INCH-POUND
MIL-DTL-55119B
26 May 2016
SUPERSEDING
MIL-E-55119A(EL)
18 September 1968

DETAIL SPECIFICATION

ELECTRO-ACOUSTICAL TRANSDUCER EQUIPMENTS

Inactive for new design after September 3, 1998

This specification is approved for use by all Departments and Agencies of the Department of Defense.

1. SCOPE

1.1 Classification. This specification covers the following electro-acoustical transducer equipment's. Only those equipment's specifically listed in the request for proposal and contract should be furnished by the contractor. See 6.1 and 6.3.

Handset H-138( )/GR
Headset, Electrical H-139( )/GR
Headset, Electrical H-140( )/GR
Headset-Chestset, Electrical H-141( )/GR
Headset-Microphone H-161( )/GR
Handset H-207( )/VRC
Headset, Electrical H-227( )/U
Microphone, Dynamic M-80( )/GR
Microphone, Dynamic M-81( )/GR
Modification Kit, Electronic Equipment MK-567/G
Headset-Microphone Kit MK-525( )/G
Headset-Microphone Kit MK-526( )/G

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 cited in other sections of this specification or recommended for additional information or as examples. While every effort has been made to ensure the completeness of this list, document users are cautioned that they must meet all specified requirements of documents cited in sections 3 and 4 of this specification, whether or not they are listed.

Beneficial comments, recommendations, additions, deletions, clarifications, etc., and any data that may improve this document should be sent to: DLA-CC, DLA Land and Maritime, ATTN: VAI, P.O. Box 3990, Columbus, Ohio 43218-3990 or emailed to sound@dscc.dla.mil. Since contact information can change, you may want to verify the currency of this address information using the ASSIST Online database at https://assist.dla.mil.

AMSC N/A

FSC 5965

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 cited in the solicitation or contract.

DEPARTMENT OF DEFENSE SPECIFICATIONS

MIL-DTL-3885	-	Cable Assemblies and Cord Assemblies, Electrical.
MIL-DTL-14072	-	Finishes for Ground Based Electronic Equipment.

DEPARTMENT OF DEFENSE STANDARDS

MIL-STD-202	-	Electronic and Electrical Component Parts
MIL-STD-202-101	-	Method 101, Salt Atmosphere (Corrosion)
MIL-STD-202-201	-	Method 201, Vibration
MIL-STD-252	-	Classification of Visual and Mechanical Defects for Equipment, Electronic, Wired, and Other Devices.
MIL-STD-810	-	Environmental Engineering Considerations and Laboratory Tests
MIL-STD-13231	-	Marking of Electronic Items.

(Copies of these documents are available online at http://quicksearch.dla.mil.

2.2.2 Other Government documents, drawings, and publications. The following other Government documents, drawings, and publications form a part of this document to the extent specified herein. Unless otherwise specified, the issues of these documents are those cited in the solicitation or contract.

DRAWINGS

NAVY

SK-N-864	-	Simulated Gun Blast Producing Equipment.

ELECTRONICS COMMAND

SC-DL-68417	-	Plug Connector U-161( )/U
SC-DL-164943	-	Headset-Microphone Kit MK-525( )/G.
SC-DL-164944	-	Headset-Microphone Kit MK-526( )/G
DL-SM-A-317091	-	Microphone, Dynamic M-80C/U
SC-DL-415575	-	Handset H-207( )/VRC
SC-DL-436100	-	Headset Microphone H-161
SC-DL-436133	-	Bail Out Connector (Lower)
SM-D-436135	-	Chest Switch Assembly
SC-DL-436200	-	Headset Electrical H-140A/U
SM-D-436220	-	Earphone and Cup Assembly
SM-C-436230	-	Headband, Sub-Assembly
SC-DL-436250	-	Microphone Dynamic M-80/U
SM-C-436270	-	Microphone Assembly
SC-DL-436300	-	Modification Kit Electronic Equipment MK-567/G
SM-D-436304	-	Bail Out Connector (Upper)
SC-DL-436331	-	Plug Connector U-182( )/U
SC-DL-448300	-	Handset, Electrical H-138( )/GR

(Users who require copies of this document(s), in connection with an open solicitation or contract award, are first directed to DIBBS and cFolders. If the user has obtained a document, drawing, or publication and has a technical issue/problem, a resolution or new copy may be obtained from the procuring activity

as directed by the contracting officer. Or, an email may be sent to dscc.cddwgs@dla.mil. The Requestor must justify their requirement, by providing all of the following information:

* Contract or Solicitation number.
* Material Number(s) [NSN's]
* Company Name.
* Company Address & CAGE.
* "Attention to" contact information [Originator name/telephone-extension/email]).

(Copies of specifications, standards, drawings and publications required by suppliers in connection with specific procurement functions should be obtained from the procuring activity or as directed by the contracting officer. Both the title and number or symbol should be stipulated when requesting copies).

2.3 Non-Government publications. The following documents from a part of this document to the extent specified herein. Unless otherwise specified, the issues of these documents are those cited in the solicitation or contract.

AMERICAN NATIONAL STANDARDS INSTITUTE (ANSI)

ANSI S3.7	-	Method for Coupler Calibration of Earphones
ANSI S1.15	-	Measurement Microphones – Part 2: Primary Method for Pressure Calibration of Laboratory Standard Microphones by the Reciprocity Technique

(Copies of these documents are available on-line at http:/www.ansi.org

ASTM INTERNATIONAL

ASTM-D3935	-	Standard Classification System and Basis for Specification for Polycarbonate (PC) Unfilled and Reinforced Material

(Copies of these documents are available online at http://www.astm.org

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

3. REQUIREMENTS

3.1 Description.

(a) Headset, Electrical H-139/GR is a single earphone headset with a flexible head band and fold-away earphone, intended for use in low and medium ambient noise areas. The earphone assembly employs a dynamic earphone, impedance matching transformer, attenuation plate and an ear cushion. The earphone through the matching transformer is connected to a retractile cord, which is terminated in connector U-182( )/U and the terminal impedance is 1,000 ohms.

(b) Headset, Electrical H-140( )/GR is a double earphone headset with a flexible headband intended for use in medium and high ambient noise areas. The earphone assemblies are identical to those in the H-139( )/GR, H-141( )/GR and H-161( )/GR. The impedance matching transformers are connected to a retractile cord, which is terminated in connector U-182( )/U and the terminal impedance is 500 ohms.

(c) Headset-Chestset H-141( )/GR is a double earphone headset-chestset with a flexible headband for use in medium and high ambient noise areas. The chestset is a neck-strap suspended, hand-

held switch and noise-cancelling dynamic microphone with a matching transformer and retractile cord, having a bail-out connector. The transformer is enclosed internally in the microphone element. The switch provides positions of “lock-on” INTERCOM, CENTER OFF, and “hold-on” RADIO. The earphone assemblies and chestset terminate in a bail-out connector, which mates with a retractile cord terminated in two connectors U-182( )/U, the terminal impedance of which are 500 and 150 ohms for earphone and microphone respectively.

(d) Headset-Microphone H-161( )/GR is a double earphone headset-microphone-chestset combination with a flexible headband boom microphone and a neck-strap suspended, hand-held chestset. The chestset switch, earphone assemblies and microphone are identical to those in the H-141( )/GR equipment. The earphone and microphone assemblies connect to a molded jack, which is connected to a bail-out connector which in turn is connected to a retractile cord terminated like the H-141( )/GR equipment.

(e) Microphones M-80( )/GR and M-81( )/GR are palm-held, dynamic type units with a push-to-talk switch incorporated in the microphone handle. Microphone M-80( )/GR has a noise canceling feature; Microphone M-81( )/GR does not. The microphones are equipped with a four conductor retractile cord terminated with connector U-182( )/U, and a clip for attaching the microphone to the user’s clothing or a radio set. Both microphones are blast-resistant, water-tight, and shall be constructed in accordance with the drawing DL-SM-A-317091.

(f) Handset H-138( )/GR is a noise-cancelling dynamic headset consisting of five major components; earphone, microphone, push-to-talk switch, retractile cord terminated with connector U-182( )/U and handle made from material in accordance with ASTM-D3935.

(g) Headset-Microphone Kit MK-525( )/G and Headset-Microphone Kit MK-526( )/C. Each kit consists of two earphones, two ear cushions, a microphone, a boom, switching facilities, cords, connectors, and mounting hardware. The earphone elements are waterproof, dynamic and blast proof. The microphone is dynamic, noise canceling waterproof and blastproof. Headset-Microphone Kit MK-525( )/G will be installed in a regular size Helmet, Combat Vehicle Crewman T-56-6 and Headset-Microphone Kit MK-526( )/G will be installed in a larger size Helmet, CVC-T56-6.

