

NSS-PLBO1-2

NATIONAL SEARCH AND  
RESCUE SECRETARIAT

PERFORMANCE STANDARD  
FOR  
406 MHZ PERSONAL  
LOCATOR BEACON (PLB)

Issued under the Authority of the  
National Search and Rescue  
Secretariat  
and the  
Quality Engineering Test Establishment

December 2000

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## 1.0 INTRODUCTION

### 1.1 Scope

This document calls up the minimum requirements for the functional and technical performance of Canadian Personal Locator Beacons (PLBs) operating in the 406 to 406.1 MHz band through a polar orbiting or geostationary satellite system.

This document covers the performance of PLBs intended for use in the operating temperature range of  $-40^{\circ}\text{C}$  to  $+55^{\circ}\text{C}$  and a non-operating range of  $-55^{\circ}\text{C}$  to  $+75^{\circ}\text{C}$

### 1.2 Purpose and Intended Use

PLBs are designed to be carried by individuals engaged in activities in remote locations who are exposed to risk, where the use of PLBs would alert authorities to a distress situation and the location of the alerting beacon.

When activated, the PLB transmits a coded signal at a designated frequency in the 406 to 406.1 MHz band to alert search and rescue (SAR) authorities via a low polar orbiting or geostationary satellite. The PLB may also transmit a low power signal on 121.5 MHz, which is primarily a homing signal for rescue forces. Some PLBs also incorporate two-way voice transceivers on 121.5 or 243.0 MHz. The testing procedures for PLBs with voice transponders are found at Annex G to C/S T.007 Issue 3- Revision 6 dated October 1999, or as amended from time to time, COSPAS-SARSAT 406 MHz DISTRESS BEACON TYPE APPROVAL STANDARD.

The PLB consists of a transmitter module, an integral antenna, ancillary devices, and a battery power source, all contained in an impact resistant watertight case.

Coded identification data is entered into the PLB memory by the manufacturer; Location Protocol PLBs also include encoded position data that is provided to the beacon in real time via internal or external navigation devices.

### 1.3 Applicable Specifications and Regulations

#### 1.3.1 Industry Canada (IC)

The latest version of the following documents shall apply:

- (i) Radio Standards Specification (RSS) 187, [Emergency Position Indicating Radio Beacons, Emergency Locator Transmitters and Personal Locator Beacons];
- (ii) Radio Standards Procedure (RSP) 100, "Certification of Radio Equipment";
- (iii) Telecommunications Regulation Circular (TRC) 49: "Certification Service Fees".

The current versions of these documents are available on the Industry Canada web site [http://spectrum.ic.gc.ca/~ cert/](http://spectrum.ic.gc.ca/~cert/)

#### 1.3.2 National Search and Rescue Secretariat (NSS) and COSPAS-SARSAT Program Documents

- (i) Specification for COSPAS-SARSAT 406 MHz Distress Beacons, C/S T.001, Issue 3 - Rev. 3 October 1999 or as amended from time to time.
- (ii) COSPAS-SARSAT 406 MHz Distress Beacon Type Approval Standard, C/S T.007 Issue 3 - Rev. 6 October 1999 or as amended from time to time.

The current issues of these documents are generally available on the Cospas-Sarsat web site at <http://www.cospas-sarsat.org/> It is recommended that the Secretariat Technical Officer be contacted to ensure that the latest changes are included. The telephone number is 011-44-20-7728-1444.

#### 1.3.3 Other

- (i) MIL - STD 810 E

MIL specs can be obtained over the internet using the following procedure:

- Access the internet web site:  
<http://www.dodssp.daps.mil>
- Click on the ASSIST icon.
- Click on the ASSIST-Online icon.  
(Note that you will need the Adobe Acrobat Reader to view the resulting .pdf file format registration form.)
- Print out and fill-in the form.

- Fax the form to the fax number indicated on the form.
- You will be contacted in approximately 7 to 10 days with an account number which will give you access to ASSIST-Online. You can then download specs from the internet.
- Call the ASSIST Help Desk at 1-215-697-6257/6396 if problems are encountered in accessing ASSIST.

