PUBLIC ENTERPRISE TESTING CENTER «OMEGA»

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Approved by
Director
PE TC "OMEGA"
_____ Belikov N.I.
January 29, 2013

TEST REPORT No. 12/1410
Issue 2

on type approval of COSPAS-SARSAT
Personal Locator Beacon (PLB)

Model **rescueME PLB1**
Manufacturer **Ocean Signal Ltd., Great Britain**

Volume 2

Documents submitted by beacon manufacturer

Sevastopol
2013

CONTENTS [1]

[1] - documents provided by customer are only numbered through the whole volume by Omega, but have no header *PE TC «Omega» Test Report 12/1410 Volume 2 Issue 2*. Page number is placed in upper right corner of every page.

Issue History		
No	**Data of issue**	**Reissue reason**
1	29.12.2012	The initial issue
2	29.01.2013	Amended: Application form (Annex G). Analysis and calculations pre-test battery discharge before the operating lifetime at minimum temperature test. User Manual. Brochure Battery consumption modes description. GNSS operation description. Design description concerning protection against erroneous position encoding into the beacon message.

Index

Application for a Cospas-Sarsat 406 MHz beacon type approval

APPLICATION FOR A COSPAS-SARSAT 406 MHz BEACON TYPE APPROVAL CERTIFICATE[1]

G.1 INFORMATION PROVIDED BY THE BEACON MANUFACTURER

Beacon Manufacturer and Beacon Model

Beacon Manufacturer	Ocean Signal Limited
Beacon Model	rescueME PLB1
Other Model Names	

Beacon Type and Operational Configurations

Beacon Type	**Beacon used while:**	**Tick where appropriate**
EPIRB	Floating in water or on deck or in a safety raft	☐
PLB	On ground and above ground	☒
	On ground and above ground and floating in water	☐
ELT Survival	On ground and above ground	☐
	On ground and above ground and floating in water	☐
ELT Auto Fixed	Fixed ELT with aircraft external antenna	☐
ELT Auto Portable	In aircraft with an external antenna	☐
	On ground, above ground, or in a safety raft with an integrated antenna	☐
ELT Auto Deployable	Deployable ELT with attached antenna	☐
Other (specify)		☐

Beacon Characteristics

Characteristic	**Specification**
Operating frequency	406.040 MHz
Operating temperature range	Tmin = -20 °C Tmax= 55 °C
Operating lifetime	24 hours min
Beacon power supply type (internal, external, combined, other)	Internal

[1] - according to C/S T.007 Iss.4 Rev.7 Oct 2012

Characteristic	Specification
External power supply parameters (AC/DC and nominal voltage)	N/A
Is external power supply needed to energise the beacon or its ancillary devices in any of operational modes (N/A or Yes or No)	N/A
Battery chemistry	Lithium Manganese Dioxide
Battery cell model name, size and number of cells in battery pack, and details of battery pack electrical configuration	Photo 123, CR123, 3, 3 cells in series
Battery cell manufacturer	Energizer
Battery pack manufacturer and part number	Ocean Signal Ltd, Part No - 901S-01227 Iss 01.00
Battery manufacturers declared maximum allowed cell shelf-life (from date of cell manufacture to date of battery pack installation in the beacon)	2 years
Declared beacon battery replacement period (from date of installation in the beacon to expiry date marked on the beacon)	8 years
Oscillator type (e.g. OCXO, MCXO, TCXO)	TCXO
Oscillator manufacturer	Rakon UK Limited
Oscillator part name and number	E5344LF
Oscillator satisfies long-term frequency stability requirements (Yes or No)	Yes
Antenna type: Integral or Other (e.g. External, Detachable – specify type)	Integral
Antenna manufacturer	Ocean Signal Limited
Antenna part name and number	130S-01180 Issue 01.00
Navigation device type (Internal, External or None)	Internal
Features in beacon that prevent degradation to 406 MHz signal or beacon lifetime resulting from a failure of navigation device or failure to acquire position data (Yes, No, or N/A)	Yes
Features in beacon that ensures erroneous position data is not encoded into the beacon message (Yes, No or N/A)	Yes
Navigation device capable of supporting global coverage (Yes, No or N/A)	Yes

