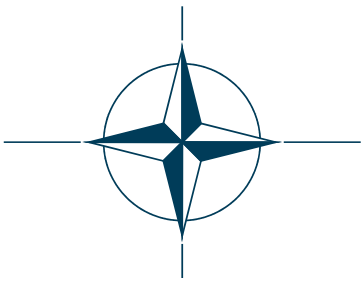
# NORTH ATLANTIC TREATY ORGANISATION (NATO)



# NATO SONOBUOY INTEROPERABILITY SPECIFICATION

## COMMON SPECIFICATIONS

## ANEP-80

July 2009

 (Reverse Blank)

ANEP-80

**NORTH ATLANTIC TREATY ORGANIZATION**

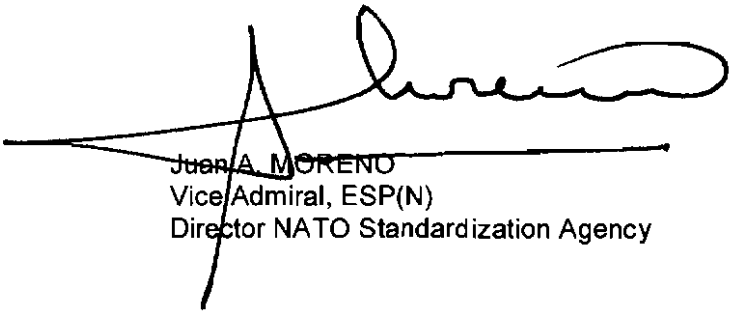
**NATO STANDARDIZATION AGENCY (NSA)**

**NATO LETTER OF PROMULGATION**

24 July 2009

1. ANEP-80 - NATO Sonobuoy Interoperability Specification – Common Specifications is a NATO UNCLASSIFIED publication.

2. ANEP-80 is effective upon receipt. It supersedes the NATO Air-ASW Buoys Interoperability Specification – Volume 1, Version 1 (2003) which should be destroyed in accordance with the local procedure for the destruction of documents.



Juan A. MORENO
Vice Admiral, ESP(N)
Director NATO Standardization Agency

## RECORD OF CHANGES

| Change Date | Date Entered | Effective Date | By whom Entered |
|---|---|---|---|
| | | | |

| CHAPTER | RECORD OF RESERVATION BY NATIONS |
|---|---|
| 1 | NONE |
| 2 | NONE |
| 3 | NONE |
| 4 | NONE |
| | |

| NATION | RESERVATIONS |
|---|---|
| | |
| | |
| | |
| | |
| | |
| | |
| | |
| | |
| | |

## TABLE OF CONTENTS

## List of Figures



## List of Tables

# CHAPTER 1

# INTRODUCTION

## 101. TERMS AND DEFINITIONS

1. This document is intended to provide a guide to what is required in a NATO Sonobuoy Interoperability Specification concerning the common specifications. Manufacture of particular sonobuoy types will be controlled by National Procurement Specifications, such as the United States Production Sonobuoy Specification and the United Kingdom Generic Specification Sonobuoys (see Related Documents).

2. The sonobuoy, defined by this specification, relays, by VHF radio transmissions, sounds in the audio frequency range from a cable suspended transducer system. It is an aircraft dispatched, expendable device, intended for the detection and localization of submarines by active and/or passive means.

3. This specification also applies to the Bathythermograph sonobuoy, which is an aircraft dispatched, expendable device for the measurement of water temperature.

4. All abbreviations and acronyms are included in a Glossary.

## 102. GENERAL INFORMATION

1. The requirements within this specification are the least restrictive of the National Procurement Specifications, if the requirements are not the same. As minimum performance requirements related to the use of air-dropped, expendable sonobuoys used in airborne ASW systems, these requirements are those which all participating countries are encouraged to include in the detailed equipment specification when procuring their service approved equipments.

2. The parameters are provided for information and design guidance. Each nation initiating a new sonobuoy design is encouraged to reflect these parameters and shall on request, provide to the other nations, drawings and technical information relating to launcher interface and aircraft separation.

3. Where practicable, new types should be made compatible with existing systems. Where it is not practicable, the developing nation is invited to provide notification of deviation from the specification at an early date.

4. Nothing contained herein is intended to limit the development of an improved system to meet new service requirements. No amended issue of this specification shall make any less acceptable any existing sonobuoy or any sonobuoy already under development whose design is compatible with the issue of the specification in force at the time the development was commenced.

5. The provision of sample sonobuoys or replicas to enable the verification of launcher compatibility is encouraged. Launcher modifications, or the provision of adaptive components, shall be the responsibility of the nation possessing the launcher.

# CHAPTER 2

# SAFETY

## 201. DESIGN SAFETY

1. The sonobuoy shall be designed for safety during handling, transportation, storage, carriage and release from Service aircraft, including loading and down loading from sonobuoy dispensers.

2. The design shall conform to NATO and national safety legislation for the manufacture, storage, handling and transport (by road, sea and air).

## 202. GENERAL SAFETY

1. Personnel.

   a. The sonobuoy and packaged sonobuoy shall be devoid of sharp edges and other such safety hazards which could injure personnel during normal handling procedures.

   b. Parts which store energy or that are acted on by stored energy shall not release energy inadvertently, or they shall be of small mass and shaped such that they do not constitute a hazard.

   c. The stored energy devices must satisfy the national requirements of Military Aircraft (MA) release.

2. Shipping. All parts and products (e.g. $SO_2$) of the sonobuoy shall be restrained within the confines of the packaging under shipping and storing conditions.

3. Launching.

   a. The sonobuoy shall not be a hazard to the aircraft or crew when launched.

   b. Launching includes normal fleer air-launch, air-launch testing and emergency jettison.

   c. Once installed in an aircraft launch tube, the SLC shall remain latched in place and shall not release the store inadvertently.

4. Potentially Hazardous Material or Devices.

   a. The sonobuoy shall not contain any hazardous materials or devices.

   b. Exceptions are lithium-chemistry batteries and electric squib devices: they shall comply with the National Procurement Specification.

5. Safety Event Criterion.

a. The sonobuoy shall be designed with safety interlocks in accordance with the National Procurement Specification.

b. The safety interlocks shall prevent the operation or functioning of any part of the sonobuoy that may result in hazard to the parent aircraft or personnel in its vicinity. This shall apply during all conditions of storage, stowage and handling and when a sonobuoy is in aircraft sonobuoy launcher in its “ready for deployment” state.

# CHAPTER 3

# REQUIREMENTS

## 301. SERVICE CONDITIONS

1. The sonobuoy shall operate as specified after storage for a minimum of five years from the date of manufacture after exposure to any combination or sequence of the service conditions.

2. The expected minimum period of storage, in conditions defined by Figure 1, before operational performance, reliability or safety is likely to be compromised, shall be determined from testing to the environmental conditions defined in accordance with the National Procurement Specifications.

3. The non-operating service conditions are defined as all shipping, storage and handling of the sonobuoy from acceptance of the sonobuoy until launch of the sonobuoy.

a. The sonobuoy will be exposed to the service conditions listed in the National Procurement Specification.

b. The packaging shall conform to the applicable packaging specifications or drawings.

c. Pallet performance tests are also considered service conditions.

d. The sonobuoy shall comply with the specification requirements after exposure to any combination or sequence of the non-operating service conditions. Examples of tests which may be applied are: Temperature/Humidity, Bounce, Free Fall, Vibration, Shock, Pressure/Temperature/Altitude, Salt Spray, Thermal Shock, etc. (See National Procurement Specification for specific tests and parameters).

e. The sonobuoy and its packaging shall not constitute a hazard to the aircraft or occupants, but may sustain damage to the point of non-operability, when subjected to some of the tests. Examples of tests which may be applied are: Tip Over, End Drop, Corner Drop, Bump Exposure, etc. (See National Procurement Specification for specific tests and parameters).

f. The sonobuoy shall be designed such that when unpackaged for a period of up to 90 days, exposure to any or all of the conditions stated in accordance with the National Procurement Specifications shall not cause any degradation in operational performance or reliability, or cause or contribute to premature deployment leading to an event that would hazard the safety of an aircraft or personnel.

g. Launch Envelope. Sonobuoys shall be designed so that, as a minimum they may be successfully launched at any point within the launch envelope depicted in Figure 2.

h. Air Descent Time. Sonobuoy flight time should be controlled to provide consistent trajectories for a given type. Sonobuoys shall meet the requirements as given in Figures 3 and 4, with permitted tolerances as shown.

i. Aircraft Compatibility.

(1) The sonobuoy will be loaded, carried and launched or unloaded from the appropriate type aircraft launcher system required by the National Procurement Specification.

(2) The sonobuoy may be loaded, carried and launched or unloaded as a bare sonobuoy, depending on the aircraft launch tube configuration and sonobuoy type (see Figure 5).

(3) No parts of the sonobuoy shall prematurely deploy.

(4) The sonobuoy shall not damage or cause a malfunction of the launch tube.

(5) The sonobuoy shall not be a hazard to the aircraft or crew when launching the store.

(6) The sonobuoy shall prevent Foreign Object Damage (FOD) producing debris when launching the store.

4. The operating service conditions are defined as conditions subsequent to launch.

a. The sonobuoy shall comply with specification requirements during exposure to any combination or sequence of the following service conditions:

(1) Launch temperature. The launch temperature of the SLC will be between -40°C (-40°F) and +55°C (+131°F), and the launch temperature of the sonobuoy will be between -20°C (-4°F) and +40°C (+104°F).

(2) Sea environment. The sonobuoy will be exposed to sea water having a salinity of 1.5 to 3.6% by weight, over a temperature range of 0°C (+32°F) to +35°C (+95°F) at the sea surface; sea water having a salinity of 2.3 to 3.6% by weight, over a temperature range of +2.78°C (+37°F) to +30°C +(86°F) at 15.58 m (50 feet) or more below the sea surface; sea-state conditions of 0 through 5 (international scale, see Table 1 below) with surface winds up to 27 knots (gusting up to 40 knots); and differential current between any two points along the deployed sonobuoy no greater than that shown in the two dimensional 90% current profile of Figure 6.

