INCH-POUND

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SUPERSEDING
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30 September 2009

PERFORMANCE SPECIFICATION

HEADSET-MICROPHONE, (HEARING PROTECTIVE TYPE, HIGH AND MODERATE AMBIENT NOISE LEVELS), GENERAL SPECIFICATION FOR

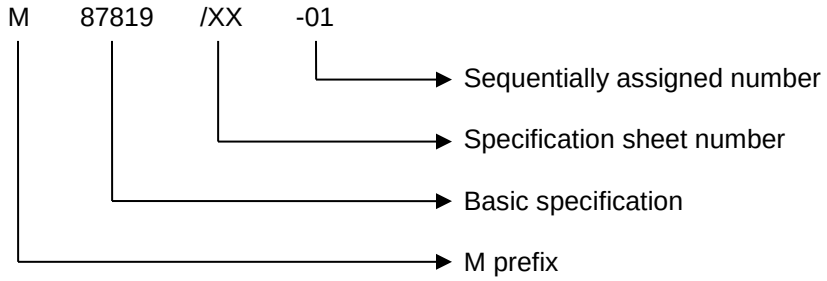
This specification is approved for use by all
Departments and Agencies of the Department of Defense.

1. SCOPE

1.1 Scope. This specification covers the requirements for headset-microphones with rigid headband. These parts meet established requirements for communications equipment used to protect against hazardous noise exposure and are approved for use in certain high and moderate ambient noise level applications (see 6.1). The term headset is to be used interchangeably for headset-microphone and is used when referring to any of the articles covered in this specification.

1.2 Classification.

1.2.1 Military Part or Identifying Number (PIN) (see 3.6). The term Part or Identifying Number (PIN) is equivalent to the terms (part number, identification number, and type designator), which were previously used in this specification. The products specified herein (see 3.1) are identified by military PIN's, which consist of the basic specification number, slash number of the specification sheet, and a sequentially assigned number as shown in the following example.



2. APPLICABLE DOCUMENTS

Comments, suggestions, or questions on this document should be addressed to: DLA Land and Maritime, Attn: VAI, 3990 East Broad Street, 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

2.1 General. The documents listed in this section are specified in sections 3, 4, or 5 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, 4, or 5 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 cited in the solicitation or contract.

DEPARTMENT OF DEFENSE SPECIFICATIONS

MIL-DTL-55668	-	Cord, Electrical, Audio, Subminiature (Retractile And Straight).
MIL-DTL-9177/2	-	Connector, Audio, Airborne, Plug, Miniature, 4 Contact.

DEPARTMENT OF DEFENSE STANDARDS

MIL-STD-202	-	Test Methods for Electronic and Electrical Component Parts.
MIL-STD-810	-	Environmental Test Methods and Engineering Guidelines.
MIL-STD-1285	-	Marking of Electrical and Electronic Parts.

(Copies of these documents are available online at http://quicksearch.dla.mil or from the Document Automation and Production Service (DAPS) 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 document to the extent specified herein. Unless otherwise specified, the issues of these documents are those cited in the solicitation or contract.

DRAWINGS

U.S. Air Force (CAGE 97151)

57B12662	-	Connector, Plug, Electrical U-173/U – Assembly of
9312801	-	Cushion, Earphone - Headset.

(Copies of this document required by contractors in connection with specific acquisition functions may be obtained from the procuring activity at DSCC.cddwgs@dla.mil, or as directed by the contracting officer.)

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

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)

S3.2	-	Method for the Measurement the Intelligibility of Speech over Communication Systems.
S3.7	-	Method for Coupler Calibration of Earphones.

S12.42 - Microphone-In-Real-Ear and Acoustic Testing Methods for the measurement of Insertion Loss of Circumaural Hearing Protection Devices.

(Copies of these documents are available online at http://www.ansi.org or from the American National Standard Institute, 25 West 43 Street, 4th Floor, New York, NY 10036.)

ASTM INTERNATIONAL

ASTM D454 - Test Method for Rubber Deterioration by Heat and Air Pressure.
ASTM D470 - Standard Test Methods for Cross-linked Insulations and Jackets for Wire and Cable.
ASTM D572 - Test Method for Rubber-Deterioration by Heat and Oxygen.
ASTM D573 - Test Method for Rubber Deterioration in an Air Oven.
ASTM D866 - Standard Specification for Cross-linked Styrene-Butadiene (SBR) Synthetic Rubber Jacket for Wire and Cable.
ASTM D3574 - Standard Test Methods for Flexible Cellular Materials – Slab, Bonded, and Molded Urethane Foams.
(Appears in Note 2 of drawing 9312801)

(Copies of these documents are available online at http://www.astm.org or from the ASTM International, P.O. Box C700, 100 Barr Harbor Drive, West Conshohocken, PA 19428-2959.)

INTERNATIONAL ORGANIZATION FOR STANDARDIZATION (ISO)

ISO/IEC-17025 - General requirements for the competence of testing and calibration laboratories

(Copies of these documents are available online at http://www.iso.ch or from the International Organization for Standardization American National Standards Institute, 11 West 42nd Street, 13th Floor, New York, NY 10036.)

NCSL INTERNATIONAL

NCSL Z540.3 - Requirements for the Calibration of Measuring and Test Equipment

(Copies of these documents are available online at http://www.ncsli.org or from NCSL International 2995 Wilderness Place, Suite 107 Boulder, Colorado 80301-5404)

(Non-Government standards and other publications are normally available from the organizations that prepare or distribute the document. These documents also may be available in or through libraries or other information services.)

2.4 Order of precedence. Unless otherwise noted herein or the contract, in the event of a conflict between the text of this specification and the references cited herein (except for associated detail specifications, specification sheets, or MS standards), 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 Specification sheets. The individual item requirements shall be as specified herein and in accordance with the applicable specification sheet. In the event of any conflict between requirements of this specification and the specification sheet, the latter shall govern.

3.2 Qualification. Headsets furnished under this specification shall be products that are authorized by the qualifying activity for listing on the applicable qualified products list before contract award (see 4.4 and 6.3).

3.3 Materials. Materials shall be as specified herein. However, when a definite material is not specified, a material shall be used, which will enable the product to meet the performance requirements of this specification. Acceptance or approval of any constituent material shall not be construed as a guaranty of the acceptance of the finished product.

3.3.1 Pure tin. The use of pure tin, as an under plate or final finish, is prohibited both internally and externally. Tin content of headset and solder shall not exceed 97 percent, by mass. Tin shall be alloyed with a minimum of 3 percent lead, by mass (see 6.7).

3.3.2 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.

3.4 Interface requirements.

3.4.1 Earphone elements. Earphone elements shall be as specified (see 3.1).

3.4.1.1 Earphone element mounting. The element shall be firmly mounted in the earcup. The mounting mechanism shall hold the earphone element in the center of the earcup, facing and directly parallel to the ear opening without shifting under specified conditions. It shall be reusable after repair and allow easy replacement of the earphone element by skill level 3 repair technicians. The earphone surface shall not protrude more than 0.75 inch from the uncompressed face of the ear cushion.

3.4.2 Microphone elements. Microphone elements shall be as specified (see 3.1).

3.4.2.1 Microphone boom assembly. The microphone boom assembly shall be as specified (see 3.1).

3.4.2.1.1 Boom interface to earcup. When specified (see 3.1), the boom shall be attached to the left earcup using a fingers-adjustable screw-and-nut assembly. The assembly shall be grooved to allow the wire boom to seat securely when tightened. The boom nut assembly shall completely prevent the boom from slipping from its tightened position during use.

