VOL 32 NO 1 JANUARY 2006

Practical Sailor

RESCUE AIDS

Versatile Lifesling floats to the top

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IN LIVING COLOR

No, you have not fallen down a rabbit hole. *Practical Sailor* has gone four-color, and our new paper is glossy. Yes, we're about ten years too late, but good things take time. To accommodate the switch to color and improve our product coverage, we will be publishing once a month instead of twice, so you'll still be getting the full 40 pages of *Practical Sailor* you've been getting. Annually, that's 480 pages of detailed, unbiased product testing and consumer information on boats, gear and everything in between, something no other sailing publication can deliver. Your expiration month won't change. (Whether your subscripton ends on the first or the 15th of a particular month you'll still get that month's issue.)

The Bilge-0-Matic

The value of any good publication lies not in presentation, but the content. This is especially true with *Practical Sailor*. Our success depends solely on how well we provide you with the concrete information you need before you buy. I think you'll agree that a review of color digital charts (check out our test in next month's issue) is much more meaningful in color than it is in black and white. In addition to adding color photographs, we've revamped the design to better highlight key information.

One change you may notice is that our tables now feature three ratings based on our evaluations: "Budget Buy," a relatively inexpensive product that meets our standards; "Recommended," a high-quality product that stands out among others in its class; and "Best Choice," a superior product that meets or exceeds our highest standards and offers exceptional value. All this in addition to our traditional "Don't Buy" recommendations.

Bottom line: We hope you'll like what you see, and we hope you'll stick around as we sharpen our focus on the information that truly matters.

This month, Dave Laska has the unenviable task of diving head first into the Bilge-O-Matic, a simulated version of the real thing that, much to Dave's dismay, will be seeing a lot more hard service for *Practical Sailor*. Dave's thorough testing and evaluation of the three most popular types of bilge switches (See "Bilge Binge," page 18) yielded results that will likely surprise longtime subscribers to *Practical Sailor*. The test spotlights the tough task our testers, writers and editors face: In many cases, no single product best serves the needs of everyone.

The owner of a shallow-bilge boat will be more interested in getting a bilge switch that doesn't cycle the pump on and off as waters sloshes, while the sailor with a deep bilge and sump might place higher value on a switch that's easy to install.

As an incurable cruising sailor, my own preferences are for heavy-duty gear that is simple to maintain. I'm not impressed by gadgets that try to think for me. But that's just me. In the months ahead, we'll consider more ways to better accomplish our mission of serving all our readers, so now is an ideal time to give us your thoughts. I look forward to hearing what you'd like to see in your new, color *Practical Sailor*.

— Darrell Nicholson

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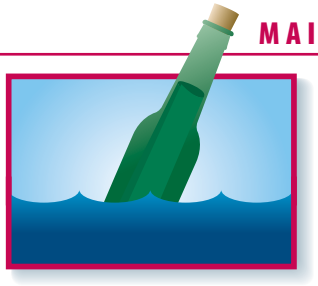


Photo by Lannis Waters/The Palm Beach Post

At the Palm Beach (Florida) Yacht Club, Todd Goldsberry clings to a piling after leaping from his boat to set more dock lines before the arrival of Hurricane Katrina.

STORM PREPARATION?

I was struck by a few things about the enclosed photo [above] taken when Hurricane Katrina hit Florida, and I recall your magazine ran a short piece a while ago ["PS Advisor," November 15, 2004] on good storm preparations. In that article, you made mention of some of several storm preparation practices. Maybe some review of such preparations is needed again. I also hope that a survey of the damage to boats in the Gulf Coast region will be done so we can all learn lessons from that experience.

Lee Campbell
Cambridge, MA

The November 15 PS Advisor mentioned the helpful BoatUS website www.boatus.com/hurricanes/, which features weather updates, storm season tips, a hurricane preparation brochure, and a handy pre-storm check list. The brochure makes the several recommendations: double-up lines, install chafe gear and strip all canvas to reduce windage. Your top priority, however, should be to have your hurricane hole selected before the storm season begins, and to secure your boat there at least 48 hours before projected landfall. Look for our upcoming report on marine insurance, which compares rates coast to coast.

POWER CONSUMPTION

I think *PS* has, in recent articles, become a little casual about the consideration of power consumption. Maybe your editors haven't spent enough time away from shore power for extended periods. I live on a 44-foot boat with 450 amp hours of batteries and a 100-amp alternator, and I can tell you that power is an issue. I don't like listening to the engine run, and the engine doesn't like running just to drive the alternator.

