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Practical Sailor™

Survival at Sea

Part II of our series explores advances in SAR technology.

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ALSO IN THIS ISSUE

Opal, *an S&S-designed 1971 Yankee 30, hangs in the slings on survey day*

Introducing Sweet *Opal*

Twenty-one years ago, my planned four-year circumnavigation was going on its 11th year. (If you're young and broke, that's precisely how a four-year circumnavigation goes, trust me.) We were roaming around Phuket, Thailand when an enticing opportunity landed in my inbox. Friend and underwater cinematographer Peter Zuccarini had a proposition: Would I like to help him with script for a Disney documentary about sharks and volcanos? The pay for a couple week's work would keep us sailing for another year—and carry us across our next big obstacle, the Indian Ocean. The catch? My fiance Theresa and I would need to take the long flight back to the U.S. to collaborate on it.

While we were back in the states, life happened—as they say. I stumbled into a fun job as an editor *Cruising World*. Theresa and I got married. We sold our wooden double-ender and settled down to raise a family. A year later, our first son was born. The sirens had nabbed us good and hard. (I don't blame them, they're just doing their job.)

I knew enough about being a boating editor and the dark abyss of debt to steer clear of big boats for a while. By the time I'd mustered enough funds to rekindle big-boat dreams, I'd learned that a good parent doesn't fill his kids sails with their own aspirations. So the boat-dream money became kid-dream money, and it all worked out for the best. One son is a UChicago debater determined to solve all the world's problems. The other is a talented jazz drummer preparing for music school auditions. Nurturing either of these passions while cruising might have been possible, but imagine the scene that would have met us in every harbor—diesels cranking and anchor chain rattling aboard as the other cruisers made a hasty exodus toward a more tranquil spot.

So now, after sixteen years at the helm of *Practical Sailor*, life keeps happening. Son number two has his bass-pedal foot out the door, Theresa and I split apart to chase different horizons, and every few years doctors scrape rebellious cells off various organs and tell me not to fret—but please come back for check-up in three months anyway. (The hazards of solvents and sunshine are real, my friends.)

Throw in a global pandemic and increasing signs that cabin fever has overcome the dirt-dwellers, and you'll understand why my heart skipped when I came across a snappy little Sparkman and Stephens sloop for sale up the road. A week later the rough-cut gem was mine, for the tidy sum of $7,000—just $1,000 more than we'd paid for the heroic old boat that took us halfway around the world.

Her name is *Opal*. She's a 1971 Yankee sloop, built in Santa Ana, CA by the same team that created the Dolphin 24, one of *Practical Sailor*'s favorite small centerboarders. I knew the Yankee 30 well, having sailed in the company of one for a few months in western Fiji. Each time our old gaffer lumbered into the next anchorage, we'd be greeted with the same sly refrain, "What took you so long?" (It will be nice to finally have a boat the moves well to windward.)

I'd started this column expecting to say more about *Opal*, but there will be time for that. And, upon reflection, a self-indulgent soliloquy is a fitting way to introduce a new sailboat. Born by imagination of a designer, and made real by the builder's hand, a boat is never truly alive until awakened by the dreams of her owner.

Ashore or afloat, the real trick of living is to never stop dreaming. It's easy enough. Just keep your head above the water—and cover up when you're out in the sun.

Cover: *Participants in a Safety at Sea Seminar in Annapolis test liferafts and PFDs. (Photo by Ralph Naranjo)*

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Photos courtesy of Rick Didion and John Reeves (below)

Two liters of Epifanes monourethane yielded three coats on reader Rob Legate's now glossy Mainship. The paint was applied with a close-nap foam roller.

BOTTOM PAINT REMOVAL TIPS

I removed 40-plus years of bottom paint from half of my Catalina 27 hull over the weekend.

We laid down poly dropcloths, peeled off as much as possible with stiff narrow putty knives (sharpened with a file every few minutes) then sanded…and sanded. I may use a stripper for the trickiest spots, but one thing is for sure.

I would not sand an inch of it without a good quality sander/grinder with excellent dust pickup from a HEPA filter vac. I am a woodworker and use the Festool line of sanders and vacs, but there are others out there that do the job just as well.

I guess my point is, err on the side of guarding your health and local environment. We collected about 70 pounds of paint chips and more in the vac. The cleanup after would have been nearly impossible without those precautions. Inside our Tyvek suits, gloves, and respirators, we stayed clean. Outside we looked like blue Smurfs.

Hoping to have the same result on the starboard side.

Everett Andrews
Meerschaum,1976 Catalina 27
New Bedford, MA

Everett Andrews' Catalina 27, Meershaum *will soon have a like-new bottom. See the blog post "Digging into Bottom Paint Removal," online for links to related reports.*

AN EPIFANES MONOURETHANE FAN

I have restored, modified, and re-painted a few boats in my amateur days. Full disclosure, I am a former marine mechanic and have taught technologies for 20 years.

Brightsides has been an overall disappointment to me. In four attempts at repainting my Bluenose 24, (my brother-in-law is a rough-landing skipper), I only had the gloss come up once. The other three times the paint kicked too early or just cured dull.

In putting an epoxy bottom coat on my Shark 24, with Pettit epoxy, that claims to cure even down to 5 celsius, the paint started kicking on the roller leaving a bumpy mess like a teen's complexion. Pettit replaced the product and after exhaustive grinding off the previous mess, it happened again. Pettit is off my list forever.

Epifanes has been my go-to choice for my trawler yacht, a Mainship Mk1. It has been the best experience of them all. Using a roll-and-tip method, the brush strokes did not level-out leaving noticeable lines up close. I contacted Epifanes Canada and they now recommend just rolling, and they are right. Just roll it on and it's great. Yes the monourethanes are softer, but they are so much more user friendly when rolling on. A factor when some drydock

Keep Safe, Busy, and Smart

With Covid-19 putting a damper on our usual routines, one spring ritual can be carried out safely in isolation—the spring cleaning/fitout. To keep busy, we have an endless supply of do-it-yourself projects, marine maintenance fun, and prep suggestions.

HEALTH

Telemedicine is a hot topic these days and we took a deep dive into this technology in April 2014. In the June 2010 issue, we took a look at why hydrating is important and the best ways to stay hydrated at sea. Also at the top of the safety gear list is an onboard medical kit; our July 2014 article shows sailors how to cut expenses by building their own ship's first-aid kit.

MAINTENANCE

Wondering what the best products are for those spring-summer cleaning jobs? Be sure to read our test reports on boat soaps (January 2013), waterline stain removers (April 2014 and November 2007), isinglass/clear-vinyl cleaners and protectors (May 2014 and March 2009), and hull waxes and polishes (*Inside Practical Sailor* blog April 9, 2014 and July 2014 *PS* issue).

STOP THAT LEAK

Leaks getting you down? Take a look at our August 2010 test of marine adhesives and get busy with those sealing and re-bedding projects. Whether you're putting the boat away in the off-season or venturing offshore, your electrical connections need protection; we tested anti-corrosion sprays in the September 2007 issue and greases in the April 2017 issue.

READING

Is spring cleaning on your to-do list? We cover everything from restoring gelcoat to reviving and caring for sails in our three-part ebook series, "Marine Cleaners," which is available in our online bookstore. While you are there, check out our report on fuel additives, a topic rife with myths. Finally, if you are in the market for a new set of sails, our series on sails covers everything from asymmetrical spinnakers to storm trysails. The series also offers money-saving tips on cleaning and repair. All are available at www.practical-sailor.com/products.

locations would not allow spraying without building a full enclosure.

After my first season, a green dockhand caused a minor scratch with improper line handling. I called Epifanes and they advised just tape of a trapezoid shape around the scratch and repaint it. You will have to get real close to see the tape line. BAM! It worked just like they said. I now do not fear docking scratches as I know I can successfully with little fuss repair them during drydock times, or even afloat if need be.

I have no investment in any of these products. I am Epifanes sold. Awlgrip is too fussy for a DIY boatyard job. Unless you want to fork out big bucks, accept the four-foot test. If it looks great four feet away, be happy.

Rob Legate
Diamond Girl, 1978 Mainship 40
Bay of Quinte, Ontario, Canada

Epifanes mono-urethane scored well in both our most recent long-term tests of topside paints, rating as one of the harder one-part paints. We don't expect the initial gloss of these one-part paints to last more than 3-4 years in year-round saltwater use. However, we were quite surprised in the last test, as tester Ralph Naranjo put it: "These paints have endured 3 years of sailing travails plus the onslaught of icy winters and boiling hot summers. The gloss has diminished some, but their adhesive quality as nonskid paints and waterway topcoats have been impressive." See the editor's blog post "Painting Your Boat Like a Pro," at www.practical-sailor.com for links to past tests and helpful tips on painting. You can also search "Topside paint" for older archive articles, including a heroic effort by former *PS* editor Doug Logan, who painted a multi-hued "bracelet" around his Boston Whaler, which in the latter stages of the test, drew more than a few curioius stares.

Photo by Drew Frye (top)

SAILBOAT STEERING

Regarding your recent report on steering systems see "Steering System Checkup," *PS* April 2021. Thank you

for this reminder. I have had the steering fail on my boat while underway and it was an experience I wouldn't want to repeat. I'm curious how many people actually remove the entire steering cable every year. Removal on my boat is miserable, as access to the quadrant is limited; and it requires disassembling the binnacle. I do examine and lubricate the entire cable, and a run a glove along the cable to look for broken wires.

Jeff Damens
C&C 30
New York City

Annual removal is overkill. Just a couple things to add to your inspection routine: Take a close look at the cable where it bends over thimbles and is clamped to the hardware that joins it to the chain or the quadrant. Check closely for any crushed thimbles.

