

MIL-H-27467A(USAF)
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MILITARY SPECIFICATION

HEADSET, ELECTRICAL H-154/AIC

1. SCOPE

1.1 This specification covers one type of headset, designated Headset, Electrical H-154/AIC.

2. APPLICABLE DOCUMENTS

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

SPECIFICATIONS

Military

MIL-E-5400	Electronic Equipment, Aircraft, General Specification for
MIL-T-5422	Testing, Environmental, Aircraft Electronic Equipment
MIL-T-9107	Test Reports, Preparation of
MIL-E-25670	Earphone H-143/AIC

DRAWINGS

Air Force

60D4292	Headset, Electrical H-154/AIC - Assembly of Shell Earphone, Headset
60D4302	
60C12501	Cord Assembly, Electrical CX-4707A/AIC - Assembly of
60C12605	Cord Assembly, Electrical CX-4708A/AIC - Assembly of
61G21706	Bracket, Earphone

(Copies of documents required by contractors in connection with specific procurement functions should be obtained from the procuring activity or as directed by the contracting officer.)

FSC 5965

3. REQUIREMENTS

3.1 PREPRODUCTION. - This specification makes provision for preproduction testing.

3.2 GENERAL SPECIFICATION. - The requirements of MIL-E-5400 for class 1 equipment apply as requirements of this specification with the exceptions and additions called out herein. When the two specifications conflict, this specification shall govern.

3.2.1 APPROVAL OF NONSTANDARD PARTS AND MATERIALS. - The requirements of MIL-E-5400 for nonstandard parts and materials shall not apply. Performance of the headset in accordance with the tests called out herein shall constitute approval of nonstandard parts or materials.

3.2.2 IDENTIFICATION OF PRODUCT. - The identification marking on the headset, located as shown on Drawing 60D4302, shall include the following information only:

Headset, Electrical H-154/AIC

Order No. _____* (Government order number)

*Data to be inserted by the contractor

3.2.3 INTERFERENCE. - Interference control requirements of MIL-E-5400 shall not apply.

3.2.4 LIFE. - The life requirements of MIL-E-5400 shall not apply.

3.2.5 SERVICE CONDITIONS (ENVIRONMENTAL). - The requirements of MIL-E-5400 for sand and dust, and explosion proofing shall not apply.

3.3 STANDARD SAMPLE. - When stated in the contract or purchase order, a model equipment, Headset, Electrical H-154/AIC, will be made available to the contractor on loan to be used as a general guide except in instances where specific improvements are detailed herein or where requirements dictate changes. The model equipment shall not be subjected to any destructive tests nor shall any part or component, with the exception of sub-assemblies retained by machine screws, or the like, be removed or disassembled.

3.4 DESIGN AND CONSTRUCTION

3.4.1 GENERAL DESIGN. - The headset shall be designed to be inherently stable in mechanical construction, electrical characteristics, and acoustical performance and shall be suitable for extended military aircraft use. The detailed mechanical and electrical design of this headset shall be accomplished by the contractor subject to the requirements of this

specification; these requirements being detailed herein only to the extent deemed necessary to obtain the desired mechanical and electrical characteristics and performance.

3.4.2 COMPLETE ASSEMBLY. - Headset, Electrical H-154/AIC shall consist of the following components, assembled in accordance with Drawing 60D4292:

<u>Quantity</u>	<u>Item</u>
2 ea.	Earphone, H-143/AIC in accordance with MIL-E-25670
1 ea.	Shell, Earphone, MX 3678/AIC in accordance with Drawing 60D4302-1
1 ea.	Shell, Earphone, MX 3679/AIC in accordance with Drawing 60D4302-2
2 ea.	Bracket, Earphone, MT-2621/AIC in accordance with Drawing 61C21706
1 ea.	Cord Assembly, Electrical, Branched CX-4707A/AIC in accordance with Drawing 60C12501
1 ea.	Cord Assembly, Electrical, Branched CX-4708A/AIC in accordance with Drawing 60C12605
1 ea.	Installation Kit, Electronic Equipment MK-634/AIC in accordance with Drawing 60D4292
2 ea.	Cushion, Earphone Shell, MX-3680/AIC in accordance with Drawing 62B21748
2 ea.	Pad Assembly, damping in accordance with Drawing 61B21713

3.5 CORD ASSEMBLY

3.5.1 CONSTRUCTION

3.5.1.1 CONDUCTORS. - The nominal area of the conductors shall be 320 circular mills and the minimum 310 circular mills. Each conductor shall consist of 37 bunch-stranded AWG #40 (0.003145 dia) tinned cadmium-bronze wires. The strands shall be twisted to have a left hand lay of about one half inch. The individual strands, before bunching and tinning, shall have a minimum tensile strength of 90,000 pounds per square inch and have a conductivity grade of at least 80 per cent.

