

# C1 S-VDR Capsule

Ethernet version



# Contents

<b>1.</b>	<b>RECOMMENDATIONS AND SAFETY NOTICES</b>	<b>3</b>
<b>2.</b>	<b>EMERGENCY USE</b>	<b>4</b>
2.1	Emergency use as EPIRB	4
2.2	Emergency use as S-VDR Capsule	6
<b>3.</b>	<b>INTRODUCTION</b>	<b>7</b>
<b>4.</b>	<b>INSTALLATION</b>	<b>8</b>
4.1	Siting the S-VDR Capsule on a vessel	8
4.1.1	Clearance	9
4.2	Installing the S-VDR Bracket	9
4.3	Cabling	11
4.3.1	Block wiring diagram	11
4.3.2	Installing DCU and power cables	12
4.3.3	Capsule Cable and Strap assembly	13
4.3.4	Connecting the Capsule data cable	15
4.3.5	Isolation and grounding tests	15
4.3.6	Bracket final assembly	15
4.4	Assembly of bracket and Capsule	16
4.4.1	Data Connector	18
4.4.2	Removing data connector	18
4.5	Post-installation verification	20
4.5.1	EPIRB check	20
4.5.2	Data communication check	20
<b>5.</b>	<b>OPERATION – S-VDR DATA RECORDING UNIT</b>	<b>21</b>
5.1	Normal operation	21
5.2	Copying data	21
5.3	S-VDR Alarms	21
5.4	Downloading and Verification	21
5.5	Maintenance	21
5.6	Annual re-certification	21
<b>6.</b>	<b>OPERATION – EPIRB</b>	<b>22</b>
6.1	Mandatory Registration	22
6.1.1	Overview	22
6.1.2	How to register	22
6.1.3	Radio licence	23
6.1.4	Sale or transfer	23
6.1.5	Mandatory information for Oceania	23
6.2	Description	24
6.2.1	Controls	24
6.2.2	Sea switch	24
6.3	GPS Operation	25
6.4	Self-test	25
6.5	Emergency operation	25
6.5.1	Switching off	25
6.5.2	Interpreting the indicators	27
<b>7.</b>	<b>MAINTENANCE</b>	<b>28</b>
7.1	Table of maintenance intervals	28
7.2	Self Test & inspection	28
7.3	Servicing	28
7.4	Changing the HRU	28
7.5	Changing the Battery	28
7.6	Fault finding	29
7.7	Self test	29
<b>8.</b>	<b>SPECIFICATION</b>	<b>30</b>
8.1	DRU section	30
8.2	EPIRB section	30
<b>9.</b>	<b>DIMENSIONS</b>	<b>32</b>

# 1. Recommendations and safety notices

- This S-VDR Capsule is an emergency device for use only in grave and imminent danger.
- False alarms cost lives and money. Help to prevent them; understand how to activate and de-activate your equipment. Intentional false alarms may involve penalties.
- Read the complete manual before installing, testing or using the EPIRB.
- Ensure you test the EPIRB section monthly – see section 6.4
- Ensure the EPIRB is registered with your local authorities (Flag State nation).
- The Capsule contains no user serviceable parts. Return to your dealer for battery replacement or other service. Do not open. Retain the original packaging for transport.
- Dispose of this device safely in accordance with local regulations. Contents include Lithium batteries; do not incinerate, puncture, deform or short-circuit.
- This device emits radio frequency radiation when activated, but such radiation is not classed as harmful at distances greater than 10 cm from the antenna (Reference: IEEE/ANSI C95.1).
- It is advisable not to stare directly at the strobe LEDs at the top of the capsule.

## 2. EMERGENCY USE

### 2.1 Emergency use as EPIRB

A 406/121.5 MHz beacon is a piece of life saving equipment. Its sole purpose is to call for help.

It must only be used in situations of grave and imminent danger.

Misuse can involve a severe penalty.

#### SUMMARY:

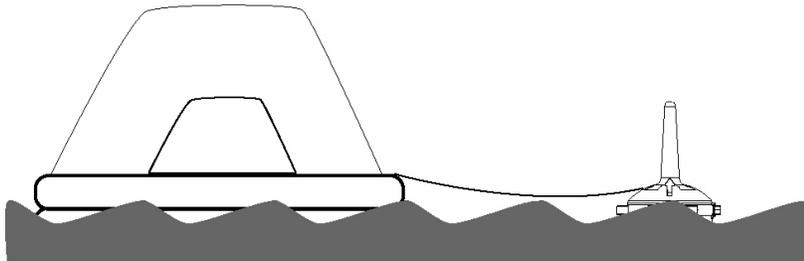
GET THE Capsule OUT OF THE BRACKET AND INTO THE WATER

**IF POSSIBLE, TETHER THE Capsule TO THE SURVIVAL CRAFT**

If time permits, the Capsule should be removed from its bracket and thrown into the water. This will activate the EPIRB, which will transmit a distress alert.

If the vessel sinks the Capsule will automatically release itself from its enclosure before it reaches a depth of 4 m. The Capsule will float to the surface and start to operate because its sea switch is activated. If possible, the EPIRB should be recovered and tied (using its lanyard) to the survival craft. An EPIRB is meant to mark survivors, not the accident scene.

For best operation leave the Capsule floating in the sea near the survival craft, as this is the condition for which it was designed and tested.



If the vessel is sinking and there is time to fetch the Capsule then this should always be done. Release the Capsule from its mounting bracket and carry it to one of the liferafts. Once the liferaft is in the water, uncoil the lanyard and tie it to the liferaft, then throw the Capsule overboard so that it floats next to the liferaft. The EPIRB will operate because its sea switch will activate. This will enable the EPIRB to transmit the location of the survival craft, and thus to maximise the effectiveness of the rescue operation.

Do not take the Capsule into the survival craft. Overhead obstructions may reduce its view of the sky and affect the operation of the GNSS position finding system.

**NOTE:** GPS Satellite coverage at the time an alert is transmitted and, if the beacon is activated onboard a ship or raft, overhead obstruction on the ship or raft may affect whether and how soon a GPS-derived position can be determined and transmitted.

DRAFT for information only

## **2.2 Emergency use as S-VDR Capsule**

If the C1 S-VDR Capsule is NOT intended to be the ship's mandatory EPIRB then it need not be removed manually from the vessel in the event of an incident.

In such a case the sole purpose of the S-VDR Capsule is to store ship's data relevant to the incident preceding the deployment of the Capsule. The EPIRB function of the S-VDR Capsule is only required to mark the position of the released capsule for later retrieval by the relevant authorities.

DRAFT for information only

### 3. Introduction

The S-VDR FFC provides two essential safety features: a rescue beacon and a store of vessel data.