Alternatively, MIL Specs can be purchased from the Global Information Centre; it can be reached at 613-237-4250 or 1-800-854-7179 extension 1.

#### 1.4 Type Approval

PLBs shall comply with the standards set forth in this document, Industry Canada and those at 1.3.1 and 1.3.2.

Information regarding the IC type approval process can be obtained on the web site or at the following address:

Industry Canada  
Certification and Engineering Bureau  
Equipment Certification Section  
1241 Clyde Avenue  
Ottawa, Ontario  
K2C 1Y3

Telephone: (613) 998-5968  
FAX: (613) 952-1088

Information regarding the COSPAS-SARSAT standards set forth in this document can be obtained at the web site at <http://www.cospas-sarsat.org/>

#### 1.5 Interpretation of this Document

In case of difficulty concerning the interpretation of the contents of this document, and the application of specified test methods, the NSS shall determine the correct interpretation. If there is variation between this document and the documents described in paragraphs 1.3, the more stringent specification shall apply.

## 2.0 PERFORMANCE REQUIREMENTS

This section has been subdivided into COSPAS-SARSAT Type Approval Requirements, IC Radio Standard Requirements, Electrical, Operational, Mechanical, and Environmental Requirements and Radiated Output Requirements.

### 2.1 COSPAS-SARSAT Type Approval Requirements

To ensure PLB compatibility with COSPAS-SARSAT receiving and processing equipment, PLBs shall meet all the requirements specified in the documents identified in paragraph 1.3.2.

NOTE: i) The temperature range for PLBs is  $-40^{\circ}\text{C}$  to  $+55^{\circ}\text{C}$  (defined as class 1 by COSPAS-SARSAT documents, class 2 PLBs are not suitable for use in Canada because of the lower temperatures found in Canada in winter).

ii) The message coding for PLBs is defined in Specification for COSPAS-SARSAT 406 MHz Distress Beacons, C/S T.001, Issue 3 - Rev. 3 October 1999 (Section 3 and Annex A)

### 2.2 Industry Canada Radio Standards Requirements

PLBs must comply with all applicable requirements of the Radio Standards Specification (RSS) 187, [Emergency Position Indicating Radio Beacons, Emergency Locator Transmitters and Personal Locator Beacons]

### 2.3 Electrical Performance Requirements

The PLB may have incorporated a 121.5 MHz auxiliary radio-locating device. If said device is incorporated, it shall meet the criteria found in the Radio Standards Specification (RSS) 187, [Emergency Position Indicating Radio Beacons, Emergency Locator Transmitters and Personal Locator Beacons, Section 8]

### 2.4 Operational Requirement

#### NOTE

In cases where testing cannot be done in a shielded room the manufacturer shall provide a modified unit fitted with a connection for termination into a 50ohm dummy load. The modification shall have the same sealing arrangement as the antenna. The modified unit does not eliminate the



requirement for full performance testing in more benign environments of a fully functional unit.

#### 2.4.1 Activation and Deactivation

The PLB shall be capable of being activated by one person with mitts in thermal extremes, rain, ice, spray, packed snow, and dirt. Activation and deactivation of the unit shall be performed manually.

The PLB shall not be accidentally activated by shock, thermal extremes, rain, ice, spray, packed snow, or storage in high humidity conditions.

#### 2.4.2 Controls and Indicators

Manual controls shall be provided to operate the device in the following modes:

"OFF" - In the "OFF" mode, the beacon is deactivated.

"ON" - In the "ON" mode, the beacon is activated.

"TEST" - In the "TEST" mode, the operational integrity of the PLB is tested.

The controls provided shall be clearly and indelibly marked. No additional controls shall be provided to the user; except for the operation of the voice transceiver if one is included within the beacon casing. A positive visual and/or audible indication that the PLB is activated shall be provided. Means shall be provided to protect the visual and/or audible indicator from damage due to dropping or contact with external objects.

The "ON/OFF" controls shall be secured with a guard or similar mechanism to prevent any inadvertent activation and to ensure that activation is a conscious decision by the user. Activation shall require at least two distinct movements.

