

MIL-B-85130(AS)

27 November 1979

MILITARY SPECIFICATION  
BEACON, UNDERWATER ACOUSTIC  
AIRCRAFT  
GENERAL SPECIFICATION FOR

This specification is approved for use by the Naval Air Systems Command, Department of the Navy, and is available for use by all Departments and Agencies of the Department of Defense.

1. SCOPE

1.1 General This specification covers the performance and interface requirements of underwater acoustic beacons used to locate aircraft or other items underwater. The beacon is mounted on the item to be located. Acoustic beacons emit pulses of sound which are detected with underwater receiving equipment. These beacons are also commonly called "pingers".  
NOTE: In using this specification Test Method references (shown in TABLES IV thru VII) appear at the end of paragraphs. Metric/English Equivalents are found in TABLE VIII. TABLES and Figures follow Section 6.

1.2 Classification - All beacons under this specification have identical characteristics except as classified in Table I.

1.3 Identification - The beacon shall be identified by nomenclature assigned to a specific configuration, or by manufacturer's model number and/or manufacturer's part number. (V-22)

1.4 Associated Equipment - The beacon is tested with commercially available test equipment. The beacon, depending on its frequency, is detected by:

10 KHz

Platform

AN/AQS-13 Sonar	Helicopter
AN/SSQ-41B Sonobuoy	Aircraft
AN/SSQ-57 Sonobuoy	Aircraft
AN/UQC-1 and AN/WQC-2 Underwater telephones	Ships
Unspecified acoustic detection systems	Ships, special purpose
Commercial hand-held receiver	Diver and Boat

Beneficial comments (recommendations, additions, deletions), and any pertinent data which may be of use in improving this document should be addressed to: Commanding Officer, Naval Air Engineering Center, Engineering Specifications and Standards Department (ESSD) Code 93, Lakehurst, NJ 08733, by using the self-addressed Standardization Document Improvement Proposal (DD Form 1426) appearing at the end of this document or by letter.

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37 KHzPlatform

AN/PQS-1 Hand held Sonar	Diver
AN/PQS-2 Portable Object Location Sonar	Diver
MK16 Receiver	Diver and Boat
MK72 Underwater Receiving Set	Diver and Boat
Unspecified acoustic detection systems	Ships, special purpose
Commerical hand-held receivers	Diver and Boat

## 2. APPLICABLE DOCUMENTS

2.1 Issue of Documents - The following documents of the issue in effect on date of invitation for bids or request for proposal form a part of this specification to the extent specified herein:

## SPECIFICATION

## MILITARY

- MIL-P-116 - Preservation - Packaging, Methods Of
- MIL-E-5400 - Electronic Equipment, Airborne, General Specification For
- MIL-T-5422 - Testing, Environmental, Airborne Electronic and Associated Equipment

## STANDARDS

## FEDERAL

- Fed. Std. No. 102 - Preservation, Packaging, and Packing Levels

## MILITARY

- MIL-STD-105 - Sampling Procedures and Tables for Inspection by Attributes
- MIL-STD-129 - Marking for Shipment and Storage
- MIL-STD-130 - Identification Marking of U.S. Military Property
- MIL-STD-454 - Standard General Requirements for Electronic Equipment
- MIL-STD-480 - Configuration Control - Engineering Changes, Deviations and Waivers

## OTHER

- NAVSEA OD 30393 - Design Principles and Practices for Controlling Hazards of Electromagnetic Radiation to Ordnance (HERO Design Guide)

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2.2 Availability of Documents - When requesting specifications and standards refer to both title and number. Copies of this specification and applicable specifications and standards required by Contractors in connection with specific procurement functions may be obtained upon application to the Commanding Officer, Publications and Forms Center, (Code 1051), 5801 Tabór Avenue, Philadelphia, PA 19120. The NAVSEA publication is available from the Commanding Officer, Naval Ordnance Station, Louisville, Kentucky 40214, Attention Code CTDO.

2.3 Precedence - When the requirements of the contract, this specification, or applicable subsidiary specification are in conflict, the following precedence shall apply:

(a) Contract - The contract shall have precedence over any specifications.

(b) This Specification - This specification shall have precedence over all applicable subsidiary specifications.

(c) Referenced Specification, Standards, and Requirements - Any referenced specification shall have precedence over all applicable subsidiary specifications referenced therein. All referenced specifications shall apply to the extent specified.

### 3. REQUIREMENTS

3.1 General - The beacon's primary function is safety related. The recovery of crashed aircraft is essential to determine the cause of loss. Correcting the cause of the loss will directly save lives and material. On this basis, survivability and reliable functioning are required without waiver or deviation.

3.2 Specification Sheets - The individual item requirements shall be as specified herein and in accordance with the applicable specification sheets. In the event of any conflict between requirements of this specification and the specification sheet, the latter shall govern.

3.3 Classification of Requirements - The requirements for the beacon and mount assembly are classified herein as follows:

<u>Requirement</u>	<u>Paragraph</u>
First Article	3.4
Design Changes	3.5
Parts and Material	3.6
Design and Construction	3.7
Environment	3.8
Performance	3.9
Reliability	3.10
Safety	3.11
Workmanship	3.12

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3.4 First Article - When specified in the order, the Contractor shall furnish sample units for First Article inspection and approval, see 6.4. First Article samples shall be fabricated using the same tooling, methods, and procedures that will be used in production. The sample shall successfully complete all tests under the First Article Quality Assurance provisions herein prior to a release to production; see 4.6.

3.5 Design Changes - All Changes in design that may affect the performance, reliability, or interface shall be tested prior to approval by the procuring activity for use in production. The beacon, manufactured with the changes incorporated, shall undergo First Article Testing, all or in part appropriate to the characteristics affected by the change as specified under the Quality Assurance provisions herein, see 4.6.

3.6 Parts and Material - The major considerations shall be crash survivability and performance reliability. The following requirements apply:

3.6.1 Nonstandard Parts and Material. The beacon and mount parts and material are not required to be repairable. All maintenance parts, that must be removed and replaced during mounting on the aircraft and during power source replacement shall be standard parts within the meaning of "Selection of parts and materials" of MIL-E-5400, excepting the power source. The power source, if replaceable, shall be fully identified on the beacon external case with all existing vendor model or part numbers. (V-24 & 26)

3.6.2 Corrosion Resistance. - All material surfaces not hermetically sealed shall be capable of or processed to be capable of resisting corrosion. The surfaces shall not corrode in the presence of salt spray fog within 48 hours, as described in "Finishes" of MIL-E-5400. The external surface of beacon and mount Classes A2 and B2 shall resist salt water corrosion due to emersion a minimum of 100 full operating periods; in addition shall not corrode in the presence of extended periods in salt spray fog. (V-33.d)

3.6.3 Fungus-inert Materials. - All material surfaces, not hermetically sealed, shall be fungus-inert or be treated to be fungus-resistant. Requirement four of MIL-STD-454 is applicable. This shall include all marking materials, finishes, lubricants, and dunking type batteries. (V-14 & 33.e)

3.6.4 Purity. - The physical make-up of the material, whether it may be the elements used, the manner in which the elements are combined, temper, or other process, shall be the same from unit to unit. Reprocessed material shall not be used, except that which has been specifically included in the units tested during First Article testing or included in the units tested during design change testing.

3.6.5 Flammability. - The beacon and mount exposed surfaces shall be non-flammable. The beacon shall be incapable of initiating a fire and/or rupturing with or without fragmentation due to a dead short of the power source. Explosive devices, squibs, gas generators, or other similar active devices (except dry cell or dunking batteries) shall not be used.

The presence of 704.4°C fire (direct flame) for 30 seconds prior to immersion, in a crash, shall not cause material failure and subsequent malfunctioning. The beacon shall not support (or propagate) an explosion initiated by an explosive projectile. Requirement three of MIL-STD-454 is applicable. (V-29, 38 & 43)

3.6.6 Parts and Material Reliability. - Parts and material used must be equal to, or more reliable than, those tested under First Article or design change testing.

3.6.7 Plastics. - Shall be of types and grades that are resistant to change in properties such as result in embrittlement, stress cracking, swelling, or softening when subjected to the manufacturing and/or cleaning process; and to prolonged exposure to aircraft hydraulic and/or fuel fumes, and to aging within the Storage and Service Life. (V-44)

3.6.8 Molded Parts. - There shall be no sharp corners in plastic parts; adequate stress relief radii shall be incorporated. Mold parting lines are acceptable providing that flashing is removed and that sealing is obtained in sealing areas. Ejection pin marks are acceptable. There shall be no porosity that extends to the surface in critical areas including O-ring sealing surfaces and strength locations. Parts shall not change size, nor slump during curing to other than the design size and shape. (V-30)

3.6.9 Finishes. - All external surfaces shall be lusterless. All finishes, marking, and labels shall not be applied in a manner that attenuates or restricts the beacon output. "Finishes" of MIL-E-5400 applies. (V-25)

3.6.10 Marking. - The first consideration in marking the beacon is to assure that the beacon output and pattern are not attenuated or reduced by application of a name plate, label or direct marking in a critical location. The beacon and mount shall each be marked. The mount shall be marked so that it can be identified when installed in an aircraft, without the beacon mounted in it. The mount marking shall additionally identify its associated beacon. Where applicable, battery change date indication, maintenance and installation warnings, and parts identification where necessary shall be marked. "Engineering design changes" and "Labels" of MIL-E-5400 and Requirement 67 of MIL-STD-454 are effective for guidance only and restricted in application consistent with small size, impact on performance, and requirements for a nonrepairable unit. The marking shall be permanent to the extent that it shall survive its environment, cleaning, and maintenance handling for the specified Service Life. Letters and numerals shall be as specified in MIL-STD-130. The beacon and mount shall each be marked to be legible at 300mm under white light of 1180 lumens as follows: (V-24)

(a) Nomenclature assigned in the contract, or required under 6.3 as a data item under the contract, or in the absence thereof, the Contractor's item name and model number.

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(b) National Stock Number (NSN) as provided for under the contract.

(c) Manufacturer's number (FSCM) followed by the manufacturer's part number (MFG P/N), and configuration identification/revision. The configuration identification/revision number or letter should be set off by a dash or bracket and shall change to reflect all revisions in the design and changes in source vendors.

(d) Weight

(e) Contract number

(f) Date manufactured

(g) US

(h) Technical manual

(i) Specification

(j) Inspection stamp applied after successful completion of individual acceptance testing.

(k) Power source replacement date peel off label (if applicable), or other means for periodic remarking for replacement. NOTE: The location shall be permanently indicated to eliminate application in an area that would restrict the output.

3.6.11 Fasteners. - All fasteners used to secure parts together, and those recommended to secure the mount to the aircraft shall comply with requirement 12 of MIL-STD-454. Where possible Hexagon-Head Cap Screws drilled for safety wires shall be used with safety wires. Water tight securing devices are excepted from this requirement but shall conform to maintenance and performance requirements. Holes for securing to the aircraft shall take 0.190-32 UNF (or Metric equivalent) cap screws and the material around the holes shall support the heads and washers, see Figure 1. (V-26)

3.6.12 Special Tools. - Requirement 63 of MIL-STD-454 applies, except special tools shall not be mounted on or in the equipment. (V-26)

3.6.13 Power Source. - Batteries or other power devices shall have a minimum Non-Operating Shelf and Service Life of 18 months; including six months logistic (Shelf) time and 12 months (Service) installed in aircraft; and Operating Service time specified in TABLE I (installed in aircraft underwater). The power device shall be unable to rupture the beacon case through malfunction. Power sources that may liberate lethal gas during malfunction, leakage, or maintenance shall not be used; notwithstanding how they are designed, fabricated, or protected. This includes lithium cells. The power device shall be physically keyed to prevent incorrect installation. Where the power device is subject to failure with time, it shall be marked with the date of manufacture and the replacement date. The device's case shall have installation arrows, polarity markings, and full recording data including source and model number. (V-26, 33, 43, & 44)



3.7 Design and Construction - The beacon and its mount may be a single unit or separate units of an assembly. It/they shall be designed and constructed to survive transportation, storage, maintenance, captive flight, crash, and underwater environments; and function in the underwater environment.

3.7.1 Detailed Mechanical and Electrical Design. - The detailed mechanical and electrical design of the equipment shall be accomplished by the contractor, subject to the requirements of this specification. The requirements of this specification are detailed only to the extent considered necessary to obtain the desired mechanical and acoustical characteristics, performance, and permanence of the same. The design layout and assembly of the units and their component parts shall be such as to facilitate quantity production and to result in minimum size and weight.