3.5.1.2 INSULATION. - The insulation shall be melt-extruded of Teflon having a minimum wall thickness of .006". The insulation shall withstand a potential of 1000 volts, of a commercial line frequency when applied in accordance with method 6211 of J-C-98.

3.5.1.3 COLOR CODE. - For circuit identification, the insulation for the 6-conductor cord assembly shall be colored white, black, red, green, black, and white in that order.

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3.5.1.4 CORD DRAWING. - The construction and dimensions of the cord shall be in accordance with Drawing 60C12501 sheets 1 and 2.

3.5.1.5 STAY CORDS. - The stay cords shall be composed of extra strength rayon threads braided together; they shall not abrade or otherwise damage the insulation of the conductors when the cord assembly is bent or stretched.

3.5.1.6 JACKET. - The cable shall be covered with a braided jacket composed of black nylon, 210 denier, 3 ends, 20 carrier, approximately 30 picks per inch.

3.5.2 PERFORMANCE AND TESTS

3.5.2.1 TEMPERATURE RANGE. - The cable shall be flexible and resilient throughout the temperature range of minus 55°C to plus 85°C and shall not show evidence of cracking or other damage as a result of exposure to the temperature range specified herein.

3.5.2.1.1 TEMPERATURE RANGE TEST. - The unterminated cable shall be placed within a test chamber wherein a temperature of plus 85°C is maintained for a period of 4 hours. While at this temperature, the cable shall be wrapped about a mandrel without damage to the cable jacket or conductor insulation. The diameter of the mandrel shall be the same as the nominal cable diameter. The cable shall be attached to the mandrel and suspended vertically with the lower end weighted sufficiently to keep the specimen taut and to permit wrapping without handling. The cable shall be inspected for damage or deformation and then subjected to a test chamber wherein a temperature of minus 55°C is maintained. After 20 hours of storage at minus 55°C, the cable shall be wrapped about the mandrel, while at this temperature, in the same manner as it was at the positive extreme temperature. The cable shall be examined for cracks or any other damage to the jacket or conductor insulation.

3.5.2.2 FLEXING LIFE. - The 6 conductor section of the cable shall have a mean flex life of 50,000 flexes without showing evidence of:

- a. Damage to the outside jacket.
- b. Damage to the insulation of the individual conductor.
- c. Electrical discontinuity.

3.5.2.2.1 FLEXING LIFE TEST. - The flexing shall be conducted on the 6 conductor cable section at a point where it is not reinforced by the spring wire. Five samples of the 6-conductor unterminated cable shall be clamped and suspended through holes in a metal bar having a rectangular cross section of 1/2 inch by 5/8 inch as described below:

- a. The clamping point shall be immediately above the metal bar; the clamp cable shall rest on top of the metal bar.

b. The cable shall be clamped in such a manner that it will not turn in the hole during the flexing test.

c. The length of the through holes in the metal bar shall be 5/8 inch. The diameter of the through holes shall be 0.005 to 0.010 inch greater than the diameter of the cable undergoing test.

d. The through holes in the metal bar shall incorporate a 1/8 inch radius at the side from which the cable emerges (bend point).

e. A knot shall be tied near the free end of the cable and a 3-pound weight shall be hung from the knot to maintain the cable in a vertical position.

f. The 6 conductors of each sample cable, a small low-current-drain 6-volt lamp, and a suitable power source shall be connected in series to indicate electrical continuity. The metal bar, supported horizontally, shall then be rotated about its longitudinal axis back and forth through an angle of 120 degrees (60 degrees each side of vertical) at a rate of approximately 85 cycles per minute. The arithmetical mean of the flexing cycles of the 5 samples of the cable before electrical discontinuity occurs shall be taken as the flexing life of the cable.

3.5.2.3 ELECTRICAL CHARACTERISTICS AND CONDUCTOR STRAIN RELIEF. - The electrical characteristics and conductor strain relief shall be determined on the complete cord assembly as shown on Drawing 60C12501 sheet 1.

3.5.2.3.1 DIELECTRIC STRENGTH. - The complete cord shall meet the requirements and be tested for dielectric strength in accordance with MIL-I-4997.