Characteristic	Specification	
For Internal Navigation Devices		
- Geodetic reference system (WGS 84 or GTRF)	WGS84	
- GNSS receiver cold start forced at every beacon activation (Yes or No)	Yes	
- Navigation device manufacturer	Quectel	
- Navigation device model name and part Number	L70	
- Internal navigation device antenna type(integrated, internal, external, passive/active) , manufacturer and model	Internal, AEL Crystals Ltd, Part No DAE1575R1820A	
- GNSS system supported (e.g. GPS, GLONASS, Galileo)	GPS	
For External Navigation Devices		
- Data protocol for GNSS receiver to beacon interface	N/A	
- Physical interface for beacon to navigation device	N/A	
- Electrical interface for beacon to navigation device	N/A	
- Part number of the external navigation interface device (if applicable)	N/A	
- Navigation device model and manufacturer (if beacon designed to use specific devices)	N/A	
Self-Test Mode Characteristics:	Self-Test Mode	Optional GNSS Self-Test Mode
- Self-test has separate switch position (Yes or No)	Yes	Yes
- Self-test switch automatically returns to normal position when released (Yes or No)	Yes	Yes
- Self-test activation can cause an operational mode transmission (Yes or No)	No	No
- Self-test causes a single beacon self-test message burst only regardless of how long the self-test activation mechanism applied (Yes or No)	Yes	No
- Results of self-test indicated by (e.g. Pass / Fail Indicator Light, Strobe Light, etc.)	Indicator LED/Strobe	Indicator LED/Strobe
- The content of the encoded position data fields of the self-test message has default values	Yes	N/A

Characteristic	Specification	
- Self-test can be activated from beacon remote activation points (Yes or No)	No	No
- Self-test performs an internal check and indicates that RF power emitted at 406 MHz and 121.5 MHz if beacon includes a 121.5 MHz homer (Yes or No)	Yes	N/A
- Self-test transmits a signal(s) other than at 406 MHz (Yes & details or No)	Yes, 121.5MHz for 1 second	N/A
- Self-test can be activated directly at beacon (Yes or No)	Yes	Yes
- List of Items checked by self-test	406 Power, Synthesiser, 121.5 power, Battery status	GPS
- Self-test transmission burst duration (440 or 520 ms)	520 ms	N/A
- Self-test format bit (“0” or “1”)	1	N/A
- Maximum duration of self-test	9.35 second	315.3 second
- Maximum number of GNSS Self Tests (beacons with internal navigation devices only)	N/A	10
- Self-test results in transmission of a single burst, irrespectively of the test result (Yes or No)	N/A	No
- Maximum number of self-tests during battery pack replacement period	96 recommended	N/A
- List all methods of Self-test mode and GNSS Self-test mode activation. Provide details on a separate sheet, if insufficient space to describe	Key Press Activation	Key Press Activation

Message Coding Protocols:	(x)	Tick the boxes below against the intended protocol options
User Protocol (tick where appropriate)	☐	Maritime with MMSI
	☐	Maritime with Radio Call Sign
	☐	EPIRB Float Free with Serial Number
	☐	EPIRB Non Float Free with Serial Number
	☐	Radio Call Sign
	☐	Aviation
	☐	ELT with Serial Number
	☐	ELT with Aircraft Operator and Serial Number
	☐	ELT with Aircraft 24-bit Address
	☐	PLB with Serial Number
	☐	National (Short Message Format)
	☐	National (Long Message Format)
Standard Location Protocol (tick where appropriate)	☒	EPIRB with MMSI
	☐	EPIRB with Serial Number
	☐	ELT with 24-bit Address
	☐	ELT with Aircraft Operator Designator
	☐	ELT with Serial Number
	☒	PLB with Serial Number
National Location Protocol (tick where appropriate)	☐	National Location: EPIRB
	☐	National Location: ELT
	☒	National Location: PLB
RLS Location Protocol (tick where appropriate) [2]	☐	EPIRB
	☐	ELT
	☐	PLB
User Location Protocol (tick where appropriate)	☒	Maritime with MMSI
	☐	Maritime with Radio Call Sign
	☐	EPIRB Float Free with Serial Number
	☐	EPIRB Non Float Free with Serial Number
	☐	Radio Call Sign
	☐	Aviation
	☐	ELT with Serial Number
	☐	ELT with Aircraft Operator and Serial Number
	☐	ELT with Aircraft 24-bit Address
	☐	PLB with Serial Number

[2] RLS protocols will be effective as of 1 November 2014. The use of RLS-enabled beacons will be regulated by national administrations. Since the RLS functionality might affect the 406 MHz beacon performance, amendments to the type approval procedure for these beacons could be required. Beacon manufacturers should consult the Cospas-Sarsat Secretariat before undertaking the type approval of RLS-enabled beacon models.