3.7.2 Nonrepairable subassemblies. - Subassemblies of high reliability or relatively low cost shall be constructed as nonrepairable. See 3.6.1.

3.7.3 Explosion-proofing. - Equipment or units thereof shall be considered explosive proof when they will not cause ignition of an ambient explosive gaseous mixture with air after having been in such an atmosphere for a period long enough to be premeated by such atmosphere. In general, this condition will be satisfied when parts are likely to produce sparking or arcing, and which are not contained within pressurized containers, are made explosion-proof. (V-43.b)

3.7.4 Encapsulation and Embedment - If encapsulation or embedment (potting) is used, Requirement 47 of MIL-STD-454 shall be considered (not a requirement).

3.7.5 Operational Checkout Provisions - The beacon shall be designed and constructed so that its performance may be evaluated in its installed location in an aircraft. Special tools and test equipment required shall be recommended. Precedence shall be given to simple acoustic detection testers that convert airborne sound to the aural range. Dunking type power supplies shall not require wetting; other means shall be employed to cause the beacon to function. (V-27)

3.7.6 Maintainability - The maintenance required during Service Life shall be limited to: (V-28) (See 6.6)

(a) wiping clean one time per week; except, when installed in aircraft position that receives sand and dust, salt fog, dew, and/or frost, the wiping clean shall not be required more than one time every third day, and daily for classes with maximum life limit, such as class A4, (V-32)

(b) annual (minimum interval) battery replacement, and

(c) periodic functional tests.

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3.7.7 Moisture Pockets - Requirement 31 of MIL-STD-454 is applicable. The beacon and mount shall be designed and constructed to preclude premature functioning. (V-33.c & .d)

3.7.8 Electromagnetic Radiation Protection - The beacon shall be designed and constructed to completely shield its functioning parts from electromagnetic radiation, or the exposed circuitry so protected, that circuit components will not prematurely fail. Aircraft near field radio, radar, countermeasure type of radiation described in NAVSEA OD 30393 (which may occur during operation, malfunction, maintenance, of while being actively irradiated) shall not cause beacon failure. (V-1)

3.7.9 Form and Weight - The assembled unit shall not exceed the volume dimensional envelope and weight specified in TABLE I for the required frequency, see Figure 1. 1/ (V-23)

3.7.10 Protection - The mount or the beacon case shall be designed with strong points or boundaries to prevent crushing the beacon, restrain the beacon, and secure it to an aircraft or other object. The strong member shall prevent hard, flat, structures of greater flat dimension than specified in 3.7.9 from crushing or otherwise damaging the beacon during an aircraft crash with a force not exceeding 2268 kgm. The beacon shall be restrained within this protective mount or be a part of it. (V-37)

3.7.11 Security - Four holes shall be provided in the mount or assembly to secure it to the airframe or other object. The four hole centers shall measure as specified in TABLE I for specific frequency, see Figure 1. 1/

3.7.12 Orientation - The assembly shall be designed and constructed for the best survivability when the beacon's longitudinal axis is parallel with the longitudinal axis of the aircraft with one specific end forward. An arrow and forward, or an arrowed forward (◀FORWARD), shall be marked on the beacon in this direction. The beacon and mount shall survive all other attitudes of installation or aircraft crash impact angles, other than forward, with no less than 50% of its capability to survive forward. (V-24 & 36)

3.7.13 Assembly - The beacon, if not integral with the mount, shall be capable of being removed from the forward end of the mount for maintenance and returned without removal of the mounts, or requirement for special tools. If integral, the assembly shall be removable without the requirement of special tools. (V-26)

3.7.14 Power Provision - The beacon may be designed and constructed for onetime use in the water with a permanent power source, except that class A2 and B2 (stainless steel case) shall be reusable. Replaceable power source (see 3.6.13) assembly shall be complete and within the envelope specified in 3.7.9. (V-26, 42 & 44)

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1/ This provides two way interchangeability with existing installations as required in 3.7.15.



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3.7.15 Interchangeability - Interchangeability shall exist between all models, in that they shall match the same airframe (or other item) mounting holes and the size envelope specified in TABLE I for their Class. See Figure 1. Where more than one unit or subassembly comprises a complete Underwater Acoustic Beacon, such as a mount and a beacon, the units or sub-assemblies for that model shall be interchangeable in the initial order and on reorder. "Interchangeability", "Interchangeability of recorded equipment", and "Interchangability conflicts" of MIL-E-5400 shall apply. (V-23)

3.8 Environment - The beacon and its mount shall survive the environments of shipping (see Section 5), storage, handling, mounting, maintenance, captive flight (including catapult launch and arrested landings), aircraft crash, and shall function during underwater captive sinking and tidal movements for its specified operating life. The beacon and mount configurations, that shall survive these environments, are specified in TABLE II. The environment normally will be restricted in its application to the beacon. During shipping and storage and associated handling, the beacon and mount will be protected by shipping containers, mitigating direct attack. During Service handling and maintenance the beacon and mount have no protection. While installed in an aircraft (prior to crash) the beacon and mount are in a closed compartment, not sealed nor heated. During a crash, the affects of water entry (impact) are modified by the airframe aborbing part of the initial shock. Underwater, the beacon is directly affected, but shall function during this period. TABLE III summarizes the total environment, with specific life cycle extremes for each non-operating and operating environment. The beacon and mount shall survive each in turn consistent with a 20 year aircraft life cycle as indicated under "Frequency" in TABLE III. At any one time, the beacon shall survive one combination of environmental stresses, as indicated in Figure 2.

3.8.1 Non-Operating - The environment shall not cause the beacon to function prematurely; except with a power source installed, the power depletion caused by the environment shall not decrease the Service Non-Operating Life nor the Service Operating Life specified in 3.6.13. This shall include the extreme environmental conditions continuously applied, but with maintenance performed normally once weekly, limited to external surface wiping or similar maintenance function that does not include disassembly or recharging. (See 3.7.6(a) for adverse installation locations and maximum life units) The non-operating environments of TABLE III, that shall be survived by the beacon and mount, includes: (V-28)

- (a) the packaged unit (without separate power source installed) in the logistic shipping "pipeline" from the manufacturer to procuring destination and subsequent reshipments to the aircraft installation site. The transportation mode is on the surface, or paved roads. The packaged unit shall not be damaged by: loading and unloading shocks and road vibration; temperature shock while in a closed vehicle; or by high humidity; (V-6, 7, 8, 13, & 15)

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- (b) the packaged unit (without separate power source installed) in a covered storage. The packaged unit shall not be damaged by; temperature shock, high humidity, and/or fungus; and shall be protected from sand and dust; (V-13, 14, & 19)
- (c) handling while protected by a package and subsequently while unprotected. The package unit shall not be damaged by handling drops. The unpackaged unit (with power source installed) shall not be damaged by: short handling drops on all faces and corners, both assembled and disassembled (if mount and beacon are sub-assemblies); exposure to a salt atmosphere, or sand and dust; (V-15, 19, 20 & 33.d)
- (d) mounted in a (non-flying) aircraft compartment which may be closed or open for maintenance, the beacon (with power source installed) installed in its mount. The mounted unit's power shall not be depleted below Service and Operating Life requirements by: frost, dew, humidity, salt atmosphere, sand/dust or fungus at high or low temperature consistent therewith; (V-28, 32 & 33.d & .e)
- (e) mounted in an aircraft, in a closed compartment, while the aircraft is being catapulted, is undergoing an arrested landing or experiencing a hard landing. The mounted unit shall not be damaged by the shocks involved, at either high or low temperature, in a salt atmosphere. (V-33.d)
- (f) mounted in a closed compartment in the rear half of an aircraft in flight where the compartment is not adjacent to engines or machine gun mounts. The mounted unit shall not be damaged by: vibration, shock, and temperature and pressure changes with altitude; and (V-34 & 35, & VII-1)
- (g) mounted in rear half of an aircraft that crashes nose first into the water at full power from high altitude, or makes multitude impacts on successive angles from the aircraft longitudinal axis. The beacon shall remain secure in its mount, the mount shall not fail in its interface with securing bolts, and the beacon shall not be damaged by fuel fire of short duration. (V-36, 37 & 38, & VII-2)

3.8.2. Operating - The underwater environment shall cause the beacon to function without failure for its Operating Service Life. The beacon, mounted in an aircraft, shall operate in the underwater environment of TABLE III, which includes: Increased pressure with depth; high, low, or no salinity; and high or low temperature. (V-39, VI-3, & VII-3)

3.9 Performance - The beacon shall perform with the characteristics listed in TABLE I for each specific class and the following:

- 3.9.1. Activation - The beacon shall emit no less than the minimum required acoustic output within five minutes of water entry. (V-39 & VII-1)
- 3.9.2 Output Level - The beacon output is listed in TABLE I. The output level shall not be less than the minimum peak sound pressure level for the entire pulse length period (3.9.4), not including the rise and decay time. See Figure 4. (V-39 & VII-2)
- 3.9.3 Output Frequency - The output is continuous wave (CW). The frequency is listed in TABLE I. (V-39, VI-3.a, VII-3)
- 3.9.4 Pulse Length - See TABLE I and Figure 4. (V-39, VI-3.c, VII-3)
- 3.9.5 Pulse Repetition Rate - See TABLE I. (V-39, VI-3.b, VII-3)
- 3.9.6 Radiation Pattern - The required output level shall be emitted radially 360° and in a minimum of 80 percent of a spherical envelope around the unmounted beacon. The mount shall not reduce the envelope more than 25%. See Figure 4. (V-41)
- 3.9.7 Operating Life - The life (of the acoustic output), specified in TABLE I, shall be full term when starting following the last day of the power source Shelf and Service Life, required in paragraph 3.6.13 and prior thereto. (V-40)
- 3.9.8. Termination - The operating life is specified in TABLE I. The life shall terminate within the tolerance specified. (V-40)
- 3.10 Reliability- The beacon shall function as specified, every time without fail, providing that: the power source is within its effective life period, periodic maintenance had been performed, power source replacement was properly performed without loss of watertight integrity, aircraft installation was consistent with recommendations in 6.5, the environments of 3.8 were not exceeded, and that the operating site does not mask the output by covering with mud or other acoustic attenuators. The electrical/electronic subassemblies of each beacon shall be operated a minimum of 15 percent of its operating life requirement during fabrication without failure to prove part and circuit reliability. Each unit shall undergo minor impact shocks to ensure that assembly and circuitry are correct and secure. Each complete beacon shall be proven to its most practical depth of recovery, a portion of its rated depth of operation; which shall assure watertight integrity and operating output level and frequency. See 3.1 for basis of reliability. V-44, VI-1, 2 & 4)
- 3.11 Safety - The beacon shall not be a source of damage to an aircraft, and shall not cause injury to maintenance personnel. The beacon case shall retain any power source failure, including: explosion, gassing, corrosive leakage, and/or arcing. The beacon and mount edges, fasteners, and appendages shall not have sharp edges that could cut hands or snag clothing. The beacon shall have external warnings, if on opening or other maintenance, spring or pressurized devices may strike personnel. (V-24, 30 & 43)
- 3.12 Workmanship The fabrication of the beacon and mount shall conform to Requirement 9 of MIL-STD-454. (V-31)

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#### 4. QUALITY ASSURANCE PROVISIONS.

4.1 General - Prior to submittal of the First Article samples, the contractor shall demonstrate design performance readiness (Contractor Demonstration): and shall deliver preliminary drafts of outline/interface/replaceable parts drawings, packaging drawings, marking drawings, test procedures, and technical manual (as specified in the order, see 6.3) for approval. The contractor shall deliver the First Article sample for laboratory testing, which shall include two "Design Record Models" (see 6.4), and specified certifications (6.2(j)). The allocated baseline (as defined in MIL-STD-480) is established by successfully passing the First Article performance tests. The "Design Record Models" are retained by the Government for base line reference. The design is frozen at the First Article acceptance and shall be changed thereafter by resubmittal of a new First Article sample (which includes two "Design Record Models") with the changes incorporated; or part thereof appropriate to the change involved as determined by the First Article test activity adequate to prove performance. Release to production is granted (in either case) by the procuring activity on successfully passing the test. In production each unit fabricated is individually tested by the Contractor for compliance with performance requirements (except those tests that prove the limits of structural integrity). The contractor provides certification of the testing. The procuring activity representative shall make a random selection of units for Government verification of performance tests (which additionally include structural integrity testing). The procuring activity's representative accepts the delivery of the packaged material in accordance with the terms of the contract based on the certification of testing, verification testing, and conformance of packaging with approved drawings. All units tested by Government (except "Design Record Models") are returned to the Contractor to be included in the delivered quantity, after the Contractor has recertified their conformance. (V-44)

4.2 Responsibility for Inspection - Unless otherwise specified in the contract, or this specification, the Contractor is responsible for the performance of all inspection requirements as specified herein. Except as otherwise specified in the contract, the Contractor may use his own or any other facilities suitable for the performance of the inspection requirements specified herein, unless disapproved by the Government. The Government reserves the right to perform any of the inspections set forth in this specification where such inspection are deemed necessary to assure supplies conform to the prescribed requirements. No item shall be submitted until it has been previously tested and inspected by the Contractor and found to comply, to the best of his knowledge and belief, with all applicable requirements.

