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KANNAD AUTO MANUAL+ MANUAL



MAINTENANCE MANUAL

Users are kindly requested to notify KANNAD for any discrepancy, omission or error found in this manual.

Please report to our customer support:

E-mail: support.sar@kannad.com

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LISTE OF MODIFICATIONS

Ind.	Date	Description of modifications
A	14/05/2007	First issue
B	07/04/2008	<p>P.7 modification of IMPORTANT notice</p> <p>P.9 & 10 removal of M/A switch reference</p> <p>P.13 removal of «Test of Frequencies» title</p> <p>P.15 add of programming protocols</p> <p>P.6 modification of 121.5 MHz range</p> <p>P.19 modification of control and programming equipment references</p> <p>P.20 add of GPS transponder</p> <p>P.21 modification of number of coaxial cables</p> <p>P.22 add of mounting bracket as specific tool</p> <p>P.25 modification of Fig.19</p> <p>P.26 add of important notice</p> <p>P.32 & 33 modification of check list</p> <p>P.35 modification of visual inspection & programming control</p> <p>P.36 modification of Fig. 24 and transmission chrono</p> <p>P.38 modification of Note</p> <p>P.39 add of Note section 3.2.4.2 § (1), add of NOTE section 3.2.4.3, removal of consumption test, add of action on Test pushbutton</p> <p>P.40 modification of 121.5 MHz range, add of action on Test pushbutton, removal of consumption test, removal of section 3.2.5 Test before reassembly</p> <p>P.41 add of unsticking action for keyboard cable</p> <p>P.42 each battery pack replaced by each new battery pack</p> <p>P.43 Connect the new battery pack to J6 connector of I521 PCB removed</p> <p>P.44 add of Connect the new battery pack to J6 connector of I521 PCB + instruction if activation, add of action in case of activation, add of action to stick the keyboard cable, add of NOTE regarding the wire of flash, add of self-test after cover reassembly</p> <p>P.45 modification of check after closing, modification of equipment for watertightness test, removal of action when a mounting bracket is not available, modification of Fig. 39, add of actions to check WSS and to reset counters</p> <p>P.46 modification of IMPORTANT notice section 4.1</p> <p>P.47 add of unsticking action for keyboard cable</p> <p>P.48 add of action to stick the keyboard cable, add of NOTE regarding the wire of flash, modification of check after closing</p> <p>P.49 modification of first IMPORTANT notice, removal of second IMPORTANT notice, add of locking lug picture on figure</p> <p>P.50 add of unsticking action for keyboard cable, add of information to keep the former traceability label, add of action to keep the tether</p> <p>P.51 add of information to install the tether</p> <p>P.52 add of action to stick the keyboard cable, add of NOTE regarding the wire of flash</p> <p>P.53 removal of IMPORTANT notice, add of action on ON/OFF Test pushbutton</p> <p>P.54 add of action to unstick the keyboard cable</p> <p>P.55 add of instruction if activation when connecting battery, add of action in case of activation, add of action to stick the keyboard cable, control of frequency removed from § (12) to § (18) P. 56</p> <p>P.56 Martec information replaced by KANNAD (including customer support).</p>



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MANUAL

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1. Description and operation

1.1. General description

1.1.1. Characteristics

KANNAD Auto, Manual+, Manual are distress beacons with a TCXO oscillator, a super flash led, a flexible monopole antenna, an intelligent PCB less greedy in energy. They transmit on 406.028 MHz and 121.5 MHz frequencies. They are buoyant in operation and watertight up to 1 bar. They are designed to be tied to a liferaft or any buoyant object.

Approvals

- COSPAS-SARSAT certificate N°162.
- Wheelmark BV0062 (Auto and Manual+) and R&TTE 0191 (Manual).

1.1.2. Versions

Figure 1: Presentation of versions



KANNAD Epirbs are available in 3 versions, Auto, Manual+, Manual, each version can be fitted with a built-in GPS as option.

- KANNAD Auto, Float Free version for the professional market:
An automatic container protects the Float Free versions (Category 1).
- KANNAD Manual+, Survival version for the professional and leisure markets:
This version (Category 2) is fitted with a water switch sensor and supplied with an ergonomic mounting bracket for on board installation and easy transportation.
- KANNAD Manual, Survival version for the leisure market:
This version (Category 2) without water switch sensor is supplied with an ergonomic mounting bracket for on board installation and easy transportation.

1.2. Description of container and mounting bracket

1.2.1. Automatic container

The KANNAD Auto, Float Free version (Category 1), is supplied in an automatic container (1). This container is designed to protect the beacon and to ensure its automatic release in the event of a ship wreck thanks to the HAMMAR H20 release system (2). This container is also fitted with a locking system (3) to open it manually.

It is mounted either in horizontal position on the wheel house or deck of the vessel, or in vertical position against a bulkhead or any vertical flat surface and clear area.

Figure 2: KANNAD AUTO, description of automatic container



Note: a magnet located in the bottom of the container inhibits the water switch sensor of the beacon avoiding any accidental activation due to moisture or water presence.

List of components

Automatic container (1): P/N 5104620

Hydrostatic release system including H20, axe and nut (2): P/N 5103555

Manual locking system and tether (3): P/N 5102004

Opening the container

Automatic opening

The release system uses the hydrostatic pressure effect. At a depth of 1.5 m to 4 m (4 to 12 ft.), the release system operates and cuts the locking axis. The cover is released to enable the beacon to rise to the surface. The beacon is automatically activated as soon as submerged in water and out of its container.

Manual opening

It is possible to open the container manually by opening the manual locking system (A). Remove the beacon from its container (B) and activate it (C) manually (ON pushbutton) or automatically (D) (throw the beacon overboard).

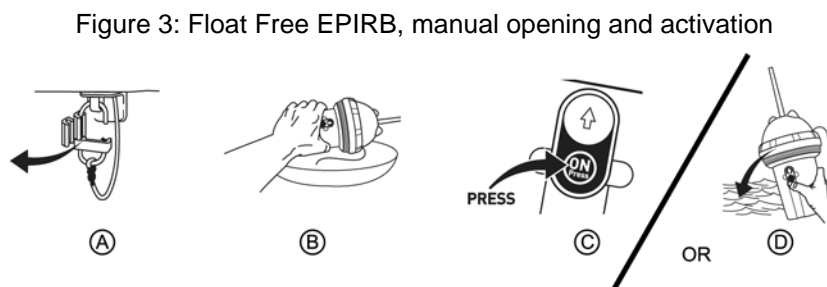


Figure 3: Float Free EPIRB, manual opening and activation

Important: Clean salt and / or moisture as soon as the beacon is extracted from its container (risk of activation).

1.2.2. Wall mounting bracket

A wall mounting bracket is supplied with the KANNAD Manual and Manual+.

This mounting bracket is fitted with a strap used to avoid an inadvertent ejection of the beacon. It is designed to be mounted vertically against a bulkhead or any vertical flat surface.

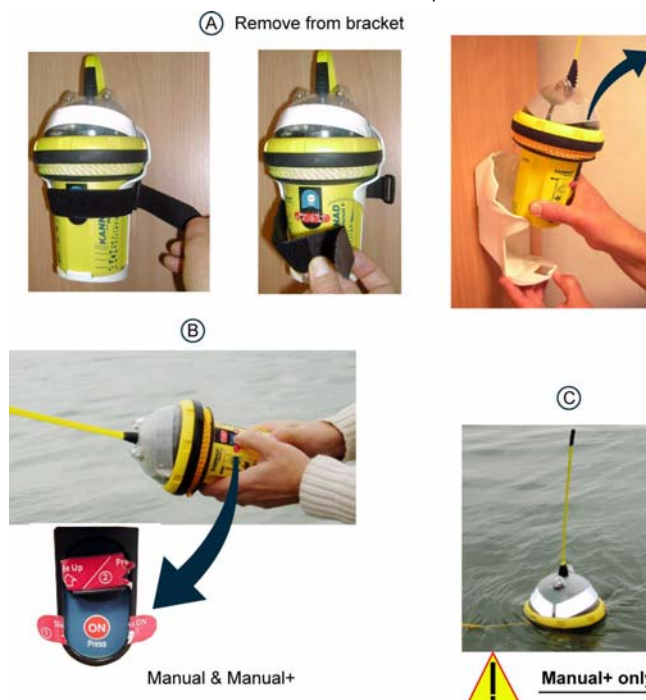
Figure 4: KANNAD 406 Manual+ & Manual, mounting bracket description



Remove the beacon from the bracket (A), to activate beacon:

- either manually by pressing ON pushbutton (B) for KANNAD Manual+ and Manual;
- or automatically by throwing overboard (C) if fitted with a water switch sensor (KANNAD Manual+ only).

Figure 5: Manual+ and Manual beacons, removal and activation



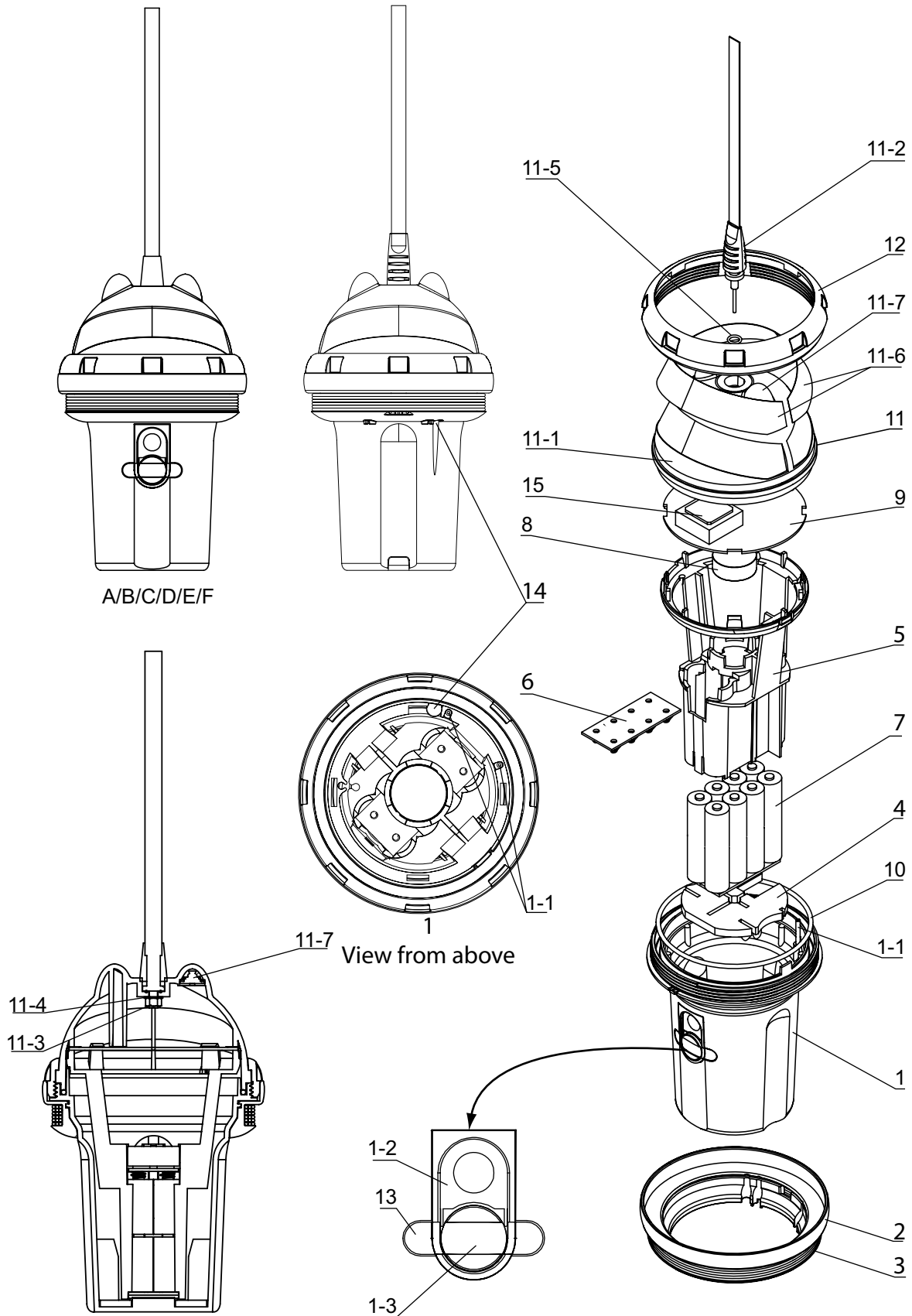
1.3. Beacon description

1.3.1. Mechanical assembly

Table 1: List of main components

Ref. Figure 6	Designation	Nomenclature
A	KANNAD AUTO GPS Assembly (including container)	1201245
B	KANNAD AUTO Assembly (including container)	1201244
C	KANNAD MANUAL+ GPS Assembly	1201164
D	KANNAD MANUAL+ Assembly	1201158
E	KANNAD MANUAL GPS Assembly	1201162
F	KANNAD MANUAL Assembly	1201156
1	Housing assembly fitted with (1-1 to 1-3):	
1-1	Water switch sensor	
1-2	Keyboard	
1-3	Cover for On / Off pushbutton	
2	Elastomer ring	
3	Tether D = 2mm	
4	Ballast	
5	Mounting rack	
6	Battery coupler board	
7	Battery pack, 8x2 DL123	
8	Desiccant capsule	
9	I521 PCB	
10	O-ring Sil 3 mm DI = 103.3 60SH	
11	Upper cover assembly fitted with (11-1 to 11-7):	
11-1	Upper cover	
11-2	Antenna	
11-3	Nut H M5 Inox A4	
11-4	Flat washer M5 inox A4	
11-5	O-ring Sil 1.5 mm DI = 7 60SH	
11-6	Retroreflective tapes	
11-7	Flash assembly	
12	Locking nut (dome / housing)	
13	Tamper proof seal	
14	slotted grub screw with cone point M4x25	
15	GPS μ Patch module + antenna	

Figure 6: KANNAD AUTO, Manual+, Manual, mechanical assembly

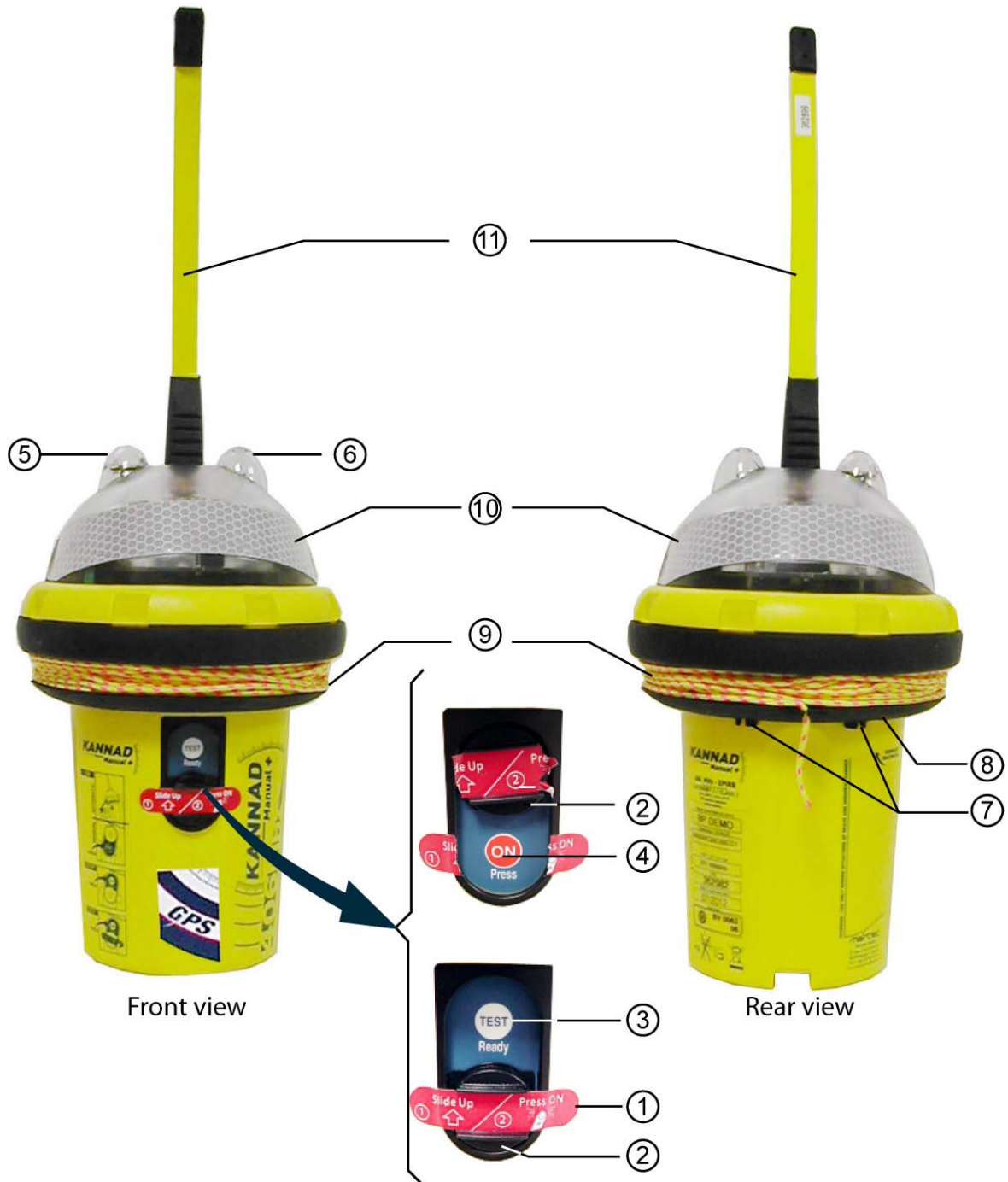


1.3.2. Use

1.3.2.1. Controls and commands

- (1) Tamper proof seal:
 - to prove the beacon has been intentionally activated.
- (2) Locking system:
 - to avoid unintentional activation of the beacon.
- (3) TEST pushbutton:
 - to perform a self-test;
 - to stop the beacon transmission when required by authorities.
- (4) ON button:
 - to activate manually beacon.
- (5) Flash:
 - to improve or help visual localization of the beacon by the SAR operations.
- (6) Beacon control lamp:
 - to check good operation when activating the beacon;
 - to check good operation when performing a self-test;
 - to program the beacon (by manufacturer or authorized programming stations).
- (7) Water switch contact:
 - to activate automatically the beacon when submerged in water (Auto and Manual+ versions only).
- (8) Emergency deactivation device:
 - to stop transmission by fully disabling the beacon should beacon not switch off despite actions on pushbutton (3)
- (9) Tether line:
 - to secure beacon to a liferaft, life jacket, boat, etc.
- (10) Retroreflective tape.
- (11) 406 / 121.5 MHz antenna.