#### 2.4.3 Built-in Test

The PLB shall be equipped with a manually activated test circuit which will verify the functioning of the code generator, modulator and RF circuitry. The test switch (or similar control) shall incorporate an automatic return to "OFF" mode after completion of the self test. A visual or audible indication shall be provided to indicate that the PLB has passed

the self-test.

It is desirable that no RF energy be radiated in any self-test mode used as a routine exercise to verify beacon operation. However, if this is not possible, then the RF test transmission must be limited to one burst of 440 ms (+ 1%) for the short message format and 520 ms (+ 1%) for a long message. If modulated, the signal shall have a frame synchronization pattern of 011010000. This bit pattern is the complement of the last 8 bits of the normal frame synchronization pattern so that the test burst will not be processed by the satellite equipment. The 121.5 MHz auxiliary radio-locating device should not radiate during the self-test. If it must radiate, the PLB should include a label noting that the self-test should be performed only within the first 5 minutes of any hour and should not exceed 3 audio sweeps or 1 second, whichever is greater.

#### 2.4.4 Power Source

The PLB shall not depend upon any external source of power for its operation. The battery power source shall be replaceable by the manufacturer or by the user, and any interface connections required shall be such as to prevent reversed polarity or incorrect installation.

The PLB or battery shall not be hazardous to any person handling, using or performing manufacturer approved servicing of the device or to any vehicle or equipment in which it is transported, housed or installed under any of the conditions specified in this document.

The PLB or battery and its contents shall not react, or release toxic/corrosive products, in such a way as to cause injury to personnel or destruction of equipment, during use in the specified operating environment, or in storage at temperatures between -55°C and + 75°C

All PLB batteries shall include measures to protect the batteries from reversal of polarity, shorting, and the effects of self-heating, cell(s)-to-cell(s) charging, and forced discharging.

The battery and the PLB shall be shown to function safely under the following conditions:

- (a) when the battery is subjected to a partial or full discharge at any rate;
- (b) when the battery is returned to the storage temperature after a full or partial discharge; and
- (c) when the battery encounters cell(s)-to-cell(s) charging or is forced discharged at low temperatures and returned to a normal storage temperature. The PLB battery shall be designed and produced to meet the above conditions and to be safe under all

environmental criteria set out in this Standard.

For each approved battery pack, the battery manufacturer shall establish a useful life and a battery expiry date and clearly indicate expiry date on the battery and battery pack or on the PLB. The useful life is defined as the length of time after its date of manufacture that the battery may be stored under normal environmental conditions (+ 20°C) without losing its ability to allow the PLB to meet the applicable performance standards in Section 2 of this document. The battery expiry date is the date of the battery manufacture plus one half of its useful life.

## 2.5 Mechanical Requirements

### 2.5.1 General Construction

The PLB shall be packaged in a container that allows operation of the unit and is watertight to a depth of 1 meter. Upon replacement of the batteries or battery pack the watertight integrity of the PLB shall be maintained. The PLB shall have the potential to accommodate a floatation collar option if the device is to be used on water and its own buoyancy may otherwise be insufficient to prevent sinking.

The PLB shall not be activated accidentally by mechanical shock or vibration. The PLB housing and internal circuitry shall be resistant to mechanical shock and vibration.

The electronic module itself shall be protected to prevent malfunction under prolonged conditions of high humidity, including condensation.

### 2.5.2 Exterior Finish

The PLB housing shall be resistant to deterioration from prolonged exposure to sunlight and water. The exterior shall be finished with a highly visible yellow or orange coloured material.

### 2.5.3 Labelling

IC and NSS have certain requirements with regard to information contained on the label.

The label shall comply with requirements of RSS 187 described in paragraph 1.3.1(ii). 5.1A unique identifier number shall be displayed on the PLB casing. The unique identifier number shall be a right justified hexa-decimal representation of bits 26 to 85, 1 character per every 4 bits, of the beacon digital message coding. In addition, concise, unambiguous operating, storage and testing instructions including information regarding the expiry date of the battery shall be displayed and shall be understandable by untrained personnel. The following caption shall also be displayed:

"NOTICE TO PUBLIC"

IF THIS PLB IS FOUND UNATTENDED, PLEASE REPORT ITS POSITION TO THE NEAREST DETACHMENT OF THE RCMP OR LOCAL POLICE.