3.5.2.3.2 INSULATION RESISTANCE. - The complete cord shall meet the requirements and be tested for insulation resistance in accordance with MIL-I-4997.

3.5.2.3.3 ISOLATION. - The complete cord assembly shall meet the isolation requirements listed in Table I.

TABLE I

<u>FREQUENCY (GCS)</u>	<u>ELECTROSTATIC ISOLATION (MINIMUM DECIBELS)</u>	<u>ELECTROMAGNETIC ISOLATION (MINIMUM DECIBELS)</u>
20,000	106	75
10,000	112	81
5,000	118	87

3.5.2.3.4 CONDUCTOR STRAIN RELIEF. - After undergoing the conductor strain relief tests specified herein the cable assembly shall show no signs of mechanical or electrical failure.

3.5.2.3.4.1 CONDUCTOR STRAIN RELIEF TEST. - A pull of 25 pounds shall be applied for a minimum of 2 minutes to the cable in the direction of the axis of telephone plug U-174/U. A pull of 8 pounds shall be applied for a minimum of 30 minutes to the cable in the direction of the axis of plug connectors U-173/U.

3.6 PERFORMANCE

3.6.1 ELECTRICAL

3.6.1.1 CIRCUITRY. - The two earphones shall be connected in parallel.

3.6.1.2 D-C RESISTANCE OF THE HEADSET CIRCUIT. - The d-c resistance of the headset circuit shall be between 8.5 and 11.5 ohms inclusive.

3.6.1.3 D-C RESISTANCE OF MICROPHONE CIRCUIT. - The d-c resistance of the microphone circuit shall not exceed the total allowable resistance of the conductors in the circuit.

3.6.2 ACOUSTICAL

3.6.2.1 ACOUSTIC DISTORTION. - There shall be no buzzes, rattles, or voice distortion when the headset is operated as specified herein.

3.6.2.2 FUNCTIONAL OPERATION. - The headset shall perform satisfactorily when used with Intercommunication Sets AN/AIC-10 () or AN/AIC-18 and when subjected to the functional operation test specified herein.

3.7 GOVERNMENT-LOANED PROPERTY. - When provided in the contract or purchase order, and if available, the following item will be loaned by the Government to the contractor, upon his request, for use as a guide in designing and in testing the headset.

<u>Item</u>	<u>Description</u>	<u>Quantity</u>
1	Headset, Electrical H-154/AIC	1
2	Microphone, Dynamic M-34/AIC	2
3	Telephone Jack U-92A/U	4
4	Helmet, Flying HGU-2/P	1

4. QUALITY ASSURANCE PROVISIONS

4.1 SUPPLIER RESPONSIBILITY. - The supplier is responsible for the performance of all inspection requirements as specified herein. Except as otherwise specified, the supplier may utilize his own or any other inspection facilities and services acceptable to the Government. Inspection records of the examination and tests shall be kept complete and available to the Government as specified in the contract or order. The Government reserves the right to perform any of the inspections set forth in the specification where such inspections are deemed necessary to assure supplies and services conform to prescribed requirements.

4.2 GENERAL SPECIFICATION. - The quality assurance provisions of MIL-E-5400 apply as provisions of this specification with the exceptions and additions called out herein. When the two specifications conflict, this specification shall govern.

4.3 PREPRODUCTION TESTING.

4.3.1 PREPRODUCTION SAMPLES. - A minimum of 10 headsets shall be subjected to the preproduction tests in the quantities indicated in 4.5. At least 3 headsets shall be subjected to each of the preproduction tests. More than one preproduction test may be performed on any one headset provided it has not been damaged by a previous test.

4.3.2 SAMPLES FOR THE PROCURING ACTIVITY. - In addition, three headsets shall be submitted to the procuring activity along with the test report together with a pressure response-frequency characteristics for each of the six earphones in the headsets.

4.3.3 PREPRODUCTION TEST REPORT. - Upon completion of the preproduction tests, three copies of a complete test report, prepared in accordance with MIL-T-9107 shall be furnished the procuring activity. The report shall include the following:

- a. The name and grade of all materials used in the headset.
- b. The extent of compliance with each requirement in section 3. This shall be done paragraph by paragraph with no omissions.
- c. The actual dimensional measurements made, shown in tabular form.
- d. The contractor's intentions concerning each variation or deviation from the specification.