DEALING WITH DIRTY SAILS

I just read your blog post on "Dealing with Dirty Sails" again and on the subtopic of locating a container large enough to soak the sail, I have used a 5-foot diameter kiddie pool in the past for the main and jib of my previous San Juan 28. I used a canoe oar to stir it with. But when I transitioned to a new-to-me Tayana Vancouver 42 the kiddie pool was way too small. I then realized that I had something I used almost every day that was big enough, my pickup truck bed. Just line it with a clean tarp and fill up the bed with enough water for soaking the sail overnight. At 8.34 lbs. per gallon of fresh water a half ton pickup will take about 120 gallons, a 3/4 ton pickup about 180 gallons. The real problem then becomes how do you rinse and dry the sail out? I chose to rig a block and tackle off an overhead tree branch and hoist it to rinse and dry; it got the job done. Another idea I have thought about is to roll up the damp sail, immediately take it to the boat on a calm day, bend the sails on, and hoist them to dry or just go sailing.

Mike Hirko
Gig Harbor, WA
Destiny, Tayana Vancouver 42

Photo courtesy of Mike Hirko (top); Jeff Damens (bottom)

Reader Mike Hirko (current record-holder for most published PS *Mailport letters), shared his creative sail washing method, the pick-up bed bath.*

The steering system on Jeff Damens' C&C 30 gets a thorough check each season.

KOREAN CABLES

Regarding your blog post "Simple Tips for Maintaining Stainless Steel," I've noticed that a lot of the new top quality Korean cables (not the cheap Chinese stuff) show signs of light corrosion almost immediately after rigging so can this method be used on stainless steel rigging/lifeline cables and turnbuckles, especially where the cable meets the turnbuckle? Is it safe to put the paste around that junction as long as you rinse it thoroughly afterwards?

Brent Cameron
Hawkestone, Ontario.

This will work on 316 stainless rigging, and since 316 is rated for long term citric acid exposure, there is no risk of leaving it on too long, though rinsing is advisable. Phosphoric acid and oxalic acid, on the other hand, can cause staining if they dry in place. .

Practical Sailor welcomes reader comments and questions. Send email & reader photography (digital .jpeg 1MB or greater) to *practicalsailor@belvoir.com*; include your name, homeport, boat type, and boat name. Send any broken gear samples to Practical Sailor, 1600 Bayshore Rd., Nokomis, FL 34275

Search & Rescue Tech 2.0

Kevin Escoffier's rescue served as a high-stakes sea trial of the latest safety equipment available—at a price—to offshore sailors.

Vendée Globe rescue heralds new era in SAR tech, and new techniques.

By Ralph Naranjo

On December 1, 2020 Kevin Escoffier was plucked from a life raft, near the infamous "Cape of Storms." The name dates back to 1488 when the Portuguese explorer Dias rounded the promontory. Dutch sailors called it Stormkaap, but a more optimistic King of Portugal renamed it the Cape of Good Hope. Weather systems have ignored the edit, and for many sailors, including Escoffier, it's where the battle with heavy seas is won or lost.

The Vendée Globe communications system combined Irridium's Certus satellite service and a Thales Vessel Link terminal. Sailors had direct-dial satphone number, giving them constant contact with shore teams.

This story of survival is a two-tracktale of seamanship and the role played by the right equipment. In April we focused on the seamanship side of the story. This month we look at Escoffier's rescue as a sea trial of some of the latest safety systems, tried and proven equipment, and why the Vendee Globe's Race Direction team has settled on these specific tools for survival.

The Race was originally conceived by BOC Race winner Philippe Jeantot, and over the years the Mt. Everest of solo sailing has become a model of how to prepare for and react to some of sailing's least desirable challenges. We stressed in part one of this series that solo sailing flies in the face of International Regulations that stipulate that when a vessel is underway, a person must be on watch at all times. It's true that there's less risk of collision in the lonely reaches of the Great Southern Ocean, but other challenges come to the forefront. And risk mitigation has been a major concern of race organizers and competitors alike.

The team that handles race management for Vendee Globe Races is referred to as "Race Direction." It's comprised of four experienced sailors—led by Race Director Jacques Caraes. They play a pivotal role in monitoring race preparation and are at the hub of things when it comes to handling emergencies at sea. Race rules are very specific about outfitting, and safety requirements are quite specific.

For example, each single-hander must carry two life rafts (SOLAS or ISO 9650 offshore) and two EPIRBS. At first this may seem a bit redundant with only one person on board. But it's likely a key reason why Escoffier is alive today. One of his two rafts was submerged in the forward portion of the cracked-in-two hull. The other was stowed in the cockpit and ready to deploy.

The communication equipment chosen for the race also proved its worth. The system provided 24/7 position reports that were normally updated every 30 minutes, but could be increased in frequency to continuous reporting. The system featured a direct-dial satellite phone number for each participant, and a customized, limited access website available to search and rescue personnel.

Photo by Marine Nationale / Défense (top); Ari Huusela / STARK (bottom)

Photos by Ralph Naranjo (2 & 3); Ari Huusela / STARK (1)

1. In-the-water testing of PFDs and survival equipment is essential.
2. Kevin Escoffier's had multiple drysuits with elastic cuffs to keep water out.
3. Removable, attached mittens allow dexterity needed to don a survival suit.

It included real time vessel location, a skipper and boat profile, along with photos of the vessel from right-side-up to upside down. There was even a portrait of the skipper in his/her survival suit. The system was GMDSS-compliant and featured digital distress signaling. Secondary distress signaling was provided by the two EPIRBs that were a mandatory part of the Vendee Globe Race equipment list.

TRACKING THE FLEET

At the heart of the Vendee Globe's rock solid communications plan was an across-the-board commitment to Iridium and Thales hardware. This combo lashed together Iridium Certus satellite service and a Thales Vessel Link terminal. Iridium, a major player in sat phone technology, with a recent launch of 66 new LEO satellites, was coupled with a Thales's broadband terminal—providing a 700 Kbps download rate and a 350 Kbps upload capacity. This increased baud rate delivered faster data handling, Skype video comms capability, 3 lines of voice comms and a whole host of additional advantages used to stay in touch and track the fleet. The system also allowed crews to maintain contact with shore-based teams.

Each day's sailing action could be shared with media outlets worldwide, and when it came to Escoffier's rescue, it gave Kevin a chance to double down on his mayday messaging. Within just a few minutes of his boat breaking in two, his EPIRB was emitting a digital distress signal picked up by the COSPAS/SARSAT system. And he had immediately followed up with a memorable Iridium/Thales message sent to his shore crew in France: "I need assistance. I am sinking. This is not a joke."

A key feature of Iridium's 700 L-band satellite communications system is its pole-to-pole, worldwide coverage. The system is now part of the Global Maritime Distress Safety System (GMDSS), and one of the major values of L-band communication is much less negative influence from weather related interference.

Thales initially developed durable communication terminals for the commercial fleets and the navies of the world. The new Thales Vessel Link connects to satellite communication equipment and, depending upon baud rate, provides a wide range of communications capability.

The Vessel Link/Iridium Certus combo wirelessly links to Android or iOS devices and allows up to 12 individual phones to be connected. The system provides, voice data and video connectivity. Vessel tracking, weather information and fleet wide info updates are all part of the package. During the Escoffier rescue, the Iridium/Thales terminal became a vital tool in rescue coordination. It tracked and provided communications with all four single-handers involved in the SAR effort. And when the Skype feed from single-hander Jean Le Cam's cabin camera revealed two sailors on board, everyone breathed a sigh of relief.

EPIRB UPDATE

The emergency position indicating radio beacon (EPIRB) has a long history of success. This satellite based distress messaging system grew out of aviation's use of emergency location transmitters (ELTs) that broadcasted on 121.5 and 243 MHz. In 1979, a plane was lost in Alaska with two Congressmen on board resulting in the development of an ELT that became

Upgrading SARSAT

EPIRB signal detecting satellites are part of a multinational Global Maritime Distress Safety System (GMDSS). In the US, NOAA manages and coordinates the Search and Rescue Satellite (SARSAT) program. NASA designs, builds and upgrades the technology. And the EPIRB monitoring electronics package piggybacks aboard GOES and other types of weather, communications and navigation satellites.

Over the years, a continuous effort has been made to increase the accuracy and expediency of detecting and locating broadcasts from 406MHz beacons. Last year, in the US, there were 302 rescues aided by SARSAT beacons (EPIRB, ELT, PLB). The breakdown includes 215 boaters/mariners, 75 PLB users and 12 in aviation incidents. Since its inception in 1982 COSPAS/SARSAT has aided in the rescue of over 48,000 people worldwide including 9,391 people in the United States.

Satellites are arrayed like a three layer cake. At the very top are the geosynchronous satellites (GEO), located about 22,000 miles away from the Earth. They remain constantly in view of a specific region of the Earth's surface by revolving around the Earth in sync with its rate of rotation. This geometric relationship, results in no discernible relative motion difference between the beacon and the satellite. Therefore, position location via Doppler effect calculation is off the table.

This means that GEO satellites provide ID details of a vessel's EPIRB , but no position information. This all changed when EPIRBS were turned into "GPIRBS," through the addition of a GPS receiver. Now, stationary GEO satellites capture position fixes and downlink to a local user terminal (LUT) at the beacon's location.

1. The initial steps the Kevin Escoffier took to ensure survival provide a good guide for the cruising sailor when sinking is imminent: alert rescue agencies; activate locator beacon; protect against exposure; and launch life raft.
2. Escoffier's rescuer Jean Le Cam spotted a low-wattage life raft beacon like the one shown in the photo, an example of lights we evaluated during PS testing.
3. Some of the personal MOB lights we tested in 2019 had strobes more brilliant than the one that led rescuers to Escoffier's life raft.

Photos by William Herrmann

Low Earth Orbiting (LEO) satellites follow a circular pole-to-pole orbit, aligned about 99 degrees to the equator and at a much lower altitude (about 530 mi). They rotate around the Earth at blistering speeds and the lower altitude means a smaller circumference to their orbit—one complete rotation takes about 100 minutes. This means that any EPIRB signal entering its cone of coverage will be affected by the approach/departure based Doppler effect that causes a detectable frequency shift and can be converted into position coordinates. The downside lies in the fact that lower altitude results in a narrower cone of coverage, due to closeness to the Earth. Another downside is the need to, at times, store a signal because there's no ground station available. This store-and-forward relay function can cause delays of many minutes, even hours, in remote oceanic regions where Local User Terminals LUTs are few and far between.

