

METRIC

MIL-PRF-32381 (AR)
20 May 2011

PERFORMANCE SPECIFICATION

ACOUSTIC HAILING DEVICE (Light)

This specification is approved for use by the U.S. Army Armament Research, Development and Engineering Center (ARDEC) and is available for use by all Departments and Agencies of the Department of Defense.

1. SCOPE

1.1 Scope. This specification describes the performance requirements and verification procedures for the Acoustic Hailing Device, (Light) hereafter referred to as the AHD. The term AHD will be used when requirements or verifications apply to the entire system. The individual component name will be used for requirements or verifications that are unique to that part.

1.2 Integral components. The AHD is a system comprised of these integral components:

- a. An emitter head (directional speaker)
- b. An audio input device to store and play prerecorded sounds
- c. A microphone for live broadcast
- d. A visual aiming device
- e. A vehicle mounting kit
- f. Power and interface cables as required
- g. Transportation case

1.3 Associated accessories. Accessories that may be used in conjunction with the employment of the AHD, but that are not described in this specification are listed at 6.5

1.4 Requirement levels. This specification provides two values for certain performance parameters. The threshold value (T) is the minimum acceptable value, and the objective value (O) is a desired value that provides an operationally significant increase in capabilities. All requirements not annotated are threshold requirements.

Comments, suggestions, or questions on this document should be addressed to: Commander, U.S. Army ARDEC, ATTN: RDAR-QES-E, Picatinny, New Jersey 07806-5000, or emailed to ardecdzdn@pica.army.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.daps.dla.mil>.

AMSC N/A

FSC: 5830

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MIL-PRF-32381

2. APPLICABLE DOCUMENTS

2.1 General. The documents listed in this section are specified in sections 3 or 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.

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 (see 6.2).

DEPARTMENT OF DEFENSE SPECIFICATIONS

MIL- DTL-38999 Connectors, Electrical, Circular, Miniature, High Density, Quick Disconnect (Bayonet, Threaded, and Breech Coupling), Environment Resistant, Removable Crimp and Hermetic Solder Contacts, General Specification for

DEPARTMENT OF DEFENSE STANDARDS

MIL-STD-167-1 Mechanical Vibrations of Shipboard Equipment
 MIL-STD-461 Electromagnetic Interference
 MIL-STD-464 Electromagnetic Environmental Effects
 MIL- STD- 810 Environmental Engineering Considerations and Laboratory Tests
 MIL-STD-1168 Ammunition Lot Numbering and Ammunition Data Card
 MIL-STD-1275 Electrical Interfaces
 MIL-STD-1472 Human Engineering
 MIL-STD-1916 DOD Preferred Methods for Acceptance of Product

DEPARTMENT OF DEFENSE HANDBOOKS

DOD-HDBK-743 Anthropometry of U.S. Military Personnel

(Copies of federal and military specifications, standards and handbooks are available online at <https://assist.daps.dla.mil/quicksearch/> or from the Standardization Document Order Desk, 700 Robbins Avenue, Building 4D, Philadelphia, PA 19111-5094.)

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

MIL-PRF-32381

AMERICAN NATIONAL STANDARDS INSTITUTE (ANSI)

| | |
|------------|--|
| ANSI S3.2 | Intelligibility of Speech |
| ANSI S3.5 | Methods of Calculation of the Speech Intelligibility Index |
| ANSI S3.19 | Hearing Protection |

(Copies of these documents may be ordered from, www.webstore.ansi.org.)

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

3. REQUIREMENTS

3.1 Design verification inspection. When specified (see 6.2), a sample of the AHD shall be subjected to Design verification in accordance with Table I and 4.1.

3.2 First article inspection. When specified (see 6.2), a sample of the AHD shall be subjected to first article inspection in accordance with Table I and 4.2.

3.3 Conformance inspection. When specified (see 6.2), a sample of the AHD shall be subjected to conformance inspection in accordance with Table I and 4.3.

3.4 Operating requirements.

3.4.1 Broadcast capability. The AHD shall be capable of broadcasting a focused acoustic beam with the following characteristics:

- a. Clear, intelligible voice transmission at 300 meters (T), 1000 meters (O) with 88 dBA background noise at specified range
- b. A acoustic beam width (defined as 3dB down points) relative to the axis of transmission at 300 meters not greater than ± 77.5 meters (T), ± 5 meters (O)
- c. Clearly audible, tunable and continuous annoying and deterrent sound

3.4.2 Power consumption. The AHD shall be capable of operating at low power for a period not less than 4 hours (T), 8 hours (O).

3.5 Interface and interoperability requirements.

3.5.1 Weight. AHD system weight shall be not greater than 45 pounds (T), 23 pounds (O).

3.5.2 Power input. The AHD shall be fully capable of operating with power input of both 12 and 24 Volts, Direct Current, (VDC) (T), selectable power input of 12 and 24 VDC, or 110/120 and 220/240 Volts, Alternating Current (VAC) (O), in accordance with MIL-STD-1275.

3.5.3 Power pass-through outlet. The AHD shall provide a DC power pass-through connector with the following features:

MIL-PRF-32381

- a. It shall be located on the outer surface of the emitter head to allow for connection of associated accessories that require input power.
- b. The output voltage shall match the input voltage of the AHD.
- c. The connector shall have an attached protective cover to provide sealing from environmental conditions when not in use.
- d. It shall comply with 3.5.4.a.

3.5.4 Cables and connectors. The AHD cables and connectors shall have the following features:

- a. All cables and connectors shall be compliant with MIL-DTL-38999,
- b. The power cable shall be capable of direct connection to the vehicle battery or bus bar.
- c. All power cables shall be fused to provide surge protection to the system.
- d. Power cables shall not interfere with the operator or host platform function
- e. The power input cable length shall be as specified in the contract or solicitation.
- f. All cables that can be employed through or above the turret shall provide breakaway capability to alleviate operator entanglement risks
- g. Connectors shall come with attached protective covers to provide sealing from environmental conditions when not in use.

3.5.5 Associated accessory integration. The AHD shall provide hard mounting points on an external surface of the emitter head to allow for mounting of accessories (see 6.5).

3.5.6 Multiple platform integration. The AHD shall be capable of being tri-pod mounted for stationary ground employment, and shall provide an adaptable vehicle mounting kit for mounting on the following vehicles utilizing a standard vehicle turret mount/ring:

- a. High Mobility Multipurpose Wheeled Vehicles (HMMWV) models M998, M1114, M1025, and M1026 (T)
- b. Light medium Tactical Vehicles (LMTV) models M1078 and M1079 (T)
- c. Unmanned Ground, Surface or Aerial Systems (UGV/USV/UAS) (O).

3.5.7 Vehicle mounting kit. The vehicle mounting kit shall have the following features:

- a. Ability to manually pan left and right, tilt up and down, lock in a fixed position, and fold (T), operate utilizing remote control (O).
- b. Provide for incremental stops by means of a manual pressure lock (T), electric motor gear stop (O) control.
- c. Provide the ability to set/adjust left and right limits.

3.5.8 Visual aiming. The AHD shall be provided with an attached fixed aiming device (T), telescopic range finding (O) to assist operator in orienting the device.