All of the above information, including the operating instructions, operating duration at -40°C to+ 55°C, the operating temperature range, shall be permanently and conspicuously displayed on the exterior of the PLB. The display information shall be weather resistant, waterproof and abrasion resistant.<sup>1</sup>

All labelling shall be in English and French.

In the event that labelling requirements cannot be met because of the size of the PLB, the NSS may waive certain of its requirement on request from the manufacturer.

## 2.6 Environmental Requirements

### 2.6.1 Temperature

A thermal shock test from the cold storage extreme to room temperature back to the cold storage extreme and from the hot storage extreme to room temperature back to the hot storage extreme.

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<sup>1</sup>**Note: Transport by Air:** If transporting the PLB by air, with batteries which are considered as dangerous cargo, then the applicable dangerous goods labels and marking required by International Civil Aviation Organization Technical Instructions will be placed on the shipping packaging. (Consult the local transportation authority for shipping instructions.)

Following the thermal shock test the PLB shall meet the thermal environmental requirement detailed in the document identified in paragraph ???? (C/S T.001) including the temperature gradient test, between -40°C to + 55°C measuring frequency stability.

The PLB shall perform to the specification for a continuous operation of 24 hours at the minimum temperature (-40°C), and at the maximum temperature of + 55°C.

#### **2.6.2 Humidity/Rain/Salt Fog**

The PLB shall perform to the specification during and after an exposure to constant high humidity environment(> 95% RH) while the temperature is cycled between 60°C and 20°C for 10 days, as specified in MIL-STD\_810 F Method 507 Aggravated Humidity Cycle.

The PLB shall perform to the specification during and after an exposure to 40 minutes of simulated driving rain on each surface as specified in MIL-STD\_810 F Method 506 Procedure II.

The PLB shall perform to the specification during and after an exposure of 24 hours to a 5% Salt Fog atmosphere as specified in MIL-STD\_810 F Method 509

#### **2.6.3 Vibration**

The PLB shall perform to the specification after being subjected to a vibration cycle that simulates loose cargo transportation. The loose cargo environment includes conditions experienced by packaged and unpackaged items transported as unsecured cargo on a vehicle traversing irregular surfaces. The cargo has the freedom to bounce, scuff, or collide with other items or the sides of the vehicle.

#### **2.6.4 Drop**

The PLB shall perform to the specification after being temperature conditioned at -40°C and then dropped six times, one drop minimum on each possible face, from a height of 122cm to a non-resilient surface.

#### **2.6.5 Submersion**

The PLB shall perform to the specification after being submerged completely in water to a depth of 1 meter for one hour. See details on page A-7.

### 2.6.6 Low Pressure (Altitude)

The PLB shall operate normally to an altitude of 30,000' above sea level.

## 3.0 DOCUMENTATION

In the event that IC issues a type approval certificate for the PLB to the applicant, the latter shall provide a user registration form as per Figure 1 to accompany each PLB at the point of sale. This form shall be uniquely imprinted with a right justified hexa-decimal representation of bits 26 to 85 of the beacon digital message coding. Prepaid self-addressed envelopes to be used by the purchaser for the transmittal of each registration form shall be provided to the successful applicant by the NSS for inclusion with each beacon.

The PLB user shall be provided with an instruction manual detailing the proper use and maintenance of the PLB. If high energy batteries are used, safety information regarding their use, transportation and disposal shall be clearly stated. Instructions to prevent false alarms and what the user should do in the event of inadvertent activation of the PLB should also be provided. Since the battery life of the PLB is adversely affected by high temperature, advice on general storage and stowage conditions for the PLB shall be included in the instruction manual.

If components of the PLB have to be disconnected for shipment, the manufacturer shall provide clear instructions to the user for proper connection and testing prior to installation.

All documentation shall be in English and French.