4.3 Classification of Inspections The inspections specified herein are classified as follows:

Inspection	Paragraph
Contractor Demonstration	4.5
First Article	4.6
Quality Conformance	4.7
Quality Verification	4.8

4.4 Inspection Conditions Unless otherwise specified, all inspections and tests shall be performed in accordance with the test conditions specified under the test requirement herein or under the referenced test document. In the absence of specified test conditions, the ambient condition then existing shall be the condition, if it is consistent with the test objective.

4.5 Contractor Demonstration The Contractor shall demonstrate one or more units, in accordance with TABLE IV, for representatives of the First Article test activity (or otherwise) designated by the contract. The Demonstration shall show readiness to proceed with First Article testing. TABLE IV includes critical tests and requirements. Additional tests may be added by the Contractor to demonstrate unique design features, or new or unusual material. Each demonstration shall be successful. Portions of TABLE IV, not depending on preconditioning by prior steps, may be redemonstrated, without repeating successful portions.

4.6 First Article Test The Contractor shall deliver the test sample required in the contract or order (6.4). The Government First Article test activities will be listed in the order (6.2). The test will be conducted in accordance with TABLE V, which is based on a test sample illustrated in Figure 3. First, one unit is evaluated in electromagnetic fields, then laboratory test starts with the fully packaged sample and duplicates the life cycle where the sample configuration progressed through transportation, storage, handling/maintenance, flight, crash, and underwater operation. The test division and sequence provides for conducting the test in specific extreme life profiles, where most steps provide a precondition for the next. Notwithstanding this, the test activity has the option of rearranging the sequence, deleting any portion, and/or adding any new or revised tests due to test facility availability and/or the unique design to be tested; providing that the scope or limits of Section 3 and 5 requirements are not exceeded and that they are adequately tested or evaluated. To this end real environment may be substituted in lieu of laboratory testing when more economical or laboratory facilities are limited or inadequate. Vehicles used to simulate aircraft water entry crash shock, in lieu of laboratory testing, shall be capable of water entry without breakup and shall have a mounting surface capable of supporting the beacon and mount. All sample units shall function as specified. Retesting may be limited to the requirement that was not met, providing that all applicable preconditioning has been included and that it does not affect any subsequent function. The packaging portion of the tests include Beacon and Mount Assemblies for both the affect on the assemblies and their interface with the packaging. The portion of the packages that do not have the assemblies, shall have dummy material of the same weight and center of gravity substituted. The assemblies shall be located in the most vulnerable position in the package system. Figure 3 illustrates the intent. The sample, however arranged, shall meet this test sample requirement. Two units of the sample shall be specially configured by the contractor to facilitate conducting hazard type tests, in accordance with instructions to be provided by the First Article test activity observers at the Contractor



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Demonstration. All units tested shall meet the requirements without waiver or deviation. The Contractor shall have conducted tests on each unit, prior to submittal, that would have eliminated all workmanship and quality assurance defects.

4.7 Quality Conformance - The Contractor shall conduct the inspection/ tests in TABLE VI on each (100%) Beacon and Mount assembly before delivery. All units failing the test shall either be repaired or replaced and retested. The Contractor shall provide certification that all units were in accordance with the requirements, and shall provide the recorded results of the Individual Tests to the procuring activity representative and the activity having technical cognizance specified in the contract or order.

4.8 Quality Verification - The procuring activity representative shall draw a random sample from all the units to be delivered, prior to their packaging. The sample size shall be based on MIL-STD-105, inspection level S-3. The sample, with power sources installed, shall be delivered to the First Article test activity for testing in accordance with TABLE VII. On return of the sample, that had successfully passed the Quality verification testing, and following its recertification by the Contractor, the procuring activity representative verifies that packaging and marking for shipment complies with this specification and the order or contract.

4.8.1 Baseline Verification - The sample submitted for Quality Verification may be further tested in accordance with part or all of TABLE V laboratory testing, to verify the Baseline established at First Article; at the option of the test activity, based on the test results.

## 5. PACKAGING

5.1 General - The packaging shall be adequate for shipping to the destination specified in the order, storage at destination, and subsequent reshipment of portions of the order, each to different installation sites. The external package is only used in the initial shipment; and the unit and intermediate packages are used for storage and reshipment. All packages shall provide physical and mechanical protection for the beacon and mount assembly.

5.2 Level - Preservation and packaging, and packing shall be Level B for unit and intermediate packages and Level C for exterior and/or unitized shipping containers as defined in Fed. Std. No. 102. (V-4, 11 & 18) Assemblies for ultimate destination outside CONUS shall be Level A when specified by the order 6.2(f), with requirements and corresponding tests increased in accordance with MIL-P-116 appropriate to Level A.

5.3 First Article - When specified in the order, the Contractor shall furnish sample units for First Article inspection and approval, see 6.4. First Article samples shall be fabricated using the same tooling, methods, and procedures that will be used in production. The sample shall successfully complete all tests under the First Article Quality Assurance provisions herein prior to a release to production; see 4.6.

5.4 Design Changes - All Changes in design that may affect the performance, shall be tested prior to approval by the procuring activity for use



in production. The packaging, manufactured with the changes incorporated, shall undergo First Article Testing, as specified under the Quality Assurance provisions herein, see 4.6.

5.5 Cleaning - The beacon and mount shall be cleaned in accordance with Method C-1 of MIL-P-116. (V-21)

5.6 Preservatives - The beacon and mount shall not have preservatives applied. See 3.6.2 and 3.6.3. (V-21)

5.7 Preservation - Packaging - Each assembled beacon and mount shall be protected by a unit package as specified by Method III of MIL-P-116. The package shall exclude sand and dust. This package shall not serve as the shipping container. (V-18 & 20)

5.8. Packing - Ten unit packages shall be packed in one intermediate shipping container. Six intermediate shipping containers shall be packed in one exterior shipping container. The (individual) intermediate containers shall be used for shipping when less than four make up an order. Partial intermediate and partial external shipping containers shall have adequate dunnage and/or bracing to make up the empty space and retain the load in position. The plan for partial loads shall be incorporated in the contractors drawings (6.3). Deviations to the intermediate and/or external packing shall be specified in the order (6.2). (V-5 & 12)

5.9 Shipping and Storage Environment - See Table III for environment. Each level of packing (unit, intermediate, and external and/or unitized) shall be capable of surviving this environment.

5.10 Labeling - Labeling shall be in accordance with the requirements of the Federal Hazardous Substance Labeling Act, if power sources, which include substances that fall under the act, are included in the package. (V-3 & 10)

5.11 Marking for Shipment and Storage - In Addition to any special marking required by the order (see 6.2) each unit, intermediate, exterior container, and/or unitized load shall be marked in accordance with MIL-STD-129. (V-2, 9 & 16)

5.11.1 Shelf-life Marking - MIL-STD-129 Type I shelf-life marking shall be included in the marking on each unit, intermediate and exterior container when the order (6.2) required that perishable power sources be delivered in each beacon. Where the power source is subject to corrosive destruction of the beacon, if not removed at end of shelf life, a warning to that effect shall be placed on the exterior of each wrap (unit, intermediate, exterior, and/or unitized). (V-2, 9 & 16)

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## 6 NOTES AND CONCLUDING MATERIAL

6.1 Intended Use - The Beacon and Mount assembly is attached to aircraft to assist in their location underwater for post crash analysis of the cause. The identification of the cause enables corrective action to prevent further losses. Normally beacons are attached to the flight recorder, the cockpit voice recorders, and/or the airframe to enable location following breakup. The beacons are also used to locate re-entry vehicles, valuable/hazardous/sensitive cargo, underwater development/test/training weapons, well heads, navigation positions/hazards; and in special small configurations to track fish and other underwater creatures under study. Swimmers and other personnel that must be located in the water, during low visibility, also may be equipped for rendezvous or life saving. The beacon is located by a number of sensors (see 1.4) each varying in its capability of range, bearing, nearness of approach, and availability.

6.2 Ordering Data - Procurement documents should specify the following:

	<u>Paragraph</u>
(a) Title, number, and date of this specification and associated specification sheet, if applicable, and amendments thereto.	(page 1) 3.2
(b) Class, and assigned nomenclature or manufacturer's model number and/or part number.	1.2 & 1.3
(c) National Stock Number.	3.6.10(b)
(d) Requirement for power sources (batteries or other) to be provided installed in the Beacon assembly, ready for use. (Note, this should be limited to units being shipped direct to the installation activity for immediate installation.)	5.11.1
(e) Deviations to packaging and marking requirements	5.8 & 5.11
(f) Shipments with destinations outside CONUS shall have Preservation and Package, and Packing Level A, MIL-P-116 applies for the additional requirements.	5.2
(g) Reorder, shall require material identical to that provided under a prior contract, that was qualified by First Article. The Contractor's drawing or part number (and revision thereto) shall be specified to insure interchangeability and continuance of configuration control from the baseline that had been established. First Article is not required on reorder with an established production baseline.	3.7.15

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<u>Ordering Data (Con't)</u>	<u>Paragraph</u>
(h) Latent defect clause	3.6.7
(j) Certification from the Contractor:	4.1
(i) Successful completion of Quality Conformance Individual Tests (Conducted by the Contractor) including the recorded values, prior to delivery. Distribution: Procuring Contract Office representative and Material Command HQ technical code.	4.7 & TABLE VI
(ii) Explosive and/or active devices, within the meaning of 3.6.5; and lethal gas generators described in 3.6.13 are not included in the design of the units to be delivered. Provide with First Article Sample (6.4). <u>1/</u>	3.6.5 & V-29 3.6.13
(iii) Total days operation (ping-days) available at the end of 18 months (from power source manufacturing date) without power depletion that would be caused by adverse environment, but including power control current and the loss due to aging. "Power control current" has also been defined as "switch-current", "off-current", and for this specification shall mean "Service Non-Operating Life (3.8.1) water immersion sensor monitoring current drain". Provide with First Article Sample (6.4). <u>1/</u>	V-33.f
(iv) Additional packaging protection due to shipping Beacon and Mount assemblies with power sources installed. Note: This specification's shipping requirement does not include power sources unless they are integral. The First Article may include testing packaging for Beacon and Mount with power source installed, if ordered. The certification shall either reference such a successful past test, or the successful test results of Contractor testing in accordance with Test Methods V-7, V-8.a, V-15, and V-19 of TABLE V. Distribution: Procuring Contract Office representative.	5.8 & 5.11.1
(k) Requirement that the Contractor advise the Systems Command HQ technical code and Procuring Contract Office when special tools and test equipment are recommended. The contract should provide for provisioned items of these categories. <u>1/</u>	3.7.5
(m) List of activities:	
(i) Systems Command HQ technical code for Acoustic Beacons.	6.2(j)(i)
(ii) Procuring Contract Office representative.	6.2(j)(i)

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1/ Not required on reorder without First Article.

