspections.

Inspection	Requirement paragraph	MIL-STD-810 method	MIL-STD-810 procedure	Remarks
Temperature shock	3.6.1	503	I	Non operating mode. Step 2 use -54°C and steps 1 & 4 use +95°C.
High temperature (see Figure 4)	3.6.2	501	I	Test using set-up of 3.5.3 during the final 30 minutes of step 3. For step 2 use +95°C and steps 4 & 5 use +71°C. The operating tests of 3.5.1 & 3.5.12 shall be performed during this test in item of Table III tests.
Low temperature (see Figure 5)	3.6.3	502	I	Step 2 use -62°C and step 4 use -54°C. The operating tests of 3.5.1 & 3.5.13 shall be performed during this test in lieu of Table III tests.
Shock	3.6.4	516.1	IV, V	Non-operating mode. The tests of Table III shall be performed before and after this test.
Vibration (see Figure 1)	3.6.5	514.1	IV, III	Non-operating mode. The tests of Table III shall performed before and after this test. Use Figure 1 of this specification in lieu of MIL-STD-810 curve Sinusoidal cycling time shall be 120 minutes. Overall time shall be 1/6 of the cycling time at each resonance

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6.5 Subject term (key word) listing.

Monolithic
Integrated circuit
Potentiometer

6.6 Changes from previous issue. Marginal notations are not used in this revision to identify changes with respect to the previous issue due to the extent of the changes.

CUSTODIAN:
Army-CR

PREPARING ACTIVITY:
Army-CR

(Project 5855-0109)

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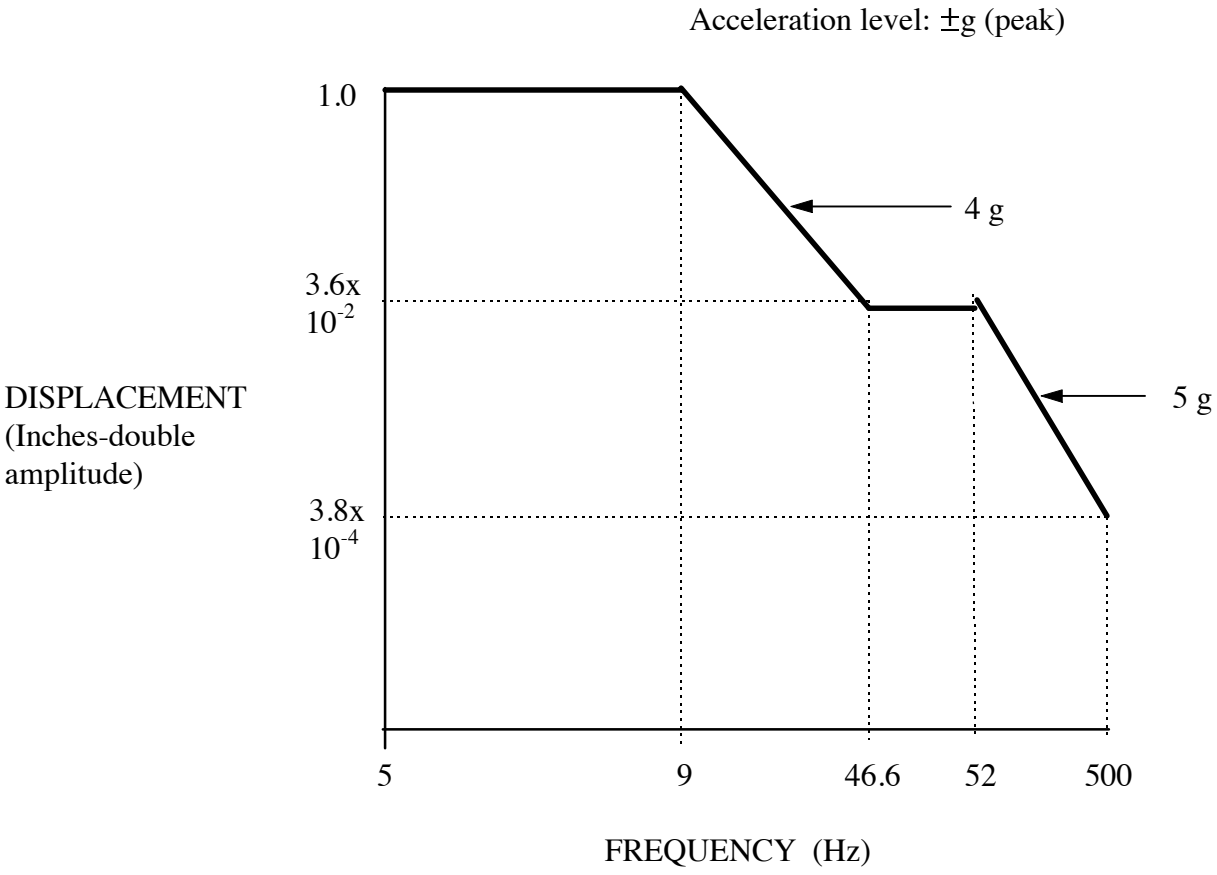