In your discussion of the Northstar 6000i and other networked plotters and instruments ("Northstar 6000i: Easy to Use, But Pricey" *Practical Sailor* October 15, 2005) you totally skipped the topic of power consumption. When comparing features, I think a comparison of value/amp-hour is just as important as some of the other attributes you compare. For example, I have a Furuno 1833BB radar/plotter and a Northstar 952XD, and the value/amp (other than in the fog) is clearly with the Northstar as it draws less than an amp, while the Furuno plotter and display (with the radar off) draws closer to six amps. In other words, the competitors to the 6000i are not just the integrated units from Raymarine and Furuno, but also smaller units which may deliver 70 percent of the functionality at 20 percent of the power.

Northstar 6000i

You briefly mentioned power in your recent market scan of water-

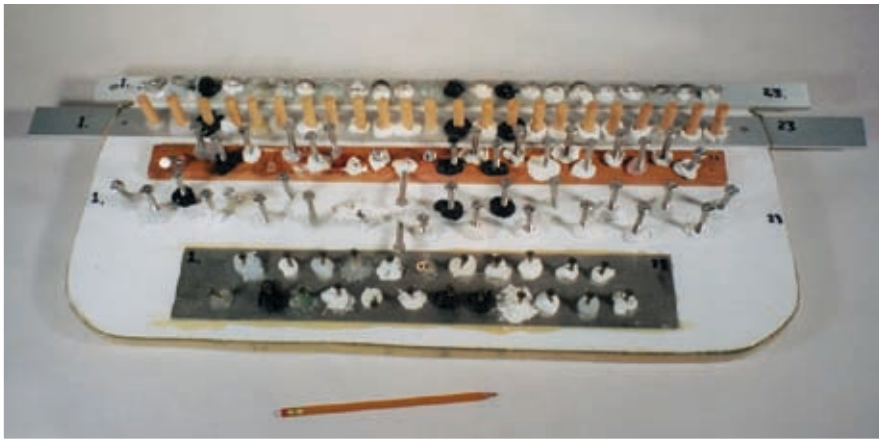
makers ("DC Watermakers: Expensive but Useful for the Cruising Sailor," November 15, 2005), but the author didn't bother to do the math or treat this as an important issue, dismissing the differences between products as "three minutes of engine operation daily." I can assure you that alternators rarely run at rated output, and batteries with three-stage chargers only briefly accept the full actual output of the alternator. All other things being equal, the more power-efficient watermaker should get the nod.

The bottom line is that I feel power is an important consideration in the selection of all components and is worth a little more of your time to analyze. The foregoing not withstanding, I thoroughly enjoy the publication and appreciate your efforts.

Russ Irwin
Via e-mail

Good point, Russ. Collectively, our editors have spent too many years away from the dock — which may explain our infrequent brain lapses. (In 11 years of cruising, our editor and wife only used shorepower while working in Guam.) The last thing we want are inefficient, amp-hungry devices that require big battery banks and charging cycles that take much of the pleasure out of sailing. Look for our upcoming radar test, which will look at power needs, both during full operation and during "stand-by" modes.

We apologize for not being able to provide personal answers to all the letters we get—we do get swamped with e-mail from time to time, not counting the spam. But we do read all the letters we get, so please keep 'em coming.



We will be subjecting the wide range of caulks assembled on our test panel to more intensive testing in the months ahead.

CAULKS AND SEALANTS

Your update on caulks and sealants ("Update: Caulks and Sealants," November 15, 2005) could have been more useful. There was no mention or discussion of the generation of new oxime rubber sealers/caulks. TDS is one such example (though there are a few others sold by Jamestown Distributors). TDS has been used for caulking teak seams, but now is being used more extensively for bedding hardware. It has an estimated life of 20 years (they claim) and elasticity of greater than 20 percent. So, is it really as good as the manufacturers claim? The evaluation of "waterproofness" was useful, but I hoped *PS* would provide more definitive numbers of this sort, and also a measure of adhesiveness to different materials. If used for bedding, does the compound bond to teak as well as it does to pine, to stainless, bronze, painted surfaces (LPU vs. enamel, etc.)? What is life expectancy in an unopened tube vs. an opened tube? And how does it resist UV? Also, color degradation (mainly of "white") is another consideration. Does the white material tend to yellow? I have found that 3M's 4000 series with UV inhibitor turns yellow in a few months.)