3.5.9 Audio input capability. The AHD's shall include an audio input capability with the following features:

MIL-PRF-32381

- a. Capable of storing and playing MP3, WMA and WAV files of not less than 1 Giga-Byte (GB) (T), 10 GB (O).
- b. Provide an upload capability by means of a USB port
- c. Provide an auxiliary input to allow for connection of additional audio devices such as a handheld translation device
- d. Provides an analog audio output to allow the device to be connected to the AHD
- e. Include an independent microphone to provide operator voice input capability

3.5.10 Human factors. The AHD shall be able to be safely, rapidly, and reliably operated by the 5th through the 95th percentile soldier, in accordance with percentile values specified in DOD-HDBK-743, while wearing Arctic or MOPP IV gloves/clothing.

3.5.11 Transportation Case. The AHD shall be supplied with a transportation case with the following features:

- a. Securely packages the AHD and provides protection from accidental drops when not employed or mounted.
- b. Accommodates the emitter head, audio input device, microphone, all power and interface cables, and user manuals.
- c. Allow for 3 packed cases to be stacked three high in storage conditions
- d. Incorporate an automatic pressure relief valve with a 3.44 kPa (0.5 psig)
- e. Reusable

3.6 Environmental requirements. The AHD and all components shall meet all specified performance and safety requirements during or after exposure to the following environmental conditions as stated.

3.6.1 Operating temperature. The AHD shall be fully functional, meet all performance requirements, and show no evidence of material degradation, damage, or failure throughout the temperature range from -20°C to +60°C.

3.6.2 Temperature shock. The AHD shall be fully functional, meet all performance requirements, and show no evidence of material degradation, damage, or failure after being subjected to temperature shocks ranging from -20°C to +60°C.

3.6.3 Storage temperature. The AHD shall be fully functional, meet all performance requirements, and show no evidence of material degradation, damage, or failure at all operating temperatures after exposure to the storage temperatures ranging from -38°C to +76°C in its transportation case.

3.6.4 Solar ultra-violet (UV) radiation. The AHD shall be fully functional, meet all performance requirements and show no evidence of material degradation, damage or failure after a combination of ambient temperatures up to +60°C and solar radiation exposure with an intensity of 1120 W/m² for a not less than 3 continuous 24-hour cycles of exposure.

MIL-PRF-32381

3.6.5 Rain/blowing rain. The AHD shall be fully functional, operate reliably and show no evidence of material degradation, damage or failure after exposure to the effects of 1.8mm/min of rain accompanied by winds of 1.8 mm/min with droplet sizes in the range of 0.5 mm to 4.5 mm in diameter.

3.6.6 Humidity. The AHD shall be fully functional, meet all performance requirements and show no evidence of material degradation, damage or failure after exposure to a high temperature of 60°C and relative humidity of 95 %.

3.6.7 Salt/fog. The AHD shall be fully functional, meet all performance requirements and show no evidence of material degradation, corrosion, damage or failure that affects performance after being subjected to salt/fog with a 5 +/-1% salt solution concentration for not less than four 24-hour periods (two wet and two dry) cycles.

3.6.8 Sand. The AHD in the installed configuration shall be fully functional, meet all performance requirements and show no evidence of material degradation, damage or failure after 12 hours of exposure to blowing sand with particles sizes of 150 um to 850 um up to a velocity of 18 m/s.

3.6.9 Dust.

a. The AHD in the installed configuration shall be fully functional, meet all performance requirements and show no evidence of material degradation, damage or failure after exposure to blowing dust with particle sizes of <149 um up to a velocity of up to 8.9 m/s for 12 hours.

b. The AHD shall also operate after exposure to the effects of settling dust with particle sizes of < 105um.

3.6.10 Vibration.

3.6.10.1 Operational vibration. The AHD shall be fully functional, meet all performance requirements and show no evidence of material degradation, damage or failure after being subjected to ground platform and watercraft platform operational vibration environments.

3.6.10.2 Transportation vibration. The AHD in the transportation case shall be fully functional, meet all performance requirements and show no evidence of material degradation, damage or failure after truck and trailer platform transportation vibration environments in its transportation case in accordance with the packaging provisions of the contract.

3.6.11 Shock. The AHD in the installed configuration shall show no evidence of material degradation, damage or failure; and shall function normally after being subjected to the effects of ground platform and watercraft platform shock levels during operational environments. The

3.6.11.1 Crash hazard shock. AHD in the installed configuration shall not become a safety hazard after being subjected to a Crash Hazard Shock.

MIL-PRF-32381

3.6.12 Gunfire vibration. The AHD in the installed configuration shall be fully functional, meet all performance requirements and show no evidence of material degradation, damage or failure; and shall function normally after experiencing gunfire vibration levels normally encountered during operation from the M249, M240, M2, and MK 19.

3.6.13 Electromagnetic environmental effects (E³). The AHD shall operate in the intended operational electromagnetic environment without causing or suffering unacceptable degradation.

a. The AHD, in the installed configuration shall be fully functional, meet all performance requirements and show no evidence of material degradation, damage or failure after exposure to E³ environments such as: Personnel electrostatic discharge (PESD), Helicopter electrostatic discharge (HESD), Electromagnetic Radiation, Operational (EMRO), Hazards of Electromagnetic to radiation (HERO), Electromagnetic Pulse (EMP) and Near lightning Effect (NLE).

b. The AHD shall be compatible with military equipment commonly found in ground vehicles, including but not limited to, Single Channel Ground Airborne Radio System (SINCGARS) radio, military Global Positioning System (GPS) receivers, and Radio-Controlled Improvised Explosive Device (RCIED) Electronic Warfare (CREW) 2.5 systems.

3.6.14 1.5-meter drop. After exposure to a 1.5 meter drop in transportation case the AHD shall be fully functional, meet all performance requirements and show no evidence of material degradation or damage.

3.6.15 Wind resistance. The AHD, in the installed configuration shall be fully functional, operate reliably and show no evidence of material degradation, damage or failure after exposure to vehicle speeds up to 31.3 meters/sec (70 miles per hour).

3.7 Support and ownership requirements.

3.7.1 Reliability. The AHD shall have an 80% confidence that it has a 90% (T), 95% (O) probability of completing a 96-hour mission without an Essential Function Failure (see 6.4).

3.7.2 Maintainability. The AHD field level Maintenance Ratio (MR) shall be not greater than 0.013 (T), 0.012 (O) Maintenance Man Hours/Operating Hours (MMH/OH).

3.7.3 Storage life. The AHD shall be fully functional, meet all performance requirements, and show no evidence of damage or failure after one (1) year in a non-humidity controlled storage and five (5) years in humidity controlled storage in the transportation case.

3.7.4 Operational life. The AHD shall be fully functional, meet all performance requirements, and show no evidence of damage or failure for not less than ten (10) years of operational life.

3.7.5 AHD Color. The AHD and all component colors shall be dull and non-reflective. The specific color shall be specified at the time of order.