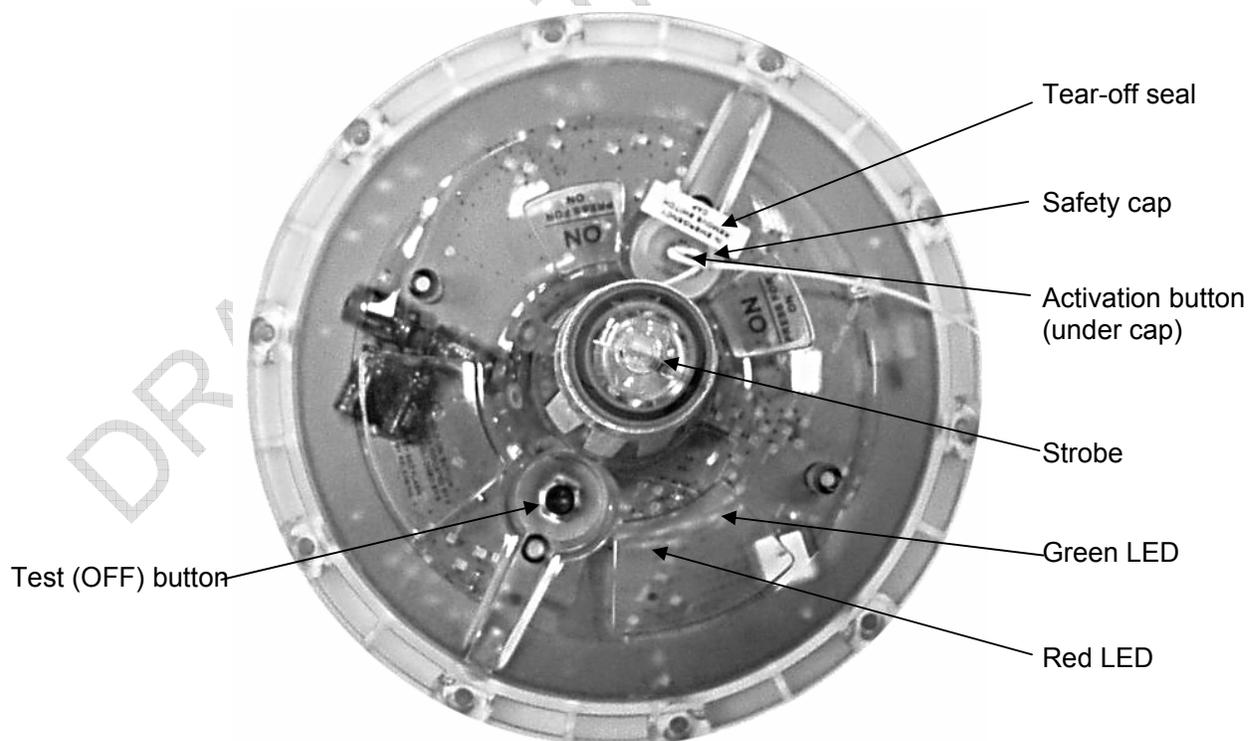
The Capsule provides the functions of an Emergency Position Indicating Radio Beacon (EPIRB), which uses the COSPAS-SARSAT satellite network to pass distress alerts to the rescue authorities. Under normal conditions position information is derived from a GPS module; this greatly enhances the accuracy of the position transmitted to the rescue services.

The Simplified Voyage Data Recorder (S-VDR) Float Free Capsule (FFC) maintains a store of information concerning the position, movement, physical status, command and control of a vessel over a 12-hour rolling period. Should any incident occur which requires investigation, the information contained in the Capsule can be made available to both the Administration and the ship-owner. This information may assist during any subsequent investigation to identify the cause(s) of the incident. The Service Manual contains instructions on the data recovery process.

The final recording medium is an ATA FLASH drive system installed in the Capsule. The Capsule is designed to float free automatically if the ship sinks, and to transmit its current location information through the COSPAS-SARSAT satellite network. The Capsule complies with the requirements of IEC 61996-2.

The Capsule is capable of being accessed following an incident but is secure against tampering. The Capsule encloses the Data Recording Unit (DRU) containing the recording medium. The final recording medium is not accessible by standard operating procedures during normal ship operations. Stored information can be retrieved to an external device via the Data Collection Unit (DCU) without opening the protective Capsule.

The C1 S-VDR DRU has an Ethernet 10/100baseT interface and requires 24 V DC (nominal) external power.



*Top view of Capsule showing controls*

## 4. Installation

The S-VDR Capsule is supplied as two separate units – the Capsule itself and the mounting bracket. The bracket should be mounted, cabled and assembled before installing the Capsule.

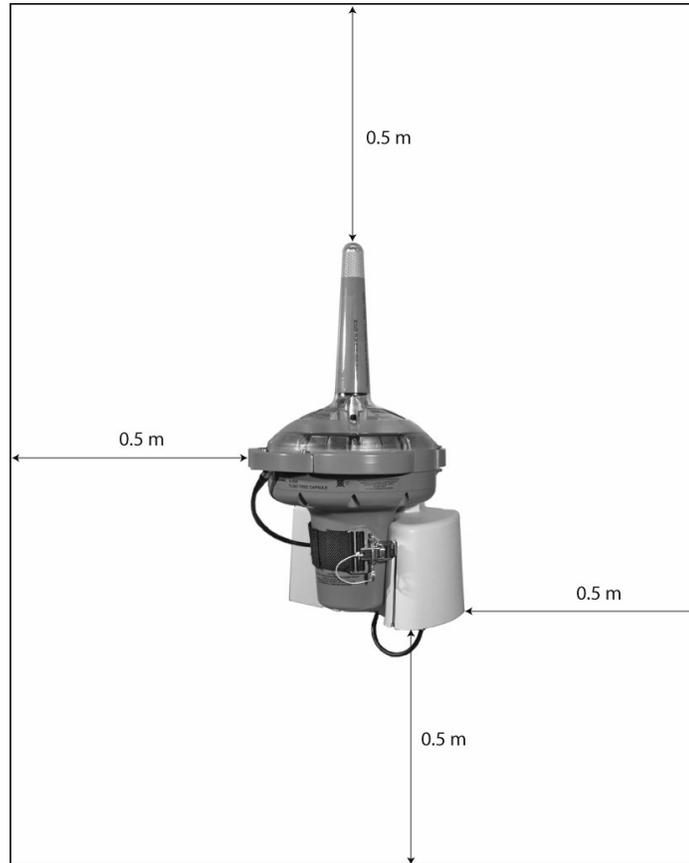
The S-VDR Capsule must be registered – refer to section 6.1.2. Do not discard the registration card.

### 4.1 Siting the S-VDR Capsule on a vessel

When deciding the best site for the S-VDR Capsule release mechanism, these points should be considered and followed as far as possible:

- The Capsule should be mounted in the vicinity of the bridge on the outside of the vessel's structure in a position such that it is *accessible by a non-vertical ladder* (ie stairway) and its controls are easily reached. Ideally the Capsule should be mounted as close to the centreline of the vessel as possible, and with sufficient space around it that it can be accessed by ROVs and divers in the event that it fails to release automatically.
- The release mechanism is designed to release the Capsule automatically when it is submerged to a depth of between 1.5 and 4 m. Once released, the Capsule must float to the surface in order for the EPIRB to be effective. Consequently, the chosen site must be where if the vessel rolls over, the released Capsule will not become entangled in rigging, nets, aerials or becoming lodged in the vessel's structure.
- In accordance with IMO MSC.163(78) and IEC 61996-2, the preferred locations are on the monkey island or on the bridge wings.
- The Capsule must be mounted vertically, at least 0.5 m above the deck or horizontal surface and 0.5 m clear of any other obstruction, as shown in the diagram on the next page.
- The release mechanism should be located at least 2.1 m from the vessel's compass.
- The Capsule should be located where it is unlikely to suffer damage during the normal operation of the vessel.
- The Capsule should be located where it is unlikely to receive direct impact from waves.
- The Capsule should be located where it is unlikely to suffer damage by being in direct line of any radar antenna.
- The Capsule should be mounted away from engine exhausts and battery fumes, fuel lines and other potential fire sources.
- The release mechanism must not be permanently attached to the structure (i.e. no welding, brazing, riveting or bonding).
- At the intended site check that the holes for the bolts will not damage other equipment and that it is possible to fit the nuts correctly.