A new system, the MEOSAR satellites has been launched as part of the Global Navigation Satellite system and the predecessor of today's beacons. Aircraft still monitor these frequencies and act as relays when a signal is received. But in 1982 a multinational organization was formed (COSPAS/SARSAT) and geostationary satellites were used to detect signals. Today EPIRBs, ELTs and smaller personal locator beacons (PLBs) operate on a primary frequency of 406MHz, but also transmit a weaker 121.5MHz signal for final SAR homing. The latest COSPAS/SARSAT electron-

there was room in the trunk for a COSPAS/SARSAT electronics package. They orbit about 12,500 miles away from the earth and provide a seven times larger footprint on the surface—resolving several prior system ailments. These new satellites utilize a "bent pipe" technology that works like a mirror, continuously beaming down received signals to land based user terminals (LUTs).

When all 72 MEOSAR equipped satellites complete the constellation, there will be four satellites in view at all times. In addition, these satellites share data with each other and downlink to multiple LUTs. This means that position fixing via EPIRB, ELT or PLB distress signals can be accomplished via Doppler calculations, GPS fix or by trilateration (time-based ranging) of signals from multiple MEOSAR satellites. They eliminate the store-and-forward delay found in LEOSAR satellite technology. MEOSAR satellites that carry EPIRB detection hardware include GPS-III (USA), GLONASS-K2(Russia) and Galileo (EU). The net result is shorter fix time, faster processing and quicker rescue responses.

Once the satellite(s) does its job, ground stations spring into action. First in this rescue chain are the local user terminals (LUT) that downlink and decode the data. They determine the beacon ID from its hexadecimal code and its position before passing it along to an appropriate Mission Control Center(s) (MCC). These belong to specific nations or regions and it's where key questions such as who will take the lead in coordinating the rescue are made. Proximity to the beacon location usually takes priority.

The MCC relays all pertinent information to a rescue coordination Center (RCC), and they determine the best means by which to effect a rescue. If the beacon is in US waters, the USCG is the RCC. In remote parts of the less developed world, where SAR assets are limited, multiple RCC centers may play a role.

In the case of Kevin Escoffier's rescue, the RCC role was led by Race Direction located 8,000 miles away. They interfaced with France's SAR center, Cross Griz Nez and MCC South Africa. Race Direction collaborated with weather/oceanography experts at Meteo France and provided the organizational and position guidance to the four Vendee Globe competitors involved in the search.

Feedback from those involved in the EPIRB based search for Escoffier, indicated that beacon position reports jumped around a bit. This was probably due to sea state the and fact that the small antenna and deep wave troughs are a poor combo. However, the fixes did seem to fall within the 3.1 mile constraint of the MEOSAR goal.

Most EPIRBS are designed to be placed in the water and securely tethered to the life raft with the attached lanyard. This way the water plane acts like a massive radial improving antenna efficiency. The reluctance of someone in a life raft to toss a beacon overboard is understandable, but there are a couple of signal dampening issues that must be considered. First of all a human body situated between the beacon and the satellite will decrease the signal, so will tilting the beacon and angling the antenna away from the vertical. So if you chose to hug the beacon instead of launching it, keep the antenna vertical and above those huddled in the raft.

Images courtesy of manufacturers

1. A key feature of Iridium's 700 L-band satellite communications system is its pole-to-pole, worldwide coverage.
2. The AIS distress beacon is relatively new to the sailor's distress alterting toolbox. It should not be confused with the personal locator beacon (see page 24).
3. Modern EPIRBs can take advantage of the newest improvements in the satellite networks that allow for more precise position finding.

ics packages are housed in geosynchronous (GEO) as well as low earth orbiting (LEO) and recently added midlevel earth orbiting (MEO) satellites, all listening for 406MHz signals. The beacons emit low wattage bursts of RF energy and thanks to major advances in digital technology, antenna design and receiver sensitivity and selectivity, these satellites and beacons have become a major player in GMDSS.

Originally, EPIRB signals were de-

A Different Approach to MOB Rescue Slings

By Ralph Naranjo

In 2005 a colleague from the USNA Sail Training program and I participated in an on-the-water Crew Overboard Rescue Symposium on San Francisco Bay. It drew from a nation-wide array of professional sail trainers, yacht club sailing program directors, safety equipment manufacturers and retailers, plus recreational sailors from up and down the West Coast. Days on the water spent rescuing volunteer MOB victims were followed up with late afternoon summary sessions (see "*Slings, Scoops, and Ladders*," *PS* January 2006)

The reoccurring problem seen on the water was a widespread inability to stop or even slow down near the person in the water (PIW). Boats approached with too much speed, often on a sailing angle that made depowering impossible. The net result was a overabundance of "flybys" and the need to set up for another approach.

Veteran Lifeguards solve the problem of bridging the gap with a slogan "reach-throw-row-go." It defines priorities, and with a slight change this mnemonic tool can help sailors approaching a PIW. The sailor's version of the slogan becomes reach-throw-tow-(and perhaps go).

The reach aspect can be a hand grab or a boat hook extended to the PIW. The throw aspect is what Le Cam settled on and put to good use. He grabbed his stern mounted SILZIG buoy and

The Silzig buoy/sling (left and top), has gained popularity in Europe. An early iteration of the device resembles the do-it-yourself "anshinya" rescue sling (see PS *January 2021).*

tected by an array of high altitude geostationary satellites, each covering a large portion of the Earth's surface. One signal burst could yield the ID of the vessel in distress, but it took multiple signals to calculate an accurate fix. A switch to 406MHz beacons and the addition of Low Earth Orbit (LEO) satellites greatly improved performance. Eventually, GPS receivers were built into EPIRBs and the emergency signal included a GPS derived lat/lon position. Along with the built-in GPS came better ways to check the readiness of the beacon. Most manufacturers provide battery test features, while some also incorporated signal propagation testing capabilities.

The most recent upgrade of EPIRB beacons coincides with a new array of Medium-Earth Orbit Search and Rescue (MEOSAR) satellites that circle the Earth. The new EPIRB system utilizes the EU's Galileo constellation of navigation/SAR satellites along with the US GPS-III and GLONASS- K2 Russian system. This addition of 72 MEOSAR satellites helps to determine EPIRB location more quickly. The system's new goal is to be able to locate an EPIRB within 3.1 miles, 95% of the time within 10 minutes. Plus the new satellites add a message forwarding capability that lets the sender know that their distress signal has been received.

Some of the latest EPIRBs also include AIS signal transmitters that add another valuable homing alternative. It's interesting to note, however, that Escoffier's personal AIS transponder did not aid in his location, but what did play a crucial role was a simple battery and bulb series circuit that comprised the fixed light glowing at the peak of the life raft's canopy. Ironically, this combination of high tech EPIRB and low Lumen light delivered Le Cam to a small raft in sea full of waves.

SUITING-UP FOR SURVIVAL.

Over the years we have been testing survival suits and dry suits of various brand and design. They all rely on seals at the wrists and ankles or built-in boots and gloves to help keep the interior dry. The neck seal and entry point zipper are also areas of serious design consideration. We found that earlier designs with thick neoprene rubber skin and attached boots and mittens were very warm but the most immobilizing of all options.

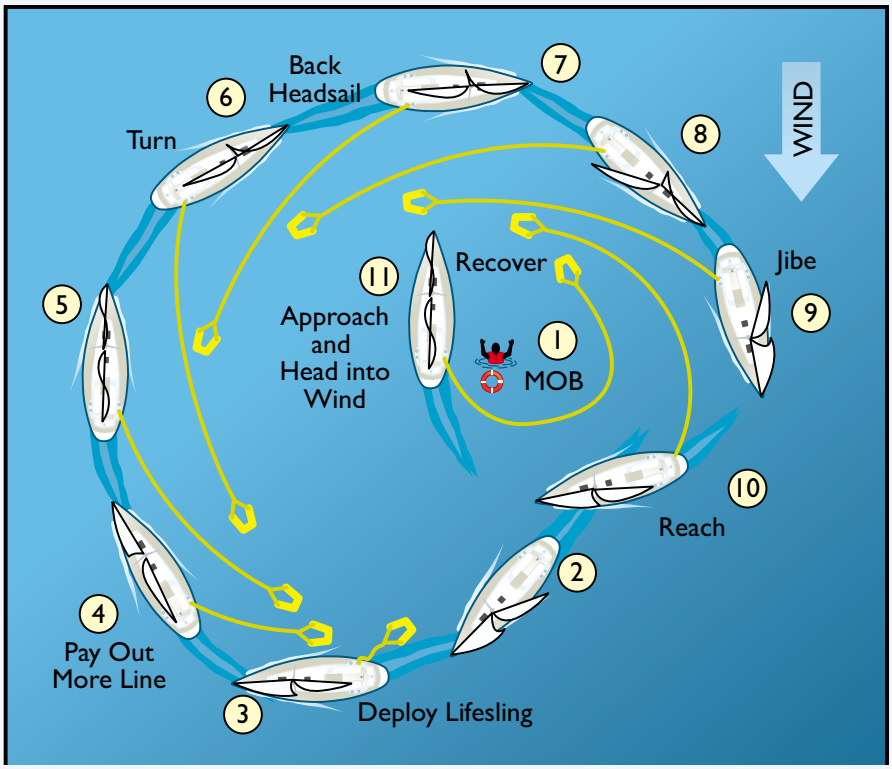
A sailor in the process of abandoning ship has a lot to do, and one of the first requirements is to don the gear that will most effectively prevent hypothermia. A big problem arises when that suit and its attached mittens limit dexterity, preventing things like radio communica-

used it as a heaving device. His first toss bridged the gap between Kevin Escoffier's life raft and his IMOCA 60. Slack line was pulled up and both sailors heaved on the line to bring the raft closer to the stern of *Yes We Cam*. The raft and stern surged in the seaway and agile Escoffier timed it right making his transition to safety.

The SILZIG buoy is a towable and throwable rescue buoy that has caught on in Europe the way the Lifesling has captured the interest of U.S. sailors. It seems more home-brew than high tech, but some of the best innovations come from such lineage. At the 2005 San Francisco safety training event mentioned above, a creative crew were showing off a prototype that they branded as the Noodlevator (see photo at left).

