Emergency Locator Beacon and PPE Grab Handles Guidance for Offshore Rescue Crews

Version 5

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CHC Helicopters
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HR Smith
Caledonian Airborne Systems
Kannard
Rhotheta
Sea Marshall
UESML
Seacroft Marine Consultants Limited
Survival-One

These guidelines have been reviewed and supported by representatives from the following organisations: -

Maritime and Coastguard Agency (MCA)
Emergency Response and Rescue Vessel Association (ERRVA)
Evacuation, Escape and Rescue Technical Advisory Group (EERTAG)
Marine Safety Forum (MSF)

ABBREVIATIONS

ADELT	Automatically Deployed Emergency Locator Transmitter
BITE	Built-In Test Equipment
CPI	Crash Position Indicator
ELT	Emergency Locator Transmitter
EPIRB	Emergency Position Indicating Radio Beacon
ERRV	Emergency Response and Rescue Vessel
GPS	Global Positioning System
HSE	Health and Safety Executive
IAD	International Air Distress
MHz	Mega Hertz
MRCC	Maritime Rescue Co-ordination Centre (Coastguard in the UK)
PLB	Personal Locator Beacon
PPE	Personal Protective Equipment
TEMPSC	Totally Enclosed Motor Propelled Survival Craft
UKCS	United Kingdom Continental Shelf
WWPLB	Wrist Watch Personal Locator Beacon

1.0 INTRODUCTION AND PURPOSE

This guidance document has been produced to provide information and guidance to offshore rescue crews in the correct handling of emergency locator beacons currently in use in the offshore oil and gas industry in the UKCS. Its content may be applied in other geographical and / or commercial sectors, but it should be known that there are many other products and items of equipment in use worldwide that are not contained in this document.

2.0 OVERVIEW OF EMERGENCY LOCATOR BEACONS

Emergency locator beacons are tracking transmitters which aid in the detection and location of boats, aircraft and people in distress. They are radio beacons that can interface with satellite systems for search and rescue (SAR) and radio direction finders on SAR vessels and aircraft with the basic purpose of ensuring people are rescued as quickly as possible.

When activated, such beacons send out a distress signal, some of which can be detected by satellite on 406 MHz, but all of which can be detected by radio direction finders locally on 121.5 MHz, which is essential for homing at close range. In the case of 406 MHz beacons which transmit digital signals, the beacons can be uniquely identified by satellite almost instantly, and furthermore, a GPS position can be encoded into the signal, which provides instantaneous identification of the registered user and its location.

By using the initial position provided via the satellite system or mayday / distress radio broadcast, SAR aircraft and surface search parties can home in on the 121.5MHz distress signals from the beacons and come to the aid of the concerned boat, aircraft, or people.

The title Emergency Locator Beacons covers a wide range of beacons which are often given a variety of names depending on their application. Beacon types that are commonly used are also known as Emergency Beacons, Emergency Location Transmitters (ELTs), Automatically Deployed Emergency Location Transmitters (ADELTs), Crash Position Indicators (CPIs), Emergency Position Indicating Radio Beacons (EPIRBs) and Personal Locator Beacons (PLBs).

There are three main types of distress radio beacons which can be put into the following three categories: -

- **EPIRBs** which signal maritime distress.
- **ELTs** which signal aircraft distress (Including ADELTs and CPIs).
- **PLBs** which indicate a person in distress

Note: All beacons are of greater assistance to the rescue crew in darkness, restricted visibility and adverse weather. Experience has shown in good conditions it may be possible to locate the casualty visually before the homing frequency is detected depending on the strength of the signal being transmitted. Therefore a good visual and listening lookout should be maintained at all times.

2.1 Helicopter Beacons

All helicopters operating offshore in the UKCS are equipped with at least one ELT / CPI which can be deployed and activated manually by the pilot or co-pilot or automatically upon impact or when submerged in water.

These beacons transmit the aircraft's last known GPS position to satellites on 406 MHz and are located by radio directions finders on 121.5 MHz
See Appendix A for the types in use and deactivation instructions.

2.2 Helicopter Liferaft Beacons

All helicopters operating offshore in the UKCS are equipped with two liferafts which contain an ELT. There is one type in use offshore in the UKCS which is activated manually by the occupants of the liferaft.

See Appendix B for the type in use and deactivation instructions.

2.3 Helicopter Crew Beacons

All helicopter pilots and co-pilots operating offshore in the UKCS are equipped with a PLB. There are two types in use offshore in the UKCS. Both can be activated manually or automatically when submerged in water.

See Appendix B & C for the types in use and deactivation instructions.

2.4 Helicopter Passenger Beacons

By mid 2010 all helicopter passengers travelling offshore in the UKCS will be equipped with PLBs. There are currently two types of passenger PLBs approved for use offshore in the UKCS. Both can be activated manually or automatically when submerged in water.

See Appendix D for the types in use and deactivation instructions.

2.5 TEMPSC / Lifeboat Beacons

Some offshore installation TEMPSC / Lifeboats are equipped with EPIRBs. Their fitment is not mandatory and there are many different types in use (too many to list in this document). If fitted, Duty Holders and rescue crews should ensure information is available on the type fitted at the installation(s) they are supporting.

