



PRODUCT SUPPORT MANUAL

Y1-03-0126
Rev. E

ACR/SATELLITE 406™

**Emergency Position Indicating
Radio Beacon**

**Product No. 2754 Cat. I, Class 2
Product No. 2758 Cat. II, Class 2
Product No. 2756 Cat. I, Class 1
Product No. 2759 Cat. II, Class 1
Product No. 2772 Cat. 1, Class 1
Product No. 2773 Cat. 1, Class 2**

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***** WARNING *****

**THIS TRANSMITTER IS AUTHORIZED FOR USE
ONLY DURING SITUATIONS OF GRAVE
AND IMMINENT DANGER**

**DELIBERATE MISUSE MAY
INCUR A SEVERE PENALTY**

Advice to owners of Emergency Position Indicating Radio Beacons (EPIRBs)

Registration of 406 MHz satellite EPIRB with the EPIRB Registration Section of the *national authority** 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 upon 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 national authority. The original card must still be mailed to the *national authority** 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 *national authority** by letter, facsimile or telephone, of the name and address of the new owner.

The subsequent owner of the beacon is required to provide the *national authority** with the information as shown on the owner Registration Card.

This obligation transfers to all subsequent owners.

**National Authority*

The term "national authority" appears throughout this manual. Wherever these words appear, reference is made to the government body responsible for EPIRB registration for the country in which the vessel is registered. The addresses for various national authorities can be found on the Registration Card appropriate for your vessel.

The national authority in the U.S.A. is NOAA. The NOAA registration telephone no. is 1-888-212-7283 (toll free).

Note: In the U.S.A. please use the enclosed FCC FORM 506 to modify your radio station license if necessary. For information on whether you need a radiostation license, call 1-888-CALLFCC (toll free)

NOTES:

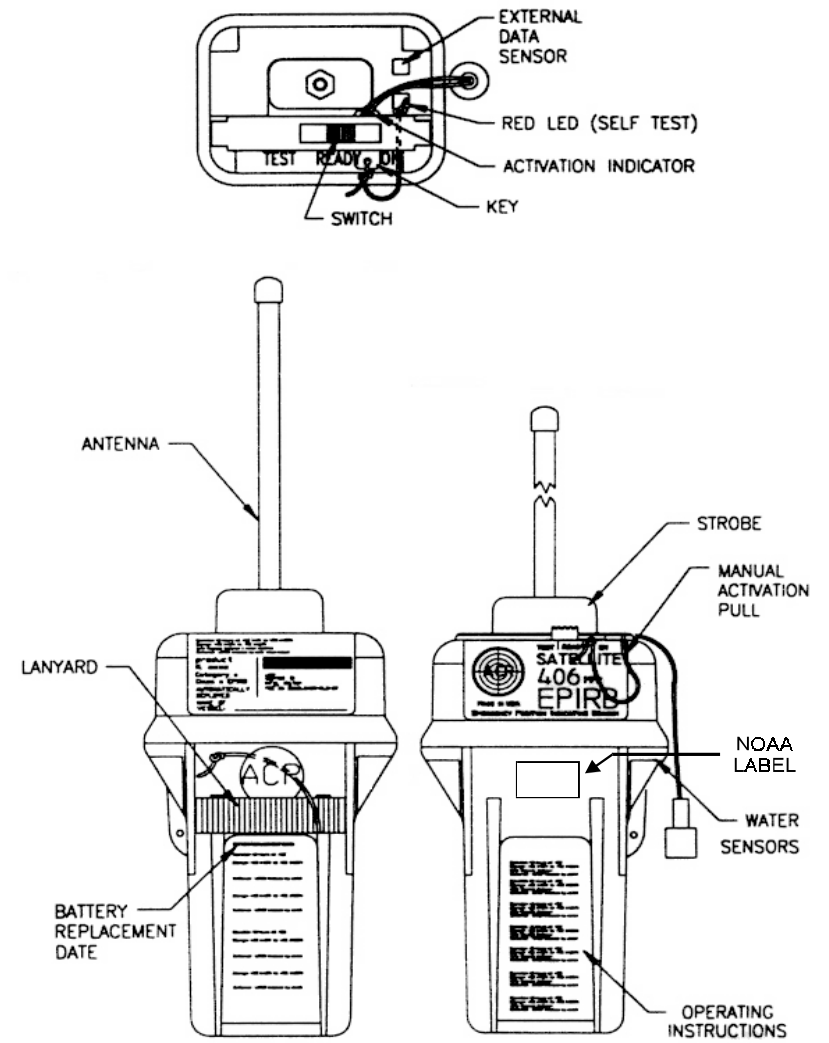


FIGURE 2: ACR/RLB-27 SATELLITE EPIRB

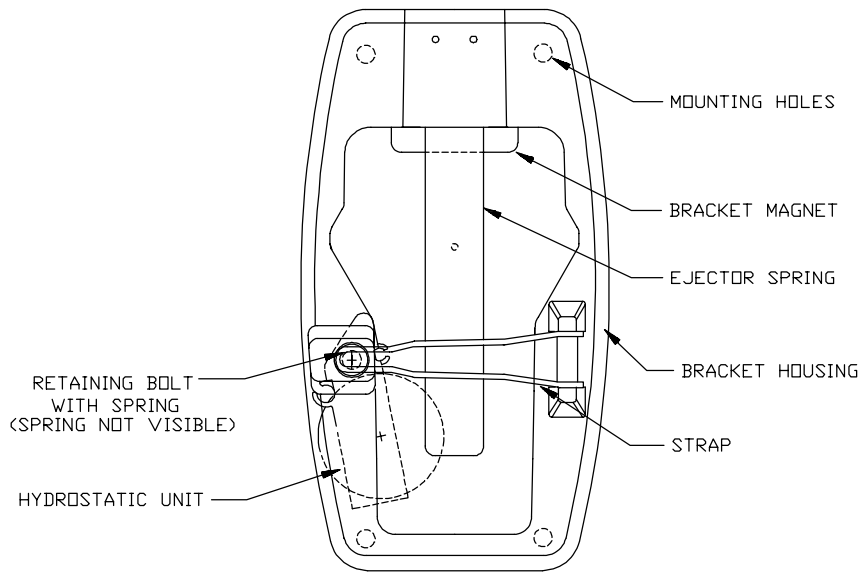


FIGURE 3: AUTOMATIC RELEASE MOUNT BRACKET

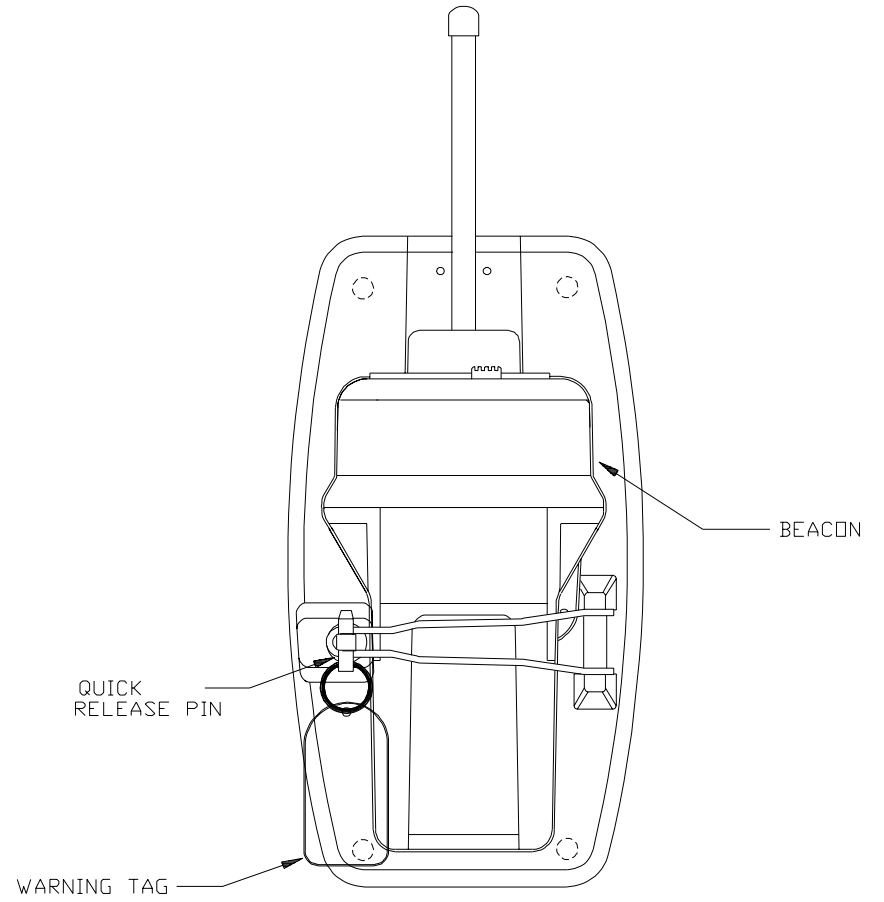


FIGURE 4: BEACON IN AUTOMATIC RELEASE BRACKET

approved shipping carton or for return shipment instructions refer to the nearest dealer or contact ACR Electronics, Inc. Service Department.

5.0 REGISTRATION

5.1 It is imperative that this EPIRB be registered with NOAA (National Oceanic and Atmospheric Administration) in the USA or with your own national authority.

The EPIRB has been programmed with a unique identification number or code which is broadcast on 406 MHz. Registration provides the Search and Rescue people with important information which will speed up the rescue operation and minimize false alarms.

5.2 To register this EPIRB with NOAA (USA registration only), simply fill out and mail the provided form in the enclosed pre-addressed envelope to NOAA or fax the completed form to NOAA at (301) 457-5406.