(3) Operating life. The sonobuoy shall have a continuous operating life during which it shall perform conforming to this specification.

(a) Operating life is the elapsed time from water entry to cessation of the capability to provide VHF transmission in compliance with this specification.

(b) Temporary interruptions of VHF transmission required by the National Procurement Specification or by operator commands via the UHF receiver shall not be considered end of operating life.

(c) The operating life of the sonobuoy will be specified in the National Procurement Specification. However, to ensure constancy of operational deployment, sonobuoys shall cease to operate (i.e. RF and acoustic transmissions shall cease to be effective or cause interference to other equipment) within -0, +10% of the specified normal life.

| Waveform Number n | Waveform Frequency $f_n$ [Hz] | Waveform Amplitude $A_n$ [m peak to trough] | Waveform Phase delay $\phi_n$ [radians] |
|---|---|---|---|
| 1 | 0.060 | 0.238 | 4.690 |
| 2 | 0.072 | 0.548 | 0.544 |
| 3 | 0.083 | 0.628 | 3.793 |
| 4 | 0.095 | 0.586 | 6.148 |
| 5 | 0.106 | 0.506 | 0.075 |
| 6 | 0.118 | 0.422 | 5.127 |
| 7 | 0.129 | 0.353 | 5.253 |
| 8 | 0.141 | 0.293 | 6.154 |
| 9 | 0.152 | 0.247 | 2.419 |
| 10 | 0.163 | 0.209 | 0.417 |
| 11 | 0.175 | 0.178 | 1.762 |
| 12 | 0.186 | 0.153 | 5.718 |
| 13 | 0.198 | 0.132 | 5.473 |
| 14 | 0.209 | 0.116 | 3.019 |
| 15 | 0.221 | 0.101 | 1.902 |
| 16 | 0.232 | 0.089 | 0.942 |
| 17 | 0.244 | 0.080 | 0.643 |
| 18 | 0.255 | 0.071 | 3.522 |
| 19 | 0.267 | 0.063 | 5.572 |
| 20 | 0.278 | 0.015 | 0.482 |

Table 1 - Components of WMO sea state 5

302. **MECHANICAL REQUIREMENTS**

1. Size, Weight and Form Factor. All sonobuoys shall be classified according to size and maximum weight, the classes being designated by letters in accordance with Table 2 below.

a. All sizes of sonobuoy shall pass through a right circular cylinder having an inside diameter 1.60 mm (0.63 in) greater than the maximum outside diameter specified for the sonobuoy, and a length 305.0 mm (1.0 ft) greater than that specified for the sonobuoy.

b. No force other than gravity shall be required to affect the sonobuoys passage through the cylinder when it is placed in a vertical position.

| Size | Diameter | Length | Max Weight |
|---|---|---|---|
| A-Size | 123.82 +0, -3.18 mm<br>4.875 +0 ,- 0.125 in | 914.40 +3.18, - 4.78 mm<br>36.00 +0.125, - 0.188 in | 17.69 kg<br>39.00 lbs. |
| B-Size | 174.62 +0, -3.18 mm<br>6.875 +0, -0.125 in | 1524.00 +0, - 6.35 mm<br>60.00 +0, -0.25 in | |
| C Size | 247.65 + 0, -6.35 mm<br>9.75 +0, -0.25 in | 1524.00 +0, -6.35 mm<br>60.00 +0, -0.25 in | |
| D Size | 76.20 +0.76, -0.76 mm<br>3.0 +0.03, -0.03 in | 381.00 +0, -2.29 mm<br>15.00 +0, -0.09 in | |
| F Size | 123.82 +0, -3.18 mm<br>4.875 +0, -0.125 in | 304.80 +0, -4.75 mm<br>12.00 +0, -0.187 in | 5.44 kg<br>12.00 lbs. |
| G Size | 123.82 +0, -3.18 mm<br>4.875 +0, -0.125 in | 419.00 +0, -4.75 mm<br>16.50 +0, -0.187 in | 8.16 kg<br>18.00 lbs |

Table 2 - Sonobuoy Dimensions and Maximum Weights

NOTES
1. Conversion to metric values has been carried out at 25.4 mm = 1.0 in.
2. Rounding has been carried out to the nearest 0.01mm except that, where upward rounding would cause the size to exceed the original inch tolerance limits, downward rounding was used.
3. The Particular Sonobuoy Specification shall state which of these sizes and weights shall apply.
4. The center of gravity shall be within 50% of the canister length from the base. Limits will be placed on this parameter which shall be recorded on the Certificate of Design.

2. Marking.

a. Sonobuoy Identification. All markings and displays shall be legible under both red and white lighting. All markings, with the exception of those in paragraph 302.2.a.(7).(b) shall be readable when the sonobuoy is standing on its base.

(1) Characters shall be upper case, normal or condensed, gothic style.

(2) Marking shall be labeLled or applied directly to the sonobuoy.

(3) Labels shall be made of water resistant paper, film or plastic with a pressure sensitive, water insoluble, adhesive coating on the back.

(4) Unless otherwise specified, labels shall have solid black characters on a white background.

(5) Labels shall remain affixed to the sonobuoy following exposure to any combination of sonobuoy specification service conditions.

(6) Labels shall be resistant to checking and cracking when exposed to the weather and sunlight for a minimum of 90 days.

(7) Marking applied directly to the sonobuoy shall be indelibly marked in solid black or white characters, whichever contrasts well with the background color (if both colors contrast well with the background color, then black shall be used), 5.0 mm (0.2 in.) to 25.4 mm (1.0 in.) in height as follows:

(a) Sonobuoy Identification, Housing. Each sonobuoy shall be plainly marked with the nomenclature, manufacturers code, lot identity or serial number/month/year of manufacture, DMC, and NSN, which shall be marked in one position and shall be located in accordance with the National Procurement Specifications.
The outside of the sonobuoy shall be marked to identify the nature of any hazard arising from any materials or methods used in its construction, using approved marking standards in accordance with a compatible national standard.
A warning symbol and phrase indicating that the sonobuoy contains sensitive components and must be handled with care shall be added. The format and location of this symbol shall be agreed with the Procurement Authority.

(b) Sonobuoy Identification, End. The sonobuoy type number SSQ (number to be decided in the contract) and where applicable, the frequency channel number, shall be marked on each end of the sonobuoy. A short form of the type number omitting the “SSQ” may be used on the end locations.

(c) Set and Verify. The functions of the switches shall be marked, where applicable, in accordance with the National Procurement Specifications. The setting function switch is identified with the word “SET”, the verifying function switch is identified with the word “VERIFY”.

(d) Air Descent Control System. The retainer or sonobuoy surface in the immediate area shall be marked with actuation instructions if manual engagement or disengagement by fleet personnel is necessary when using the sonobuoy in the bare buoy configuration.
- If the retainer requires manual engagement, the instructions shall include the motion required to engage the retainer, the type of mechanism, and arrows (as necessary) to indicate direction or location (e.g. "SLIDE LEVER TO ENGAGE", "ROTATE LEVER TO ENGAGE", etc.).
- If the retainer requires manual disengagement, the instructions shall include the words "CAUTION- DISENGAGE BEFORE LAUNCH", the type of mechanism, and arrows (as necessary) to indicate direction or location (e.g. "CAUTION-DISENGAGE LEVER BEFORE LAUNCH").
- If disengagement instructions apply only to specific aircraft, then the instruction shall specify the aircraft (e.g. "P-3", "S-3", "SH-2" or "SH-60").
- If the retainer requires manual engagement and it is not located on the sonobuoy end initially exposed by the removal of the SLC muzzle cap, then an instruction shall be provided on the sonobuoy end initially exposed describing the location of the retainer (e.g. "RETAINER ON WINDFLAP BLADE").
- If the activator is spring loaded, then the warning "WARNING-SPRING LOADED" shall be marked on the activator. The sonobuoy surface in the immediate area of the captivator shall be marked with

the instructions "REMOVE LANYARD PRIOR TO LAUNCH" or similar wording if removal of the lanyard is necessary when the sonobuoy is launched without an SLC. An arrow shall extend from the instructions to the engagement point between the captivator and activator.

(e) Bar Codes. Bar code labels of standard NATO, variable length, discrete, self checking, bi-directional, alphanumeric 3 of 9, bar code (also known as 39 code) shall be attached to the sonobuoy and its packaging in accordance with the National Procurement Specifications, if required.

b. Sonobuoy Launch Container (SLC), if utiliSed.

(1) All markings and displays shall be legible under both red and white lighting.

(2) All markings shall be readable when the SLC is standing with the muzzle end up.

(3) Marking shall be labeLled or applied directly to the SLC.

(4) Labels shall be made of water resistant paper, film or plastic with a pressure sensitive, water insoluble, adhesive coating on the back.

(5) Unless otherwise specified, labels shall have solid black characters on a white background.

(6) Labels shall remain affixed to the SLC following exposure to any combination of SLC specification service conditions.

(7) Labels shall be resistant to checking and cracking when exposed to the weather and sunlight for a minimum of 90 days.

(8) Marking applied directly to the SLC shall have solid black or white characters whichever contrasts well with the background coloUr (if both coloUrs contrast well with the background coloUr, then black shall be used).

(9) Characters shall be upper case, normal or condensed, gothic style.

(10) Marking shall be resistant to abrasion as encountered in loading and downloading from an aircraft launch tube and resistant to fading when exposed to the weather and sunlight for a minimum of 90 days.

(11) The medium used in marking shall not change color when tested in accordance with ASTM G23.

(12) Marking shall be legible following exposure to any combination of SLC specification service conditions.