Beacon includes a homer transmitter(s) (Yes or No) - homer transmitter(s) frequency - homer transmitter(s) power	Yes 121.5 MHz 17 dBm ±3dBm
- homer transmitter(s) duty cycle - duty cycle of homer swept tone	97 % 34 %
Beacon transmission repetition period satisfies C/S T.001 requirement that two beacon's repetition periods are not synchronised closer than a few seconds over 5 minute period, and the time intervals between transmissions are randomly distributed on the interval 47.5 to 52.5 seconds (Yes or No)	Yes
Other ancillary devices (e.g. voice transceiver, remote control, external audio and light indicators, external activation device). List details on a separate sheet if insufficient space to describe.	Strobe Light, 1 cd at 24 flashes per minute
Beacon includes automatic activation mechanism (Yes or No) Specify type of automatic beacon activation mechanism	No
Beacon includes features and functions not listed above, related or non-related to 406 MHz (Yes or No) List features and use a separate sheet if insufficient space	No
Beacon model hardware part number (P/N) and version	900S-01240 Issue 01.00
Beacon model software/firmware P/N, version, date of issue/releases	500S-01239 Issue 00.06, 18/12/2012
Beacon model printed circuit board P/N and version	101S-01162 Issue 01.00

Dated 28/01/2013. Signed: ……Simon Nolan, Technical Director, Ocean Signal Limited
(Name, Position and Signature of Beacon Manufacturer Representative)

Photographs of the beacon, with its antenna deployed whilst in all manufacturer declared configurations

T.007: 5.b Photos of Declared Operating Positions

The rescueME PLB1 and PLB2 is designed to be operated when held in the hand, or laying on the ground. These modes of operation correspond to the beacon operating configuration 'PLB – on ground and above ground'

Figure 1: Operation while held in the hand

Figure 2: Operation while on the ground

Analysis and calculations that support the pre-test battery discharge figures

T.007: 5.c Pre-test Battery Calculations

rescueME PLB1 Battery Calculations for Cospas-Sarsat

S Nolan Technical Director Ocean Signal Limited
28th January 2013

PLB BATTERY REPORT

Product: rescueME PLB1

Date: 29/01/2013

Battery Discharge Calculations

Characteristic	Designation	Units	Value	Comments
Beacon manufcturers declared maximum allowed cell shelf life (from date of cell manufacture to date of battery pack installation in beacon)	T_{CS} or TCS	Years	2	
Declared beacon battery replacement period (from date of installation in the beacon to expiry date marked on the beacon)	T_{BR} or TBR	Years	8	
Battery pack electrical configuration	3 123 cells in series			
Cell model and cell chemistry	Energizer 123 Photo MNO2			
Nominal cell capacity		A-hrs	1.5	
Nominal battery pack capacity	C_{BN}	A-hrs	1.5	
Annual battery cell capacity loss (self-discharge) due to aging, as specified by cell manufacturer at ambient temperature	L_{SDC}	%	1.0	
Calculated battery pack capacity loss due to self-discharge: $L_{CBN} = C_{BN} - [C_{BN} * (1 - L_{SDC}/100)^{TBR+TCS}]$	L_{CBN}	A-hrs	**0.143**	
Number of self-tests per year	N_{ST}		12	
Average battery current during a self-test	I_{ST}	mA	*70.02*	
Maximum duration of a self-test	T_{ST}	sec	*9.35*	
Calculated battery pack capacity loss due to self-tests during battery replacement period: $L_{ST} = I_{ST} * T_{ST} * T_{BR} * N_{ST} / 3600$	L_{ST}	mA-hrs	**17.458**	
Maximum Number of GNSS self-tests between battery replacements	N_{GST}		10	
Average battery current during a GNSS self-test of maximum duration	I_{GST}	mA	16.85	
Maximum duration of a GNSS self-test	T_{GST}	sec	315.30	
Calculated battery pack capacity loss due to GNSS self-tests during battery replacement period: $L_{GST} = I_{GST} * T_{GST} * N_{GST} / 3600$	L_{GST}	mA-hrs	**14.76**	
Average stand-by battery pack current	I_{SB}	mA	1.00E-05	
Other Capacity Losses	L_{OTH}	mA-hrs	**5.00**	To simulate worst case of GPS receiver consumption when GNSS signal is available after 12 hrs of Operation lifetime test
Battery pack capacity loss due to constant operation of circuitry prior to beacon activation: $LISB = I_{SB} * T_{BR} * 8760$	L_{ISB}	mA-hrs	**0.70**	
Calculated value of the battery pack pre-test discharge $L_{CDC} = L_{CBN} + 1.65 * (L_{ST} + L_{GST} + L_{ISB})/1000 + L_{OTH}/1000$	L_{CDC}	A-hrs	**0.203**	

The average Current during each operating mode is given below for reference.