5.3 NOAA will supply a Beacon Registration decal which is to be affixed to the Satellite 406™. The recommended mounting location is on the front of bottom case above the instruction label. (See *Figure 2*)

6.0 FALSE ALARMS

6.1 Should there be, for any reason, an inadvertent activation or false alarm, it must be reported to the nearest search and rescue authorities. The information that should be reported includes the satellite EPIRB Unique Identifier Number (UIN); date, time, duration, and cause of activation; and the location at the time of activation.

6.2 Contact the following to report false alarms (US):

Atlantic Ocean/Gulf of Mexico—

USCG Atlantic Area Command Center Tel: (212)668-7055

Pacific Ocean Area—

USCG Pacific Area Command Center Tel: (510)437-3700

From any location—

USCG HQ Command Center Tel: (800)323-7233

*****WARNING*****

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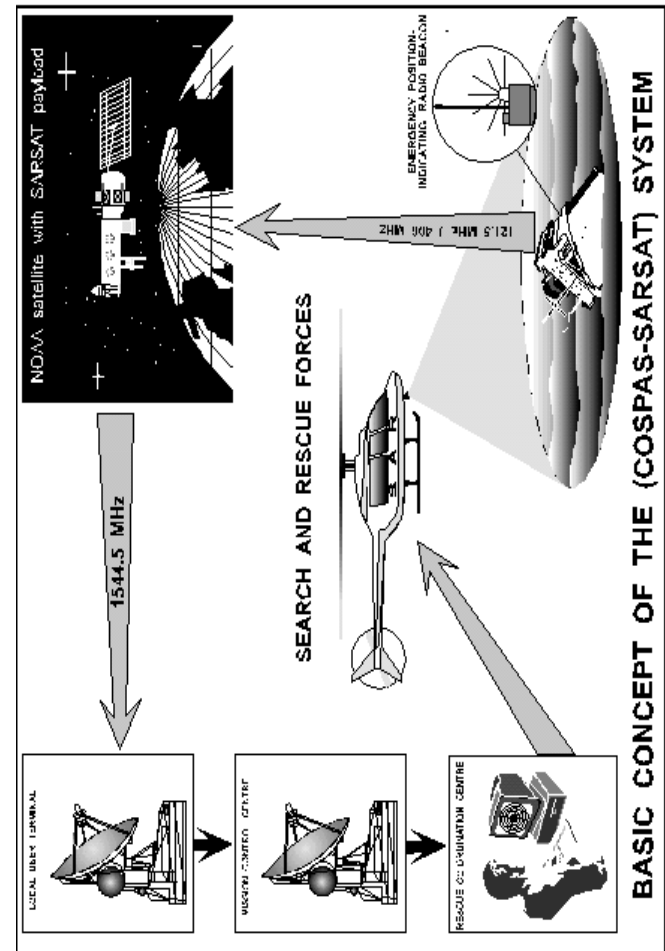


FIGURE 1: SATELLITE DETECTION

3.4 MANUAL ACTIVATION WITHOUT DEPLOYMENT

3.4.1 The **Satellite 406™** can be activated while still in its bracket by removing the blocking key. Activation by this method overrides all sensors and turns the beacon “ON”.