(13) The SLC shall be marked in accordance with the National Procurement Specifications.

c. Bayonet Base Pallet Unitized Load, if utilized.

(1) Marking shall be labeLled or applied directly to the unitized load.

(2) Labels shall be made of water resistant paper, film or plastic with a pressure sensitive, water insoluble, adhesive coating on the back.

(3) Unless otherwise specified, labels shall have solid black characters on a white background.

(4) Labels shall remain affixed to the unitized load following exposure to any combination service conditions.

(5) Labels shall be resistant to checking and cracking when exposed to the weather and sunlight for a minimum of 6 months.

(6) Marking applied directly to the unitized load shall have solid black characters.

(7) Characters shall be upper case, normal or condensed, gothic style.

(8) Marking shall be resistant to abrasion as encountered in shipping and handling and resistant to fading when exposed to the weather and sunlight for a minimum of 6 months.

(9) The medium used in marking shall not change coloUr when tested in accordance with ASTM G23.

(10) Marking shall be legible following exposure to any combination service conditions.

(11) The unitized load shall be marked in accordance with the National Procurement Specifications.

3. Retrieval mechanism.

a. All A, F and G size sonobuoys shall be equipped with a retrieval mechanism device (strap, grip, or hole in the base plate for use with an extractor tool) which will allow safe loading and unloading of sonobuoys from the sonobuoy launch tube.

b. The water impact end of the A-size sonobuoy shall have a 12.7 mm (0.5 inch) minimum diameter opening.

c. The shape, depth and location of the opening shall allow the A-size sonobuoy to be hooked and lifted from an internal aircraft launch tube using the tool shown in Figure 7.

4. Air descent control system.

a. A system shall be provided to control the air descent of the sonobuoy when the sonobuoy is launched at any point within the launch envelope specified in Figure 2.

b. The system shall be compatible with and certified safe in accordance with the National Procurement Specification.

c. The air descent control system shall not inadvertently activate or deploy while the sonobuoy is handled, loaded, carried, or downloaded from the aircraft launch tubes that do not use the SLC.

d. The air descent control system shall not deploy or otherwise activate until the sonobuoy has cleared the SLC, regardless of the sonobuoy's orientation with respect to the air stream, from all aircraft.
It shall not deploy or otherwise activate from rotary wing aircraft at air speeds up to 150 KIAS for up to one hour unless sonobuoy has cleared the SLC.

e. Any required manipulation of the system (engagement, disengagement, moving or removing of parts) to accomplish the above functions shall be performable by hand and not require tools.

f. Any required manipulation of the system shall be described by marking on the SLC or sonobuoy.

g. Special marking on the sonobuoy is required when the air descent control system contains springs or other stored energy devices which may be inadvertently deployed.

h. Decelerator.

(1) The size of a sonobuoy decelerator, stabilizer, or any deployable device used on an "A" size or smaller sonobuoy shall be limited so that the overall length of such device measured from the top edge of the sonobuoy shall not exceed 0.92 meter (3.0 feet) when fully extended in the un-inflated state.
The design authority may request a relaxation of this dimension because of Particular Sonobuoy Specifications.

(2) If a parachute decelerator is used, the decelerator shall have at least two attachment points.
The decelerator shall be located at the end of the sonobuoy that exits the SLC first during launch.
At air speeds greater than 150 KIAS, the decelerator shall fully deploy within 0.8 sec after the sonobuoy clears the aircraft launch tube.

5. Scuttling system.

a. The sonobuoy shall have a scuttling system that automatically scuttles the sonobuoy after the selected operating life, in accordance with the operating life requirements as defined in the National Procurement Specification.

b. Scuttling is the purposeful and permanent sinking of the sonobuoy to below the sea surface.

c. The sonobuoy shall not scuttle during its pre-programmed operating life, unless commanded to do so.

6. Bathythermographic system. The BTS shall contain a temperature-sensing device as described in the National Procurement Specification and a narrowband VHF transmitter as described in paragraph 303.3.

7. Sonobuoy operating depth.

a. Operating depth is the vertical distance from the mean ocean surface to the acoustic or geometric centre of the transducer or transducer array.

b. The operating depth in calm seas shall be as specified in the National Procurement Specification.

8. Sonobuoy descent and deployment times.

a. Descent time is the elapsed time from water entry until the sensor reaches operational depth.

b. Deployment time is the elapsed time from water entry to the moment when continuous compliance with all specification requirements begins.

c. Descent and deployment times shall be in accordance with the National Procurement Specification.

9. Transducer or transducer array tilt.

a. The tilt of the sonar transducer or the transducer array, relative to vertical, shall be no greater than the levels specified in the National Procurement Specification.

b. A straight line intersecting any two sonar transducers in the array will be used to determine tilt of the array.

## 303. ELECTRICAL REQUIREMENTS

1. Power sources. All power shall be supplied by self-contained sources.

a. If hazardous materials are used, then their use shall comply with the National Procurement Specification requirements to allow unrestricted transportation, storage and disposal of the sonobuoy.

b. The use of lithium based power supplies in expendable sonobuoys has become attractive due to their high energy density and superior storage life potential.

(1) If improperly used, however, lithium cells can present a serious safety hazard. Accordingly design guidelines and qualification test procedures have been established by the U.S. and the U.K.

(2) All nations are encouraged to use appropriate information from these guidelines during the sonobuoy design. UK/US aircraft are not permitted to carry sonobuoys containing lithium batteries unless they successfully pass their national approval procedures.

2. Electromagnetic interference control. The sonobuoy shall not radiate electromagnetic radiation in excess of the levels specified in the National Procurement Specification.

3. VHF characteristics.

a. Power output.

(1) The sonobuoy shall radiate VHF power as specified in the National Procurement Specification on the assigned channel frequency (see paragraph 303.3.b).

(2) The radiated signal power density shall be at the specified full power when measured at the maximum amplitude of the major lobe of the vertical beam pattern (see paragraph 303.3.d) at a distance of 1 meter.

b. Frequency. The channel number and frequency assignments shall conform to Table 3 below. In the absence of modulation, the VHF carrier frequency shall be within ±25 kHz of the assigned channel frequency.

(1) Narrowband Channels. The bandwidth of narrow band channels shall be 375 kHz, centered on the carrier frequencies set out.
However, the actual number of channels used may be limited to less that those in Table 3 listed due to the National Procurement Specification.

(2) Wideband Channels. The nominal bandwidth of wide band channels shall be 750 kHz, centred on the channel frequencies assigned to channels 1 to 16 inclusive, and to all even numbered channels from 32 to 98 inclusive (Note that wide band channels occupy the narrow band channels associated with the centre frequency of the channel number, plus half of each of the physically adjacent channels).
Nations may place restrictions on the number of wide band channels used for a particular sonobuoy type.

c. Commencement.RF. Commencement shall be to the National Procurement Specification and a specific signal shall be subject to the restrictions imposed by the limits on harmonic and spurious radiation.

d. Vertical beam pattern.

(1) The vertical beam pattern of the VHF transmission at the assigned VHF channel frequency shall have a single major lobe between the angles of 0° to 90° of elevation measured relative to a reference plane normal to the longitudinal axis of the sonobuoy.

(2) The beam width of the pattern shall be defined by the -3 dB points which shall occur at elevation angles of less than 3° and greater then 30° with respect to the reference plane.

(3) Variations in the pattern with respect to the maximum of the major lobe shall be not greater than -16 dB between 0.5° and 3° elevation and -12 dB between 15° and 60° elevation.

(4) The pattern shall have a null at 90° from the reference plane which is at least 20 dB below the maximum amplitude of the major lobe.

e. Horizontal beam pattern. The horizontal beam pattern of the VHF transmission at the assigned VHF channel frequency shall be omni-directional within ±1 dB when measured at the mean centre of the major lobe (see paragraph 303.3.d).

f. Loss of signal.

(1) Loss of the VHF carrier or loss of the VHF modulation signal is permitted if the loss of signal occurs under conditions of sea state 5 with surface winds of 27 knots gusting up to 40 knots.

(2) The allowed loss of signal can be for no more than 5 percent of the operating life of the sonobuoy.

(3) Loss of the VHF carrier signal is defined as a 6 dB or greater momentary reduction in specified radiated signal power density for all elevation angles greater than 3° and less than 60° (see paragraph 303.3.d).

(4) Loss of VHF modulation is defined as a momentary reduction in the power spectrum density of the signal of greater than 20 dB.

g. Spurious radiation. The sonobuoy shall emit no spurious radiation in the electromagnetic spectrum of magnitude greater than – 40 dB relative to the main lobe power density (see paragraph 303.3.a).

h. Carrier modulation.

(1) The VHF carrier shall be modulated with the specified modulation format as required by the National Procurement Specification.

(2) Carrier modulation shall commence within 1 sec. of VHF commencement for all passive and active sonar systems.

(3) The maximum VHF carrier deviation shall not exceed the specified limits listed in the National Procurement Specification.

i. FM modulation.

(1) Analogue signals shall Frequency Modulate (FM) the VHF carrier, except where an alternative form of modulation is defined in the National Procurement Specification.

(2) At all times during the descent of the temperature probe of the thermographic system, or after the descent time specified for passive and active sonar systems, the VHF carrier shall be frequency modulated by signals within the frequency response of the thermographic system or the sonic receive system.

j. Carrier Deviation.

(1) Analogue signals will be considered to be 100% modulated when the VHF carrier has 75 kHz deviation.