2.6 Installation Liferaft Beacons

Some offshore installation liferafts are equipped with locator beacons. Their fitment is not mandatory and there are many different types in use (too many to list in this document). If fitted, Duty Holders and rescue crews should ensure information is available on the type fitted at the installation(s) they are supporting.

2.7 Overside Work Beacons

Not all duty holders in the UKCS currently equip personnel with PLBs for overside work situations but some do. Those companies that do will provide them to all personnel engaged in overside work. As well as the two types of helicopter passenger PLBs in use offshore (which can also be used for overside work) in the UKCS there is a third PLB (that is no longer permitted on aircraft) that can also be used onboard installations. This can be activated manually or automatically when submerged in water.

See Appendix D & E for the types in use and deactivation instructions.

3.0 EQUIPMENT TESTING AND CREW FAMILIARISATION

All offshore rescue crews should ensure they have sufficient knowledge to ensure they can correctly operate any homing equipment they may have to operate as part of their duties and / or recognise and deactivate any Emergency Locator Beacons that may be recovered during a rescue.

Crews should also ensure they are aware of how their equipment 'behaves' when it encounters multiple signals. Most modern direction finding equipment will home in on the strongest signal but this should be verified by the crew for each individual piece of equipment.

Exercises and familiarisation training should be conducted to verify crew competence.

It is also recommended that Duty Holders validate the correct use and operation of associated equipment by means of independently witnessed trials with rescue crews. This could be conducted in conjunction with other independently witnessed exercises to minimise the impact to other crew and / or vessel commitments.

Any 'live' testing of homing equipment for exercise and training purposes should be conducted on the test frequency only (121.65 MHz). Duty Holder's should provide test units for this purpose.

Testing should **NOT** be conducted on the 'emergency' frequency 121.5 MHz.

4.0 RECOVERY PROCEDURE

So as not to impede the rescue, all **recovered** beacons should be deactivated. However, rescue crews should not endanger themselves by boarding abandoned helicopters just to find and deactivate locator beacons.

Direction finding equipment will normally lock on to the strongest signal which is likely to be coming from the beacon that is highest or closest to the receiving antennae. If not deactivated it is likely homing equipment will lock onto the beacon which is onboard the rescuing aircraft or vessel (whether onboard your own or a nearby aircraft / vessel) before detecting any further casualties in the water.

Crews should be aware that some beacons transmit on higher power than others so a high powered aircraft beacon, for example, may mask the detection of lower powered PLBs worn by immersed casualties. Therefore, when conducting a search for survivors rescue crews should also attempt to locate and deactivate any beacons that may have floated free to avoid confusion during the rescue.

At the earliest opportunity, the time and location of the beacon recovery must be passed to the co-ordinating rescue centre - normally a Coastguard MRCC. This is of particular importance for the PLBs (crew or passenger). Whilst this may appear to add to the rescue unit's workload, time and location details can greatly assist the MRCC in defining or refining search areas for other survivors - particularly important in the event of a malfunction of an individual PLB.

5.0 GRAB HANDLES FOR SURVIVAL SUITS AND LAPP JACKET

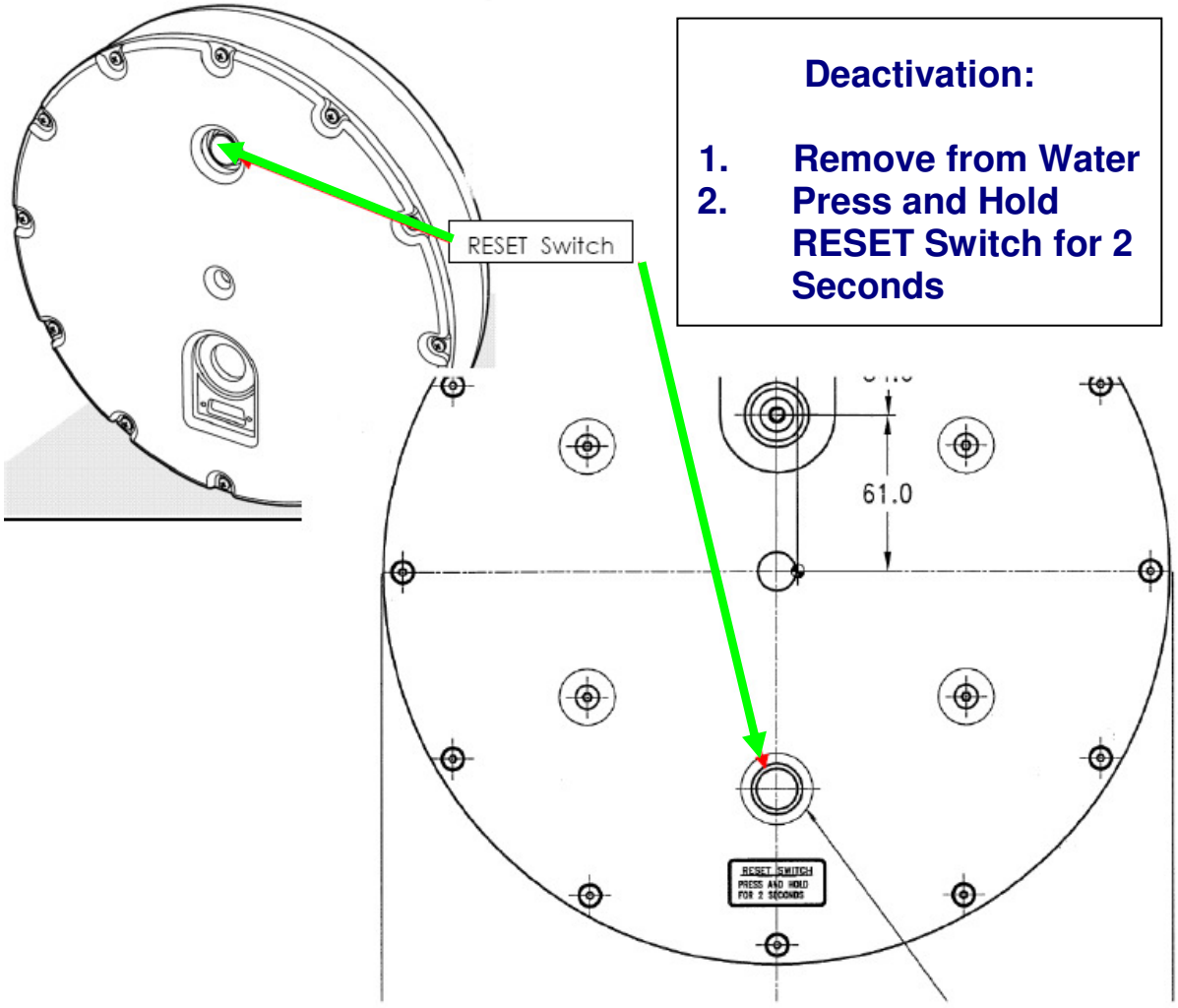
If possible, the grab handles of survival suits or life jackets should be used when recovering persons from water. Grab handles are fit for manual handling purposes due to their reinforced stitching.

