COSPAS-SARSAT Search and Rescue System

1) Beacon Activated due to grave and imminent danger

2) Distress signals received by COSPAS-SARSAT satellites

3) Alerts re-transmitted to automated ground stations called Local User Terminals (LUTs)

4) Mission Control Centers (MCCs) receive alerts from LUTs, process the signals and forward them to RCCs (NOAA operates U.S.MCC)

5) Rescue Control Centers (RCCs) verify distress and alert nearest Search and Rescue units

6) Search and Rescue units go to the scene and take care of victims

The difference between 121.5 MHz and 406 MHz emergency beacons:

BEACON TYPE	121.5 MHz	406 MHz
Beacon Identification	None	Unique ID number
Location Accuracy	12 miles	2 miles
Coverage	Local	Global
Signal Power	0.1 Watt	5 Watts
Signal Type	Analog	Digital
Alert Time (minimum)	2 hours	Instantaneous
Doppler Location	Two Passes	Single Pass
GPS Location	None	100m Accuracy

ELTs and EPIRBs

Transitioning from 121.5 MHz to 406 MHz

Your life could depend on it!

"It is all about time... The sooner we know you're in distress, where you are and who you are, the sooner help can get underway."

Ajay Mehta, SARSAT Program Manager,
National Oceanic and Atmospheric Administration (NOAA)

Make the switch to 406!












Search and rescue satellites save lives

In September 1982 another milestone in the history of space was made when the first emergency distress beacon signal from a downed aircraft was picked up by a low earth-orbiting satellite. Three people were saved. Today, over 20 years later, the number of rescues* attributed to the existence of search and rescue satellites number in the thousands worldwide.

This search and rescue satellite system, called COSPAS-SARSAT, is international in scope, operates 24 hours a day, 7 days a week and is free of charge to anyone in distress. The National Oceanic and Atmospheric Administration (NOAA) is responsible for operating and maintaining the system in the U.S.. NOAA works with the U.S. Coast Guard for maritime search and rescue (SAR) incidents and the U.S. Air Force for inland SAR incidents. It has proven to be an indispensable tool for search and rescue in the United States and around the world.

How emergency distress beacons work

Emergency distress beacons are essentially specialized radio transmitters. Search and rescue satellites, thousands of miles above the earth, can "hear" even faint distress signals radiating up from these beacons; signals that might not otherwise be heard by land-based receivers or over-flying aircraft. Knowing there is a distress and getting there fast is vital both to survivors and rescue personnel. It can mean the difference between life and death. Emergency beacons provide that capability. For example, a satellite would hear a downed aircraft's distress beacon in most cases, before the plane was even reported overdue.

**A rescue is recorded any time COSPAS-SARSAT is used as the primary means of alerting or locating during a rescue*

Different types for different applications

There are three types of distress beacons: EPIRBs (Emergency Positioning Indicating Radio Beacons) for use in the maritime community, ELTs (Emergency Locator Transmitters) found on aircraft and PLBs (Personal Locator Beacons) for individual use. EPIRBs and ELTs are capable of automatic activation, where PLBs can only be set off manually.

121.5 MHz distress frequency to be dropped – *Remember this date!*

At present there are two internationally sanctioned satellite alerting distress frequencies - 406 MHz (digital) and 121.5 MHz (analog). Older model EPIRBs and ELTs send a distress signal on only 121.5 MHz, which is little more than a homing signal. The newer, more advanced, models send out an encoded, digital 406 MHz frequency, which provides more accurate location and identification information. *PLBs are only available with 406 MHz capabilities.*

Important changes are coming soon for 121.5 MHz model beacon owners. As of February 1, 2009, the 121.5 MHz frequency band will no longer be processed by search and rescue satellites. The decision to drop processing of 121.5 MHz was made by the International Cospas-Sarsat Program with guidance from the United Nations. This was due to numerous signal reception problems, a high incidence of false alerts (over 99%) and a host of other limitations associated with the 121.5 MHz frequency.

Why just 406 MHz?

When search and rescue satellites were first launched, the digital 406 MHz frequency was introduced to work specifically with the system. In addition, the 121.5 MHz analog distress frequency band was also included due to its widespread use in aviation. Although it was initially a giant step forward in search and rescue, 121.5 MHz soon proved unreliable and prone to false alerts...and its limitations continue to this day.

It's all about time & location

NOAA's satellites detect hundreds of 121.5 MHz "hits" per day. 99% of them are false. False alerts are generated many ways. Some culprits include ATM machines, sports stadium scoreboards, and pizza ovens! Because of this unreliability, a 121.5 MHz hit must be independently verified to make sure that it is a real distress. This means delays in responding to calls for help while Rescue Coordination Centers (RCCs) work to verify that the distress is real. Poor signal strength from a 121.5 MHz beacon also means poor accuracy. Search areas can be as large as 12 to 15 nautical miles in radius, a lot of territory for search and rescue teams to cover and very time consuming.

406 MHz beacons, on the other hand, have proven superior performance capabilities. They transmit a much stronger signal, are more accurate, verifiable and traceable. 406 MHz distress signals can be accurately detected within a matter of minutes. Each 406 MHz beacon has a unique ID encoded within its signal. As long as the beacon ID has been registered (which is required by law), RCCs can quickly confirm that the distress is real, who they are looking for and where they should look. This means a search can be launched even before a final distress location has been determined. Position accuracy means the search area is less than 2 nautical miles in radius, which decreases the amount of time SAR teams must search. This adds up to a significant time saving and a major advantage over the 121.5 MHz beacons.

406 beacons and GPS

Some 406 MHz beacon models have been designed with the capability to utilize GPS technology. If the 406 MHz beacon carries a GPS receiver, either internally or externally connected, then the location of the distress can be known instantaneously and is even more accurate – to within 100 yards!

Start your transition now!

In anticipation of the February 1st, 2009 deadline, new beacon carriage regulations are coming into effect for both the maritime and aviation community. Some types of beacons are being phased out. For example: 121.5 MHz EPIRB (marine type) beacons can no longer be manufactured or sold in the U.S.. By 2005 certain categories of aircraft, depending on circumstances and use, will be required to carry a 406 MHz ELT. And by January 1st, 2007, it will be illegal to carry or use a 121.5 MHz EPIRB aboard any vessel in American waters. *Please note: 121.5 MHz Man Overboard Devices will still be legal for use beyond 2009.*

Using distress beacons properly

Emergency distress beacons are designed for use in situations of grave and imminent danger when lives are at risk. 406 MHz beacon registration is a vital part of providing a rapid response to distress incidents as well as mandatory by law in the U.S.. Contact NOAA to register your beacon either online or via the forms provided at the time of purchase. Intentional false activation can be punishable with fines of $250,000, imprisonment for six years and payment of all costs associated with the rescue.

For Further information:

The following web sites contain more detailed information, links to related sites as well as answers to frequently asked questions (FAQs) on the COSPAS-SARSAT satellite system, emergency distress beacons and what to do in the event of an emergency:

NOAA - Search And Rescue Satellite Aided Tracking Program:
www.sarsat.noaa.gov

United States Air Force Rescue Coordination Center:
www.2.acc.af.mil/afrcc/

United States Coast Guard Office of Search and Rescue:
www.uscg.mil/hq/g-o/g-opr/sar.htm

NASA Search And Rescue Mission Office:
http://poes.gsfc.nasa.gov/sar/sar.htm

International COSPAS-SARSAT Program:
www.cospas-sarsat.org/