3.4.2.2 Microphone protective shield. The microphone protective shield shall be as specified (see 3.1).

3.4.3 Cable and cord assemblies. The cable and cord assemblies shall conform to the requirements of MIL-DTL-55668, for consistency with established repair procedures regarding conductor color-coding. Other electrically-compatible audio-communications cord may be supplied, given that it has equivalent or superior performance with respect to extremes of temperature, ozone-resistance, flame-retardant, tensile-strength, retractability, and extension range, when approved by the qualifying activity. Terminations of the 4-conductor cord at (1) the entry to the earcup and (2) the U-174/U connector shall include a mechanism to resist slippage of the cable conductors from the associated connector due to twist and pull during normal use, when tested in accordance with 4.7.12.

a. Two-conductor cords shall be shielded overall, for electrical-isolation, and have a jacket diameter of .140 ± .015 inch, for interface to connectors, and for adherence to the flex-life requirements of this specification.

b. The jacket compound and insulation materials shall be in accordance with ASTM D866 and ASTM D470, or shall be material having equivalent or superior performance with respect to ozone-resistance, flame-retardant, deterioration by heat and air pressure aging (ASTM D454), heat and oxygen (ASTM D572), and air oven (ASTM D573), as specified.

c. The 4-conductor (console) cord shall be integrated with the 2-conductor (earcup-to-earcup) cord in a manner which allows replacement of either section individually during repair (see 3.5.18), while also meeting the attenuation and twist-pull requirements of this specification.

3.4.4 Headset-microphone. The configuration for products covered by this specification shall be as specified (see 3.1).

3.4.5 Finish. The finish shall be a non-reflective, lusterless, dark color having low contrast with colors in operational clothing and gear, such as black, grey, dark blue, or green. The finish shall be uniform in color. The use of any protective coating that will crack, chip, or scale with age, normal use, or extremes of atmospheric conditions shall be avoided.

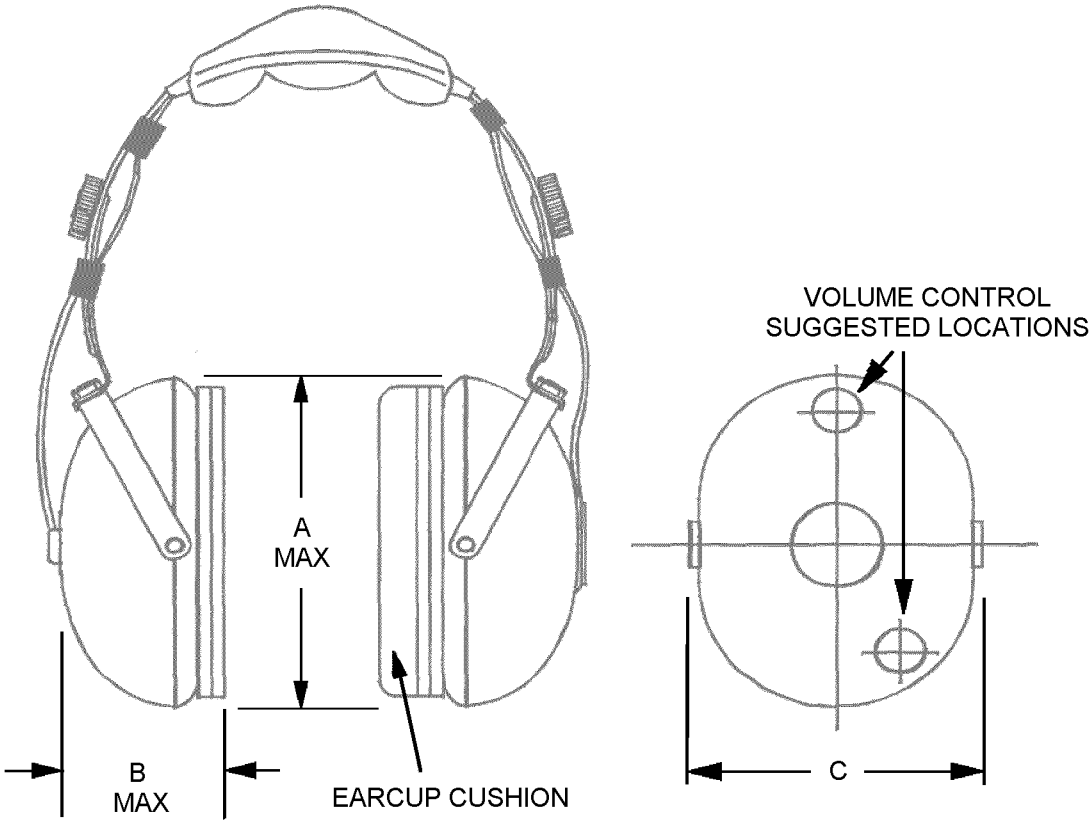
3.4.6 Rigid materials. The materials used shall be of sufficient durability and hardness to provide the required strength and rigidity with maximum strength to weight ratio. Any metals shall be of a corrosion resistant type.

3.4.7 Earcup shells. The earcup shall conform to the overall dimensional envelope of figure 1, in order to avoid obstructions to the emergency oxygen mask harness. The earcup shell material shall resist breakages at the yoke attachment, at the seams (if any), and at points where cable and volume control holes have been drilled, when tested in accordance with 4.7.6. Treatments used to process the device shall not cause skin irritation.

3.4.8 Earcup fillers. If the earcup is supplied with a filler material, it shall be flame retardant, and meet the environmental requirements (see 3.5.5, 3.5.6, 3.5.8, 3.5.9, 3.5.10, and 3.5.15) of this specification. It shall not obstruct the auditory path of the transducer, and shall only be permanently attached to the earphone element if the manufacturer demonstrates that such attachment increases the signal-to-noise ratio of the headset. Fillers shall allow clearance of at least 0.750 inch, from the uncompressed face of the ear cushion, unless otherwise specified (see 3.1).

3.4.8.1 Earcup shell cushion (earcushion). The earcup shall be supplied with a cushion, meeting the human interface dimensional requirements of Air Force drawing (CAGE 97151) 9312801. It shall be replaceable without causing damage to the earcup. As specified in ASTM D3574, the cushion shall have a filler material that meets the noise-attenuation requirements of this specification and has a density that supports the comfort requirements of the headset's intended use, not less than 5.7 lbs/ft^3. The fillers and cushion surface material shall be flame-retardant and shall not crack, tear, or otherwise degrade under the environmental conditions of this specification (see 3.5.5, 3.5.6, 3.5.8, 3.5.9, 3.5.10, and 3.5.15). The color shall be black. The fillers shall not leak, in the event of puncture to the cushion surface.

3.4.8.2 Microphone protective shell cushion. The microphone protective shell cushion shall be as specified, when required (see 3.1).