Figure 7: Controls and commands

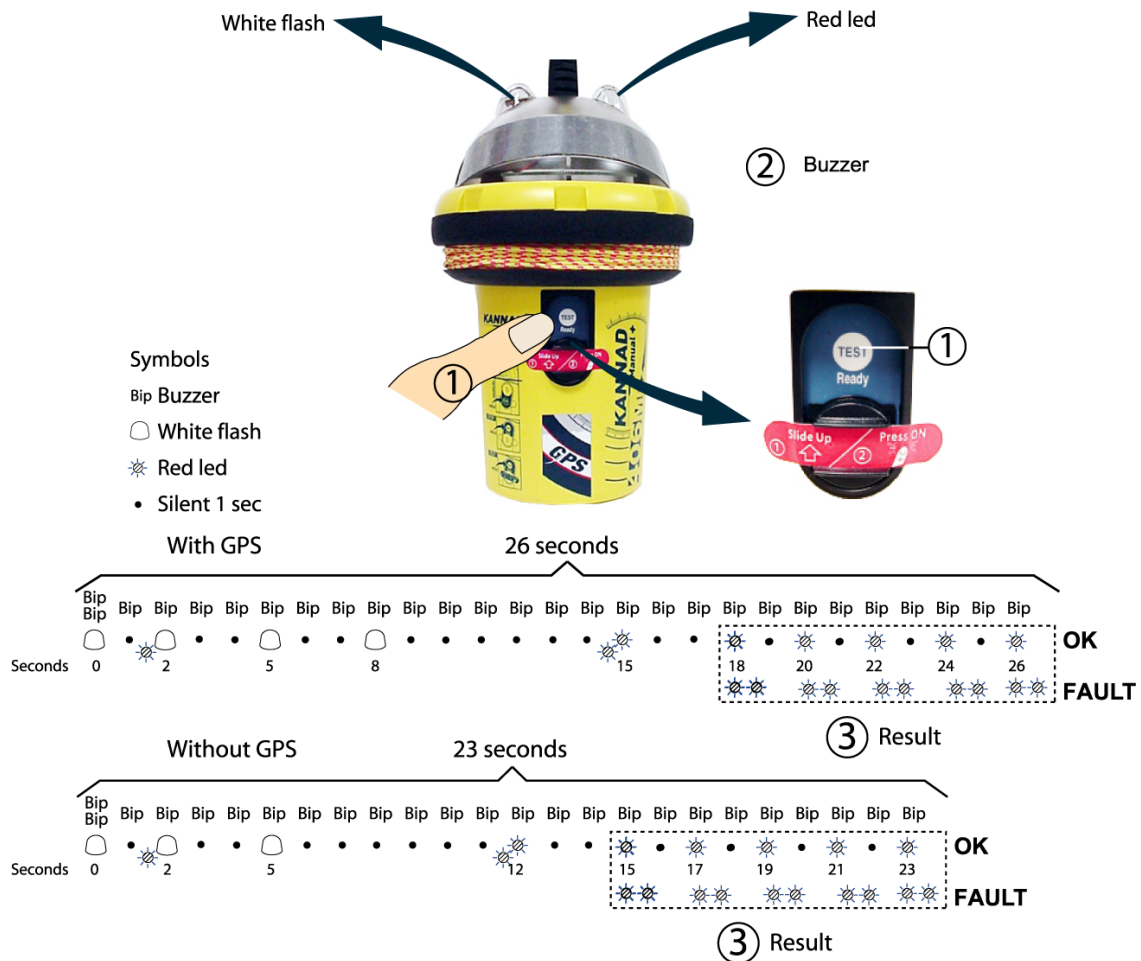


1.3.2.2. Self-test

- (1) Press TEST / READY push button.
- (2) The buzzer transmits an audible signal every second.
- (3) Check that control lamp blinks:
 - The test lasts 23 or 26 seconds according to version.
 - The test sequence starts as follows:
 - GPS Version
White flash / 1sec / Red led + White flash / 2 sec / White flash / 2sec / White flash / 6 sec / Red led / Red led.
 - Non GPS Version
White flash / 1sec / Red led + White flash / 2 sec / White flash / 6 sec / Red led / Red led.
 - Then the test result is displayed as follows:
 - Red led, 1 blinking every 2 seconds indicates good operation.
 - Red led, 2 blinkings every 2 seconds indicates faulty operation.

Repeat 3 times to confirm failure before contacting agent.

Figure 8: Test instructions



1.4. Programming

KANNAD AUTO, Manual+ and Manual beacons are programmed with a unique ID code (MMSI, radio call sign or serial number).

KANNAD AUTO, Manual+ and Manual beacons are encoded with a PKR programming kit working under Windows (WinProg software) without opening the beacon. The code is entered inside the beacon memory with an optical pen placed over the beacon control lamp.

This programming kit has been specially designed by KANNAD for all the KANNAD 406 EPIRBs.

Refer to Winprog software for programming procedure.

Figure 10: Programming, optical pen



1.5. Technical characteristics

Operating temperatures	: -20°C to +55°C.
Storage temperatures	: -30°C to +70°C.
Lithium manganese batteries	: Non hazardous LiMnO ₂
• Expiration	: 6 years from date of production
Operating life	: 48 hours mini. at -20°C.

Housing made of polycarbonate with a high resistance to shocks.

Watertight at 1 bar

Housing dimensions: Ø 129.5 / 240 mm antenna folded

Weight	Without GPS	With GPS
Alone	1000 gr.	1015 gr.
With support	1170 gr.	1185 gr.
With container	2080 gr.	2095 gr.

406 MHz SATELLITE TRANSMISSION

Frequency	: 406.028 MHz ± 0.001 MHz
UHF output power	: 5W (37dBm ± 2 dB)
Phase modulation	: 16K0G1D, Biphasic L± 1.1 ± 0.1 radians
Repetition period	: 50 sec. ± 5%
Transmission time	: 440 msec. (520 msec. with GPS) ± 1%

121.5 MHz HOMING TRANSMITTER

Frequency	: 121.5 MHz ± 0.006 MHz
Power	: 50 mW (17dBm ± 3dB)
Modulation	: AM audio sweep
Modulation format	: 3K20A3X
Transmission	: Continuous

STROBE LIGHT

Type	: Super LEDs
Intensity	: 0.75 Candela
Rate	: 20 flashes per minute

BATTERIES

Type (Cospas-Sarsat Approved)	: 16LiMnO ₂ DL123 type cells (8 packs of 2 batteries in series connected in parallel)
Voltage / Intensity	: 9 V / 10.5 Ah
Replacement	: every 5 years (MSC 1039 Circ.)

1.6. Working principle

The beacon operates thanks to:

- a I521PCB used as micro interface / RF interface;
- a 2-frequency antenna;
- a built-in GPS (module and GPS antenna are installed on GPS version only);
- a water switch sensor (connected on Auto and Manual+ only);
- a user interface;
- a power supply (battery pack).

Figure 11: Block diagram of KANNAD Auto, Manual+, Manual

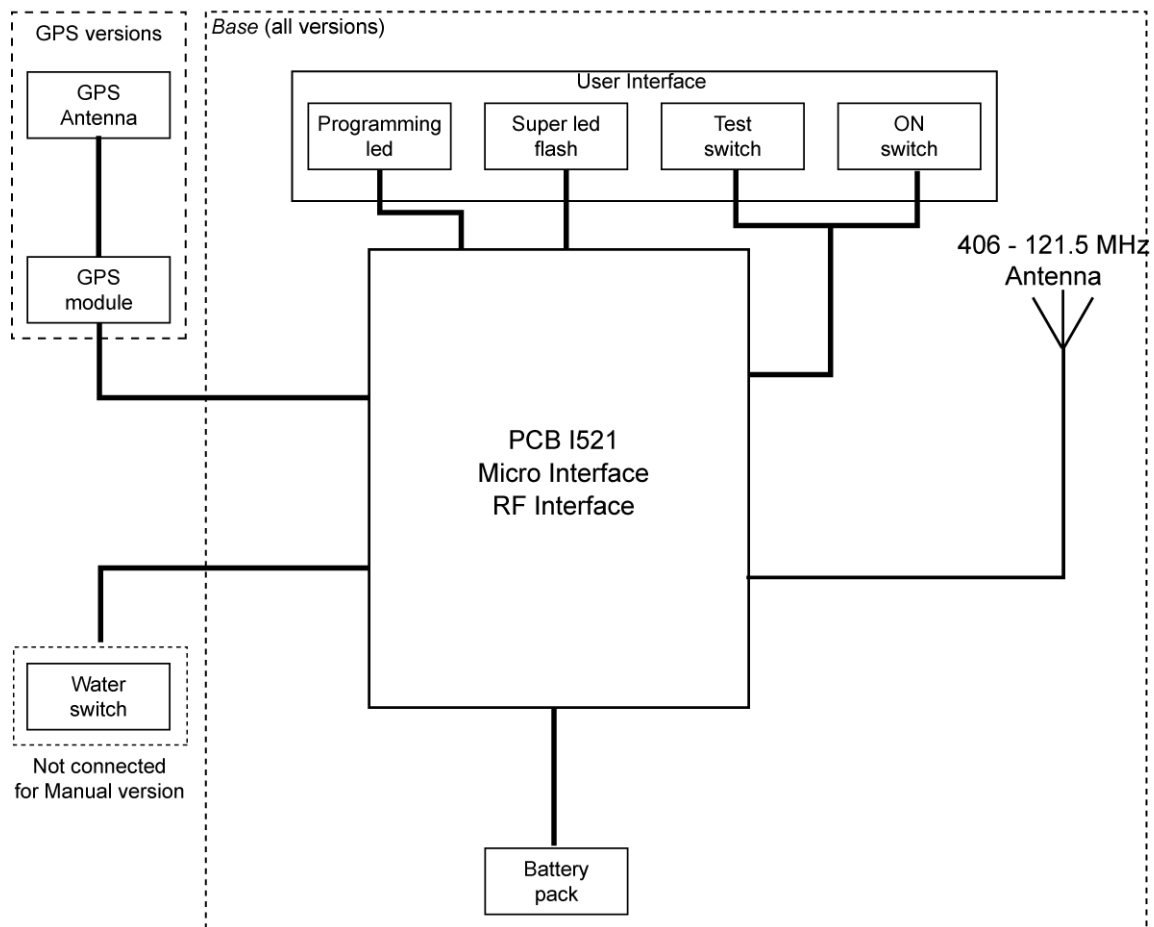
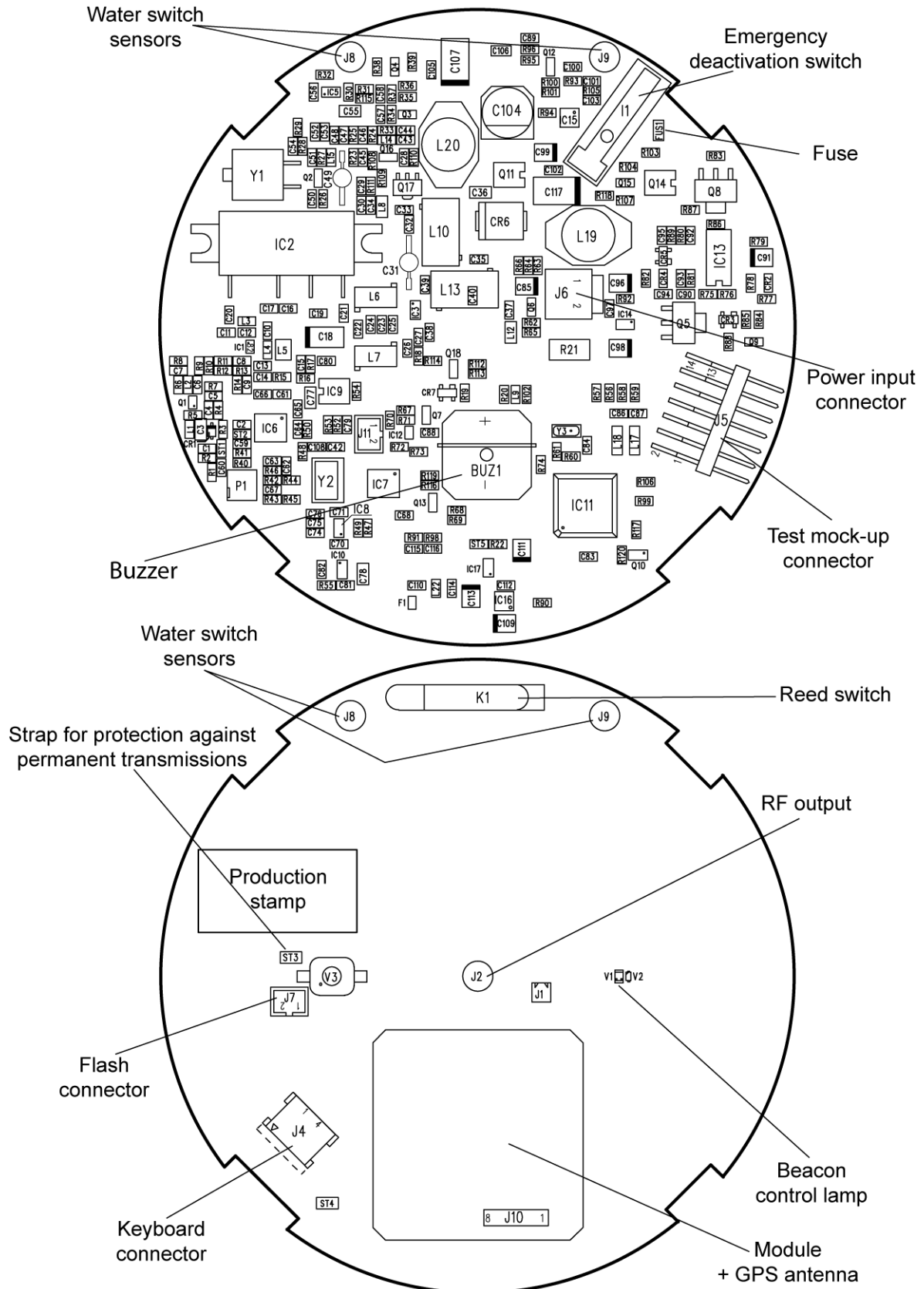