Beacon Operating Modes	Mode Manually selectable	Measuremetn interval , Sec	Average Current, mA	Peak Current, mA
StandBy mode	Automatic		0.00001	
Self Test mode	Manually to self test on auto off	9.35	70.02	1143
Operating mode with GPS receiver in search mode (406 MHz+Homer+GPS on+strobe light)	Automatic	50	38.8	1195
Operating mode with GPS fix obtained (406 MHz+Homer+GPS off+strobe light)	Automatic	50	29	1171
GPS Test mode	Manually to GPS Test on	315.3	16.85	86

∴ the required pre-discharge time for the Cospas-Sarsat requirement in T.007 at the standard operating current of 29mA is 7 hours 0 minutes, at a discharge current of 50mA the pre-discharge time is 4 hours 4 minutes.

Analysis that identifies the operating mode that draws the maximum battery energy

T.007 5.d Battery Consumption Modes PLB1

From the analysis given in section 5.c, it can be seen that the worst case mode that draws the maximum battery is for the PLB1 model with GNSS receiver in the operational condition and with the GNSS receiver in search mode (no GPS signal present).

There are no other modes that draw peak currents higher than during normal operation with GNSS receiver in search mode.

Since the GPS timings are different between GPS signal present and absent. It is possible that additional current could be drawn if the GPS signal were made available after 12 hours. During operational life testing in this instance however the PLB1 would likely gain a fix within a time less than 40 seconds and switch off the GNSS receiver. For this reason it is not possible to accurately test this mode during the operational life test for PLB1. Under these conditions we must account for the potential worst case additional current by calculation as shown below.

PLB1 GPS Cycles

Elapsed Time	No GPS Signal	With GPS Signal	Worst Case
1st hour up to 2nd hour	30 mins on 30 mins off	10 mins on 50 mins off	GPS off
2nd hour up to 3rd hour	20 mins on 40 mins off	10 mins on 50 mins off	GPS off
3rd hour up to 6th hour	30 mins on 150 mins off	30 mins on 150 mins off	Same
6th hour up to 12th hour	15 mins on 345 mins off	15 mins on 345 mins off	Same
12th up to 20 hours	10 mins on 470 mins off	20 mins on 460 mins off	GPS On **
20 hours +	off	5 mins on for every 115 off	GPS On **

** with a GPS signal during test the GNSS receiver will get a lock within 30 to 40 seconds and so not provide the worst case figures. These must be calculated since we cannot guarantee that with a GPS signal the GPS will be on for the full five minutes.

From the above calculation it can be seen that with the operational life test carried out without GPS signal the additional worst case GPS on time for 24 hours would be increased over the no GPS time by an additional 20 minutes. The additional current drawn with GPS on against no GPS is given as 38.8mA – 29mA = 9.8mA. This additional current at worst case equates to an extension on the operational life of 3.3mAh or 6.75 minutes operation, which is insignificant. An additional 5mAh will be added to the Battery pre-discharge during the operational life tests to account for the additional current.

Extending the operational time by an hour to account for the electronic witness will add an extension to the beginning of the operation so an additional first hour must be added to the operation to account for this and still meet the 24 hours minimum operation. This additional operational time would normally be with GPS on for 30 minutes in the first hour. However it would be possible for a user to only turn on the PLB1 for 5 minutes 12 times thus having the GNSS receiver on for the full additional electronic witness first hour. Again this is an extension on top of the additional hour for the electronic witness an additional 9.8mAh or 20.3 minutes operation.

In total the additional operational time required to allow for the electronic witness and the potential worst case in GPS on time is 1 hour 20.3 minutes. The PLB1 must operate for at least 25 hours 20.3 minutes after the pre discharge of the battery to meet the operational requirements.

Since we are adding 1 hour 20.3 minutes to the operation of the PLB if we assume worst case and have GPS on after 12 hours then we would have an additional 5 minutes of GNSS receiver on time worst case for this additional period. This would equate to an additional 0.817mAh capacity from the battery. This will require an additional 1.7 minutes extension on the operational life of the unit. So to account for all worst case possibilities we should add a 1 hour 22 minutes to the 24 hours operation requirements to ensure the unit will meet the requirement.

If there is no GPS position at the 20th hour (four hours without a fix)the GPS is turned off and not turned on again. If however the PLB has a valid fix then the GPS follows the timings as shown in the table for “with GPS Signal”. If at any point after the 20th hour the GPS position is not valid (e.g. four hours without a fix) then the GPS is turned off and does not turn on again.

T.007 5.d Battery Consumption Modes PLB2

The worst case mode that draws the maximum battery or the PLB2 model is the operational condition. The maximum average current for the PLB2 model is lower than the maximum average current in the PLB1 model. The PLB2 current is shown in 5.c for the PLB2.