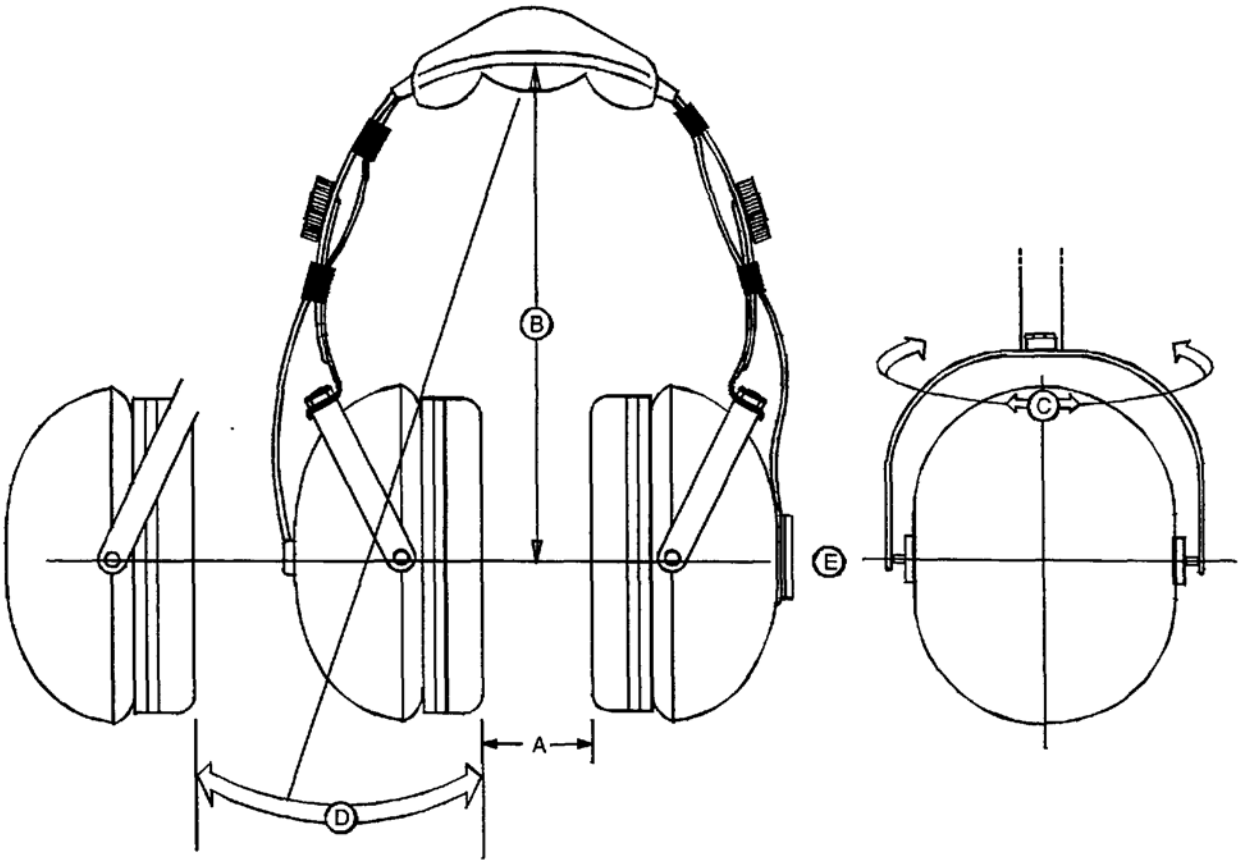


Letter	Inches		mm	
	Design dimension	Tolerances	Design dimension	Tolerances
A	4.50	Max	114.3	Max
B	1.75	Max	44.45	Max
C	3.60	± 0.031	91.44	± 0.7874

NOTES:

1. Envelope dimensions shall be as shown, to provide interface to the emergency oxygen mask harness.
2. All cable entry or other holes in the earcup shall be strengthened to meet the environmental and shock (drop) requirements of this specification.
3. Each earcup shall be secured to its yoke in a manner which prevents inadvertent detachment, in accordance with the Foreign Object Damage requirements of this specification (see 3.5.16), while allowing replacement of the earcup during repair.
4. When specified (see 3.1), the volume control knob shall not restrict the movement of the microphone boom assembly, the earcup, or yoke and shall be located on the left earcup in an easily accessed position, such as one of the two suggested positions shown here.
5. Dimensions are in inches. Unless otherwise specified, tolerance is ± 0.015 inch. Metric equivalents are given for information only

FIGURE 1. Earcup Shell Dimensions.



NOTES:

1. Metric equivalents are in parentheses.
2. Metric equivalents are given for general information only.
3. Headband minimum adjustment range with the headband pad removed. With dimension “A” set at 5.12 in (130 mm), dimension “B” shall be adjustable to 5.1 inches (129.5 mm) maximum. With dimension “A” set at 6.10 inches (155.0 mm), dimension “B” shall be adjustable to 6.1 inches (155.0 mm) minimum.
4. The force required to maintain dimension “A” of 6.10 in (155.0 mm) shall be as specified (see 3.1).
5. Earcup yoke shall swivel with an angular deflection “C” of 0 to ± 5 degrees with respect to axis “E”.
6. Angular deflection “D”, the earcup plane shall be freely movable between vertical and angle of 5 degrees (top out – bottom in) at all settings of dimension “A”.
7. Angular displacement from 0 degree or neutral position shall not generate couples causing uneven ear seal pressure.
8. The earcup shall be suspended by yokes (stirrup) from the headband to allow quick adjustments and suitable pressure to the head of the user.

FIGURE 2. Anthropometric headband adjustment requirements.

3.4.9 Headband and headband parts. The headband material shall provide sufficient pressure of the earcups against the user's head to meet or exceed the noise-attenuation requirements of this specification. It shall also conform to the environmental, headband flexing, and shock (drop) requirements of this specification. It shall include an adjustment mechanism which can be used to easily and smoothly modify and firmly set the earcup position for the typical user head size, in accordance with figure 2. The adjustment shall not loosen inadvertently during use. There shall be no protruding hardware or excess wire, which could become entangled with other parts of the headset or other equipment. The headband shall not separate from the earcup yoke during normal use, including the use of quick-don oxygen mask assemblies. The use of any parts to secure the yoke to the earcup which may become inadvertently detached shall not be used. This includes, but is not limited to, "c-clips" or "e-clips". Neither the headband nor any attachments to it (pad, support, etc.) shall obstruct the normal adjustment of the headband and earcups.

3.4.9.1 Headband pad. The headband pad shall protect the user's head from the weight of the headset, displacing no less than 0.165 lbs/in ^{2} of force. The pad surface material shall resist puncturing, and shall not tear, crack or otherwise degrade under the environmental conditions specified (see 3.5.5, 3.5.6, 3.5.8, 3.5.9, 3.5.10, 3.5.15). Any filler used in the pad shall not leak from the pad in the event of puncture to the surface. The pad shall be removable during normal maintenance without damaging the headset and shall not become inadvertently detached during use.

3.4.9.2 Headband pad support. If the headset is supplied with a support for the headband pad, it shall provide a firm foundation for the headband pad across the pad's full dimensions. It shall be firmly attached and shall not become inadvertently detached from the headband during normal use.

3.4.10 Connectors. The connectors to be used shall be U–174/U in accordance with MIL-DTL-9177/2, for interface to the console, and U-173/U in accordance with Air Force drawing (CAGE 97151) 57B12662, for interface to the emergency oxygen mask. Electrically and mechanically compatible connectors may be used, if they meet or exceed the performance requirements specified. All other connectors used shall be as specified (see 3.1).

3.5 Performance characteristics.

3.5.1 Acoustic quality (see 4.7.2). There shall be no buzzing, rattles, or other spurious noises which would impair the quality of the reproduced signal.

3.5.2 Attenuation (see 4.7.3). For the purpose of qualification testing, attenuation characteristic requirements shall be in accordance with 3.5.2.1. For the purpose of quality assurance testing, attenuation characteristics shall be determined in accordance with 3.5.2.2.

3.5.2.1 Qualification attenuation (see 4.7.3.1). The individual attenuation at each test center frequency shall meet the requirements as specified (see 3.1). Mean attenuation values shall be rounded to the nearest whole number.

3.5.2.2 Conformance inspection (see 4.7.3.2). The minimum attenuation requirements shall meet or exceed the attenuation values determined at the time of initial qualification testing.

3.5.3 Speech intelligibility (see 4.7.4). The intelligibility scores shall meet or exceed the percentages listed in table I, for the corresponding sound pressure test levels.