Figure 12: I521 PCB, micro interface / RF interface



2. Material used for maintenance
2.1. Material used for programming and control
2.1.1. Programming and control equipment

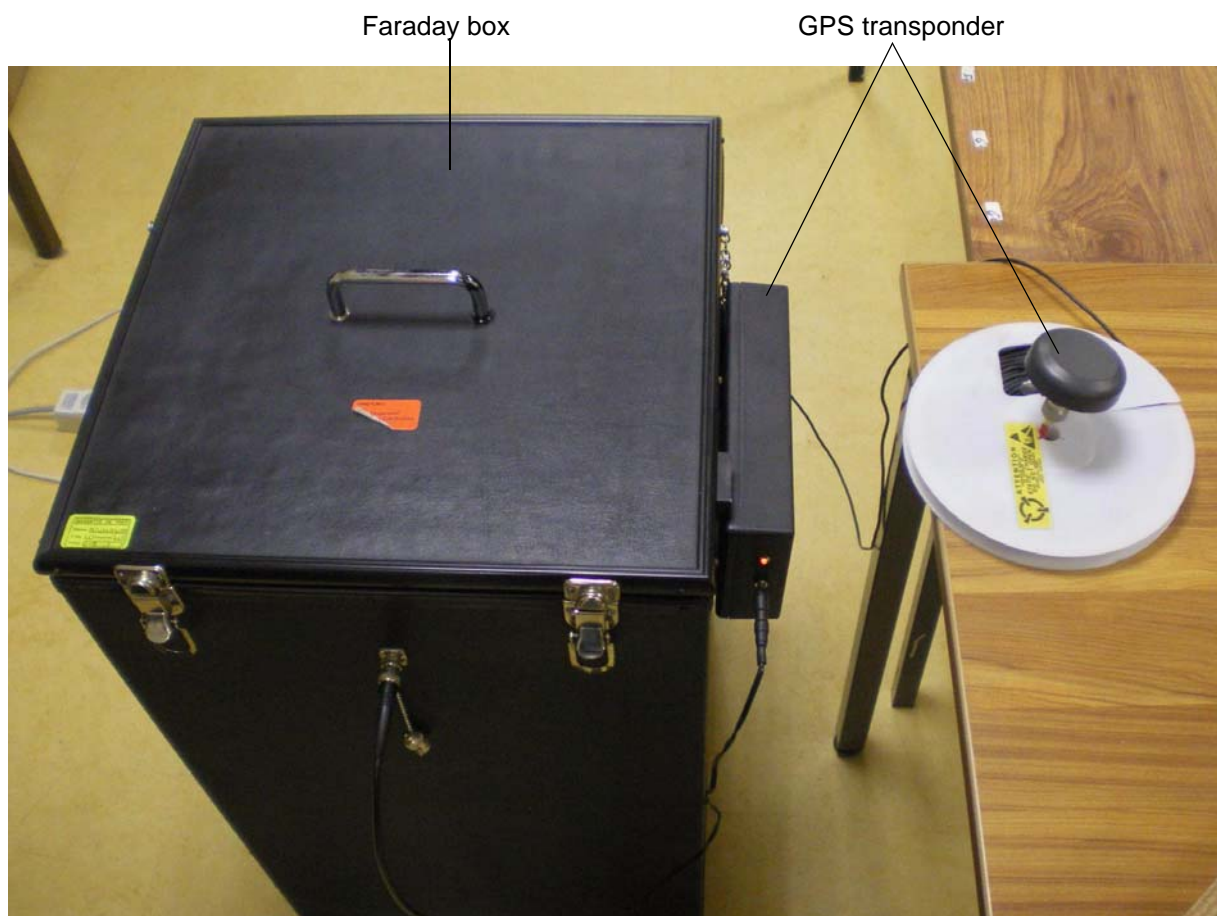
Designation	KANNAD Reference
PKR4 programming kit: USB optical pen with KANNAD WINPROG software.	0143264
BT100A Tester	0141296

Figure 13: PKR 4 programming kit

Figure 14: BT100A Tester


2.1.2. Measurement equipment without opening the beacon

Designation	KANNAD reference
Faraday box	0137913
GPS transponder	0145082

Figure 15: Example of Faraday box and GPS transponder

2.1.3. Measurement equipment with beacon opening

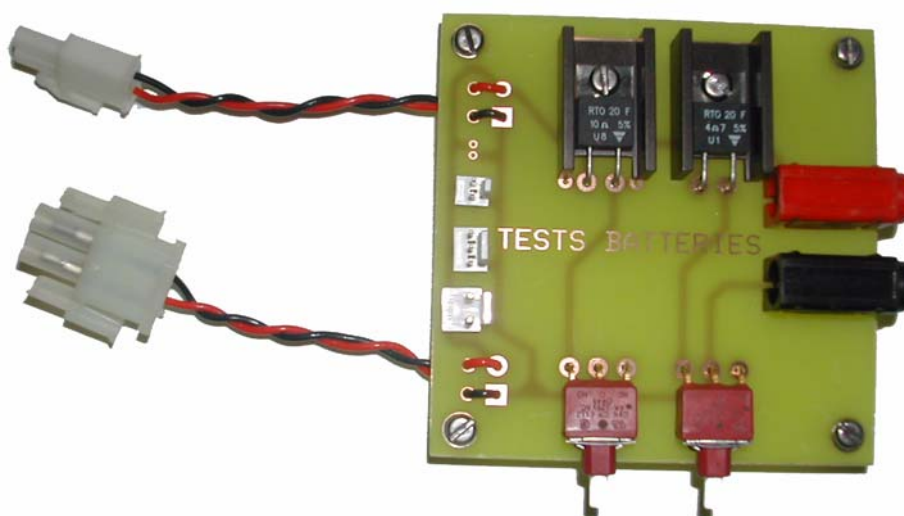
Designation	Reference
Wattmeter and frequencymeter: <ul style="list-style-type: none"> • BT100 tester; • or spectrum analyzer; • or radio test bench 	<ul style="list-style-type: none"> •0141296 (KANNAD) •Commercially available •Commercially available
Multimeter	Commercially available

CAUTION: handling should be performed on an anti-static plan, the measurement equipment should be grounded. Do not wear synthetical clothes.

2.1.4. Battery test mock-up

Designation	KANNAD reference
Battery test mock-up	5104687

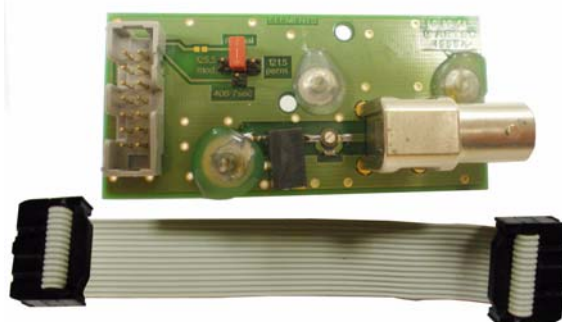
Figure 16: Battery test mock-up



2.1.5. Test interface

Designation	KANNAD reference
I555A PCB radio test interface	5104627

Figure 17: I555A PCB radio test interface



2.2. Interconnections

Designation	Reference
1 BNC / BNC 50-Ohm coaxial cable	Commercially available

2.3. Specific tool

Designation	KANNAD reference
Opening device	0143033
Mounting bracket for Manual / Manual+	5104340

Figure 18: Opening device



2.4. Maintenance kits

Designation	References	Components
KIT upper cover all versions	5104612	See § 2.4.1. page 22
KIT housing MANUAL, MANUAL GPS	5104613	See § 2.4.2. page 23
KIT housing MANUAL+, MANUAL+ GPS	5104614	See § 2.4.3. page 23
KIT housing AUTO, AUTO GPS	5104615	See § 2.4.4. page 23
KIT PCB I521 without GPS	5104616	See § 2.4.5. page 23
KIT PCB I521 with GPS	5104617	See § 2.4.6. page 24
KIT battery pack	5104618	See § 2.4.7. page 24
KIT mounting rack	5104619	See § 2.4.8. page 24
AUTO Float Free CONTAINER without H2O	5104620	See § 2.4.9. page 24
LOT tamper proof seal	5104621	See § 2.4.10. page 24
Mounting bracket Manual+, Manual	5104340	See § 2.4.11. page 24
KIT Hammar H2O hydrostatic release system	5103555	See § 2.4.12. page 24

2.4.1. KIT upper cover all versions

Designation	Quantity	Figure 6 Item N°
Upper cover	1	11
Desiccant capsule	1	8
O-ring 3mm	1	10
Seal	1	13

2.4.2. KIT housing MANUAL, MANUAL GPS

Designation	Quantity	Figure 6 Item N°
Housing, MANUAL	1	1
Desiccant capsule	1	8
O-ring 3mm	1	10
Seal	1	13
GPS Sticker	1	-

2.4.3. KIT housing MANUAL+, MANUAL+ GPS

Designation	Quantity	Figure 6 Item N°
Housing, MANUAL+	1	1
Desiccant capsule	1	8
O-ring 3mm	1	10
Seal	1	13
GPS Sticker	1	-

2.4.4. KIT housing AUTO, AUTO GPS

Designation	Quantity	Figure 6 Item N°
Housing, AUTO	1	1
Desiccant capsule	1	8
O-ring 3mm	1	10
Seal	1	13
GPS Sticker	1	-

2.4.5. KIT I521 PCB without GPS

Designation	Quantity	Figure 6 Item N°
I521 PCB	1	9
Desiccant capsule	1	8
O-ring 3mm	1	10
Seal	1	13

2.4.6. KIT I521 PCB with GPS

Designation	Quantity	Figure 6 Item N°
I521 PCB	1	9
GPS kit (already mounted on PCB)	1	8
Desiccant capsule	1	10
O-ring 3mm	1	13
Seal	1	-

2.4.7. KIT battery pack

Designation	Quantity	Figure 6 Item N°
Pack 2 batteries	8	7
Desiccant capsule	1	8
O-ring 3mm	1	10
Seal	1	13

2.4.8. KIT mounting rack

Designation	Quantity	Figure 6 Item N°
Mounting rack	1	5
Desiccant capsule	1	8
O-ring 3mm	1	10
Seal	1	13

2.4.9. AUTO Float Free CONTAINER without H2O

Float Free container with manual locking system and tether, without release system ([see page 7](#)).

2.4.10. LOT tamper proof seal

Lot of 10 tamper proof seals ([Figure 6](#) Item N°13).

2.4.11. Mounting bracket Manual+, Manual

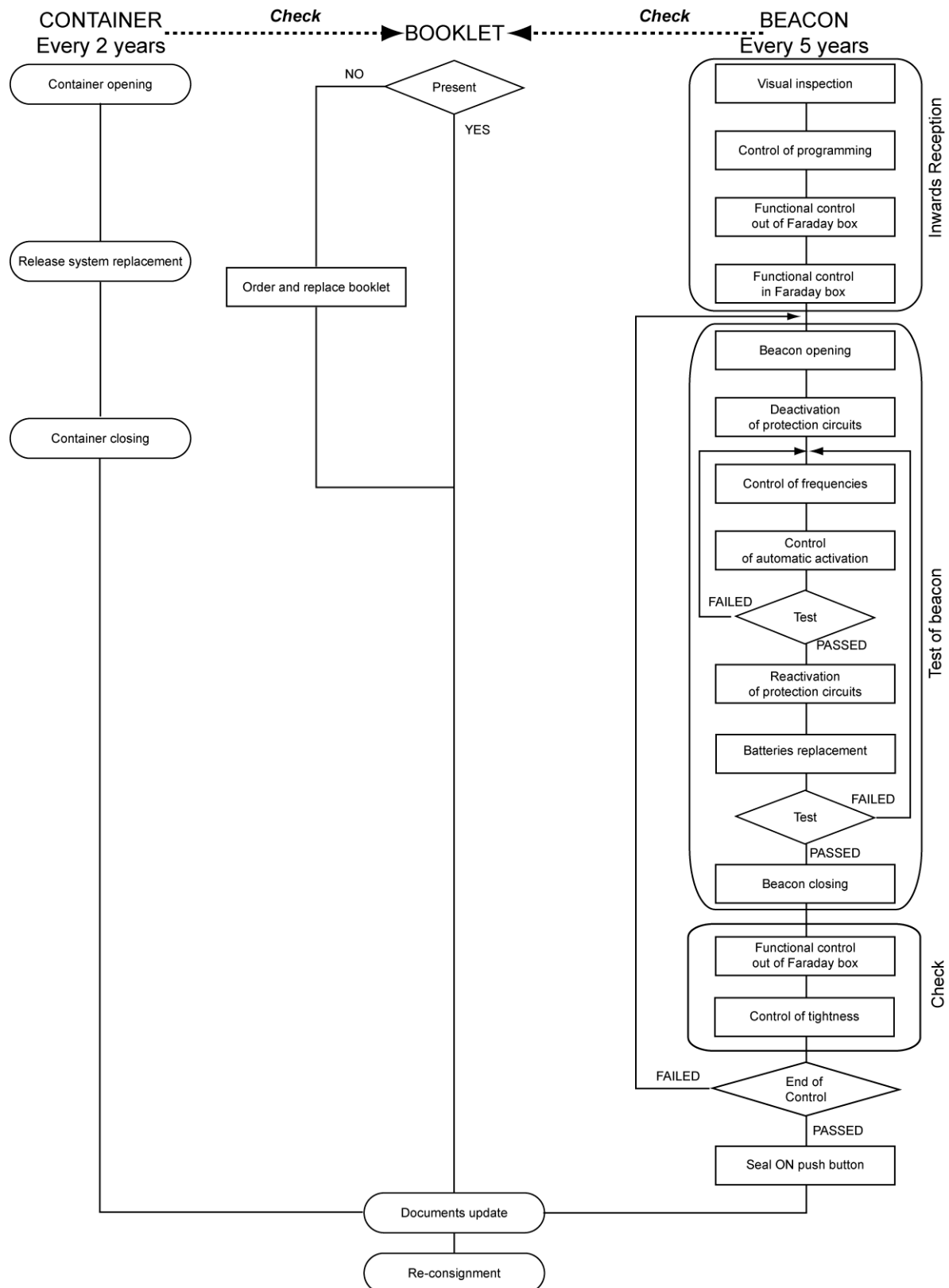
Mounting bracket with strap and magnet ([see Figure 4 page 8](#)).

2.4.12. Kit Hammar H2O hydrostatic release system

Hammar H2O release system with severable axis, washer and two nylon nuts without tether and locking hook ([see Figure 21 page 26](#)).

3. Preventive maintenance

Figure 19: Maintenance logical diagrams

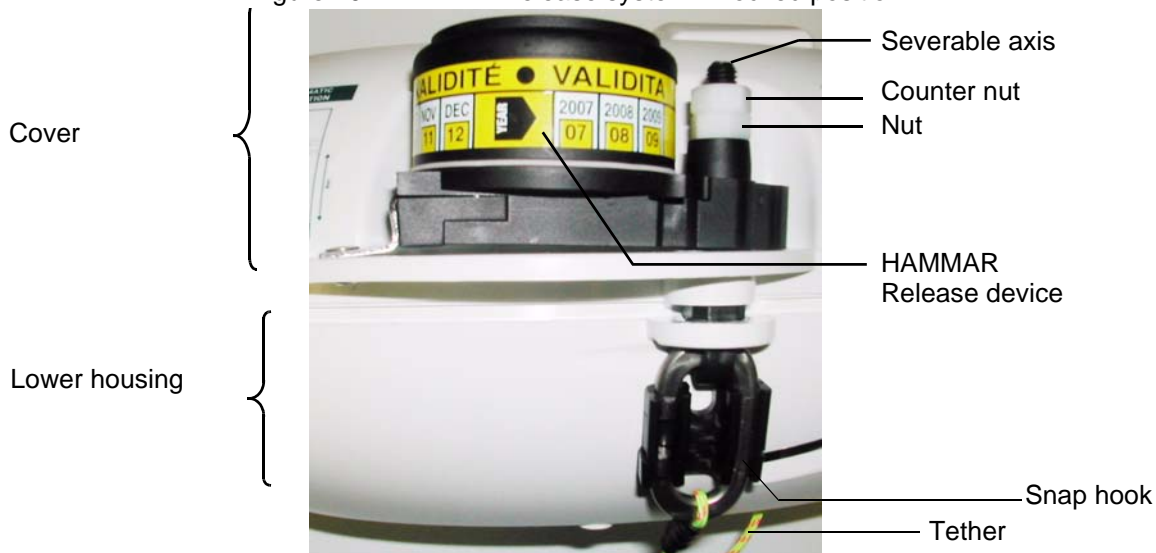


3.1. Maintenance of automatic container

Maintenance of automatic container (KANNAD AUTO and AUTO GPS only) consists in replacing the HAMMAR hydrostatic release system. **This replacement must be performed every 2 years**

3.1.1. Container opening

Figure 20 : HAMMAR release system in locked position



- Unlock and remove the locking hook, disengage the severable axis.
- Open the cover.

Important: before extracting the beacon, check there are neither salt nor moisture on the water switch sensor. Clean if necessary (risk of activation).

3.1.2. Release system replacement

Locking system

Figure 21 : Locking system elements



The locking system is composed of:

- (1) a HAMMAR release device;
- (2) a tether;
- (3) a stainless locking hook;
- (4) a severable axis;
- (5) two HU8 nylon nuts;
- (6) a rubber washer.

Release device removal

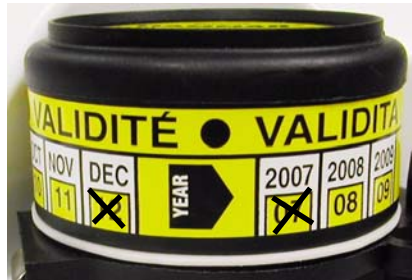
- Unscrew the counter nut and the nut securing the severable axis.
- Remove the severable axis from the well of the release device.
- Lift up the release device as shown hereunder and remove from the tongue inside which it was inserted in.

Figure 22 : Release device removal

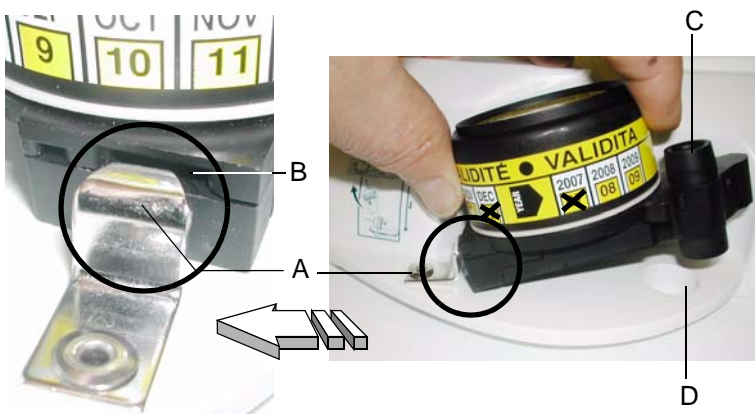


Release device positioning

Before positioning the new release device, mark replacement date (replacement every 2 years).