### 4.1.1 Clearance



*Recommended clearance around Capsule*

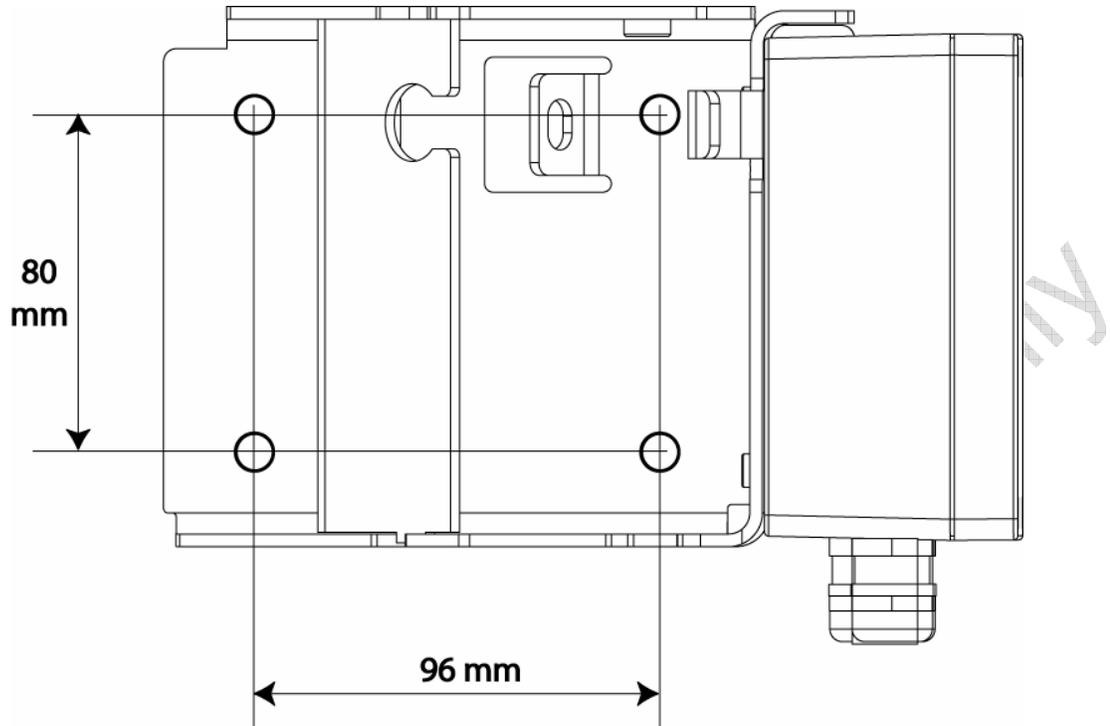
### 4.2 Installing the S-VDR Bracket

Read this manual fully before attempting to install the bracket and Capsule.

Remove the cover from the bracket by unscrewing the retaining bolt as shown below.

Retaining bolt





***Drilling position***

Mark the four bolt fixing holes. Use the bracket as a template or mark them as shown above. Drill the holes 8.4 mm or  $21/64$ " to provide clearance for the M8 bolts. Remove any paint if present around the holes to ensure good electrical contact.

Bolt the mounting bracket to the bulkhead using the supplied hardware, with the flat washers under both the bolt heads and the fixing nuts. Use a thread locking compound or other suitable locking arrangement on the bolts to prevent loosening under vibration.

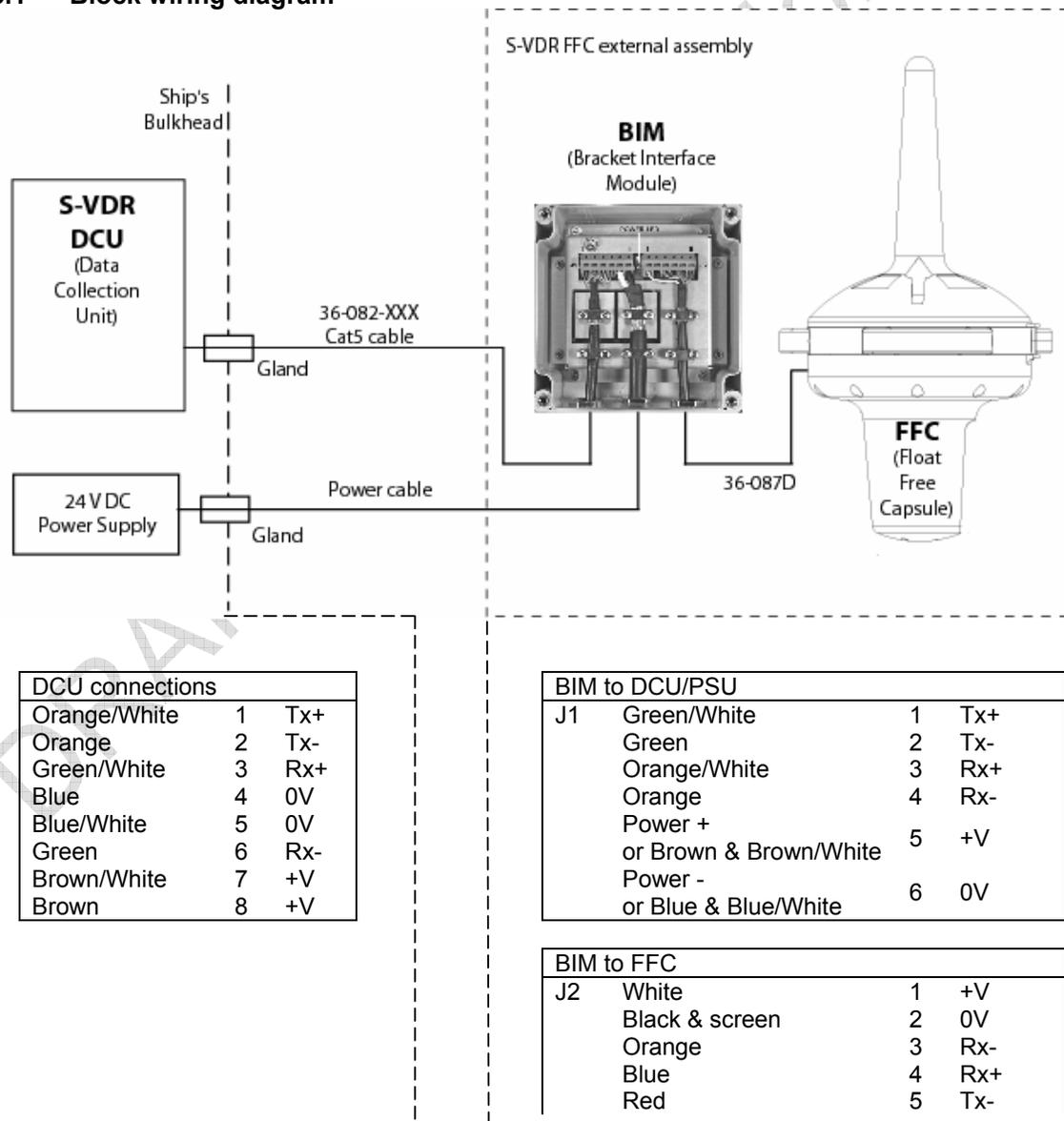
### 4.3 Cabling

The cable glands fitted to the Bracket Interface Module (BIM) accommodate cables in the range 4 mm to 11 mm diameter. Cables outside this range may compromise the sealing or retaining ability of the glands. Fitting the recommended power cable requires that the centre section of the sealing grommet is removed, as shown below.

The recommended external data cable is Cat5 to EIA/TIA 568 B, 26 AWG x 4 pair, foil & braid screen; eg McMurdo 36-082-XXX (where XXX denotes length eg 050 = 50 m).



#### 4.3.1 Block wiring diagram



External power connection is to pins 6 & 5 of J1 inside the BIM. If external power is supplied, the DCU cable must not be connected to these pins; cut off and tie back these wires in the cable.

Cat5 cable should be routed away from cables carrying high power. The maximum length of Cat5 cable is 75 m.