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- (iii) First Article test activity 6.2(j)(ii)&(j)(iii)
- (iv) Systems Command HQ cognizant design code V-1.a  
for "Design Safety (HERO)". 1/
- (v) Cognizant Field Activity (CFA) for Electro- V-1.b  
magnetic Radiation Hazards testing. 1/

6.3 Data Requirements - When this specification is used in a procurement, which incorporates a DD Form 1423 and invokes the provisions of 7-104.9(n) of the Armed Services Procurement Regulations, the data requirements identified below will be developed as specified by an approval Data Item Description (DD Form 1664) and additionally modified herein, and delivered in accordance with the approved Contract Data Requirements List (DD Form 1423) incorporated into the contract. When the provisions of ASPR-7-104.9(n) are not invoked, the data specified below will be delivered by the Contractor in accordance with the contract requirements. Deliverable data required by the specification is cited in the following paragraphs:

<u>Paragraph</u>	<u>Data Requirement</u>	<u>Applicable DID</u>
3.6.10.a	Nomenclature (limited to: Assignment of nomenclature, or confirmation of existing nomenclature)	UDI-E-21336
6.2(j)	Certification of Compliance (i. Quality Conformance) (ii. Explosive/active devices) <u>1/</u> (iii. Equipment life) <u>1/</u> (iv. Additional protection)	DI-E-2121
3.6.12, 3.7.5, 4.6, 6.2(k) & V-41.a	Data, Design - Equipment Submitted For Testing (Special Tools And Test Equipment and Suspension For Radiation Pattern Tests recommendations included) <u>1/</u>	UDI-E-21338
4.7	Procedures, Test (limited to: Individual Acceptance Testing) <u>1/</u>	UDI-T-21347
3.5	Engineering Change Proposals (ECPs) And Requests For Deviations And Waivers (Short Form)	DI-E-2038

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1/ Not required on reorder without First Article.

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<u>Paragraph</u>	<u>Data Requirement</u>	<u>Applicable DID</u>
4.2	Plan, Inspection And Test <u>1/</u>	UDI-R-21375
3.6.1, 3.7.9 3.7.11, 3.7.15 5.8 & TABLES IV & V	Drawings, Engineering and Associated Lists (Level 2) (limited to interface, outline, marking, replaceable parts and components, and complete packaging coverage) <u>1/</u>	DI-E-7014
3.7.6, & TABLES IV & V	Manual, Technical <u>1/</u>	UDI-M-21368

(Copies of data item descriptions required by Contractors in connection with specific procurement functions should be obtained from procuring activity or as described by the Contracting Officer).

6.4 Instructions for First Article First Article tests, once completed, need not be rerun providing that configuration control is maintained from contract to contract. When a First Article is required, the contract shall invoke the provisions of 7104.55(b) of the Armed Services Procurement Regulations. The clause in the contract shall require the delivery of the following material: (See Figure 3)

(a) Increment I

One Beacon Assembly with Power Source installed to Cognizant Field Activity for Electromagnetic Radiation Hazards testing.

(b) Increment II

One external pack containing six intermediate packages, one of which contains 10 unit packages, and (of these) six of the unit packages each containing a Beacon and Mount assembly without power source. The balance of the unit and intermediate packages are to the same weight and center of gravity, with dummy loads, equal to full loading. The contract may specify "with power sources", see 6.2.(d) and (j)(iv).

Two Beacon and Mount assemblies without power sources installed.

Eight (Nine for Classes A2 and B2) power sources. Six may be installed, see above.

Two Beacon and Mount assemblies with power sources installed, and specially configured to enable remote shorting of the power sources at full current capacity.

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1/ Not required on reorder without First Article.

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Mockup of aircraft frame or bulkhead with one end marked forward and one down. Mounting holes shall be provided for eight Beacon and Mount assemblies. See V-26, 35, 36.a, and 36.b.

This increment shall be provided to the First Article test activity on the successful completion of Increment I.

(c) Increment III

Two Beacon and Mount assemblies, with power sources installed, and marked "Design Record Models" to the First Article test activity on the successful completion of Increment II.

6.5 Mounting on Aircraft - These specification requirements assume that the Beacon and Mount assembly:

- (a) will be mounted in the rear half of the aircraft,
- (b) will be secured to a substantial frame or bulkhead,
- (c) will be secured by high strength bolts or other fasteners,
- (d) will not be in close proximity to an engine or other high heat and vibration components, or aircraft machine guns,
- (e) will be mounted with the beacon longitudinal axis parallel to the aircraft longitudinal axis,
- (f) will be accessible for periodic maintenance in place, with removal space forward of the installation,
- (g) will be in a compartment normally closed to the external elements, but near an airframe location that probably will open or carry away during a crash, and
- (h) will not be shielded by honeycomb or other sound absorbing material.

6.6 Beacon maintenance - This specification's 20 year life and Operating Service Life requirements assumes that the Beacon:

- (a) will not have a power source installed either with polarity reversed or with a higher voltage,
- (b) power source replacement process will not damage sealing surfaces and threads on watertight closure devices,
- (c) will not have marking stickers or paint applied to the exterior other than in the area designated for such application by marking (see 3.6.10 (k)),



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- (d) will be inspected for surface damage such as dents and gouges (the cause of cracked transducers and low output) at regular intervals, while installed in aircraft,
- (e) will be checked for functioning on a routine basis while installed in aircraft,
- (f) will be cleaned at the in-water-sensor activating surfaces, while installed in aircraft, as frequently as necessary to remove dust and salt to prevent activation by humidity, dew, frost, and rain,
- (g) will be checked at the time of power source replacement or not more than every three years for performance characteristics on a practical basis:
  - (1) output frequency is within the band-width of receivers in use.
  - (2) pulses occur approximately once a second (except Class A4 which is twice a second).
  - (3) pulses have a good solid sound without a noticeable noise component.
  - (4) acoustic output level is not down as compared with other units under the same conditions of shielding, reflecting surfaces, and distance from test sensor.

6.7 Changes from previous issue. N/A.

6.8 Cognizant design code - NAVAIRSYSCOM HQ (AIR-54901E).

Preparing Activity:  
NAVY - AS

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TABLE I. Characteristics.

Class							Beacon and Mount Characteristics	
A1	A2	A3	A4	B1	B2	B3		
								<u>Frequency</u>
X	X	X	X	X	X	X	→	10±0.2kHz
X	X	X	X				→	37.5±1kHz
								<u>Pulse Length MIN</u>
X	X	X	X	X	X	X	→	9 milliseconds
								<u>Pulse Repetition Rate</u>
X	X	X		X	X	X	→	1 per second
			X				→	2 per second
								<u>Sound Pressure Level (Peak) MIN</u>
X	X	X	X				→	Starting Life 163.5db//1μPa
X	X	X	X				→	Ending Life 160db//1μPa
				X	X	X	→	Starting Life 166db//1μPa
				X	X	X	→	Ending Life 163.5db//1μPa
								<u>Life (Operating)</u>
				X	X	X	→	10 days minimum
			X				→	12 ±2 days
X	X	X					→	30 days minimum
								<u>Interface (see 3.7.9, 3.7.11, and 3.7.15), mm</u>
X	X	X	X				→	Length 103.6, Width 50.8, Height 44.5 Max; 4 Mounting holes 4.85 MIN, centers 38.1X60.95; Assembly hardware 5.6 additional one end Max.
				X	X	X	→	Length 158.8, Width 63.5, Height 65.1 MAX; 4 Mounting holes 4.85 MIN, centers 50.8X76.2; Assembly hardware 5.6 additional one end MAX.
								<u>Material: Beacon Case Mounts</u>
X			X	X			→	Aluminum Aluminum
	X				X		→	Stainless Steel unspecified
		X				X	→	Titanium unspecified
								<u>Weight Maximum</u>
X			X				→	430
				X			→	1080
	X						→	525
					X		→	unspecified
		X					→	500
						X	→	unspecified

TABLE II. Environmental Configurations.

Matrix	In Shipping Container See Section 5.	Loose Sub-Assemblies and/or Assembly	Hard Mounted on Airframe
Shipping	X		
Storage	X		
Handling	X	X	
Mounting		X	X
Maintenance		X	X
Captive Flight			X
Crash			X
Underwater			X

MIL-B-85130(AS) TABLE III. Environmental profile.

Environments 1/	Temperature °C 2/	Altitude/ Depth	Pressure	Moisture 2/
<b>NON OPERATING</b> Shipping	-54 +71	Land Level +	97.8 ± 1.5kNm <sup>2</sup>	Humidity Vapor Pressure 2.972 to 3.883 kNm <sup>2</sup> 6/
Storage	-54 +71	Land Level+	97.8 ± 1.5kNm <sup>2</sup>	Same as Shipping
Handling	-40 +53	Land Level +	97.8 ± 1.5kNm <sup>2</sup>	Salt Atmosphere
Mounted on aircraft. (Mon-flight & Maintenance)	-40 +53	Land/Sea Level +	97.8 ± 1.5kNm <sup>2</sup>	Dew/Frost, Hi Humidity, Salt Atmosphere
Catapult	-37 +51	Sea Level +	97.8 ± 1.5kNm <sup>2</sup>	Salt Atmosphere
Captive Flight (Naval aircraft over ocean areas)	-62 +54	Up to 30 km	Decreases to 701Nm <sup>2</sup> at 1.7kNm <sup>2</sup> / sec rate of change and equal increases	(Closed compartment, Dry, Lo. Humidity)
Arrested or Hard Landing	-37 +51	Sea Level +	97.8 ± 1.5kNm <sup>2</sup>	Salt Atmosphere
Water Entry Crash	704.4 for 30 seconds (Fire)3/	Sea Level	97.8 ± 1.5kNm <sup>2</sup> Atmosphere.  2268kg structural crush.	-
<b>OPERATING</b> Underwater	+0.6 +30	Down to 6.1km	0.1 to 61.2MNm <sup>2</sup>	Water 0-3.6% Salt by Weight

1/ See TABLE II for configuration.

2/ Extremes and/or opposing environments are shown together; requirements at any one time shall be consistent with nature. See figure 2.

3/ Subsequent to water entry shock.

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Sand Dust <u>2/</u>	Fungus <u>2/</u>	Vibration	Shock <u>4/</u>	Frequency Or Period
-	-	5-200Hz 1.5g's	1.2m free fall drop all faces, edges, and cor- ners; total 26 drops	.4827 km
-	Aspergillus niger Aspergillus flavus Aspergillus versicolor Pencillium funiculosum Chaetomium globosum	-	-	once 8 months
Particle size up to 500µm (above 21°C & below 30% R H.)	-	-	305mm free fall (w. & w/o mount, and w. & w/o unit pack)	20 evolutions
Particle size up to 150µm (above 21°C & below 30% R.H.)	Same as storage	-	-	20 years: 192 months operational 48 months maintenance
-	-	-	6 g's forward	2000
-	-	5-28Hz 0.18DA" 28-56Hz ± 7g's 56-76Hz 0.044 DA" 76-2000Hz ± 12g's	10g's down (climb)	6,000 flights 13,000 flight hrs minimum
-	-	-	6 g's aft 9-15 g's up 730ms	2000
-	-	-	5000g's aft 0.5 ms; 1000g's 5ms base; 40g's all axis 11ms twice both dir- ections.	one time <u>5/</u>
-	-	-	-	10 days A2,B1 B2,B3. 30 days A1,A3 A4, (Classes) <u>5/</u>

4/ Longitudinal axis parallel to aircraft's; see 3.7.12.5/ Class A2 and B2 minimum 20 times.6/ Contant high humidity/temperature protection not withstanding minimums possible.

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TABLE IV. Contractor Demonstration (4.5).

Requirement Paragraph	Inspection/Test	Configuration	Method Number	Method
3.8 3.8.1 3.8.1(a)	Transportation Handling Shock	External(Fig3,GrpB) Package (Dummy load) Beacon Assy. in one corner.	IV-1	Method 516.2, Procedure II, MIL-STD-810
		Intermediate(Fig3GrpC) Package (Dummy load) Beacon Assy in one corner	IV-2	Same.
3.8 3.8.1 3.8.1(c)	Storage Handling Shock	Unit Package & Beacon Assy. (Fig. 3, Grp. D)	IV-2	Same.
3.8 3.8.1 3.8.1(c)	Maintenance Handling Shock	Beacon Assy. less mount (if separate) with power source installed(Fig3,GrpE)	IV-3	305mm free fall on hard wood. Five drops, flat one side and both ends, and edge below c.g. both Ends. Functional test (IV-8) in air.
		Same with mount assy. (if separate)	IV-4	Repeat Method IV-3 only if mount is a separate subassembly.
3.7.9 3.7.11 3.7.15	Interface dimensions	Beacon and Mount Assy.	IV-5	Measure each interface and compare against preliminary drawings. Tolerance must be specified on drawing and unit shall measure within the tolerance.
3.6.9	Finish	Beacon and Mount Assy.	IV-6	Observe against requirement. Illuminate with a maintenance type lamp with a 1180 Lumes light source (minimum) at a maximum distance of 381 mm.



TABLE IV. Contractor Demonstration (continued).