TABLE I. Speech intelligibility requirements.

Sound pressure level of pink noise (OASPL)(dB)	75	95	105	115
Minimum score (percent correct)	95	90	85	80

3.5.4 Headset system sensitivity (see 4.7.5). The headset system sensitivity shall meet or exceed the output dB SPL listed in table II for the corresponding frequencies.

TABLE II. Headset system sensitivity.

Frequency for test	400 Hz	1.0 kHz	3.0 kHz
Output in dB SPL with 1 volt rms input.	95.4	98.5	104

3.5.5 Shock (drop) (see 4.7.6). The product shall completely resist failures due to excessive dropping from typical-use heights onto a hard surface, showing no evidence of physical or electrical defects except minor chipping or scratches. Following the dropping, the acoustic quality shall be as specified in 3.5.1.

3.5.6 Fungus (see 4.7.7). The product shall be constructed of fungus-inert materials and shall show no evidence of fungus or other corrosion, which may cause a mechanical or electrical failure. For more information, see 6.6.

3.5.7 Vibration (see 4.7.8). The product shall not exhibit loosened components or any other mechanical failure due to the repeated application of high-frequency vibration. Following such vibration, the acoustic quality shall be in accordance with 3.5.1.

3.5.8 Temperature (see 4.7.9). The product shall not exhibit cracking or any other deformation of major or minor components due to extremes of temperature. Following such extreme temperatures, the acoustic quality shall be in accordance with 3.5.1.

3.5.9 Temperature shock (see 4.7.10). The product shall not exhibit cracking or any other deformation of major or minor components due to repeated and extreme changes in temperature. Following such wide temperature swings, the acoustic quality shall be in accordance with 3.5.1.

3.5.10 Humidity (see 4.7.11). The product shall not exhibit failure due to moisture or corrosion when subjected to excessively high levels of humidity for long periods of time. Following such exposure, the acoustic quality shall be in accordance with 3.5.1.

3.5.11 Twist and pull (see 4.7.12). The terminal components (U/179A, U/173, U/174), termination points to the earcup, and any other terminations (see 3.1) shall not part from the conductor when subjected to excessive twisting and pulling. After twisting and/or pulling there shall be no more than .0312 inch (0.793 mm) slippage of the cable jacket from the connector. There shall be no separation of the bond on molded terminations, molded bend reliefs, and molded strain reliefs or any kind of slippage of the cable from its entry into the earcup shell.

3.5.12 Headband pressure (see 4.7.13). The headband shall maintain the specified pressure (see 3.1), when stretched to a position specified as representing the Air Force user head breadth.

3.5.13 Headband flexing (see 4.7.14). The headband force shall not degrade more than ± 10 percent from its pressure in accordance with 3.5.12, when subjected to excessive amounts of flexing from the closed to open position.

3.5.14 Cable isolation (see 4.7.15). The cable assembly with connectors shall demonstrate at lease 60 dB of electromagnetic and electrostatic isolation (see 6.8.3) between the microphone and earphone circuits when subjected to the frequencies as specified.

3.5.15 Salt fog (see 4.7.16). The product shall completely resist failure of any kind due to corrosion, when subjected to extremes of salt-atmosphere. Following exposure to such conditions, the acoustic quality shall be in accordance with 3.5.1.

3.5.16 Foreign object damage (FOD) hazards. The headband shall be designed to avoid any and all FOD hazards. It shall not use any small parts which may become fully detached during normal military use, including, but not limited to: c-clips at the earcup yoke attachment, nuts which can come loose from their bolt, and non-secured cable retaining clips.

3.5.17 Cable retention. All cabling shall be restrained such that it does not protrude to a distance from which the cable could become entangled with surrounding equipment during normal use.

3.5.18 Reparability (see 3.4.3). Headsets shall be designed so that components which are expected to fail are accessible and replaceable, without damaging other components in the process. The replaceable components shall be: headband pad, earcushion, entire microphone boom assembly (when specified), earphone elements, 4-conductor cord assembly (console cord), 2-conductor cord (earcup-to-earcup), earcup shells, and volume control potentiometer and knob. The headset shall be designed such that the removal and replacement (see 6.1) of replaceable components does not necessarily degrade the pre-repair performance of the headset.

3.5.19 Interchangeability. All parts having the same manufacturer's part number or military part or identifying number (PIN) shall be directly and completely interchangeable with each other with respect to installation and performance to the extent specified herein.

3.6 Marking. Marking shall be in accordance with MIL-STD-1285. Location shall not interfere with replacement of the U-174/U connector, as specified (see 3.1), and shall consist the following:

a. NSN.

b. Military PIN in accordance with 1.2 or 6.4.

c. Manufacturer's CAGE and PIN.

d. Contract number.

3.7 Workmanship. The products shall be processed as to be uniform in quality and shall be free from loose or deposited foreign materials and other defects that will affect life, serviceability, or appearance.

4. VERIFICATION

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

a. Qualification inspection (see 4.4).

b. Verification of qualification (see 4.5).

c. Conformance inspection (see 4.6).

4.2 Inspection conditions. Unless otherwise specified, all inspections shall be performed in accordance with the test conditions specified in the "GENERAL REQUIREMENTS" of MIL-STD-202.

4.3 Test equipment and inspection facilities. The supplier shall establish and maintain a calibration system in accordance with NCSL Z540-3, ISO/CEI-17025, or equivalent system, as approved by the qualifying activity.

4.3.1 System requirements. The calibration system requirements, including all parts necessary to conduct the measurements of physical ear attenuation and ensure calibration of the system, shall be in accordance with ANSI S12.42.

4.4 Qualification inspection. Qualification inspection shall be performed at a laboratory acceptable to the government (see 6.3) on headset-microphone units produced with equipment and procedures normally used in production.

4.4.1 Sample size. Ten (10) headset-microphone units shall be subjected to qualification inspection.

4.4.1.1 Disposition of samples. All ten headset-microphone units shall be returned to the manufacturer. At least one unit that is assembled and one that is disassembled shall be retained by the manufacturer as production standards.

4.4.2 Inspection routine. The samples shall be subjected to the inspections specified (see 3.1). All ten samples shall be serialized and subjected to the inspections of subgroup 1, prior to submittal to the government laboratory. The results of subgroup 1 flat plate attenuation shall also be provided. The six samples returned by the government laboratory shall be divided equally into two groups and subjected to the inspections of subgroups 2 and 3. Upon completion of these subgroups, three units selected at random shall be disassembled and subjected to subgroup 4.

4.4.3 Failures. One or more failures in subgroups 1, 2, 3, or 4 (see 3.1) shall be cause for failure of qualification.

4.5 Verification of qualification. Every 12 months the manufacturer shall provide verification of qualification to the qualifying activity. Continuation of qualification is based upon meeting the following requirements:

a. Design of the headset-microphone has not been modified.

b. Group A and group B inspection requirements are met.

c. Periodic group C inspection requirements are met.

4.6 Conformance inspection.

4.6.1 Inspection of product for delivery. Inspection of product for delivery shall consist of group A and group B inspections (see 3.1).

4.6.1.1 Inspection lot. An inspection lot shall consist of all products of the same type, produced under essentially the same conditions, and offered for inspection at one time.

4.6.1.2 Group A inspection. Group A inspection shall consist of the inspection specified (see 3.1).

4.6.1.2.1 Sampling plan. A sample of parts shall be randomly selected in accordance with table III. If one or more defects are found, the lot shall be rescreened and defects removed. After screening and removal of defects, a new sample of parts shall be randomly selected in accordance with table III. If one or more defects are found in the second sample, the lot shall be rejected and shall not be supplied to this specification.