These handles are ordinarily located by the nape of the neck, and are a different colour to the rest of the suit/ jacket. In some cases, a reflective strip may help locate the handle. There are currently no grab handles on helicopter crew suits, due to the fact they have handles on the aviation life jackets.

Photographs of the grab handles for the most common PPE are given in Annex F.

APPENDIX A HELICOPTER BEACON TYPES AND OPERATION

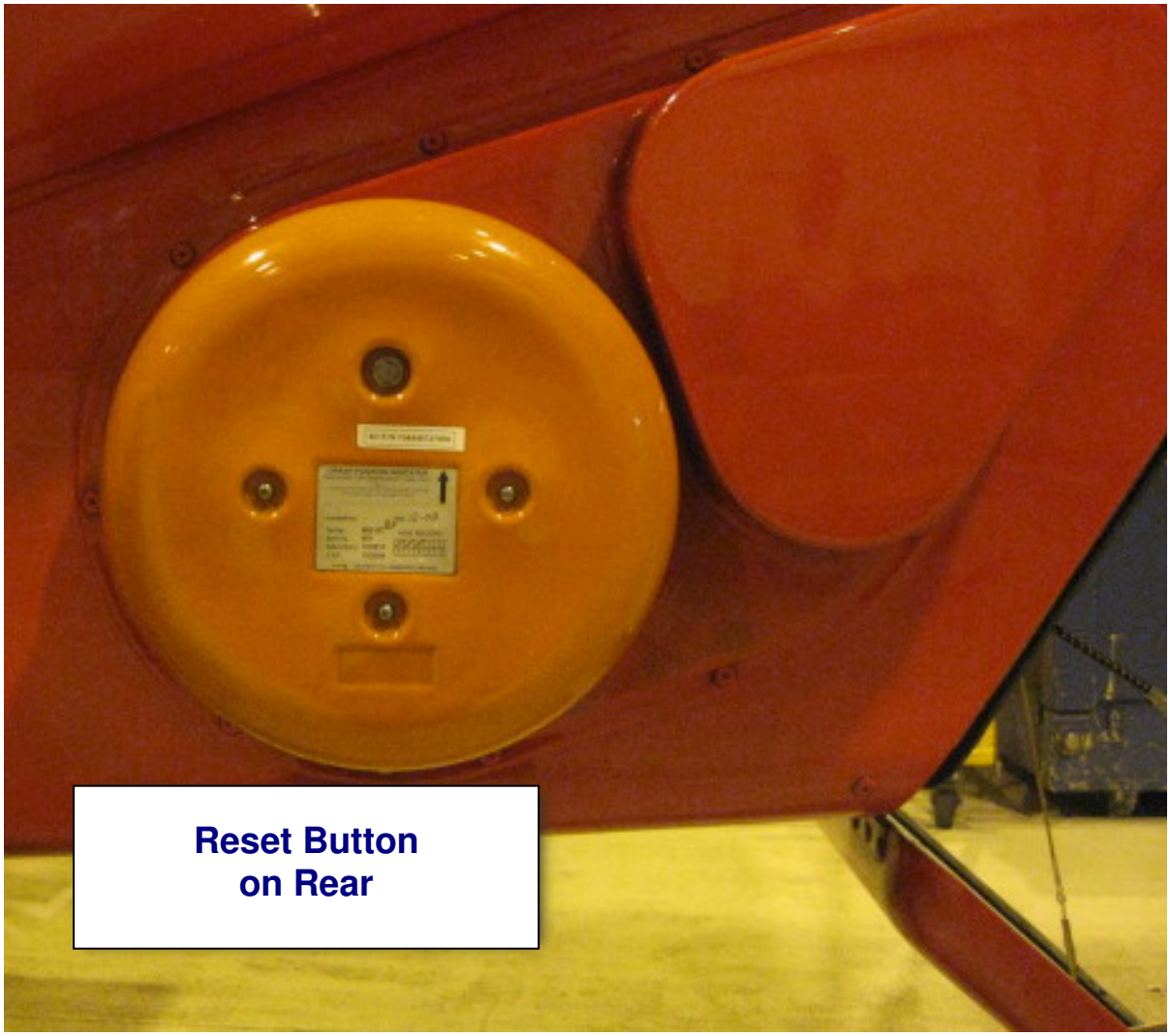
HR Smith Techtest 503-1 – Helicopter Crash Position Indicator