- Pre-position Hammar release device:
 - insert the tongue (A) of the cover into the groove (B) of the Hammar release device;



- insert the well (C) of the release device into the hole (D) fitted on the cover.
Use a screwdriver to perform this task: insert the blade of the screwdriver into the hole of the cover and the well of the release device. Use the screwdriver as a lever by pulling on the handle.

Release device locking

- Slide the severable axis (A) into the well (B) of the release device.
IMPORTANT: check that the rubber washer (C) is still on the screw.



- Gently screw the first nylon nut (D) onto the severable axis (A) until **it comes into contact with the release device.**



- Position the upper cover above the lower housing to check that the severable axis can be inserted into the notch of the lower housing.



- If necessary turn the severable axis so that it can be inserted into the notch then, **using a torque wrench, tighten the nut (torque = 0.8 N/m).**
- Screw the nylon counter nut (E) on the severable axis (A), then **using a torque wrench, tighten the counter nut (torque = 0.8 N/m) while holding the first nut with a wrench.**



- Disengage the upper cover from the lower housing.

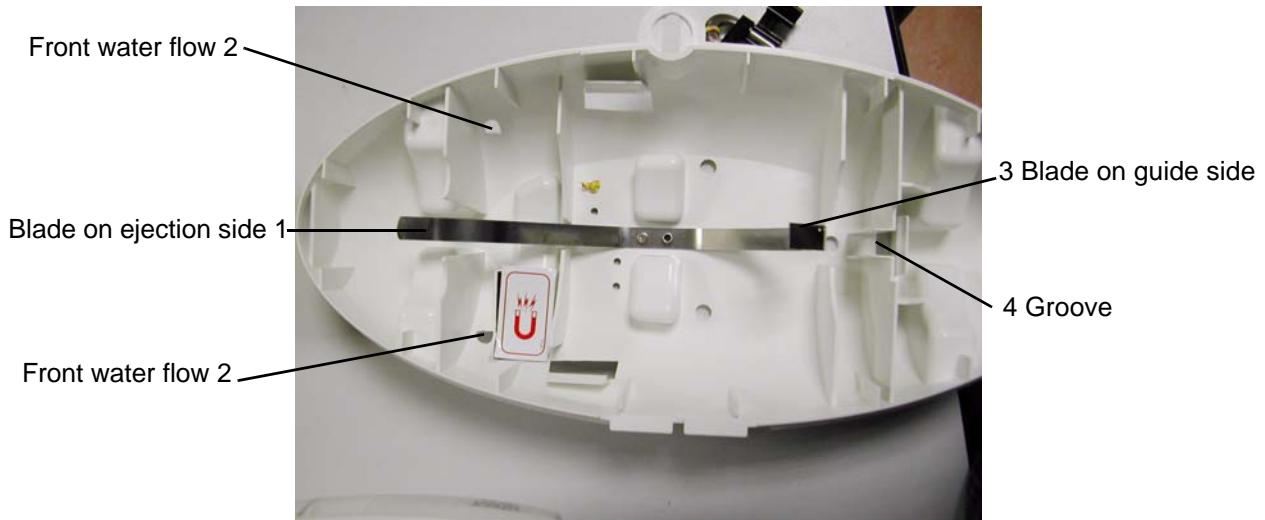
3.1.3. Container closing

CAUTION: Before closing the container, check that all information regarding the labelling of the beacon and the update of the manual (date of next release system replacement) are recorded.

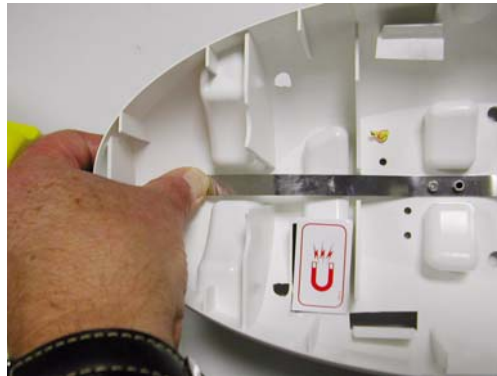
Tip before installing the beacon

To install the beacon into the container, the blade on the ejection side (1) must be kept down. Using a cylindrical rod of 7mm diameter and 150mm minimum length will help this handling.

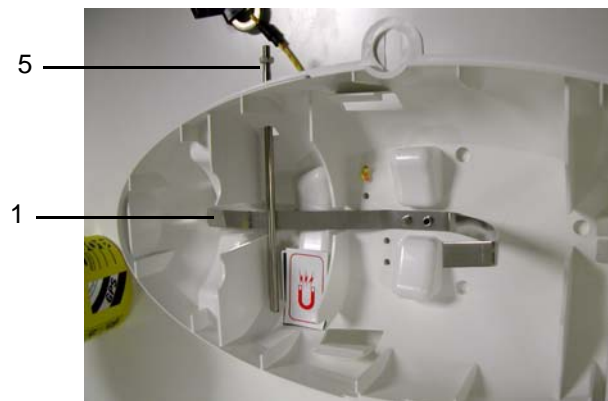
Figure 23: Lower housing of container, internal view



- Press and hold the blade on ejection side (1) (front part of the beacon).



- Slide the cylindrical rod (5) into the holes used for water flow (2) then release the blade (1). The rod will keep it into position while installing the beacon.



- Use the guide (6) on the bottom of the beacon to place the beacon and the blade (3) as follows:
 - Insert the support blade (3) into the guide (6) on the bottom of the beacon.



- Press down and place beacon into position. Carefully check that both sides of the blade (3) inserted in the guide of the beacon are within the rear groove (4) of the container.

CAUTION: The blade must be positioned exactly in the middle of the groove and must not be neither to the left nor to the right.



- Fold the antenna over the beacon and keep it pressed down.



- Insert the lugs (7) of the lower housing into the notches (8) of the upper cover.



- Close the upper cover while keeping the antenna folded on top of the beacon.
- Release the antenna as soon it cannot unfold any more.

- Slide the locking hook through the hole of the screw head.



- Lock the locking hook by rotating the large hinged flap.



- Remove the rod (if used) from the container.



3.2. Maintenance of beacon

Table 2 : Check list

	Control		Result	Action
	Inwards reception			
1	Visual inspection: See § 3.2.2.1. page 34			
		- If GPS beacon, check amendment - Aspect of lower and upper case, locking nut	If < D → If damaged	Contact customer support Replace
2	Control of programming: See § 3.2.2.2. page 34			
		Programming control	OK, If failed	Reprogram.
3	Functional control out of Faraday box: See § 3.2.2.3. page 34			
3-1		On / Off		
3-2		TEST Pushbutton		
3-3		WSS out of container + magnetic switch		
4	Functional control in Faraday box: See § 3.2.2.4. page 35			
4-1		Self-test result		
4-2		Flash		
4-3		Code / transmission		
4-4		Test of GPS		
	Beacon testing			
5	Beacon opening: See § 3.2.3. page 37			
		Disassemble upper cover		
6	Control of frequencies: See § 3.2.4. page 38			
		- Deactivate protection circuit against permanent transmission (except with BT100) - Connect test interface to I521 PCB	ST3 I521 PCB J5 connector	
6-1		121.5 MHz: See § 3.2.4.3. page 39		
	6-1a	Modulation rate	85% <<100%	Replace I521
	6-1b	Demodulation	Audio control	Replace I521
	6-1c	Frequency	121.5 MHz ± 6 KHz	Replace I521
	6-1d	Power (if measured with Radio Bench)	8 to 14 dBm	Replace I521
		(if measured with BT100 or spectrum)	14 to 20 dBm	Replace I521
6-2		406,028 MHz: See § 3.2.4.4. page 40		

	Control		Result	Action
	6-2a	406.028 MHz frequency	406.028 MHz \pm 1KHz	Replace I521
	6-2b	Power	35 to 39 dBm	Replace I521
	6-2c	400 Hz biphase modulation	2 rd << 2.4 rd	Replace I521
7	Reactivation of protection circuits: See § 3.2.5. page 40			
		- Disconnect test interface from I521 PCB - reactivate protection circuit against permanent transmissions	J5 connector ST3 I521 PCB	
8	Battery replacement: See § 3.2.6. page 41			
		- Unstick and disconnect the keyboard		
		- Disassemble mounting rack		
		- Disassemble battery pack		
		- Note batch number of each new element		
		- Install new battery pack		
		Check battery pack: See § 3.2.6.4. page 43		
		Voltage on 2.5 ohms load during 6 seconds	> 5.4 V / 6 sec.	
9	Beacon closing: See § 3.2.7. page 43			
9-1		- Replace O-ring		
9-2		- Replace desiccant		
9-3		- Reassemble mounting rack		
9-4		- Connect and stick the keyboard		
9-5		- Install the upper cover		
9-6		- Perform self-test		
9-7		- Lock the upper cover		
	Check			
10	Functional control out of Faraday box: See § 3.2.2.3. page 34			
10-1		On / Off		
10-2		TEST pushbutton Flash / Led / Code / Transmission		
11	Control of watertightness: See § 3.2.9. page 45			
11-1		5 minutes at 55°C \pm 10°C	No bubbles	Check closing
11-2		Water switch sensor out of container		
12	Reset the counters			
13	Seal the ON push button			
14	Update of documents (Labelling and booklet)			
15	Re-consignment (Administrative input)			

3.2.1. Container

Open the container (for KANNAD 406 AUTO and AUTO GPS only), [See § 3.1.1. Container opening.](#)

Important: before extracting the beacon, check there are neither salt nor moisture on the water switch sensor. Clean if necessary (risk of activation).

3.2.2. Receiving Inspection**3.2.2.1. Visual inspection**

Ensure the housing, upper cover and locking nut are free from cracks or other visible damages.

Check of firmware: for a GPS beacon, on the traceability label located below the beacon check that the amendment of the beacon is higher or equal to D. If lower than D, contact KANNAD customer support (support.sar@kannad.com or Tel. +33 (0)2 97 02 49 00).

3.2.2.2. Control of programming

Check the programming data of the beacon and print the coding sheet (KANNAD Winprog).

If necessary, re-program the beacon and update.

3.2.2.3. Functional control out of Faraday box

IMPORTANT: should these controls not be carried out in the Faraday box, they should not last more than 40 seconds to avoid the transmission of a distress message towards the satellites.

Control of ON / OFF pushbutton

(1) Activate the beacon by pressing 1 second the ON pushbutton:

- During 20 seconds, check that the led and the flash flicker as described [paragraph 1.3.2.3. Manual activation.](#)

(2) Stop the beacon by pressing the TEST / Ready pushbutton.

- Check that the flickering stops immediately.

Control of TEST pushbutton

- Press the TEST / Ready pushbutton:

- Check that the led and the flash operate as described [paragraph 1.3.2.2. Self-test.](#)

Control of water switch sensor, beacon out of container (Auto and Manual+ versions only)

The purpose of the water switch sensor is to activate the beacon as soon as submerged and out of container. Because of lapping or waves movement, the water switch sensor can sometimes be out of water during a few seconds. When the beacon is activated by the water switch sensor, 10 seconds lapse time is applied to avoid that the transmission stops as soon as it is out of the water.

The purpose of this test is to check:

- activation by water switch sensor;
- temporizing of water switch sensor.

IMPORTANT: do not press ON pushbutton.

- Short circuit during 10 seconds the water switch sensor (about 10 buzzer's beeps) then remove it:

Figure 24: Short-circuit of water switch sensor



- Led and flash start flickering, the buzzer «beeps» every seconds.
- Remove the short circuit from the water switch sensor.
- Check that transmission stops after ≈ 10 seconds.

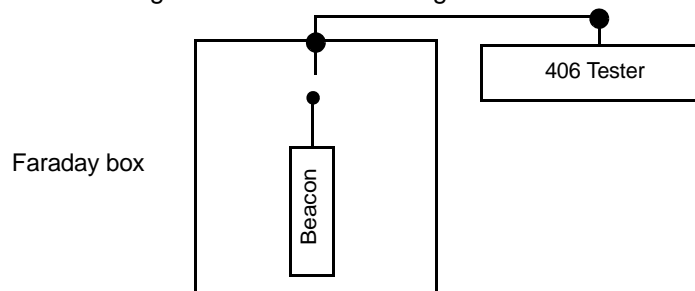
3.2.2.4. Functional control in Faraday box

NOTE: this control is used to check the beacon in real transmission.

BEACON WITHOUT GPS

For operation of 406 MHz tester, refer to the applicable operation manual included with the test set.

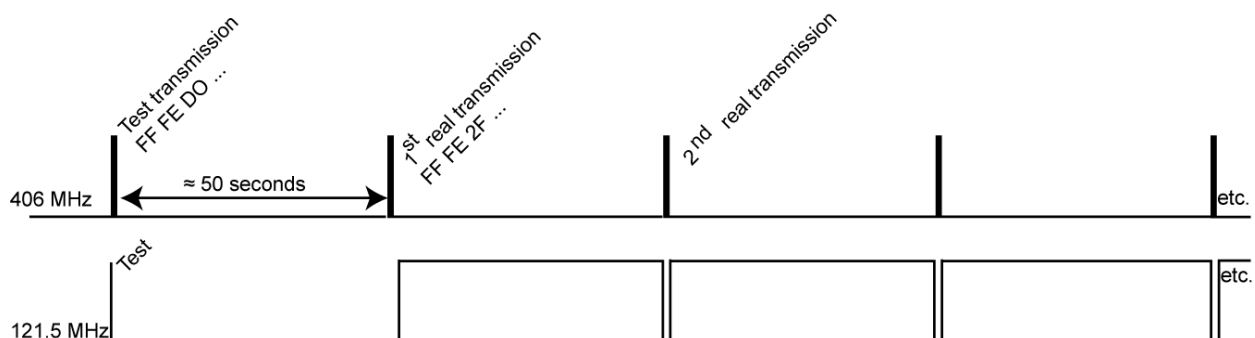
Figure 25: Connection diagram without GPS



- Connect the Faraday box to the tester with a coaxial cable.
- Put the beacon into the Faraday box.
- Activate the beacon ([See § 1.3.2.3. Manual activation](#)).
- Check that the beacon operates (flash, led and chrono): [see Figure 9 : Manual activation by ON pushbutton](#).
- Close the Faraday box.
- Check the code transmitted by the beacon and received by the tester.

IMPORTANT: Only the first 406 transmission is a test transmission (1st digits encoded FF FE D0), the next ones are real distress transmissions (1st digits encoded FF FE 2F).

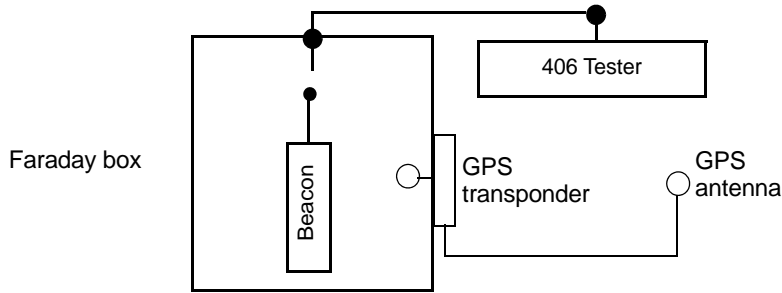
- Wait for the second transmission and check that ≈ 50 seconds separate the second and the third 406 MHz transmission, check the 121.5 MHz presence.



- Open the Faraday box.
Caution: to avoid transmission of a distress signal towards the satellites, ensure that the transmitter is between two 406 MHz transmissions before opening the Faraday box.
- Remove the beacon from the Faraday box and immediately de-activate it (press TEST / READY pushbutton).

BEACON WITH GPS

Figure 26: Connection diagram with GPS

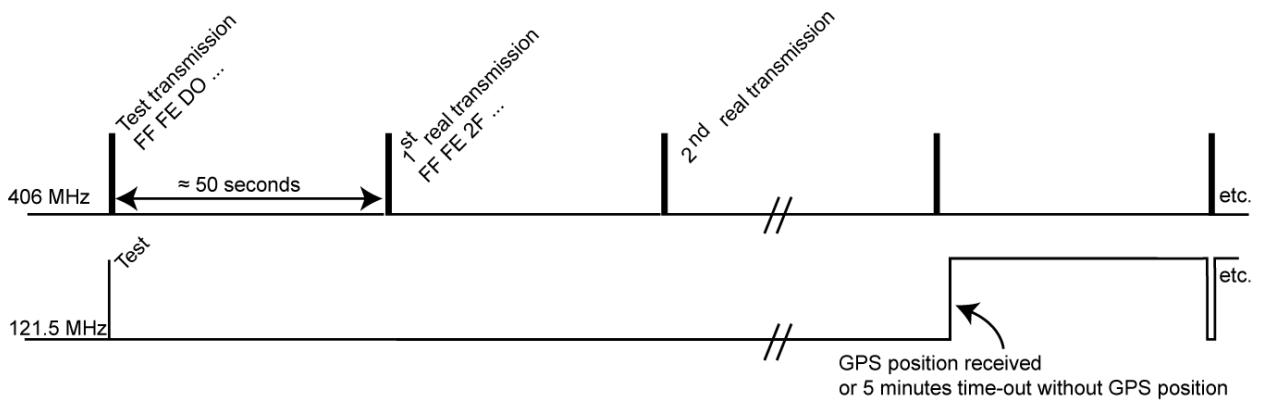


- Connect the Faraday box to the tester with a coaxial cable.
- Put the beacon into the Faraday box.
- Activate the beacon ([See § 1.3.2.3. Manual activation](#)).
- Check that the beacon operates (flash, led and chrono): [see Figure 9 : Manual activation by ON pushbutton](#).
- Close the Faraday box.
- Check that the led of GPS transponder is ON.
- Check that, after a few minutes of transmission, the GPS position is decoded by the tester.