TABLE III. Group A and B zero defect sampling plan.

Lot size	Sample size For group A	Sample size For group B
1 to 2	100 percent	100 percent
3 to 12	100 percent	3
13 to 50	13	5
51 to 90	13	7
91 to 150	13	11
151 to 280	20	13
281 to 500	29	16
501 to 1,200	34	19
1,201 to 3,200	42	23
3,201 to 10,000	50	29

4.6.1.3 Group B inspection. Group B inspection shall consist of the inspections specified (see 3.1) and shall be made on samples which have been subjected to and have passed group A inspection.

4.6.1.3.1 Sampling plan. A sample of parts shall be randomly selected in accordance with table III. If one or more defects are found, the lot shall be rescreened and defects removed. After screening and removal of defects, a new sample of parts shall be randomly selected in accordance with table III. If one or more defects are found in the second sample, the lot shall be rejected and shall not be supplied to this specification.

4.6.1.3.2 Disposition of samples. Samples which have passed the group B inspection may be delivered on the contract if the lot is accepted and the samples are still within specified electrical tolerances.

4.6.1.4 Periodic group C inspection. Group C inspection shall consist of the inspections specified (see 3.1). Group C inspection shall be made on sample units selected from inspection lots, which have passed group A and group B inspections. Except where the results of these inspections show noncompliance with the applicable requirements (see 4.6.1.4.4), delivery of products which have passed group A and group B shall not be delayed pending results of these periodic inspections.

4.6.1.4.1 Sampling plan. Six (6) samples shall be selected every 6 months or every 1,000 units. All six samples shall be subjected to the tests of subgroup 1, as required (see 3.1). The samples shall then be divided equally into two groups of three (3) and subjected to subgroups 2 and 3. Upon completion, three units shall be randomly selected and subjected to subgroup 4. The attenuation conformance Microphone-in-Real-Ear (MIRE) test (see 4.7.3.1) shall be applied to 3 of the 6 group C samples, and shall be performed only on alternating 6-month test cycles, such that attenuation conformance is verified one time every 12 months on 3 headset products.

4.6.1.4.2 Failures. If one or more samples fail to pass group C inspection, the sample shall be considered to have failed.

4.6.1.4.3 Disposition of samples. Samples which have been subjected to group C inspection shall not be delivered on the contract or purchase order.

4.6.1.4.4 Noncompliance. If a sample fails to pass group C inspection (see 3.1), the manufacturer shall notify the qualifying activity and the cognizant inspection activity of such failure and take corrective action on the materials or processes, or both, as warranted, and on all units of product which can be corrected and which were manufactured under essentially the same materials and processes, and which are considered subject to the same failure. Acceptance and shipment of the product shall be discontinued until corrective action that is acceptable to the qualifying activity has been taken. After the corrective action has been taken, group C inspection shall be repeated on additional sample units (all inspections, or the inspection which the original sample failed, at the option of the qualifying activity). Group A and group B inspections (see 3.1) may be reinstituted; however, final acceptance and shipment shall be withheld until the group C inspection has shown that the corrective action was successful. In the event of failure after reinspection, information concerning the failure shall be furnished to the cognizant inspection activity and the qualifying activity.

4.7 Methods of inspection.

4.7.1 Visual and mechanical inspections. Products shall be examined to verify that the materials, design, construction, physical dimensions, marking, and workmanship are in accordance with the applicable requirements (see 3.3, 3.4, 3.6, and 3.7).

4.7.2 Acoustic quality (see 3.5.1). A constant voltage having a value of 1.5 V $\pm$ 0.1 V RMS shall be applied at the proper contacts of the connector such that the voltage will be applied to the voice coil terminals of the earphone elements and the frequency shall be continuously varied from 100 Hz to 4,500 Hz and back to 100 Hz.

4.7.3 Attenuation (see 3.5.2).

4.7.3.1 Qualification attenuation (see 3.5.2.1). The attenuation of the device under test shall be measured in accordance with the ANSI S12.42. The Microphone-in-Real-Ear (MIRE) test shall be conducted with additional measurements at test frequencies of 63, 80, and 100 Hz. Attenuation measurements shall be made on three randomly chosen headsets. Three fittings and measurements using each headset shall be made for ten subjects. The mean of all measurements shall be calculated for each test frequency and compared with the requirements of 3.5.2.1 for compliance. This test shall be accomplished with and without military eyeglasses. Eyeglasses shall be HGU-4/P Sunglasses, or equal. Following the qualification attenuation tests, the same product shall be subjected to the flat plate conformance attenuation testing of 4.7.3.2. These results will be retained by the qualification activity for a baseline comparison to subsequent qualification retention test results (see 3.5.2.2).

4.7.3.2 Conformance inspection (see 3.5.2.2). The test shall be conducted using a Type 1 artificial ear, acoustic coupler and flat plate as described in the American National Standards Institute, Method for Coupler Calibration of Earphone, S3.7. The recommended test fixture is a B&K 4152 Artificial Ear, DB 0909 coupler with a brass flat plate that is flush with the top of the coupler and maintains the 6.0 cm^3 volume of the coupler. A diffuse pink (see 6.8.1) or white (see 6.8.2) noise of 90 dB overall SPL shall be used as the ambient noise. The open noise field shall be measured using the un-occluded (see 6.8.4) test fixture. The headset shall be placed on the test fixture and measurements shall be made of the noise field with the occluded test fixture. The measurements shall be made at the test frequencies of 4.7.3.1 with the exception that measurements at test frequencies of 63, 80, and 100 Hz are not required. The occluded values shall be subtracted from the un-occluded values to yield the attenuation values. These attenuation values shall be averaged to yield the baseline attenuation performance.

4.7.4 Speech intelligibility (see 3.5.3). The intelligibility test shall be performed using the modified rhyme test under the guidance of the ANSI S3.2. An AIC-25 Intercommunication System, or equivalent, as approved by the qualifying activity, shall be used for this test. Both the talker and the listener are to be in a pink noise environment, with the overall sound pressure levels as specified in table II. Minimum performance levels (in percent correct), as a function of sound pressure level, shall be checked for compliance.

4.7.5 Headset system sensitivity (see 3.5.4). The sensitivity of the device under test shall be measured in accordance with ANSI S3.7. The headset shall be placed on a Type-1 earphone coupler with a brass flat plate. The recommended test fixture is B&K 4152 Artificial Ear, and a DB 0909 coupler with a brass flat plate that is flush with the top of the coupler and maintains the 6.0 cm^3 volume of the coupler. The input voltage at the specified frequencies, in accordance with table II, shall be 1 Volt RMS. The acoustic output of the headset on the artificial ear, with a 1 kilogram weight, shall be as specified in table II.