Deactivation:

1. **Remove from Water**
2. **Press and Hold RESET Switch for 2 Seconds**

HR Smith 503-16 – Helicopter Crash Position Indicator



Summary

This is a large round orange disc that usually mounts on the LHS tail/baggage bay area of the aircraft, when deployed transmits homing signals on both 121.5 MHz (Civil) and 243.0 MHz (Military) distress frequencies together with 406.025 MHz for satellite location.

Deactivation

On the rear flat face there is a connector plug and a round button, press and hold the button for approx 5 seconds to deactivate. The CPI's beeping will then stop.

Caledonian Airborne Systems CPT-900 – Helicopter Emergency Locator Transmitter

'Power' and 'Transmit' Indicators

Summary for deactivation of CPT-900

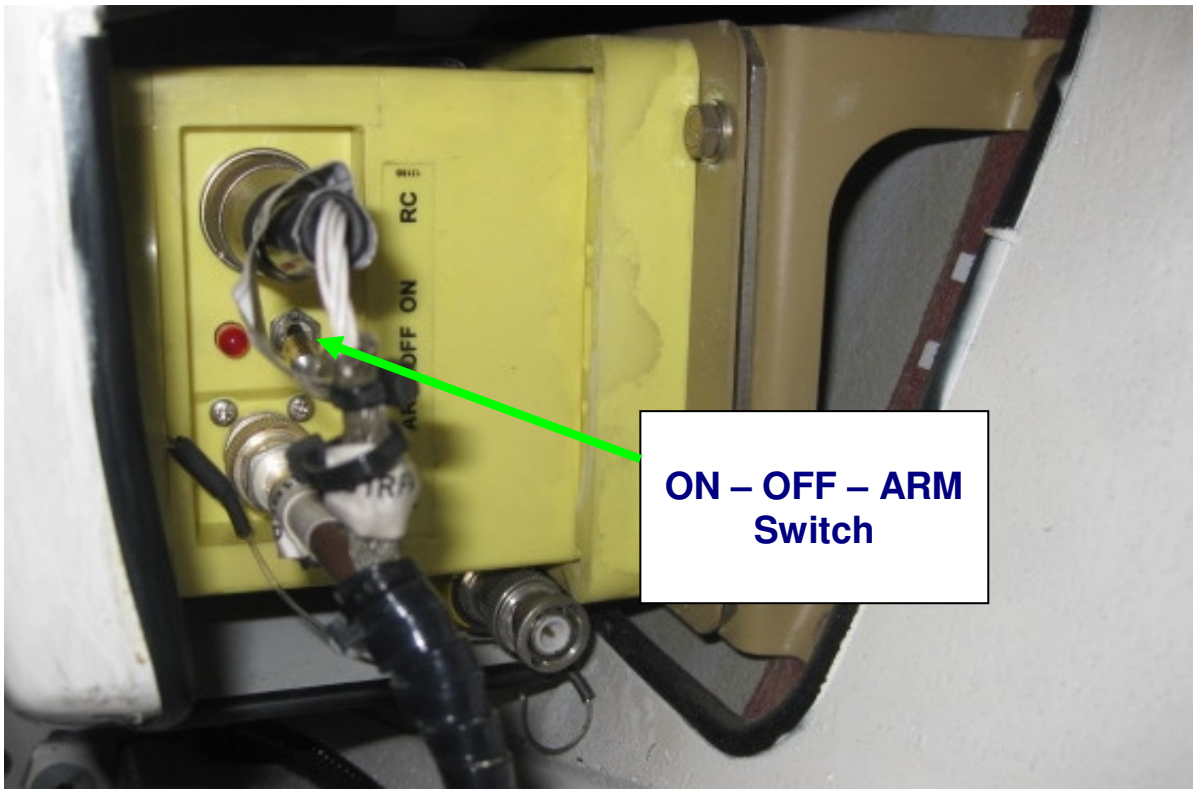
1. Remove from water
2. Flick 'ARM' Switch to OFF
3. Press TST/RST button

The beacon is no longer transmitting when the green power LED and the amber transmit (XMT) LED are both off.