The caution note above still applies.

3.5 DEACTIVATION

3.5.1 The **Satellite 406™** can be deactivated by:

If manually activated:

1) Sliding the switch to the ready position and reinserting the blocking key,

If automatically activated

1) Removing the beacon from the water. The beacon normally takes up to 20 seconds to deactivate.

2) Placing the beacon back into the release bracket,

3.5.2 If the beacon continues to operate after it has been deactivated, remove the four screws holding the unit together and unplug the battery to disable the unit.

Return it to a service center for repair.

3.6 TEST

3.6.1 The **Satellite 406™** can be tested in or out of the release bracket. A Self Test is initiated by sliding the switch to the TEST position and releasing it after the beacon beeps. The red light will flash then there is a 5 second pause before the testing begins. The sequence of tests is:

1. Check Data Integrity Beep if passed
..... Stop if failed
2. Check 406 MHz Synthesizer Beep if passed
..... Stop if failed
3. Check RF Power/Battery Beep if passed
..... Stop if failed
4. Turn on red light to indicate Successful Test.
5. Flash Strobe Light to test Strobe.

A successful test result is indicated by three beeps, the red light flashes then the strobe light flashes.

NOTE: The homing beacon at 121.5 MHz is inhibited during self test.

3.6.2 It is strongly recommended to test the **Satellite 406™** on a quarterly basis.

4.0 MAINTENANCE (Check antenna for tightness)

4.1 At least every ninety days, the float free mounting bracket and **Satellite 406™** EPIRB should be inspected for deterioration and/or buildup that may affect the function of the beacon or automatic release.

Also carefully inspect the EPIRB case for any visible cracks. Cracks may admit moisture which could falsely activate the beacon or otherwise cause a malfunction. Any cracking observed should be immediately referred to ACR for evaluation, (1-800-432-0227 Ext. 112)

4.2 Clean the beacon and the mounting bracket to remove residue buildups. It is recommended that the mounting bracket be waxed with a high quality marine wax.

4.3 The hydrostatic release must be replaced by the date indicated on the float free mounting bracket. The hydrostatic release can be replaced by removing the Beacon from the bracket, unscrewing four (4) screws to remove top piece of bracket. Then unscrew the release rod and remove hydrostatic release out of the mounting bracket. Insert the new hydrostatic release and secure it with a new release rod. Replace the top piece and beacon into the mounting bracket.

4.4 The battery must be replaced by the date indicated on the beacon. At each inspection, check the time remaining until replacement is required.

NOTE: There are no user serviceable items inside the EPIRB. DO NOT OPEN THE EPIRB UNLESS TO DISABLE IN CASE OF FAULTY ACTIVATION. Refer all long life battery replacement and other internal EPIRB service to a factory authorized service center.

For the nearest location of a factory authorized service center, call 1-800-432-0227 Ext. 112 (toll free).

4.5 The **Satellite 406™** contains lithium batteries and as such are considered hazardous goods for shipping purposes. Special packaging and labeling are required by the Department of Transportation. Every effort should be made to obtain and save the original DOT approved shipping carton. Should you need to obtain a DOT

recommended.

- 2.1.5 Do not mount the Satellite 406™ in the vicinity (2 meters) of strong magnetic (such as loud speakers) or electric (such as radar or high power radio transmitter) fields.
- 2.1.6 Consideration should be given to mounting the Satellite 406™ in a vertical (antenna upward position). In certain circumstances, such as medical emergencies or disabled vessels, manual activation of the EPIRB for location and homing purposes is sometimes requested. Mounting in this orientation provides the best homing signal.

2.2 VISUAL INSPECTION

- 2.2.1 Visually inspect the area surrounding the mounting bracket installation site for hidden hazards, obstacles, etc., that may have been overlooked during selection. If there is any doubt as to the ready accessibility to the beacon at all times or if any condition may appear to be questionable, make complete and thorough investigation before making final approval of the installation.