MIL-PRF-32381

3.7.6 Marking. Each AHD shall have a unique identification (UID) marking in accordance with MIL-STD-130. The AHD shall be permanently and legibly marked in a clearly visible area. The marking color shall provide a clear contrast from the AHD color. The AHD nomenclature marking shall be in compliance with the commercial manufacturer's standard practice and shall include the following, in addition to the manufacturer's own nomenclature. Letter height shall be 12mm +/- 0.5mm.

- a. ACOUSTIC HAILING DEVICE, MXX
- b. UIC NO. XX-YY

3.8 Workmanship. All parts and assemblies shall be free of burrs, chips, sharp edges, cracks, crazes, unblended radii, porosity, warpage, burn marks, checks, chipped edges, blisters, excess flash, dirt and other defects and foreign matter. The cleaning methods used shall not be injurious to any part, nor shall the parts be contaminated by the cleaning agent(s). Exterior surface coating shall be continuous except for a few light scratches not exposing base material.

MIL-PRF-32381

4. VERIFICATION

TABLE I. Requirement/verification cross reference matrix.

| METHOD OF VERIFICATION | | CLASSES OF VERIFICATION | | | | | | | |
|------------------------|----------------------------------|-------------------------|---------------------|-------------------------|---|---|--------------------|-----------------|---|
| 1 – Analysis | | 3 - Examination | | A – Design verification | | | | C - Conformance | |
| 2 – Demonstration | | 4 - Test | | B – First article | | | | | |
| Section 3 Requirement | Description | Section 4 Method | Verification Method | | | | Verification Class | | |
| | | | 1 | 2 | 3 | 4 | A | B | C |
| 3.1 | Design verification inspection | 4.1 | | X | X | X | X | | |
| 3.2 | First article inspection | 4.2 | | X | X | X | | X | |
| 3.3 | Conformance inspection | 4.3 | | X | X | X | | | X |
| 3.4.1 | Broadcast capability | 4.4.1 | | | X | X | X | X | X |
| 3.4.2 | Power consumption | 4.4.2 | | | X | X | X | X | X |
| 3.5.1 | Weight | 4.5.1 | | | X | | X | X | X |
| 3.5.2 | Power input | 4.5.2 | | X | | | X | X | X |
| 3.5.3 | Power pass-through outlet | 4.5.3 | | X | | | X | X | X |
| 3.5.4 | Cables and connectors | 4.5.4 | | | X | | X | X | X |
| 3.5.5 | Associated accessory integration | 4.5.5 | | | X | | X | X | X |
| 3.5.6 | Multiple platform integration | 4.5.6 | | X | X | | X | X | X |
| 3.5.7 | Vehicle mounting kit | 4.5.7 | | | X | | X | X | X |
| 3.5.8 | Visual aiming | 4.5.8 | | | X | | X | X | X |
| 3.5.9 | Audio input capability | 4.5.9 | | X | | | X | X | X |
| 3.5.10 | Human factors | 4.5.10 | | X | X | | X | X | X |
| 3.5.11 | Transportation case | 4.5.11 | | | X | | X | X | X |
| 3.6.1 | Operating temperature | 4.6.1 | | | | | | | |
| | Hot | 4.6.1.1 | | | X | X | X | X | X |
| | Ambient | 4.6.1.2 | | | X | X | X | X | X |
| | Cold | 4.6.1.3 | | | X | X | X | X | X |
| 3.6.2 | Temperature shock | 4.6.2 | | | X | X | X | | |
| 3.6.3 | Storage temperature | 4.6.3 | | | X | X | X | X | X |
| 3.6.4 | Solar (UV) radiation | 4.6.4 | | | X | X | X | | |
| 3.6.5 | Rain/blowing rain | 4.6.5 | | | X | X | X | | |
| 3.6.6 | Humidity | 4.6.6 | | | X | X | X | | |
| 3.6.7 | Salt/fog | 4.6.7 | | | X | X | X | | |
| 3.6.8 | Sand | 4.6.8 | | | X | X | X | | |
| 3.6.9 | Dust | 4.6.9 | | | X | X | X | | |
| 3.6.10 | Vibration | 4.6.10 | | | X | X | X | X | |
| 3.6.10.1 | Operational vibration | 4.6.10.1 | | | X | X | X | X | |
| 3.6.10.2 | Transportation vibration | 4.6.10.2 | | | X | X | X | X | |
| 3.6.11 | Shock | 4.6.11 | | | X | X | X | | |
| 3.6.11.1 | Crash hazard shock | 4.6.11.1 | | | X | X | X | | |
| 3.6.12 | Gunfire vibration | 4.6.12 | | | X | X | X | | |
| 3.6.13 | Electromagnetic effects (E) | 4.6.13 | | | X | X | X | | |

MIL-PRF-32381

TABLE I. Requirement/verification cross reference matrix.(Continued)

| Section 3 | Description | Section 4 | Ver. Method | | | | Ver. Class | | | |
|-----------|------------------|-----------|-------------|--|---|---|------------|---|---|--|
| 3.6.14 | 1.5 meter drop | 4.6.14 | | | X | X | X | X | | |
| 3.6.15 | Wind resistance | 4.6.15 | | | X | X | X | X | | |
| 3.7.1 | Reliability | 4.7.1 | | | X | X | X | X | X | |
| 3.7.2 | Maintainability | 4.7.2 | | | X | X | X | | | |
| 3.7.3 | Storage life | 4.7.3 | | | X | X | X | | | |
| 3.7.4 | Operational life | 4.7.4 | | | X | | X | | | |
| 3.7.5 | AHD color | 4.7.4.1 | | | X | | X | X | X | |
| 3.7.6 | Marking | 4.7.6 | | | X | | X | X | X | |
| 3.8 | Workmanship | 4.8 | | | X | | X | X | X | |

4.1.1 Design rejection. If any sample fails to comply with any of the requirements or verifications, the design shall be rejected.

4.2. First article inspection. A sample shall be subjected to first article inspection by demonstration, examination and tests in accordance with Table I and Table II.

4.2.1 First article rejection. If any sample fails to comply with any of the requirements or verifications, the sample shall be rejected and result in failure of first article.

4.3 Conformance verification. A sample shall be subjected conformance inspection by demonstration, examination and tests in accordance with Table I and Table II.

4.3.1 Lot formation. Lot formation shall be in accordance with the lot formation and identification requirement as specified in MIL-STD-1916.

4.3.2 Lot Rejection. If any sample fails to comply with any of the requirements or verifications, the lot shall be rejected.