There are no other modes that draw peak currents higher than during normal operation.

Beacon operating instructions and a technical data sheet

ocean SIGNAL

User Manual

PLB1

Personal Locator Beacon

English

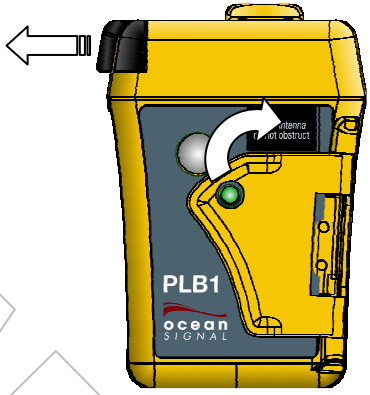
www.oceansignal.com

The technical data, information and illustrations contained in this manual were believed to be correct at the time of print. Ocean Signal Ltd reserve the right to change specifications and other information contained in this manual as part of our continual improvement process.

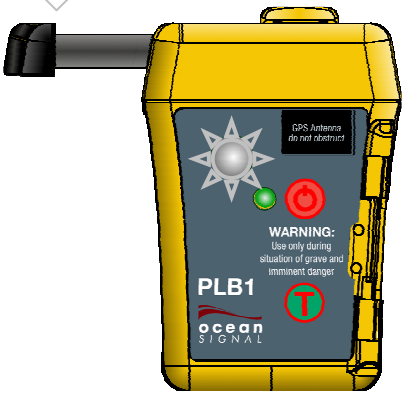
No liability can be accepted for any inaccuracies or omissions in this manual.

IN CASE OF EMERGENCY

- **USE ONLY IN CASE OF GRAVE OR IMMINENT DANGER**
- **PULL THE ANTENNA OUT FROM THE BODY TO ITS FULL EXTENT USING THE BLACK TAB.**
- **LIFT THE FLAP UP**
- **PRESS THE ON KEY FOR ONE SECOND TO ACTIVATE THE BEACON. THE GREEN LED WILL FLASH TO INDICATE ACTIVATION –RELEASE THE key.**
- **ENSURE THE ANTENNA IS HELD VERTICALLY WHILE OPERATING THE PLB**



- **THE STROBE LIGHT WILL START FLASHING TO INDICATE IT IS ACTIVIVATED**



Contents

1. GENERAL

1.1 Exposure to RF Electromagnetic Energy

This product has been evaluated for compliance with the FCC exposure limits given in CFR47 part 2.1093 at a distance of 2.5cm for "General Use Only". This product also complies with EN50371 (EU) and RSS-102 (Canada).

1.2 Warnings

- It is a legal requirement to register your PLB with your National Authority.
- Only use your PLB in a situation of grave and imminent danger. Deliberately misusing your PLB or setting it off accidentally may result in prosecution and a fine.
- Your PLB contains small lithium batteries. Please see section 6 for information on safe transportation.
- The battery in your PLB should be replaced immediately if it has been activated, or if the test indicator shows the battery as 'used', or if the expiry date marked on the unit has been exceeded.
- THIS PLB WILL NOT FLOAT, unless fitted with a flotation lanyard.
- The PLB1 is not designed to be operated floating in water. Please hold above the water when activated.
- Please read these instructions carefully. Failure to follow the guidance in this manual may result in loss of warranty.

1.3 Model designators

The Ocean Signal PLB is available in two variants. The rescueME PLB1 has a GPS receiver built in for maximum position accuracy. A version without the GPS receiver is also available, the rescueME PLB2. This manual covers both variants, but section 5.1.2, 7.1.2 and other references to the GPS do not apply to the PLB2.

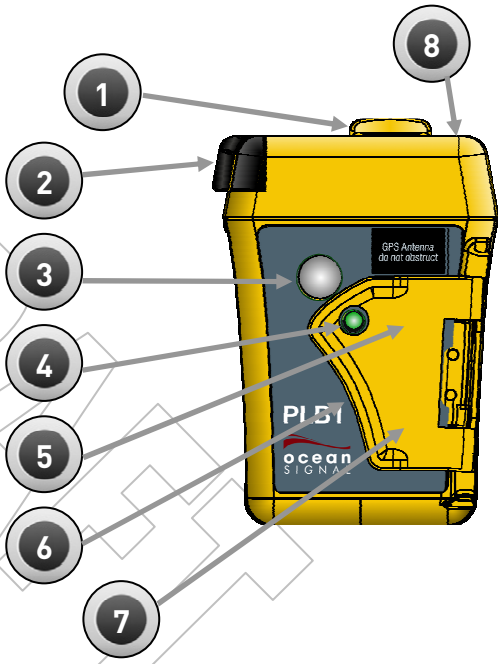
1.4 Registration

To register your beacon, contact you national registration authority via post, email or online. Provide your 15 digit HEX ID (UIN), 5 digit checksum if required, your contact details and emergency contact information. Some countries also require additional information such as boat type and identification or alternative emergency contacts.