4.3.4 PREPRODUCTION TEST PROGRAM. - Prior to any formal preproduction testing of the sample headsets, the manufacturer shall submit a draft of his proposed test program to the procuring activity for approval. The draft shall include:

- a. A list of all tests to be performed and complete procedures for each test including block or schematic diagrams.
- b. A list of test equipment to be used, identified by manufacturer and type number in the case of standard test equipment or identified by characteristics and parameters in the case of non-standard test equipment.
- c. Copies of the data record forms to be used in recording the test data.

4.3.5 PREPRODUCTION TESTS. - Preproduction tests shall consist of all the tests listed in 4.5.

4.4 ACCEPTANCE TESTS. - Acceptance tests shall consist of:

- a. Individual tests
- b. Sampling plan and tests

4.4.1 INDIVIDUAL TESTS. - Each headset shall be subjected to the individual tests listed in 4.5.

4.4.3 SAMPLING PLAN AND TESTS. - At least one headset shall be selected at random from every 100 headsets produced and be subjected to the environmental tests listed in 4.5.

4.4.3.1 REJECTION AND RETEST. - When one item selected from a production run fails to meet the specification, no item still on hand or later produced shall be accepted until the extent and cause of failure are determined.

4.4.3.2 INDIVIDUAL TESTS MAY CONTINUE. - For operational reasons, individual tests may be continued pending the investigation of a sampling test failure. But final acceptance of items on hand or produced later shall not be made until it is determined that items meet all the requirements of the specification.

4.5 TEST SCHEDULE. - The headsets shall be subjected to the tests listed in table I in the quantities shown. The order of performing the preproduction or acceptance tests is immaterial except that the salt spray test shall be last. At the end of each test, the headset shall be thoroughly inspected and checked for any damage, defects, or deterioration resulting from the tests.

TABLE I

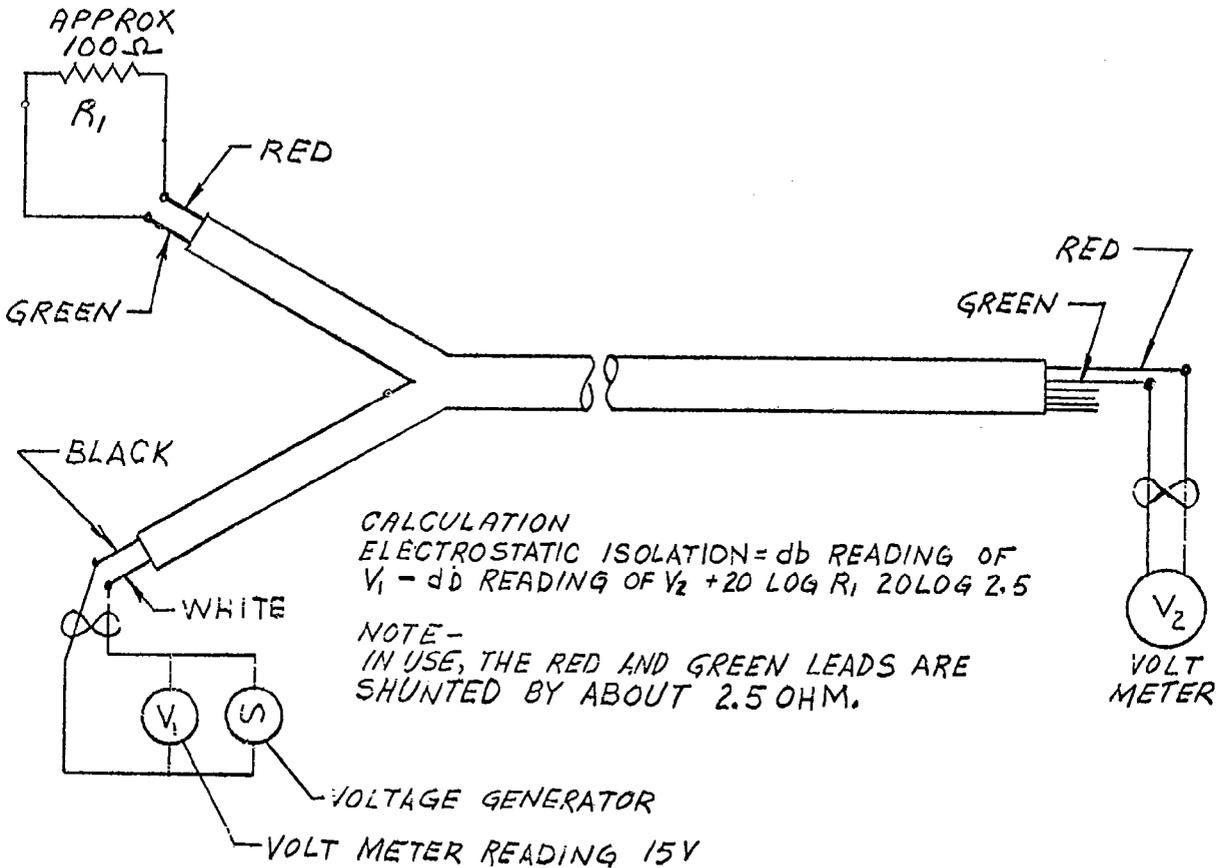
<u>Inspection or Test</u>	<u>Require-</u> <u>ment</u>	<u>Test</u> <u>Procedure</u>	<u>Preproduc-</u> <u>tion</u>	<u>Ind.</u>	<u>Sampl.</u>
Temperature Range	3.5.2.1		3 (Unterminated samples only)		
Flexing Life	3.5.2.2		5 (Unterminated samples only)		
Dielectric Strength	3.5.2.3.1		All		1%
Insulation Resistance	3.5.2.3.2		all		1%