Table II. Design verification, first article and conformance test quantity matrix.

| | Section 3 Requirement | Section 4 Verification | Test quantity | | |
|----------------------------------|-----------------------|------------------------|---------------------|---------------|--------------|
| | | | Design verification | First article | Conformance |
| Broadcast capability | 3.4.1 | 4.4.1 | 5 <u>1</u> / | 3 <u>2</u> / | 1 <u>3</u> / |
| Power consumption | 3.4.2 | 4.4.2 | 5 <u>1</u> / | 3 <u>2</u> / | 1 <u>3</u> / |
| Weight | 3.5.1 | 4.5.1 | 10 | 5 | 3 |
| Power input | 3.5.2 | 4.5.2 | 10 | 5 | 3 |
| Power pass-through outlet | 3.5.3 | 4.5.3 | 10 | 5 | 3 |
| Cables and connectors | 3.5.4 | 4.5.4 | 10 | 5 | 3 |
| Associated accessory integration | 3.5.5 | 4.5.5 | 10 | 5 | 3 |
| Multiple platform integration | 3.5.6 | 4.5.6 | 10 | 5 | 3 |

MIL-PRF-32381

Table II. Design verification, first article and conformance test quantity matrix – Continued.

| | Section 3 Requirement | Section 4 Verification | Design verification | First article | Conformance |
|--|--------------------------|---------------------------|------------------------|------------------|--------------|
| Vehicle mounting kit | 3.5.7 | 4.5.7 | 10 | 5 | 3 |
| Vehicle mounting kit adjustments | 3.5.7 | 4.5.7.1 | 10 | 5 | 3 |
| Vehicle mounting kit incremental stop | 3.5.7 | 4.5.7.2 | 10 | 5 | 3 |
| Vehicle mounting kit hard stop | 3.5.7 | 4.5.7.3 | 10 | 5 | 3 |
| Visual aiming | 3.5.8 | 4.5.8 | 10 | 5 | 3 |
| Audio input capability | 3.5.9 | 4.5.9 | 10 | 5 | 3 |
| Human Factors | 3.5.10 | 4.5.10 | 10 | 5 | 3 |
| Transportation Case | 3.5.11 | 4.5.11 | 10 | 5 | 3 |
| Operating temperature | 3.6.1 | 4.6.1 | | | |
| Hot operational temperature | | 4.6.1.1 | 2 <u>1</u> / | 1 <u>2</u> / | 1 <u>3</u> / |
| Ambient operational temperature | | 4.6.1.2 | 5 <u>1</u> / | 1 <u>2</u> / | 3 <u>3</u> / |
| Cold operational temperature | | 4.6.1.3 | 2 <u>1</u> / | 1 <u>2</u> / | 1 <u>3</u> / |
| Temperature shock | 3.6.2 | 4.6.2 | 2 <u>1</u> / | - | - |
| Storage temperature | 3.6.3 | 4.6.3 | 4 <u>1</u> / | 2 <u>2</u> / | 2 <u>3</u> / |
| Solar ultra-violet (UV) radiation | 3.6.4 | 4.6.4 | 1 | - | - |
| Rain/blowing rain | 3.6.5 | 4.6.5 | 1 | - | - |
| Humidity | 3.6.6 | 4.6.6 | 1 | - | - |
| Salt/fog | 3.6.7 | 4.6.7 | 1 | - | - |
| Sand | 3.6.8 | 4.6.8 | 1 <u>1</u> / | - | - |
| Dust | 3.6.9 | 4.6.9 | 1 <u>1</u> / | - | - |
| Operational vibration | 3.6.10.1 | 4.6.10.1 | 2 <u>1</u> / | 2 <u>2</u> / | - |
| Transportation vibration | 3.6.10.2 | 4.6.10.2 | 2 <u>1</u> / | 2 <u>2</u> / | - |
| Shock | 3.6.11 | 4.6.11 | 2 <u>1</u> / | - | - |
| Gunfire vibration | 3.6.12 | 4.6.12 | 2 <u>1</u> / | - | - |
| Crash hazard shock | 3.6.11.1 | 4.6.11.1 | 1 | - | - |
| Electromagnetic environmental effects (E) | 3.6.13 | 4.6.13 | 1 | - | - |
| 1.5-Meter drop | 3.6.14 | 4.6.14 | 2 <u>1</u> / | 2 <u>2</u> / | - |
| Wind Resistance | 3.6.15 | 4.6.15 | 1 | 1 <u>2</u> / | - |
| Reliability | 3.7.1 | 4.7.1 | 5 <u>1</u> / | 3 <u>2</u> / | 1 <u>3</u> / |
| Maintainability | 3.7.2 | 4.7.2 | 10 <u>4</u> / | - | - |
| Storage life | 3.7.3 | 4.7.3 | 2 | - | - |
| Operational Life | 3.7.4 | 4.7.4 | 2 | - | - |
| AHD Color | 3.7.5 | 4.7.5 | 10 | 5 | 3 |
| Marking | 3.7.6 | 4.7.6 | 10 | 5 | 3 |
| Workmanship | 3.8 | 4.8 | 10 | 5 | 3 |

MIL-PRF-32381

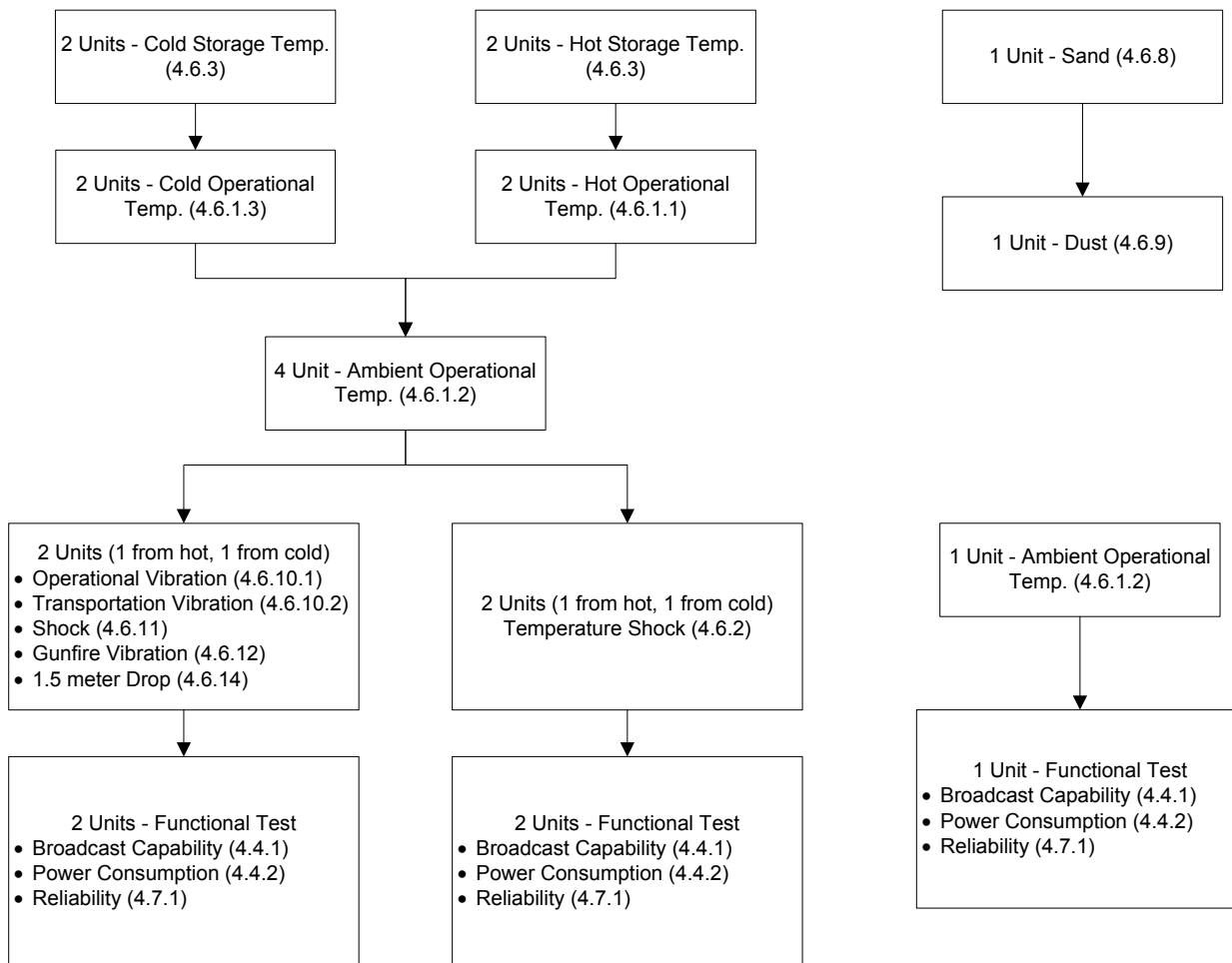
Table II. Design verification, first article and conformance test quantity matrix – Continued.Notes:

1/ - See Figure 1 for test sequence.