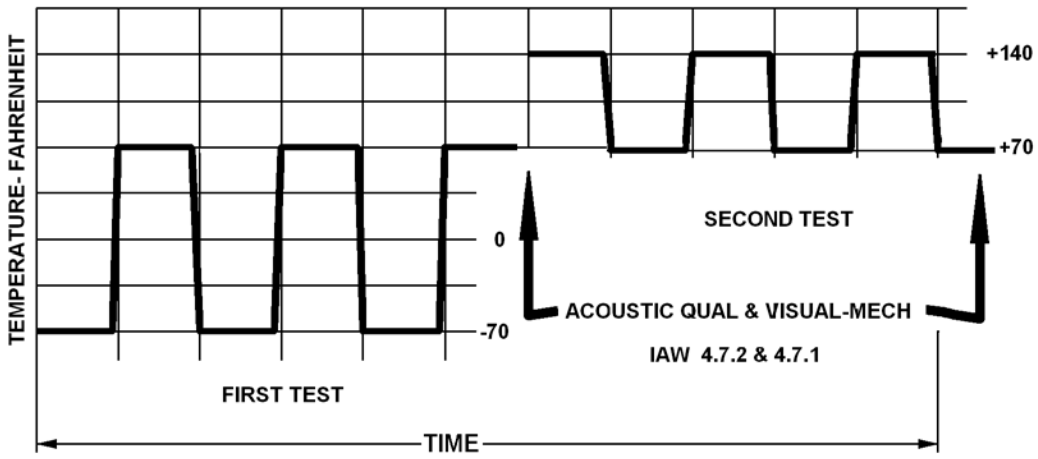
4.7.6 Shock (drop) (see 3.5.5). The assembly shall be dropped at least six times from a height of six feet on a concrete floor, when specified (see 3.1). The assembly shall strike at least once on the microphone protective shield, microphone boom assembly and once on each earcup. Following the test, the assembly shall be examined for damage to the product due to breaking or cracking and the product shall be subjected to the acoustic quality test, in accordance with 4.7.2.

4.7.7 Fungus (see 3.5.6). At the option of the contractor, the contractor shall certify that the materials are fungus resistant materials, or test method 508 of MIL-STD-810 shall be performed. Upon completion, the unit shall be examined for compliance.

4.7.8 Vibration (see 3.5.7). The headset-microphone shall be tested in accordance with test method 201 of MIL-STD-202. Upon completion of the test, the acoustic quality test in accordance with 4.7.2 and the visual and mechanical examination in accordance with 4.7.1 shall be performed.

4.7.9 Temperature (see 3.5.8). The headset shall be tested in accordance with method 502 of MIL-STD-810 (Low Temperature), procedures I (Storage) and II (Operation). Storage parameters shall be – 70 degrees F for 24 hours total, and operating parameters shall be – 65 degrees F constant for 2 hours. In addition, the product shall be tested against method 501 of MIL-STD-810 (High Temperature), procedures I (Storage) and II (Operation), where the Storage parameters are + 140 degrees F for 24 hours total and the operating parameters are + 120 degrees F constant for 6 hours. Tests shall be performed in sequence on the same parts, with no more than 24 hours time-lapse between the tests, a period equivalent to that required to transport the product from one geographical climate extreme to the other. Within 1 hour of test completion, the acoustic quality test shall be performed (see 4.7.2), as well as the visual and mechanical examination (see 4.7.1).

4.7.10 Temperature shock (see 3.5.9). The headset shall be tested in accordance with method 503 of MIL-STD-810 (Temperature Shock). Each of the Cold and Hot tests shall be repeated two times, for a total of 3 [three] cycles, and then followed by acoustic quality and mechanical checks. This procedure addresses product use in very cold climates as well as in very hot climates. The first test shall apply temperature extremes of – 70 degrees F and then + 70 degrees F. The headset under test shall be placed in a chamber and held at each temperature for 30 minutes, with no more than a 5 (five) minute delay between temperature conditions to simulate the duties around a heated shack on an arctic flight line. Within 1 hour of completing the third cycle, the acoustic quality test shall be performed (see 4.7.2), as well as the visual and mechanical examination (see 4.7.1). The second test shall apply temperature extremes of + 140 degrees F and then + 68 degrees F. The headset under test shall be placed in a chamber and held at each temperature for 30 minutes, with no appreciable delay between temperature conditions to simulate the duties around a cooled shack on a tropical flight line. Within 1 hour of completing the third cycle, the acoustic quality test shall be performed (see 4.7.2), as well as the visual and mechanical examination (see 4.7.1). See chart below.



MIL-PRF-87819 TEMPERATURE SHOCK 4.7.10

4.7.11 Humidity (see 3.5.10). The headset-microphone shall be tested in accordance with method 103 of MIL-STD-202, test condition B. Upon completion of the test, the acoustic quality test in accordance with 4.7.2 and the visual and mechanical examination shall be performed in accordance with 4.7.1.

4.7.12 Twist and pull test. The cable assembly pull test shall consist of the twist test (4.7.12.1) followed by the pull test (4.7.12.2) performed three times. Upon completion of the tests specified, the cable assembly shall meet the requirements of 3.5.11.

4.7.12.1 Twist test. The twist test shall be applicable to all ends of the cable assembly that are terminated with a connector only. Each connector shall be secured in a holding device in such a way that it cannot rotate. The twist shall be applied about the axis of the cable to cause a point on the cable 3 inches from the connector to twist 180 degrees from the starting position and held there for 30 seconds. The cable shall then be twisted in the opposite direction such that the point on the cable has twisted 180 degrees past the original staring position, and be held there for 30 seconds.

4.7.12.1.1 Twist test (short cable). The twist (short cable) shall be applicable to the short cable termination into the headset on one end and terminating with a connector on the other end. The connector shall be secured in a holding device in such a manner that it can not rotate. The twist shall be applied about the axis of the cable to cause a point on the cable to twist 90 degrees from the starting point and held for 30 seconds. The cable shall be twisted in the opposite direction such that the point on the cable has twisted 90 degrees past the original starting position, and be held there for 30 seconds.

4.7.12.2 Pull test. The pull test shall be applied to all connectors and the physical locations where the cables are attached. The component of the cable assembly to be tested shall be secured in a stationary holding device and the cable gripped 6 inches to 12 inches from the component of the cable assembly under test. The grips shall not slip or damage the cable during the test. The static force shall be applied for 30 seconds with a pull force of 20 pounds. Connectors that are potted or molded with bonded bend reliefs or bonded strain reliefs shall have a pull force of 30 pounds applied.

4.7.13 Headband pressure (see 3.5.12). The headset pressure shall be tested by use of an apparatus equivalent to the pressure-measuring device shown on figure 3. Per the illustration on figure 2, the “A” dimension of the headset shall be adjusted to 6.10 inches (155 mm), and the “B” dimension adjusted to represent an approximate midpoint of the headband extension range. The pressure shall then be measured from the strain gauge.

4.7.14 Headband flexing. The headset-microphone shall be tested in accordance with the following procedures. Upon completion, the headset-microphone shall meet the requirements of 3.5.13:

a. Measure and record the headband pressure in accordance with 4.7.13.
b. The headset-microphone shall be mounted in a flexing device providing essentially sinusoidal relative movement between two parallel plates (the outline of an example is shown on figure 4).
c. Set the cups/headband to the mid-point of the range of their adjustment. If the cups/headband setting tends to change, the adjustment position shall be secured (for example, by means of adhesive tape). Such means shall not interfere with the normal pivoting of the cups on the headband.
d. Place the headset or headset-microphone on the apparatus and secure the cups to the plates. The method used to secure the cups shall not interfere with the test.
e. Adjust the minimum separation of the plates to correspond with the Free State separation of the headset cushions, or to 1 inch (25 mm), whichever is the greater.
f. Adjust the maximum separation of the plates to 7.09 ± .20 (180 mm ± 5 mm).
g. Cycle the headset between the minimum and maximum separation for 1,000 cycles at a rate of 10 to 12 cycles per minute.
h. Measure and record the headband pressure in accordance 4.7.13.

NOTE: Ensure that, throughout the test, no part of the headband touches any object that will interfere with its mechanical action.