## 4.0 TEST REQUIREMENTS

### 4.1 COSPAS-SARSAT Requirements

The COSPAS-SARSAT requirements shall be tested in accordance with C/S T.007 and the results must be approved by the National Search and Rescue Secretariat. The operational temperature range in the temperature test is  $-40^{\circ}\text{C}$  to  $+55^{\circ}\text{C}$  for PLBs. All COSPAS-SARSAT specifications shall be met for 24 hours of continuous operation at the minimum temperature ( $-40^{\circ}\text{C}$ ) and maximum temperature of  $+55^{\circ}\text{C}$ .

#### 4.2 Industry Canada (IC) Requirements

The Industry Canada requirements are detailed in documents TRC-75 and RSS 187 issue 3. All applicable tests are to be performed and the results be approved by Industry Canada.

#### 4.3 Battery Life Test

This test is designed to verify the operating life of the PLB battery:

##### 4.3.1 Procedures

The PLB shall be equipped with batteries which have the capacity expected at the end of the manufacturer's maximum recommended storage time, including any discharge due to self tests based on test rate of one per month. The PLB is then operated in a test chamber maintained at a temperature of  $-40^{\circ}\text{C} \pm 1^{\circ}\text{C}$ . The power output into a 50 ohm dummy load is measured at the beginning of the test, and after 24 hours. The test shall be repeated at  $+55^{\circ}\text{C}$ .

##### 4.3.2

The measured power outputs shall be  $5\text{ W} \pm 2\text{ dB}$ , for the 406 MHz transmitter, and  $25\text{ mW} - 0\text{dB}$  to  $+6\text{dB}$  for the 121.5 MHz transmitter.

#### 4.4 Environmental Requirements

The environmental requirements are tested according to the procedures described in Appendix A.

#### 4.5 Minimum Radiated Power

The minimum radiated power, for 90 percent of PLB antenna's spherical radiation area between elevation angles of 5 to 60 degrees and azimuth angles of 0 to 360 degrees, shall not be less than 1.5 watts peak effective radiated power (PERP), when measured in accordance with the procedure described in Appendix B.

#### 4.6 Satellite Reception

An operational test shall be performed to determine that the PLB can be detected with favourable ambiguity resolution and its message content received correctly by a COSPAS-SARSAT satellite and ground station. The procedure is described at Appendix B.

## **5.0 QUALITY CONTROL**

### **5.1 General**

The PLB may be inactive for long periods of time while being exposed to adverse environmental conditions and yet it must function properly when activated. The choice of materials used and the manufacturing process are key elements in ensuring its durability for a long time. In addition, strict quality control procedures during manufacture, and periodic inspection and test after commencement in service are required.

### **5.2 Manufacturer's Obligation**

Manufacturers shall institute quality control procedures to ensure that all PLBs are produced to the same standard as the unit on which the type approval is based.

Records should be kept of production and production sampling tests.

Random inspections may be conducted under the auspices of the NSS to ensure that appropriate quality control procedures are followed and maintained. The NSS reserves the right to acquire samples of production run or off-the-shelf PLBs for testing purposes. If the PLB does not meet the required specifications, IC may, after consulting with the NSS, declare that the device's type-approval certificate be null and void and require that beacons in service be recalled, action be taken to correct the areas of non-compliance and the beacon be retested to have certification reinstated.

The type approval certification holder shall notify IC immediately of proposed modifications made to the PLB. Full technical details shall be submitted so that any type approval retesting requirements can be identified.



PLB REGISTRATION FORM/FORMULAIRE D'ENREGISTREMENT DE BALISE DE DÉTRESSE

The information you provide is used only for search and rescue purposes and is essential in providing a quick response to your distress call.

Cette information servira uniquement à des fins de recherche et sauvetage et elle est essentielle pour une réponse efficace.

When a signal is received from your beacon, the information is passed on to the nearest rescue coordination center for appropriate action.

Lorsqu'un signal provenant de votre balise est capté, l'information est aussitôt transmise au centre de coordination de sauvetage le plus rapproché afin que les mesures nécessaires soient prises.

This form is to be completed at the point of purchase, signed by the Purchaser and returned in the self-addressed envelope provided. **If this is not practical the form is to be completed and returned by the vender.**

Veillez remplir ce formulaire immédiatement, et nous le retourner dans l'enveloppe.