In contrast, I liked your article on watermakers. It reflected a careful analysis of the needs and applications of different users.

Harvey Karten, MD
La Jolla, CA

According to Jamestown Distributors, the product you mention from Teakdecking Systems of Florida, is more of an adhesive than a caulk. We will be evaluating many of the caulk characteristics you mention as the test progresses, but some of them are beyond the scope of this project. There is a good deal of research within the chemical industry regarding these concoctions. From what we can surmise, p-Quinone dioxime ($C^6H^6N^2O^2$) is used as a vulcanization accelerator by combining with peroxy-free radicals to tie up free radicals, and it acts as an adhesion promoter between metal and rubber. We're unaware of research showing that it's going to increase butyl rubber's adhesiveness for wood. Because of its oil content, teak has always presented special problems for caulks. We will be comparing specialty caulks for teak in a future issue.

TO PRO-TECHT:

I ordered a new product called the **Mantis** (a quick portable cover for boaters) to use at the helm of my MacGregor 26X. When I received it, I was extremely pleased because it serves as a bimini without cluttering the rear of the small cockpit. I've resisted getting a bimini for 10 years because I didn't want to encumber the cockpit. But the problem I encountered was how to use one of the three applicable bases on the 26's lightly built, hinged helm seat. A Pro-Techt rep took time to work out a partly customized solution to my unique needs. In a very pleasant and timely way, the company modified its deck/floor mount and back plate for use with stronger and longer bolts that exactly fit my application and resulted in a strong, stable mount. I am an enthusiastic fan of this product and the company's engaged and willing attitude toward service. (www.pro-techt.com)

Richard Cattell
Golden, CO

Pro-techt Mantis

TO ORIGO STOVES:

We were snug as a bug in a rug in Three Mile Harbor on Long Island, cooking up a pot of pasta and meat sauce on my trusty 10-year-old Origo 3000 when the flame turned from blue to yellow. I tried to turn it down, but nothing happened. In fact, flames started spurting out in all directions. Being on a wooden boat, I was alarmed—and the crew was famished. I grabbed the flaming stove, ran topside, tied a line around the unit, and heaved the whole thing overboard.

I wrote to Origo about the self-immolation of my stove, asking if it could be fixed. Back came an e-mail saying that, as they didn't have the stove in front of them, it was difficult to assess the situation. No mention of sending the unit, but a long paragraph on the proper way to use the 3000, i.e. no pots bigger than 9 inches diameter, etc. But the last line really lit up my face. "We have arranged to have a refurbished unit sent to you as a goodwill gesture." Wow!

The unit I received several weeks later looked brand new to me, with only a very slight ding on the front edge. I'm sure next summer's steaks will never notice. (www.origo-sweden.com)

Origo 3000

William C. Winslow
New York, NY
Via e-mail

TO ESPAR HEATERS & ROTON INDUSTRIES:

I bought an Espar diesel-fired air heater [Airtronic D4] for my sailboat from Roton Industries in Vancouver, BC. Shortly after the expiration of the warranty period, the control unit failed and I had it replaced. Afterwards, I approached Ken Johnston and Brian Silk of Roton and, notwithstanding the expired warranty period, they both worked hard to present a warranty claim to Espar, and the company kindly agreed not to charge me for the replacement part. Roton worked diligently to make the out-of-time warranty claim on my behalf and Espar stood behind its product. The manufacturer's integrity and Roton's devotion to service are exceptional and much appreciated.

Airtronic D4

I am very pleased with the Espar heater, and equally pleased with Roton's service. (www.espar.com)

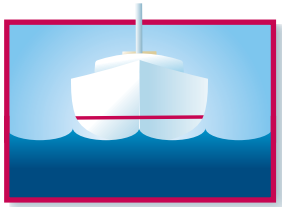
Richard Reeson
Via e-mail

CENTER STAGE

Hunter's vision of the comfortable cruiser leads back to a center cockpit design.

Hunter Marine, the well-known builder of auxiliary sailboats headquartered in Alachua, Florida, has been reinventing itself as of late. In the past five years, this firm has introduced 13 new models and the company now builds 22 different models from eight to 46 feet. But, with over a dozen new boats in just five years, it's surprising to learn that the new Hunter 45 Center Cockpit, introduced last fall, is the first center cockpit model from this company in nine years.