TABLE I (cont)

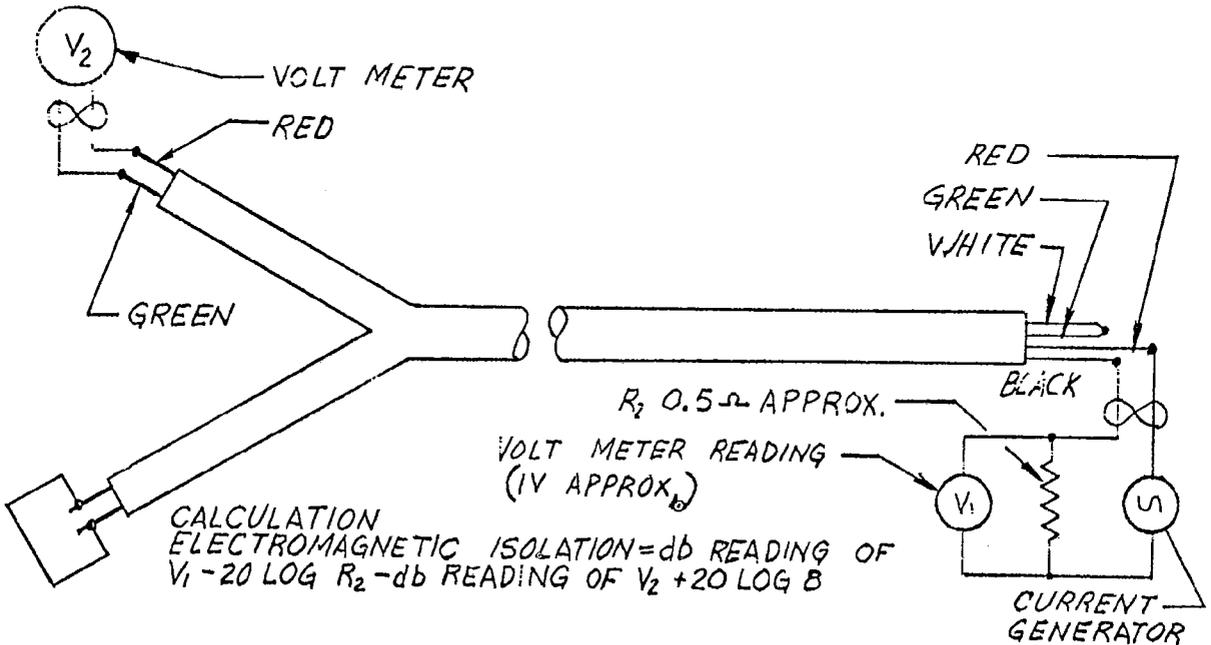
<u>Inspection or test</u>	<u>Require- ment</u>	<u>Test Procedure</u>	<u>Preproduc- tion</u>	<u>Ind.</u>	<u>Sampl.</u>
Isolation	3.5.2.3.3	(Fig. 1)	all		
Conductor Strain Relief	3.5.2.3.4		all		1%
Examination of product		4.6.1	all	all	all
Electrical short and continuity (cord assembly only)			all	all	all
D-c resistance of headset circuit	3.6.1.2	4.6.2	all	all	all
D-c resistance of microphone circuit	3.6.1.3	4.6.3	all	all	all
Acoustic distortion	3.6.2.1	4.6.4	all		all
Functional operation	3.6.2.2	4.6.5	all	all	all
Service conditions (environmental)	3.2.5	4.6.6			
Temperature-altitude			all		all
vibration			3		1%
Shock			3		1%
Humidity			3		10%
Salt spray			3		1%

4.6 TEST PROCEDURES

4.6.1 EXAMINATION OF PRODUCT. - The headset shall be inspected thoroughly to determine conformance to the requirements of this specification with respect to materials, mechanical detail, workmanship, physical dimensions, and finishes, prior to and during assembly. Particular attention shall be paid to neatness and thoroughness of soldering, wiring, marking of parts and assemblies, painting, and screw assemblies.