(2) Digital signals shall be as specified in the National Procurement Specification.

| Channel | Freq (MHz) | Channel | Freq (MHz) | Channel | | Freq (MHz) |
|---|---|---|---|---|---|---|
| 32 | 136.000 | 66 | 148.750 | 1 | | 162.250 |
| 33 | 136.375 | 67 | 149.125 | | 17 | 162.625 |
| 34 | 136.750 | 68 | 149.500 | 2 | | 163.000 |
| 35 | 137.125 | 69 | 149.875 | | 18 | 163.375 |
| 36 | 137.500 | 70 | 150.250 | 3 | | 163.750 |
| | | | | | | |
| 37 | 137.875 | 71 | 150.625 | | 19 | 164.125 |
| 38 | 138.250 | 72 | 151.000 | 4 | | 164.500 |
| 39 | 138.625 | 73 | 151.375 | | 20 | 164.875 |
| 40 | 139.000 | 74 | 151.750 | 5 | | 165.250 |
| 41 | 139.375 | 75 | 152.125 | | 21 | 165.625 |
| | | | | | | |
| 42 | 139.750 | 76 | 152.500 | 6 | | 166.000 |
| 43 | 140.125 | 77 | 152.875 | | 22 | 166.375 |
| 44 | 140.500 | 78 | 153.250 | 7 | | 166.750 |
| 45 | 140.875 | 79 | 153.625 | | 23 | 167.125 |
| 46 | 141.250 | 80 | 154.000 | 8 | | 167.500 |
| | | | | | | |
| 47 | 141.625 | 81 | 154.375 | | 24 | 167.875 |
| 48 | 142.000 | 82 | 154.750 | 9 | | 168.250 |
| 49 | 142.375 | 83 | 155.125 | | 25 | 168.625 |
| 50 | 142.750 | 84 | 155.500 | 10 | | 169.000 |
| 51 | 143.125 | 85 | 155.875 | | 26 | 169.375 |
| | | | | | | |
| 52 | 143.500 | 86 | 156.250 | 11 | | 169.750 |
| 53 | 143.875 | 87 | 156.625 | | 27 | 170.125 |
| 54 | 144.250 | 88 | 157.000 | 12 | | 170.500 |
| 55 | 144.625 | 89 | 157.375 | | 28 | 170.875 |
| 56 | 145.000 | 90 | 157.750 | 13 | | 171.250 |
| | | | | | | |
| 57 | 145.375 | 91 | 158.125 | | 29 | 171.625 |
| 58 | 145.750 | 92 | 158.500 | 14 | | 172.000 |
| 59 | 146.125 | 93 | 158.875 | | 30 | 172.375 |
| 60 | 146.500 | 94 | 159.250 | 15 | | 172.750 |
| 61 | 146.875 | 95 | 159.625 | | 31 | 173.125 |
| | | | | | | |
| 62 | 147.250 | 96 | 160.000 | 16 | | 173.500 |
| 63 | 147.625 | 97 | 160.375 | | | |
| 64 | 148.000 | 98 | 160.750 | | | |
| 65 | 148.375 | 99 | 161.125 | | | |

Table 3 - Channel Number and Frequency Assignment

4. UHF Downlink receiver requirements.

a. Command Signal Generator (CSG) link.

(1) The CSG capability will provide a one way RF communication downlink from the aircraft to the sonobuoy after it has been deployed.

(2) CSG shall enable the operator to command the sonobuoy or change some of the sonobuoy option settings by transmitting signals through an RF downlink to the deployed sonobuoy.

(3) The sonobuoy, if required by the National Procurement Specification, shall execute commands received from the appropriate CSG Set.

(4) Frequency. The UHF receiver shall be capable of receiving a carrier frequency of 291.3, 291.4, or 291.5 MHz ±0.005 percent with signals that are modulated as required by the National Procurement Specification.

(5) Sensitivity. The sensitivity of the UHF antenna system and receiver shall be in accordance with the National Procurement Specification.

(6) Command decoding. The sonobuoy shall respond as required to each command as described in the National Procurement Specification.

(7) Downlink Antenna Polar Patterns. To be defined by NATO.

b. Command Function Selection (CFS) UHF receiver.

(1) The CFS capability provides a one way RF communication downlink from the aircraft to the deployed sonobuoy.

(2) CFS shall enable the sonobuoy operator to command or change some of the sonobuoy option settings (including CSG commands) on sonobuoys by transmitting signals through an RF downlink to the deployed sonobuoy.

(3) The sonobuoy, if required by the National Procurement Specification, shall incorporate a UHF receiver and associated components capable of meeting the requirements of the US P.S.S. Appendix E (NATO release version – see Related Documents).

(4) Sonobuoys with CFS shall be capable of being used in non-CFS equipped aircraft.

5. Programmable functions. The sonobuoy shall be capable of being preset for combinations of selectable settings:

a. Set and Verify (SV) selector.

(1) The programming interface shall consist of momentary switches and a display viewed from the side of the sonobuoy tube. The SV function is referred to as Autonomous Function Selection (AFS) by the UK and as Electronic Function Select (EFS) by the US.

(2) Each sonobuoy shall have an SV for selecting the functions listed as per the National Procurement Specification.

(3) The SV shall be capable of performing at least 50 SET sequences and 100 VERIFY sequences.

(4) Following launch, the SV shall not be capable of being reprogrammed. The sonobuoy shall operate in the modes selected by the SV upon sonobuoy activation unless overridden by an aircraft UHF command.

(5) SV Location. The SV controls and displays shall be located on the sonobuoy conforming to the National Procurement Specifications.

(6) SV Controls. Two push-button switches shall control the SV:

(a) The left switch shall be the “SET” switch, and it shall enable function selection.

(b) The right switch shall be the "VERIFY" switch, and it shall cause the display of function selections stored in the SV memory.

(c) The switch surface that must be pressed shall have a minimum diameter of 4.7 mm (0.185 inches) and no sharp edges.

(d) Switches shall provide tactile feedback when activated, if the entire surface of the switch is not the active area.

(e) Activation of the SV switches through the SLC setting port(s) shall require no more than 1.78 N (8 pounds) of force.

(f) The switches shall be capable of being operated by an operator wearing Arctic gloves.

(g) Forces acting on the switches during launch, flight or water entry, shall not affect set parameters.

(h) The switch shall activate each time it is pressed, within the limits specified above.

(7) SV Display.

(a) The SV display shall consist of a two digit, red seven segment display and easily readable in direct sunlight and through the SLC.

(b) The display shall have a minimum character height of 6.35 mm (0.25 inches) and a minimum luminous intensity of 1750 microcandela per ‘8’ digit and 500 microcandela per ‘1’ digit displayed. Individual “on-off” indicators shall have a minimum luminous intensity of 250 microcandela.

(c) Variation in luminous intensity of like elements shall not exceed 50 percent.

(8) SV Programming sequence.

(a) SV programming shall be accomplished through use of the SET control or the SET/VERIFY control depending on the National Procurement Specification.

(b) Each activation of the control shall select the displayed function’s option and cycle the display to the next function’s options.

(c) The programming sequence shall be in accordance with the National Procurement Specification.

(d) Function selections shall start at the lowest or first value specified and cycle to the next selection every 1 (+0.5, -0.1) sec.

(e) When selecting the VHF channel, the selected ten's digit shall remain displayed until the unit's digit has also been selected.

(f) The available VHF channels shall conform to the National Procurement Specification.

(g) No selection of a function shall be possible until it is displayed. At least two cycles of values shall be displayed for each selection of a function, unless interrupted by control activation.

(9) SV Verification. Activation of the VERIFY control shall cause the function selections stored in the SV memory to be displayed on the SV Display.

(a) The stored settings shall be displayed only once for each activation of the VERIFY control.

(b) The time required to initiate the verification sequence shall not exceed 0.5 sec after the VERIFY control is activated.

(c) The display shall cycle through the selected functions every 1.0, (+0.5, -0.1) sec.

(10) SV Memory. The SV memory shall store selections for a minimum of 48 hours following activation of either the SET or VERIFY switches.

b. Remote Function Selection (RFS).

(1) The RFS shall be based on Infra-Red (IR) communications technology. It shall provide a single way communication link to enable the remote initialization, and programming of a sonobuoy via a hand-held remote control unit, prior to loading into the dispenser.

(2) The implementation of RFS shall not impact on any existing SV capability in the sonobuoy.

(3) The sonobuoy, if required by the National Procurement Specification, shall incorporate a RFS receiver and associated components capable of meeting the requirements of the UK G.S.S.

(4) The sonobuoy shall be capable of being programmed for any valid combination of commands/subcommands as specified in the National Procurement Specification.

(5) All selectable functions shall be changeable prior to sonobuoy launch.

304. **THERMOGRAPHIC REQUIREMENTS**

1. Thermographic system. The BTS shall have a thermographic system which provides a discrete signal that is a function of the measured temperature of the ocean at probe depth.

2. Temperature/frequency relationship. The BTS shall modulate the VHF carrier with a discrete signal whose frequency is related to ocean temperature, as measured by the temperature probe assembly, in accordance with the formula:

a. Degrees Celsius
F = 1440 + 36*T
Where: F is expressed in Hertz
T is expressed in degrees Celsius

b. Degrees Fahrenheit
F = 800 + 20*T
Where: F is expressed in Hertz
T is expressed in degrees Fahrenheit

3. Accuracy. The accuracy of the thermographic system from commencement of VHF modulation until the probe reaches the specified depth shall meet the following requirements.

a. The signal specified in paragraph 304.1 shall be within ± 20 Hz of the value calculated from the formula of paragraph 304.2 using the true sea water temperature over the range from -2.22°C (28°F) to 35°C (95°F).

b. The thermographic system shall meet this accuracy requirement within one second for instantaneous temperature changes of up to 20°C (± 36°F).

4. Modulation artifacts.Modulation artifacts, sinusoidal signals other than the frequency described in paragraph 304.2, within the frequency range from 1200 Hz to 2800 Hz shall be 60 dB below the signal level required by the National Procurement Specification.

305. **ACOUSTIC REQUIREMENTS**

1. The sonobuoy selected shall have acoustic requirements as specified in the National Procurement Specification.

2. Sonic receive system.

a. The sonic receive system is defined as all sonobuoy elements necessary to receive acoustic energy from the ocean, process it as specified and modulate the VHF carrier as specified in paragraph 303.3.

b. The sonobuoy shall have the sonic receive system specified in the National Procurement Specification.