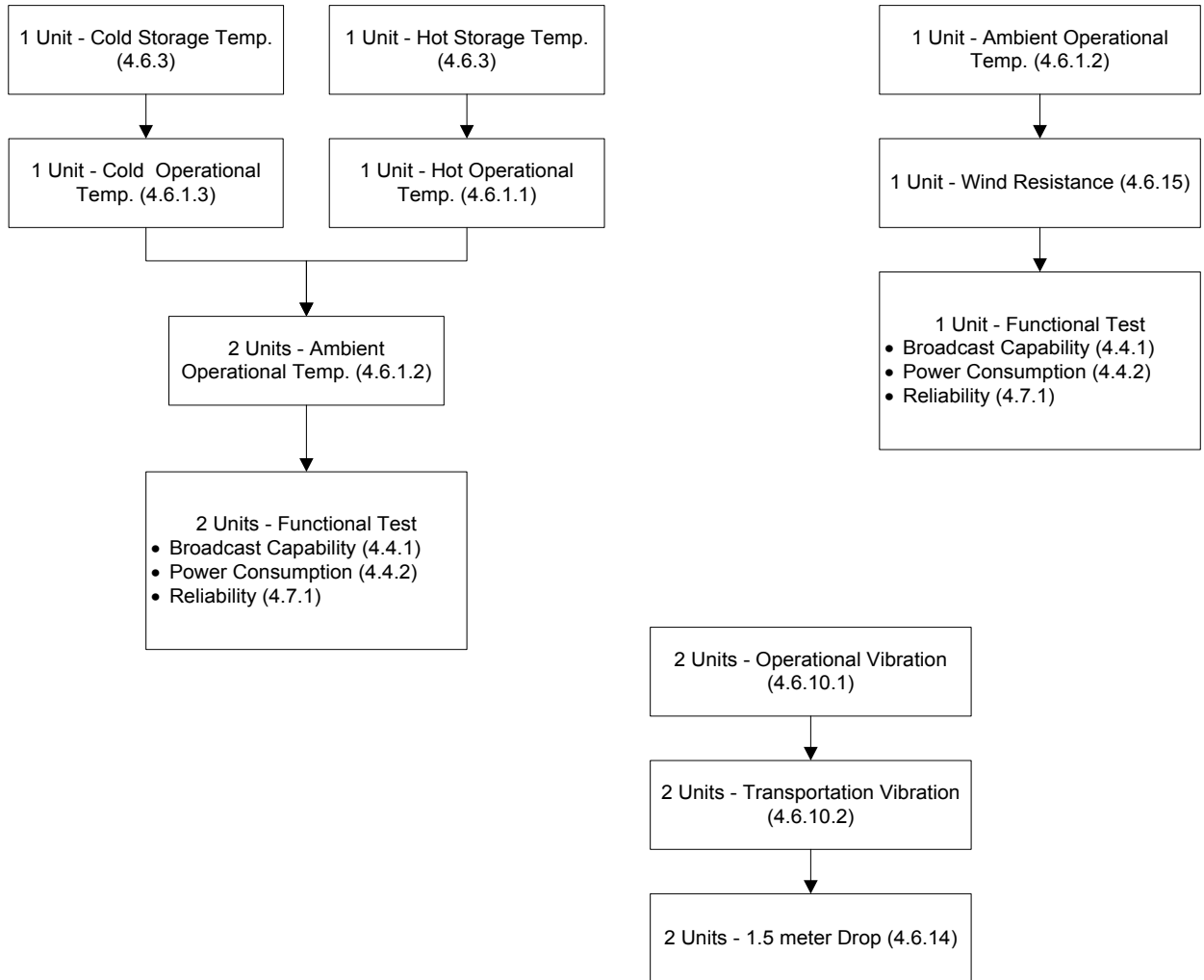
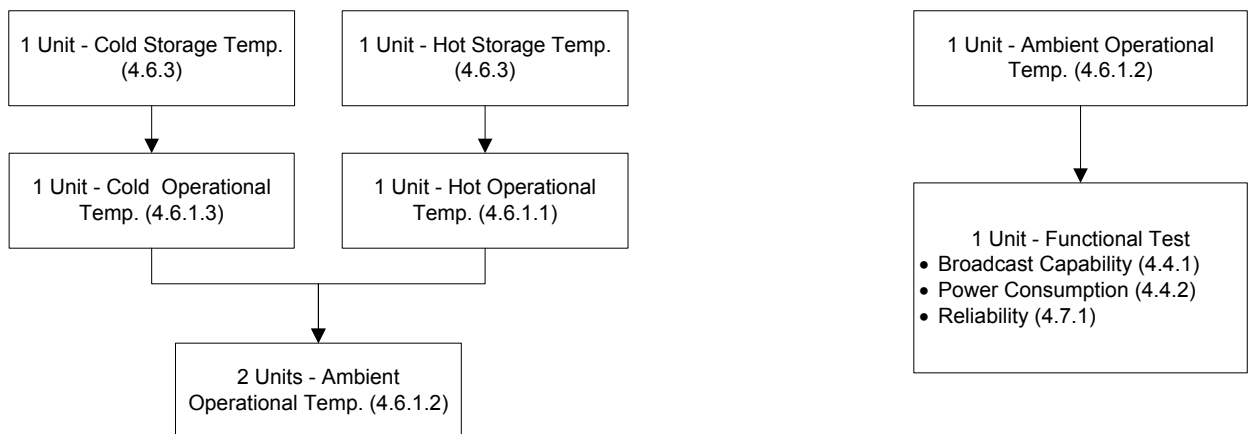
2/ - See Figure 2 for test sequence.

3/ - See Figure 3 for test sequence.

4/ - Unit time spent in other tests & examinations may be counted towards this requirement.

Figure 1: Design verification test series.

MIL-PRF-32381

Figure 2: First article test series.Figure 3: Conformance test series.