For USA the registration is at www.beaconregistration.noaa.gov/

2. PLB1 OVERVIEW

1) Antenna rewind knob
2) Antenna pull grip
3) Strobe light
4) Indicator LED
5) On Key (Under Flap)
6) Lift up flap
7) Test Key (Under Flap)
8) Lanyard fixing (on rear of case)



3. FALSE ALERTS

False alerts cause the rescue authorities unnecessary time and expense. To avoid false alerts make sure your PLB is safely stowed with the protective cover closed and the antenna fully wound in. Make sure that there is no excessive pressure applied to the protective cover. Ensure that anybody carrying the PLB is fully aware that this device is for emergencies and should only be used in situations of grave and imminent danger.

If you accidentally activate your beacon or otherwise set it off when a rescue is not required, contact your local emergency services as soon as possible and advise them of your beacon's 15 digit HEX code (UIN), your current location and the time the beacon was first activated.

For USA phone: 1-800-851-3051 (USAF Rescue Coordination Center)

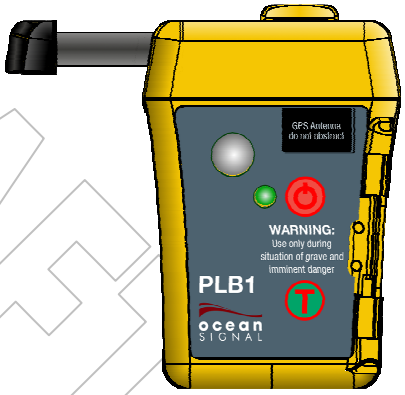
For UK phone: +44 (0)1326 317575. (UKCG)

4. OPERATION

Ensure that your PLB1 is always fitted with an unused battery that is within the marked expiry date. Failure to do so may result in reduced operating time is used in a real emergency. Please observe the recommendations on testing in section 5.

4.1 Activation

Only activate your PLB1 in situations requiring emergency assistance from the rescue authorities. Deliberate misuse of your PLB may result in a fine.



- To activate your PLB in an emergency, pull the black antenna tab out completely.
- Lift the protective flap and press the key for one second until the green LED flashes and release the key. (Do not force the flap through more than 180°, otherwise the hinge may break)
- When operating the PLB over water, tether the beacon to your body or the liferaft. Keep the PLB clear of water when operating.
- Hold your beacon laying flat with the antenna standing vertically. Keep the area marked 'GPS Antenna' free from obstruction, which would interfere with the GPS reception.

Note: the PLB does not transmit an alert until approximately 50seconds has elapsed. This allows time to deactivate the unit if accidentally turned on.

4.2 Deactivation

To deactivate your PLB after use or is accidentally activated, press the key for one second until the indicator LED flashes red twice, then release. Rewind the antenna using the knob on the top of the PLB

Do not push the antenna back into the PLB as this may cause it to be damaged.

5. MAINTENANCE AND TROUBLESHOOTING

Your PLB will require little maintenance except periodic cleaning, if required. Always use a damp cloth to clean the case and dry thoroughly. Do not use solvents or other cleaning fluids as this may cause the plastics to deteriorate. Ensure the antenna is free to unwind.

5.1 Testing

Routine testing of your PLB is recommended to ensure it is in good working order if needed, but please follow the guidance notes below on the frequency that tests should be carried out. Please remember that each test will reduce the battery capacity slightly and reduce the operation time of your PLB during an emergency.

5.1.1 Beacon test

To test your PLB1 is functioning correctly, press and hold the T key for one second. The red LED will come on to indicate the switch is depressed, followed by the red LED flashing rapidly. The switch may now be released. The strobe light will flash once and the indicator LED will flash one or more times in two groups to indicate the pass and fail status. The number of green/amber flashes indicates the battery status as shown in the table below.