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Requirement Paragraph	Inspection/Test	Configuration	Method Number	Method
3.6.11 3.6.13 3.7.6(b) 3.7.14	Power source replacement	Beacon and Mount Assy. with power source installed.	IV-7	Using tools required, change power source in accordance with instruction in technical manual. Check: effectiveness of keying; presence of installation arrows, polarity markings, reorder data, and replacement record; and try to cross thread all securing devices that would be functional in maintenance/power source replacement.
3.7.5 3.7.6(c)	Operational checkout	Beacon and Mount Assy. secured to simulated aircraft structure with power source installed.	IV-8	Using test equipment to be recommended, as required by the order (6.2), conduct an operational checkout in accordance with instruction in technical manual.
3.7.6(a)	Maintainability after; -dew -sand/dust	Same	IV-9	Spray water on all sides of Beacon, then blow dust/dirt not exceeding 150µm in size on wet surface. The objective is to turn Beacon "on" with mud, to be detected as in method IV-8. Dry with heat lamp until Beacon turns "off". Demonstrate maintenance in accordance with technical manual. Then spray water on Beacon and let it run off; the beacon shall not have any output. The maintenance time shall not exceed one minute. Dry thoroughly before next method.

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TABLE IV. Contractor Demonstration (continued).

Requirement Paragraph	Inspection/Test	Configuration	Method Number	Method
3.6.13 3.7.7 3.7.14 3.8.1	Operational life Dew(daily cycle) Frost (flight cycle)	Beacon and Mount Assy. secured to simulated aircraft structure with power source installed	IV-10	Reduce temperature (and stabilize) to point that, when exposed to the ambient atmosphere, condensation will form on the surface (humidify if necessary). Output (IV-8) shall be monitored for 15 minutes. If steady output occurs, compute 4 hours per day for 240 days divided by 24 for days lost, or portion thereof proportional to intermittent output. Repeat test with unit stabilized at $-62^{\circ}\text{C}$ to cause frost to form on the surface, when exposed to air temperature $23\pm 2^{\circ}\text{C}$ (Humidify if necessary). Monitor (IV-8) and measure total time until output stops times 1.02 per day for 293 days divided by 24 for days lost. Reduce data to total operating (pinging) life available at 18 months, with the first six months of logistic life without dew or frost. Note, output is not required during condensation periods.
3.7.10	Crushing during crash	Beacon & Mount Assy. (not secured to structure)	IV-11	Place between two rigid flat surfaces, that will not deform during test. Apply a minimum of 2268kg to force plates together. Release pressure after five seconds. Check functioning (IV-8). Test all three axes. Any one unit is required to survive only one axis, except Classes A2 and B2 are each required to survive all axis.

TABLE IV. Contractor Demonstration (continued).

Requirement Paragraph	Inspection/Test	Configuration	Method Number	Method
3.8.2 3.9.1 3.9.2 3.9.6	Operating Life	Beacon & Mount Assy. with power source inst.	IV-12	Start test on one unit in advance of demonstration so last day may be observed. Place in fresh water at ambient temperature. Record activation time from wetting and initial sound pressure level (radial and axial). Pressurize to 1.8MNm <sup>2</sup> and hold till demonstration.
3.9.2	Output Level	Same	IV-12.a	Measure sound pressure level once on the longitudinal axis and once at right angles thereto opposite mounting surface. IV-12 test conditions at ambient pressure.
3.9.3	Output frequency	Same	IV-12.b	Measure acoustic frequency. IV-12 test conditions at ambient pressure.
3.9.4	Pulse Length	Same	IV-12.c	Measure pulse length at ambient pressure.
3.9.5	Pulse Repetition Rate	Same	IV-12.d	Measure pulse repetition rate at ambient pressure.
3.9.8	Termination	Same	IV-12.e	Demonstrate that output life exceeded minimum and, where tolerance is specified, that all output was terminated within tolerance at ambient pressure.
3.9.6	Radiation Pattern	Beacon without mount, if separate, power source installed.	IV-13	Provide test records of one unit for inspection, of 90 sound pressure level readings as indicated in Figure 4.

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TABLE IV. Contractor Demonstration (continued).

Requirement Paragraph	Inspection/Test	Configuration	Method Number	Method
3.7.8	Electromagnetic Radiation Protection	Mockup Drawings, Cutaway, or partial Assembly	IV-14	Demonstrate through analysis based on NAVSEA OD 30393 that design should protect circuits from damage from electromagnetic radiation.
3.6.5 3.6.13 3.7.13 3.11	Explosive atmosphere and malfunction power source containment evaluation	Same	IV-15	Demonstrate the design features that prevent initiating an explosive atmosphere, and those that contain the power source (fire, arc, gas, corrosive and/or lethal gas or liquid, and/or missiles).  NOTE: At this time the First Article test activity observers will advise the Contractor of the special configuration (shorting wires, etc.) required for testing. See Figure 3, group F.

TABLE V. First Article Tests (4.6)

Require. Para.	Inspection/Test (And Support Items)	Figure 3 Grp & Unit	Method Number	Method
3.7.8	Electromagnetic Radiation Circuit Protection (Mockup, or Drawings, or Cutaway, or Partial Assembly)	-	V-1.a	Technical evaluation meeting with cognizant design code for "Design Safety (HERO)" in Systems Command HQ of PCO preliminary to delivery of test unit to the cognizant field activity for electromagnetic radiation testing.
	(Preliminary Technical Manual and acoustic detection tester.)	'A'	V-1.b	(required only if directed in V-1.a) Conduct test and analysis to prove that the circuits in the Beacon will not be destroyed or caused to malfunction from near field radiation from radar, radio, ECM, or other emitters in aircraft or from the surface ship operating from; including their malfunction or leakage. Perform functional test on Beacon in accordance with technical manual.
				(NOTE: The following will be conducted in the First Article test activity laboratory specified in the order (6.2). Packages will be opened when test method directs, unless test is terminated due to failure. Removable power sources will only be installed in or removed from the Beacon when directed by the test method.)
5.11 5.11.1	Marking, external pack (Preliminary packaging marking drawings)	'B'	V-2	Compare against requirements of MIL-STD-129 for external container. Examine marking drawings for shelf life Type I marking and hazard warnings (if applicable) when power source is also shipped installed.

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TABLE V. First Article Tests (continued)

Require. Para.	Inspection/Test (and support items)	Figure 3 Crp & Unit	Method Number	Method
5.10	Labeling, external pack (Preliminary packaging marking drawings)	'B'	V-3	Examine preliminary marking drawings for requirement of the appropriate label under the Federal Hazardous Substances Labeling Act, when power sources are shipped installed in the Beacon Assembly, providing that the power source falls under the act.
5.2	Level, external pack	'B'	V-4	Evaluate that the exterior pack is Level C, capable of safe shipment of its contents to the destination specified in the order.
5.8	Partial load, external pack (Preliminary packaging drawings.)	'B'	V-5	Examine preliminary packaging drawings for adequacy of damage to fill out a partial load. The test activity may require submittal of the specified damage for testing, in the event that it does not appear to be adequate on the drawings.
3.8.1(a)	Transportation temperature shock	'B'	V-6	MIL-STD-810, Method 503.1, modified: with low temperature -54°C, and Beacon assemblies are not operated. This is pre-conditioning for following methods. Failure criteria: Bonding failure, material embrittlement, and/or marking not legible.
3.8.1(a)	Transportation vibration	'B'	V-7	MIL-STD-810, Method 514.2, Category g, Procedure X, Table 514.2 VII (Mode: rail, air, sea, truck or semitrailer), Figure 514.2-7 (Curve: AW). Beacon assemblies are not operated. Failure criteria: bonding failure, rupture, and/or loose load.
3.8.1(a)	Transportation handling shock or Transit drop	'B'	V-8.a	MIL-STD-810, Method 516.2, Procedure II. Beacon assemblies not operated. Failure criteria: bonding failure, cracking, rupture, and/or loose load.
			V-8.b	Remove external pack and examine all intermediate packages for legibility of marking and damage.

TABLE V. First Article Tests (continued)

Require. Para.	Inspection/Test (and support items)	Figure 3 Grp & Unit	Method Number	Method
5.11 5.11.1	Marking, intermediate packaging (Preliminary packaging marking drawings.)	'C'	V-9	Same as Method V-2 above limited to intermediate container.
5.10	Labeling, intermediate packaging (Preliminary packaging marking drawings.)	('C')	V-10	Same as Method V-3 above
5.2	Level, intermediate package	'C'	V-11	Evaluate that the intermediate package is Level B, capable of reshipment as the external container between logistic activities and the installation site for the Beacon assembly.
5.8	Partial load, intermediate package (Preliminary packaging drawings.)	('C')	V-12	Same as Method V-5 above.
3.8.1(b)	Storage Humidity (accelerated)	'C' and 'E 7 & 8'	V-13	MIL-STD-810, Procedure I, except the Beacon assemblies are not operated. Failure criteria: bond failure, loose load, and/or marking not legible.
3.6.3 3.8.1(b)	Storage Fungus	'C' 'E 7 & 8'	V-14	MIL-T-5422, fungus test. The Beacon assemblies are not operated. Failure criteria; loss of marking legibility; growth on Beacon and Mount surfaces, lubricant used with sealing devices, and integral power source (when so equipped); and bonding failure of package.
3.8.1(a), (c)	Transportation and Storage handling shock or Transit drop	'C'	V-15.a V-15.b	Same as Method V-8.a above for the intermediate package. Same as Method V-8.b above to examine unit packages.

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TABLE V. First Article Tests (continued)

Require. Para.	Inspection/Test (and support items)	Figure 3 Grp & Unit	Method Number	Method
5.11 5.11.1	Marking, unit package (Preliminary packaging marking drawings).	'D'	V-16	Compare against requirements of MIL-STD-129 for unit packaging. Examine preliminary marking drawings for shelf life Type I marking and hazard warnings (if applicable), when power source is also shipped installed.
5.10	Labeling, unit packaging	('D')	V-17	Same as Method V-3 above.
5.2 5.7	Level, unit packaging	'D'	V-18	Evaluate that the unit package is Level B capable of reshipment in an external container, is suitable for logistic storage, and that it provides MIL-P-116 Method III protection.
3.8.1(b), (c)	Handling shock	'D' 1-4' 'E' 7-8 with power source installed'	V-19.a V-19.b	Same as Method V-8.a for unit package. 305mm end, side, and corner drops on hardwood; five for beacon and mount assembly with power source installed and five without the mount (if separate). Functional check is conducted in V-34.
5.7 3.8.1(c)	Storage Sand and Dust	'D' 1-6'	V-20	MIL-T-5422 Sand and Dust test. The Beacon assemblies are not operated. Particle size up to 500um may be included. Position each unit container with a different side to the airflow. High temperature shall be limited to +53°C. Remove units from unit containers on completion of the test. Failure criteria: Sand and Dust on the Beacon assembly.
5.5 5.6	Cleaning and Preservation	'E' 1-6'	V-21	Examine each unit. Failure criteria: preservation (not part of surface finish) present, and dirt and/or discolored stains on surface.
1.3	Nomenclature	'E' 1'	V-22	Check that nomenclature agrees with that required in the contract, or that assigned as a result of application (see 6.3), or in the absence of the foregoing with the manufacture model or part number.



TABLE V. First Article Tests (continued)

Require. Para.	Inspection/Test (and support items)	Figure 3 Grp & Unit	Method Number	Method
3.7.9 3.7.11 3.7.15 Figure 1 TABLE I	Validate interfaces (Preliminary interface drawings)	'E 1 & 2"	V-23.a	Measure securing hole diameters and centers. Measure the overall width, length (less securing hardware extension), and height. Determine if the hole centers are centered within the length and width. Measure the extension of securing hardware from the forward end. Verify that the measurements are within the tolerance of the preliminary drawings and that the drawings are in agreement with TABLE I and Figure 1.
3.7.9 TABLE I	(One power source)	'E 1'	V-23.b	Weigh the Beacon and Mount assembly and one power source. Compare with TABLE I.
3.6.1 3.6.10 3.7.12 3.11	Marking, Beacon and Mount assembly	'E 1'	V-24	Remove Beacon from Mount, if constructed separately. Verify, that the Mount marking, identifying it as a subassembly of the Beacon, would be visible in its mounted position. Check that each item required under 3.6.10 is marked on the Beacon in the same sequence, with letters and numerals as specified in MIL-STD-130. Illuminate with a 1180 lumens white light at 300mm to check legibility. Additionally check that orientation (3.7.12), maintenance (3.6.10), part identification (3.6.10), replaceable power supply identification (3.6.1), and disassembly warnings (3.11) if applicable, are present and legible.
3.6.9	Finish	'E 1'	V-25	Illuminate beacon and mount with a 1180 lumens light source in a maintenance type lamp (drop light) at 381 mm from the surface. Evaluate that the surface is or is not lusterless.