MIL-PRF-32381

4.4 Operating verifications. Operating verifications shall be performed as follows:

4.4.1 Broadcast capability.

a. Voice transmission. The AHD shall be tested in accordance with ANSI S3.2 or ANSI S3.5. All test personnel shall understand and speak English, and the test shall be performed with live spoken English voice. The test shall be executed at a range starting at 300 meters, and then increasing up to a distance of 1000 meters at increments of 100 meters. The AHD shall be mounted on a tripod and directed across an open area. A background noise of 88 dBA at the target location shall be used in all test runs. The farthest distance that an intelligible test phrase or word is perceived for each test run shall be judged as the effective distance. If ANSI S3.2 is used, the five listeners shall all be positioned on the axis of transmission directly in front of the AHD.

In addition to the test procedures conducted in accordance with ANSI S3.2 or ANSI S3.5, Table III contains the list of 40 test phrases that shall be used when testing voice intelligibility. The test shall consist of using 25 of the 40 test phrases (25 test runs), chosen at random and tested in random order. The phrases used, and the order they were used in, shall be observed.

Table III. Test Phrases.

| Intelligibility Phrase Words | |
|------------------------------|---|
| 1 | You Are In A Restricted Area. |
| 2 | Do Not Move. |
| 3 | We Will Fire Across The Bow Of Your Ship. |
| 4 | Your Cooperation Will Be Necessary. |
| 5 | You Are Released To Proceed Directly To Your Destination. |
| 6 | We Would Like To Inspect Your Cargo. |
| 7 | Please Remain Calm To Help Avoid Any Misunderstanding Or Confrontation. |
| 8 | Drop Your Weapons. |
| 9 | We Intend No Harm to Your Ship Your Cargo Or Your Crew. |
| 10 | You May Be Shot If You Enter This Area Illegally. |
| 11 | Stop Your Engines. |
| 12 | We Are Authorized To Search Your Vessel. |
| 13 | Muster The Crew On The Fantail. |
| 14 | Lethal Force May Be Used Against You. |
| 15 | Exit In An Orderly Fashion. |
| 16 | You Are Not Authorized To Proceed To Your Intended port. |
| 17 | We Are Here To Help You. |
| 18 | Put Your Arms To Your Sides. |
| 19 | Raise Your Hand If You Can Hear Me. |
| 20 | Stop And Prepare To Be Boarded. |
| 21 | Let Us Pass. |

MIL-PRF-32381

Table III. Test Phrases - Continued.

| Intelligibility Phrase Words | |
|------------------------------|---|
| 22 | Deadly Force Is Authorized In This Area. |
| 23 | Please Establish Radio Communications. |
| 24 | Hold Your Fire. |
| 25 | Move Along. There Is Nothing More To See. |
| 26 | Do As We Say Or You Will Be Arrested. |
| 27 | Stay Clear Of The Building. |
| 28 | We Will Disable Your Vessel By Firing At The Stern. |
| 29 | What Is Your Next Port Of Call? |
| 30 | You Are In A Naval Vessel Exclusion Zone. |
| 31 | Thank You For Your Cooperation. |
| 32 | This Is An Illegal Assembly. |
| 33 | Do Not Approach The Fence. |
| 34 | This Is The United States Navy. |
| 35 | Slowly Kneel Down One Leg At A Time. |
| 36 | You Are Approaching An Army Checkpoint. |
| 37 | This Is United States Property. |
| 38 | Step Away From The Vehicle. |
| 39 | Help Will Be Here Soon. |
| 40 | Clear The Road. |

b. Directionality. The AHD shall be tested for horizontal noise falloff by setting the AHD to “Alarm” at a continuous tone with the elevation angle set to zero, and positioning microphones at various angles off the zero line at a distance not less than of 10 meters. This test shall be performed in an anechoic test room with wall-to-wall dimensions of at least 5 times the diameter (or diagonal) of the test unit’s driver array. The observed data then shall be extrapolated to a distance of 300 meters.

c. Warning tones. Verify by demonstration that the AHD system clearly broadcasts discernable warning tones at a distance of 300 meter (T), 1000 meter (O).

4.4.2 Power consumption. Verify by demonstration that the AHD is capable of being operated at low power for 4 hours (T), 8 hours (O) while powered by a rechargeable or vehicle/vessel battery.

4.5 Interface and interoperability verifications. Interface and interoperability verifications shall be performed as follows:

4.5.1 Weight. The weight shall be verified using standard measuring equipment.

4.5.2 Power input. The AHD shall be powered by each specified power source in accordance with MIL-STD-1275 and audio characteristics, maximum Sound Pressure Level (SPL) and frequency response shall be compared to the supplied manufacturer data.

MIL-PRF-32381

4.5.3 Power pass through outlet. A visual examination shall be performed to verify the AHD provides a DC power pass through connector and a demonstration shall be performed to verify that the output voltage matches the input voltage utilizing standard measuring equipment.

4.5.4 Cables and connectors. Verify by examination that the required AHD cables and connectors comply with the requirements specified.

4.5.5 Associated accessory integration. A visual examination shall be performed for the presence of hard mounting points and a demonstration shall verify the AHD has the ability to affix accessories (see 6.5).

4.5.6 Multiple platform integration. A demonstration shall be performed to verify the AHD can be mounted on a tripod, and on all specified service vehicles with the use of a standard vehicle ring mount without modifications, adjustments or shimming.

4.5.7 Vehicle mounting kit. A visual examination shall be performed for the presence of a vehicle mounting kit.

4.5.7.1 Vehicle mounting kit adjustments. A demonstration shall be performed to verify the AHD ability to manually pan left and right, tilt up and down, lock in a fixed position, and fold.

4.5.7.2 Vehicle mounting kit incremental stop. A demonstration shall be performed to verify the AHD ability for incremental stops by means of manual lock or remote electric stop.

4.5.7.3 Vehicle mounting kit hard stop. A demonstration shall be performed to verify the AHD ability to set/adjust left and right limits.

4.5.8 Visual aiming. A visual examination shall be performed for the presence of a visual aiming device and its ability shall be verified during broadcast testing of 4.4.1.

4.5.9 Audio input capability.

a. Verify by demonstration that the AHD has an audio input device or MP3player capable of storing and playing MP3, WMA and WAV files, of at least 1 Giga-Byte (GB) (T) and at least 10 GB (O) utilizing internal memory or removable storage media of digital audio files comprised of tones, sound and voice.

b. Verify by demonstration that the AHD audio input device has upload capability by means of a USB port.

c. A visual examination shall be performed for the presence of an auxiliary input to allow for connection of additional audio devices and a demonstration shall be performed to verify the auxiliary input functionality with an additional audio device.

d. Verify by demonstration that the AHD has audio input device that provides an analog audio output to allow the device to be connected to the AHD.

e. Verify by demonstration that the AHD includes a microphone capable of interfacing with the AHD and withstand the same environmental conditions and operating environments as the AHD.

MIL-PRF-32381

4.5.10 Human Factors. The AHD shall be in its transportation case. The containers shall be able to be opened and closed and contents removed; without use of any tools, excessive force or damaging the container, when wearing Arctic or MOPP IV gloves/clothing.

4.5.11 Transportation Case. The AHD transportation case shall be inspected to verify the specified AHD components are securely packaged within their designated location. After successful completion of the inspection unpack each container, remove all items, and repack all components in their designated location in the transportation case. After successful completion of repack, stack three cases high and verify cases stack securely. A visual examination shall be performed for the presence of a pressure relief valve.