(h) Handset H-207( )/VRC is a noise canceling dynamic handset consisting of five (5) major components; earphone, microphone, push-to-talk switch, retractile cord 48” long extended terminated with 5 spade lugs”, and handle made from material in accordance with ASTM-D3935.

(i) Headset, Electrical H-227( )/U is a double earphone headset with a flexible headband. This headset is identical to Headset, Electrical H-140( )/GR except that Plug, connector U-161 replaces Plug connector U-182/U.

3.2 Construction.

(a) Models. A model of the equipment will be available for inspection by prospective bidders and will be loaned to the contractor for the following equipments:

* Headset, Electrical H-139( )/GR
* Headset-Chestset, Electrical, H-141( )/GR
* Headset, Electrical H-227( )/U
* Microphone, Dynamic M-81( )/GR

* Note: Asterisked items shall be constructed in accordance with the models except for the following components, which shall be constructed in accordance with the indicated drawings.

1. Headset, Electrical H-139( )/GR

Drawings SC-DL-436200 covering Headset Electrical H-140( )/U shall apply except that headband using a single earphone shall be in accordance with the model.

2. Headset-Chestset H-141( )/GR

Drawings SM-D-436220 – Earphone and Cup Assembly.
Drawings SM-C-436270 – Microphone Assembly.
Drawings SM-D-436135 – Chest Switch Assembly.
Drawings SM-C-436230 – Headband Assembly.
SM-D-436304 – Bail Out Connector
SM-D-436331 – Plug Connector U
SM-D-436133 – Bail Out Connector (Lower)

All the other parts of the H-141( )/GR shall be in accordance with the model.

3. Headset, Electrical H-227( )/U

Drawings SC-DL-436200 covering Headset, Electrical H-140( )/G shall apply except that Plug Connector U-161( )/U in accordance with SC-DL-68417 shall be used instead of Plug Connector U-182( )/U.

4. Microphone, Dynamic M-81( )/GR

Drawing SC-DL-436250 covering Microphone, Dynamic M-80( )/U shall apply except that the noise canceling feature shall be in accordance with the model. Both microphones shall be blast-resistant, water-tight, and shall be constructed in accordance with the drawing DL-SM-A-317091.

Unless otherwise specified herein or in the invitation for bids, physical construction of the equipment shall conform to the model and the equipment shall incorporate all features of the model. (NOTE: In case of conflict between specified performance characteristics for the equipment and the performance of the model, the specified performance characteristics govern.)

(b) The following equipments shall be constructed in accordance with drawings as listed on the Drawing and Data Lists as follows:

SC-DL-164943	Headset-Microphone Kit MK-525( )/G.
SC-DL-164944	Headset-Microphone Kit MK-526( )/G.
SC-DL-415575	Handset H-207( )/VRC
SC-DL-436100	Headset Microphone H-161
SC-DL-436200	Headset Electrical H-140A/U
SC-DL-436250	Microphone Dynamic M-80/U
SC-DL-436300	Modification Kit, Electronic Equipment MK-567/G.
SC-DL-448300	Handset, Electrical H-138( )/GR

3.3 Materials.

3.3.1 Magnetized materials. – The materials used in the magnetic circuit shall be of such a character and shall be so processed and assembled that the microphone and earphone elements will not suffer objectionable degradation in performance due to loss in magnetization over long periods of storage or service.

3.3.2 Diaphragm and air gap. – The stability of diaphragm material and the concentricity of the air gap shall not be affected by extended aging and exposure to environmental conditions. There shall be no foreign material present in the air gap.

3.3.3 Recycled, recovered, environmentally preferable, or biobased materials. Recycled, recovered, environmentally preferable, or biobased materials should be used to the maximum extent possible, provided that the material meets or exceeds the operational and maintenance requirements, and promotes economically advantageous life cycle costs.

3.3.4 Pure tin (see 6.6). The use of pure tin, as an underplate or final finish, is prohibited both internally and externally. Tin content of loudspeaker components and solder shall not exceed 97 percent, by mass. Tin shall be alloyed with a minimum of 3 percent lead, by mass.

3.4 Finish. Equipment shall be finished in accordance with MIL-DTL-14072.

3.5 Marking. Marking shall conform to MIL-STD-13231.

3.5 Serial numbers. Serial numbers are not required.

3.6 Microphone.

3.6.1 Microphone response. The frequency response of the microphone (with transformer) shall be essentially flat from 300 to 3,500 hertz (Hz). The minimum power output of the microphone shall be –56 dBm at 1,000 Hz, when measured in accordance with 4.7.1. In addition, the response shall fall within the envelope of Figure 1. During this test, the microphone shall be terminated with a non-inductive load of 150 ohms.

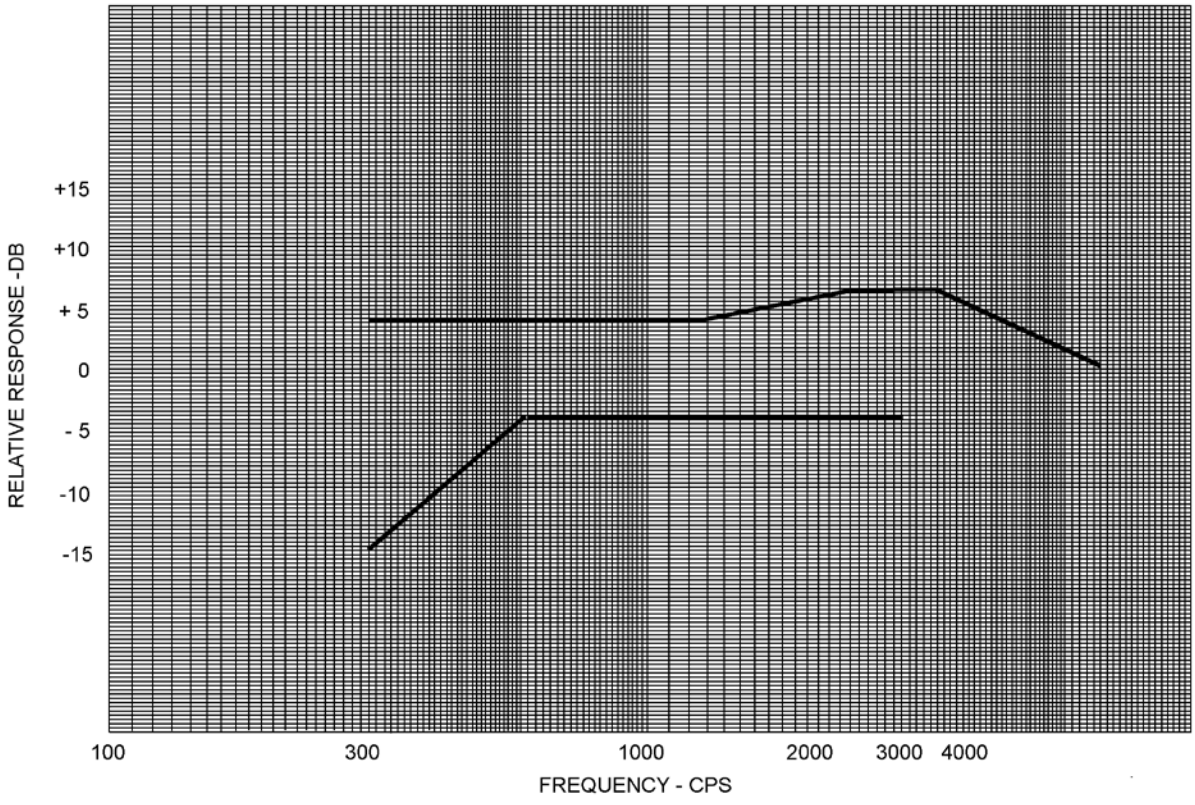


FIGURE 1. Microphone frequency response.

3.6.2 Distortion. Total harmonic distortion shall not exceed 5 percent of a sound pressure level of 125 dB referenced above a reference level of 20 micro-Pascal (µPa) over the frequency range of 300 to 3,500 Hz.

3.6.3 Signal-to-noise ratio. The signal-to-noise ratio of the microphone shall be at least 15 dB (signal over noise), when measured in accordance with 4.7.3.3.