IMPORTANT!

IMPORTANT!

Ensure that the form has been signed by the PLB owner and the person identified as their contact so that this information can be released to the appropriate search and rescue authorities.

Assurez-vous que le propriétaire de la radiobalise et son mandataire ont signé le formulaire aux endroits appropriés afin que l'information puisse être transmise aux autorités de recherche et sauvetage.

BEACON OWNER/PROPRIÉTAIRE DE BALISE

NAME/NOM	Surname/nom de famille	First name/prénom
ADDRESS/ ADRESSE	Street/rue	Apt/app
	City/ville	Province/province
	Postal code/code postal	Telephone number/ numéro de téléphone
	Authorization for release of information to search and rescue authorities/autorisation de communiquer l'information aux agences de recherche et sauvetage _____ Signature	
Beacon Serial Number (beacon 15 Hex ID) /numéro de serié de balise		

EMERGENCY CONTACT/PERSONNE À CONTACTER EN CAS D'URGENCE

NAME/NOM	Surname/nom de famille	First name/prénom
ADDRESS/ ADRESSE	Street/rue	Apt/app
	City/ville	Province/province
	Postal code/code postal	Telephone number/ numéro de téléphone
	Relationship to Beacon owner/ lien avec le propriétaire de balise	
		Home/domicile ( ) _____ _mobile _____ Office/bureau ( ) _____ Authorization for release of information to search authorities/autorisation de communiquer l'information aux autorités de recherche _____ Signature

For more information, please write to:

Pour de plus amples renseignements, veuillez vous adresser à:

Canadian Beacon Registry  
 National Search and Rescue Secretariat  
 275 Slater Street, 4<sup>th</sup> Floor  
 Ottawa, Ontario K1A 0K2

Enregistrement des balises du Canada  
 Secrétariat national Recherche et sauvetage  
 275, rue Slater, 4<sup>ème</sup> étage  
 Ottawa (Ontario) K1A 0K2

## APPENDIX A

## ENVIRONMENTAL TEST PROCEDURES

## A 1.0 SEQUENCE OF TESTS

All environmental tests shall be conducted in the sequence in which the tests are listed herein. The performance parameters at room ambient temperature ( $25^{\circ} \pm 5^{\circ}\text{C}$ ) shall be measured at the beginning and end of the environmental tests.

## A 2.0 GENERAL TEST CONDITIONS

No adjustments or repairs are permitted to the unit under test throughout the complete test program except for removal and application of primary power as required by the detailed test procedure. All testing, wherever possible, shall be conducted in a manner that does not emit radiation from the test site. Unless otherwise stated, the tests shall be conducted at a temperature of  $25^{\circ}\text{C} \pm 5^{\circ}\text{C}$ , except for unavoidable seasonal temperatures for any outdoor tests.

A log of battery on-time should be maintained for the PLB being tested. Batteries should not be replaced during a test unless it is probable that the battery on-time will exceed the prescribed operating life time before the test is completed. The test shall be terminated in the case of critical failure.

## A 3.0 TEMPERATURE

The temperature gradient, temperature shock, maximum temperature, and operating lifetime at minimum temperature tests shall be performed as defined in reference ????, C/S T.001.

## A 4.0 HUMIDITY TEST

The 10 day aggravated humidity test shall be conducted with the unit in its housing. An additional test shall be conducted on the electronic module(s) of PLBs after removal from the PLB housing.

## A 4.1 Procedure

10 day aggravated

The PLB shall perform to the specification during and after an exposure to constant high humidity environment ( $> 95\% \text{RH}$ ) while the temperature is cycled between  $60^{\circ}\text{C}$  and  $20^{\circ}\text{C}$  for 10 days. As specified in MIL-STD\_810 F Method 507 Aggravated humidity cycle.

Module test

The electronic module(s) shall be exposed to relative humidity in excess of 95% at a temperature of 40°C for a period of eight hours. During this time, the unit under test shall be deactivated with no electrical power applied.

At the end of the period, the unit shall be removed from the test chamber to room ambient conditions and any condensed moisture drained off. Within five minutes after removal, the unit shall be activated.