PASS: 

USED: 

FAIL: 

Green / Amber Indicator. *Chages to Amber after 1 hour of use*		Red indicator
No of Flashes	**No of Hours Use**	**Type of Failure**
1 Flash	0 to 1hr 59min	121.5MHz homer
2 Flashes	2hrs to 3hrs 59min	406MHz generation
3 Flashes	4hrs to 5hrs 59min	406MHz power amp
4 Flashes	6hrs to 7hrs 59min	Replace battery
5 Flashes	8hrs to 9hrs 59min	Other failure
6 Flashes	10hrs +	

- Pull antenna out fully before commencing the test. Retract the antenna after the test.
- Because the test transmits a short burst on the aircraft distress frequency of 121.5MHz, please only carry out this test in the first five minutes of each hour.
- It is recommended to test your PLB once a month.
- The amber test result is an electronic witness that indicates the battery has been used for over one hour or the allowed number of tests has been exceeded. The PLB will still operate normally in distress, but the battery should be replaced to ensure the full operating life when your PLB is needed.

5.1.2 GPS test

To test the GPS function of your PLB press and hold the T key for ten seconds. Initially the red LED will illuminate while the button is held and then start flashing. After ten seconds the LED will change to a long red flash and a short green flash until either a fix is obtained or the GPS test fails. A successful test will be indicated by the strobe flashing and the green LED flashing. The number of green flashes indicates one more than the number of GPS tests remaining. A failure is indicated by the red LED flashing. The test can be ended by holding the T key down for five seconds.

Ensure that the PLB has a clear view of the sky when performing the GPS test. Make sure the area marked 'GPS antenna' is not obstructed.

Do not test the GPS operation more than once a year as this will reduce the operating time during an emergency. (The maximum number of GPS allowed is limited to ten over the life of the battery. After ten tests the GPS test will fail to activate)

6. BATTERIES

The PLB1 contains Lithium batteries for long operating life. Your battery must be replaced either after the expiry date or after the PLB has been activated, even if only for a short period of time. Battery replacement must be done at an Ocean Signal authorised battery replacement centre.

When shipping your PLB the following guidance and regulations should be followed, but you are advised to contact your nearest battery replacement centre or Ocean Signal prior to shipping as regulations may have changed. The PLB1 battery contains <2g of lithium.

- Always pack your PLB securely in a stout cardboard carton. Ocean Signal advises that you keep the original packaging in case of return for service.
- For surface transport the PLB may be shipped 'excepted' under special provision 188.
- For air transport the PLB should be shipped as category UN3091 and packed under IATA packing instruction 970 section II. If you are hand carrying your PLB on an aircraft please contact you airline for advice.

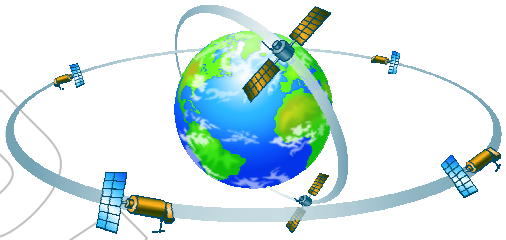
6.1 Disposal

Care should be taken when disposing of your PLB when it is no longer required. It is recommended to remove the battery from the PLB by removing the case lid. The case screws are covered by the top label. Dispose of the battery in accordance with local waste regulations. Please note that the PLB1 is not user serviceable and removing the lid will invalidate the warranty.

7. APPENDIX

7.1 System Overview

7.1.1 COSPAS/SARSAT System



The COSPAS/SARSAT system utilises two satellite arrays to provide distress alert and location data to search and rescue authorities. The GEOSAR system can provide near immediate alerting within the coverage of the receiving satellite. The LEOSAR system provides coverage of the polar region beyond the range of the GEOSAR system. It can calculate the location of distress events using Doppler processing techniques and is less susceptible to obstructions which could block a signal in a given direction. The system is comprised of instruments on board the satellites which detect the signals from the distress beacons. Ground receiving stations, referred to as Local Users Terminals (LUTs) receive and process the satellite downlink signal to generate the distress alerts. The distress alerts, generated by the LUTs, are then received by Mission Control Centres (MCCs) which then forward the alert to Rescue Co-ordination Centres (RCCs), Search and Rescue Points of Contacts (SPOCs) and other MCCs.

7.1.2 GPS System

The GPS system is a satellite array that enables a GPS receiver to determine its position around the globe. There are a minimum of 24 satellites orbiting the Earth providing accurate position, velocity and time information. The PLB1 PLB has a built in 66 channel GPS receiver and antenna allowing reception of this positional data. The received position is then coded into the PLB emergency transmission thus enabling search and rescue teams to narrow the search area and increase the effectiveness of the rescue operation.