4.6 Environmental verifications. The following procedures shall be performed as pretest and post-test procedures executed before and after exposure to each specified environment;

a. Pretest. The following pretest procedures shall be conducted:

1. Perform audio characterization testing at room ambient condition ($\sim 22^{\circ}\text{C}$); in accordance with test procedure, maximum Sound Pressure Level (SPL), frequency response test provided by the manufacturer (see 6.7).
2. Inspect the unit for any signs of damage and or structural problems, such as loose fasteners, and connectors.
3. Perform functional checks on microphone and MP3 player corresponding to the unit.

b. Post-test. After the unit is removed from the test chamber:

1. Inspect the unit for any signs of damage and/or structural problems, such as loose fasteners, connectors, etc.
2. Ensure all assemblies still fit together.
3. Ensure all weather seals are still intact and functional.
4. At room ambient condition ($\sim 22^{\circ}\text{C}$), perform audio characterization testing on the test unit with reference to the pre-test results.
5. Perform functional test on microphone and MP3 player corresponding to the unit.

c. Installed configuration. Defined as the full AHD system mounted on either the tripod or vehicle mounting kit. For all examinations, regardless of what the AHD is installed on, the other item shall be placed alongside the system to be exposed to the test conditions.

4.6.1 Operating temperature. The AHD in its installed configuration on a tripod shall be tested in its operational mode. Acceptance shall be in accordance with the applicable section of MIL-STD-810 for the test cited. Temperature ramps may not be more than 3°C per min, to prevent temperature shock. The AHD shall be capable of functioning during and after being subjected to the following temperatures:

4.6.1.1. Hot operational temperature up to $60^{\circ}\text{C} + 2^{\circ}\text{C}$ - The AHD in the installed configuration on a tripod shall be tested in accordance with Procedure II – Operation, Method 501.4 of MIL-STD-810. The AHD shall be conditioned not less than 24 hours at constant

MIL-PRF-32381

temperature of 60°C (140°F) and operated at that temperature after its temperature stabilizes. The AHD shall operate with a 65% duty cycle (see 6.9) track at full power for a not less than 96 hours. After the 96-hour test duration, the temperature shall be lowered to ambient conditions (~20 °C) and once temperature has stabilized for a not less than 2 hours, conducted the post-test procedure (see 4.6.b)

4.6.1.2. Ambient operational temperature 20°C + 2°C (68°F +4°F)- The AHD in the installed configuration on a tripod shall be conditioned not less than 24 hours at constant temperature of 20°C (68°F) and operated at that temperature after its temperature stabilizes. The AHD shall operate with a 90% duty cycle track at full power for not less than 96 hours.

4.6.1.3. Cold temperature down to -20°C - 2°C - The AHD in the installed configuration on a tripod shall be tested to procedure II – Operational, Method 502.4 of MIL-STD-810. The AHD shall be conditioned not less than 24 hours at constant temperature of -20°C and operated at that temperature after its temperature stabilizes. The AHD shall operate with a 65% duty cycle track at full power for a not less than 96 hours. After the 96-hr test duration, the temperature shall be ramped up to ambient conditions (~20°C) and once the temperature has stabilized for not less than 2 hours, conduct the post-test procedure (see 4.6.b).

4.6.2 Temperature shock. The AHD in its transportation case shall be tested in accordance with Procedure II – Cyclic, Method 503.4 of MIL-STD-810. The temperature high and low used in the hot and cold temperature tests shall be used as the high and low in the temperature shock test. Transfer time (high and low temp) shall be performed as rapidly as possible. At least one shock per condition (high and low temp) shall be performed. The soak time following each shock shall be not less than of 2 hours. Figure 503.4-2, from Method 503.4 of MIL-STD-810, shows the time vs. temperature for the procedure.

4.6.3 Storage temperature. The AHD in its transportation case shall be conditioned at each of the required storage temperatures ($\pm 2^\circ\text{C}$) for 14 days. At the end of the conditioning period, the AHD shall be returned to ambient temperature and tested in accordance with 4.4.1.a using three selected phrases.

4.6.4 Solar ultra-violet (UV) radiation. The AHD in the installed configuration on a tripod shall be tested to procedure I – Cycling (heating effects), Method 505.4 of MIL-STD-810. The test shall be performed at a temperature of 60 °C. High temperature diurnal cycle A1 shall be used and the test item shall be exposed to at least 3 continuous 24-hour cycles of controlled simulated solar radiation, in accordance with Figure 505.4-1 below from Method 505.4 of MIL-STD-810.

4.6.5 Rain/Blowing rain. The AHD in the installed configuration on a tripod shall be tested to procedure I – Rain and Blowing Rain, Method 506.4 of MIL-STD-810. The test shall be performed at a temperature of $23\pm 2^\circ\text{C}$. The test shall be 40 minutes in duration for each side; front, back, two sides, top and bottom. The wind speed during the test shall be at least 18.9m/s (40mph). The rainfall rate shall be 4"/hr, using a water sprinkler that produces droplets in the diameter range of 0.5mm to 4.5mm.

MIL-PRF-32381

4.6.6 Humidity. The AHD in its installed configuration on a tripod shall be tested to Humidity, Method 507 of MIL-STD-810. The test shall begin at a temperature of $23 \pm 2^\circ\text{C}$. An operational checkout shall be performed every five cycles, in accordance with Method 507.4 of MIL-STD-810.

4.6.7 Salt/fog. The AHD in its installed configuration on a vehicle mounting kit, tripod and mounting yoke shall be subjected to a forty-eight (48) hour salt fog test as defined in MIL-STD-810, Method 509.4. The test shall be conducted with alternating 24-hour periods of salt fog exposure and drying conditions for not less than four 24-hour periods (two wet and two dry). The sample shall be rejected if corrosion is found anywhere on the AHD material that affects its performance.

4.6.8 Sand. The AHD in the installed configuration on a tripod shall be tested to procedure II – Blowing Sand, Method 510.4 of MIL-STD-810. The test shall be performed at a temperature of $60 \pm 2^\circ\text{C}$. The orientation of the test item shall be such that each side is tested at intervals of 90 minutes.

4.6.9 Dust.

a. The AHD in the installed configuration on a tripod shall be tested to procedure I – Blowing Dust, Method 510.4 of MIL-STD-810. The test shall be performed at a temperature of $60 \pm 2^\circ\text{C}$. The orientation of the test item shall be such that each side is tested at intervals of 90 minutes.

b. The AHD in the installed configuration on a tripod shall be tested in accordance with Procedure III – Settling Dust, Method 510.4 of MIL-STD-810

4.6.10 Vibration. The AHD in its installed condition on a vehicle mounting kit shall be tested according to MIL-STD-810 and MIL-STD-167-1. Upon completion of this test, the item shall show no signs of damage and remain functional without degradation in performance.