Arm/ Off Switch

Test/ Reset Switch

Kannard S1821502-02 & S1820502-02 - Helicopter Crash Position Indicator



N.B. Rescue crews should not endanger themselves by boarding abandoned helicopters just to find and deactivate locator beacons!

Summary

The Kannard transmits homing signals on both 121.5 MHz (Civil) and 243.0 MHz (Military) distress frequencies together with 406.025 MHz for satellite location.

It is inside the Baggage Bay of the aircraft and is not under normal circumstances removed from there.

Deactivation

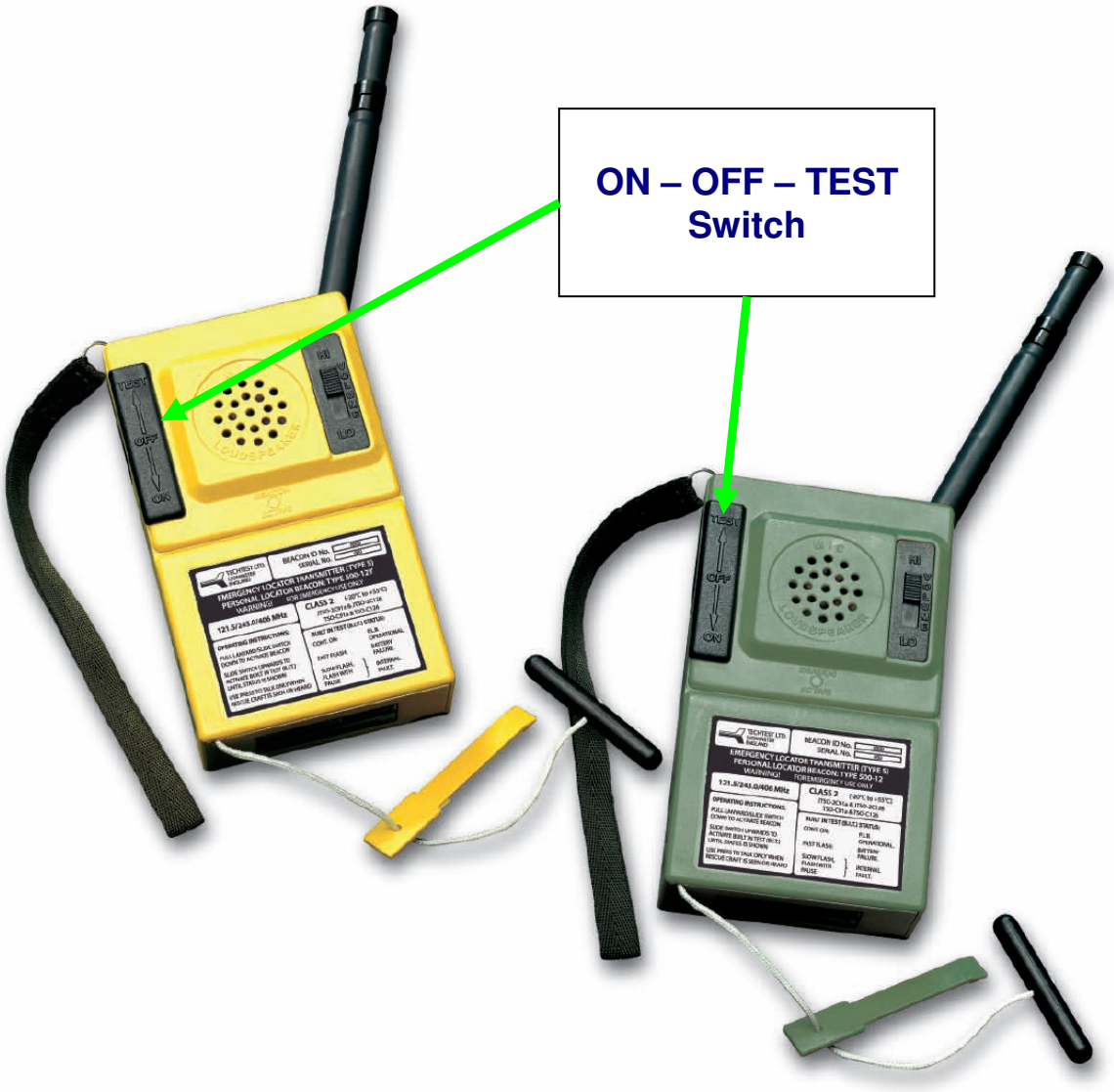
The Kannard is off or deactivated when the switch on the front of the unit is set to OFF. The status of the CPI is confirmed as being off by an inactive LED.

B HELICOPTER LIFERAFT BEACON TYPES AND OPERATION

(ALSO WORN BY SOME HELICOPTER PILOTS)

HR Smith Series 500-12 - Multi Function Locator Beacons

(Contained in helicopter liferafts and also worn by some helicopter pilots)



Summary

The HR Smith Series 500-12 beacon transmits modulated homing signals on both 121.5MHz (Civil) and 243.0 (Military) distress frequencies together with 406.025 MHz for satellite location.