7.2 Accessories

To be completed

7.3 Specifications

406MHz Transmitter

Frequency	406.040 MHz ±1KHz
Output Power	5W Typical
Modulation	Phase ±1.1 Radians Pk (16K0G1D)
Encoding	Biphase L
Rate	400 bps

121.5MHz Transmitter

Frequency	121.5 MHz
Output Power	25-100mW PEP
Modulation	Swept Tone AM (3K20A3X)
Sweep Range / Rate	TBC Hz
Modulation Depth	~97%
Frequency Stability	±50ppm
Duty Cycle	~35%

Low Duty Cycle Strobe

Light Type	High Intensity LED
Light Colour / Intensity	White / 1candela (typ)
Flash Rate	20-30 per minute

Battery

Type	Lithium Manganese Dioxide (LiMnO2)
Operating	>24Hours @ -20°C
Replacement Interval	7 years

GPS Receiver

Satellites Tracked	66 Channel
Sensitivity	-148dBm
Cold Start Re-acquisition	-163dBm
GPS Antenna	Microstrip Patch

General

Height of Body	76mm
Width of Body	52mm
Depth of Body	32mm
Weight	115grams

Environmental

IEC60945 Category	Portable
Operating Temperature	Class 2 -20C to +55C
Storage Temperature	Class 2 -30C to +70C
Waterproof	15m depth

7.4 Approvals

7.4.3 European Declaration of Conformity

English Hereby, Ocean Signal Ltd declares that this PLB is in compliance with the essential requirements and other relevant provisions of Directive 1999/5/EC

Finnish Ocean Signal Ltd vakuuttaa täten että PLB tyyppinen laite on direktiivin 1999/5/EY oleellisten vaatimusten ja sitä koskevien direktiivin muiden ehtojen mukainen

Dutch Hierbij verklaart Ocean Signal Ltd dat het toestel [type van toestel] in overeenstemming is met de essentiële eisen en de andere relevante bepalingen van richtlijn 1999/5/EG

French Par la présente Ocean Signal Ltd déclare que l'appareil PLB est conforme aux exigences essentielles et aux autres dispositions pertinentes de la directive 1999/5/CE

Swedish Härmed intygar Ocean Signal Ltd att denna PLB står I överensstämmelse med de väsentliga egenskapskrav och övriga relevanta bestämmelser som framgår av direktiv 1999/5/EG

Danish Undertegnede [Ocean Signal Ltd erklærer herved, at følgende udstyr PLB overholder de væsentlige krav og øvrige relevante krav i direktiv 1999/5/EF

German Hiermit erklärt Ocean Signal Ltd, dass sich dieser/diese/dieses [Gerätetyp] in Übereinstimmung mit den grundlegenden Anforderungen und den anderen relevanten Vorschriften der Richtlinie 1999/5/EG befindet".

Greek ΜΕ ΤΗΝ ΠΑΡΟΥΣΑ Ocean Signal Ltd ΔΗΛΩΝΕΙ ΟΤΙ PLB ΣΥΜΜΟΡΦΩΝΕΤΑΙ ΠΡΟΣ ΤΙΣ ΟΥΣΙΩΔΕΙΣ ΑΠΑΙΤΗΣΕΙΣ ΚΑΙ ΤΙΣ ΛΟΙΠΕΣ ΣΧΕΤΙΚΕΣ ΔΙΑΤΑΞΕΙΣ ΤΗΣ ΟΔΗΓΙΑΣ 1999/5/ΕΚ

Italian Con la presente Ocean Signal Ltd dichiara che questo PLB è conforme ai requisiti essenziali ed alle altre disposizioni pertinenti stabilite dalla direttiva 1999/5/CE

Spanish Por medio de la presente Ocean Signal Ltd declara que el PLB cumple con los requisitos esenciales y cualesquiera otras disposiciones aplicables o exigibles de la Directiva 1999/5/CE

Portuguese Ocean Signal Ltd declara que este PLB está conforme com os requisitos essenciais e outras disposições da Directiva 1999/5/CE

CE 0168 !

7.5 Limited Warranty

Your PLB1 Personal Locator Beacon is warranted against manufacturing defects and workmanship for a period of two years from date of purchase. Ocean Signal Ltd will, at its discretion, repair or replace a faulty product free of charge, including return carriage costs to the owner. (To be changed before publication)

For further assistance, please contact our Technical Service Department:

Email: service@oceansignal.com

Accidental damage and misuse or non-approved modifications are not covered by this warranty. This warranty does not affect your statutory rights.

7.6 Country of Intended Use (EU requirement)

To be completed

Austria		Germany		Netherlands	
Belgium		Greece		Poland	
Bulgaria		Hungary		Portugal	
Cyprus		Ireland		Romania	
Czech Republic		Italy		Slovakia	
Denmark		Latvia		Slovenia	
Estonia		Lithuania		Spain	
Finland		Luxembourg		Sweden	
France	✓	Malta		United Kingdom	✓

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