Apparently the development process didn't go as well as the SILZIG buoy. But it does remind us that a life ring on a line is a very effective, throwable rescue device. A Lifesling is a very good towable device. The question is does the SILZIG buoy offer both attributes? During the summer we will take a close look at towable and throwable MOB candidates and come up with some useful observations.

Illustrations by Regina Gallant



A rescue sling helps a shorthanded crew make contact with a less precise maneuver. The approach varies with boat and crew skill, but the concept is the same. Passing close by the victim and making a sharp buttonhook (often under power) on the final approach is the most effective way to connect. Aim to get the boat—not the towed sling—to the person. If you overshoot your target, you can pull the sling closer so the person in the water can grab it.

tion, button pushing and releasing snap shackles and other life raft constraining clamps. Our research on immersion "survival" suits found that removable mittens or gloves are a must, and lighter weight, more flexible suits are not as restrictive and allow a sailor to better handle the jobs at hand (see "Immersion Suit Test," *PS* July 2007) We also noted that thermal protection had more to do with the layers worn under the skin of the suit rather than the suit itself.

Compared to the survival suits we tested, Escoffier's T.P.S. Manoeuvring Suit was made of much thinner 3mm neoprene covered by a rip-resistant nylon on both sides. It had removable mittens, a non-zipper means of suit entry and a built in hood that had a high visibility to stripe. The user donned the suit feet first through a large across-the-shoulders opening. Once the suit was on, the dry bag like shoulder slit must be rolled up and clipped to the chest harness, providing a water tight, roll type seal. We have also tested dry suits that share this feature (see "Drysuits and Wetsuits for Sailor," *PS* March 2009).

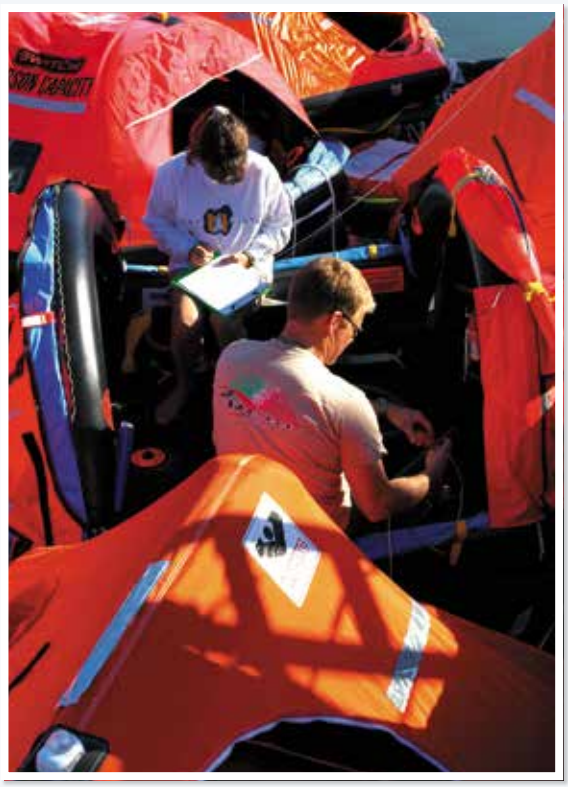
A GLINT OF LIGHT

In the end, a little bit of light saved the day. When Jean Le Cam noticed the first glint, it turned out to be some low wattage light beamed from Escoffier's life raft canopy lamp refracting off the wave faces. Detection was not made due to an abundance of Lumens, but due to a skilled mariner's night vision and the darkness linked to being away from shore side illumination. It was the final link to a rescue after 11 hours of bobbing around in a life raft.

Had Le Cam missed that dim visual cue, there was still time in the EPIRB battery's life to home in with the ongoing triangulated search. But, if no vessels were in range, as with many long distance cruises, the hours in the raft would likely become days. So a cruiser's best bet would include having the grab bag in the raft and among its contents a second EPIRB, a hand pump water maker and perhaps each person in the crew should be equipped with a PLB on their life jacket. Using these devices sequentially, turn one on when another has run its battery down, extends the duration of the distress signal. In empty stretches of open ocean it's a 406MHz signal that reaches out to a wide range of search and rescue assets.

CONCLUSION

The message for mainstream cruisers and racers was summed up pretty well by a friend who loves to race offshore but has also had an extensive maritime career. Kip Louttit is a retired USCG Captain who is now the



1. ISO 9650-rated inflatable rafts (shown above) are a lot lighter than SOLAS rafts, which also have specified equipment stored in the raft. 2. PS *testers evaluate life rafts prior to on the water testing for our comprehensive life raft test, featured in our "Survival at Sea" ebook series (www.practical-sailor.com/products).*

Escoffier rescue makes case for SOLAS A-Pack

When it's rough enough to cause a carbon fiber reinforced, 60 foot racing sailboat to disintegrate, what chance does one have in a 130 pound, inflatable life raft? The answer is: a pretty good chance. The reason why is that over the last couple of decades there's been a steady improvement in life raft design and construction. Higher modulus materials, better seam bonding, more reliable bladder valves and features such as inflatable boarding assists, improved arch and canopy designs and more efficient ballast bags have added up to improved survivability for the raft and its occupants .

The tricky balancing act is the total weight of canister, raft and equipment packed inside. For example, The fabric used in the manufacture of SOLAS life rafts is heavier and higher tensile strength than the material used to make ISO 9650. The SOLAS A-pack equipment load includes water and food and is another major source of weight. When all is packed into a raft canister the 6 person SOLAS raft weight with an A-Pack is 163 pounds.

A six-person ISO 9650 offshore raft, in a canister, weighs as little as 89 pounds. The lighter material and fewer supplies along with a smaller volume CO2 inflation tank contribute to the lighter weight.

Escoffier was able to launch the heavy SOLAS raft that had been cockpit stowed. He had been unable to retrieve his abandon ship bag that was stowed forward and was underwater. Having the in-raft-stowed A-pack with its food and water supplies was beneficial. ISO rafts provide 500ml/person water but no food supplies. The idea is that such needs would be compensated for with the load out in the abandon ship bag.

Executive Director of the Maritime Exchange of Southern California. His day job is controlling commercial vessel traffic in one of the most fog-bound and busiest regions in the world. However, when it comes to survival at sea, Kip reverts to USCG days and says—"stay afloat, radiate an electronic distress signal and we'll come get you."

Interestingly, the Vendee Globe Race uses a similar tactic, but each competitor knows that, in extremis, they may become the rescuer or the person in need of a rescue.

On January 6, 2009, Jean Le Cam was sailing another IMOCA 60 when the ballast bulb broke free, flipping the boat upside down. Le Cam's closest landfall was Cape Horn. Fellow competitor Vincent Riou was vectored to Le Cam's position and asked the skipper if he wanted a lift. Ironically, Riou was sailing the same boat Le Cam would come to rescue years later—*PRB*. It's good to see some seafaring traditions are still alive and well.

Ralph Naranjo, PS *editor-at-large, is an adjunct lecturer at the Annapolis School of Seamanship and the author of* The Art of Seamanship, *a comprehensive textbook aimed at the advanced cruising sailor.*

Photo by Drew Frye

Open transoms are popular in today's performance cruisers, and on small boats that means feet will get wet.

Testing 'Waterproof' Socks

Which brand best keeps feet warm and dry?

By Drew Frye

I can endure anything if my feet are warm, and dry is even better. I like winter sailing; not just the shoulder seasons, but also the wash-the-frost-off-the-deck cold of January and February. Unfortunately, I dislike pull-on boots and prefer the support and nimbleness I get from a lace-up deck shoe.

For me, and for many other sailors, all day comfort, foot health and knee health require the use of custom orthotics, which only fit and function properly in a lace-up shoe. Obviously, there's a conflict.

These days I sail a Corsair F-24, a sporty boat that puts a premium on agility. When deep reaching on rough days, all it takes is a slow jibe for a trailing wave to catch us and roll through the open transom, resulting in wet feet. When sailing to weather a trip to the bow can be submarine duty.

My last boat was a cruising cat, with a quick motion under foot in rough conditions. Although the cockpit stayed dry under the hard top, a trip to the bow got you drenched with water coming up from both under and across the tramp.

I've found a good many non-boot solutions that work, but they all have limitations. Deck shoes with fleece or wool socks are warmish when wet, but still wet and aren't much fun below 60F (see "Sailing Socks," *PS* January 2019). Gore-Tex approach shoes with fleece socks are good for a little spray, light rain, or a little water splashing in the cockpit, but not if there is enough green water on deck to overtop them. The Gore-Tex lining will begin to leak in time, after which your $150 shoes are just sneakers. Still, I always liked them below 50F.

A drysuit with attached feet is top notch for horrible cold and wet, but although a dry suit never leaks, it will gradually get damp inside if you're working hard, and eventually even if you aren't, limiting its use to really wet conditions below 55F. Try on the suit with shoes before you buy; some can have an annoying wrinkle or seam and none are as comfortable as an ordinary socks (see "Soul Dry Suit 2-Year Update," *PS* February 2016).

Neoprene dinghy boots can be worn with either a dry suit or fleece socks. With a dry suit they are warm in any conditions, but because of the constant squeeze they are not as comfortable as more conventional shoes and don't really work with orthotic shoes. With fleece socks they are only so-so.

Seaboots are the traditional winter answer for good reason and nothing has changed. That's where you will find maximum warmth and reliable dryness. Here are a couple of Practical Sailor reviews that cover the essentials:

-"Sea Boots Under $100," *PS* September 2002

-"Sea Boot Camp," *PS* October 2009

We tried waterproof Gore-Tex socks soon after they came out, probably 40 years ago. They cost a king's ransom at the time and didn't fit well, stretch much, or last long. Perhaps hiking was just too much for them, but we abandoned them when they started leaking after just a few trips. Time has passed, the product has improved by leaps and bounds, and the price has dropped to little more than comparable quality wool socks, so we thought we would give them another try.

WHAT WE TESTED

We tested socks from Gill, Randy Sun, Sealskinz, and Showers Pass.