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TABLE V. First Article Tests (continued)

Require. Para.	Inspection/Test (and support items)	Figure 3 Grp & Unit	Method Number	Method
3.6.1 3.6.11 3.6.12 3.6.13 3.7.13 3.7.14	Assembly (Preliminary Technical Manual and Frame or bulkhead mockup.)	'E 1'	V-26	Use aircraft frame or bulkhead test mockup. Bolt Beacon and Mount assembly to mockup in accordance with the Technical Manual. Remove Beacon, install power source and reinstall Beacon in accordance with the Technical Manual. Validate the correctness of the manual. Verify that all parts that must be removed (less the power source watertight closure, power source, and beacon) are standard (3.6.1); that all bolts and/or nuts are safety wired (3.6.11); that all threaded parts start easily without cross-threading (3.6.11); that special tools are not mounted (3.6.12); that Beacon is removable in the forward direction or as a whole unit with standard tools (3.7.13); that the power source (if applicable) was keyed, had date of mfg and replacement, installation arrows, polarity signs, source and model number (3.6.13); and that the power source fit within the interface envelope (Method V-23.a) and for Classes A2 and B2 was of a replaceable type (3.7.14). Leave unit installed for next method.
3.7.5	Operational Checkout (Acoustic detection tester and preliminary Technical Manual)	'E 1'	V-27	Conduct functional test of the Beacon assembly in accordance with the Technical Manual. Use tester provided. Validate the manual. Leave unit installed for next method.
3.7.6 3.8.1 3.8.1(d)	Maintainability (Acoustic detection tested and preliminary Technical Manual)  (In absence of walkin temperature chamber, precondition sample to -54°C & perform test without delay).	'E1'	V-28.a	Stabilize the installed unit at -40°C in a walk-in cold chamber. Perform the period maintenance steps, periodic function test, and annual power source replacement (if applicable) in accordance with the Technical Manual, in the cold chamber. Complete the Technical Manual validation. Evaluate the impact on maintenance personnel to perform the job simply and without error due to shortcomings of the instructions and/or the complexity of the design.

TABLE V. First Article Tests (continued)

Require. Para.	Inspection/Test (and support items)	Figure 3 Grp & Unit	Method Number	Method
	(same, except temperature +71°C)		V-28.b	Stabilize the installed unit at +53°C in a walk-in hot chamber. Repeat the V-28.a test. Remove unit from frame or bulkhead mockup.
3.6.5	Hazard Certification (Hazard certification)		V-29	Confirm that the certification (6.2) includes the absence of explosive devices, squibs, gas generators and other similar active devices (except non-lethal dry cell batteries and dunking batteries); and that the Beacon and Mount assembly will not support an explosion.
3.6.8 3.11	Safety	'E 1'	V-30	Drag a loose weave piece of cloth or gauze across the mounted unit in at least four equally opposing directions to determine if sharp corners or burrs exist. Check all Beacon and Mount edges that they are not sharp. Evaluate the design to insure, that if the power source was not replaced, that corrosive leakage from the power source would be contained within the Beacon and that gassing would also be contained.
3.12	Workmanship	'E 2-6'	V-31	Install power sources in each Beacon. Examine each Beacon and Mount assembly during the installation. for the items listed in Requirement 9 of MIL-STD-454, that are applicable to the design presented.
3.8.1(d) 3.7.6(a)	Sand and Dust (Acoustic detection tester and Preliminary Technical Manual)	'E 1-6'	V-32	MIL-T-5422 Sand and Dust test. Orient each unit in a different direction. On removal from chamber, monitor output of Beacon. Perform normal periodic maintenance in accordance with the Technical Manual and no more. Defect criteria: output.

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TABLE V. First Article Tests (continued)

Require. Para.	Inspection/Test (and support items)	Figure 3 Grp & Unit	Method Number	Method
3.6.13 3.8.1(d)	Operational Life, Winter Frost (Acoustic detection tester.)	'E 1 & 2'	V-33.a	Stabilize two units at $-15^{\circ}\text{C}$ . Insert units into a humidity chamber set at $+10^{\circ}\text{C}$ and 90% R.H. $\pm 3\%$ . Frost should form. If not, adjust until it does. Monitor unit when frost forms on outside, for output, with tester. Do not place hands on unit during transfer. This is to simulate daily frost cycle, and to compute ping time lost from total (power depletion). No output equals no depletion. Output equals 20 days lost. (4 hrs frost per day for 120 days per year)
3.6.13 3.8.1(d)	Operational Life, Daily Post-Flight Frost (Acoustic detection tester.)	'E 5 & 6'	V-33.b	Stabilize two units at $23 \pm 2^{\circ}\text{C}$ . Place in humidity chamber set at $23 \pm 2^{\circ}\text{C}$ , $80 \pm 5\%$ R.H. (or ambient air if within these limits). Frost should form. If not, adjust conditions. Do not place hands on unit during transfer. Monitor output. Time total duration. This simulates the daily flight cycle. Compute time on, times 1.02 flights, times 293 for total depletion in hours, and divide by 24 for days lost.
3.6.13 3.7.7 3.8.1(d)	Operational Life, Summer Dew (Acoustic detection tester.)	'E 7 & 8'	V-33.c	Stabilize two units at $23 \pm 2^{\circ}\text{C}$ . Insert units into humidity chambers set at $31 \pm 2^{\circ}\text{C}$ $90 \pm 5\%$ R.H. Position one unit in Normal attitude (3.7.12) and the other at a right angle to it with the power control surface down. Dew should form on units. If not, adjust conditions. Do not place hands on unit during transfer. Monitor output when dew forms on outside of unit. This is to simulate daily dew cycle, and to compute ping time lost from total (power depletion). No output equals no depletion. Intermittent output is timed (within first 20 minutes) for percent of time on in daily four hour dew period. Compute percent on times four hours, times 120 days, and divided by 24 for days lost.

TABLE V. First Article Tests (continued)

Require. Para.	Inspection/Test (and support items)	Figure 3 Grp & Unit	Method Number	Method
3.6.2 3.6.13 3.7.7 3.8.1(c) (d) (e)	Operational Life, Salt Fog at sea (Acoustic detection tester)	'E 3 & 4	V-33.d	(Note, this test objective is detection of power depletion in surface ship platform, not corrosion resistance.) Create a salt fog from sea water, 3.6% salt by weight, +30°C, wind velocity 20 knots. Atomize the sea water. The sample shall be located behind two half meter square baffle plates normal to the wind. Position units as in V-33.c. This is to simulate at sea deck maintenance cycle where aircraft is open and to compute ping time lost from total (power depletion). No output equals no depletion. Run test for two hours. Record total ping output time (less intermittent off operating periods), times 120 days, and divide by 24 for days lost.
3.6.3 3.6.13 3.8.1(d)	Operational Life, Fungus on land (Acoustic detection tester.)	'E & 7 8'	V-33.e	Repeat Method V-14 only if fungus grew on surfaces that surround the power control surfaces and on exposed or open power sources. Once it is noted that the growth has covered these areas start monitoring the output. No output equals no depletion. Output equals immediate depletion of power source.
3.6.13 TABLE I	Operational Life, total depletion.		V-33.f	Failure Criteria: Ping days available at end of 18 months (new power source) reduced by switch current and aging (provided by mfg 6.2(j)(iv)) less ping days lost by Operational Life V-33a.b.c. and d above reduces the total ping time below that required in TABLE I and/or Method V-33e causes the Beacon to Function.

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TABLE V. First Article Tests (continued)

Require. Para.	Inspection/Test (and support items)	Figure 3 Grp & Unit	Method Number	Method
3.8.1(f) TABLE III	Altitude/Temperature (Acoustic detection tester and preliminary Technical Manual)	'E 1-8'	V-34	MIL-T-5422, Temperature and Altitude Tests, for Class 3 equipment modified as follows: maximum high temperature +71°C, no operating periods, conduct functional check at conclusion in accordance with Technical Manual.
3.8.1(f) TABLE III	Vibration, aircraft (Acoustic detection tester, Preliminary Technical Manual, and Simulated aircraft structure.)	'E 1-8'	V-35	Secure eight Beacon and Mount Assemblies to simulated aircraft structure (3.6.11, 3.7.11 and 3.7.12) in accordance with Technical Manual. MIL-T-5422, Procedure II, Part I, Curve IV; and Procedure II, Part II, Curve VIIIa. Conduct functional test on completion in accordance with Technical Manual. 1/
3.8.1(g) TABLE III	Shock, powered water crash (Preliminary Technical Manual, Acoustic detection tester, and Simulated aircraft structure).	'E 1-4'	V-36.a	Simulate aircraft structure, mount for four units, all oriented (3.7.12) for a crash in the longitudinal axis, from forward. The mounting plate shall be shocked with one undamped sawtooth peak pulse of 5000 g's with a 0.5ms base and one sawtooth peak pulse of 1000 g's with a 5ms base. Class A2 and B2 shall receive 20 shocks each. Securing hardware to airframe shall be replaced for each set of impacts. Conduct functional test on completion in accordance with Technical Manual. Remove units from aircraft structure. 1/ Alternate test may utilize water fillable bomb or mine as a test vehicle with the Beacon and Mount bolted to the inside of the tail structure or a substantial adapter therein.
	Shock, multipal water impact crash (Preliminary Technical Manual, Acoustic detection tester, and Simulated aircraft structure.)	'E, 5-8'	V-36.b	Simulate aircraft structure, mount for four units all oriented the same. MIL-STD-810, Procedure III, Figure 516.2-1, amplitude 'a', and time duration 'c'. Bending and distortion is not acceptable for Class A2 and B2. Conduct functional test on completion in accordance with Technical Manual. Remove units from aircraft structure. 1/

TABLE V. First Article Tests (continued)

Require. Para.	Inspection/Test (and support items)	Figure 3 Grp & Unit	Method Number	Method
3.7.10 3.8.1(g) TABLE III	Structural crush airframe failure (Acoustic detection tester and Preliminary Technical Manual.)	'E 5-7'	V-37	Place three unmounted Beacon and Mount assemblies under 2268kg loads. The test bed and the load faces shall each present parallel flat rigid surfaces to the unit under test. Each of the three units shall be tested on different axis. The units shall be functionally tested in accordance with the Technical Manual, while under test. The test shall last a minimum of 10 seconds. <u>1</u>
3.6.5 3.8.1(g)	Fuel fire, post-crash (Acoustic detection tester and Preliminary Technical Manual.)	'E 5-7'	V-38	Place jet fuel or kerosene in open pan of enough square area to enable suspension of test unit in upper third of fire. Suspend units with wire or metal strap in fire for 30±2 seconds. Remove from fire and observe if any material is burning (3.6.5) then plunge sample under water for half a minute. Conduct functional test in accordance with Technical Manual. Classes A2 and B2 are not required to be reusable after fire, all classes shall function.
3.8.2 3.9.1-5	Operation (less life) (Output may be relative to low pressure output where facility is limited.)		V-39	Conduct six separate tests, each under different environmental conditions found in ocean, sea, lake and rivers. Each test will vary in one or more characteristics of temperature, salinity, and pressure due to depth. In each case stabilize the temperature of the pressure vessel, the water used, and the Beacon and Mount assembly prior to starting the test. Place the Beacon and Mount assembly in the pressure vessel. Record the time to turn on (to have signal output). Pressurize the vessel at a rate of 133 kNm/sec until the test pressure is reached. Record the output level, frequency, pulse length and pulse repetition rate. In one half hour thereafter, record the same data again and terminate the test for that



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TABLE V. First Article Tests (continued)