IMPORTANT: Only the first 406 transmission is a test transmission (1st digits encoded FF FE D0), the next ones are real distress transmissions (1st digits encoded FF FE 2F).

- Wait for the second transmission and check that ≈ 50 seconds separate the second and the third 406 MHz transmission.

Caution: for GPS versions, homing (121.5 MHz) starts only after reception of GPS position. Without GPS position, homing starts only after a time-out of 5 minutes.



- Open the Faraday box:
Caution: to avoid transmission of a distress signal towards the satellites, ensure that the transmitter is between two 406 MHz transmissions before opening the Faraday box.
- Remove the beacon from the Faraday box and immediately de-activate it (press TEST / READY pushbutton).

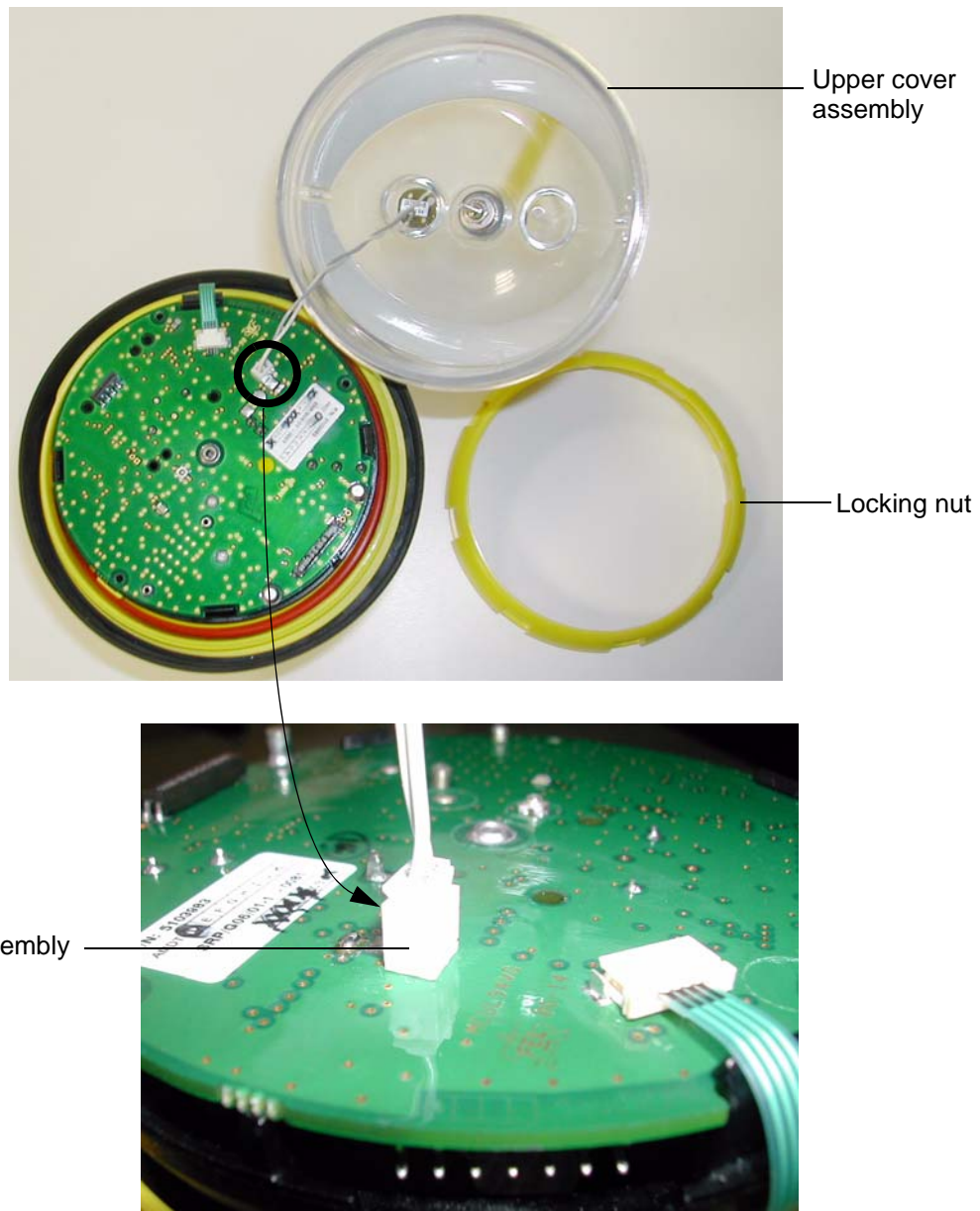
3.2.3. Opening the beacon

3.2.3.1. Upper cover disassembly

IMPORTANT: desiccant capsule (Item 8 [Figure 6](#)) and O-ring (Item 10 [Figure 6](#)) must be replaced each time the beacon is opened.

- (1) Unscrew the locking nut (Item 12 [Figure 6](#)) with the opening device ([see Figure 18 : Opening device](#)).
- (2) Lift the upper cover assembly (Item 11 [Figure 6](#)) and disconnect the flash assembly from connector of I521 PCB.

Figure 27: Cover disassembly



3.2.4. Control of frequencies on test bench

The purpose of this test is to check and measure the 121.5 MHz and 406 MHz real transmissions.

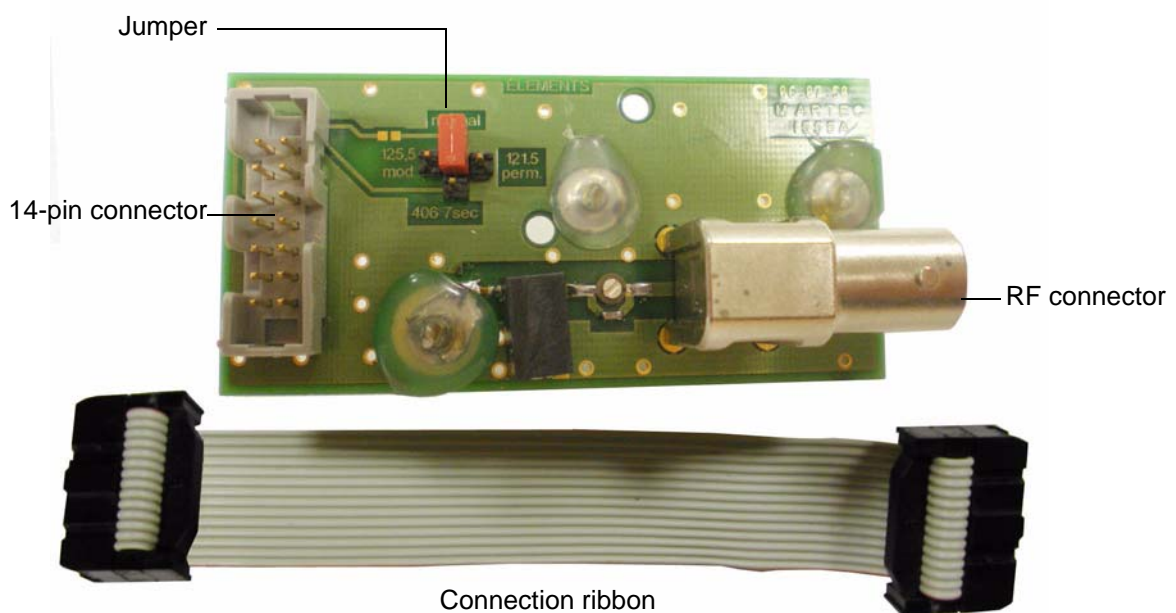
This will be done using the KANNAD test interface and a radio bench.

This control must be performed for each PCB replacement.

NOTE: When control of frequencies operations are carried out with a BT100 (See § 3.2.4.3. page 39, and § 3.2.4.4. page 40, they can be performed by pressing test only once, jumper in "Normal" position, test mock-up without connection ribbon.

3.2.4.1. Description of test interface

Figure 28: Test interface description

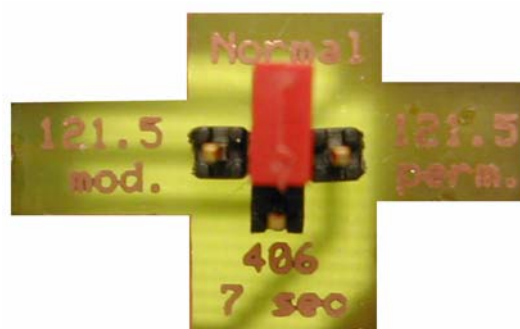


The test interface is composed of:

- A connection ribbon fitted with two connectors.
- An electronic PCB mainly composed of:
 - a RF connector;
 - a 14-pin connector;
 - a jumper used to select the frequency to be tested.

Note: the jumper should be in «Norm» position when no test is performed or when the tests are performed with BT100A.

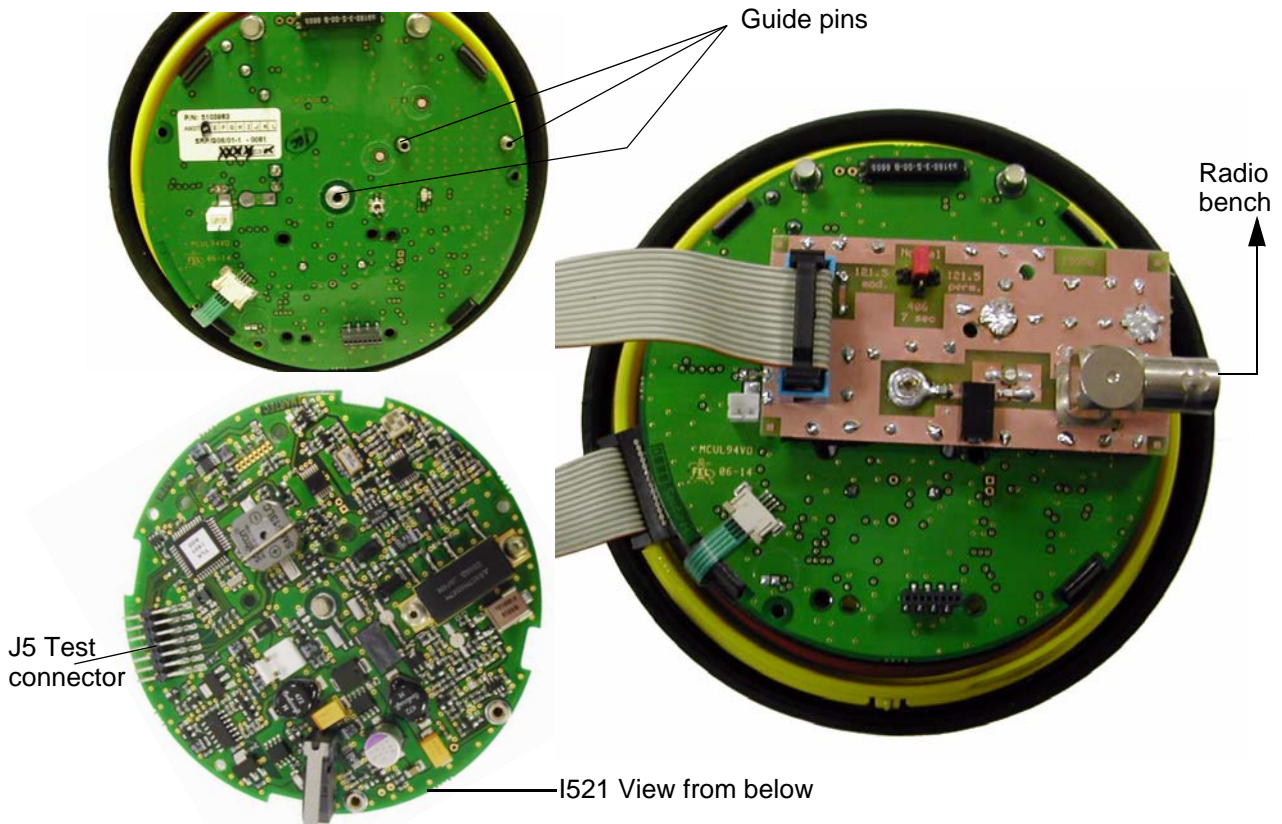
Figure 29: Jumper in Norm position



3.2.4.2. Connection of test interface

- (1) On I521 PCB, de-activate ST3, protection circuit against permanent transmissions ([Refer to Figure 12 : I521 PCB, micro interface / RF interface](#)).
Note: do not deactivate ST3 when using BT100.
- (2) Connect I521 PCB to the radio bench as follows:
 - insert the test interface into the guide pins of I521 PCB;
 - connect the connection ribbon to the test interface and to J5 connector of I521 PCB;
 - connect the RF connector to the radio bench input.

Figure 30: Connection of test interface



3.2.4.3. Control of 121.5 MHz

NOTE: For use with BT100A, see note [§ 3.2.4](#).

- (1) Modulated 121.5
 - On the test interface, set the jumper to «121.5 mod.» position as shown below.



- Press ON pushbutton of beacon then check that:
 - modulation rate should be between 85% and 100%;
 - demodulation is present (audio control);
- Press TEST to stop.
- On the test interface, set the jumper to «Norm.» position

(2) Non modulated 121.5:

- On the test interface, set the jumper to «121.5 perm.» position as shown below.



- Press ON pushbutton of beacon:
 - Frequency should be equal to 121.5 MHz \pm 0.006 MHz.
 - Power should be between 25 mW and 100 mW (14 dBm and 20 dBm).
If the results are different of those indicated above, replace I521 PCB ([See § 4.3. Replacement of I521 PCB](#)).
- Press TEST to stop.
- On the test interface, set the jumper to «Norm.» position.

3.2.4.4. Control of 406.028 MHz

NOTE: For use with BT100A, see note [§ 3.2.4.](#)

- On the interface test, set the jumper to «406 7 sec» position as shown below.



- Press ON pushbutton of beacon:
 - Frequency should be equal to 406.028 MHz \pm 0.001 MHz.
 - Power should be between 3 W and 8 W (35 dBm and 39 dBm).
 - 400 Hz bi-phase modulation should be between 2 and 2.4 rd.
If the results are different from those indicated above, replace I521 PCB ([See § 4.3. Replacement of I521 PCB](#)).
- Press TEST to stop.
- On the test interface set the jumper to «Norm.» position.

3.2.5. Re-activation of protection circuits

- Disconnect the RF connector from the test bench and from J1 of I521 PCB ([see Figure 30 : Connection of test interface](#)).
- On I521 PCB, re-activate ST3, protection circuit against permanent transmissions ([see Figure 12 : I521 PCB, micro interface / RF interface](#)).

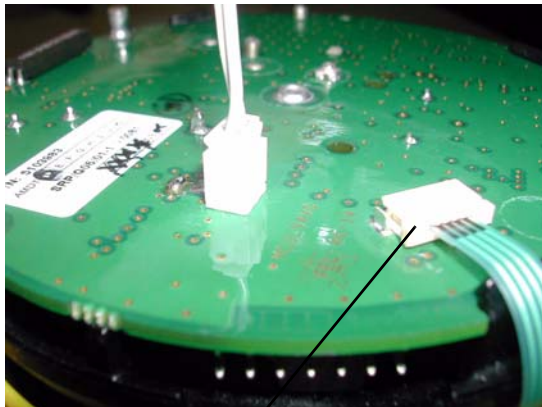
3.2.6. Replacement of battery pack

See § 2.4.7. KIT battery pack for components included in the kit (only available from MARTEC Serpentesm).

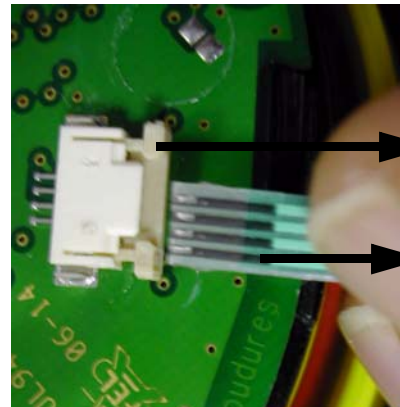
3.2.6.1. Mounting rack disassembly

- (1) Disconnect the keyboard (Item 1-2 [Figure 6](#)) from J4 connector of I521 PCB (Item 9 [Figure 6](#)):
 - (a) unlock the locking system of the connector by pulling it off;
 - (b) once unlocked, disengage the cable of the keyboard from its connector and unstick it.