4.6.10.1 Operational vibration. Operational Vibrations shall be tested to Procedure I – General Vibration and Procedure III – Large Assembly Transportation, method 514.5 of MIL-STD-810. Procedure I General Vibration shall be tested in accordance with category 20 (Ground Vehicles) of Table 514.5I – Vibration environment categories for a wheeled vehicle. Procedure III Large Assembly Transportation shall be tested while mounted on a HMMWV for not less than 500 miles. Watercraft vibration shall be tested in accordance with category 21 (Watercraft – marine vehicles) of figure 514.6D-9 – Category 21 – Shipboard random vibration exposure for a duration of two hours along each of the three orthogonal axes.

4.6.10.2 Transportation vibration. Transportation Vibration shall be tested to procedure I – General Vibration, method 514.5 of MIL-STD-810 using category 4 (Restrained Cargo) of Table 514.5I – Vibration environment categories for two-wheeled trailer and wheeled vehicles.

4.6.11 Shock. The AHD shall be tested in accordance with Procedure I – Functional Shock and Procedure IV – Transit Drop, Method 516 of MIL-STD-810. Upon completion of these

MIL-PRF-32381

tests, the item shall show no signs of damage and remain functional without degradation in performance.

4.6.11.1 Crash hazard shock. The AHD shall be tested in accordance with Procedure V – Crash Hazard Shock Test, Method 516 of MIL-STD-810. Ground hazard test and functional test for ground equipment shall be performed.

4.6.12 Gunfire vibration. The AHD in its installed configuration on a vehicle mounting kit shall be tested to Procedure I – Direct Reproduction of Measured Material Response Data, method 519 Gunfire Vibration of MIL-STD-810. Upon completion of this test, the item shall show no signs of damage and remain functional without degradation in performance.

4.6.13 Electromagnetic Environmental Effects (E³).

a. The AHD in its installed configuration on a vehicle mounting kit shall be tested in accordance with MIL-STD-461; Procedures CE102, RE102-4, and RS103.

b. The AHD shall also be tested in accordance with MIL-STD-464, ESD procedure. The AHD shall show no signs of damage and remain functional after exposure to E³

c. Verify by demonstration that operation of the AHD has no adverse impact to the operation of specified radio and navigation equipment

4.6.14 1.5-Meter Drop. The AHD shall be tested in accordance with ITOP 4-6-602. The test AHD shall be dropped as follows:

- a. Front
- b. Back
- c. Top
- d. Bottom
- e. Both sides
- f. All four corners.

After the drops, post-test procedure (see 4.6.b) shall be conducted.

4.6.15 Wind resistance. The AHD in its installed configuration on a vehicle mounting kit shall be tested by placing it in a wind tunnel for 2 continuous hours, with a wind velocity of 31.3 meters/sec (70 MPH). Following the wind exposure, post-test procedure (see 4.6.b) shall be conducted.

4.7 Support and ownership verifications.

4.7.1 Reliability. Verify by demonstration that the AHD system can complete a 96-hour mission (86.4 operational hours) with a 65% duty cycle track at full power without an Essential Function Failure at ambient conditions (see 6.4).

4.7.2 Maintainability. The test shall use 10 AHDs to assess the maintainability of the AHD system, observing the maintenance time for each unit during the test. Each AHD shall be

MIL-PRF-32381

operated for not less than 500 hours in accordance with Table IV below, totaling not less than 5000 operational hours for 10 AHDs.

Table IV. Maintainability test hours per AHD unit

| Volume Level (%) | Duty Cycle (%) | Operation (hours) |
|------------------|----------------|-------------------|
| 100 | 65 | 50 |
| 75 | 90 | 200 |
| 50 | 90 | 200 |
| 25 | 65 | 50 |

4.7.3 Storage life. Accelerated aging testing shall be conducted at elevated environmental conditions as specified at the contract order.

4.7.4 Operational life. Accelerated aging testing shall be conducted at elevated environmental conditions as specified at the contract order.

4.7.5 AHD Color. All AHD system components shall be visually inspected for compliance with specified requirement

4.7.6 Marking. Each AHD shall be visually examined to verify marking.

4.8 Workmanship. Visually verify that all parts and assemblies meet 3.8.

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 that may be helpful, but is not mandatory.)

6.1 Intended use. The AHD is a military unique system that will allow for long range acoustic hailing and warning using an input microphone and/or input audio devices that facilitate the use of pre-recorded warning tones and voice messages, as well as spontaneous voice commands.

MIL-PRF-32381

6.2 Acquisition requirements. Acquisition documents should specify the following:

- a. Title, number and date of this specification and all reference documentation cited in Section 2 and noted in Section 6 for information.
- b. Requirements for submission of design verification sample
- c. Requirements for submission of first article sample
- d. Requirements for submission of conformance inspection
- e. Requirement for submission of inspection equipment designs.
- f. Requirement and provisions for submission of test data as required.
- g. Requirement for certificates of conformance for each lot or shipment of product
- h. Government Furnished Material or Equipment
- i. Requirement for markings

6.3 Submission of inspection equipment designs for approval. Submit copies of designs as required to: Commander, US Army ARDEC, Attn: RDAR-QEM-B, Picatinny, NJ 07806-5000. This address will be specified on the Contract Data Requirements List, DD Form 1423 in the contract.

6.4 Essential function failure. The AHD should provide the following essential functions at the levels specified in the AHD CPD. The unacceptable degradation of, or the inability to perform one of the following is defined as an essential function failure.

6.4.1 Emplace. The AHD should be capable of ground, vehicle, watercraft, or rooftop (building) emplacement. This essential function also includes the ability to provide power for the AHD.

6.4.2 Aim. The AHD should be able to be aimed in the direction of the intended target and locked into position.

6.4.3 Broadcast. The AHD should be able to broadcast intelligible voice, warning tones, and sounds, in a focused beam out to 300 meters.

6.5 Additional authorized items. Additional authorized items for use with the AHD system include:

- a. Mounting yoke
- b. Tripod
- c. Optical warning, distraction and suppression (OWDS) device
- d. High intensity spotlight
- e. AC-DC power converter
- f. Laser Range Finder, Class I

6.6 Tripod. The AHD should include a tripod capable of interfacing with the AHD. The tripod should be ruggedized to withstand the same environmental conditions and operating environments as the AHD.

MIL-PRF-32381

6.6.1 Tripod height. The AHD, when in an installed configuration on a tripod (see 4.6c), should have a height from ground to the midpoint of the AHD system no less than 60 inches.

6.6.2 Tripod manipulation. The tripod should allow for no less than 6 inches of additional inches of vertical height.

6.7 Environmental verifications pretest. The manufacturer should conduct environmental verifications pre- tests as stated in paragraph 4.6.

6.8 Subject term (keyword) listing.

Sound
Microphone
Audio
Voice transmission
Warning tones

6.9 Duty Cycles.

| 65% Duty Cycle Test File | | 90% Duty Cycle Test File | |
|--------------------------|---------|--------------------------|---------|
| Time (Sec) | Content | Time (Sec) | Content |
| 5.3625 | Tone | 7.425 | Tone |
| 32.175 | Voice | 44.55 | Voice |
| 5.3625 | Tone | 7.425 | Tone |
| 23 | Silent | 6.6 | Silent |
| Total Time: 65.9 | | Total Time: 66.0 | |

Preparing activity:
Army – AR
(Project 5830-2010-001)

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.daps.dla.mil>.