HOW WE TESTED

We tested the socks while sailing, of course, over a fall and winter season. If the weather wasn't rough enough, we dunked our feet in the water before we started. We also wore the socks hiking in cold rain with sneakers and cycling in freezing temperatures. Normally, we wore them alone, but a few times we layered other sock beneath them, depending on the temperature and footwear fit.

OBSERVATIONS

Read the sizing charts. Although much more pliable than the first generation, waterproof don't stretch as much as conventional socks and can vary considerably between brands. A men's size 9 can be anything from small to large. Don't oversize, but do remember that you may wear a thin sock under them. Sizing seems to allow for this.

There are countless styles, ranging

PS VALUE GUIDE WATERPROOF SOCKS

BRAND	GILL ★	SEALSKINS	RANDY SUN $	SHOWERS PASS	DEXSHELL	NRS
MODEL	Boot Sock	Cold Weather Knee Length Sock	Cold Weather Knee-high	Cross Point Mountain Sock	Hydrotherm | Pro Socks	2mm Wetsocks
TESTED	Yes	Yes	Yes	Yes	No	Yes
OUTER LAYER	80% nylon, 20% elastane	90% nylon, 10% elastane	61% nylon, 32% polyester, 7% elastane	Nylon, elastane blend	97% nylon, 3% elastane	2mm neoprene
INNER LAYER	50% merino wool, 50% acrylic	35% merino wool, 26% polyester, 35% acrylic, 4% elastane	66% Coolmax, 30% polyester, 4% elastane	Merino wool blend	35% Merino wool, 38% acrylic, 24% nylon	Neoprene
WARMTH	Warm	Medium	Medium	Medium	Medium	Cool
THICKNESS	Thick	Medium	Medium	Medium	Medium	Medium
STYLE	Knee sock	Knee sock	Knee sock	Mid-calf	Mid-calf	Mid-calf
PRICE, MID-CALF	$40	$50	$26	NA	NA	NA
PRICE, KNEE LENGTH	$55	$55	$35	$45	$46	$25

★ Best Choice Recommended $ Budget Buy

from thin, low versions for runners to high insulated socks for hikers and sailors. We tested only the cold weather versions that came with merino wool inner layers.

We prefer ordinary socks in warm weather because they breath better, but if you like dry feet all year or sail in a cool water area, the thinner waterproof versions may be for you. Boot length is better in boots, and with low shoes the taller socks can keep water from wicking up your mid-layer. Mid-calf is more comfortable in moderate conditions.

Breathability is less than a normal sock, although they were never overly sweaty, even after a full day on the water at 60-70F. However, once they get wet, like any raingear that is wetted out, they don't breath. The literature says they do, but no membrane can breathe once the surface is fully wet.

The Merino wool liners really help. Waterproof socks will take twice as long to dry as ordinary socks; you will need multiple pairs for multi-day trips. Stink seems to be a minor problem, again thanks to merino wool construction, which we strongly recommend. We could always wear them at least a half dozen times before laundering was needed.

Unlike a dry Gore-Tex shoe, they will feel squishy inside the shoe when fully soaked. Sometimes you'll feel a cool spot, like your feet must be wet, but they aren't. It's just the water moving around. They are not quite as warm as dry socks, because ½ of the insulation is wet, but they are much warmer than wet socks, and you can always wear another sock under them. Even if they leak (they didn't—we poured some water inside for testing) they remain warmer than wet socks, because like a wet suit, they hold the water in place so it can warm up.

What about some additional wind resistance in dry conditions? We compared them with wool and fleece socks cycling in freezing temperatures, a severe test of windy dry weather comfort. With shoe covers, wool and fleece socks were slightly warmer, probably because our feet were less clammy. Without the covers, waterproof socks were warmer, presumably because of better wind resistance.

RANDY SUN COLD WEATHER SOCKS

Available in both knee-high and mid-calf, the mid-calf version is our favorite for cool weather wear with deck shoes. They are affordable, reach mid-calf, and are warm enough above 55F. However, the Gill Waterproof socks are much thicker and warmer.

Bottom line: We rate these a cool weather Budget Buy.

SHOWERS PASS CROSS POINT MOUNTAIN SOCK

These are very similar to the mid-calf Randy Sun Cold Weather Sock, they fit our shoes without changing the fit and were comfortable enough for all-day wear.

Bottom line: We wish they were a little cheaper.

SEALSKINZ COLD WEATHER KNEE LENGTH SOCKS

These reminded us a lot of the Gill socks, but with a little less thickness and padding. They are also the pair we have the most miles on, so they get a gold star for durability.

Bottom line: Like many Sealskinz products, they are Recommended.

GILL BOOT SOCK

The boot height is a full knee sock, which seems a little weird at first, but the extra elastic band at the top insures they stay up, nothing can sneak over them, and they do keep your calves warm, which is nice. Thick and luxuriously well-padded, these should make deck shoes comfortable deep into the fall unless you suffer from chronically

Waterproof Socks for Wet Sailing

We tested the waterproof socks in our comparison while sailing over the fall and winter season. If the weather wasn't rough enough, we dunked our feet in the water before we started. We also wore the socks hiking in cold rain with sneakers and cycling in freezing temperatures. Normally we wore them alone, but a few times we layered other sock beneath them, depending on the temperature and footwear fit.

1. Doubling up makes sense on colder days. Here boot socks are on top, and Randy cold weather socks on bottom.

2. It's easy to slip a wool sock under the waterproof sock.

3. The Gill boot sock goes much further up the calf.

cold feet, and through a mild winter if you have warm feet.

I'd rate them at about 40F in deck shoes, and slightly below freezing if it's dry. You can always add a pair of fleece or merino wool socks inside them. Inside waterproof shoes or boots they add an extra level of security.

Bottom line: These are our Best Choice if you want to stay warm in all conditions.

DEXSHELL HYDROTHERM PRO SOCKS

We didn't get to test these but a fellow sailor recommended them. They are medium thickness with a merino wool lining. His only complaint was that he wished they were boot-height. He wore another boot high pair of socks with them, noting that wicking was sometimes a problem.

Bottom line: These are good with deck shoes.

NRS WETSOCKS

Made from 1.5 mm neoprene, NRS socks are generally watertight for a while, but after several uses the seams begin to leak. In dry conditions your feet get cold and clammy from sweat within 20 minutes. *PS* testing revealed very low insulation value (see "Sailing Socks," *PS* January 2019) and this round of testing cemented our opinion. We wear them under swim fins for chafe protection and a bit of warmth, but that's about it.

Bottom line: Nope. We do not recommend these for sailing use.

CONCLUSION

All winter footwear gets damp with condensed sweat. In the interest of reducing odor, increasing longevity, and having them ready to wear tomorrow, consider using a powered shoe drier for all shoes, boots, winter gloves, and waterproof socks. See "The Sailor's Boot Drier," *PS* February 2019.

We don't have a single "best choice" for all wet conditions. For a long offshore slog in cold weather, sea boots are the traditional choice. If you prefer the agility of deck shoes, waterproof socks can make all the difference, and we're kicking ourselves for not trying these years ago. If it's cool, the Randy Sun Cold Weather Socks are a great value, and when it's cold enough that you are questioning your sanity, the Gill Boot Socks are great, with another sock under it if there is room. Now go enjoy some shoulder season sailing, without the distraction of frozen toes.

CONTACTS

DEXSHELL, www.dexshell.com

GILL, www.gillmarine.com

RANDY SUN, www.randysun.com

SHOWERS PASS, www.showerspass.com

SEALSKINZ, www.sealskinz.com

Photo by Drew Frye

PS Tech Editor and avid cat sailor Drew Frye held back from investing in a bowsprit and instead used a homemade bridle to set his asymmetrical spinnaker, shown here on a cruising cat, a PDQ 32.

Spinnaker Tips for Multihulls

Your approach to light-air sails will depend on performance factors.

By Drew Frye

A *Practical Sailor* reader recently reached out to me with a question regarding light air sails on catamarans: "I've owned two catamarans, and have wondered about flying spinnakers. The common thread is that the main must be flown because the main sail/sheet acts as a backstay . . . I have always found it difficult to have the main and spin up at the same unless running about 150 degrees or more off the wind."

Mainsheet tension on cats is primarily important when beating to windward. Lacking a backstay, much of the forestay tension comes from the mainsheet. When the mainsheet is slack or the mainsail furled, the genoa becomes full and baggy, and both heeling force and leeway increase.

A tight mainsheet, on the other hand, keeps the forestay tight and straight and the jib shape is as designed. Thus, it is better to have the main up anytime the apparent wind is forward of the beam, even if deeply reefed.

Another reason to have the main up is for balance. With only the genoa up, the boat will develop considerable lee helm, constantly trying to turn away from the wind. This is fine if the apparent wind is aft of the beam, but with the wind farther forward, you will find that you can't beat, tack, and perhaps not even to turn into the wind, because the wind and waves will overpower the rudders. Poor balance is also hard on the autopilot.

Another reason to fly at least some mainsail is furling. Without a mainsail

to block the wind, it is hard on equipment and can be just plain impossible in a blow. I often watch folks struggling to put the genoa away to windward, often resorting to a winch and courting serious furler damage. Most likely they could have furled the sail by hand in even a fierce wind, if they had only turned downwind (apparent wind about 150 degrees off the bow), hiding the sail behind the main. It is also much easier to drop the chute when it is blanketed by the main.

The mainsail is eased well out when reaching and does not add vital support when flying a spinnaker in moderate conditions. It does help stabilize the mast in strong conditions, but hopefully you will have the chute down by then. Looking aloft, the angle of spinnaker force is given by the direction of the halyard. In general, it is well to the side and is carried efficiently by the cap shrouds.

THE FAST CAT FACTOR

Multihulls don't fly chutes deep downwind. They reach. But there are shades of meaning in that and some half truths spread about cruising cats. Four decades ago I mounted a long sprit on my beach cat, and she went like mad. My next boat, a Stiletto catamaran, A Kevlar honeycomb speedster, carried a chute on a sprit.

Both of these boats routinely exceed windspeed when sailing off the wind, and we never carried the apparent wind farther aft than 75 degrees off the bow. A good downwind jibe was actually a tack, with the spinnaker blowing aft, like a jib.