Figure 31: Keyboard connection



Keyboard connector

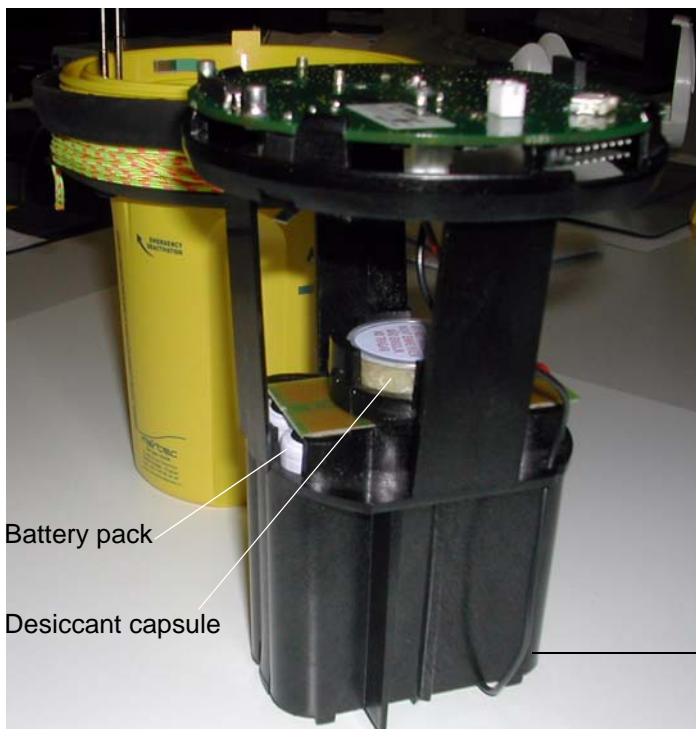


(a) Pull

(b) Disengage

- (2) Lift and remove the mounting rack (Item 5 [Figure 6](#)) still fitted with I521 PCB.
- (3) Put down the mounting rack.

Figure 32: Mounting rack disassembly



Battery pack

Desiccant capsule



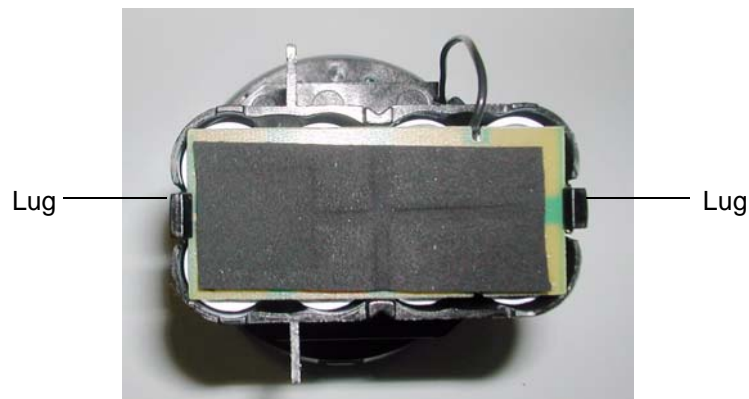
J6 connector

Mounting rack

3.2.6.2. Battery pack disassembly

- (1) Disconnect the battery pack from J6 connector of I521 PCB (see [Figure 32 : Mounting rack disassembly](#)).
- (2) Throw away desiccant capsule (Item 8 [Figure 6](#)) (see [Figure 32 : Mounting rack disassembly](#)).
- (3) Disengage the battery coupler board (Item 6 [Figure 6](#)) from the two lugs used to fix it to the mounting rack (Item 5 [Figure 6](#)).

Figure 33: Battery pack disassembly



- (4) Remove the battery pack (Item 7 [Figure 6](#)) from the mounting rack (Item 5 [Figure 6](#)).

3.2.6.3. Battery pack reassembly

- (1) Record the batch and serial numbers of each new battery element (ex: **Fab:0628 1594**).
- (2) Install the new battery pack (+ of batteries upwards).
- (3) Reassemble the battery coupler board, taking care that the wires of the battery pack pass through the notch of the board and the notch of the mounting rack.

Figure 34: Battery pack reassembly



Battery pack installed

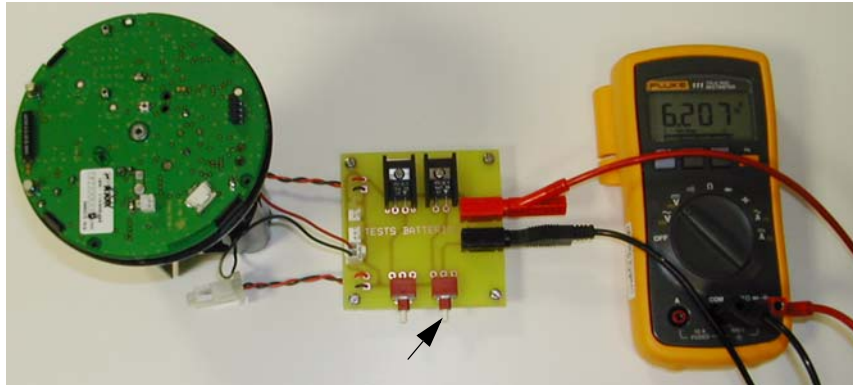


Notches

3.2.6.4. Check of battery pack

- (1) Connect the battery pack to the battery test mock-up and a multimeter as shown below.

Figure 35: Test of battery pack



- (2) Press the 2.5 ohms load switch or simultaneously on the two 5 ohms load switches during 6 seconds and check that:
 - the voltage must be at least 5.4 volts on the 2.5 ohms load. If the value is less than 5.4 volts, wait 1 minutes and check again.
- (3) Disconnect the battery pack from the battery test mock-up.

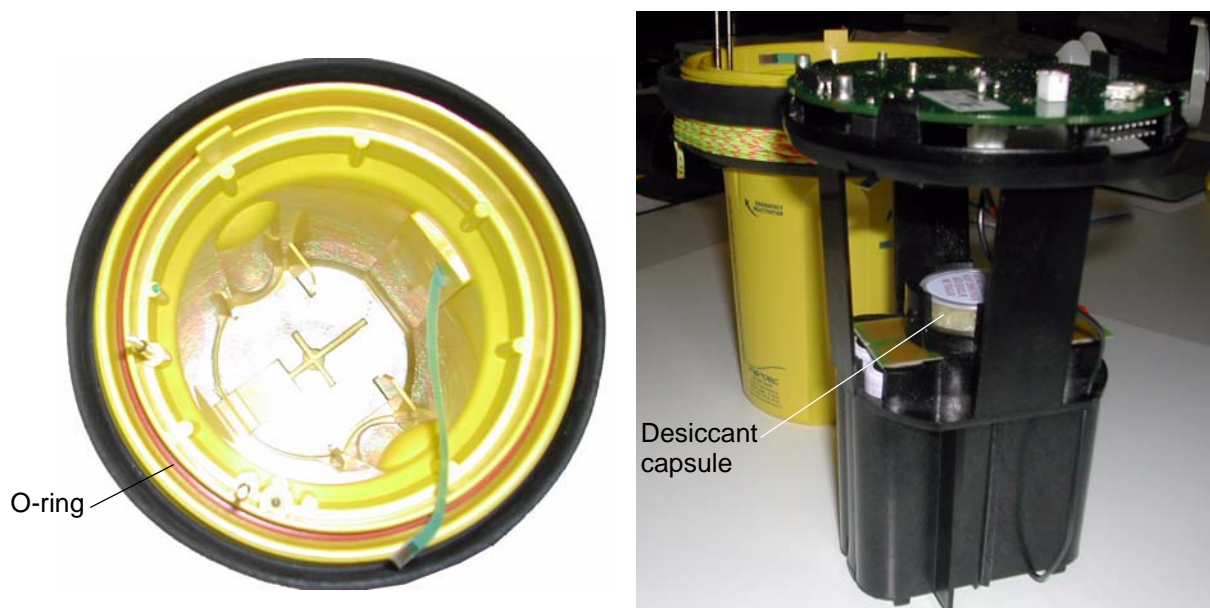
3.2.7. Beacon reassembly

IMPORTANT: Replace desiccant capsule and watertightness O-ring each time the beacon is opened.

- (1) Remove the old O-ring (item 10 [Figure 6](#)) from its groove.
- (2) Check that the O-ring groove is clean.
- (3) Insert the new O-ring into the groove of the housing.
- (4) Put the new desiccant capsule into place.

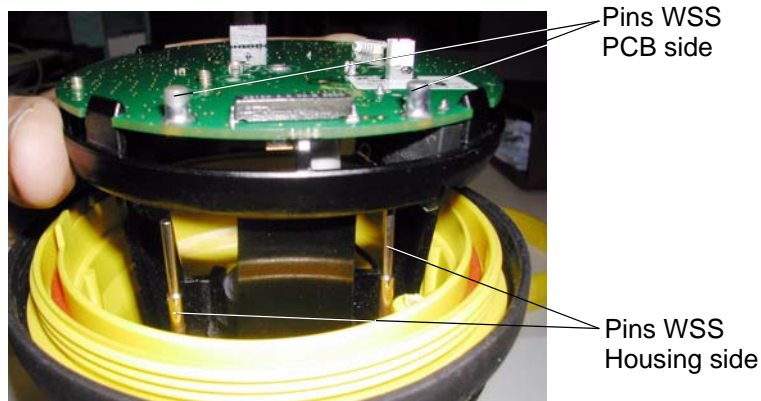
IMPORTANT: Install cardboard side of capsule upwards (towards PCB).

Figure 36: O-ring and desiccant capsule replacement



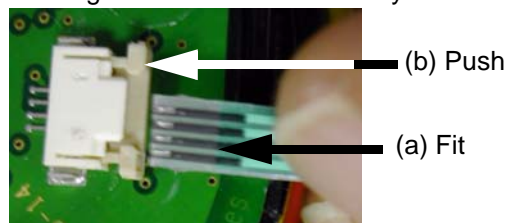
- (5) Connect the new battery pack to J6 connector of I521 PCB. If the beacon is activated, stop by holding the switch of emergency stop as long as possible.
- (6) Insert the mounting rack into the housing taking care that the pins of the water switch sensor on housing side are opposite to the pins of the water switch sensor on I521 PCB side.

Figure 37: Inserting mounting rack



- (7) Connect the keyboard to I521PCB:
 - (a) fit the cable of the keyboard into its connector (J4 I521 PCB);
 - (b) lock the locking system of the connector by pushing it.

Figure 38: Connection of keyboard

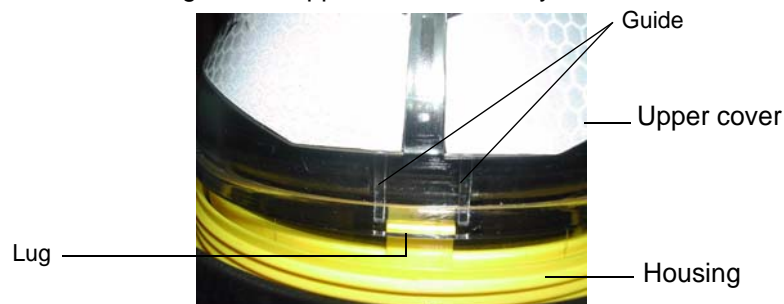


- (8) If the beacon was activated when connecting the battery pack, press TEST/Ready to stop.
- (9) Stick the keyboard cable.
- (10) Place the upper cover above the housing.
- (11) Connect the flash assembly to J7 connector of I521 PCB (*see Figure 27 : Cover disassembly*).
- (12) Insert the upper cover into the housing:

NOTE: Caution, the wire of the flash must be sufficiently distant from the antenna axis (stuck to the cover).

- insert the lug of the housing into the guide of the upper cover as shown below.

Figure 39: Upper cover assembly



- (13) Screw the locking nut manually. Do not lock.
- (14) Perform a self-test. If the self-test is not OK, check the wire of the flash.
- (15) Lock the locking nut with the opening device. The locking nut must be tightened until an audible click.

3.2.8. Check after closing

Once the beacon is closed, perform ON / OFF and test pushbutton controls described § 3.2.2.4.

3.2.9. Control of watertightness, use of the bath

3.2.9.1. Necessary equipment

- Bath or adequate equipment.
- Fresh water.
- Thermometer.
- Mounting bracket for Manual / Manual+ mounted on a non-metallic pole.

3.2.9.2. Procedure

- Bring the water to a temperature of $+ 55^{\circ} \text{C} \pm 10^{\circ} \text{C}$.

WARNING: If an electrical heating source is used, its power supply must be switched off while handling the beacon in the bath.

- Place the beacon into the mounting bracket

Figure 40: Magnet position and water level



- Immerse the beacon in the bath as shown here above.
- Free the residual air trapped during immersion by moving slightly the beacon until total elimination of the air.
- Immerse during 5 minutes:
 - check that no bubble rises;
 - if bubbles rise, identify and suppress the reason of the leaking then carry out a new test;
 - remove the beacon from its bracket then immerse it again shortly to check the water switch contact.
- Dry the beacon with compressed air.

3.2.10. Counter reset.

- Reset counters to zero (use PKR4).

3.2.11. Sealing the ON pushbutton

When all the controls are performed, **stick a new tamper proof seal on the ON pushbutton.**

3.2.12. Update

Write the new battery expiration date (fabrication date + 6 years) and next SBM date according to the local regulation on the label of the housing and on the user manual.

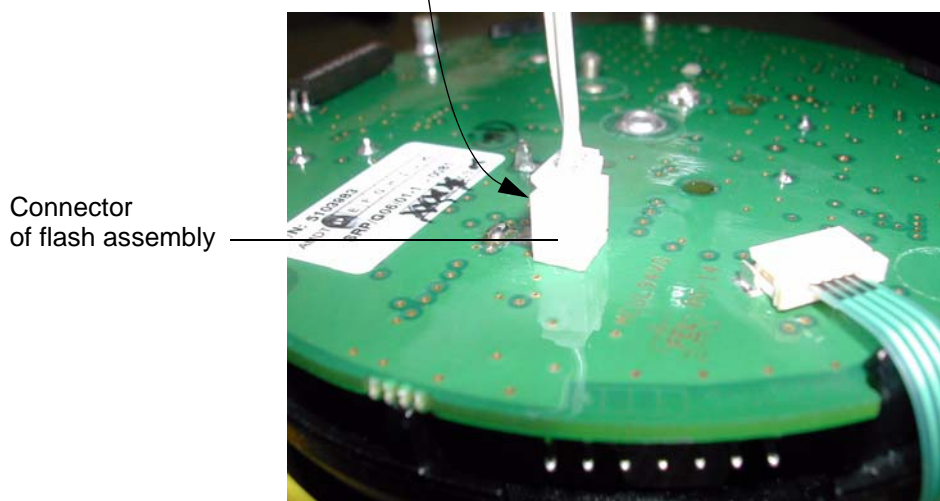
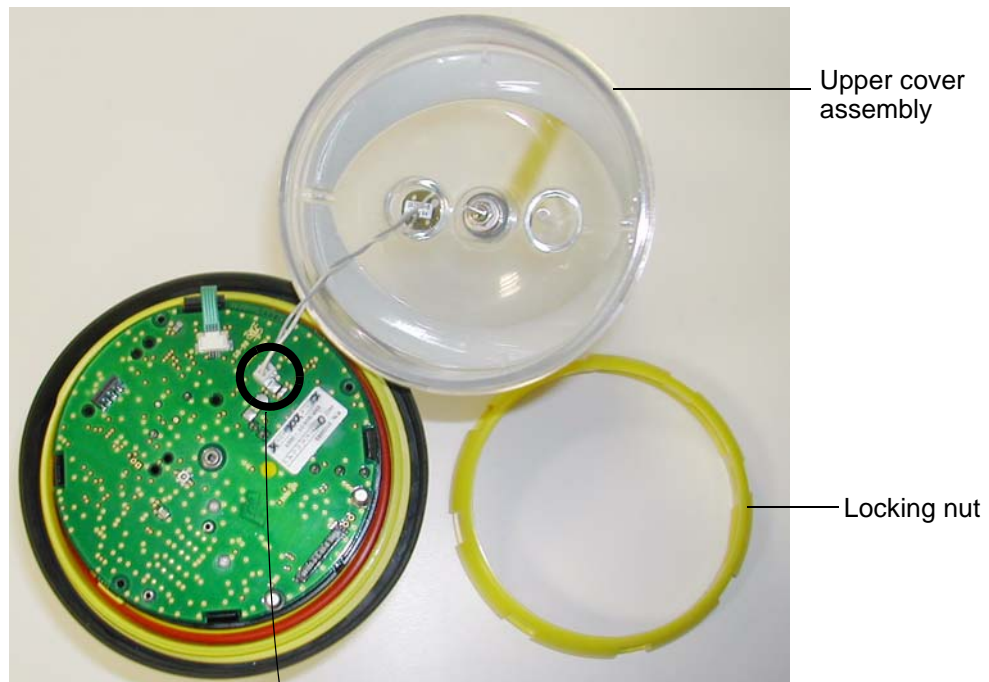
4. Corrective Maintenance

4.1. Replacement of upper cover assembly

See § 2.4.1. KIT upper cover all versions, for components included in the kit.