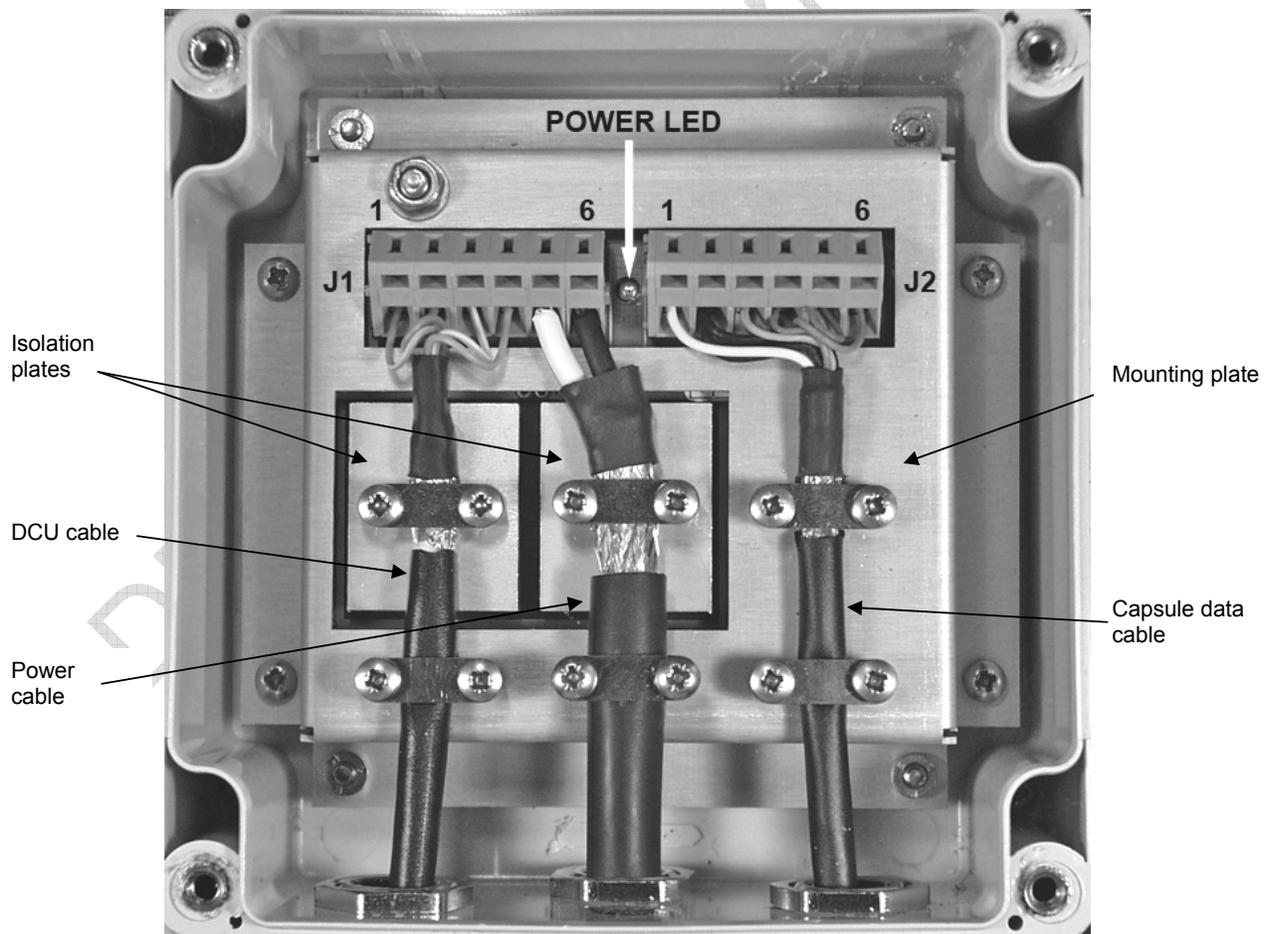
External power cable should have conductors of 1 mm<sup>2</sup> minimum area, and have a maximum length of 100 m.

**WARNING:** Ensure power is switched off at the DCU and at the 24 V power supply before starting any work around the Capsule, particularly if the BIM is to be opened.

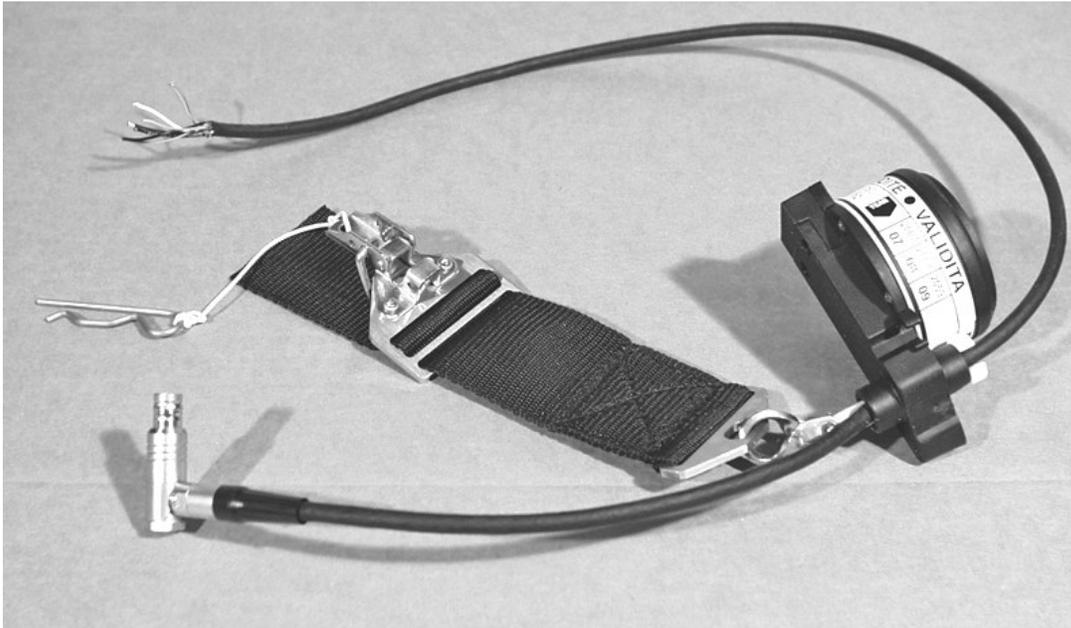
#### 4.3.2 Installing DCU and power cables

Remove the lid of the junction box (BIM). Prepare and connect the Cat5 cable and the power cable (if applicable). Referring to the picture below, slacken the left hand (and centre, if applicable) cable gland(s) and thread the cable(s) through. Connect the cable(s) to the BIM terminal strip J1 as shown (note that the designators shown are for reference, and do not appear on the BIM), following the table in section 4.3.1

Note that the lower cable clamps in the illustration are mechanical clamps and must be fitted over the cable insulation, but the upper clamps must make connection to the cable screens.

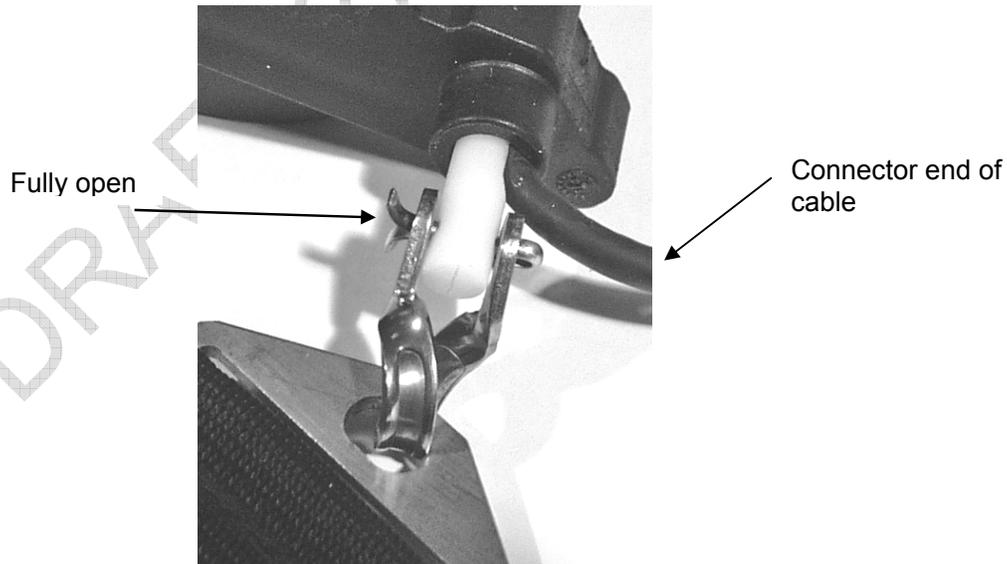


### 4.3.3 Capsule Cable and Strap assembly



As shown, the HRU is connected to the Capsule retaining strap, and the Capsule data cable is threaded through the breakable bolt in the HRU.