FIGURE 1. Vibration test profile.

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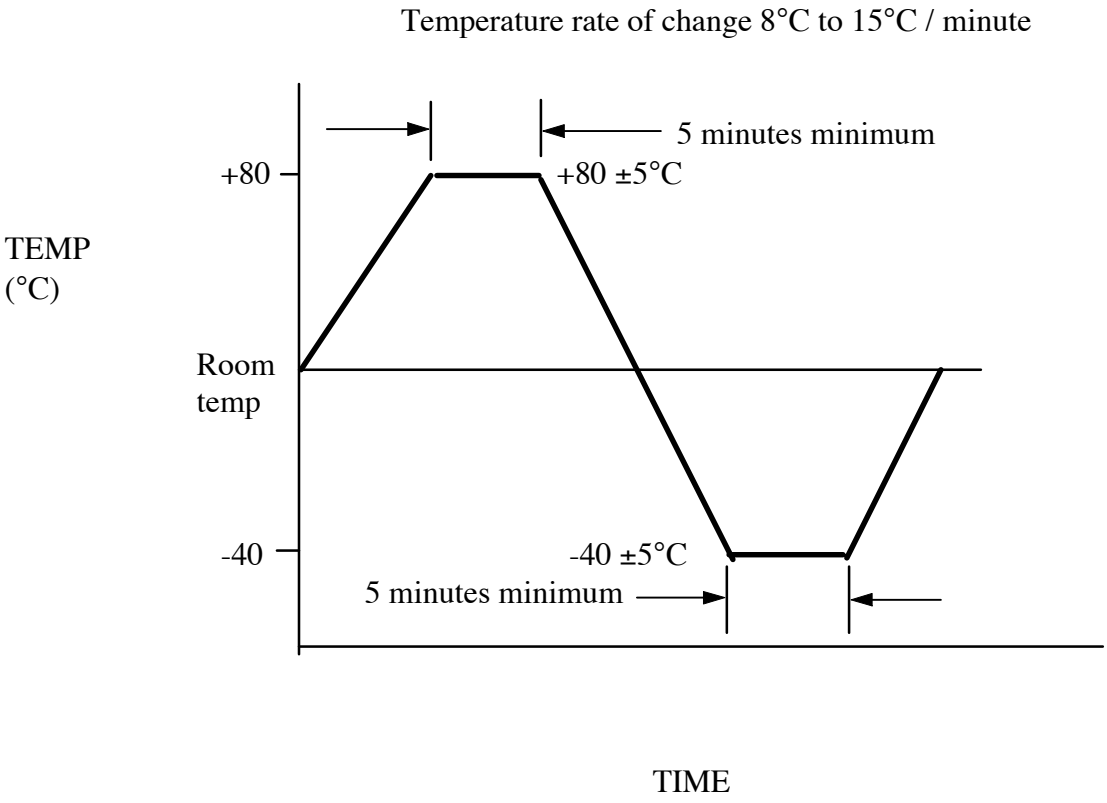

FIGURE 2. One preconditioning cycle.