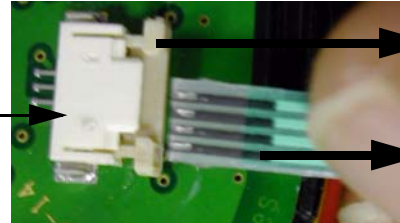
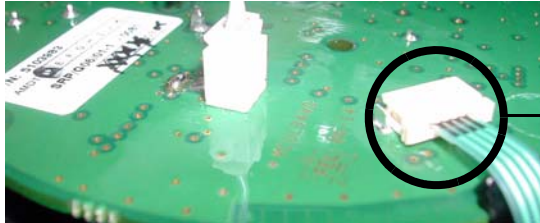
IMPORTANT : Desiccant capsule and O-ring should be replaced each time the beacon is opened. However, if the beacon is open for less than 5 minutes, steps (4), (5), (6), (7), (9) and (10) of this paragraph may be omitted.

- (1) Unscrew the locking nut with the opening device (*see Figure 18 : Opening device*).
- (2) Lift the upper cover assembly and disconnect the flash assembly from J7 connector of I521 PCB.



- (3) Extract the upper cover from the housing and discard it.

- (4) Disconnect the keyboard from J4 connector of I521 PCB.
- (a) unlock the locking system of the connector by pulling it off;
 - (b) once unlocked, disengage the cable of the keyboard from its connector and unstick it.



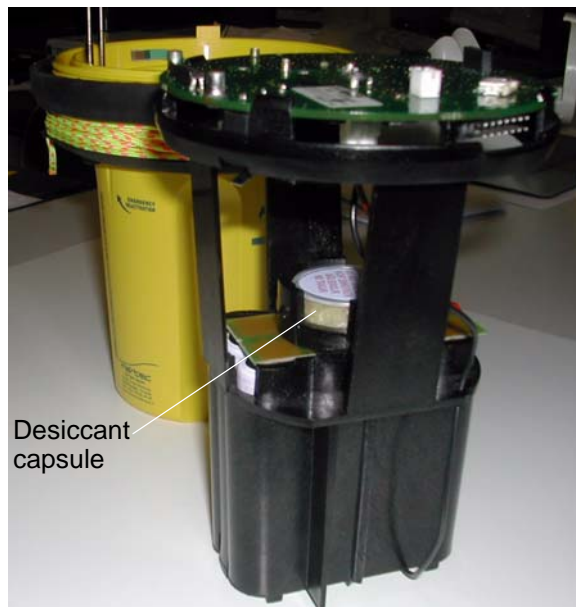
(a) Pull

(b) Disengage

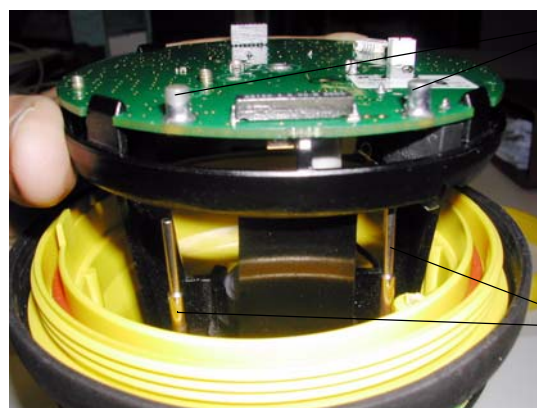
- (5) Lift and remove the mounting rack connected with I521 PCB.
(6) Replace the desiccant capsule.

IMPORTANT: Install cardboard side of capsule upwards (towards PCB).

- (7) Remove the old O-ring from its groove and replace it by a new O-ring.
(8) Check that the O-ring groove is clean.



- (9) Insert the mounting rack into the housing taking care that the pins of the water switch sensor on housing side are opposite to the pins of the water switch sensor on I521 PCB side.

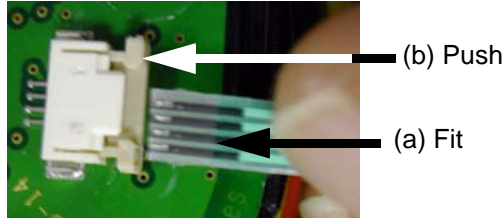


Pins WSS
PCB side

Pins WSS
Housing side

(10) Connect the keyboard to I521PCB.

- (a) fit the cable of the keyboard into its connector;
- (b) lock the locking system of the connector by pushing it in.



(11) Stick the keyboard cable.

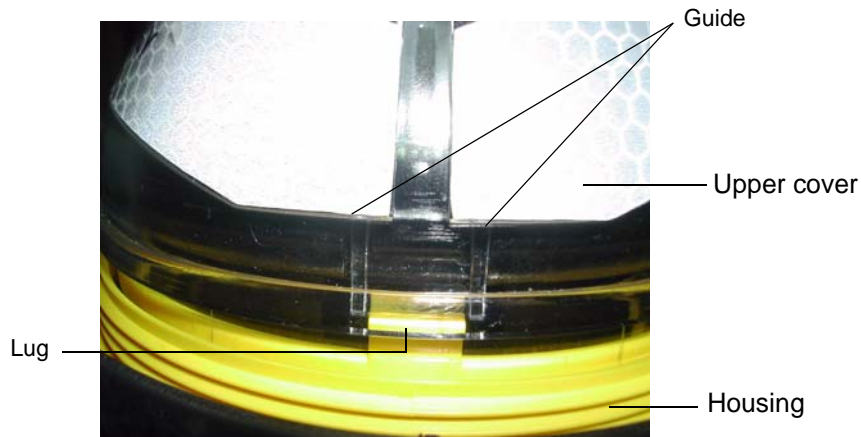
(12) Place the new upper cover above the housing.

(13) Connect the flash assembly to J7 connector of I521 PCB ([see page 46](#)).

(14) Insert the upper cover into the housing.

NOTE: Caution, the wire of the flash must be sufficiently distant from the antenna axis (stuck to the cover).

- Insert the lug of the housing into the guide of the upper cover as shown below.



(15) Screw the locking nut manually. Do not lock.

(16) Perform a self-test. If the self-test is not OK, check the wire of the flash.

(17) Lock the locking nut with the opening device. The locking nut must be tightened until an audible click.

(18) Once the beacon is closed perform the following tests:

- ON / OFF and test button controls described [§ 3.2.2.4](#).
- [paragraph 3.2.9. Control of watertightness, use of the bath](#).

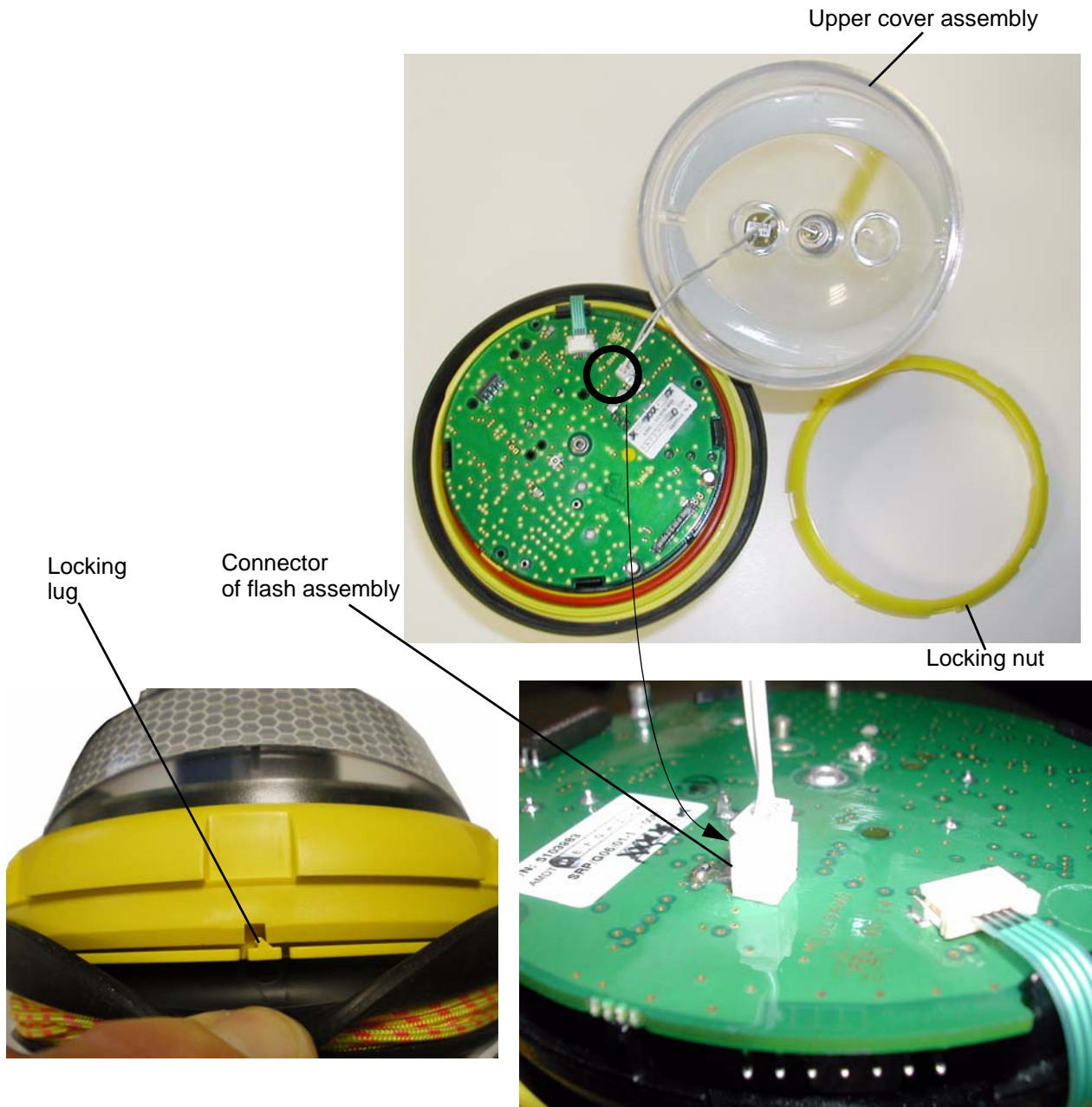
(19) Stick a new tamper proof seal on the ON pushbutton.

4.2. Replacement of housing

IMPORTANT : The housing has to be replaced if the locking lug is worn.

For components included in the kit:

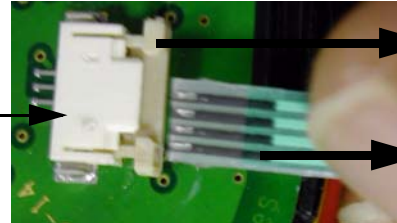
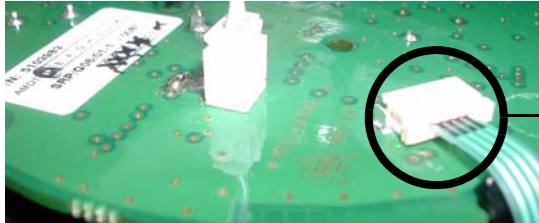
- KANNAD Manual versions: See § 2.4.2. KIT housing MANUAL, MANUAL GPS.
- KANNAD Manual+ versions: See § 2.4.3. KIT housing MANUAL+, MANUAL+ GPS.
- KANNAD Auto versions: See § 2.4.4. KIT housing AUTO, AUTO GPS.
 - (1) Unscrew the locking nut with the opening device (see Figure 18 : Opening device).
 - (2) Lift the upper cover assembly and disconnect the flash assembly from J7 connector of I521 PCB.



- (3) Extract the upper cover from the housing.

(4) Disconnect the keyboard from J4 connector of I521 PCB.

- (a) unlock the locking system of the connector by pulling it off;
- (b) once unlocked, disengage the cable of the keyboard from its connector and unstick it.



(a) Pull

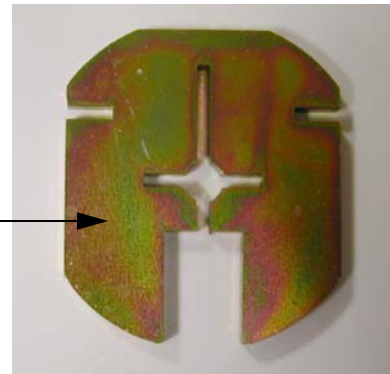
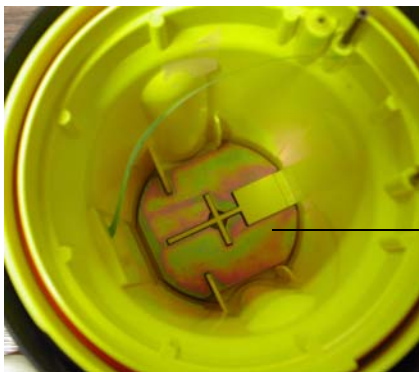
(b) Disengage

(5) Lift and remove the mounting rack still connected to I521 PCB.

(6) Using a scalpel, unstick the traceability label located below the old housing. Stick it onto the new housing then protect it with LEXAN®.

(7) Remove and keep the ballast of the old housing.

Note: turn the beacon upside down and give a tap on the bottom of the housing to extract the ballast.



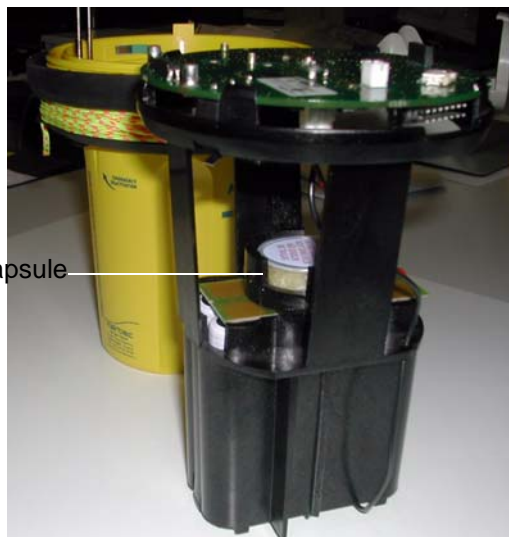
(8) Keep the tether to use it after housing replacement.

(9) Discard the old housing.

(10) Replace the desiccant capsule.

IMPORTANT: Install cardboard side of capsule upwards (towards PCB).

Desiccant capsule



(11) Install the tether onto the new housing and tight it using the same knot as described figure below.



1

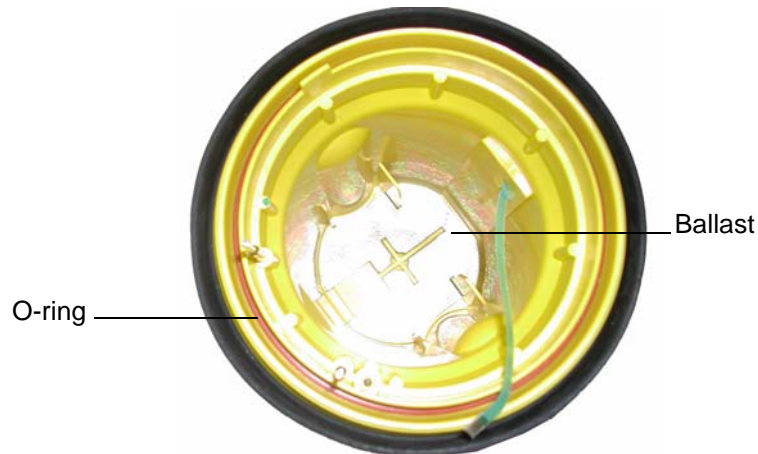


2

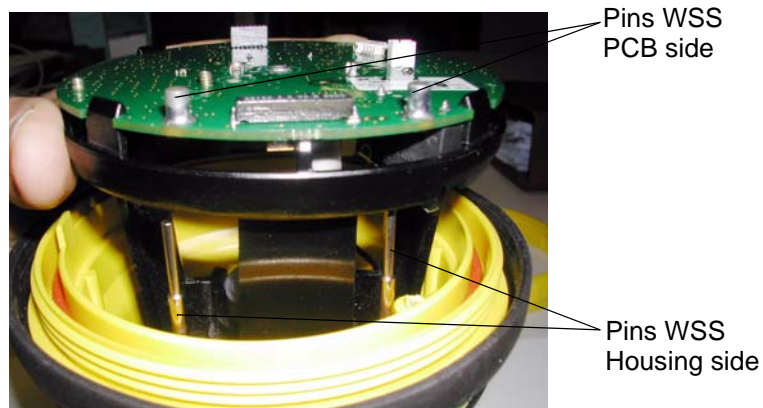


3

(12) Insert the new O-ring into the groove of the new housing and the ballast into the new housing.

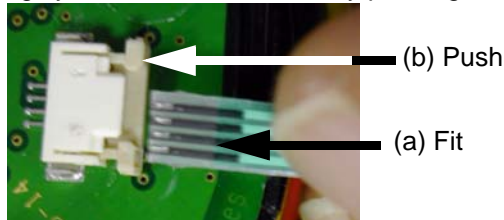


(13) Insert the mounting rack into the new housing taking care that the pins of the water switch sensor on housing side are opposite to the pins of the water switch sensor on I521 PCB side.