When Hunter's president, John Peterson, summarizes the company's overall market strategy, his words apply in spades to the new 45: "Interior volume is important to us," he proclaimed. "We put a big emphasis on amenities. We also offer boats that are easy to sail, have adequate stability, are easy to maintain, and ultimately cost less."



BOATS IN REVIEW

DESIGN

Getting substantial volume and amenities into a hull that will still perform above average is the challenge of every naval architect engaged in the design of cruising vessels. In the case of the new 45, explained Glenn Henderson, Hunter's director of engineering, the magic formula comprises equal parts of naval architecture and of the savvy use of materials. "We wanted to pack as much performance as we could into a full-volume boat. So we went for a low-drag, high-stability matrix in the design parameters."

The hull lines of the 45 stem initially from its predecessor, the Hunter 45, in fact it's built from the same mold, but Henderson and the Hunter design department have refined the new boat with modifications to accommodate not only the center cockpit, but their performance objectives as well. In profile, center-cockpit boats tend to resemble the proverbial wedding cake; not so the Hunter 45, which manages to achieve center-cockpit features and attributes while maintaining a relatively low coach roof profile. A bonus of this arrangement is the abundance of light that floods the saloon via the wrap-around windshield that's set low in the coach roof.

"I took a chance early on with the application of low-drag, low-lift sections in the appendages of this boat," said Henderson. "I knew that this approach works with sportboats, but I didn't know how it might work with a relatively heavy displacement boat." The objective, said Henderson, was to create a design that would attain hull speed easily and quickly.

Perhaps the most fundamental challenge here is that center cockpit designs rob space from what Henderson terms "the main high-volume area of the boat." Devising such a design with the fewest interior compromises can stretch the abilities of any designer, but to their credit, Henderson and his team have given the 45 ample proportions below.

The Bergstrom and Ridder (B & R) rig (see "The B & R Rig," page 11) aboard the Hunter 45 is situated well forward. Henderson is a devout fan of smaller headsails and larger mainsails for cruising boats because that arrangement affords easier sailhandling. The arrangement also solves some design challenges.

"Once you start getting all the systems and tankage in, et cetera, you're always fighting to keep the center

of gravity from moving too far aft," explained Henderson. "So you end up putting the keel forward to counteract that, and this dictates, in part, that the rig be forward." Hence, a larger main and the commensurately shorter J measurement.

ON DECK

Inherent in any center-cockpit design is the division of a boat's deck into distinct sectors. In the case of the 45, the foredeck, aft deck, and cockpit are integrated in a fashion that makes each easily accessible from the other. This, primarily, is due to how little hardware there is cluttering the sidedecks. The mainsheet traveler is up out of the way on a stout stainless steel arch that doubles as a handhold for crew moving about and an anchoring point for the bimini. And all the Lewmar hatches are low profile, as are the two cowl vents on deck.

The broad expanse of the aft deck provides plenty of space for lounging while underway in mild conditions or under power. The non-skid texture offers secure footing without being too coarse. We'd pass on the synthetic teak option, but mostly for aesthetic reasons. Housed here are large twin lockers, one in each aftermost corner, for lines, sails, buckets, etc. *PS* was pleased to see that their lids are controlled by gas-piston arms. Incorporated into the after pulpit are two single person seats that face forward. One nice treatment is that the upper and lower lifelines spanning the off-center gate that leads down to the swim platform each retract into the stainless stern rail.

Moving forward, a single set of winches flanks the cockpit atop the coaming. These Lewmar 48s are located almost directly outboard of the helm, so the person steering can easily adjust headsail sheet tension. (Actually, during *PS*'s test sail, we found that it's possible for one person

HIT: *The main saloon provides ample room for dockside lounging.*

MISS: *Moving fore and aft when the boat is heeled can prompt a hunt for handholds.*

HIT: *Most engine service points and critical systems are easy to access.*

MISS: *Hatches, hatch frames and hardware at some of these inspection points won't stand up to hard use, in our view.*

HIT: *The aft-facing nav station has plenty of panel space for a full set of electronics.*

MISS: *That comfortable-looking chair wobbles.*

HIT: *A smart layout and plenty of storage space make for a pleasant, functional galley for preparing meals.*

MISS: *The front-opening fridge will spill hard-earned cold air.*

HIT: *The center-cockpit payoff is a spacious aft cabin.*

MISS: *A lee-cloth arrangement is in order for the centerline berth while underway.*