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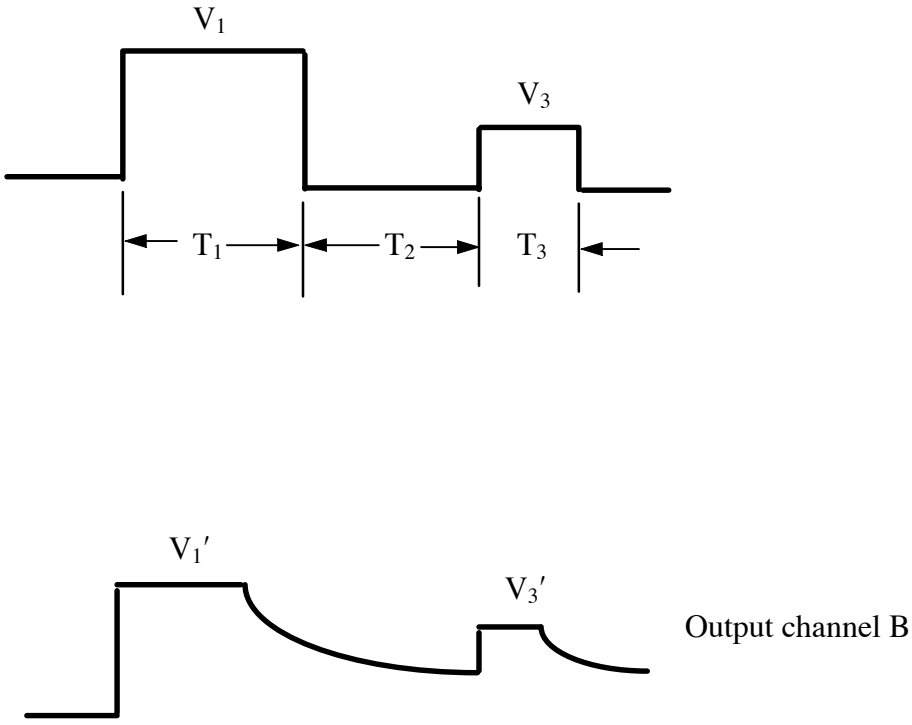

FIGURE 3. Recovery time.

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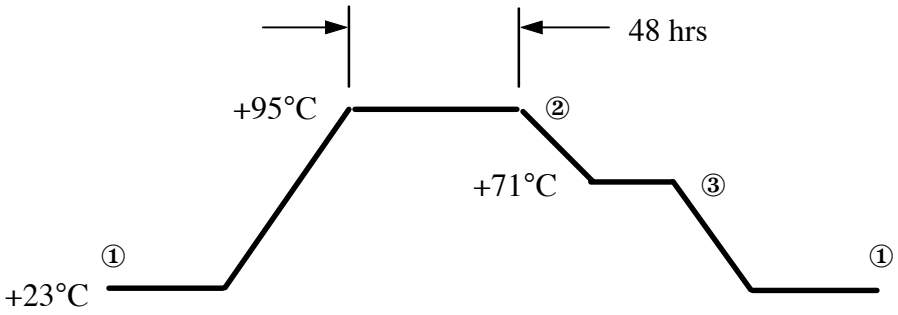

① Voltage gain test (4.5.3) is conducted at these points.

② Test item is operated for 30 minutes at this point.

③ Channel to channel tracking (4.5.1) and voltage gain drift tests (4.5.4) are conducted at this point.

FIGURE 4. High temperature profile.

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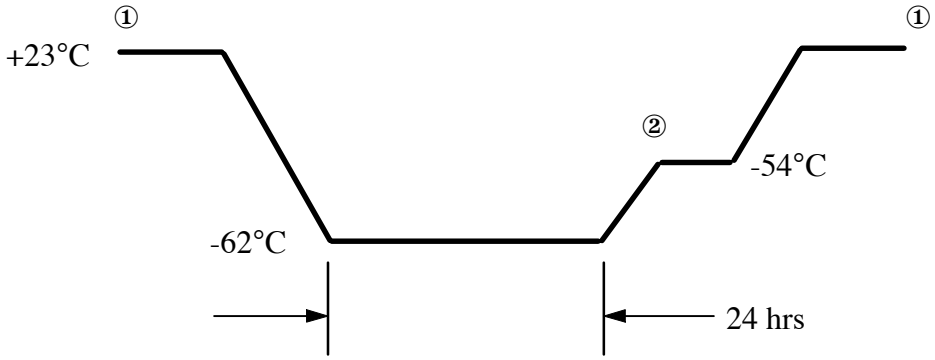

① Voltage gain test (4.5.3) is conducted at these points.

② Channel to channel tracking (4.5.1) and voltage gain drift (4.5.43) tests are conducted at this point

FIGURE 5. Low temperature profile.