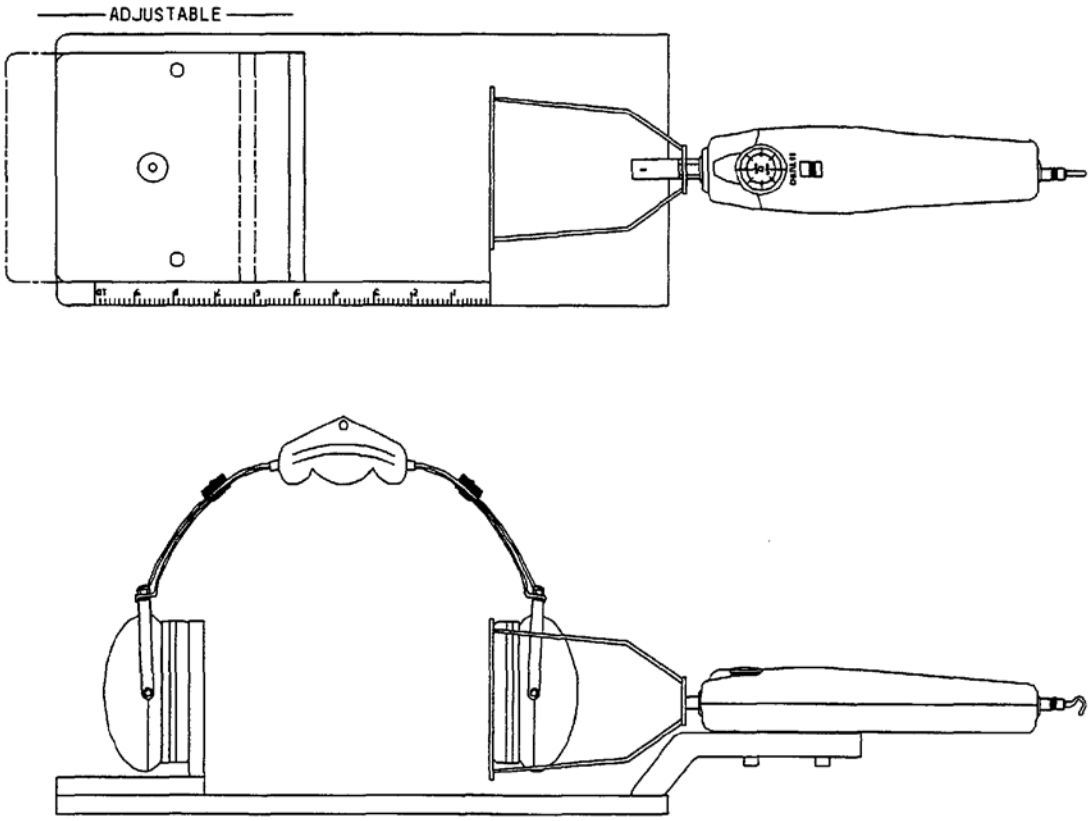
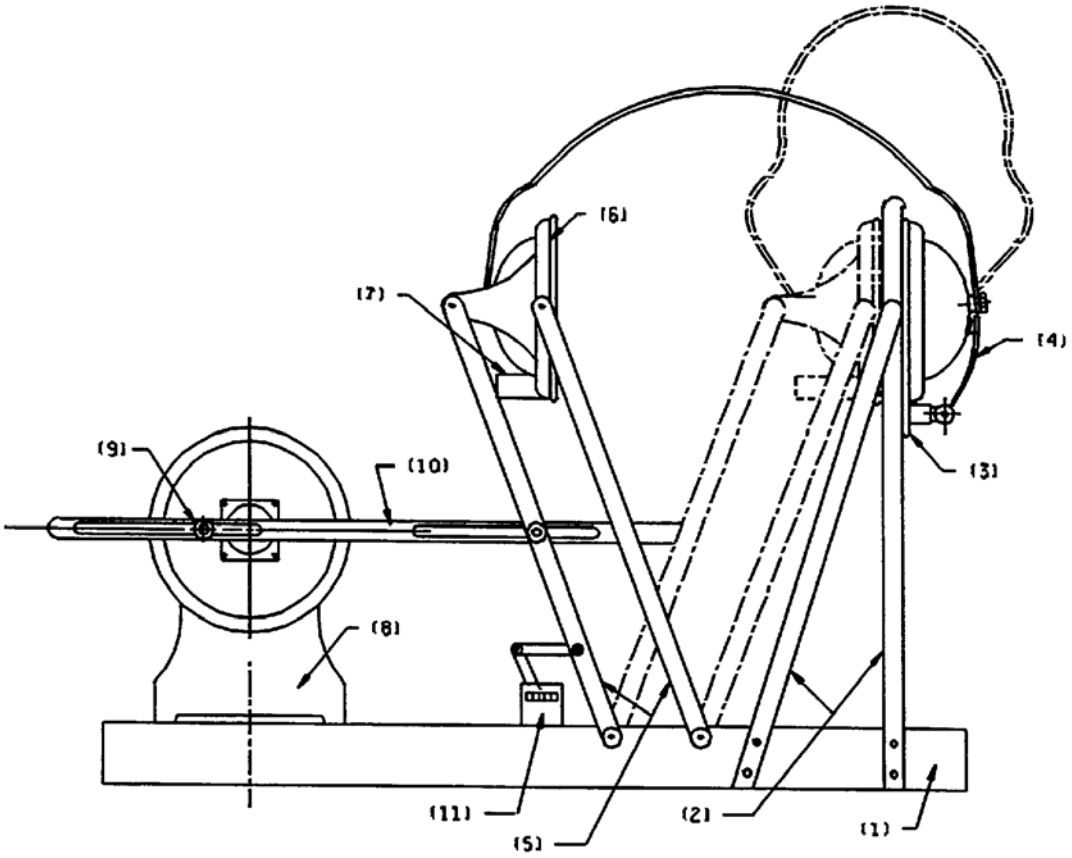


FIGURE 3. Example of headband pressure device.



1. Base
2. Fixed mounting arm
3. Fixed mounting platform
4. Earcup clamps only one shown
5. Rocking arms with parallel motion
6. Moving platform
7. Locating bracket for free earcup
8. Motor with reduction gearbox (position adjustable on base)
9. Crank on slow speed shaft
10. Connecting rod (adjustable)
11. Counter

NOTES:
1. For headsets with earcups that have restricted cup articulation, it may be necessary to hinge the moving platform.
2. This diagram is not to scale.

FIGURE 4. Example of flexing device.