3. Active sonar systems.

a. The active sonar system is defined as all sonobuoy elements necessary to transmit acoustic energy into the ocean.

b. The sonobuoy, if required, shall have the active sonar system specified in the National Procurement Specification.

306. **GPS NAVIGATION MESSAGE (NAV-msg)**

To be defined by NATO.

307. **ENVIRONMENTAL**

1. Pollutants.

a. The sonobuoy shall be composed of environmentally responsible materials. The use of any materials or concentrations of materials known to have deleterious effects to marine organisms shall not be allowed.
Trace level is defined as naturally occurring in the operating environment (e.g. ocean).
Contaminants are defined as those items not specifically added to the process/material for a specific function.

b. In general, materials with minimum environmental impact are to be selected wherever it is possible and in compliance with the operational requirements.
However, this cannot be met in all cases. Therefore, the Design Authority (DA) must supply a statement which:

(1) Lists the quantities of all environmentally hazardous material used in sonobuoys for which no replacement within the specified performance data can be identified.

And:

(2) Describes alternatives investigated, introducing less hazardous material as well as the change in performance data to be expected in this case.

c. Specifically:

(1) The sonobuoy shall liberate no materials during launch, deployment, operational life and scuttling that do not sink within 30 minutes to the ocean bottom, except biodegradable plastic and/or rubber pieces that require sunlight to degrade which shall remain on the surface for a maximum of 48 hours.

(2) The sonobuoy shall contain no cadmium or mercury of any type nor non-metallic chromium (including any chromate conversion coating), other than as trace contaminants.

(3) The sonobuoy shall contain no more than 10% lead by weight.

(4) The sonobuoy shall contain no oil, grease or other organohalogen material. Organohalogens are organic (carbon-containing) materials with fluorine, chlorine, bromine or iodine constituents.

(5) The sonobuoy shall contain no materials which, when mixed in a 1:100 part ratio with water, leave a visible sheen on a water surface.

(6) The use of perfluoro compounds with low toxicity to marine life, low solubility in water, and a density significantly greater than sea water will be allowed. Examples are FC™-72 and FC™-77 Fluorinert™ Electronic Liquids.

(7) No carcinogen, mutagen, teratogen or suspected carcinogen, suspected mutagen or suspected teratogen which is not specifically addressed in this section will be allowed.

(8) The sonobuoy shall contain no marine pollutants or priority marine pollutants, other than as trace contaminants.

(9) The sonobuoy shall contain no Polychlorinated biphenyls (PCB's).

(10) The sonobuoy shall contain no organochlorine pesticide or herbicide compounds.

2. Magnetic Influence.

a. The compass safe distance shall be determined by tests which shall be performed on both a single sonobuoy and ten sonobuoys arranged on a pitch of 500 mm diameter.

b. The single sonobuoy shall not cause a deflection on the monitoring equipment of more than 1° at a distance of 300 mm (11.8 inches) and the configuration of ten sonobuoys shall not cause a deflection of greater than 1° at a distance of 1 meter (39.4 inches) from the circle outer circumference.

# CHAPTER 4

# PACKAGING

## 401. PRESERVATION AND PACKAGING

1. The sonobuoy shall be packaged as specified in the National Procurement Specification.

## 402. MARKING

1. The packaging shall be marked conforming to the National Procurement Specification.

## 403. HAZARDOUS MATERIALS

1. When the sonobuoy contains hazardous materials, the contractor shall package and mark sonbuoy in accordance with the appropriate UN Hazard Classification and National Safety Legislation.

## FIGURES

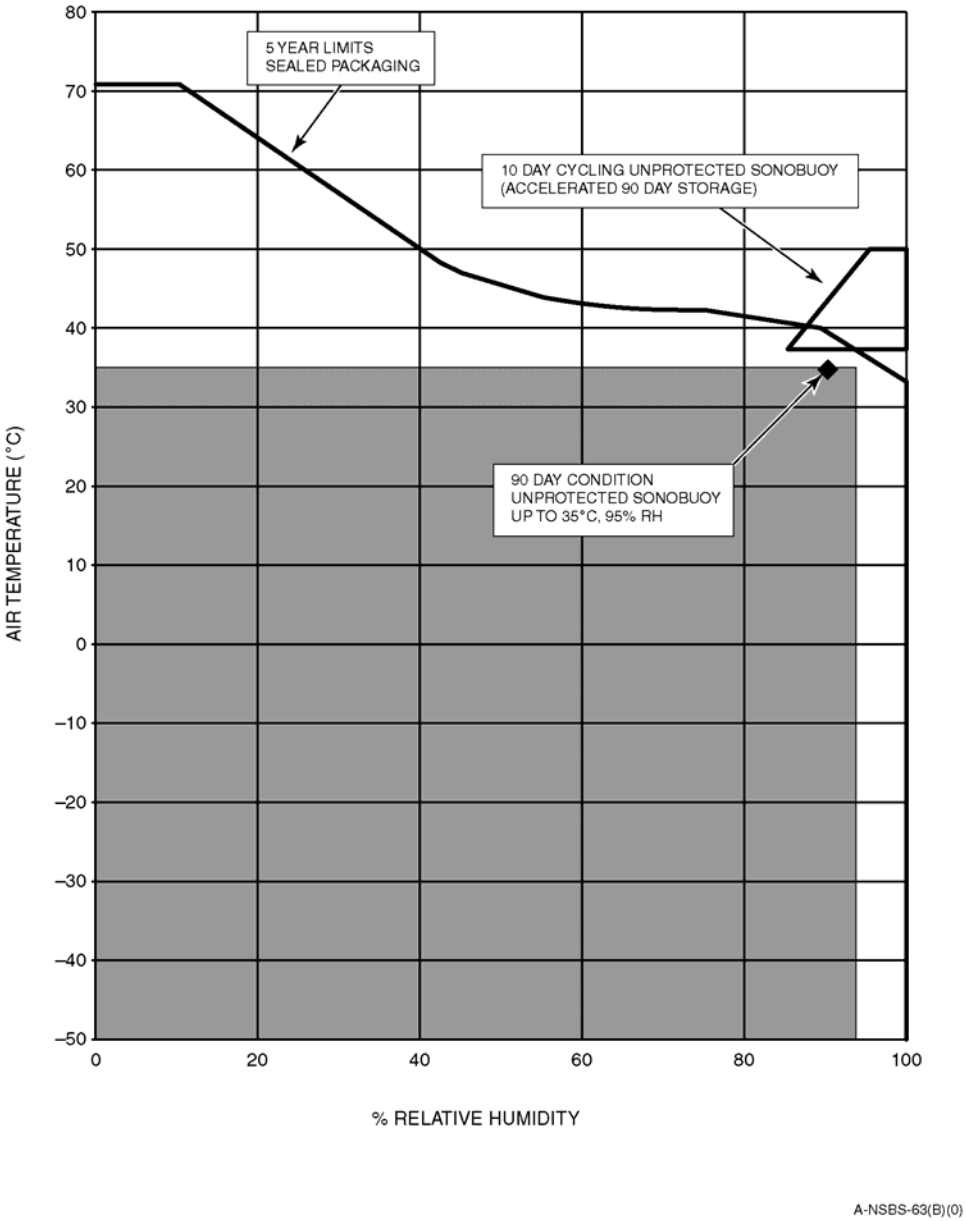
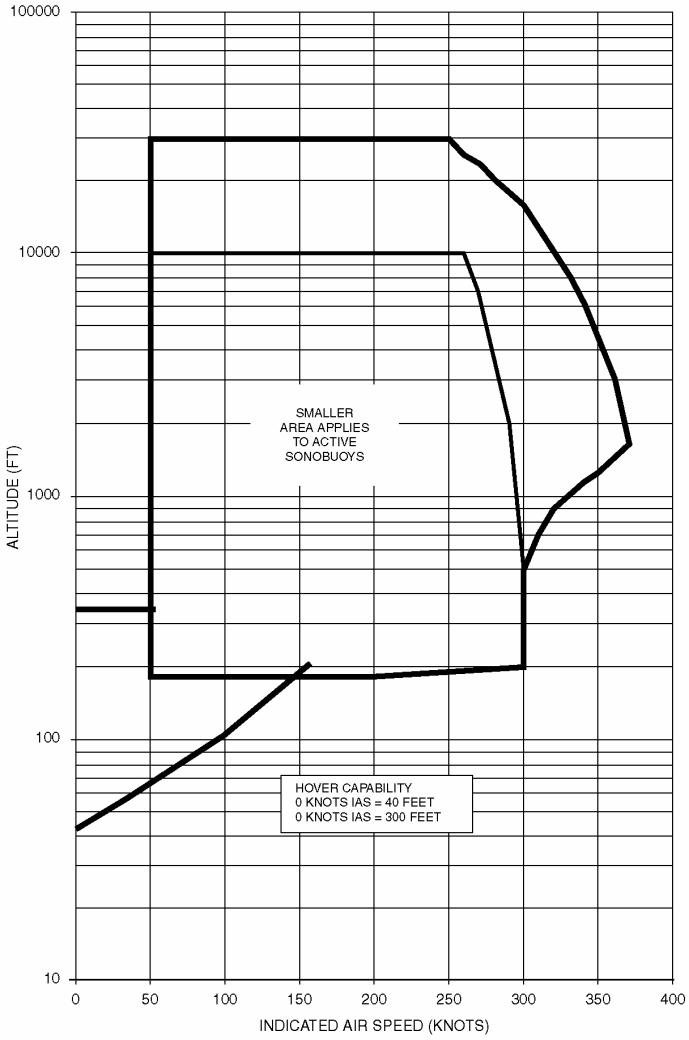