HUNTER 45 IN CONTEXT

MANUFACTURER	HUNTER 45	BENETEAU 42 CC	ISLAND PACKET 445
LOA	44′ 3″	43′ 5″	45′ 9″
LWL	39′ 2″	36′ 4″	38′ 1″
Beam	14′ 6″	12′ 10″	14′ 4″
Draft	6′6″	5′ 11″	5′ 0″
Draft (shoal)	5′0″	N/A	N/A
Displacement (lbs.)	22,936	19,620	32,000
Ballast (lbs.)	7,237	4,155	12,800
Ballast (lbs., shoal)	7,389	N/A	N/A
Sail Area (sq. ft. furling)	883	872	1,074 (cutter)
Engine (hp)	75	56	75
Water (gals.)	149	163	260
Fuel (gals.)	75	53	160
SA/D	17.46	19.14	17.01
D/L	170.65	182.85	258.79
Price	$269,900	$232,970	$499,950

Of the three center-cockpit sailboats included above, the Beneteau 42 is by far the lightest, but carries almost as much sail area as the slightly larger Hunter 45. The Island Packet 445 has the lowest SA/D ratio and its D/L ratio puts it in the range of medium displacement boats. Both Hunter and the Beneteau have the lowest D/L ratios, so it's likely that those two would be faster under sail, particularly in light winds.

to steer through a tack, cast off, and trim on the new side, though this arrangement doesn't promote optimum performance.) The electric mainsheet/halyard winch sits to starboard of the companionway, requiring that someone other than the person on the helm tend it. But the traveler controls—mounted on the arch supports port and starboard—are certainly handy from the helm, so the person steering can spill the mainsail if overpowered by a sudden gust.

The seats in the cockpit are long enough to recline on (over 7 feet), but too narrow for a proper snooze. Like the steps that access the cockpit outboard of the coaming, the seats are covered with synthetic teak (Flexiteek). The *PS* reviewers were divided over whether we preferred this to plain fiberglass in this application. The seatbacks are high enough that they offer support up to the mid back on most sailors, and they're angled outboard for comfort. There are no visible scuppers in the cockpit sole, but this area has a large drain forward, shielded by a removable fiberglass panel. While we're not sure how that arrangement will function, we do like that the companionway hatch retracts into the boat, so it's handy when needed.

But two fundamental aspects of the cockpit really gave us doubts: the respective size of the footwell and the pedestal. The footwell is wide enough to offer comfort, but it would be much easier to move around in if it were just three to six inches longer fore and aft. According to our measurements, it's a mere 50 inches long, and the base of the mammoth pedestal housed here takes up 13 by 8 inches of that, almost in the middle.

Though beautiful in its ergonomics, the Lewmar pedestal—what one *PS* reviewer referred to as the elephant in the room—is so large in this relatively small space that it dominates, particularly the oversize instrument display. However, when you step out from behind the pedestal, the sight lines from the cockpit are superb, as well they should be since occupants sit roughly eight to nine feet above the water. For any serious offshore sailing, *PS* would add more dedicated padeyes for harness tethers, because the 45 comes with just one in the cockpit.

One of the 45's most distinctive features is the ½-inch-thick acrylic wrap-around portlight. This is covered by what company reps call a "brow," and it's to this brow that the grabrail is fastened. When we tugged on the rail, the brow beneath it flexed visibly. Hunter's on-board rep told us that it's fastened to the rest of the structure with machine screws, which are a little light duty for our taste.

The bow features a stout, stainless stem cap integrated into a double anchor roller, and an anchor locker that's large enough to house sufficient rode and a Simpson-Lawrence windlass. Little design ingenuity has been used to keep the hatch cover on the anchor locker open. It's simply meant to be held ajar with a small length of bungee cord and a hook. Not a fancy system, but it works.

ACCOMMODATIONS

The saloon sets the tone for the rest of the interior—it's remarkably voluminous. To begin with, there's 6′ 11″ of headroom, with a broad passage leading forward past the polished teak table to port and an inviting,

full-length settee to starboard. Glossy teak woodwork abounds, all cushions are upholstered with an attractive yet rugged fake leather (optional, not standard), and the overhead is covered in a white, foam-backed fabric that Henderson calculates is 600 pounds lighter than the fiberglass liner installation Hunter used previously.