SECTION 3 - OPERATION

3.1 GENERAL

- 3.1.1 The **Satellite 406™** Beacon Models 2754, 2756, 2772, and 2773 are designed to be automatically deployed and activated. The **Satellite 406™** may also be hand held on the deck of vessels, or floated in water and attached to a raft or life vest with the lanyard provided. The **Satellite 406™** is designed to operate best while floating in water. Hand held operation should be avoided when possible. Do not operate inside liferaft or under any similar cover or canopy.
- 3.1.2 The **Satellite 406™** Beacon can be deployed and activated manually in any of the available products.
- 3.1.3 Because many users failed to properly place earlier generation beacons in the “ARMED” or “READY” positions when installing them in their brackets, U.S. and International specifications require the elimination of the “OFF” switch position and the inclusion of sensors to automatically activate the beacon under specific conditions.

The **Satellite 406™** is equipped with sensors to detect when it is

no longer in its bracket (a deployment condition) and other sensors to determine if its in water.

Two conditions must be satisfied for the **Satellite 406™** to automatically activate:

- 1) It must be out of its bracket,
- 2) It must be in the water,

Note: Either condition by itself will *not* activate the beacon.

- 3.1.4 The **Satellite 406™** is also designed to allow the user to perform periodic testing while EPIRB is in the release bracket to assure a functioning beacon.
- 3.1.5 Place the **Satellite 406™** Product No's 2754 and 2756 into the release bracket with the coiled lanyard inward. Fold the capture arm over the beacon and onto the release rod eyelet. Place the retaining pin through the eyelet. The beacon should now be firmly held in the release bracket and ready for automatic deployment.

3.2 AUTOMATIC DEPLOYMENT & DEACTIVATION

(Product No's 2754 & 2756 only)

- 3.2.1 Automatic deployment and activation occurs when the vessel sinks and a hydrostatic release device frees the beacon from the bracket allowing it to float to the surface. Built-in sensors detect that the beacon is no longer in its bracket and is in water. This condition will automatically activate the beacon.

Note: Transmissions of the 121.5 MHz signal will begin immediately while the first 406 MHz transmission will not occur until 50 seconds later.

3.3 MANUAL DEPLOYMENT & ACTIVATION

- 3.3.1 The **Satellite 406™** can be manually deployed by removing the retaining pin, then removing the beacon from the mount. *It is best to hold one hand against the beacon when removing the retaining pin to prevent the ejector spring from tossing the beacon.* Once removed from the bracket, the beacon can be activated by placing it in water or by pulling the red lanyard to break the yellow key, remove the yellow key and move switch to “ON” position.

Note: Activating the beacon by removing the yellow blocking key will cause a tear in the end of the key. Some countries fine vessel owners for causing false alarms. The permanent change to the blocking key is a positive indicator of a manual activation.

Duty Cycle	37.5%
Antenna	
Frequency	406.025 & 121.500MHz
Polarization	Vertical
VSWR	Less than 1.5/1

Xenon Strobe

Light Color	White
Output Power	0.75 effective candela
Flash Rate	20—30 per minute

General/Environmental

Battery Life	
Operating	48 hours minimum
Replacement Interval	5 1/2 years
Size	
EPIRB less Antenna	8.92" (22.66cm)
Antenna	5.65" (14.35cm)
Material, EPIRB	High impact and UV resistant plastic
Color	International Orange
Weight	2.2 lbs.
Temperature Range	
Operating	Class I -40°C to +55°C
	Class II -20°C to +55°C
Stowage	Class I -40°C to +70°C
	Class II -30°C to +70°C

Mounting Case (Product No's 2754 & 2756 only)

Construction	White High Impact and UV resistant plastic
Size	6.5" x 11.15" (16.51 cm x 28.32 cm)
Release System	Hydrostatic with manual override

Optional Mounting Brackets are available for Product No's 2758 and 2759.

Mounting Case - Sea Shelter (Product No's 2772 & 2773)

Construction	White High Impact and UV resistant plastic
Size	6.5" x 17" (16.51 cm x 43.18 cm)

Release System	Hydrostatic with manual override
<u>Hydrostatic Release Kits</u>	
No. 9323	Satellite 406 hydro release kit
No. 9333	Hydro release kit for Sea Shelter
<u>Replacement Kits</u>	
No. 9342	Pull Tab assembly Replacement Kit RLB-27/28
No. 9344	Release Tag Replacement Kit, Bracket RLB-27

SECTION 2 - INSTALLATION (Attach antenna tightly onto unit)

2.1 MOUNTING LOCATION (PRODUCT NO'S 2754, 2756, 2772 & 2773))

2.1.1 The **Satellite 406™** float-off mounting bracket should be mounted securely to a *vertical or horizontal surface* (the mount has predrilled holes for attachment to a flat surface) where there are no overhead obstructions. Location aboard a vessel must be chosen to allow the EPIRB to float free of sinking craft and as high as possible especially on small vessels. This will help ensure operation of the hydrostatic release unit in the event the vessel capsizes without sinking.