Deactivation

The HR Smith Series 500-12 beacon is off or deactivated when the sliding switch on the front left hand side of the unit is set to OFF in the central position. No more lights or sounds should come from the handset.

C HELICOPTER CREW BEACON TYPES AND OPERATION (SEE APPENDIX B ALSO)

HR Smith Series 500-1 – Personal Locator Beacon (Pilots)

Summary

The HR Smith Series 500-1 beacon transmits modulated homing signals on both 121.5MHz (Civil) and 243.0 (Military) distress frequencies Together with 406.025 MHz for satellite location.

Deactivation

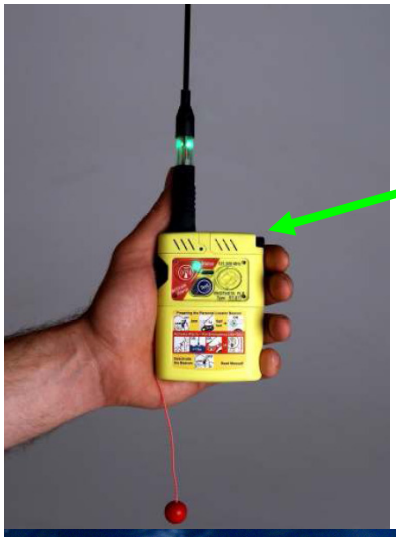
The HR Smith Series 500-1 beacon is off or deactivated when the sliding switch on the front of the unit is set to OFF in the central position.

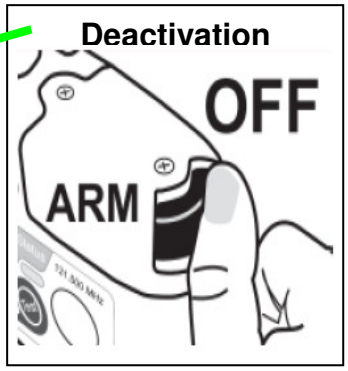
To check this, the switch can be slid up further to initiate BITE, whereupon two simultaneous audible and light bursts will be emitted, followed by a steady red LED. Releasing the switch will allow it to slide back to its relaxed position. The beacon is now off but ready to transmit again.

D HELICOPTER PASSENGER BEACON TYPES AND OPERATION

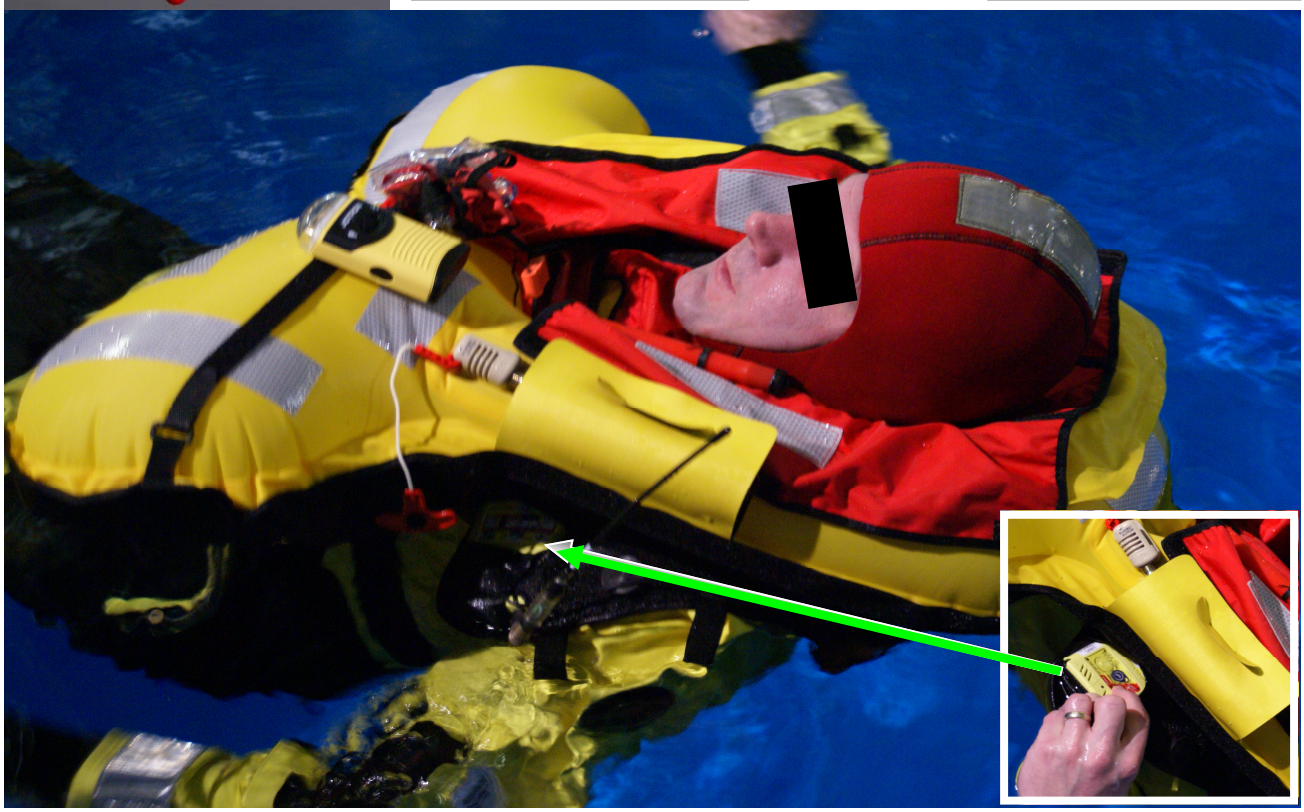
(MAY BE USED FOR OVERSIDE WORK ALSO)