ELECTROSTATIC ISOLATION TEST



ELECTROMAGNETIC ISOLATION TEST

FIGURE 1

4.6.2 D-C RESISTANCE OF HEADSET CIRCUIT. - The d-c resistance of the headset circuit shall be measured across the earphone contacts of Telephone Plug U-174/U.

4.6.3 D-C RESISTANCE OF MICROPHONE CIRCUIT. - The d-c resistance of the microphone circuit shall be measured with the microphone contacts of telephone Plug U-174/U short circuited.

4.6.4 ACOUSTIC DISTORTION. - Electrical voice signals shall be applied across the earphone contacts of Telephone Plug U-174/U. The input shall be such that the peak of the speech signal applied to the headset is at least 2.0 volts rms. During this test, the operator shall listen for buzzes, rattles, or voice distortion in the acoustic output of the headset.

4.6.5 FUNCTIONAL OPERATION. - An M-34/AIC microphone shall be connected to the microphone circuit of the headset. Telephone Plug U-174/U on the headset shall be inserted in a Telephone Jack U-92A/U that has the earphone contacts connected to the output of an amplifier of suitable gain and the microphone contacts to the input of the same amplifier. During this test, the talker shall listen to his own voice while speaking into the microphone to insure that the headset is functioning satisfactorily.

4.6.6 SERVICE CONDITIONS (ENVIRONMENTAL). - The environmental tests shall be conducted in accordance with MIL-T-5422 for class 1 equipment. During these tests, where equipment operation is specified, the headset shall be operated the number of sequences specified below in lieu of the operating time periods specified in MIL-T-5422. The headset shall be operated as follows: The headset shall be tested by application of a signal, using a random noise source having Gaussian amplitude distribution. The spectrum of the noise source shall be uniform from 100 to 6000 cps and fall off above 6000 cps at a rate of 6 or more db per octave. The true rms value of the noise applied to the headset shall be 1.3 volts as read on a Ballantine 300 meter or equivalent. Noise sources, such as amplified thermal noise, or the noise output of an f-m tuner, tuned off station, with the input shorted and the d-c emphasis circuit removed approximate the desired noise.

a. Temperature and altitude: Steps 2, 3, 4, 6, 9, 11, and 14 require six operational sequences. Step 7 requires two operational sequences. Steps 10 and 12 require three operational sequences.

b. Vibration: The headset shall be tested in accordance with the test procedure for equipment normally mounted. Eight operational sequences shall be conducted in each direction during the resonance test. Step 6 is not required.

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c. Shock: Three operational sequences are required after each direction of shock application.

d. Humidity: Steps 4 and 6 require three operational sequences.

e. Salt spray: Three operational sequences are required.

f. Explosion proofing: No test required.

g. Fungus resistance: No test required.

h. Sand and dust: No test required.

5. PREPARATION FOR DELIVERY

5.1 Preparation for delivery shall be in accordance with the instructions of the procuring activity.

5.2 SHIPMENT MARKING. - Shipment marking nomenclature shall be Headset, Electrical H-154/AIC.

6. NOTES

6.1 INTENDED USE. - Headset Electrical H-154/AIC is intended for use with Helmet, Flying HGU-2A/P. The headset includes a plug connector to plug in a low impedance dynamic microphone which is mounted in an oxygen mask. The headset is intended for use with Intercommunication Sets AN/AIC-10 and AN/AIC-18 to provide communication of high intelligibility under the extreme noise conditions encountered in military aircraft.

6.2 ORDERING DATA. - Procurement documents should specify the following:

a. Title, number, and date of this specification.

b. Number of preproduction samples, point of testing, and delivery of test report (see 4.3.1, 4.3.2, and 4.3.3).

c. Samples will be made available.

d. Submission of test programs for approval (see 4.3.4 and 4.4.2).

e. Selection of applicable levels of preservation and packaging, and packing.

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

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