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\$7.00US \$9.00CAN



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NOVEMBER/DECEMBER 2019

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## Of NEEDLES and HAYSTACKS

*In a crew-overboard situation, the latest emergency rescue gear goes a long way toward enabling a successful outcome.*

ELECTRONICS BY DAVID SCHMIDT

**W**hile safety tethers and lifelines are the first line of defense when it comes to keeping everyone on board, the hard-boiled reality is that people still end up in the water. Fortunately for sailors, electronic safety technologies have evolved to give those still on board a better chance of ensuring help is on the way. Here, then, is a look at the latest electronic emergency kits for cruisers.

When it comes to electronics and safety at sea, the conversation begins with emergency position-indicating radio beacons. These lifesaving devices are registered to the vessel—not its individual sailors—and broadcast on the 406 MHz and 121.5 MHz frequencies. Today's EPIRBs have a 360-degree strobe light

and, depending on the model, they can be activated manually or triggered hydrostatically.

Once active, EPIRBs transmit a satellite distress message on the 406 MHz frequency for a minimum of 48 hours. These signals are received globally by satellites operating on the International Cospas-Sarsat Programme's three satellite networks: Low-Earth Orbiting Search and Rescue, Geostationary Orbiting Search and Rescue, and the still-being-completed Medium-altitude Earth Orbiting Search and Rescue. When picked up by the satellites, distress signals are relayed down to ground-based local user terminals. The LUTs determine the beacon's location (see below) and pass this data along to Cospas-Sarsat's central mission control

center, which generates an alert message that's sent to the geographically correct rescue coordination center. It, in turn, attempts to contact the EPIRB's registered user (and/or their emergency contacts), while also dispatching a search-and-rescue team. Once on scene, rescuers use specialized homing equipment to follow the EPIRB's 121.5 MHz signal for their "final-mile" search.

Almost all contemporary EPIRBs include a high-performance, multichannel GPS receiver that allows the beacon to bundle its location information with its 406 MHz emergency signal, but, should this fail (or if an EPIRB doesn't have GPS capabilities), the Cospas-Sarsat network can calculate the beacon's position using Doppler processing. While effective, it can take several satellite passes to achieve a proper fix because each satellite network handles data differently. MEOSAR and GEOSAR, for instance, deliver much quicker service than the older LEOSAR network.

Attentive readers will know that GPS, or the Global Positioning System, is part of the Global Navigation Satellite System, which also includes

satellites from the European Union's Galileo network, Russia's GLONASS system and China's BeiDou constellations. Next-generation EPIRBs and other devices (more on these in a minute) that operate on both the GPS and Galileo networks are expected to reach chandlery shelves by late 2019 or early 2020, and will enable faster, more precise signal reception and tracking. This capability will also allow the system to deliver a reassuring (and possibly lifesaving) Return Link Service (RLS) to the EPIRB. (This feature is forecast to go live in late 2020.)

"RLS sends a signal back along the search-and-rescue ecosystem to the 406 MHz beacon that originated the distress alert," says Sean McCrystal, the senior maritime marketing manager at Orolia Maritime, the manufacturer of the McMurdo, Kannad and Netwave brands. "The signal flashes on the beacon to confirm that the distress alert has been received and that help is being organized. This reassurance signal allows those in distress to make decisions based on a better understanding of their situation." The hope is that it will reduce fatalities from people taking misguided risks based on a lack of information and feeling they have nothing else to lose, he adds.

### TWO IN ONE

While Cospas-Sarsat has been credited with saving more than 46,000 lives since 1982, one obvious shortcoming is that other nearby vessels, which are often significantly closer to the scene than the United States Coast Guard or other responders and therefore able to render help faster, are electronically blind to unfurling emergencies. Because of this, McMurdo introduced its revolutionary Smartfind G8 AIS in fall 2018, which was the first combined AIS and Galileo-enabled EPIRB. As its suggestive moniker implies, this EPIRB transmits



on 406 MHz, 121.5 MHz and Automatic Information System frequencies. AIS broadcasts are transmitted over specific VHF channels and can alert all nearby boats, much as a mayday broadcast might. This allows all AIS-equipped vessels that are within VHF range of the EPIRB to receive its distress signal, including vessel name and Maritime Mobile Service Identity calling information, as well as the location of the beacon.