RHOTHETA RT-B77 *HELB* - Helicopter Passenger Personal Locator Beacon *(May be used for Overside Work also)*





PLB Storage Pouch on Left hand side of lifejacket



Summary

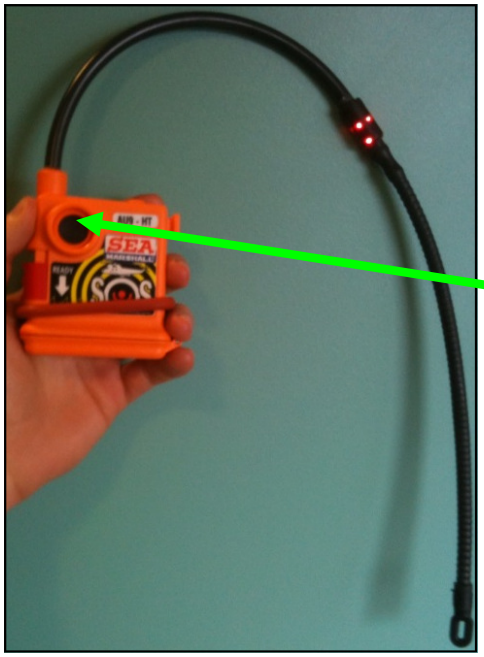
The RHOTHETA RT-B77 *HELB* beacon transmits homing signals on 121.5MHz (Civil) distress frequency

Deactivation

The RHOTHETA RT-B77 *HELB* beacon is off or deactivated when the rotary switch on the top right hand corner of the unit is set to the OFF position. It may be easier to do this once the beacon is removed from its pouch. When successfully deactivated, all visual and audible activities stop.

Sea Marshall® AU9-HT Helicopter Passenger Personal Locator Beacon

(May be used for Overside Work also)



Summary

The Sea Marshall® AU9-HT Helicopter Transit PLB transmits homing signals on 121.5MHz (Civil) distress frequency

Deactivation

The Sea Marshall® AU9-HT Helicopter Transit PLB is off when the sliding switch on the left hand side of the unit is set to OFF in the upper position, and the black button is held for 3 seconds. Deactivation is confirmed with the handset beeping three times, followed by no activity.

Modelled on an inflated jacket

Modelled on an un-inflated jacket

PLB Storage Pouch on Left hand side of lifejacket

APPENDIX E OVERSIDE WORK BEACON TYPES AND OPERATION

SML TECHNOLOGIES - Wrist Watch Personal Locator Beacon *(Overside Work Only)*

Summary

The SML TECHNOLOGIES - Wrist Watch PLB transmits homing signals on 121.5MHz (Civil) distress frequency

Deactivation

To stop transmitting, manually press and hold both ARMING and CONFIRM buttons for 5 seconds. The WWPLB will acknowledge with a double beep and an LED flash.

Disarm

Step 1. Press the CONFIRM button 6 times. A single beep and LED flash will confirm step one.
Step 2. Press the ARMING button once. The WWPLB will acknowledge with a double beep and an LED flash.

APPENDIX F GRAB HANDLES FOR RECOVERING PERSONNEL FROM WATER

500 Series Survival Suit

* denotes grab handle

1000 Series Survival Suit

* denotes grab handle

LAPP Jacket

* denotes grab handle

APPENDIX G FINDINGS FROM SEAMARSHALL (AU9) PLBs AND DIRECTION FINDER TRIALS

1.0 INTRODUCTION

At the end of July 2010, a series of trials were undertaken using the Sea Marshall AU9 Personal Locator Beacon (PLB) and Direction Finder (DF) Sets from the Vroon Offshore Services vessel "VOS DON". The following conclusions have been drawn from the exercises conducted in Aberdeen Bay during the hours of daylight, with good visibility, and a 2 metre swell.

Items **emboldened in red** should be considered when installing DF equipment and using AU9 PLBs.