3.6.3.1 Signal to noise ratio (M-80C/U). The signal to noise ratio of the microphone shall be not less than 17 dB (signal over noise), when measured in accordance with 4.7.3.3.

3.6.4 Dielectric strength, and insulation resistance. There shall be no evidence of insulation breakdown when the microphone is subjected to a voltage of 100 volts d.c. for 10 seconds, applied between the terminals of the microphone and the insulated outer metal parts of the microphone. The insulation resistance shall equal or exceed 1 (one) megohm between the indicated points following the application of this voltage. (See 4.7.4).

3.7 Earphone.

3.7.1 Earphone response. The output of the earphone shall be not less than 103 dB above a reference level of 20 micro-Pascal (µPa), when 1 milliwatt rms power at 1,000 Hz is applied to the earphone terminals. The response of the earphone at any frequency shall not deviate from the 1,000 Hz response by more than the values shown in table I.

TABLE I. Earphone response.

Frequency (in Hz)	Deviation from 1,000 Hz (in dB)	
	Min.	Max.
300 – 1,000	-3.5	+1.5
1,000 – 3,500	-5	+5

3.7.2 Distortion. The acoustic output of the earphone shall have no more than 5 percent (%) total harmonic distortions over the audio frequency range of 300 to 3,500 Hz, when measured as specified in 4.8.3.

3.7.3 Overload. The earphone shall show no more than 3 dB change from its original response curve, after being subjected to the test specified in 4.8.4.

3.7.4 Dielectric strength and insulation resistance. The insulation between the earphone terminals and outer exposed metal parts shall withstand 100 volts d.c. for 10 seconds without breakdown. The insulation resistance shall exceed one megohm between the indicated points, following the application of this voltage. (See 4.8.5)

3.7.5 Impedance. The impedance of the earphone at 1,000 Hz shall be 15 ohm ± 20 percent (%), as determined by the test of 4.8.2. For Handset H-138( )/GR, the impedance of the earphone measured at Connector Plug U-182( )/U shall be 1,000 ohms ± 20 percent (%).

3.8 Service conditions. The equipment shall meet the following service conditions, where a test is referenced. Meeting the test shall be considered as compliance with requirements.

3.8.1 Temperature (see 4.13.1).

(a) Operating: Ambient temperature in the range of +150 degrees F to -40 degrees F. (The 150 degrees F temperature includes effect of sun load). Duration of exposure at the high temperature extreme shall not exceed 4 hours, and at the low temperature extreme shall not exceed 72 hours, at any one time.

(b) Nonoperating: For exposure in the range of +160 degrees F to -80 degrees F; duration of exposure at the high temperature extreme shall not exceed 4 hours and at the low temperature extreme shall not exceed 24 hours.

3.8.2 Humidity resistance (see 4.13.2). Exposure up to 97 percent (%) relative humidity for 20 hours and exposure at 100 percent (%) relative humidity with condensation for 4 hours shall apply.

3.8.3 Altitude (see 4.13.3). –

(a) Operating: Up to 15,000 feet above sea level shall apply.

(b) Non-operating: Up to 50,000 feet above sea level shall apply.

3.8.4 Immersion (see 4.13.4). Three feet of water for 2 hours shall apply.

3.8.5 Salt spray (see 4.13.5). Twenty percent salt solution at 96 degrees F for 48 hours shall apply.

3.8.6 Blast (see 4.13.6). – Thirty (30) rounds of blast at a peak pressure of 9.5 pounds per square inch with no more than 3 dB degradation in performance shall apply.

3.8.7 Vibration (see 4.13.7). The amplitude of vibration of any part, sub-assembly, or structural member of the equipment shall not exceed twice the amplitude of the vibration applied to the equipment at any frequency between 10 and 55 Hz.

3.8.8 Bounce (see 4.13.8). The equipment shall meet specified performance, with no physical damage allowed, after subjection to the test of 4.13.8.

3.8.9 Shock drop (see 4.13.9). The equipment shall be operable after the test of 4.13.9. Any physical damage shall be minor only.

3.8.9.1 Shock drop (M-80C/U). The equipment shall be dropped at -40 degrees F and shall be operable after the test of 4.13.9. Any physical damage shall be minor.

3.9 Switch.

3.9.1 Push-to-talk switch (H-138( )/GR, M-80( )/GR, M-81( )/GR. The switch shall be a push-to-talk switch, which shall be capable of 500,000 operations, at a rate not to exceed 1 cycle per second, with a current of ½ ampere (24 volt supply) flowing through the control circuit in series with a resistive load. The switch contacts shall “make” in sequence (microphone circuit first, then control circuit). The control circuit contacts shall “break” before the microphone circuits. (See 4.12.1)

3.9.2 Toggle switch H-139( )/GR, H-140( )/GR, H-141( )/GR, H-161( )/GR. The switch shall be a toggle switch capable of 100,000 complete cycles of operation, when tested as specified in 4.12.2.

3.9.3 Level switch (MK-525( )/G and MK-526( )/G. The switch shall be capable of 100,000 complete cycles of operation, when tested as specified in 4.12.3.

3.10 Cord assemblies. Cord assemblies shall be in accordance with MIL-DTL-3885.

3.10.1 Insulation resistance (see 4.14). During the test, there shall be no evidence of insulation breakdown. At the conclusion of the test, the insulation resistance shall not have decreased to a value below 1 (one) megohms.

3.11 Operational requirement. Headsets shall be tested as indicated in paragraph 4.9.

3.12 Interchangeability. Like units, assemblies, subassemblies, and replaceable parts shall be physically and functionally interchangeable, without modification of such items or of the equipment. (See 4.11). Individual items shall not be hand-picked for fit or performance. Reliance shall not be placed on any unspecified dimension, rating, characteristic, etc.

3.13 Preconditioning. The equipment shall be capable of meeting the requirements herein, without subsequent processing, after subjection to the bounce preconditioning of 4.6 (Also see 4.5).

3.14 First article samples (see 4.3). Unless otherwise specified in the bid request and contract, the contractor shall furnish 12 each first article samples of each type of electro-acoustical transducer on order.

3.15 Workmanship (see 4.10). The equipments shall be manufactured and assembled in accordance with the applicable portions of the following paragraphs:

(a) In This specification

3.3.1 Magnetized materials
3.3.2 Diaphragm and air gap

4. VERIFICATION

4.1 Classification of inspection. Inspection shall be classified as follows:

(a) First article inspection (see 4.3) .

(b) Inspection covered by subsidiary documents (see 4.4).

(c) Conformance inspection (see 4.5).

4.2 Inspection conditions. Unless otherwise specified, equipments shall be tested under the following conditions:

Temperature - Room ambient, +15 degrees C (+59 degrees F) to +35 degrees C (+95 degrees F).
Pressure - Normal atmospheric.
Humidity - Room ambient up to 90 percent relative humidity.

4.3 First article inspection (see 3.14). This inspection will be performed by the Government unless otherwise specified in the contract. It shall consist of the first article inspection specified in table II, the inspection specified in the subsidiary documents covering the items listed in 4.4, and the inspection specified for Group A, and Group B, and Group C (see table III, and table IV, and table V, respectively). The first article inspection will normally be performed in this order: (1) vibration, (2) bounce, (3) shock, drop, and (4) immersion; other first article inspections may precede, follow, or be interspersed among the foregoing.

TABLE II. First article inspection

Inspection	Req. Para.	Insp. Para.
Temperature	3.8.1	4.13.1
Moisture resistance	3.8.2	4.13.2
Altitude	3.8.3	4.13.3
Immersion	3.8.4	4.13.4
Salt spray	3.8.5	4.13.5
Blast	3.8.6	4.13.6
Vibration	3.8.7	4.13.7
Bounce	3.8.8	4.13.8
Shock; drop	3.8.9	4.13.9

4.4 Inspection covered by subsidiary documents. The following shall be inspected under the applicable subsidiary documents as part of the inspection of equipment before preparation for delivery:

Item	Where required
Finish	3.4
Marking	3.5
Cord assemblies	3.10

4.5 Conformance inspection of equipment. The contractor shall perform the inspection specified in 4.4 and 4.5.1 through 4.5.4. This does not relieve the contractor of his responsibility for performing any additional inspection, which is necessary to control the quality of the product and to assure compliance with all specification requirements. The Government will review and evaluate the contractor's inspection procedures and examine the contractor's inspection records. In addition, the Government—at its discretion—may perform all or any part of the specified inspection, to verify the contractor's compliance with specified requirements. (See 6.5). Test equipment for Government verification inspection shall be made available, by the contractor. Each unit which will be subjected to group A, group B, or group C inspection, except first article samples, shall be preconditioned after final assembly. (See 3.13)

4.5.1 Group A inspection. – The Group A inspection shall consist of the inspections specified in table III, in the order shown.