2.1.2 The location selected must be sufficiently rigid to support the weight of the total installation and at the same time consider vibration, exposure to the elements, exposure to surrounding hazards such as equipment movement, doors being opened, accidental covering, personnel traffic, etc., and yet be readily accessible at all times for the emergency use for which the beacon is intended.

2.1.3 Also to be considered in selecting a location for installation is the harmful effect that certain corrosive vapors might have on the beacon. Under no circumstances should a location be selected for installation where the beacon would be jeopardized by any foreign articles being temporarily or permanently emplaced during “at sea” or “in port” activities.

CAUTION: Care must be taken to prevent any lanyard, line, or other emergency equipment that may be attached to the beacon from becoming entangled or fouled which could prevent the beacon from being removed in an emergency.

2.1.4 The **Satellite 406™** float-off mounting bracket should be securely attached to the vessel. The use of #10 stainless steel hardware is

as well as being stored for later transmission to other LUTs. In the real-time mode, the signal detection is limited to a mutual EPIRB-satellite-LUT circular visibility area of about 2500 km radius that moves with the satellite along its track. However, because of the stored-mode capability at 406 MHz, the need for this mutual EPIRB-satellite-LUT visibility is not essential, and the system is fully functional in just the global mode.

- 1.3.4 The LUT processes the Doppler-shifted signal and determines the location of the satellite EPIRB; then the LUT relays the position of the distress to a Mission Control Center (MCC) where the distress alert and location information is immediately forwarded to an appropriate maritime Rescue Coordination Center (RCC). The RCC dispatches Search and Rescue (SAR) forces.
- 1.3.5 The COSPAS-SARSAT System includes 33 LUTs and 19 MCCs that provide real-time as well as global-mode coverage for the northern hemisphere, while the southern hemisphere is presently served primarily by the global mode. Additional LUTs and MCCs are planned for installation in the near future both in the northern and southern hemispheres.
- 1.3.6 Because most of the search and rescue forces presently are not equipped to home on the 406 MHz Satellite EPIRB signal, homing must be accomplished at 121.5 MHz.
- 1.3.7 The **Satellite 406™** EPIRB is available for all of the combinations for category and class of operations. The following product codes determine the options required to meet the specific mode of operation:

Product No.	Cat. I	Cat. II	Class 1	Class 2
2754	X			X
2756	X		X	
2758		X		X
2759		X	X	
2772	X		X	
2773	X			X

1.4 AUTHORIZATIONS

- 1.4.1 The **Satellite 406™** EPIRB meets the requirements of Federal Communications Commission (FCC) Part 80 (Model No.'s RLB-27 and RLB-28) and GMDSS (Model No. RLB-27).

1.5 CHARACTERISTICS

- 1.5.1 The **Satellite 406™** EPIRB is a floatable, battery operated unit. The beacon case, with its external antenna, is waterproof. The semiconductor circuits are mounted within the case assembly that also contains the battery power supply. A “Test/Ready/On” switch is installed on top of the beacon, along with a strobe light. The beacon must be stored in its special mount, free of obstructions aboard a vessel for automatic float-off. The unit is self buoyant and no external floatation devices are required.

1.6 TECHNICAL DATA — Satellite 406™

1.6.1 Applicable Documents

RTCM	Standard for 406 MHz Satellite EPIRBs
COSPAS-SARSAT FCC	Document C/S T.001 Nov. 95 Part 80 (Model No.'s RLB-27 and RLB-28) and GMDSS (RLB-27)
UK	MPT 1259

1.6.2 Specifications

406 MHz Transmitter

Frequency	406.025 MHz
Frequency Stability	±2 parts per billion/100ms
Output Power	5 watts
Digital Message Format	Serialized*
Duration	440ms
Rate	400 bps
Encoding Modulation	Biphase L ± 1.1 radians peak

*Leaves ACR with Serialized U.S. code but can be reprogrammed at a service center to Maritime or other coded format including nationality of registration.