The expiry date must be marked on the HRU. The HRU has a 2 year in-service life which starts as soon as it is exposed to a marine environment, hence the 2 year period starts at installation; it is the responsibility of the installer to mark this date during installation. A date 2 years into the future should be marked on the HRU body by cutting out the corresponding dates on its label, as shown on the leaflet enclosed with the HRU kit.

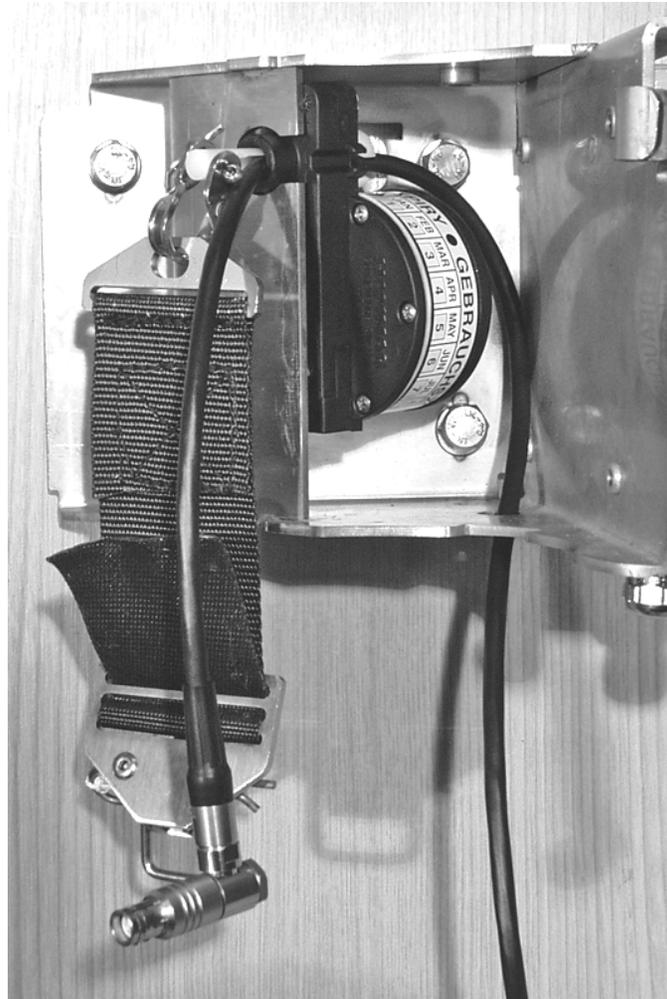


Assemble the HRU and breakable bolt, then fit the strap, ensuring that the split pin is completely open to retain the shackle.

WARNING: The assembly must be orientated as shown in the illustrations.

DRAFT for information only

Fit the HRU and strap to the bracket, as shown below, and thread the free end of the cable through the hole in the bracket.



#### **4.3.4 Connecting the Capsule data cable**

Referring to the picture in section 4.3.2, slacken the right hand cable gland and thread the cable through it. Connect the cable to the BIM terminal strip J2 as shown (note that the designators shown are for reference, and do not appear on the BIM), following the table in section 4.3.1

#### **4.3.5 Isolation and grounding tests**

For correct operation, it is important that these checks are made:

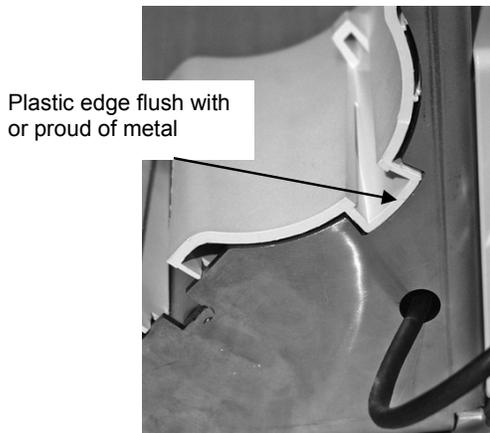
- Ensure that the BIM mounting plate is connected to ship's earth.
- Ensure that there is isolation between the mounting plate and the isolation plates.

The plates are identified in the illustration in section 4.3.2

#### **4.3.6 Bracket final assembly**

Replace the lid of the junction box and ensure that it is correctly fitted. Check that all cable glands are tight.

When fitting the cover, ensure that it is fully seated and that it overlaps completely the bottom metal plate. Finally, fit and tighten the retaining bolt.



*View underneath bracket to show fitting of cover*



*Appearance of fully fitted Bracket*

Note: Do not leave excess cable between the BIM and the HRU. The illustration shows the recommended maximum size of loop. Equally, it is important to leave sufficient loop to avoid straining the cable – the cable should not be taut at any point.

#### **4.4 Assembly of bracket and Capsule**

The Capsule is retained in the bracket by a strap which latches into a hook on the bracket, with a R-clip to prevent accidental release.

Before fitting the Capsule, check that the battery life marked on the label located on the lower part of the Capsule gives an adequate service life and that the serial number/MMSI marked on the upper section of the Capsule is registered to the vessel to which it is to be fitted.

NOTE: It is important that the Capsule is registered and the MMSI/identity is correct in order that the emergency services can mount the appropriate rescue operation. If the serial number or MMSI/identity as transmitted by the Capsule is incorrect, contact your supplier, as these data can only be changed by a main distributor or service agent.

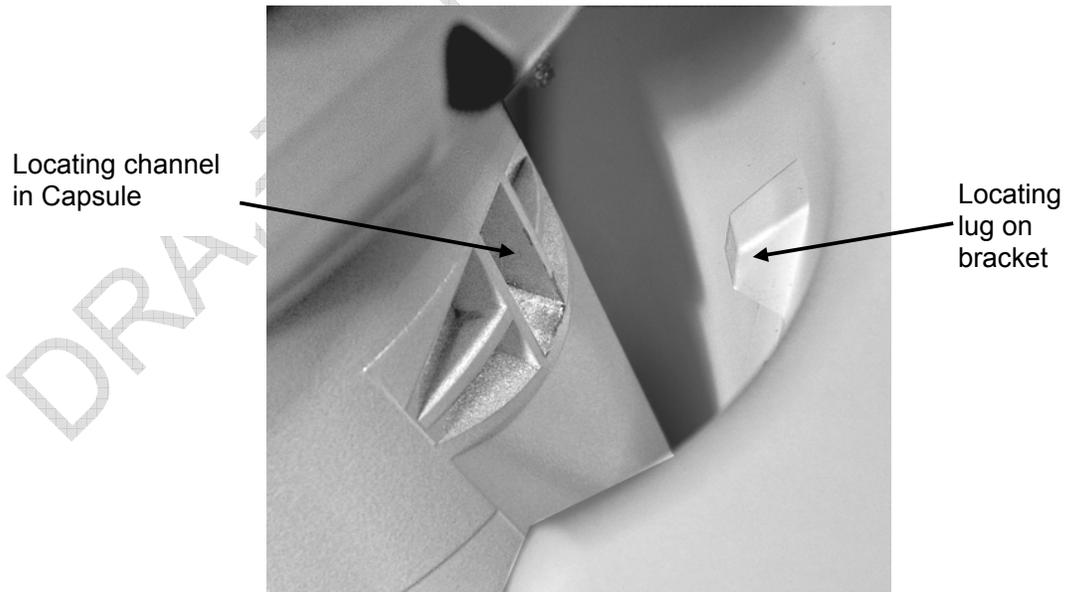
The battery is not a user replaceable item. If the battery life as marked on the label has expired, contact your local service centre to arrange a replacement.

Fit the Capsule to the bracket, making sure that the locating lug engages correctly, and retain it by attaching the strap to the hook and closing the latch. Check that the strap is tight and holds the Capsule firmly; if it is not, tighten it by adjusting the strap at the buckle. (As a guide, it should just be possible to close the latch; if the latch closes easily, the strap should be adjusted.). Fit the R-clip to the latch, as shown on the following page.