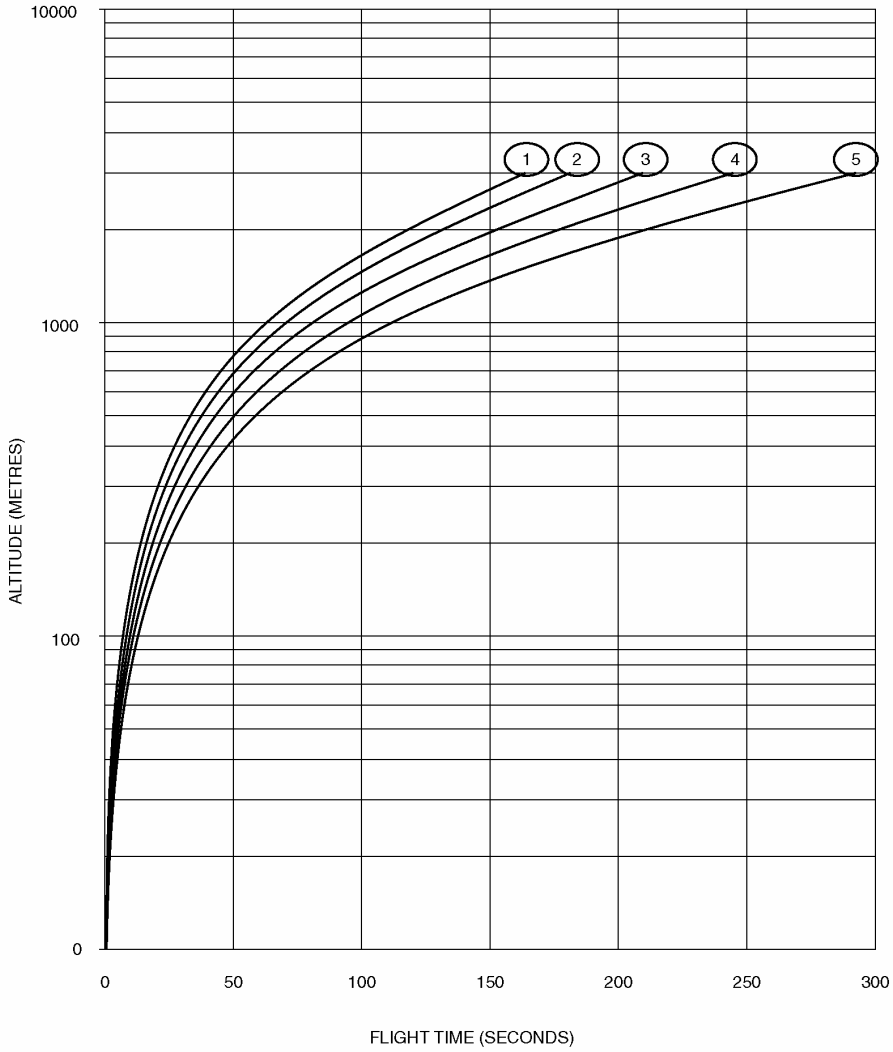

Figure 1 - Humidity/Temperature envelope




| THE CORNER VALUES FOR THIS ENVELOPE | | | | | |
|---|---|---|---|---|---|
| FOR PASSIVE BUOYS | | | FOR ACTIVE BUOYS | | |
| ALTITUDE | | TAS | ALTITUDE | | TAS |
| METRES | FEET | KNOTS | METRES | FEET | KNOTS |
| 45 | 150 | 50 | 45 | 150 | 50 |
| 45 | 150 | 200 | 45 | 150 | 200 |
| 61 | 200 | 300 | 61 | 200 | 300 |
| 152 | 500 | 300 | 3048 | 10,000 | 300 |
| 564 | 1,850 | 380 | 3048 | 10,000 | 50 |
| 9144 | 30,000 | 380 | | | |
| 9144 | 30,000 | 50 | | | |

A-NSBS-64(B)(0)

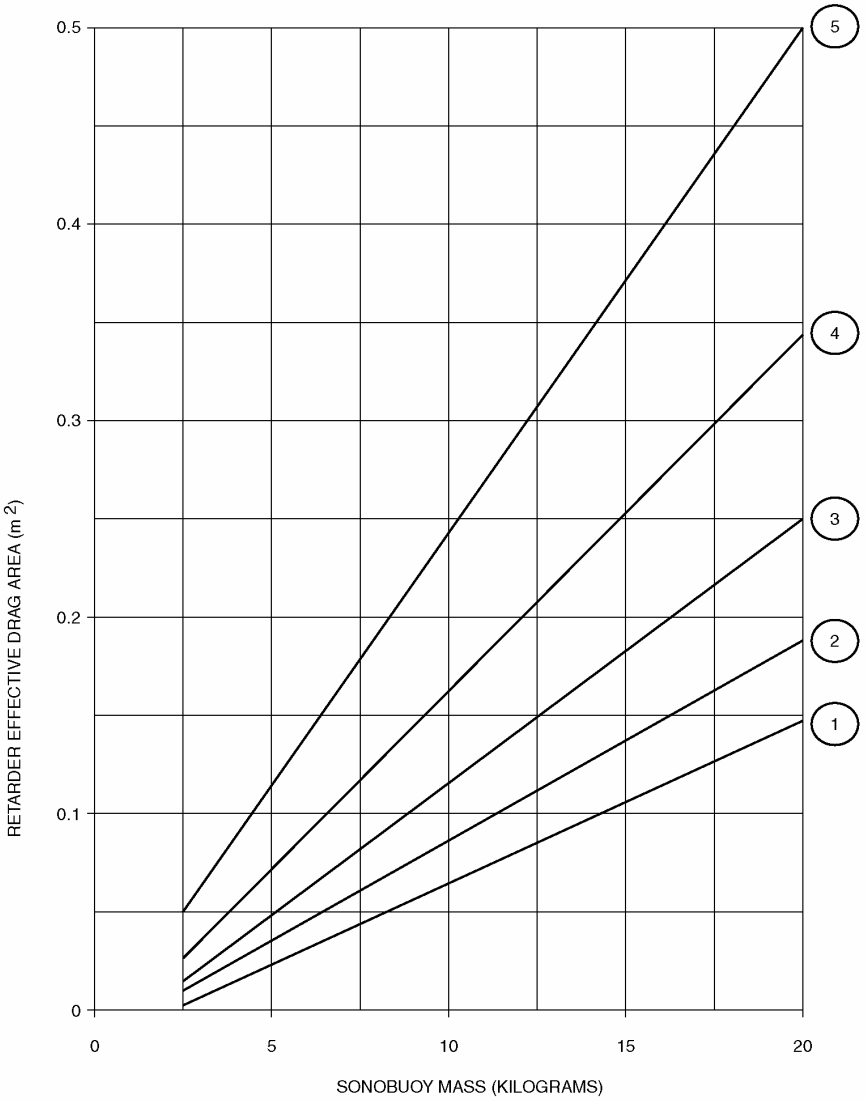
Figure 2 - Launch Envelope




| | 1 | 2 | 3 | 4 | 5 |
|---|---|---|---|---|---|
| BALLISTIC COEFFICIENT (kg $m^{-2}$) | 125 | 100 | 75 | 55 | 39 |
| TERMINAL VELOCITY, $V_t$ (m $s^{-1}$) | 45 | 40 | 35 | 30 | 25 |

A-NSBS-65(B)(0)

Figure 3 - Flight times for A, F and G size Sonobuoys




| | 1 | 2 | 3 | 4 | 5 |
|---|---|---|---|---|---|
| BALLISTIC COEFFICIENT (kg $m^{-2}$) | 125 | 100 | 75 | 55 | 39 |
| TERMINAL VELOCITY, $V_t$ (m $s^{-1}$) | 45 | 40 | 35 | 30 | 25 |

A-NSBS-66(B)(0)