Require. Para.	Inspection/Test (and support items)	Figure 3 Grp & Unit	Method Number	Method
	(May be conducted with fresh water if test facility is limited, or tests may be conducted under the actual environment. Where maximum pressure will not be obtained, the unit shall be pre-pressurized in the laboratory to the full pressure in water)	'E 1'	V-39.a	unit. During the test insulate or otherwise insure that the vessel temperature does not change. Test to the following conditions: -0.6°C, 3.6% salt by weight, and 101.4kNm <sup>2</sup> .
		'E 2'	V-39.b	-0.6°C, 3.6% salt by weight, and 61.2MNm <sup>2</sup> .
		'E 3'	V-39.c	30°C, 3.6% salt by weight, and 101.4kNm <sup>2</sup> .
		'E 4'	V-39.d	30°C, 3.6% salt by weight, and 61.2MNm <sup>2</sup> .
		'E 5'	V-39.e	2.5°C, 0% salinity, and 101.4kNm <sup>2</sup> .
		'E 6'	V-39.f	2.5°C, 0% salinity, and 1.8MNm <sup>2</sup> .
3.9.7 & 3.9.8	Operating Life and Termination (The extremes affecting dunking type power sources have been selected for life tests. Testing activity should substitute other extremes from TABLE I & Figure 2 that will have greatest affect on the design submitted, if applicable.)		V-40	Conduct two separate tests, each under different environmental conditions. The conditions shall be maintained within 10% for the duration of the test. Perform the tests as specified in V-39 except that the Beacon will be allowed to run till termination. The second set of measurements will be taken within an hour of the minimum life requirement and where there is also a maximum requirement (Class A4) the test shall verify that all output had stopped by the maximum. The test may be terminated at anytime the Beacon stops. The test conditions are:  Same as V-39.c. Salt water required. Actual equivalent tropic ocean environment may be substituted. Same as V-39.f. Actual equivalent cold lake environment may be substituted.
		'E 7'	V-40.a	
		'E 8'	V-40.b	

TABLE V. First Article Tests (continued)

Require. Para.	Inspection/Test (and support items)	Figure 3 Grp & Unit	Method Number	Method
3.9.6	Radiation Pattern	'E 1, 3 & 5'	V-41.a	(Mount removed if separate subassembly). Suspend Beacon in accordance with the manufacturers recommendation in an acoustic measurement tank. Take 90 output readings as illustrated in Figure 4. Defect criteria: Any of the 18 radial readings is less than TABLE I Starting Life minimum and/or more than 20% of the total axial spherical surface output (in 72 reads is less than this minimum).
		'E 2, 4, & 6'	V-41.b	(Complete Beacon and Mount Assembly). Same as V-41.a, except the mount included. Correlate position of mount with data. Defect criteria: mounting sector excepted, the remaining sectors reduced in coverage from V-41.a. (Mounting sector maximum 25%)
3.7.14	Reuse, Classes A2 and B2 only. (One set of spare power supplies and Preliminary Technical Manual.)	'E 1 & 2'	V-42	Replace power source in Beacon and Mount assembly including components required in accordance with the Technical Manual. Pressurize the unit to 61.2MNm <sup>2</sup> . Verify that it functions. Release pressure. Repeat complete foregoing operation 18 times, to total 20 times (see V-31 and V-39).
3.6.5 3.6.13 3.7.3 3.11	Power Source Short	'F' one unit	V-43.a	(Power source installed and lead-in-wires connected by manufacturer. The wires shall be heavy enough to conduct full current of power source.) Place unit in a glass container to trap gas emitted. Rig witness envelope of paper or other material around unit in container. Place all this behind a fragmentation

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TABLE V. First Article Tests (continued)

Require. Para.	Inspection/Test (and support items)	Figure 3 Grp & Unit	Method Number	Method
				barricade. Make direct observation of units through safety glass, mirrors, movies, or TV monitor capable of observing flame. Rig wires to high amperage knife switch. After all precautions for safety have been observed close switch and observe for fire, explosion, arking, and corrosive leakage. Analyze gas content in sampling container. Open unit to determine if corrosive leakage occurred. If corrosive leakage occurred reseal unit and check progress of corrosion every month until it eats through the Bealon or becomes neutralized.
		'F' one unit	V-43.b	(Unit same as in V-43.a). MIL-STD-810 Explosive Atmosphere Test, Method 511.1, Procedure I. Loosen access covers. Short battery during Step 3.
3.6.7 3.6.13 3.7.14 3.10 4.1	Post First Article Shelf Life and Latent Defects	'G'	V-44 2/	(Power source installed by the manufacturer) Observe that each unit is marked "Design Record Model" and has the date of power source replacement on as required in 3.6.10. On the date of power source replacement conduct an operational life test on each unit, one Method V-40.a and the other Method V-40.b. Verify total ping days available without losses due to dew, frost, or salt atmosphere, see V-33.f. Prior to test observe marking was legible and that parts had not developed cracks and other aging indications.

1/ Designs that incorporate plastic parts or structure other than supported insulators shall be stabilized at -62°C and tested within five minutes of removal from cold chamber. Where parts may separate due to expansion, additional tests shall require stabilization at +54°C.

2/ First Article is terminated on receipt of V-44 units for Shelf Life and Latent Defects testing

TABLE VI. Individual Tests, Quality Conformance (4.7)

Requirement Paragraph	Inspection/Test	Method Number	Method
3.10	Reliability burn-in	VI-1	Electronic subassembly is activated with power for 48 hours.
3.10	Reliability minor shock	VI-2	Install power source in completed unit without mount (if mount is a separate subassembly). Stand unit on end on a flat block of hardwood. Tip over, free fall, on its side. Repeat from other end.
3.8.2	Costal shelf depth pressure	VI-3	Pressurize unit (from VI-2) to a minimum of 1.8 MNm <sup>2</sup> in fresh water. (Design with built-in power sources will be tested in an underwater pressure environment in a non-destructive procedure developed by the Contractor). Record activation time.
3.9.3	Frequency	VI-3.a	Record frequency to tenths of a kHz, underwater.
3.9.5	Pulse repetition rate	VI-3.b	Record PRR in pulse per second to hundredths, underwater.
3.9.4	Pulse duration	VI-3.c	Record pulse duration in milliseconds and tenths, underwater.
3.9.2 3.9.6	Output level and pattern	VI-3.d	Measure and record output level, underwater, as indicated in Figure 4. Dry Beacon and remove power source.
3.6.10	Marking, exterior	VI-4	Check that all markings including requirements 3.6.1, 3.6.10, 3.6.13, 3.7.12 and 3.11 (if applicable). Then, if all the tests in this table are satisfactory, apply a stamp indicating approval.

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TABLE VII. Quality Verification (4.8)

Requirement Paragraph	Inspection/Test	Method Number	Method
3.8.1(f)	Vibration aircraft	VII-1	Secure all units parallel in same direction, with power sources installed, in their mounts to a metal plate simulating aircraft structure. See TABLE V, Method V-35. Conduct in accordance with MIL-T-5422, Procedure II, Part I, Curve IVa; and Procedure II, Part II, Curve VIIIa.
3.8.1(g)	Shock, aircraft crash	VII-2	Position plate, from VII-1 above, with forward position as marked (3.7.12) in direction to receive shock. Shock 1000g's duration 5 ms. See TABLE V, Method V-36.
3.8.2 3.9.1-5	Deep water operation	VII-3	Remove Beacon and Mount assemblies from VII-2 plate. Measure output level. <sup>1/</sup> Pressurize each separately in fresh water at a rate of 133KNm <sup>2</sup> /sec. till 61.2MMm <sup>2</sup> is obtained. Hold this pressure for half an hour. Record time from wetting till output starts. At full pressure, record: output level, frequency, pulse length, and pulse repetition rate.  Dry and return to Contractor for re-certification, power source removal, and delivery.

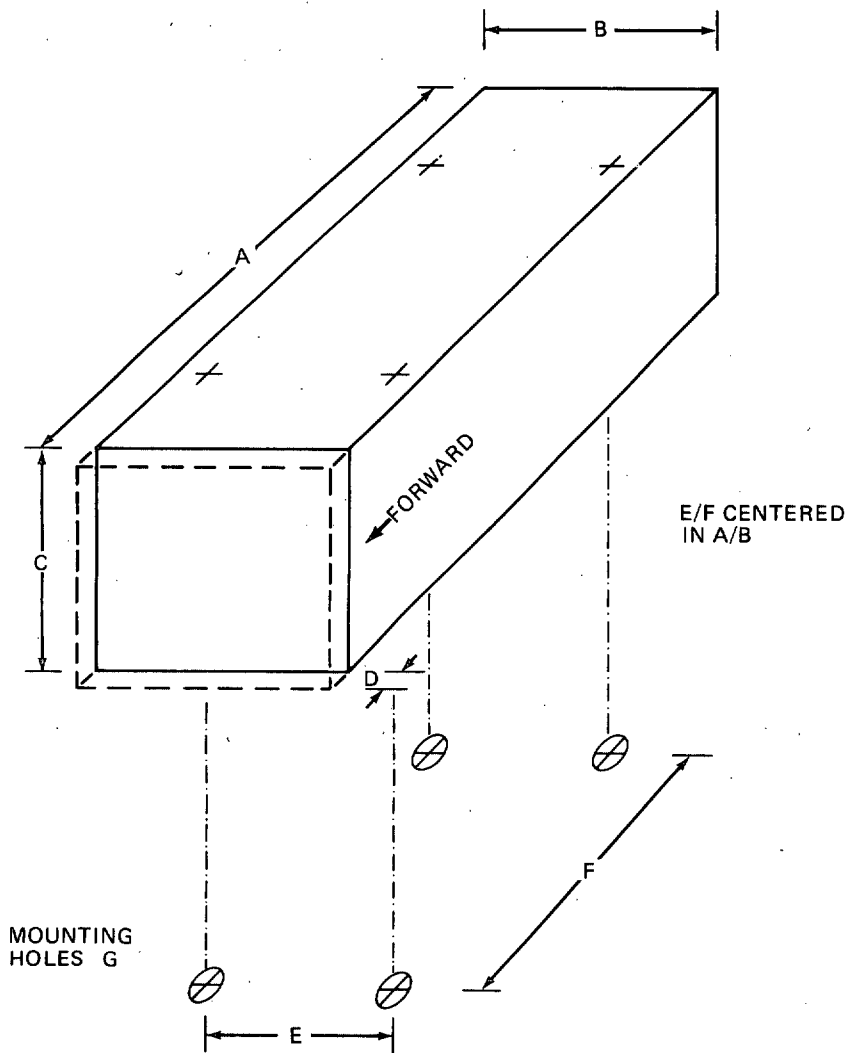
<sup>1/</sup> When test facility capabilities do not include sound pressure level measurement under high pressure, ocean tests may be substituted with minimum depth of 3,048m (10,000 feet). Measurement should be taken at one meter, also should be confirmed from a distant point. Care should be taken to not shield the beacon from the calibrated hydrophone being used.

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TABLE VIII. Metric to English conversion.

<u>°C</u>	to	<u>°F</u>	<u>mm</u>	to	<u>inches</u>	<u>Nm<sup>2</sup></u>	to	<u>in. Hg</u>
-66	-	86.8	4.8514		0.191	701		0.207
-62	-	79.6	5.6		7/32			
-54	-	65.2	38.1		1.5	<u>kNm<sup>2</sup></u>	to	<u>in. Hg</u>
-40	-	40	44.5		1 3/4	1.7		0.5
-37	-	34.5	50.8		2	2.97		0.88
-15	+	5	60.95		2.4	3.88		1.15
+ 0.6	+	35	63.5		2 1/5	97.8±1.5		28.9±3
+ 2.5	+	36.5	65.1		2 9/16			
+10	+	50	76.2		3	<u>MNm<sup>2</sup></u>	to	<u>in. Hg</u>
+21.1	+	70	103.6		4 5/64	0.1		31.9
±23±2	+	73.4±3.6	300		11.8			
+30	+	86	304.8		12	<u>kNm<sup>2</sup></u>	to	<u>psi</u>
+31±2	+	87.8±3.6	381		15	30.3		4.4
+51	+	123.8				101.4		14.7
+53	+	127.4	<u>m</u>	to	<u>feet</u>			
+54	+	129.2	1.22		4	<u>MNm<sup>2</sup></u>	to	<u>psi</u>
			3,048		10,000			
+71	+	159.8				1.8		264
+704.4	+	1300	<u>km</u>	to	<u>miles</u>	61.8		8880
			4827		3000			
			<u>gm</u>	to	<u>oz</u>	157		1000
			426		15	160		1500
			482		17	163		2000
			490		17.25			
			1064		37.5			
			1215		42.83			
			1234		43.5			
			<u>kg</u>	to	<u>lbs</u>			
			2268		5000			
						<u>db//1μPa</u>	to	<u>Dynes/cm<sup>2</sup></u>

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<u>DIMENSION</u>	<u>CLASS A</u>	<u>CLASS B</u>
A	103.6mm	158.8mm
B	50.8mm	63.5mm
C	44.5mm	65.1mm
D	5.6mm	5.6mm
E	38.1mm	50.8mm
F	60.95mm	76.2mm
G	4.85mm	4.85mm

Figure 1. Interface maximum and mounting centers.