As of this writing, the Smartfind G8 AIS is the only commercially available EPIRB with AIS capability, however other brands are expected to soon offer similar technologies. While these next-generation EPIRBs are more expensive than standard beacons that don't offer Galileo and RLS capabilities, they afford a considerably wider safety net. Because of this, sailors with older, non-GPS-enabled EPIRBs are highly encouraged to upgrade their location device.

#### GETTING PERSONAL

While EPIRBs are registered to a particular vessel, sailors can also buy and carry individually registered personal locator beacons. Similar to EPIRBs, PLBs operate as part of the Cospas-Sarsat program and transmit on the 406 MHz and 121.5 MHz frequencies; they also include an LED strobe light, which can help those still on board locate and rescue a missing mate.

Once manually activated—and provided that a user has properly registered their beacon—it will transmit an individually registered user identification number along with its 406 MHz emergency signal. Users can (and should) update their registration profiles to include their specific cruising itineraries, names of their shipmates, medical information and emergency contacts, all of which help authorities hasten rescue times.

Modern PLBs come with GPS/GNSS capabilities as well. As mentioned, the ability to

operate on Galileo satellites delivers faster, more-precise signal reception and tracking; next-generation PLBs that will leverage multiconstellation compatibilities and also deliver RLS reassurances are expected to hit the market by late 2020.

“We’re at the mercy of satellite networks for RLS, which is actually run through Galileo GNSS satellites, and which works in conjunction with MEOSAR,” explains Mike D’Arcangelo, ACR’s vice president of global marketing and product development. The first successful RLS test

It’s worth noting that RLS capabilities won’t be backward compatible with older-generation beacons that lack a blue LED flasher (or screen), so sailors wanting this extra level of assurance will need to purchase a new device. While not cheap, reluctant spenders are reminded that the new beacons will also deliver other advantages. “They also have the benefit of the ‘cannon effect,’ where the greater number of listening satellites improves detection in high-sided areas near cliffs, where previously a signal may not have been

automatic activation, battery use and SAR notification requirements,” McCrystal says. He’s optimistic, though, that regulations will soon change. Until then, D’Arcangelo and McCrystal recommend that sailors carry both a PLB and a personal AIS transmitter, and keep their PLBs registration information up to date.

#### HEY, HELP!

In many crew-overboard situations, it’s easy to see why a personal AIS transmitter would prove invaluable. These devices contain their own GPS receivers, and therefore can determine the exact location of the person in the water, once activated. Turned on, they alert all nearby Class A and Class B AIS users that a crew member has gone missing and will broadcast the location of the person continuously at a rate of once per minute for typically 24 or more hours.

Reach, of course, is limited to VHF range (up to about 5 nautical miles, depending on conditions).

Once received, any AIS-capable chart plotter on nearby vessels will initially display an “MOB Active” message that’s quickly replaced with location information, which appears as a special active AIS icon (sometimes a red circle with a cross, depending on the plotter). On some systems, receipt of an active AIS MOB signal can also trigger onboard auditory and visual alarms, further drawing attention to the emergency. Some devices can even trigger Digital Select Calling alarms, says ACR’s D’Arcangelo. These are similar to the emergency DSC buttons found on many of today’s VHF radios. This feature is included on ACR’s AISLink and OceanSignal MOB<sub>i</sub> devices; it allows DSC-enabled VHF users to receive the emergency information (including position information) via their radio, even if they don’t carry AIS.