Figure 4 - Retarder characteristics for A, F and G size Sonobuoys

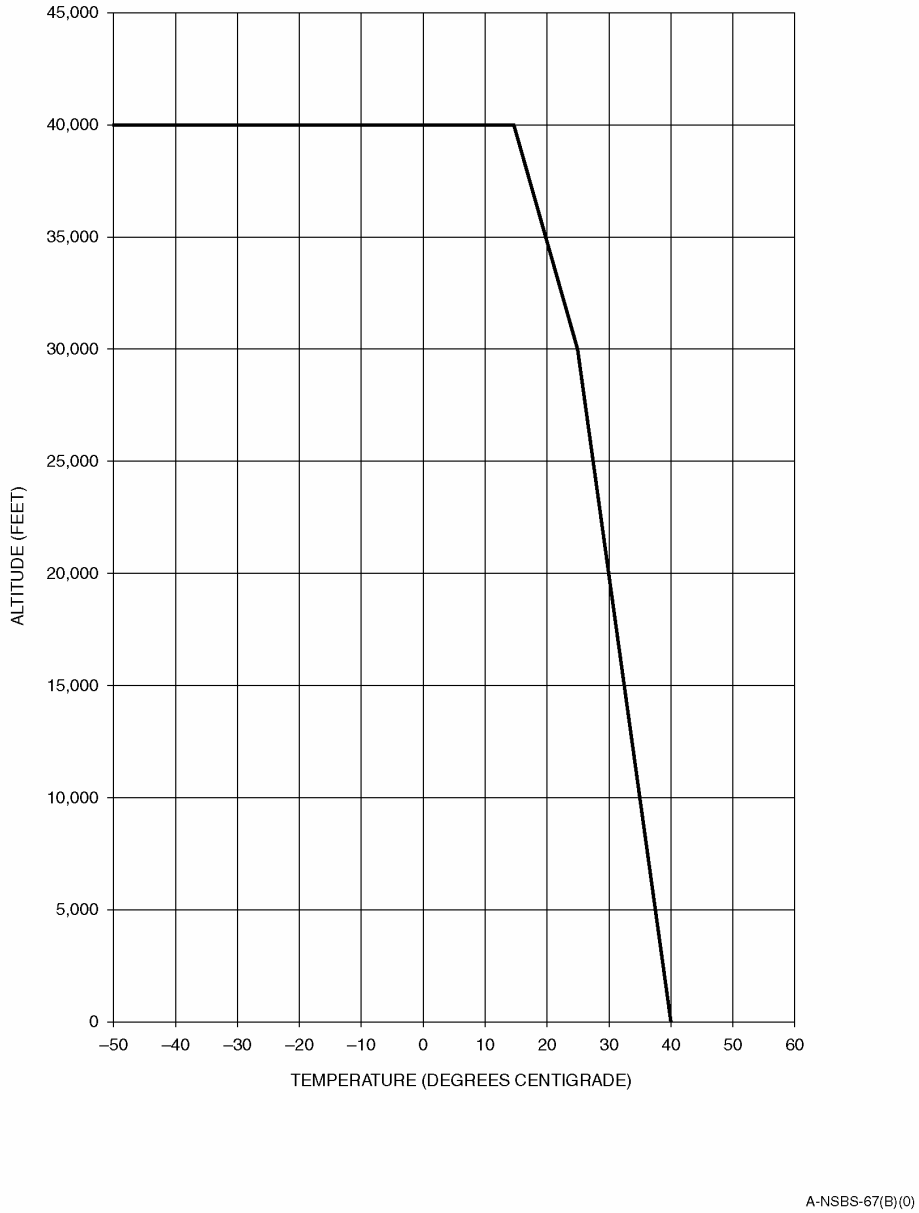



Figure 5 - Operational carriage requirement for unpacked Sonobuoys

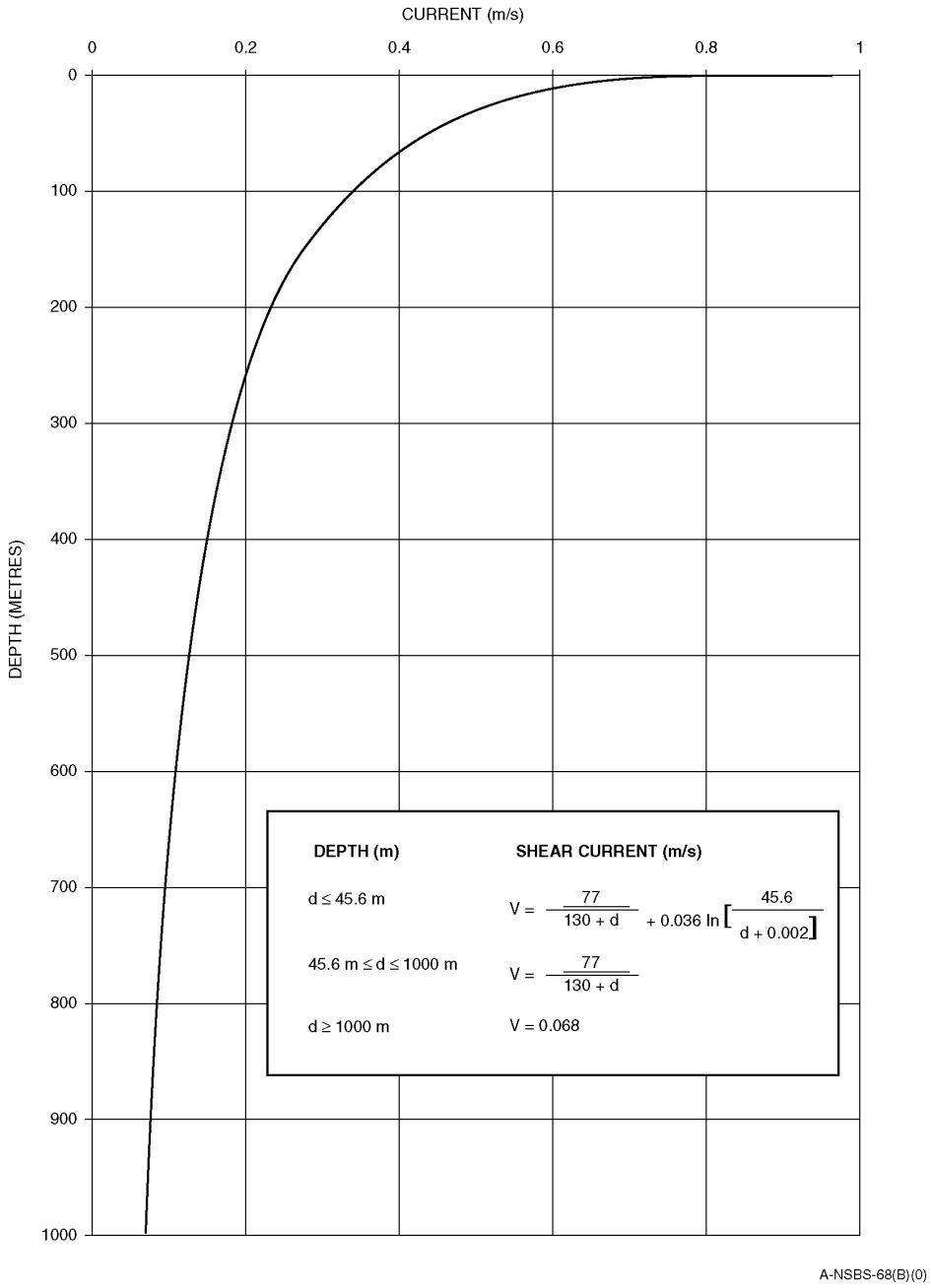



Figure 6 - 90% Shear current profile

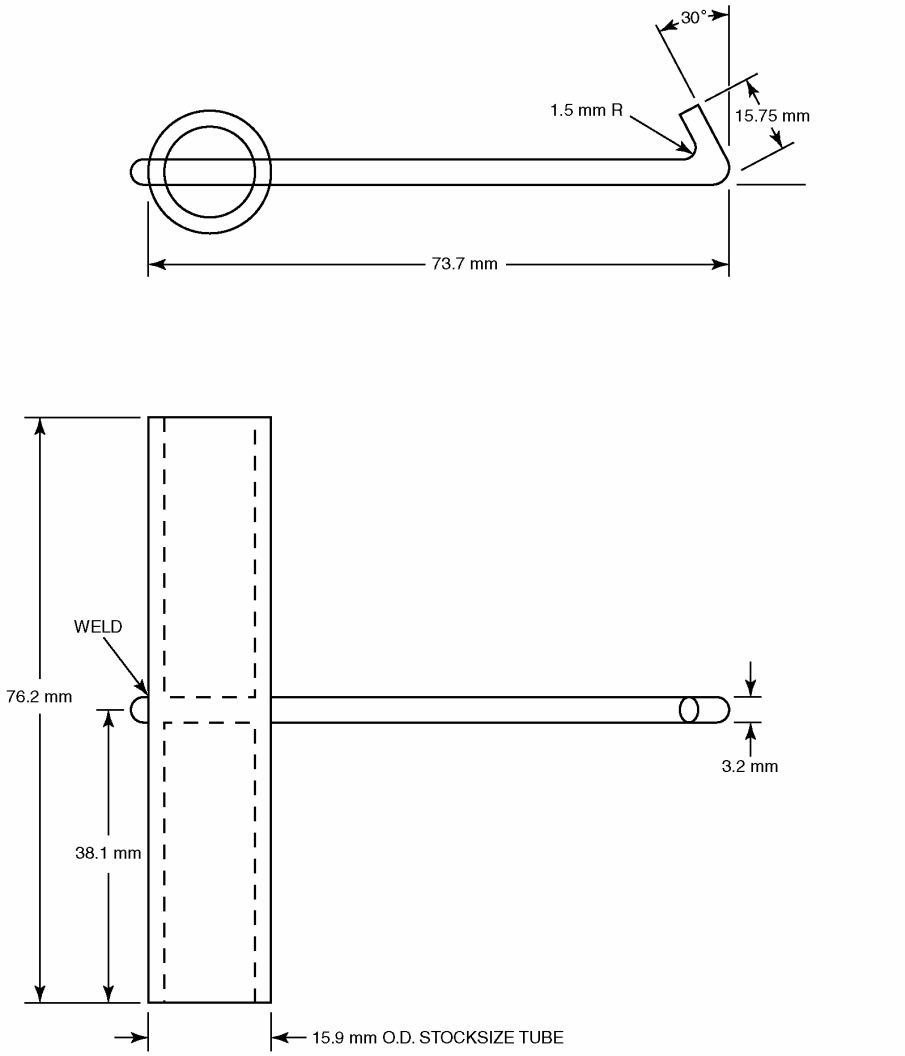



Figure 7 - Downloading hook tool

# RELATED DOCUMENTS

| Country | Documents | Sources of supply |
|---|---|---|
| CA | International Standard<br>ISO 2859-1 dated 1999<br><br>Sampling Procedures for Inspection by Attributes | Directorate Aerospace Equipment Program Management (Maritime) 2-5-3<br>National Defence Headquarters<br>MGen George R. Pearkes Building<br>101 Colonel By Drive<br>Ottawa, Ontario, K1A 0K2<br>Canada |
| | Sonobuoy Test Range Description and Use Manual<br><br>Volume I General<br>Volume II Test Overview<br>Volume III Equipment Description | |
| UK | Specification N° RAE/RSP 5002<br>Issue 5.0 Sept 99<br><br>Generic Specification Sonobuoys | Defence Procurement Agency<br>Walnut Oc #1073<br>MOD Abbey Wood<br>Bristol BS34 8JH |
| | DEF STAN 00-10<br><br>General Design and Manufacturing Requirements for Service Electronic Equipment | a. Defence Standards:<br><br>Ministry of Defence<br>Directorate of Standardisation<br>Kentigern House<br>65 Brown Street<br>Glasgow G2 8EX<br><br>b. Defence Storage and Distribution Agency:<br><br>Forms & Publications<br>C Site<br>Lower Armcott<br>Bicester, Oxford<br>OX25 1LP<br><br>c. British Standards:<br><br>BSI Publications Customer Services<br>389 Chiswick High Road<br>London W4 4AL<br><br>d. DPA Documents:<br><br>Defence Procurement Agency,<br>C/O Nimrod. MS2,<br>Walnut 0c #1034, Abbey Wood,<br>PO Box 702, Bristol, BS34 8JH<br><br>e. Ordnance Board Documents:<br><br>Ordnance Board<br>Walnut 2c #67, Abbey Wood,<br>PO Box 702, Bristol. BS34 8JH. |
| | DEF STAN 00-35<br><br>Environmental Handbook for Defence Materiel | |
| | BS EN 60068<br><br>Environmental Testing | |
| | BS 6001<br><br>Sampling Procedures for Inspection by Attributes | |
| | Naval Engineering Standard NES 1006<br><br>Radio Frequency Environment and Acceptance Criteria for Naval Stores containing Electro – Explosive Devices | |
| | RRG/P600/2.0<br><br>Conduct of sonobuoy test trials as Raasay | |
| | D/RMPA/132/2<br><br>Sonobuoy Range Criteria | |
| | DEF STAN 05-123<br><br>Technical Procedures for the Procurement of Aircraft, Weapons and Electronic Systems | |