(14) Connect the keyboard to I521PCB.

- (a) fit the cable of the keyboard into its connector;
- (b) lock the locking system of the connector by pushing it in.



(15) Stick the keyboard cable.

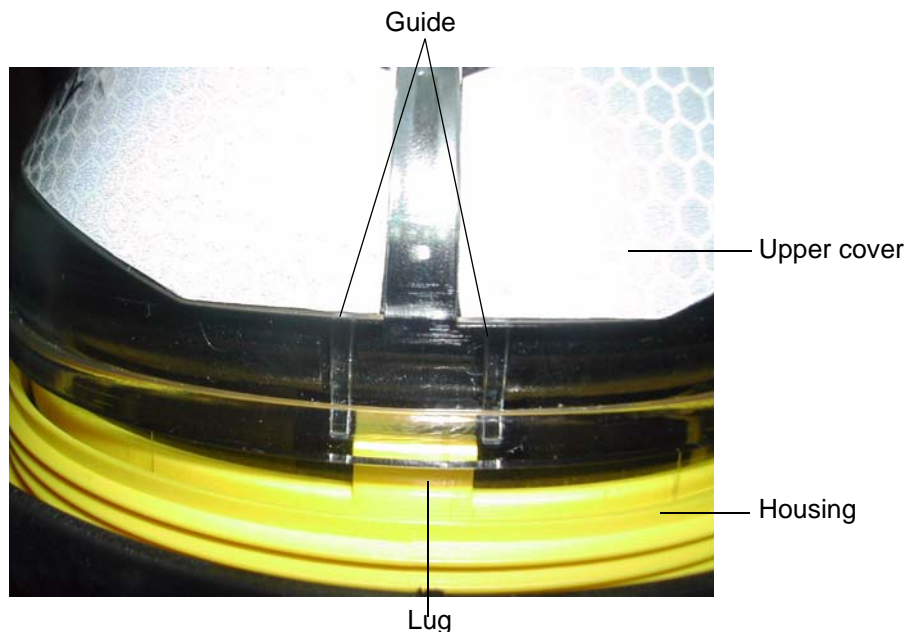
(16) Place the upper cover above the housing.

(17) Connect the flash assembly to J7 connector of I521 PCB ([see page 49](#)).

(18) Insert the upper cover into the housing.

NOTE: Caution, the wire of the flash must be sufficiently distant from the antenna axis (stuck to the cover).

- Insert the lug of the housing into the guide of the upper cover as shown below.



(19) Screw the locking nut manually. Do not lock.

(20) Perform a self-test. If the self-test is not OK, check the wire of the flash.

(21) Lock the locking nut with the opening device. The locking nut must be tightened until an audible click.

(22) Once the beacon is closed perform the following tests:

- ON / OFF and test button controls;
- [paragraph 3.2.9. Control of watertightness, use of the bath.](#)

(23) Stick a new tamper proof seal on the ON pushbutton.

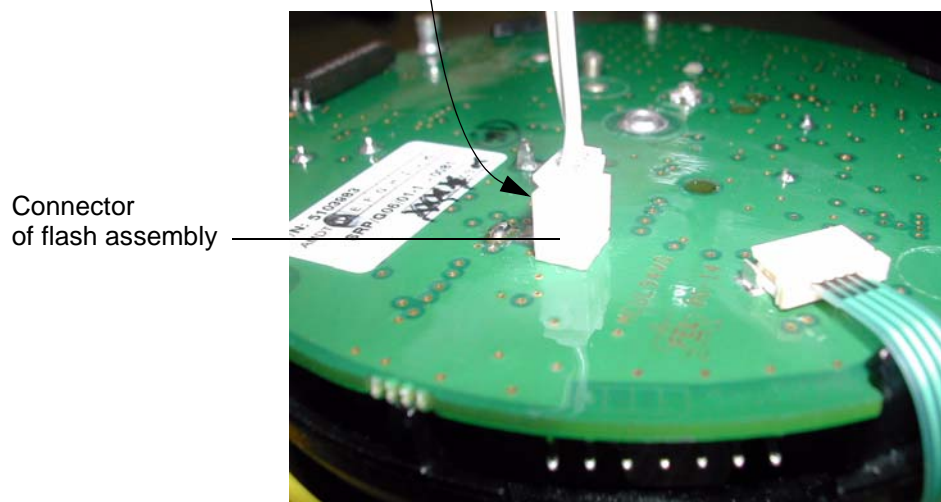
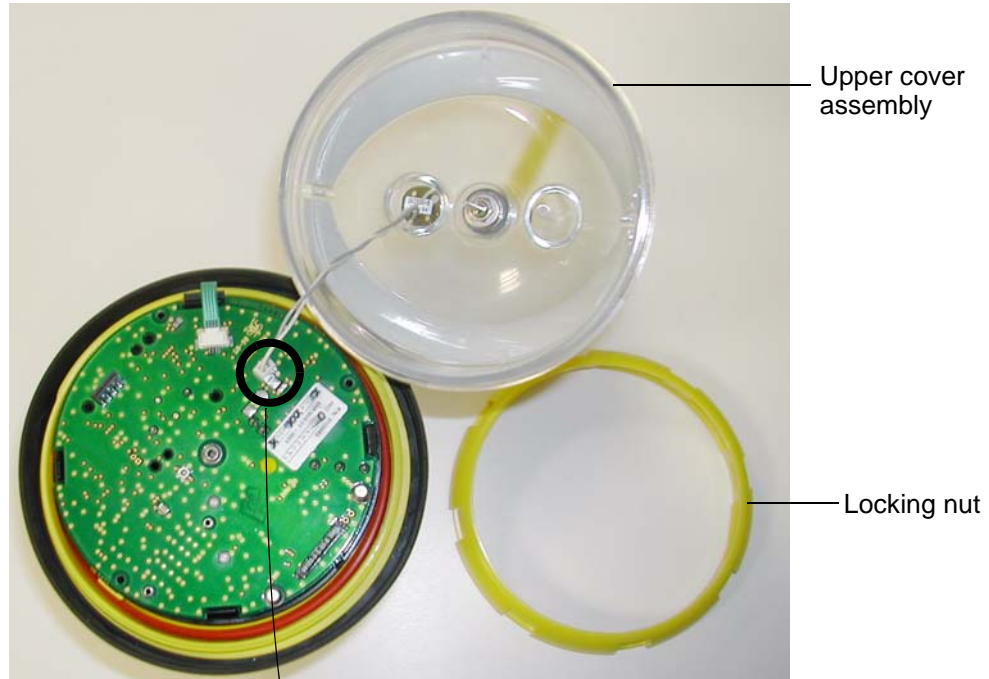
(24) If the beacon is a GPS version, stick a GPS sticker below the ON / Test pushbutton.

(25) Report the information of the old housing onto the label of the new housing.

4.3. Replacement of I521 PCB

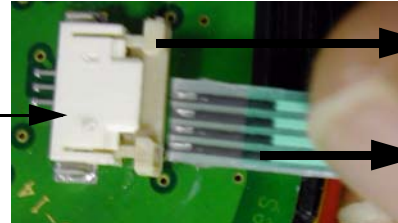
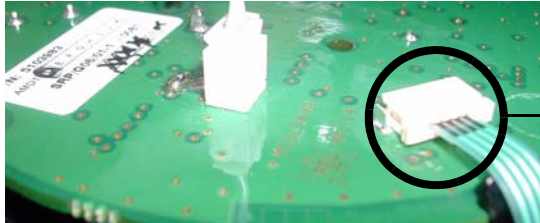
For components included in the kit:

- Beacon with built-in GPS: [See § 2.4.6. KIT I521 PCB with GPS.](#)
- Beacon without built-in GPS: [See § 2.4.5. KIT I521 PCB without GPS.](#)
 - (1) Unscrew the locking nut with the opening device ([see Figure 18 : Opening device](#)).
 - (2) Lift the upper cover assembly and disconnect the flash assembly from J7 connector of I521 PCB.



- (3) Extract the upper cover from the housing.

- (4) Disconnect the keyboard from J4 connector of I521 PCB.
- (a) unlock the locking system of the connector by pulling it off;
 - (b) once unlocked, disengage the cable of the keyboard from its connector and unstick it.



(a) Pull

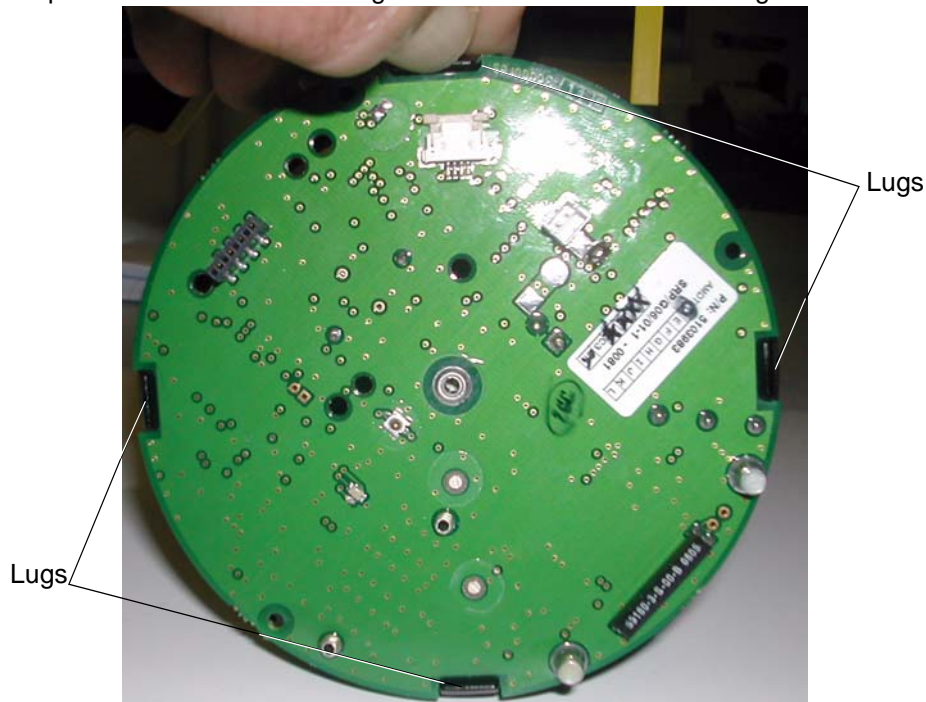
(b) Disengage

- (5) Lift and remove the mounting rack still fitted with I521 PCB.
(6) Disconnect the battery pack from J6 connector of I521 PCB.

J6 connector



- (7) Unclip I521 PCB from the four lugs used to fixed it to the mounting rack.



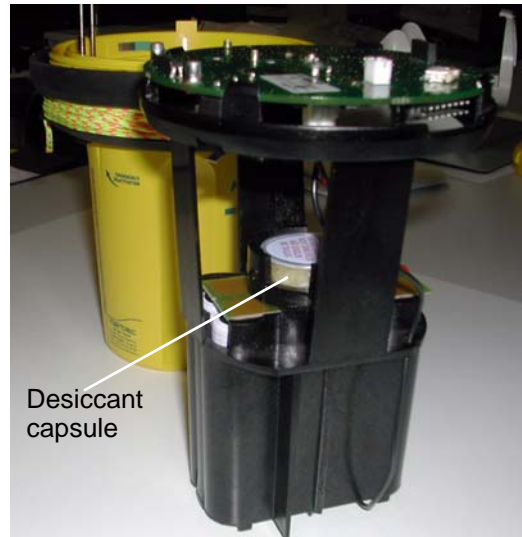
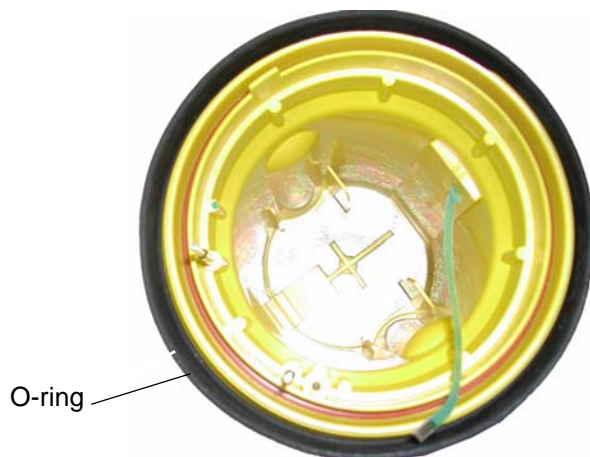
- (8) Put down I521 PCB disassembly and discard it.
(9) Clip the new I521 PCB into the four lugs of mounting rack.
Note: Like the mounting rack which is fitted with four lugs, one being wider than the other, there are four notches in the PCB, one being also wider than the other. Use these wide lug as indexing slot.
(10) Replace the desiccant capsule.

IMPORTANT: Install cardboard side of capsule upwards (towards PCB).

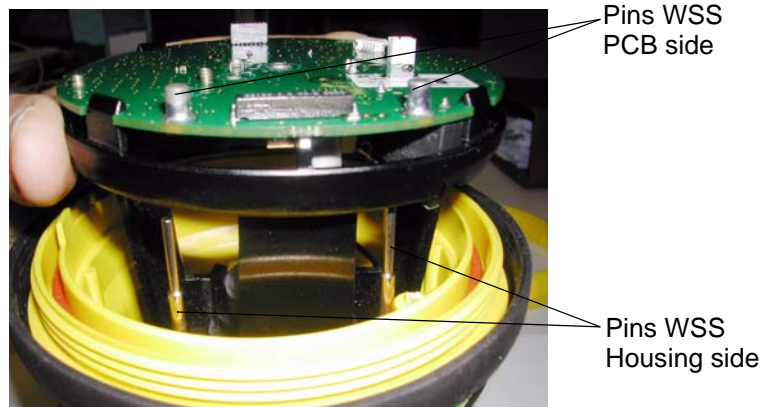
(11) Connect the battery pack to J6 connector of I521 PCB. If the beacon is activated, stop by holding the switch of emergency stop as long as possible.

IMPORTANT:

(12) Remove the old O-ring from its groove and replace it by the new O-ring.

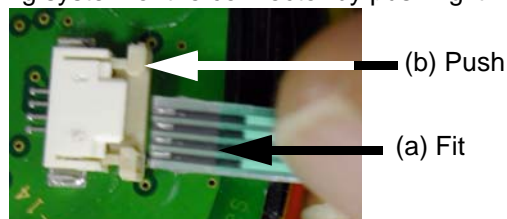


(13) Insert the mounting rack into the housing taking care that the pins of the water switch sensor on housing side are opposite to the pins of the water switch sensor on I521 PCB side.



(14) Connect the keyboard to I521PCB.

- (a) fit the cable of the keyboard into its connector;
- (b) lock the locking system of the connector by pushing it in.



(15) If the beacon was activated when connecting the battery pack, press TEST/Ready to stop.

(16) Stick the keyboard cable.

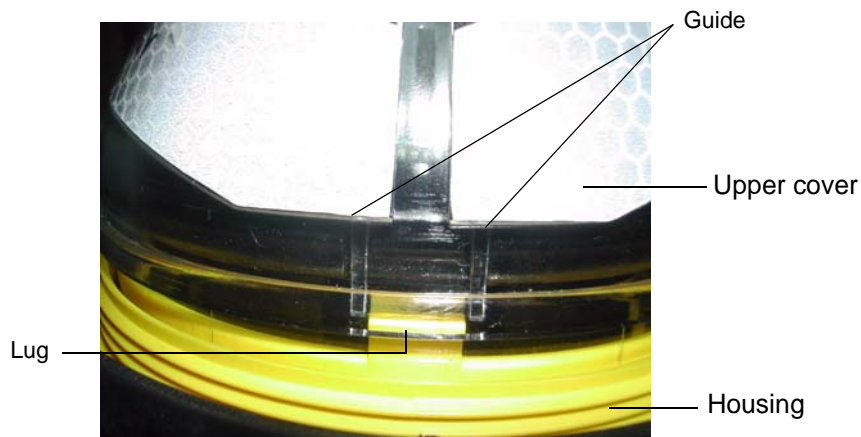
(17) Perform a control of frequencies: [See § 3.2.4. Control of frequencies on test bench.](#)

(18) Place the upper cover above the housing.

(19) Connect the flash assembly to J7 connector of I521 PCB ([see page 53](#)).

(20) Insert the upper cover into the housing.

- Insert the lug of the housing into the guide of the upper cover as shown below.



(21) Screw the locking nut manually. Do not lock.

(22) Perform a self-test. If the self-test is not OK, check the wire of the flash.

(23) Lock the locking nut with the opening device. The locking nut must be tightened until an audible click.

(24) Report the new CSN of the beacon onto the label of the housing and on the booklet.

(25) Once the beacon is closed perform:

- Functional controls:
 - [paragraph 3.2.2.4. Functional control in Faraday box,](#)
 - [paragraph 3.2.2.3. Functional control out of Faraday box.](#)
- Watertightness test:
 - [paragraph 3.2.9. Control of watertightness, use of the bath.](#)

(26) Stick a new tamper proof seal on the ON pushbutton.

(27) Inform KANNAD that the CSN number has been changed:

Send old CSN number, new CSN number and S/N to:

pkrr@kannad.com or support.sar@kannad.com