121.5 MHz Transmitter

Frequency	121.5 MHz
Frequency Tolerance	±50 ppm
Output Power	25 mW PEP
Modulation Type	AM (3K20A3N)
Sweep Range	400 to 1200 Hz
Sweep Rate	3 Hz

SECTION 1 - THE SYSTEM

1.1 GENERAL

1.1.1 This manual provides installation, operation and maintenance instructions for the **Satellite 406™** Emergency Position Indicating Radio Beacon, hereinafter referred to as the Beacon. This section describes the characteristics and details of the Beacon System. The FCC authorizes the use of 406 MHz Radio Beacons by any ship that is also equipped with a VHF Ship Station. This will make the 406 MHz Radio Beacon available for use on most U.S. ships and boats. EPIRB carriage requirements are contained in USCG regulations.

1.2 PURPOSE

1.2.1 The **Satellite 406™** Beacon provides distress alerting via radio transmission on 406 MHz to satellites of the COSPAS-SARSAT network. The message transmitted by the **Satellite 406™** is unique for each EPIRB, which provides identification of the transmitter through computer access of registration files maintained by the National Oceanic and Atmospheric Administration or other national authority. **It is the users responsibility to fill out and mail the enclosed registration form to the appropriate agency of the country under which the vessel is registered.** US flagged vessels send the enclosed NOAA/NESDIS form to NOAA in the stamped envelope provided. For vessels registered in other countries, the **Satellite 406** must be reprogrammed by an ACR authorized programming facility for the registered country. **Remember**, if your EPIRB is **not registered**, SAR Authorities do not know who you are, what type of vessel, your home port, or where to contact anyone who might know anything about your situation.

1.2.2 Once Search and Rescue (SAR) forces are alerted by the **Satellite 406™** signal (406 MHz), relayed through the COSPAS-SARSAT network, they can converge on the position estimated by the satellite. Intermediate and short range location is aided by the **Satellite 406™**'s on board radio beacon transmitter (121.5 MHz) and high intensity xenon strobe light.

1.2.3 Model numbers 2754, 2756, 2772, and 2773 of the **Satellite 406™** may be deployed and activated automatically by the built-in hydrostatic float free release. Once free from the release

bracket, the **Satellite 406™** will automatically turn on if the water sensors are wet. Alternately, the **Satellite 406™** can be manually activated by pulling the red lanyard to break the yellow key, remove the yellow key and move switch to "ON" position.

1.2.4 Power is provided by self contained long life batteries with five and one half year recommended replacement cycle.

1.2.5 Self test (Section 3.2 and 3.3) is initiated by momentarily moving the switch to the test position. During self test, an actual satellite message is transmitted while certain key performance parameters are measured and recorded. The self test message is modified such that the satellite will not forward an alert message during self test. The red LED will light to indicate correct test status. The strobe light will also flash as a test.

1.3 SATELLITE DETECTION

1.3.1 The **Satellite 406™** constitutes the satellite EPIRB portion of the COSPAS-SARSAT System. The system was developed and implemented by the COSPAS-SARSAT Partners (Russian Federation, Canada, France and the United States).

1.3.2 COSPAS-SARSAT is an international system that uses Russian Federation and United States low altitude, near-polar orbiting satellites that assist in detecting and locating activated 121.5/243 MHz EPIRBs and 406 MHz Satellite EPIRBs. The Russian Federation provides aboard COSMOS navigation spacecraft COSPAS payloads that are inter-operable with the SARSAT System. In addition to weather and environmental sensors, SARSAT payloads, provided by Canada and France, are carried aboard the United States National Oceanic and Atmospheric Administration's (NOAA's) Advanced TIROS environmental satellites. (See Figure 1: Satellite Detection)

1.3.3 COSPAS and SARSAT satellites receive distress signals from satellite EPIRBs transmitting on the frequency of 406.025 MHz. The COSPAS-SARSAT 406 MHz satellite EPIRB signal consists of a transmission of non-modulated carrier followed by a digital message format that provides identification data. The 406 MHz system uses spacecraft-borne equipment to measure and store the Doppler-shifted frequency along with the satellite EPIRB digital data message and time of measurement. This information is transmitted in real time to an earth station called the Local User Terminal (LUT), which may be within the view of the satellite,