TABLE III. Group A inspection.

Inspection	Req. Para.	Insp. Para.
Visual and mechanical	3.15	4.10
Microphone		
Response	3.6.1	4.7.1
Dielectric strength and insulation resistance	3.6.4	4.7.4
Earphone		
Response	3.7.1	4.8.1
Impedance	3.7.5	4.8.2
Dielectric strength and insulation resistance	3.7.4	4.8.5
Operational	3.11	4.9

Note: Operational inspection shall be performed prior to packaging.

4.5.1.1 Sampling tests. Unless otherwise specified, one (1) equipment shall be selected at random from each number of 100 or fraction thereof on the order. The selected equipment and its component parts shall be subjected to all the sampling tests listed in table III, and to any other tests deemed necessary by mutual agreement of the procuring activity and the contractor to determine conformance to the requirements of this specification.

4.5.1.2 Rejection and retest. When one or more items fail to meet the specification, acceptance of all items will be withheld until the extent and cause of failure are determined. After corrections have been made, all necessary tests shall be repeated. Such lots shall be separate from new lots and shall be clearly identified as re-inspected lots.

4.5.2 Group B inspection. – Group B inspection shall consist of the inspections specified in table IV and shall be made on sample units which have been subjected to and have passed the group A inspection.

TABLE IV. Group B inspection.

Inspection	Req. Para.	Insp. Para.
Signal-to-noise ratio	3.6.3	4.7.3.3
Distortion		
Microphone	3.6.2	4.7.2
Earphone	3.7.2	4.8.3
Dimensional interchangeability	3.12	4.11
Overload	3.7.3	4.8.4

4.5.2.1 Sampling tests. Unless otherwise specified, one (1) equipment shall be selected at random from each number of 100 or fraction thereof on the order. The selected equipment and its component parts shall be subjected to all the sampling tests listed in table IV, and to any other tests deemed necessary by mutual agreement of the procuring activity and the contractor to determine conformance to the requirements of this specification.

4.5.2.2 Rejection and retest. When one or more items fail to meet the specification, acceptance of all items will be withheld until the extent and cause of failure are determined. After corrections have been made, all necessary tests shall be repeated. Such lots shall be separate from new lots and shall be clearly identified as re-inspected lots.

4.5.3 Group C inspection and Table V. This inspection comprises the tests listed in table V and shall be performed on sample units, which have passed both Group A and Group B inspections. Sampling comprises 2 (two) phases, as follows:

TABLE V. Group C inspection.

Inspection	Req. Para.	Insp. Para.
C-1		
Salt Spray	3.8.5	4.13.5
C-2		
Blast	3.8.6	4.13.6
C-3		
Temperature	3.8.1	4.13.1
Immersion	3.8.4	4.13.4
C-4		
Moisture Resistance	3.8.2	4.13.2
C-5		
Vibration	3.8.7	4.13.7
Bounce	3.8.8	4.13.8
Altitude	3.8.3	4.13.3
C-6		
Drop	3.8.9	4.13.9
C-7		
Life (switch)	3.9	4.12

4.5.3.1 Initial sampling. Twelve (12) samples of the type units and 2 (two) samples of the switch assembly shall be selected at random from the first 1,000 units produced on the order, or contract. These samples of the type units shall be subdivided into pairs and designated as C-1 through C-6. These pairs shall be subjected to Group C inspection, as shown in table V. The 2 (two) samples of the switch assembly, designated as C-7, shall be subjected to the switch Life test listed in table V.

4.5.3.2 Noncompliance. If a sample unit fails group C inspection, the contractor shall immediately investigate the cause of failure and shall report to the Government inspector the result thereof and details of the corrective action taken on the process and all units of product which were manufactured with the same conditions, materials, processes, etc. If the Government inspector does not consider that the corrective action will enable the product to meet specified requirements, or if the contractor cannot determine the cause of failure, the matter shall be referred to the contracting officer. (See 6.4).

4.5.3.3 Production sampling. Subsequent to the initial sampling, 8 (eight) samples of the type unit and 2 (two) samples of the switch assembly shall be selected, at random, from each 1,000 units produced on the order or contract. These samples comprise production conformance Group C inspection lots. The 8 (eight) samples of the type unit shall be subdivided into pairs (as before) and designated as C-3 through C-6. These pairs shall be subjected to Group C inspection (as before), as shown in table V. The 2 (two) samples of the switch assembly, designated as C-7 (as before) shall be subjected to the switch Life test listed in table V.

4.5.3.4 Orders for less than 1,000 Units. Eight (8) samples of the type unit and 2 (two) samples of the switch assembly shall be selected at random from every 999 units, or fraction thereof, produced in the order or contract. The 8 (eight) sample units shall be subdivided into pairs and subjected to Group C testing, C-3, C-4, C-5, and C-6, as shown in table V. The 2 (two) samples of the switch assembly, designated as C-7, shall be subjected to the Life test listed in table V. The samples selected shall be from the start of the contract, from the first conformance inspection production lot.

4.5.4 Reinspection of conforming group B and group C sample units. Unless otherwise specified, sample units which have been subjected to and passed group B or group C inspection, or both, may be accepted on contract, provided that they are re-subjected to and pass group A inspection after repair of all visible damage.

4.6 Bounce preconditioning (see 3.8.8). The unit shall be placed in its normal operation position on the table of the Package Tester, Type 1000-SC, as made by the L. A. B. Equipment, Inc. (CAGE 1MNL5), Phone (630) 595-4288, Itasca, IL. 60143, or equal. The package tester, shafts in phase, shall have a speed such that it is just possible to insert a 1/32 inch-thick strip of material under one corner or edge of the unit to a distance of 3 inches as the unit bounces. The unit shall be subjected to this preconditioning for 1 minute. After bounce preconditioning, the unit shall not be repaired, aligned, cleaned, or otherwise changed prior to subjection to conformance inspection.

4.7 Microphone tests.

4.7.1 Response test. The response of the microphone shall be measured by means of a suitable a-c electronic voltmeter, having an input impedance of at least ½ megohm. The response of the microphone shall be determined using a constant sound pressure level (SPL) input of 2.8 Pascals (Pa) at 1 kHz. The driver unit used to obtain the desired sound pressure input, (Western Electric Co., Type No. 555W, or equal) shall have been previously calibrated by means of a condenser microphone such as Western Electric Co. 640AA, or equal, (calibrated by “reciprocity method” in accordance with ANSI S1.15). The sample dynamic microphone shall be positioned with its face ¼ inch directly in front of the driver unit with the diaphragm of the microphone parallel to the driver unit. The voltage – frequency response of the microphone (with transformer) shall be measured across a non-inductive load resistance of 150 ohms. The response of the microphone shall be tested in the frequency range of 300 to 3,500 Hz at approximately the following increments: 100 Hz increments from 300 to 1,000 Hz and 250 Hz increments from 1,000 to 3,500 Hz. The microphone shall meet the requirements of 3.6.1.

4.7.2 Distortion. Harmonic distortion shall be determined using the same equipment and circuitry as used in 4.7.1 except that the constant sound pressure shall be 125 dB above a reference level of 20 micro-Pascal (µPa) and the output of the microphone terminated in 150 ohms shall be connected to a Hewlett Packard Distortion Analyzer Model 330C, or equal, for distortion measurements. The distortion shall not be greater than 5 percent (%). Measurements will be made from 300 Hz to 1,000 Hz inclusive at each 100 Hz increment and from 1,000 to 3,500 Hz inclusive at each 500 Hz increment.

4.7.3 Signal-to-noise ratio.

4.7.3.1 Noise spectrum. – By means of apparatus detailed in Figure 2, and the test circuit of Figure 3, provision shall be made for the production of the noise spectrum, table VI, at an rms sound pressure of 115 dB a above a reference level of 20 micro-Pascal (µPa), as measured at the microphone diaphragm. The “Noise” source shall incorporate a loudspeaker capable of producing a sound pressure of 115 dB above a reference level of 20 micro-Pascal (µPa) at the rear, as well as, at the front of the microphone. The loudspeaker shall be located as far away from the microphone as practicable. The calibrating condenser microphone shall be mounted in the test rig, in the box, ¼ inch from the mouth of the signal speaker, which shall be short-circuited during adjustments of the noise spectrum.