Fifteen minutes after activation, the following tests shall be performed in accordance with C/S T.001 and C/S T.007:

- (a) Frequency accuracy;
- (b) Medium and short term stability; and
- (c) RF power output into a 50ohm dummy load ( $5W \pm 2 \text{ dB}$ ).

#### **A 5.0 VIBRATION TEST**

The PLBs shall be tested in accordance with method 514.4, Category 3 Procedure III of MIL-STD-810E for loose cargo transportation.

The PLB shall not activate during exposure to the vibration tests. Following the test, an exterior mechanical inspection shall be performed. The transmitter output test in a 50ohm load, a frequency accuracy test and a short and medium term frequency stability test shall be performed after a 15minute warm-up.

The PLB shall have failed the test if loose or dislodged components are found, or if electrical parameters become out of specifications.

#### **A 6.0 DROP TEST**

The PLB shall be tested in accordance with method 516.4 Procedure IV of MIL-STD - 810E for transit drop.

Prior to the drop test the PLB shall be temperature conditioned for a minimum of two hours at  $-40^{\circ}\text{C}$ .

The PLB shall not activate during the test. Document the impact point or surface for each drop and any obvious damage.

The drops shall be distributed among all possible faces.

Upon completion of the drop tests, an exterior and an interior mechanical inspection shall be performed. The power output test into a 50ohm load, the frequency accuracy tests and the short and medium frequency stability tests shall be performed 15 minutes after the application of power.

The PLB shall have failed the test if loose or dislodged components or cracks on the casing are found.

## A 7.0 IMMERSION TEST

The unit shall be turned OFF during the tests. The unit shall be 5°C warmer than water prior to immersion. The water temperature shall be 18°C ± 2°C. The unit should be submerged at a depth of one meter.

### A 7.1 Procedure

The PLB shall be completely submerged for one hour, removed from the water and wiped dry. There shall be no evidence of water leakage into the unit or any of its components.

After completion of the submersion test, the unit shall be subjected to the transmitter power output and frequency accuracy tests performed fifteen minutes after the application of power to the unit, followed by a thorough mechanical inspection of the unit.

The unit shall be opened for inspection. The unit will have failed the test if there is evidence of water leakage into the unit, corrosion, condensation, deterioration of finishes, seals or components.

### A 7.2 Acceptability

The test PLB shall be deemed unacceptable if any of the above effects are noticeable.

## A. 8.0 LOW PRESSURE (Altitude)

The low pressure test shall be performed in accordance with Procedure 1 Method 500.3 of MIL-STD-810E.

**APPENDIX B**

**RADIATION TEST PROCEDURES**

**WARNING:** Before proceeding with this test, permission is required from the Canadian Mission Control Centre.

**B 1.0 MINIMUM RADIATED POWER**

The measured power output shall be  $5W \pm 2 \text{ dB}$  and  $25 \text{ mW} -0\text{dB to } + 6\text{dB}$ , for the 406 MHz and 121.5 MHz transmitters respectively.

The minimum radiated power of the PLB is measured by an equivalence to an isotropic source that produces at a specified distance an RF field equal in strength to the peak RF field produced, by the PLB transmitter operating on a ground plane and at the same distance.

The PLB is measured on an elevated metal ground plane, in order to provide a standard test arrangement that eliminates reflections from the site ground.

**B 1.1 METHOD OF MEASUREMENT**

The method of measurement for both power and antenna characteristics shall be in accordance with the guidance provided in C/S T.007 Annexes A and B.

**APPENDIX C**

**PLB MESSAGE CODING**

**C 1.0 BEACON DIGITAL MESSAGE CODING**

The coding for the PLB shall be the Serial Coding, using the Cospas-Sarsat type approval certificate number as specified in C/S T.001 Annex A, specifically pages A-9 and A-10 , article A 2.5.

If the coding is for a Location Protocol Beacon the coding shall be the Standard Location Protocol as specified in C/S T.001 Annex A, specifically pages A-24, 25 and 26, and using the Cospas-Sarsat type approval certificate number as noted in article A3.3.5.2 c) (i).