| Country | Documents | Sources of supply |
|---|---|---|
| UK | BS 381C<br>Specification for Colours for Identification. Coding and Special purposes | idem |
| | OB Pillar Proceeding 101 (2)<br>Ordnance Board Principles of Design and Use for Electrical Circuits Incorporating Explosive Components | |
| | DEF STAN 08-5<br>Design Requirements for Weapon Systems (Guided Weapons, Torpedoes and Airborne Armament Stores) | |
| | BS 2G 239 : 1992<br>Specification for Primary Active Lithium Batteries for use in Aircraft | |
| | BS 5378<br>Safety signs and colours | |
| | DEF STAN 05-97 Issue 1<br>Quality Assurance Procedural Requirements Quality Plans | |
| | DEF STAN 00-52<br>The general Requirements for Product Acceptance and Maintenance Test Specifications and Test Schedules | |
| | AvP 70<br>Specification for Air Technical Publications | |
| | BS 3G 100<br>General requirements for Equipment in Aircraft | |
| | STANAG 4294<br>NAVSTAR Global Positioning System Characteristics | IHS<br>Willoughby Road<br>Bracknell<br>Berks RG12 8FB<br><br>or<br><br>Infornorme London Information<br>Index House<br>Ascot<br>Berks<br>SL5 7EU |
| | STANAG 4329<br>NATO Bar Code Symbology | |

| Country | Documents | Sources of supply |
|---|---|---|
| US | Production Sonobuoy Specification<br>Dated 19 Oct 00<br>NATO releasable version for Bathythermograph Transmitting Set AN/SSQ-36B and Sonobuoys AN/SSQ-53F, 62E, 77C and 101 | Naval Air Warfare Center<br>Aircraft Division<br>Building 2185, Suite 1117<br>22347 Cedar Point Road<br>Patuxent River, MD 20670-1161 |
| | Federal AMSE B1.1-1989<br>Screw Thread Standards for Federal Services | Standardization Document Order Desk<br>700 Robbins Avenue, Building 4D<br>Philadelphia, PA 19111-5094 |
| | DOD MIL-STD-464<br>18 Mar 97<br>Electromagnetic Environmental Effects – Requirements for Systems | |
| | | Naval Air Warfare Center<br>Aircraft Division<br>14051 Westgate Ct.<br>P.O. Box 68<br>Crane, Indiana 47522-0068<br>[1](812) 863 7070 |
| | SPD-11<br>Sonobuoy Transducer Vertical Test Procedure | |
| | NAC Report TR-2359<br>Update to the Free Floating Two-Dimensional Extensible Cable System Model (FF2E), 18 May 1984 | |
| | NADC Report 80178-30<br>A Modification To the Free Floating Extensible Cable System Computer Model (FF2E), 7 May 1980 | |
| | NAWCADLKE MISC 05-MT-0002<br>Standard Requirements for Soldered Electrical and Electronic assemblies | |
| | NOC WS 21491<br>Product Specification, Initiator JAU-22B | |
| | NAVSEA OD 30393<br>Design Principles and Practices for Controlling Hazards of Electromagnetic Radiation to Ordnance (HERO) Design Guide | |
| | NAVSEAINST 8020.7<br>Hazards of Electromagnetic Radiation to Ordnance (HERO) Safety Program | |

| Country | Documents | Sources of supply |
|---|---|---|
| US | NAVSEA Technical Manual S9310 AQ-SAF-010<br>Technical Manual for Batteries, Navy Lithium Safety Program Responsibilities and Procedures | idem |
| | NSRDC Report 3721<br>Analysis of the two-dimensional Steady State Behaviour of Extensible Free Floating Cable System, Oct 71 | |
| | NSWC 6074-SOP-004<br>Standard Operating Procedure (SOP) for Laboratory and Ocean Testing of Sonobuoys, SLCs and Associated Packaging | |
| | NSWC 6074-SOP-005<br>Open Ocean Testing Defect Criteria | |
| | NSWC STP-7054-006<br>Open Ocean Testing Procedure | |
| | Sonobuoy Handling and Marine Operations | |
| | NSWC STP-7056-002<br>Ballistic Test Procedure for Sonobuoy Launcher Containers with “A” Size Store | |
| | DL 1458AS100<br>Data List for Packaging Assembly | |
| | DL 1458AS202<br>Data List for CNU-239/E Sealed Shipping Container Assembly | |
| | DL 1458AS300<br>Data List for Packaging Assembly | |
| | NAVAIR 1458AS202<br>CNU-239 Shipping and Storage Container | |
| | NAVAIR 3065AS100<br>“A” Size Store Launch System | |
| | NAVAIR 844AS275<br>Initiator JAU-22/B Assembly | |

| Country | Documents | Sources of supply |
|---|---|---|
| US | NAVSEA 7375860<br>Data List for Bayonnet Base Pallet | idem |
| | NAVSEA 7375861 thru 7375876<br>Bayonnet Base Pallet (36 and 48 unit load) and Bayonnet Base | |
| | 40 CFR<br>Code of Federal regulations, Title 40 - Protection of Environment | |
| | 49 CFR<br>Code of Federal Regulations, Title 49 - Transportation | |
| | ANSI S 1.20 1988<br>Procedures for the Calibration of Underwater Electro-acoustic Transducers | |
| | EIA-541<br>Packaging Material Standards for ESD Sensitive Items | American National Standards Institute<br>1430 Broadway<br>New York, NY 10018-3308 |
| | EIA-JESD42<br>Requirements for Handling Electrostatic-Discharge-Sensitive (ESDS) Devices | Electronic Industries Association<br>2500 Wilson Blvd<br>Arlington, VA 22201-3834 |
| | EIA-JEP108-B<br>Distributor Requirements for Handling Electrostatic Discharge Sensitive (ESDS) Devices | |
| | UL 94<br>Tests for Flammability of Plastic Materials Parts in Devices and Appliances | Underwriters Laboratories Inc.<br>333 Pfingsten Rd.<br>Northbrook, IL 60062 |

# LIST OF ABBREVIATIONS

| | |
|---|---|
| AFS | Autonomous Function Selection |
| AH | Ampere Hour |
| AQL | Acceptance Quality Level |
| ASTM | American Society for Testing and Materials |
| BS | British Standard |
| BTS | Bathythermographic System |
| CFS | Command Function Select |
| CSG | Command Signal Generator |
| DA | Design Authority |
| dB | Decibel |
| DEF STAN | Defence Standard |
| DIFAR | Directional Frequency Analysis and Recording |
| DMC | Domestic Management Code |
| DODISS | Department of Defense Index of Specifications and Standards |
| DPA | Defence Procurement Agency |
| EED | Electro Explosive Device |
| EFS | Electronic Function Selector. (Same duty as AFS) |
| FM | Frequency Modulation |
| FOD | Foreign Object Debris |
| GHz | GigaHertz |
| GPS | Global Positioning System |
| GSS | U.K. Generic Specification Sonobuoys |
| IR | Infra-Red |
| KIAS | Knots Indicated Airspeed |

| | |
|---|---|
| kHz | KiloHertz |
| LED | Light Emitting Diode |
| MA | Military Aircraft |
| MC | Manufacturer's Code |
| MHz | MegaHertz |
| MR | Maritime Reconnaissance |
| NATO | North Atlantic Treaty Organization |
| NES | Naval Engineering Standard |
| NSN | NATO Stock Number |
| OB | Ordnance Board |
| PAS | Product Acceptance Specification |
| PSS | U.S. Production Sonobuoy Specification |
| QA | Quality Acceptance |
| QAA | Quality Assurance Authority |
| RF | Radio Frequency |
| RFS | Remote Function Selection |
| RH | Relative Humidity |
| RMPA | Replacement Maritime Patrol Aircraft |
| RSP | Requirement Specification |
| Sec | Second |
| SLC | Sonobuoy Launch Container |
| SV | Set and Verify |
| TBD | To Be Decided |
| WMO | World Meteorological Organization |
| VHF | Very High Frequency |
| UHF | Ultra High Frequency |

# LIST OF EFFECTIVE PAGES
# (LEP)

| Effective Pages | Page numbers |
|---|---|
| Original | I (Reverse blank) |
| Original | III (Reverse blank) |
| Original | V (Reverse blank) |
| Original | VII, VIII |
| Original | IX (Reverse blank) |
| Original | 1-1 |
| Original | 2-1 to 2-2 |
| Original | 3-1 to 3-18 |
| Original | 4-1 |
| Original | Figures F1 to Figures F7 |
| Original | RD-1 to RD-5 |
| Original | Glossary-1 to Glossary-2 |
| Original | LEP-1 (Reverse blank) |

(Reverse Blank)