TABLE VI. Noise spectrum.

Frequency in Hz	Sound pressure in dB relative to sound pressure at 130 Hz
40	0
70	0
130	0
300	-5
600	-9
1000	-13
2000	-17
3000	-19
4000	-21

4.7.3.2 Signal spectrum. By means of the apparatus as set up previously, provision shall also be made for the production of the following signal spectrum, table VII at an rms sound pressure of 115 dB above a reference level of 20 micro-Pascal (µPa). The “signal” source shall be the driver unit. The standard microphone shall be fitted with a baffle having the same size, shape, and acoustical impedance as the microphone to be evaluated. The depth of the baffle shall be such as to position the diaphragm of the standard microphone in exactly the same position as that occupied by the diaphragm of the microphone undergoing evaluation. The calibrating condenser (standard) microphone shall be positioned so that the external front surface of the baffle is ¼ inch directly in front of the driver unit.

TABLE VII. Signal spectrum.

Frequency in Hz	Sound pressure in dB relative to sound pressure at 130 Hz
130	0
300	+7
600	+8
1000	+5
2000	-3
3000	-7
4000	-9

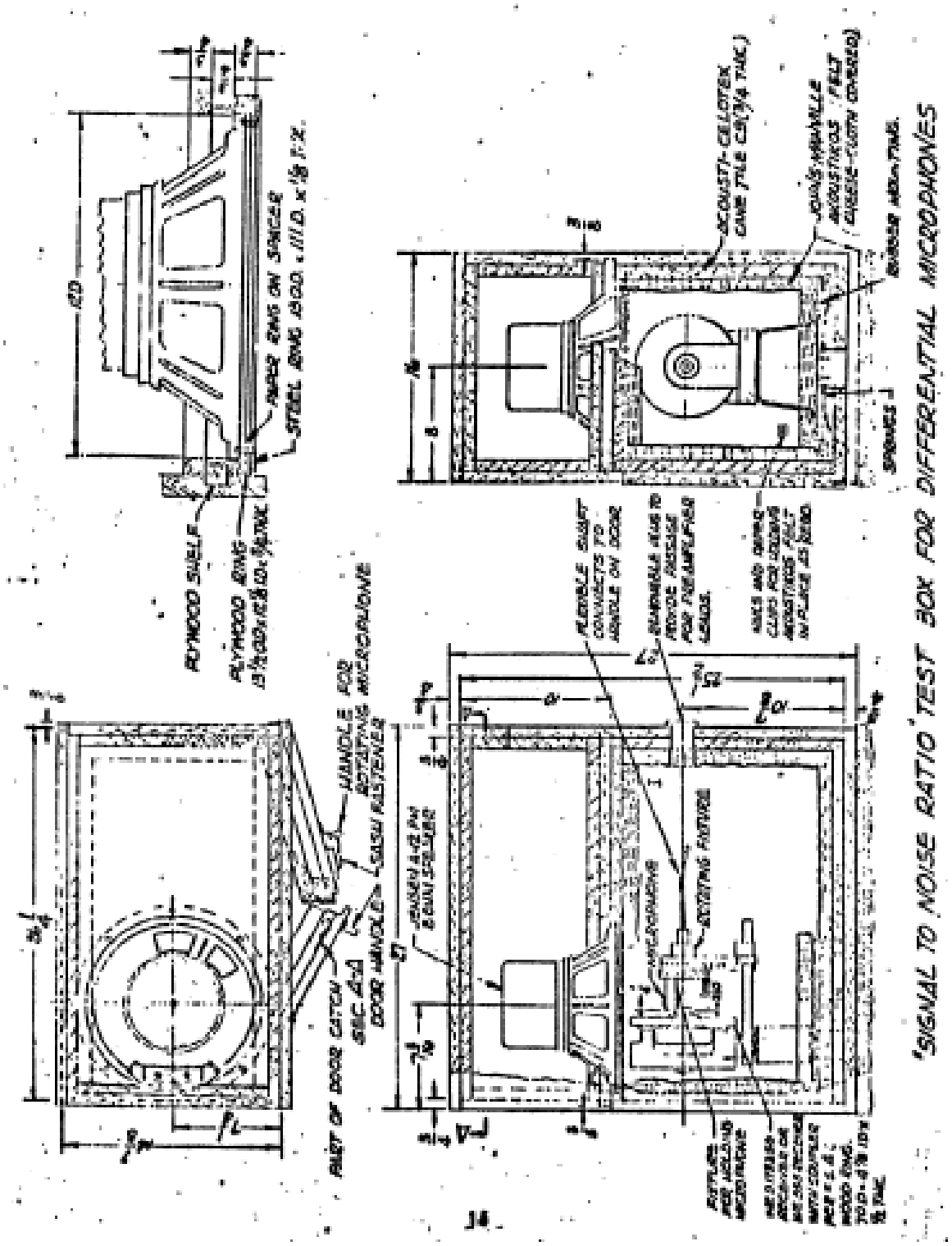


FIGURE 2. Signal-to-noise ratio test box for differential microphones.

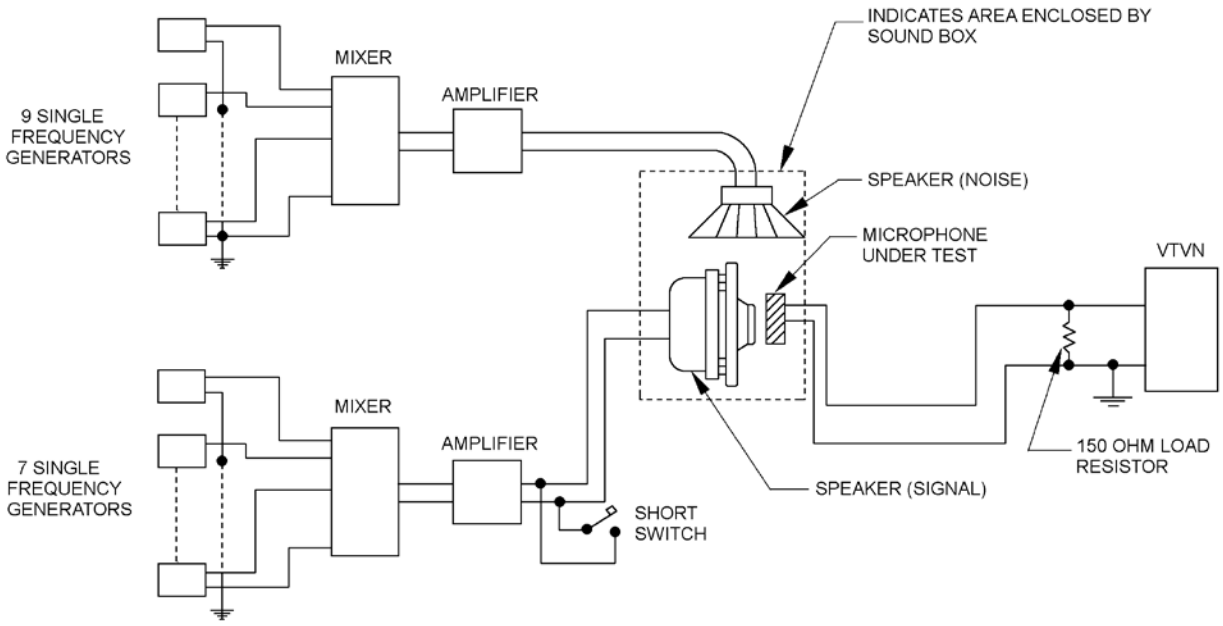


FIGURE 3. Microphone signal-to-noise ratio test circuit.

4.7.3.3 Measurement of the signal-to-noise ratio. The microphone shall be mounted in its test rig with its front grid ¼-inch from the mouth of the "signal" speaker. The microphone shall be connected to the test circuit shown in figure 3. The noise spectrum shall be applied for 3 seconds, and the output of the microphone shall be measured. The noise spectrum shall be removed, and the signal spectrum shall be applied for 3 seconds. The output of the microphone shall be measured. The dB difference between the "signal" value and the "noise" value is the signal-to-noise ratio, and shall be in accordance with 3.6.3.