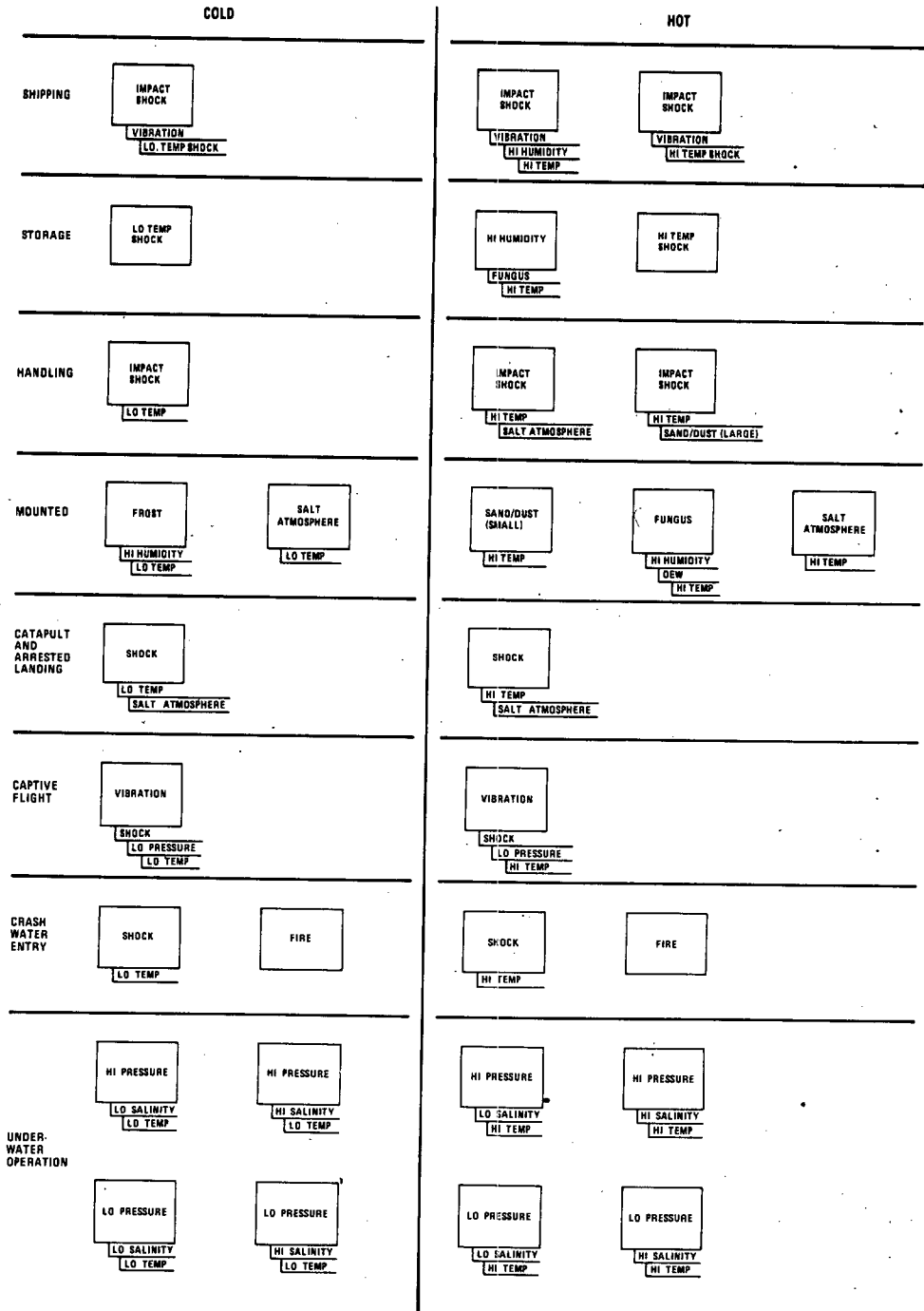


Figure 2. Combinations of simultaneous environment.

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GROUP

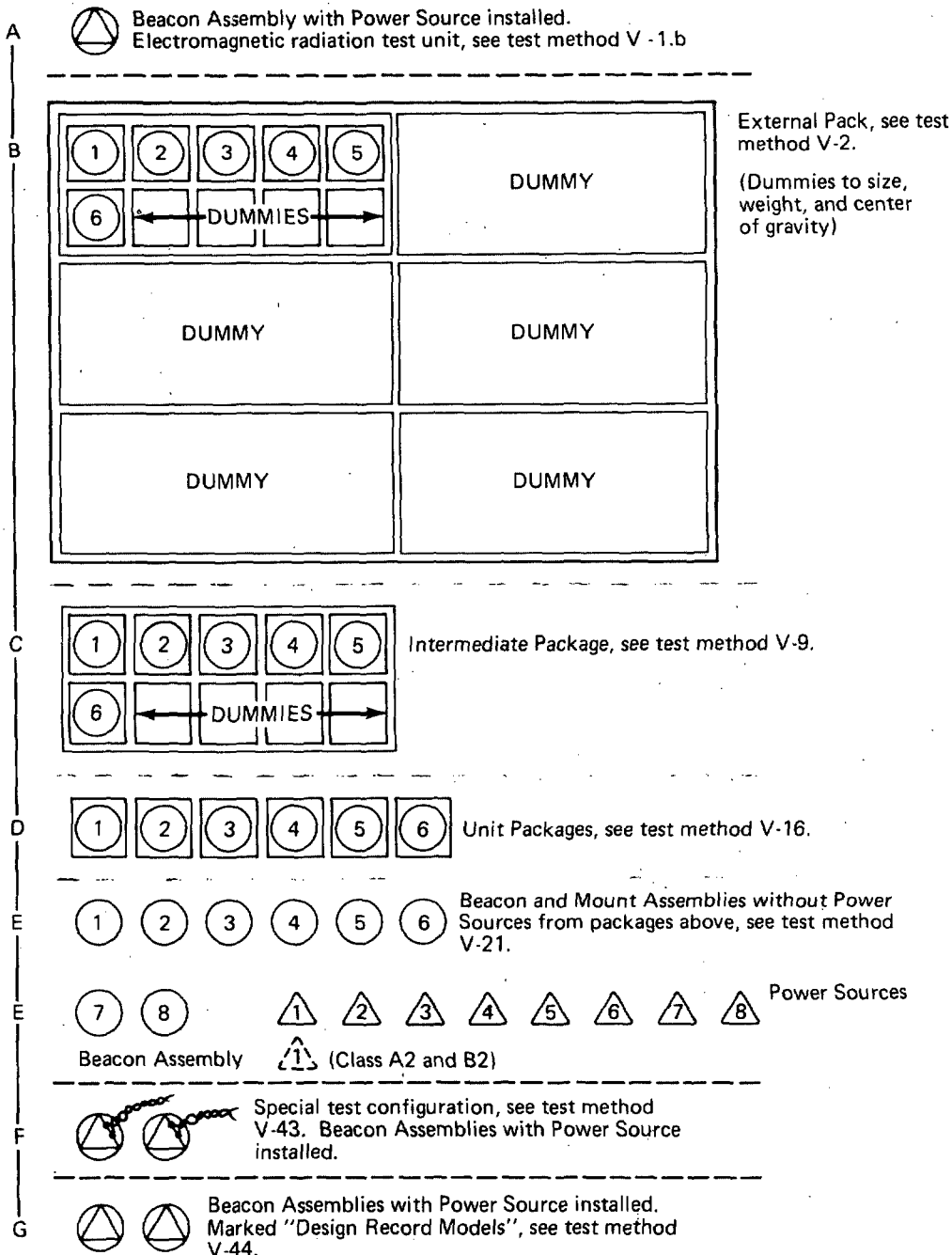
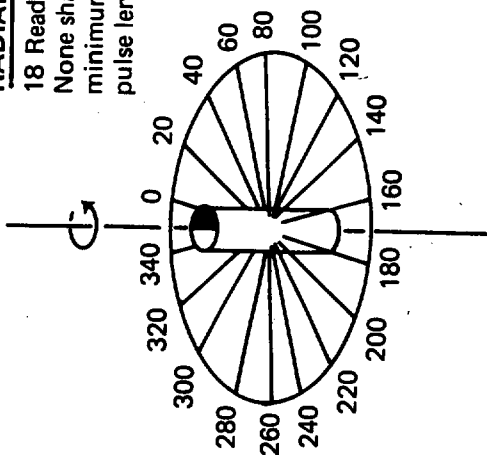


Figure 3. Test configuration.

**RADIAL OUTPUT**

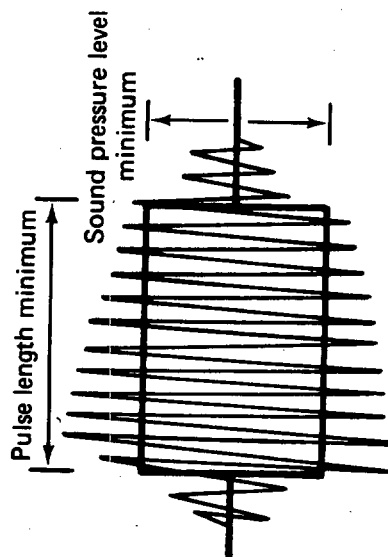
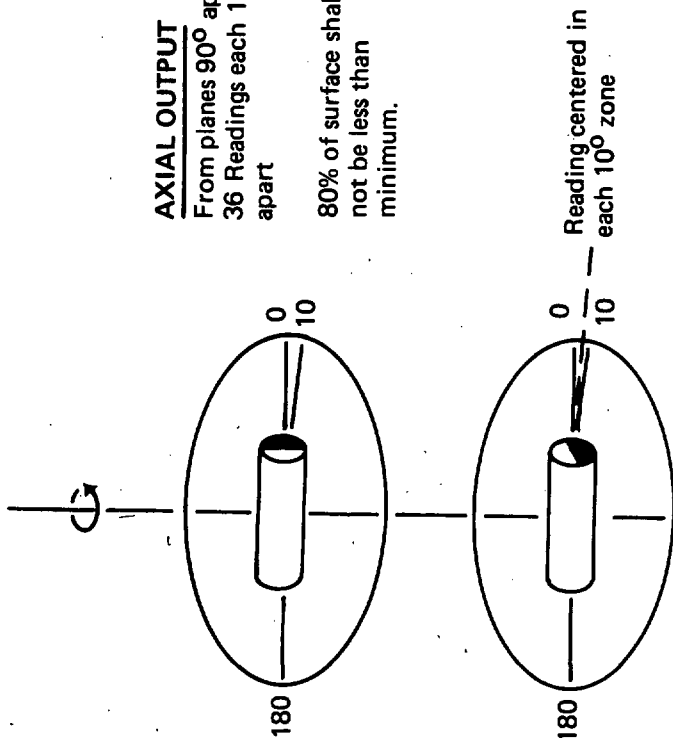
18 Readings 20° apart.  
None shall be less than minimum for minimum pulse length period.



**AXIAL OUTPUT**

From planes 90° apart  
36 Readings each 10° apart

80% of surface shall not be less than minimum.



**SURFACE ZONES**

Each:

10° Latitude of one quadrant of one hemisphere, pole to equator.

Percent of total sphere surface indicated in each surface zone.

Total percent of sphere surface of all zones, with less than minimum output, shall not exceed 20%.  
(72 readings)

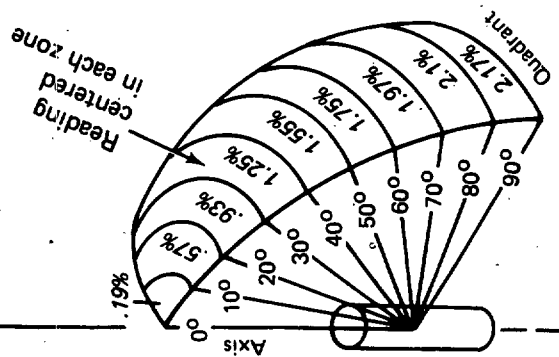


Figure 4. Output test requirements.

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DOCUMENT IDENTIFIER AND TITLE		
MIL-B-85130(AS) Beacon, Underwater Acoustic, Aircraft, General Specification		
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MATERIAL PROCURED UNDER A		
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