*Detail of Capsule mounted in bracket*

**WARNING: THE S-VDR CAPSULE MUST ALWAYS BE MOUNTED SUCH THAT THE MOULDED LOCATION FEATURE ON THE LOWER SECTION OF THE CAPSULE LOCATES AGAINST THE BRACKET CORRECTLY.**

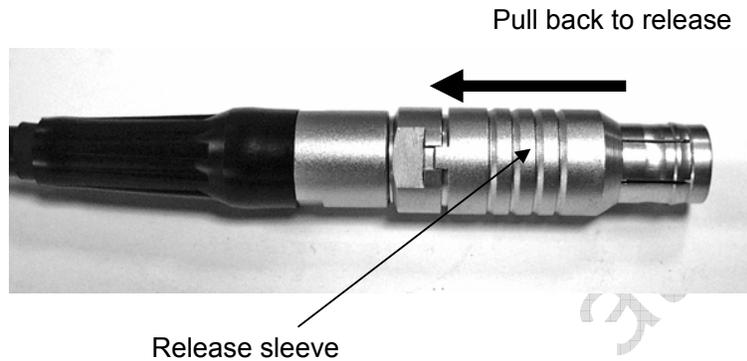


#### 4.4.1 Data Connector

The data connector is fitted beneath a protective cover which is held by two screws. Remove the cover and plug in the connector. Ensure that the connector is pushed fully home and that it locks in position. Replace the cover.

#### 4.4.2 Removing data connector

Unscrew the protective cover and slide it outwards to clear the connector. The connector is latched into the socket; it can only be removed by pulling the release sleeve to disengage the latch – DO NOT PULL THE CABLE. Do not use excessive force, as this can break the latch and render the connector useless – if problems are encountered, contact your local Service Agent.





**Assembled Capsule and Bracket**

## **4.5 Post-installation verification**

### **4.5.1 EPIRB check**

Perform the self-test, as detailed in section 6.4

### **4.5.2 Data communication check**

**TBI**

The Capsule is now installed and operational.

**IMPORTANT:** Register the S-VDR Capsule.

**CAUTION:** DO NOT APPLY PAINT OR ANY OTHER COATING (eg ANTI-ICING AGENTS) TO ANY PART OF THE CAPSULE OR RELEASE MECHANISM.

## **5. Operation – S-VDR Data Recording Unit**

**TBi**

**5.1 Normal operation**

**5.2 Copying data**

**5.3 S-VDR Alarms**

**5.4 Downloading and Verification**

**5.5 Maintenance**

**5.6 Annual re-certification**

**(These headings are the information required to be provided, as specified by IEC 61996-2)**

## 6. Operation – EPIRB

### 6.1 Mandatory Registration

- You must register your S-VDR FFC / EPIRB with the appropriate authorities.
- Failure to register may slow the rescue and lead to loss of life.
- In the USA failure to register may result in a fine.
- In the UK you are legally required to register your S-VDR FFC / EPIRB.

#### 6.1.1 Overview

Every S-VDR FFC / EPIRB is pre-programmed with a unique identity before it reaches the end user. This is done by the manufacturer or in some cases the distributor. The identity includes a 3 digit country code. This is the country that takes responsibility for storing that particular EPIRB's registration details. In most cases this is the country to which the vessel is flagged. The country programmed into your EPIRB can be found from its rear identity label. You **must** register with this country.

Details to be supplied when programming printer is determined.

This also affects instructions (to be written) about affixing the labels to the S-VDR cone.

When you activate your S-VDR FFC / EPIRB in an emergency, the nearest maritime search and rescue coordination centre (MRCC) will receive the message and decode the country code (eg 232). They will then access the registration database for that country and expect to find details of your vessel, its radio equipment and who to contact. If they fail to find this information, this may slow down any rescue.

#### 6.1.2 How to register

Three registration forms are provided, two are for future use and one must be completed immediately. The forms are all pre-printed with your EPIRB's identity, all you have to do is complete details of your vessel and provide contact numbers. Wherever possible the forms are also pre-printed with the correct mailing address and a faxback number. If your form does not have a mailing address, contact your supplier. When you have completed the form, you can choose to fax it or mail it.

It is usual to receive confirmation when you register. In the UK and USA you will also receive a "Decal" sticker which you must fit to the S-VDR FFC / EPIRB itself. The Decal is proof of registration. Not having a Decal is an offence.

Useful registration contacts are:

USA Sarsat Beacon Registration  
E/SP3, RM3320, FB-4  
NOAA, 5200 Auth Road  
Suitland MD 20746-4304  
Tel 888 212 7283 Fax 301 568 8649

UK EPIRB Registry  
HM Coastguard (Southern)  
Pendennis Point, Castle Drive  
Falmouth TR11 4WZ  
Tel 01326 211569 Fax 01326 319264

COSPAS-SARSAT provide registration details for many countries; use the web address [www.cospas-sarsat.org](http://www.cospas-sarsat.org) and follow the links to *406 MHz Beacons* and *Registration*.

### 6.1.3 Radio licence

An EPIRB is a radio transmitter and must therefore be added to your radio licence. If you have been allocated a radio callsign, then you already have a radio licence for your VHF or MF radio set. You should update your licence to include your EPIRB. For further details see your licence or use these contact numbers:

**USA** FCC Tel : 888 225 5322 Website : [www.fcc.gov/Forms/Form506/506.pdf](http://www.fcc.gov/Forms/Form506/506.pdf)

**UK** Ship Radio Licensing, Radio Licensing Centre, The Post Office, PO Box 1495  
Bristol BS99 3QS Tel: 0870 243 4433 Fax: 0117 975 8911  
Minicom: 0117 921 9550 Website: [www.radiolicensingcentre.co.uk/](http://www.radiolicensingcentre.co.uk/)

### 6.1.4 Sale or transfer

EPIRBs registered in the USA, Canada, UK and Australia do not necessarily need to be re-programmed when transferred to a new vessel. Simply complete another registration form to inform the authorities of the transfer. Use one of the spare forms provided or contact McMurdo for a blank form. (See warranty section for address).

For most other countries, the EPIRB must be re-programmed with either the new vessel's Maritime Mobile Station Identity (MMSI) or its radio callsign, whichever is required by the country controlling the new vessel.

Since the EPIRB identity contains a country code, it follows that changing the flag state of the vessel also means the EPIRB must be re-programmed. Programming can be carried out at McMurdo or any of our designated agents. For details of your nearest agent, either contact McMurdo using the details in the warranty section, or visit the McMurdo web site at [www.mcmurdo.co.uk](http://www.mcmurdo.co.uk).

### 6.1.5 Mandatory information for Oceania

#### **Advice to owners of Emergency Position Indicating Radio Beacons:**

Registration of 406 MHz satellite Emergency Position Indicating Radio Beacons (EPIRB) with the EPIRB Registration Section of the appropriate Maritime Safety Authority (MSA) is mandatory because of the global alerting nature of the system.

The information provided in the registration card is used only for rescue purposes. Fill in the owner registration card immediately on completion of the sales transaction. Mail the registration card immediately.

If the beacon is to enter service immediately, complete the registration card and fax the information to the MSA. The original card must still be mailed to the MSA for hard-copy reference and filing.