4.7.4 Dielectric strength and insulation resistance test. The microphone shall be tested for compliance with 3.6.4.

4.8 Earphone tests.

4.8.1 Earphone response test. Available-power frequency response measurements shall be made starting at 300 Hz and extending through 3,500 Hz, in sufficient detail to establish definitely the shape of the curve. Response measurements shall be made in accordance with ANSI S3.7. The contractor shall supply a 6 cc coupler. The outside dimensions of the coupler shall be such as to provide the proper seating and sealing of the earphone.

4.8.1.1 Testing procedure. The earphone under test shall be connected to the test circuit and shall be mounted on the 6 cc coupler as shown in figure 4. The output from the oscillator at each test frequency shall be adjusted to 0.245 volts rms as measured by VM #1. The output from the calibrated microphone and pre-amplifier unit shall be measured as indicated by the reading of VM #2. This reading shall be converted to the equivalent dB value above a reference level of 20 micro-Pascal (µPa) using the most recent available calibration curve for the test microphone in use. The operations set forth above shall be performed from 300 Hz to 1,000 Hz inclusive, with measurements of each increment of 100 Hz, and from 1,000 Hz to 3,500 Hz inclusive, with measurements at each increment of 250 Hz. The response of the earphone shall meet the requirements specified in 3.7.1.

4.8.1.2 Test equipment. The test equipment used for the response test shall meet the following requirements:

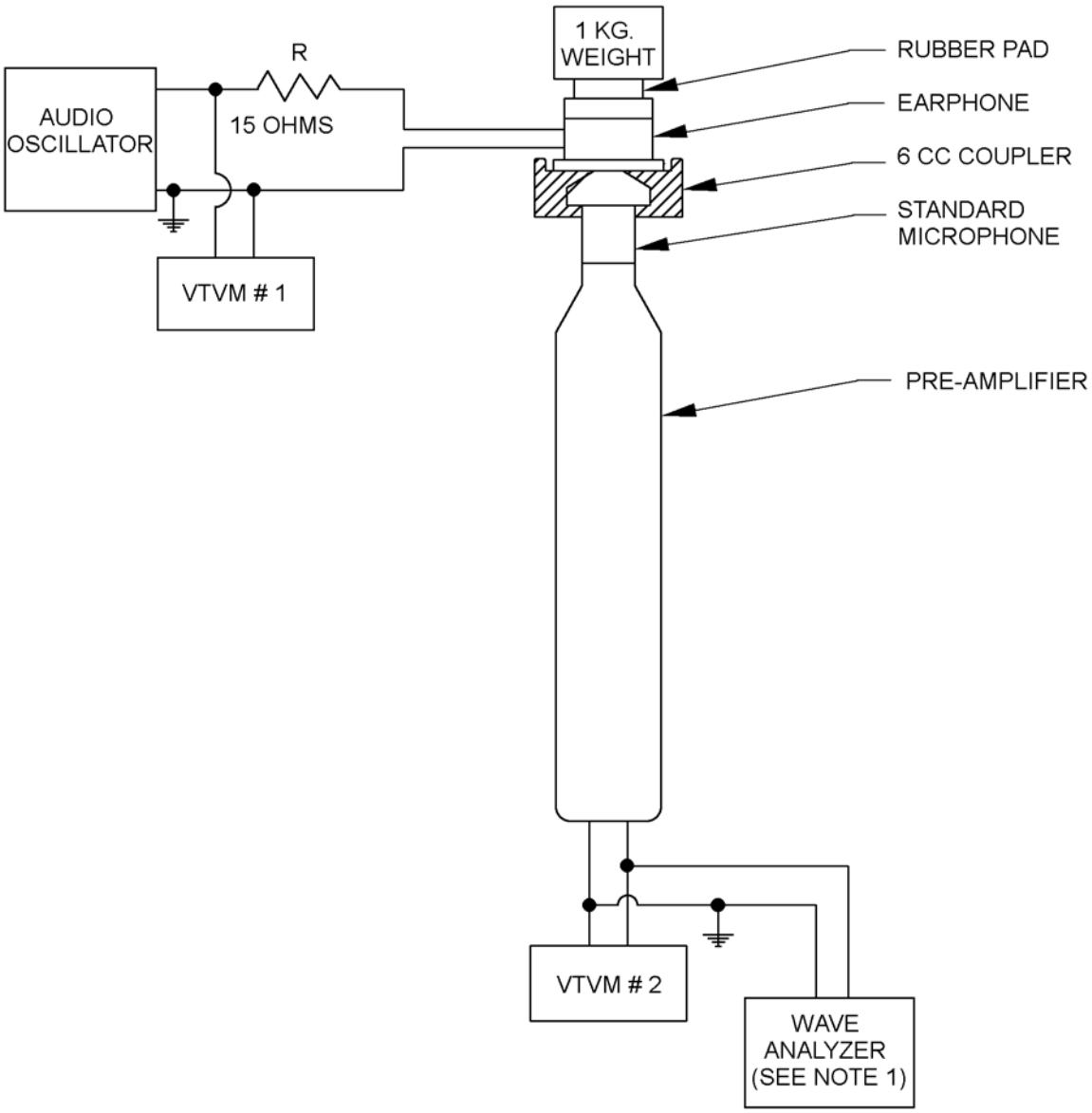
(a) Calibrating microphone. A Western Electric Co. 640AA condenser microphone, or equal shall be used for measuring sound pressure. It shall be calibrated by the reciprocity method in accordance with ANSI S1.15.

(b) Audio oscillator. The audio oscillator shall have a frequency range of at least 100 to 10,000 Hz, shall have a high degree of stability in both output voltage and frequency, and shall have a waveform distortion of less than 2 percent.

(c) Voltmeter. The voltmeters used must have flat frequency response (± 1 dB) from at least 100 to 10,000 Hz and must be capable of measuring voltage from 0.001 volt rms to 10 volts or more.

(d) Microphone preamplifier. The microphone pre-amplifier shall have a flat response (± 1 dB) over a frequency range of at least 100 to 10,000 Hz, shall have a high degree of stability, and shall have distortion of less than 2 percent.

4.8.2 Impedance. The impedance of the earphone shall be measured with 0.122 volt at 1,000 Hz applied to the earphone terminals. The impedance shall be determined either by measuring the voltage across and the current through the earphone or with an impedance bridge. The impedance of the earphone when mounted on the coupler shall meet the requirements of 3.7.5. In addition, the impedance of the earphone of Handset H-138( )/GR shall be measured at Connector Plug U-182( )/U with 1.0 volt at 1,000 Hz being applied.



NOTE 1: Wave analyzer required for distortion test only.

FIGURE 4. Earphone frequency response test circuit.

4.8.3 Distortion test. The earphone shall be mounted on the 6 cc coupler, and shall be connected to the test circuit described in 4.8.1.1. The output of the oscillator shall be adjusted to 2.12 volts rms at 300 Hz across the series combination of the 15 ohm resistor and the earphone. The rms harmonic distortion shall be measured with a Hewlett-Packard Model 330-C Total Noise Distortion Meter, or equal connected across the output of the microphone referenced in 4.8.1. The distortion measurements shall be repeated at 400 Hz and at sufficient points between 400 and 3,500 Hz to determine the frequency where maximum distortion exists. Total harmonic distortion shall meet the maximum requirements of 3.7.2.

4.8.4 Overload. After operation of the earphone for 8 hours with 500 milliwatts input power (2.74 volts) at 1000 Hz, the response shall be tested in accordance with 4.8.1, to establish compliance with the requirements of 3.7.3.

4.8.5 Dielectric strength and insulation resistance test. The earphone shall be tested for compliance with 3.7.4.

4.9 Operational test. Prior to packaging, completely assembled headsets shall be tested by a talk test to insure correct wiring and satisfactory operation.

4.10 Visual and mechanical inspection (see 3.15). The equipment shall be examined for the defects listed in MIL-STD-252.

4.11 Inspection for dimensional interchangeability. Each replaceable part listed below in the selected Transducer Equipments shall be interchanged with the corresponding part in the approved preproduction sample in sequential order. At the completion of this inspection, the interchanged parts shall be reassembled in their original transducer equipments. Non-interchangeability of these parts constitutes failure.