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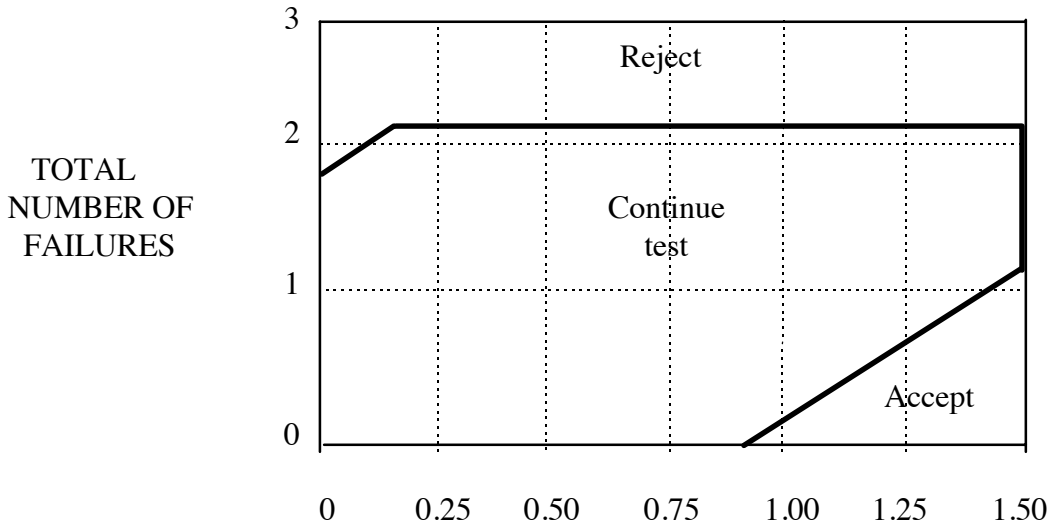

TOTAL TEST TIME*

Number of failures	Reject (equal or less)	Accept (equal or more)
0	nA	0.89
1	nA	1.44
2	0.12	1.50
3	1.50	nA

*Total test time is the total unit hours of equipment "on time" and is expressed in multiples of lower test MTBF, θ_1

FIGURE 6. First article reliability accept - reject criteria.

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STANDARDIZATION DOCUMENT IMPROVEMENT PROPOSAL

INSTRUCTIONS

1. The preparing activity must complete blocks 1, 2, 3, and 8. In block 1, both the document number and revision letter should be given.
2. The submitter of this form must complete blocks 4, 5, 6, and 7.
3. The preparing activity must provide a reply within 30 days from receipt of the form.

NOTE: This form may not be used to request copies of documents, nor to request waivers, or clarification of requirements on current contracts. Comments submitted on this form do not constitute or imply authorization to waive any portion of the referenced document(s) or to amend contractual requirements.

I RECOMMEND A CHANGE:	**1. DOCUMENT NUMBER** MIL-PRF-49164C	**2. DOCUMENT DATE (YYMMDD)** 970519

3. DOCUMENT TITLE VIDEO POSTAMPLIFIER-CONTROL DRIVER, AM-6924/UA

4. NATURE OF CHANGE *(Identify paragraph number and include proposed rewrite, if possible. Attach extra sheets as needed.)*

5. REASON FOR RECOMMENDATION

6. SUBMITTER

a. NAME *(Last, First, Middle Initial)*	b. ORGANIZATION	
c. ADDRESS *(Include Zip Code)*	d. TELEPHONE (Include Area Code) (1) Commercial (2) AUTOVON *(if applicable)*	**7. DATE SUBMITTED** (YYMMDD)

8. PREPARING ACTIVITY

a. NAME ROGER LOUISAIRE	b. TELEPHONE *Include Area Code)* (1) Commercial (732) 532-2735 (2) AUTOVON 992-2735
c. ADDRESS *(Include Zip Code)* US ARMY COMMUNICATIONS-ELECTRONICS COMMAND, ATTN: AMSEL-LC-LEO-E-EP FORT MONMOUTH, NJ 07703-5023	**IF YOU DO NOT RECEIVE A REPLY WITHIN 45 DAYS, CONTACT:** DEFENSE QUALITY AND STANDARDIZATION OFFICE 5203 Leesburg Pike, Suite 1403, Falls Church, VA 22401-3466 Telephone (703) 756-2340 AUTOVON 289-2340