THE CRUISING CHUTE

My next boat was a PDQ 32 cruising cat. While a good bit faster than a monohull of the same length, it had barely half the maximum speed potential of my earlier racing boats, never sustaining more than 12 knots. Coincidentally, the fastest VMG (velocity made good to leeward) course for both boats was about 130-150 degrees off the true wind. But the best apparent wind was much farther aft, as much as 150 degrees off the bow.

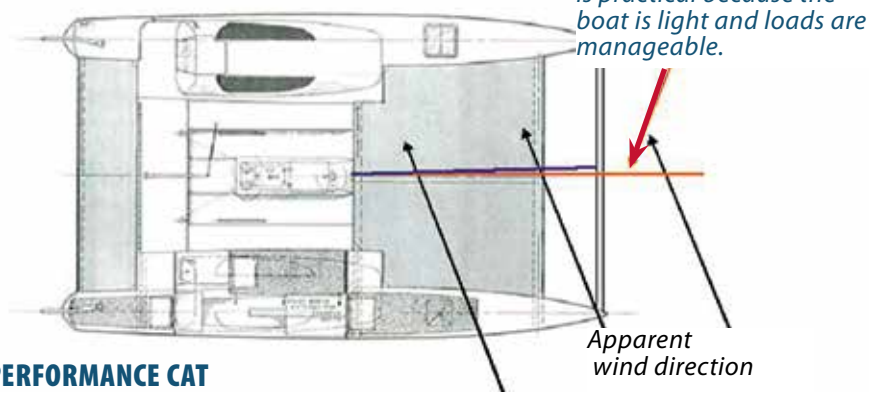
With the apparent wind that far aft, the best way to fly a spinnaker is NOT with a centerline spinnaker pole, as has become all the rage, but rather a bridle that hauls the spinnaker tack to windward. This provides more projected area, helps the chute rotate to windward, and is lighter and faster when going deep.

It also better suits a full chute designed for going downwind, whereas chutes sprits are generally given a much flatter cut, better suited for reaching on hotter (apparent wind forward of the beam) courses. I considered adding a sprit, even gathering some of the materials and running through the engineering, but it would have been slower on my native Chesapeake Bay, which emphasizes windward/leeward sailing in our typical summer weather patterns.

Yes, with the main up will have to jibe downwind, but will be about 30 percent faster VMG than just flying a chute alone, depending on the wind conditions. And, by keeping the main up, you can easily switch to a higher course if the wind changes, easily strike the chute in a blow, and change to main and jib when it becomes too strong for the chute. The winds are light and you don't you want the extra speed? That's up to you, but I didn't buy a cat to go slow.

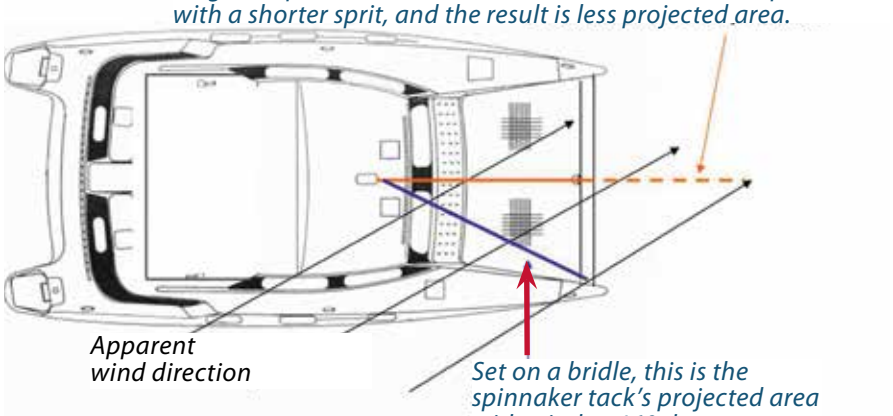
On a performance cat like the Stilletto that can routinely sail faster than the windspeed, the apparent wind is about 75 degrees, the true wind is at 135 degrees, and never aft of the beam.

A bowsprit only 5 feet long can increase the projected area and will make inside jibes much easier. A DIY construction is practical because the boat is light and loads are manageable.



PERFORMANCE CAT

On a slower displacement catamaran, the bowsprit must be 10 feet long to provide the equivalent projected area. This is too long for a practical construction, so most owners compromise with a shorter sprit, and the result is less projected area.



CRUISING CAT

On a fast cat (top) the tack on the asymmetrical spinnaker is nearly on the centerline. On a cruising cat (below), the tack is moved to windward as needed.

An anchor off the bow or stern (or both) helps with soft landings and sure departures in strong winds. For more details on mooring against bulkheads see "Dodging a Bullet When Caught on a Bulkhead," PS July 2018.

Drudging To a Safe Landing

Maneuvering and docking with the assistance of anchors and drag devices.

By Drew Fry

The word 'drudging' can be traced to the middle-English word for dragging. It is the practice of using a chain, heavy weight, or anchor on very short scope to control the motion of a boat while maneuvering in harbor.

There will come a day when your engine has quit and you need to enter a marina. Or perhaps your engine is working fine, but there is a combination of wind and tide that cannot be managed by engine and shorelines alone. Possible solutions are as numerous as the situations.

Dinghy Tow. If you have an inflatable tender with a sturdy engine, the most practical solution is often to use it like a tug boat. On smooth but open water, use a long nylon towline to reduce surging loads. For close-quarter maneuvering, lash the tender to the after quarter, steering with both the main rudder and the dinghy outboard. This is common practice for marina work crews any time a boat must be moved for service or hauling.

One of the most important rules of docking is never to force a landing that you don't feel good about. The dockmaster on Chincoteague Island, Virginia, directed me to slip between pilings, in spite of a 3-knot current running at 90-degree to the slip. I looked at the slip, thought about it at length, and decided because the slip was a tight fit (only 18 inches wider than the boat) and my crew was limited, any attempt to enter the slip and control motion with ropes would be dangerous.

I chickened out and tied up to an adjacent bulkhead that was parallel to the current, easily warping the boat alongside and tying up without impact. I felt both guilty and incompetent as I watched a boat slide into the slip 15 minutes later. Thirty minutes after that, I walked up the dock on my way into town, and noticed that the boat had scraped off an 2' x 8' area of paint, the worst dock rash I'd ever seen.

Later on the same cruise, I was directed to tie up along side a floating bulkhead with the tide running strongly underneath it. With twin engines, I had no difficulty working my boat into a parallel position, but I underestimated how the current would grab the keels and move the boat sideways, inexorably toward the dock.

We slammed into the dock sideways at more than a knot, with the full force of the tide pressing on both keels. Thank goodness for fenders, a strong hull-to-deck seam, and sturdy rub rails. This would've seriously dented many boats.

OBSERVATIONS

If you think a docking situation calls for drudging, here are some things to consider as you plan your approach (or departure).

Drag Factors. Obviously, the resistance will vary with the shape of the object being dragged and the type of bottom.

Chain. We've dragged lengths of chain along mud and sand bottoms. The friction amounts to about 0.4 to

Photo courtesy of John Neal, www.mahina.com

0.7 times the weight of the chain actually on the bottom. Any chain that is suspended as catenary does not contribute to friction. We also tested dragging a loop of chain. Depending on the distance the ends are separated, drag increases 0.6 to 1.0 times the weight of the chain, unless of course the chain snags on a rock or old wreck, which happened a few times. In each case we were able to recover the chain by releasing one end. Assuming 5/16-inch chain and that only 50 feet are dragging on the bottom, this will provide about 35 pounds of drag, or similar to the effect of applying about 1.5 horsepower in reverse.

This tactic is only good for slowing a boat in lighter winds.

Kellet. Same rules as chain, only it is more likely that the entire weight of the kellet is bearing on the bottom, so long as there is reasonable scope (at least 3:1). The drag will be about equal to the weight of the kellet, depending on shape and bottom. Like chain, but useful in more wind.

Anchors. Here's where things can get hairy. A pivoting fluke anchor that has not set will act like a poor kellet. You won't even feel it. An aluminum Fortress will need some chain and rapid release of slack to keep it from planing along and never reaching the bottom. A pivoting fluke or new generation anchor that sets will stop the boat right where it is.

It also depends on the bottom. A new generation anchor dragged at 3:1 scope through soft mud will dig in a little bit, but not go deep enough to generate any real holding. With the chain leader, the same anchor might bite hard in sand, while with the rope leader it might not bite at all.

Plow and claw anchors, on the other hand, are more able to drag predictably on short scope without actually setting. But notice that everything we said above is full of caveats. On any given day, with a different rode combination, slightly different scope, and different bottom type, the anchor that very predictably provided 100 pounds of drag yesterday, may now either slide along with no discernible restriction, or set hard and stop the boat.

Stern-to mooring is the norm in Europe (thus the name Med-moor). Knowing how your boat behaves in wind and current is essential to getting it right.

An anchor can be dragged backwards. If the rode is attached to a tripping eye it behaves much as a kellet, described above. Of course, you have surrendered the option of converting it to an anchor by increasing scope.

Evaluate the situation. Even if the engine is functioning, never feel you need to land on the first pass. Very often, when entering a new marina I will intentionally motor past the assigned space in order to get a good look at the space, what I might hit, escape routes if the approach is blown, and a look at the local wind and tide. I might make several passes, until I have at least two plans in mind and discuss them with the crew.

If the engine isn't functioning, anchor out and take the dinghy over to have a look. Watch how the tide moves the dinghy. Figure out where you can get lines on to control the motion of the boat. Will it make sense to drag something, or set an anchor either during the approach or with the dinghy that you can use as an additional control line?

No amount of extra rigging effort will look as silly as crashing into something. Don't feel that using a drudge or anchor as an aid to getting into a tight spot is unnecessary just because you have an engine. Finally, reserve the right to refuse any slip or bulkhead that feels unsafe. I've turned down many slip assignments.

Sails. In many cases it's perfectly safe to sail right into the slip. I've done this a number of times in my own slip, comfortable with an intimate knowledge of local conditions and the maneuvering characteristics of my boat.