Switches	Microphone mounting clip
Boots	Mounting screws
Retainer plates	Ear cushions
Cable relief spring, retaining bushing, and cord	Boom
	Headband

4.12 Life test switch.

4.12.1 Push-to-talk switch (H-138( )/GR, M-80( )/GR, M-81( )/GR. The switch shall be tested by operating it for 500,000 “make” and “break” cycles, with positive detent action, at a rate not to exceed 1 cycle per second at a rated load of ½ (one-half) ampere and 24 volts flowing through the control circuit in series with a resistive load. (See 3.9.1)

4.12.2 Toggle switch (H-139( )/GR, H-149( )/GR, H-141( )/GR, H-161( )/GR). The switch shall be tested to determine compliance with 3.9.2. A series circuit shall be set up including a 24 volt dc supply, a resistive load, and the switch. During the test, 250 milliamperes shall flow in the control circuit, and no current shall flow in the microphone circuit of the switch. One cycle of switch operation test shall consist of the following, in sequence:

(a) Switch in mid-position.
(b) Switch in forward position.
(c) Switch in mid-position.
(d) Switch in back position.
(e) Switch in mid-position.

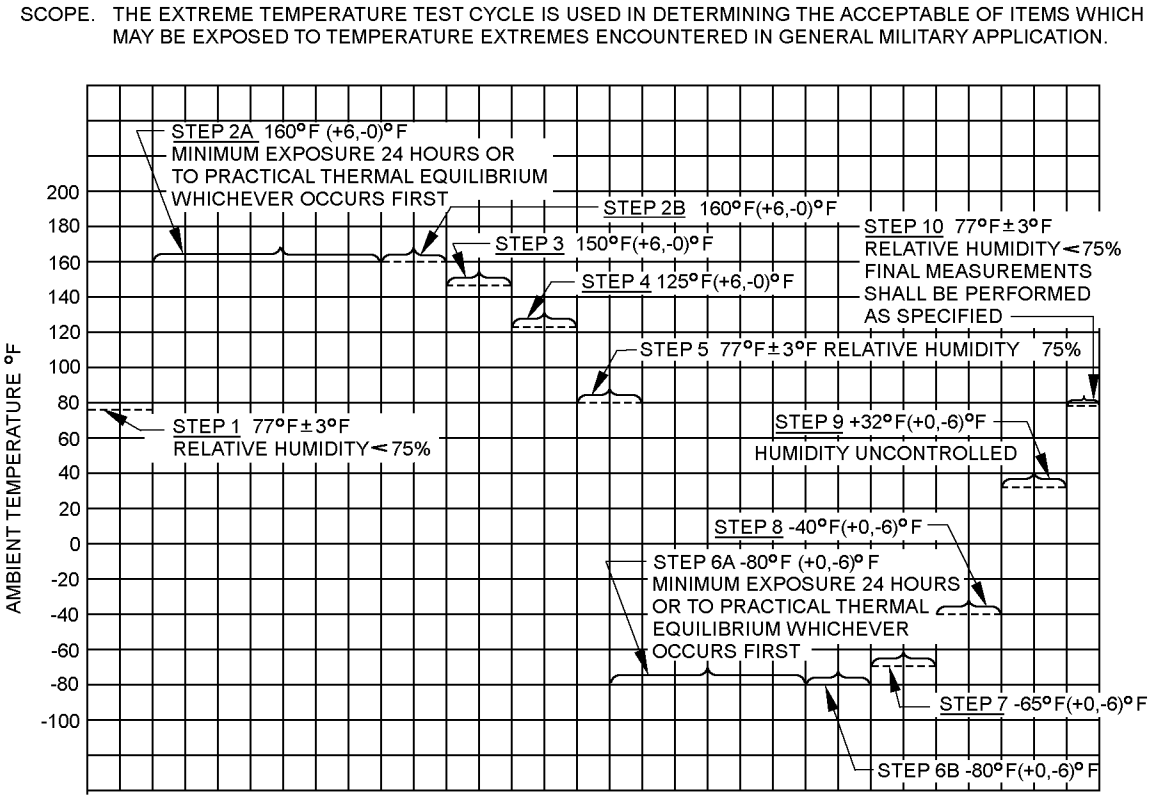
Each cycle of switch operation shall take approximately 2 seconds. The switch shall be tested for 100,000 cycles operation.

4.12.3 Level switch (MK-525( )/G and MK-526( )/G. The switch shall be tested to determine compliance with 3.9.3. A series circuit shall be set up including a 24 volt dc supply, a resistive load, and the switch. During the test, 1 (one) ampere shall flow in the control circuit, and 60 milliamperes shall flow in the microphone circuit of the switch. One cycle of switch operation test shall consist of the following, in sequence:

(a) Switch in mid-position.
(b) Switch in forward position.
(c) Switch in mid-position.
(d) Switch in back position.
(e) Switch in mid-position.

4.13 Service conditions tests.

4.13.1 Extreme Temperature test (see 3.8.1). The equipment shall be subjected to the temperature cycle shown on figure 5. The test of 4.9 shall be performed at step 3 and step 8. At step 10, the equipment shall meet the requirements of 3.6.1 and 3.7.1 with degradation not to exceed 3 dB.



NOTES:
1. Rate of temperature change: As rapidly as possible.
2. When measurements are taken on any step, practical thermal equilibrium shall first be attained. Practical thermal equilibrium is attained, when the temperature of any selected surface of the equipment changes less than 1° F during a ½ (one half) hour period while the ambient temperature is steady.

FIGURE 5. Extreme temperature cycle.

3. Steps 2A, 6A, and 10 are always required. Other steps are used only when measurements at those temperatures are specified.
4. Humidity is uncontrolled, except on steps 1, 5, and 10.
5. Equipment shall meet full specification requirements on step 10.
6. Measurements, when called for on steps 4, 5, and 8, or 9, shall conform to full specification requirements.
7. Equipment performance on steps 2B, 3, 6B, and 7, when called for, shall be as specified for those steps. Steps 2B and 6B may be exercised when additional minimum exposure time is required, provided this increase this increase is indicated in the equipment specification. Normally, steps 2A and 6A with minimum exposure time of 24 hours is sufficient.

FIGURE 5. Extreme temperature cycle – Continued.

4.13.2 Humidity resistance test .

4.13.2.1 Test conditions.

(a) Do not remove equipment from the humidity chamber for measurements.

(b) Start measurements not more than 5 minutes after power is applied to the equipment. Complete measurements as rapidly as possible. Do not leave power on after measurements have been completed.

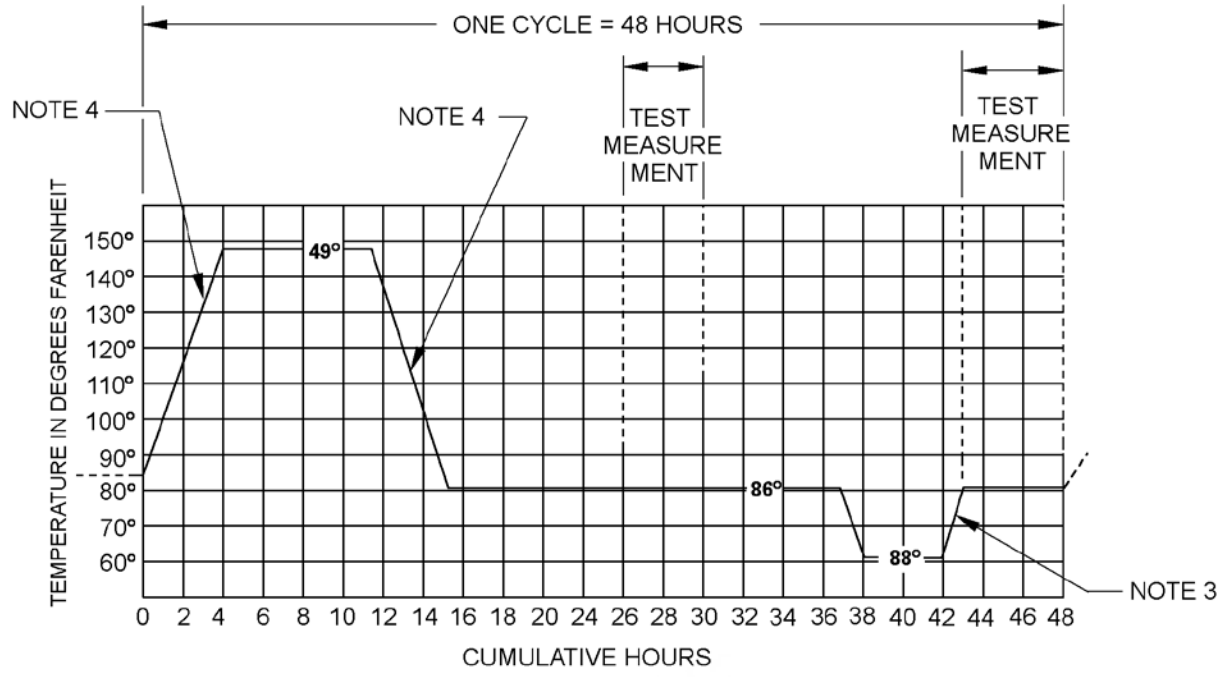
4.13.2.2 Test procedure. The equipment shall be tested as follows:

(a) Dry at 130 degrees ± 5 degrees F for 24 hours.