2.0 FINDINGS AND LIMITATIONS OF DF SETS AND PLBs

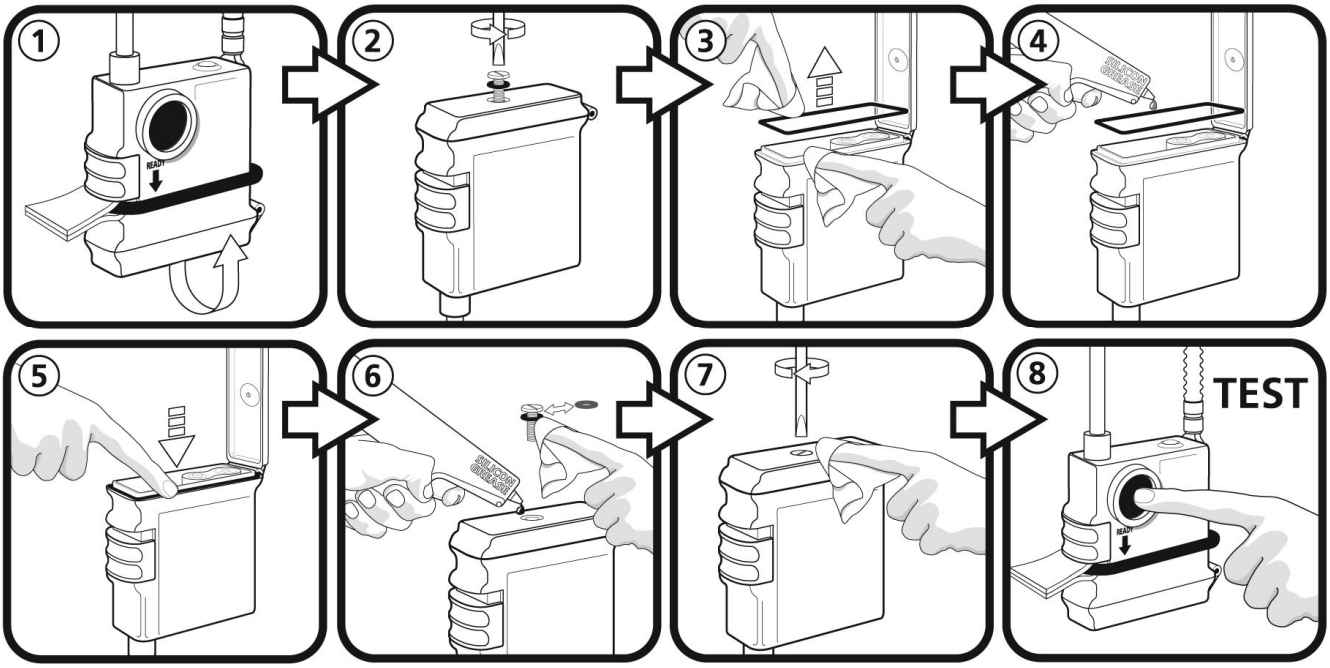
2.1 DIRECTION FINDER SETS

- In order to work effectively, the Direction Finder (DF) antenna needs a "clear line of sight" to the PLB, thus, **DF Antenna should be positioned at the maximum height possible, and with the minimum number of "blind" spots**.
- DF sets always lock on to the nearest PLB, and as the craft approaches the PLB, the Received Signal Strength Indicator (RSSI) increases until the craft is within 50 – 150 feet of the PLB (depending upon antenna height), when the RSSI will start to flash intermittently, at which point the casualty was clearly visible.
- The RSSI will continue to flash intermittently, even if the craft moves away from the PLB, until another closer signal is identified, or until the PLB is deactivated.
- The DF set stays locked onto the strongest signal (the nearest PLB), but if that signal is lost then the DF set will lock on to the next closest signal; in the event the original signal is restored, then the DF set will lock on to the original source.
- The DF Equipment on both ERRV and FRC/DC behaves identically, locking on to the same target, when both craft are in close proximity to each other, provided "line of sight" is not interrupted.
- The audible Man Overboard (MOB) Alarm on the DF set sounds when a signal is received from a PLB, and at the same time a visual warning indicator illuminates. While the alarm is loud enough to be heard in the wheelhouse of the ERRV, it is inaudible aboard the FRC and DC, however, the visual warning indicator is sufficiently bright to attract the coxswain's attention.
- **VHF transmission equipment may interfere with the DF equipment if they are positioned in close proximity**.

2.2 SEARMARSHALL (AU9) PERSONAL LOCATOR BEACON

- In moderate sea states, PLB's at sea level can be detected from circa 4 nautical miles using DF equipment on the Emergency Response and Rescue Vessel (ERRV); the detection range from a Fast Rescue Craft (FRC) and Daughter Craft (DC) is less, owing to the lower antenna height, and the curvature of the earth.
- If the PLB antenna becomes submerged, detection of the casualty using DF equipment is severely curtailed, if not impossible, at any distance greater than close visual contact with the casualty.
- Great care must be taken when changing the PLB batteries to ensure that the watertight integrity of the unit is maintained, otherwise, if it is subsequently submerged in water, failure of the PLB will result. After prolonged use, the PLB's battery may need replacing. **Upon reassembling the SeaMarshall AU9 unit, silicon grease must be applied to the seal along the base of the cap to ensure a water tight seal.** See below for detailed instructions.

2.3 CHECKING THE WATERPROOFING SEALS AND RE-SEALING THE AU9



Instructions:

1. Turn the unit upside down.
2. Unscrew the base and replace battery.
3. Clean and remove the rubber seal with a dry cloth.
4. Apply silicon grease to the whole rubber seal.
5. Press the rubber seal firmly back into place.
6. Clean the threads of the base screw and washer, apply silicon grease to the threads of the base plate.
7. Clean any excess grease from the unit.
8. Test the unit by pressing the black button; the LEDs in the antenna should flash and the unit should start to beep.