I am always prepared to immediately anchor or slow down and grab a piling if something changes or if traffic prevents necessary maneuvers. Don't hesitate to use the horn, but don't expect that anyone will listen; they may not recognize that you are in legitimate distress, assume you're just a stupid sailor showing off, and not understand just how restricted your maneuverability truly is.

Anchor Tactics for Quick Stopping

That neatly stowed anchor won't do much good if it's sitting deep in a forepeak locker.

An anchor ready to deploy can help avoid getting into a tight fix like this.

Anchoring can be an emergency situation, even in a harbor. Several years ago I headed out for an afternoon sail, after ticking off a few boat tasks. A hundred yards into the passage between the entrance jetties, one of the engines conked out. I tried the key and it wouldn't even cough, but I reasoned it was just a minor warm-up problem that I would sort out in a few minutes once I was in open water. Unfortunately, its twin conked out less than a minute later, just short of the exit. There was a brisk 25-knot crosswind and I calculated that by the time I fussed with restarting them I would surely be on the rocks. The solution was to anchor immediately; there was enough room and time if I executed every step correctly and expeditiously.

• **Momentum.** The boat was still moving forward at 5-6 knots, providing me considerable latitude to coast into an advantageous position. If I had wasted time puzzling out why the engines stopped, I would have drifted too close to the leeward jetty for anchoring to be an option. Instead, I took advantage of what momentum I had to maneuver the boat as close to the windward jetty as practical. Act quickly, because momentum won't keep. Each time you anchor, note how far your boat carries into the wind, until you create a database covering a range of conditions.

• **Quick Deployment.** In harbor settings the anchor should be ready to go within a matter of seconds. Any lashings for offshore sailing should be removed and the anchor should be secured by only a quick-release pin or simple lock. Because I had only to remove a spring clip and pull a pin, I was able to calmly walk to the bow and release the anchor before the boat began drifting backwards.

• **Scope.** While it's tempting to begin snubbing the rode at short scope to see if the anchor is catching, resist the temptation. Nothing more than the lightest hand setting should be attempted until scope is at least 7:1. Remember, you're in a harbor and it's probably shallow, so it won't take that long to achieve 7:1 scope. You want it to set and hold the first time. Allow for rode stretch and setting distance.

I was singlehanding, as I often do, but that didn't make a difference. Anchoring should be a one-person job, where no two actions need to be performed at the same time. Practice until you can do it quickly, without preparation.

I was anchored squarely across the channel, but it was a weekday without traffic. Once satisfied that the anchor was holding, I was free to focus on the engine problem. I lifted the port engine cover and within moment suffered a classic face-palm moment; when I changed fuel filters that morning I forgot to re-open the filter isolation valves. The gasoline in the carburetors and line was just sufficient to propel me between the jetties. Always run the engines for 10 minutes after any engine work, no matter how simple, before heading out!

THE BASICS

Slowing the Boat. If there is a following wind and the boat is simply blowing in the channel too quickly, try a long length of chain first, perhaps with a kellet, but have an anchor ready.

Turning the Boat. The rudder is typically ineffective at very low speeds; 2-3 knots is the minimum, depending on the boat. However, the boat can be turned either quickly or slowly by lowering an anchor off one side.

Lowering the anchor from near the midship cleats and dragging lightly creates a gradual turn. Lowering the anchor further and allowing it to bite, whether from the midship cleats or bow, creates an abrupt turn and stop,

1. This simple, homemade chain-stopper can release the anchor at a moment's notice.
2. This Fortress is ready to deploy, but unfortunately, this style of anchor is a poor brake, since the design tends to 'plane' if you are moving too fast.
3. Assemble adjustable-fluke anchors to match the bottom long before you need to use them.

Several years later I backed out of a slip in a small fishing village, right into a mess of floating fishing gear that had just drifted behind the boat, tangling both props. I didn't have a lot of time, probably only 30 seconds, before the 2-knot tide swept me into a row of boats. However, there was enough time to throw the rudder hard over to spin the boat 90 degrees, walk to the front of the boat, and lower the anchor. After drifting 100 feet, I gently snubbed the rode, checked for holding, and went for a quick swim (tricky in such current) to unwind the ropes. Another tragedy narrowly averted.

I often see boats with an anchor on the stern rail. Many are used for fore-aft anchoring, but a good many believe that if the engine fails, this is also their emergency brake. In practice, it may not work. First, you probably won't have enough distance. Better, use your momentum to coast in a direction of safety. This will also slow the boat. Second, the anchor is not going to catch and hold if you have any significant way on.

A pivoting fluke anchor might plane and not even reach the bottom, and others will just drag at speed. If by some miracle it did catch in the soft harbor muck, the impact force will be immense, on the order of hurricane loads, and the anchor will then drag. *PS* testing has shown that boat speed over 1.5 knots exceeds the safe working load of chain rode, and a boat speed over 3 knots exceeds the safe working load of rope rode. In both cases, the holding capacity of a newly set anchor will be severely taxed.

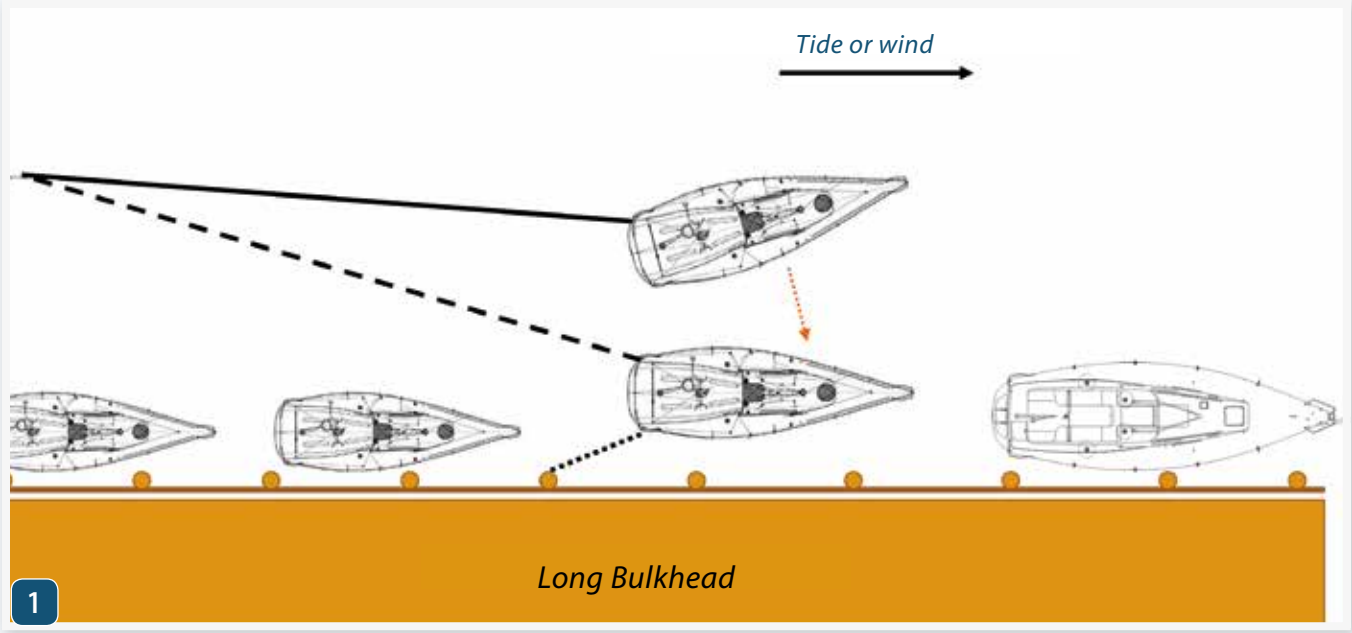
Dropping the bow anchor with even a slight turn of the wheel is better; the boat will "club haul," pivoting within its own length, the turning action dissipating considerable energy. If the situation is really tight, sometimes the best plan is to coast within grabbing range of a windward piling. Get the boat stopped with a quick turn, and place fenders where protection is needed. Now you have bought yourself time to work out a proper solution.

The important thing in each of these examples is that you are stopped, the result of maintaining situational awareness and using stored momentum.

through a practice known as club hauling.

Allowing the anchor to bite and securing it to a midship cleat will hold the boat at 90-degrees to the wind or tide, depending on which is of the two forces is controlling the movement of the boat.

Stopping the Boat. Often it is possible to convert from either slowing or turning the boat by gentle dragging of an anchor, to stopping the boat entirely. Let the rode run free for 100 feet so that the anchor can set, and then slowly snub the rode around a cleat until the boat is stopped. The snubbing can be very gentle if all you intend to do is slow down.



Putting Old-school Tricks to Brand New Use

When wind and current conspire against you try a little 'drudging.'

By Drew Frye

The accompanying illustrations show the various situations in which "drudging" can be put to work. Some of these, I've put to use on more than one occasion.

1. **Stopping on a long bulkhead.** You may be able to sail parallel to a long open section of bulkhead using the genoa, but then there is the matter of stopping. Only a small bit of sail should be used, and that will be let free or doused some distance from the bulkhead. Dragging a chain, kellet, or anchor will stop the boat, the choice based on the amount of wind and weight of the boat. Too much is better than too little.

2. **Sailing into a slip.** First, be realistic about the conditions, your ability, the crew on board, and the situation. I have sailed right into my slip several times, but only with intimate knowledge of my boat, the surroundings, and in perfect conditions. Another time the conditions were not perfect (too much wind), so I anchored very close to the slip and used two lines looped around pilings to warp the boat in single-handed (see illustration). It took 20 minutes, but went smoothly and without strain.