(b) Condition at 77 degrees ± 5 degrees F and 40 to 50 percent relative humidity for 24 hours.

(c) Perform the test of 4.9.

(d) Subject to continuous cycling for 5 (five) 48-hour cycles. Temperature, relative humidity, and period of time for each portion of the cycle shall conform to Method 507 of MIL-STD-810 and figure 6. Perform the test of 4.9 at the times specified on figure 6.



NOTES:
1. The actual temperature during the cycle shall be within 5° F of the temperature shown on the chart.
2. Relative humidity shall be maintained between 90 and 98% at all times during the cycle.
3. The measured increase in temperature from 68 ± 5° F shall not be less than 18° F.
4. Rate of temperature change between 86 and 149° F shall not be less than 15° F per hour.

FIGURE 6. Moisture resistance test cycle – Continued.

(e) After cycling has been completed, condition the equipment for 24 hours at 77 degrees ± 5 F at 40 to 60 percent (%) relative humidity. The equipment shall meet the requirements of 3.6.1 and 3.7.1 with degradation not to exceed 3 dB. There shall be no evidence of cracking, warping, or other mechanical deterioration.

4.13.3 Altitude test.

4.13.3.1 Operating. The microphone and earphone units shall be placed in an altitude chamber. The response of the microphone and earphone units at ground level shall be obtained at 300, 600, 1,000, 2,000, and 3,500 Hz. Pressure inside the chamber shall then be reduced to that corresponding to an altitude of 15,000 feet. The response of the microphone and earphone units shall be taken again at the same frequencies as mentioned above. The degradation in response of either unit shall be not more than 5 dB from the requirements of 3.6.1 and 3.7.1.

4.13.3.2 Nonoperating. The microphone and earphone shall be subjected to 5 varying pressure cycles. Each pressure cycle shall consist of 30 minutes at 3.4 inches of mercury. The pressure transition shall be approximately 5,000 feet per minute. The response characteristics of the earphone and microphone shall be measured, and shall not exhibit degradation in performance in excess of 5 dB from the requirements of 3.6.1 and 3.7.1, after being subjected to five pressure cycles.

4.13.4 Immersion (see 3.8.4). The equipment shall be immersed to a depth of 3 feet of fresh water at room temperature to 2 hours. After completion at the 2 hour period of immersion, evidence of water in the switch cavity shall be cause for rejection. Remove any water from the earphone and microphone cavities. The microphone and earphone shall then meet the requirements of 3.6.1 and 3.7.1 respectively.

4.13.5 Salt spray test (see 3.8.5). The completely assembled equipment shall be exposed to salt spray in accordance with MIL-STD-202-101 for 48 hours. Upon completion of the test, there shall be no evidence of harmful corrosive action or damage due to the salt spray. The earphone and microphone shall not suffer degradation in response, in excess of 3 dB from their performance values of 3.6.1 and 3.7.1.

4.13.6 Blast test (see 3.8.6). Each earphone and microphone element being tested shall be mounted on the carriage of the U.S. Navy Simulated Gun Blast Equipment in accordance with Bureau of Ships Drawing SK-N-864 with the front edge of the earphone or microphone element in the test plane, and with its axis coincident with that of the explosion chamber. The earphone and microphone element shall be subjected to 30 rounds of blast at a peak pressure of 9.5 pounds per square inch. The earphone and microphone units shall not suffer degradation in their response of more than 3 dB from the performance values of 3.6.1 and 3.7.1.

4.13.7 Vibration test (see 3.8.7). The complete equipment shall be subjected to the vibration test in accordance with MIL-STD-202-201. The equipment shall be mounted in a horizontal position, and shall be vibrated in a direction perpendicular to the plane of the earphone and microphone for a period of 5 hours. Tests of the earphone element and the microphone element shall be made to determine compliance with 3.6.1 and 3.7.1, respectively prior to, and after the cycling. Upon completion of the vibration test, the equipment shall exhibit no evidence of loosening of parts or other mechanical damage and shall meet full specification requirements.

4.13.8 Bounce test (see 3.8.8). The equipment shall be tested on the package tester, as made by the L.A.B. Corporation, Skaneateles, New York, or equal, as follows:

(a) Cover the tester bed with a panel of ½-inch plywood, with the grain parallel to the drive chain. Space sixpenny nails, with the heads below the surface, at 6-inch intervals around all four edges and at 3-inch intervals in a 6-inch square in the center.

(b) Place the equipment on the bed of the package tester. Limit the lateral motion, by wooden fences, to not more than 3 inches and not less than 1 inch. Additional barriers may be used to prevent tumbling, provided that the fore-and-aft motion of the equipment against the back stop is not restrained.

(c) Operate the package tester, shafts in phase, for a total of 3 hours at 284 $\pm$ 2 rpm. Turn the equipment at the end of each 30 minutes so it will rest on a new face.

(d) At the conclusion of the test, the equipment shall meet the requirements of 3.6.1 and 3.7.1 with degradation not to exceed 3 dB.

4.13.9 Shock drop test (see 3.8.9). The complete assembled equipment shall be dropped twelve times at random from a height of 4 feet onto concrete. The equipment shall operate satisfactorily after being dropped and shall not suffer any degradation in performance of more than 3 dB for the microphone element or for the earphone when tested in accordance with 3.6.1 and 3.7.1 respectively. The handle shall show no evidence of breaking or cracking or damage to switch. Minor chipping shall not be considered a failure.

4.14 Insulation resistance (see 3.10.1). A potential of 500 volts (rms) 60 Hz shall be applied between any exposed metal parts of the switch (including the mounting screws and plated if used) and control circuit contacts of terminating plug-connector. The duration of the voltage application shall be 10 (ten) seconds.

5. PACKAGING

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

6. NOTES

(This section contains information of a general or explanatory nature which may be helpful, but is not mandatory.)

6.1 Intended use. The equipment covered in this specification is intended for use as audio accessories for Radio Set AN/VRC-12.

6.2 Ordering data. Procurement documents should specify the following:

a. Title number, and date of this specification and any amendment thereto.
b. Type required.
c. Packaging requirements (see 5.1).
d. Place of final inspection.
e. Whether first article inspection is required (see 3.14).

6.3 Nomenclature. The parentheses in the nomenclature will be deleted or replaced by a letter identifying the particular design for example: H-139W/GR. The contractor should apply for nomenclature in accordance with the applicable clause in the contract. (See 1.1)

6.4 Group C inspection. Approval to ship may be withheld, at the discretion of the Government pending the decision from the contracting officer on the adequacy of corrective section.

6.5 Verification inspection. Verification by the Government will be limited to the amount deemed necessary to determine compliance with the contact and will be limited in severity to the definitive quality assurance provisions established in this specification and the contract. The amount of verification inspection by the Government will be adjusted to make maximum utilization of the contractor's quality control system and the quality history of the product.

6.6 Tin whisker growth (see 3.3.4). The use of alloys with tin content greater than 97 percent, by mass, may exhibit tin whisker growth problems after manufacture. Tin whiskers may occur anytime from a day to years after manufacture and can develop under typical operating conditions, on products that use such materials. Conformal coatings applied over top of a whisker-prone surface will not prevent the formation of tin whiskers. Alloys of 3 percent lead, by mass, have shown to inhibit the growth of tin whiskers. For additional information on this matter, refer to ASTM B545 (Standard Specification for Electrodeposited Coatings of Tin).

6.7 First article inspection. Information pertaining to first article inspection of products covered by this specification should be obtained from the procuring activity for the specific contracts involved.

6.8 Subject term (key word) listing.

Acoustical
Cord
Earphone
Frequency response
Handle
Magnetic
Microphone
Radio
Sound pressure
Switches
Talk test

6.9 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.

CONCLUDING MATERIAL

Custodians.
Army - CR
DLA - CC

Preparing activity:
DLA – CC

(Project 5965-2016-007)

NOTE: The activities listed above were interested in this document as of the date of this document. Since organizations and responsibilities can change, you should verify the currency of the information above using the ASSIST Online database at https://assist.dla.mil/.