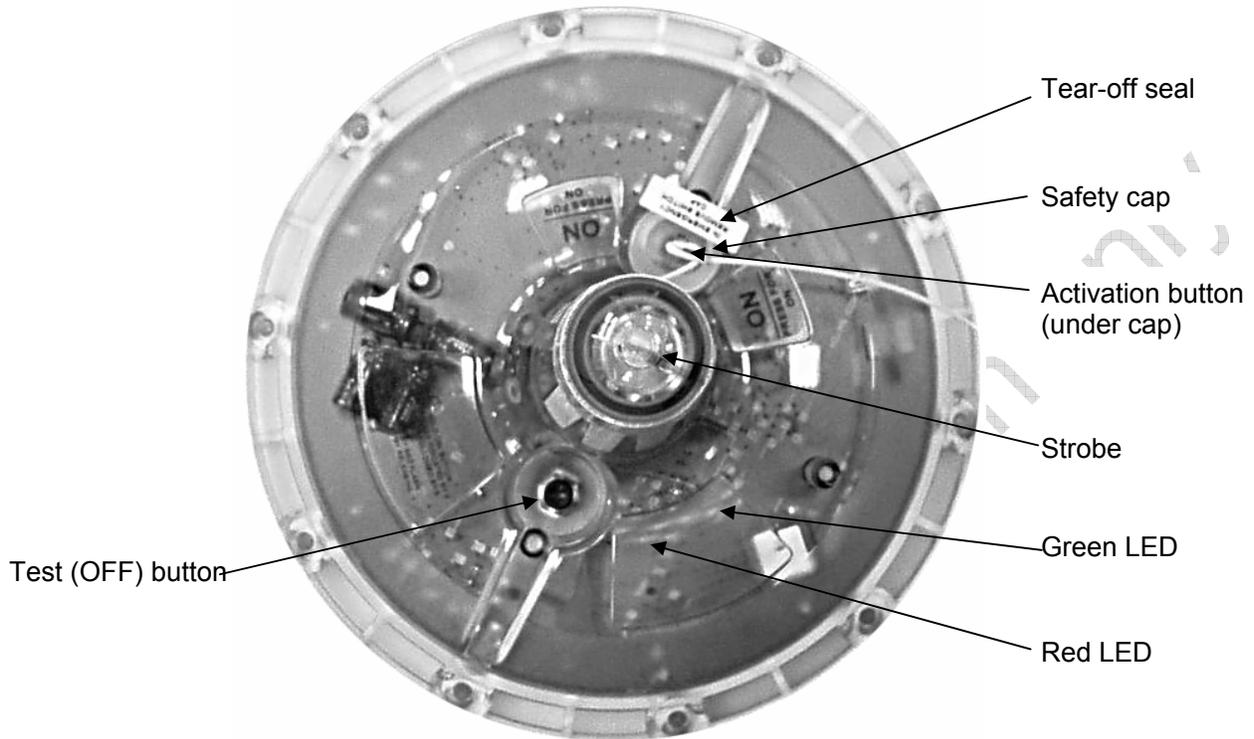
If the current owner is transferring the beacon to a new owner, the current owner is required to inform the MSA by letter, fax or telephone of the name and address of the new owner.

The subsequent owner of the beacon is required to provide the MSA with the information shown on the owner registration card. This obligation transfers to all subsequent owners.

The MSA is the Australian Maritime Safety Authority or the Maritime Safety Authority of New Zealand, as appropriate, whose respective fax numbers are 06 257 2036 (Australia) and 04 382 6482 (NZ).

## 6.2 Description

The EPIRB is a powerful self-contained distress transmitter. It is powered by a Lithium battery that has a replacement interval of 5 years. An EPIRB is intended to be a one-shot device; once activated it can operate for at least 7 days.



### 6.2.1 Controls

#### Activation button

This button is protected against accidental activation by a cap and a tear-off seal which indicates if the EPIRB has been activated.

The EPIRB can be activated manually by tearing the seal off, removing the cap and pressing the activation switch.

When the EPIRB is activated the strobe will start to flash immediately, but the EPIRB will not make any distress transmissions for 2 minutes. This provides a chance to turn off if it was activated accidentally. During this 2 minutes the red LED illuminates continuously. When the red LED starts to flash, the 2 minutes delay has passed and distress transmissions have started.

#### TEST (OFF) button

This control is the means of turning off the EPIRB at any time, provided that the sea switch is not active. It also allows various test sequences to be run on the EPIRB; details of these tests are given in Section 6.4.

### 6.2.2 Sea switch

It is important to realise that the only time the EPIRB is completely off is when it is fitted in its mounting bracket. As soon as it is removed, a magnetic switch activates and puts the EPIRB into its "ready" state. In this state it will not drain the battery, but it will turn on automatically if the sea switch contacts are immersed in water. The sea contacts are the two screw heads on the bottom of

the EPIRB. To ensure the sea switch operates properly in rough seas, it has a built-in time delay. It has to be wet for at least 2 seconds before it will activate and it has to be dry for at least 8 seconds before it will de-activate.

The EPIRB can be switched on manually using the ON button, but the sea switch overrides any manual settings.

If the Capsule is being removed from the bracket (eg for maintenance), it is important to ensure that it is dry and that it stays dry.

### 6.3 GPS Operation

The GPS receiver needs a clear view of as much sky as possible in order to acquire signals from sufficient satellites to determine its position. Should it fail to do this, the beacon will still transmit the 406 MHz distress signal, and its position will be determined by the COSPAS-SARSAT satellites using Doppler techniques.

### 6.4 Self-test

Self-test verifies the operation of the EPIRB. The test checks that key areas, including battery, 406 MHz and 121.5 MHz transmitters and antenna, are within limits. In accordance with ITU recommendations, self-test should be performed during the first five minutes of the hour.

Press the TEST button and **HOLD IT DOWN** until the self-test sequence is completed. While the button is held down and the self-test sequence is in progress the red indicator light will illuminate. On successful completion of the self-test sequence, the green light will flash 3 times and the white strobe will flash 3 times. This is the signal to release the TEST button.

If the self-test fails, as shown by 3 flashes of the red LED, release the TEST button then repeat the test. If the problem persists, check the battery expiry date. Do not use the EPIRB; return it to a dealer.

### 6.5 Emergency operation

Tear the seal and remove the safety cap from the ON switch. THE SWITCH MUST BE HELD DOWN FOR AT LEAST 1 SECOND. The red LED will light when the EPIRB has been activated.

The indicator lights will show the status of the EPIRB. When the indicator lights are flashing, the EPIRB is transmitting. A full table of the status indications is given in the section "Indicators". The EPIRB will continue to transmit for a minimum of 168 hours.

**Important:** Transmissions do not start until the EPIRB has been active for 2 minutes. This is to allow time to switch the unit off in the event of accidental activation, preventing a false alert being sent to the search and rescue services. During this period the red indicator light comes on continuously.

#### 6.5.1 Switching off

To switch off the EPIRB after it has been activated in an emergency (eg when rescue has been effected):

If activated by the ON button:

Ensure the EPIRB is dry, then press the OFF button and hold it down until the indicator lights go off and the strobe stops flashing.

If activated by the sea switch:

Dry the EPIRB. It will switch off automatically (after about 8 seconds).

A five second delay is built in to the operation of the OFF button to prevent inadvertent de-activation during an emergency situation. After operating the OFF button, confirm that both

indicator lights are extinguished and that the strobe has stopped. Remember that the EPIRB will activate if it is wet and is removed from the bracket, and this will not be affected by the OFF button, thus it is important to make sure the EPIRB is dry.

DRAFT for information only

## 6.5.2 Interpreting the indicators

EPIRB SELF-TEST		
Event	Self-test button pressed and held	Self-test completed and passed
Red Light	On while self-test sequence in progress	Off
Green Light	Off	Flashes 3 times
Strobe	Off	Flashes 3 times

EMERGENCY OPERATION					
	First 2 minutes	After 2 minutes			
Event	Start/On button pressed	121.5MHz homing transmitter on	406 MHz burst transmission	406 MHz burst transmission with GPS data less than 20 minutes old	406 MHz burst transmission with GPS data more than 20 minutes old
Red Light	On continuously for first 2 minutes	Flashes every 2.5 seconds	Long flash for 2 seconds every 50 seconds. Then flashes every 2.5 seconds.	Long flash for 2 seconds every 50 seconds. Then flashes every 2.5 seconds.	Long flash for 2 seconds every 50 seconds. Then flashes every 2.5 seconds.
Green Light	Off	Off	Off	On for 2 seconds every 50 seconds. Then flashes every 2.5 seconds. Comes on in time with red light.	On for 2 seconds every 50 seconds (approx), then off.
Strobe	Flashes approx 23 times per minute				

DIAGNOSTIC INDICATIONS						SPECIAL MODES
Event	Self-test button pressed and held	Self-test completed	During operation			Protocol Programming
Red Light	Off	Flashes 3 times	Only flashes for 2 seconds every 50 seconds	Flashes every 2.5 seconds, but no long (2 second) flash	-	Flashes continually.
Green Light	Off	Off	-	-	Does not flash	-
Strobe	Off	-	-	-	-	-
Meaning	No power to PLB	Self-test failure	No 121.5MHz signal	No 406 MHz signal	GPS has not been able to acquire a fix since switch-on	Programming mode.
Action to be taken	Return unit to dealer to check battery pack.	Do not use. Return unit to dealer.	None. Unit is still broadcasting 406MHz signal.	None. Unit is still broadcasting 121.5MHz signal.	If possible, make sure GPS view of the sky is not impaired. Flashing red light shows status of 121.5 & 406 MHz transmissions.	Programming can only be carried out by an authorized dealer using special equipment.