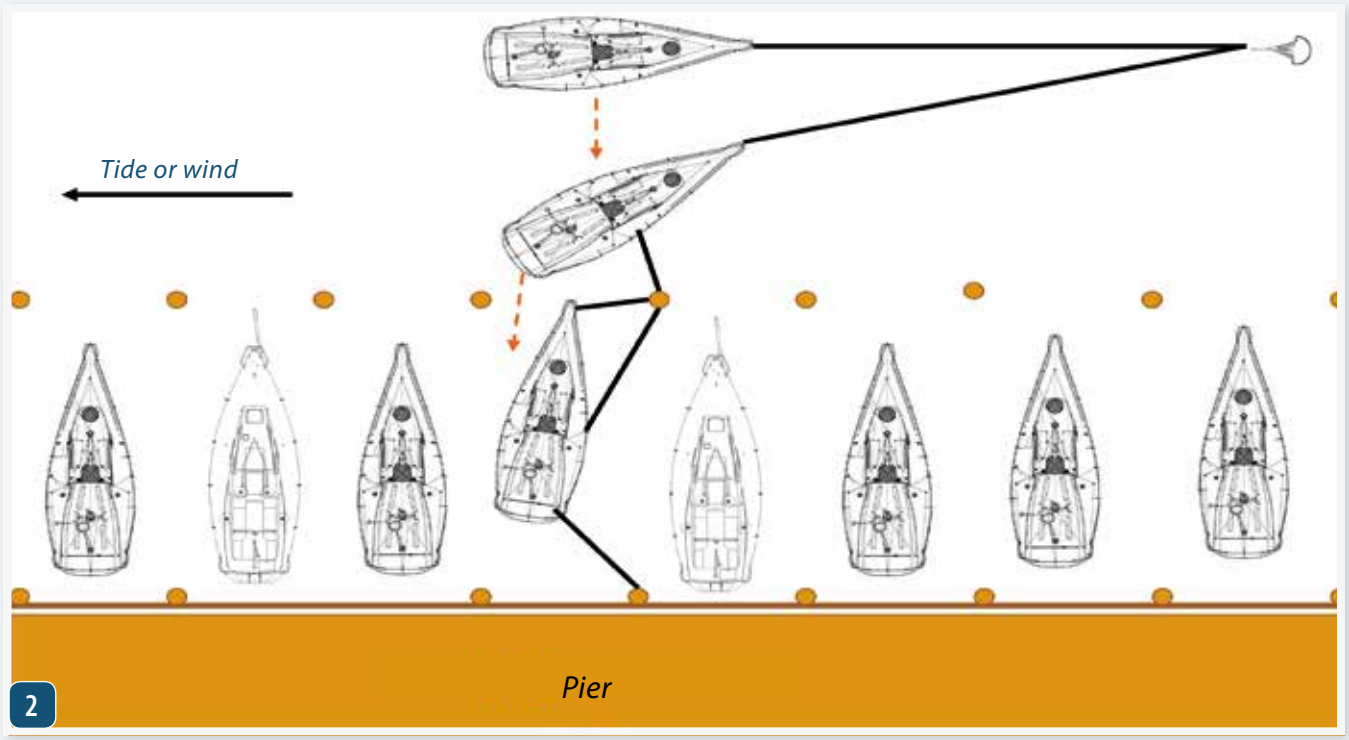
3. **Floating Dock.** Having learned my lesson about tides running under floating docks, I was more cautious the next time I was faced with this situation. My engine was operating just fine, but the slot was only about 10 feet

A ready kedge like those pictured above come in handy when wind and tide are working against you in tight situations.

longer than my boat and I feared the tide slamming me into the dock again. The solution was to lower an anchor off the non-dock side while still about 100 feet from the dock. The rope rode was turned loosely around the mid-ships cleat. As per usual, I maneuvered the boat parallel to the slot, while at the same time a crewman controlled slack in the anchor rode. As the tide began to push the boat sideways, the crew firmly snubbed the anchor line while I jockeyed the throttles to keep the boat parallel and centered in the space. In fact, we left the anchor line in place over night, since a storm was approaching and a beam anchor would help hold us off the bulkhead if waves built.

CONCLUSION

Plan ahead. None of this is complicated, but putting it together under fire is a recipe for disaster. Try some of these methods in the open to learn how your boat responds. When a challenge arises, take as much time as you need to work out a safe solution. Back in the day maneuvering by oar, anchor and warp was common practice.



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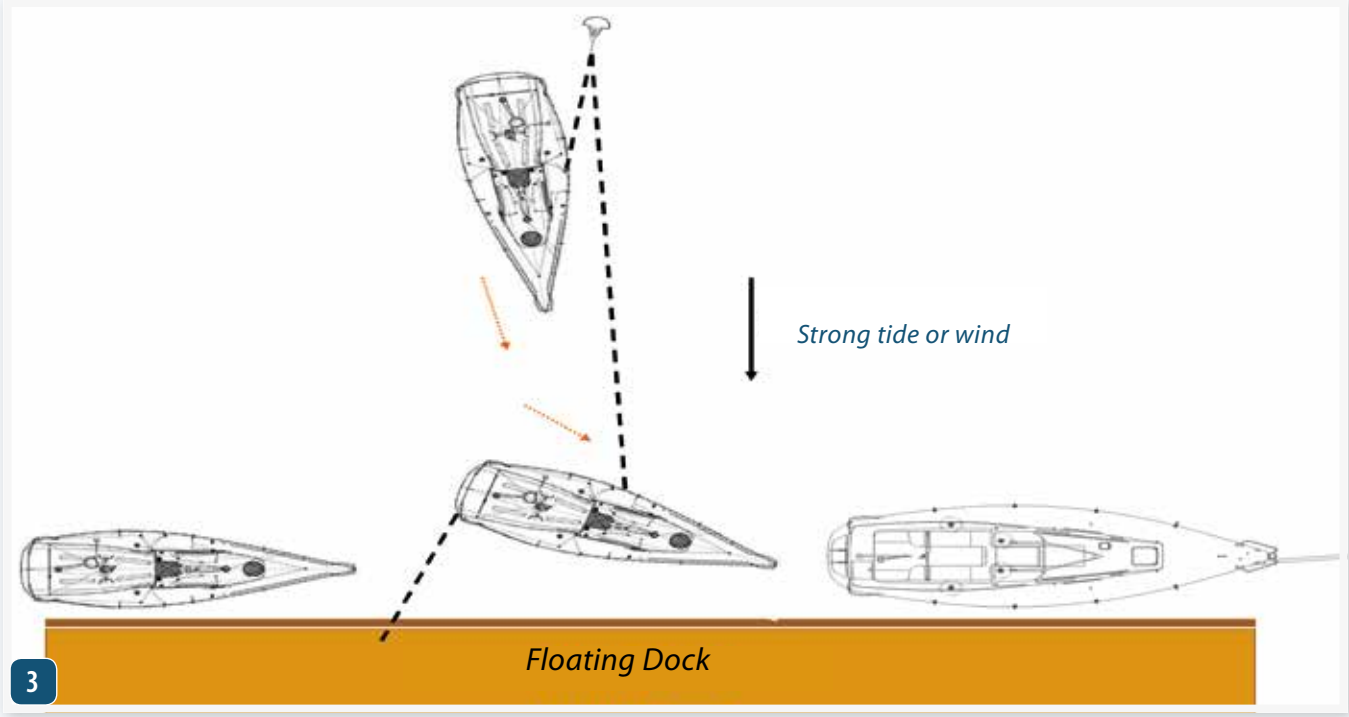

3

ON THE HORIZON
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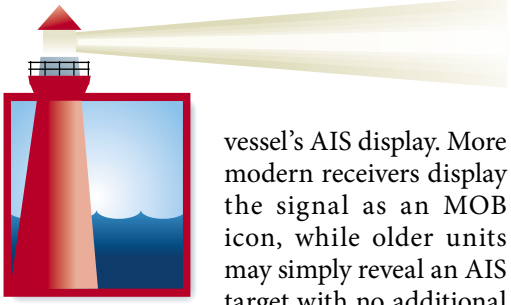
Don't Confuse AIS Beacons with PLBs

Ralph Naranjo



PS ADVISOR

Lots of confusion has arisen over the use and functionality of personal locator beacons (PLB) and automatic identification system (AIS) devices. Both can increase your odds of survival but do so in very different ways. The PLB is a diminutive EPIRB and functions in exactly the same manner as its big brother, the EPIRB. Details of how 406 Mhz digital distress signals are handled globally and the response they elicit are outlined in the article "Upgrading Sarsat," (see page 8).

AIS beacons promulgate a short-range, line-of-sight signal that will show up on a nearby (within 2-3 miles) vessel's AIS display. More modern receivers display the signal as an MOB icon, while older units may simply reveal an AIS target with no additional information.

One of the advantages of the system is that it gives the crew remaining on the vessel a real-time MOB position that can be displayed on the vessel's MFD. This aid can guide the crew to the person in the water. However in heavy seas, the wave troughs, spray and breaking seas can further diminish the 2-3 mile range. The AIS beacon works best in calm winds and flat seas, when MOB incidents are less likely.

The PLB is a small compact device that engages a huge, multi-national search and rescue service. The beacons themselves have undergone an immense amount of lab and field testing and the number of actual rescues instigated by PLB signals dwarfs other personal beacon types. However, there's no way for the crew of the vessel with an MOB to receive the position information from the Rescue Coordination Center (RCC). At best, this requires a secondary means of communication such as VHF or satellite link with the RCC. This approach worked well in Vendée sailor Kevin Escoffier's rescue (see page 6), but even with the new array of MEO satellites, there was less-than-pinpoint accuracy and some searching was necessary.

The bottom line is both of these systems have their value. Perhaps the ideal answer is to have both. For many it's an issue of cost not bulk. There's little inconvenience of tucking a PLB into your pocket and packing an AIS in your inflatable life jacket. However, neither device is a substitute for investing in good tether clips, installing jacklines, and getting accustomed to functioning in heavy weather, attached to the boat.

In the future, AIS tracking satellites (S-AIS), now keeping tabs on ocean going vessels equipped with AIS units(type B+ and A), will likely also be able to locate the next generation of AIS beacons. This will add a whole new aspect to distress signaling and rescue coordination.

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As a precaution, we alerted the Coast Guard before testing our AIS beacon (signal displayed on our plotter in photo above). A test might accidentally alert nearby boats, who might call rescuers. PS *tested MOB alerting devices in flat water (right), see* PS *May 2013, "Field Testing Kannad, McMurdo, and Mobilarm MOB Beacons."*

Practical Sailor photos