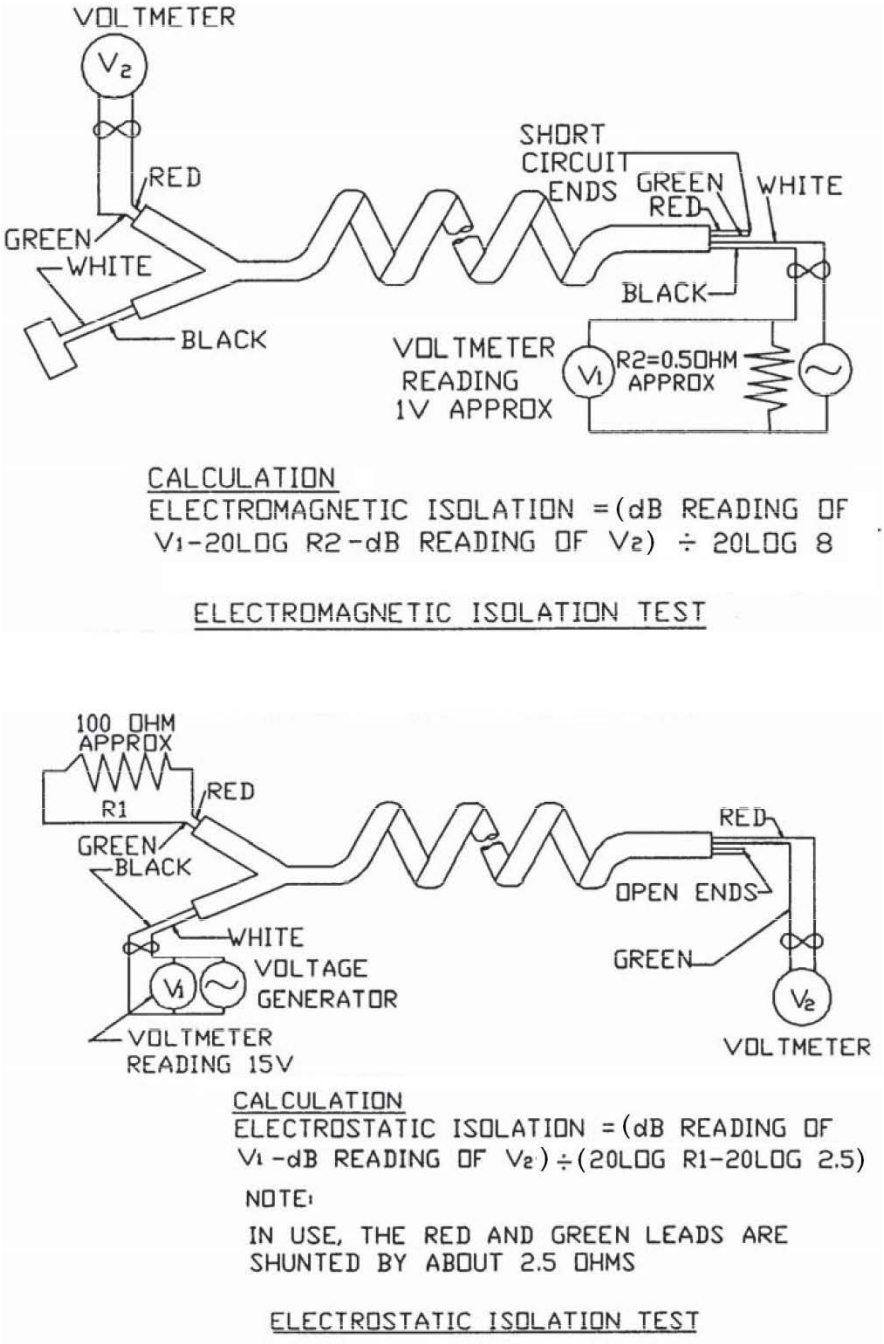


FIGURE 5. Isolation test setup.

4.7.15 Cable isolation (see 3.5.14). The cable assembly shall be tested for electromagnetic and electrostatic isolation (see 6.8.3) at 5 kHz, 10 kHz, and 20 kHz, as shown on figure 5. Upon completion, the cable assembly shall meet the requirements of 3.5.14.

4.7.16 Salt fog (see 3.5.15). The headset or headset-microphone shall be tested in accordance with test method 101 of MIL-STD-202, test condition B. Upon completion of the test, the acoustic quality test in accordance with 4.7.2 and the visual and mechanical examination in accordance with 4.7.1 shall be performed.

5. PACKAGING

5.1 Packaging. For acquisition purposes, the packaging requirements shall be as specified in the contract or order (see 6.2). When actual packaging of materiel is to be performed by DoD or in-house contactor 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 that may be helpful, but is not mandatory.)

6.1 Intended use. Products delivered under this specification are intended for use in high and moderate ambient noise level environments. These environments are areas where the ambient noise levels are between 105 dB SPL and 125 dB SPL (i.e., ground crew and aircrew). All hearing-protective requirements in this document and its slash sheets (intelligibility, noise-attenuation, sensitivity) were developed by Air Force agency [Air Force Research Laboratory (AFRL) 711th HPW/RHCB (Battlespace Acoustics) Wright-Patterson AFB OH 45433] and intended for products used by Air Force personnel, in cooperation with guidelines established by the United States Air Force Office of the Surgeon General. These field-reparable parts are repaired in accordance with Air Force Technical Order 12R2-2AIC-222CL-1, which is available from the Air Force Custodian upon request. Products are expected to be effectively used for a period not less than 4 years, including authorized maintenance and repair.

6.2 Acquisition requirements. Acquisition documents must specify the following:

a. Title, number, and date of the specification and applicable specification sheet.

b. Packaging requirements.

6.3 Qualification (see 4.4). With respect to products requiring qualification, awards will be made only for products which are, at the time of award of contract, qualified for inclusion in Qualified Products List QPL-87819, whether or not such products have actually been so listed by that date. The attention of the contractors is called to these requirements. And manufacturers are urged to arrange to have the products that they propose to offer to the Federal Government tested for qualification, in order that they may be eligible to be awarded contracts or purchase orders for products covered by this specification. Information pertaining to qualification of products may be obtained from the DLA Land and Maritime, Attn: VQ, Post Office Box 3990, Columbus, OH 43218-3990, vqp.do@dla.mil. An online listing of products qualified to this specification may be found in the Qualified Products Database (QPD) at http://assist.dla.mil. Application for qualification tests may be made in accordance with "Provisions Governing Qualification SD-6". This document is available from the DAPS.

6.4 Environmentally preferable material. Environmentally preferable materials should be used to the maximum extent possible to meet the requirements of this specification. As of the dating of this document, the U.S. Environmental Protection Agency (EPA) is focusing efforts on reducing 31 priority chemicals. The list of chemicals and additional information is available on their website at http://www.epa.gov/osw/hazard/wastemin/priority.htm. Included in the list of 31 priority chemicals are cadmium, lead, and mercury. Use of these materials should be minimized or eliminated, unless needed to meet the requirements specified herein (see 3.2).

6.5 Subject term (key word) listing.

Acoustic quality
Attenuation
Speech intelligibility

6.6 Fungus (see 3.5.6). Refer to Guideline 4 of MIL-HDBK-454 for more information on soldering. This document is available from the Document Automation and Production Service (DAPS) Standardization Document Order Desk, 700 Robbins Avenue, Building 4D, Philadelphia, PA 19111-5094.)

6.7 Tin whisker growth (see 3.3.1). 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 B 545 (Standard Specification for Electrodeposited Coatings of Tin). Copies of this document are available from http://www.astm.org or ASTM International, P.O. Box C700, 100 Barr Harbor Drive, West Conshohocken, PA 19428-2959.

6.8 Definitions.

6.8.1 Pink noise (see 4.7.4). Noise with a spectral intensity that is inversely proportional to frequency over a specified range.

6.8.2 White noise (see 4.7.3.2). Random noise (e.g., shot and thermal noise) whose constant energy per unit bandwidth is independent of the central frequency at the band.

6.8.3 Cable Isolation (see 3.5.14 and 4.7.15)

a. Electromagnetic isolation (coupling) is the amount of mutual relationship, measured in decibels, between two separate but adjacent wires, when the magnetic field of one induces a voltage in the other.

b. Electrostatic isolation (coupling) is a method of coupling by which charges on one surface influence those on another through capacitive action, measured in decibels.

6.8.4 Occlude (see 4.7.3.2). To close up or block off.

6.9 Amendment notations. The margins of this specification are marked with vertical lines to indicate modifications generated by this amendment. This was done as a convenience only and the Government assumes no liability whatsoever for any inaccuracies in these notations. Bidders and contractors are cautioned to evaluate the requirements of this document based on the entire content irrespective of the marginal notations.

CONCLUDING MATERIAL

Custodians:
Air Force – 85
DLA – CC

Preparing activity:
DLA – CC

(Project 5965-2014-005)

Review activities:
Air Force – 99

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.