## 7. Maintenance

### 7.1 Table of maintenance intervals

Interval	Operation
1 month	Self-test
1 year	Annual maintenance
2 years	HRU change
5 years	Shore-based maintenance & battery change

### 7.2 Self Test & inspection

As an important item of safety equipment, your EPIRB should be checked regularly. The EPIRB has a built-in test capability that can be used as a confidence check. This self-test confirms that the battery is healthy, that the GPS receiver and both distress transmitters are functional and that the strobe light is operational. The self-test should be performed **monthly**, but not more frequently. It should be performed during the first 5 minutes of the hour, to minimise disturbance on the emergency channel.

### 7.3 Servicing

All servicing must be carried out by a McMurdo approved service agent. Always call your nearest agent and talk to their service department before returning equipment. You can find your nearest service agent from:

- The McMurdo web site: [www.mcmurdo.co.uk](http://www.mcmurdo.co.uk)
- Contacting McMurdo direct (see warranty page).
- Contacting a McMurdo distributor

If the EPIRB has to be returned, the original packaging should be used if possible.

### 7.4 Changing the HRU

The HRU must be changed every two years, using the kit P/N XXX. The expiry date is marked on the HRU body.

1. Remove the Capsule from the bracket and place it in a secure dry environment.  
WARNING: it will activate if wet.
2. Disassemble the bracket by reversing the assembly instructions in section 4.3.3.
3. When fitting the replacement HRU, ensure that the expiry date (2 years after fitting) is marked correctly on the HRU.
4. Replace the HRU by following the assembly instructions in section 4.3.3.

### 7.5 Changing the Battery

The EPIRB uses custom battery packs, McMurdo replacement kit P/N XXX. Typically these will have to be replaced every 5 years. The exact battery expiry date is marked on the base of the capsule. The battery expiry date should be checked regularly. You will need to replace the battery when:

- The expiry date has been reached **or**
- The EPIRB has been used in an emergency situation **or**
- A false activation exceeds 2 hours of use.

The battery is a one shot device. It is not rechargeable or user replaceable. Battery replacement **must** be carried out by a McMurdo approved service agent. The entire set of batteries must be replaced together.

The Lithium batteries contain 21 g of Lithium; local and international shipping regulations may require certain packaging standards and labelling. Batteries have special disposal requirements. Never incinerate a Lithium battery. Never dispose of one at sea. Your service agent will deal with battery disposal.

## 7.6 Fault finding

The majority of initial faults with the system are likely to be caused by wiring errors. The BIM and DSM (Data Storage Module – inside the Capsule) are protected against accidental misconnection, but care must be taken to wire them correctly. If the unit does not function correctly then check the following:

- Ensure all cables are undamaged.
- Ensure all cables are connected in the BIM in accordance with the wiring diagram and illustration – refer to sections 4.3.1 and 4.3.2.
- Ensure connectors are fully plugged in at the Capsule and DCU.
- Check power is reaching the BIM. There should be 10 to 32 V DC between pin 5 (positive) and pin 6 (negative) of the DCU/power connector (J1). If power within these limits is present, then the LED between the two connectors (see 4.3.2) should be illuminated.
- Check power is leaving the BIM. There should be 10 to 32 V between pin 1 (positive) and pin 2 (negative) of the Capsule connector (J2). If power is reaching the BIM but not leaving it, then either the BIM is faulty or there is a short circuit in the cable to the Capsule.

A further check that can be made is to disconnect the wire from pin 6 of J1, and measure the current flowing. A correctly functioning BIM and Capsule will draw between 50 and 150 mA with a 24 V supply. If the voltages measured above are correct, then a current of zero implies an open circuit cable to the Capsule. A momentary high current settling to a value in the region of 50 mA implies a short circuit being protected by the fuse in the BIM. (This value is very variable, as it is affected by supply voltage, temperature, etc; consequently, the best indication is the momentary surge.)

If all power measurements are good, then there is the possibility that the Ethernet connections are faulty. There is little that can be measured here, but continuity through the BIM can be checked. There should be less than 3.3 ohms between the following pins:

J1 pin 1 to J2 pin 6

J1 pin 2 to J2 pin 5

J1 pin 3 to J2 pin 4

J1 pin 4 to J2 pin 3

In addition, there should be no continuity between any of these pins and the BIM metalwork.

## 7.7 Self test

### BIM

There is no self test for the BIM. The BIM has to be working correctly for the Capsule to record data.

### FFC - DSM

There is no visible self test of the DSM. The integrity of the DSM is continually checked by the DCU by virtue of the fact that the DCU validates data that has been written to the DSM.

### EPIRB

The EPIRB has a self-test facility, as previously described in section 6.4

## 8. Specification

### 8.1 DRU section

Supply voltage	12/24 V nominal (10.7 to 32.0 V )
Power consumption	<3 W
Interface	10/100BASE-T Ethernet
Protocol	SMB
Data transfer rate	3.4 MB/s maximum sustained rate
Number of drives	One (two available)
Drive capacity	2 Gbytes (Other capacities up to 128 Gbytes available)

### 8.2 EPIRB section

#### General

Approved to	COSPAS-SARSAT T.007 Class 1
Complies with	EN 60945
Operating temperature range	-20 °C to +55 °C (Class 2)
Storage temperature range	-50 °C to +70 °C
Operational life	168 hours minimum at -20 °C
Battery type	9 V lithium manganese dioxide
Battery expiry	6 years from date of manufacture

#### Electrical

406.028 MHz transmitter	
Frequency	406.028 MHz $\pm$ 1 kHz
Output power	5 W $\pm$ 2 dB
Data encoding	Bi-phase L
Modulation	Phase modulation; 1.1 rads $\pm$ 0.1 rads
Transmission time	520 ms $\pm$ 1%
Repetition period	50 secs $\pm$ 2.5 secs
121.5 MHz transmitter	
Frequency	121.5 MHz $\pm$ 3 kHz
Output power	50 mW $\pm$ 3 dB PERP
Transmit duty cycle	100%
Modulation format	3K20A3X (2K00A2A during Morse "V" Tx)
Modulation frequency sweep	1250 Hz to 322 Hz (fixed 1 kHz tone during Morse "V" Tx)
Modulation duty cycle	41% $\pm$ 5%
Sweep repetition rate	3 Hz $\pm$ 1 Hz
Sweep direction	Programmable UP or DOWN
GPS receiver/engine	
Centre frequency	Band L1 1.57542 GHz
Received signal sensitivity	-175 dBW minimum
Satellites tracked (max)	12
Transmit antenna	
Type	Vertical PCB monopole
Characteristics	Vertically polarised, omni-directional
Receive antenna	
Type	Ceramic dielectric patch
Characteristics	RH circular polarised, gain +3 dBi nominal
External interfaces	
Programming interface	IR link to PC serial port
Manual activation	Push-to-make switch with tamper cover
Self test/Manual deactivation	Push-to-make switch

Visual strobe (nominal values) 23 FPM , 0.75 Cd over 75% of horizontal plane

#### Physical characteristics

Weight	3.5 kg (Capsule); 2.7 kg (Bracket)
Height (capsule)	481 mm
Diameter (capsule)	267 mm max
Buoyancy	Buoyant
Sealing	Waterproof to 10 m immersion

#### Communications

Time to first transmission	2 minutes
Typical time to alert	LEOSAR: 90 minutes*    GEOSAR: 05 minutes*

Position accuracy  
\* COSPAS-SARSAT published figures

120 m typical

DRAFT for information only

## 9. Dimensions