Both PLBs and personal AIS transmitters are intended to be carried by crewmembers



**Safety comes in a variety of packages (clockwise from top left): the McMurdo Fast Find 220, ACR’s PLB 425, Weems and Plath’s CrewWatcher, and McMurdo’s SmartFind G8.**

using a PLB took place in May 2019. Once operational, an activated RLS-enabled beacon will begin flashing a dedicated blue LED light next to its RLS icon to indicate that Cospas-Sarsat has received the signal; additionally, some PLBs, such as the newer ACR models, feature a digital screen that displays pre-scripted readouts such as “message received.”

obtained,” McCrystal says. Cruisers, he adds, should invest in this technology as they would move from analog to digital television.

Finally, as with EPIRBs, PLBs leave those still on board electronically blind. “PLBs with AIS are yet to be approved by Cospas-Sarsat because of the complexity of PLB regulation in relation to



at all times, and are designed to fit neatly into pockets and inflatable life jackets.

#### TETHERED CREW

Recent years have seen marine-electronics companies leverage Bluetooth capabilities to create next-generation overboard alarms that are aimed at self-rescue rather than a Cospas-Sarsat response. A pioneering example of this is Weems and Plath's CrewWatcher, which uses a small, pocket-friendly beacon (hint: it's also dog-collar friendly) and a smartphone app. Should someone fall overboard, the radio-frequency link between the beacon and the smartphone is broken when the beacon is submerged or separated by distance, triggering an alarm on the phone. The phone also records its position at the time that the electronic tether snaps, and the app can navigate back to the scene of the splash.

Likewise, ACR's new

#### VENDOR INFORMATION

ACR: [acrartex.com](http://acrartex.com), \$75-\$810

Ocean Signal: [oceansignal.com](http://oceansignal.com), \$280-\$810

Kannad: [orolia.com](http://orolia.com), \$250-\$1,400

Netwave: [orolia.com](http://orolia.com), \$500-\$800

McMurdo: [orolia.com](http://orolia.com), \$250-\$1,400

Fell Marine: [fellmarine.com](http://fellmarine.com), \$200

Weems and Plath: [weems-plath.com](http://weems-plath.com), \$90-\$170

Overboard Location Alert System offers comparable capabilities, starting with the OLAS Crew Tag. These tidy, wrist-worn pendants house a small, waterproof Bluetooth transmitter that electronically pairs with ACR's app. The app tracks Crew Tags within a

50-foot radius. Should a Crew Tag break RF contact with the smartphone, the app marks the tag's location and provides return routing. The company's OLAS Float On offers similar capabilities as the Crew Tag but with an LED flashlight, a strobe and a rechargeable battery.

One idea for cruisers who are reluctant to buy a PLB and an AIS MOB is to instead carry a PLB and a Bluetooth device. "We're going to bundle OLAS products with PLBs," D'Arcangelo says. "It's the fastest and easiest way to turn a PLB into a real MOB alarm." While this setup would serve to alert one's own vessel of a crewmember-falling-overboard event, prospective buyers need to understand that OLAS equipment can't contact other nearby vessels.

For anyone interesting in further marinizing an OLAS setup, ACR makes a USB-powered portable base station that can track every Crew Tag,

without relying on a phone. Also, D'Arcangelo says, ACR is working to make OLAS compatible with NMEA 0183 and 2000 networks, which will open the door to plotting OLAS-monitored MOB incidents on a networked chart plotter.

And for shorthanded or singlehanded cruisers who regularly start the motor when the air gets light, some of the next-generation Bluetooth and wireless systems also will offer engine kill switches. For example, Fell Marine offers a line of pendant-style beacons that can stop props, while ACR's OLAS Guardian offers a similar response.

Finally, for anyone who cruises on a large sailboat, ACR's OLAS Extender delivers signal-repeater capabilities and can expand the system to monitor up to 15 Crew Tags throughout the vessel.

*David Schmidt is CW's electronics editor.*



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