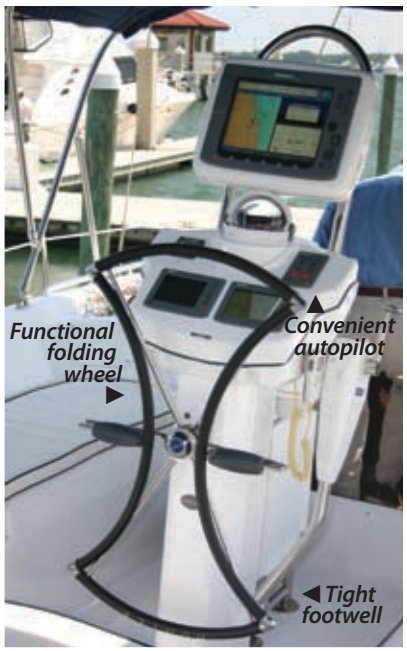
To port is the nav station—with an ample desk and sufficient vertical space to house a bank of instruments. Hunter's choice for a navigator's seat—not unlike an executive office chair—is initially comfortable, but has no system for height adjustment and was wobbly enough to be worrisome in a seaway, we felt.

To starboard is a U-shaped galley with Corian countertops, stainless steel sinks, and a number of desirable amenities like a gimballed, three-burner stove/oven, front-loading stainless refrigerator, and a top-loading freezer compartment.

The saloon's table could seat five comfortably with its wrap-around settee, and two more might squeeze onto the bench that's set on centerline. We like that the 45's cabin sole is engineered to afford some of the best access we've seen to the bilge sump, fresh-water system, and tanks, but these panels pose a concern for heavy weather. Neither the benchtop nor the inspection panels had any provision to be locked in place.

The bilge sump is deep (roughly 28 inches) and affords ready access to all the keel bolts. The boat *PS* sailed was equipped with primary (Rule 1500) and secondary high-volume (Rule 4000) bilge pumps, both with Rule-amatic float switches. There was also a manual bilge pump that you operate from the cockpit.

The saloon is well illuminated by a series of recessed lights and dedicated reading lamps as well as courtesy lighting near the sole, two



Top left: The Hunter's anchor-handling arrangement reflects some careful thought. We'd prefer more clearance between the furling drum and anchor, but this works and allows a bit more headsail. The padeye for the bitter end lets you to cast off the entire rode quickly, if necessary. The concealed chain-lead keeps the foredeck clear.

Top right: You don't have to reach through the wheel to control the autopilot. The cockpit footwell is too tight for our liking, although the folding wheel opens up space at anchor.

Bottom: The arch-mounted traveler allows end-boom sheeting without interfering in the cockpit. Shorter sailors will have to stand on the seat to see beyond the console display. Side decks are wide with adequate grab-rails, though we'd prefer more cowl vents.

fixed portlights in the hull, and the wrap-around coach roof windshield. Three hatches and two dorade vents provide ample ventilation dockside. But with just those two dorades serving the entire boat, it may get stuffy below while underway.

Aft of the nav station is a large area to house the 45-gallon holding tank. And even farther aft is the master stateroom, a 10' by 12' chamber naturally illuminated with five opening portlights in the cabin trunk, two in the hull, and a central hatch overhead. Without lee cloths, the centerline, queen-sized berth will not be a comfortable for sleeping in a seaway.

Hunter offers the 45 with numerous options. The boat we sailed had two air-conditioning units that served two separate zones. There were also a generator, a flat-screen TV, a top-loading freezer, and a Bose stereo system. There's a sizeable list of standard equipment, including an 11-gallon water heater, 45-gallon holding tank with macerator pump, an isolation transformer, and a Raymarine knotmeter and depthsounder with alarms.

PERFORMANCE

PS took Hull No. 1 out for a spin off St. Augustine, FL, on a relatively breezy afternoon. We assessed both the boat's performance under sail and under power. We also put the anchor down for about 10 minutes, just to see how that aspect of the design functioned.

This boat is powered by a 75-hp Yanmar that is cooled with fresh water. Under power, the 45 spun in remarkably small diameter circles. (Hull No. 1 was also equipped with an optional bow thruster, which did an admirable job of squaring away our landing once back at the dock.) We ultimately got up to 8.9 knots of boat speed through flat water with the fixed, three-blade prop spinning at 3,200 rpm. That diminished to 7.2 knots as we throttled back to 2,800 in a small swell at the harbor's entrance. We also took decibel readings with the engine at idle (89 to 91 dB from the saloon table). Then, after revving it up to 2,800 rpm, we recorded 88 dB from the nav station. From the cockpit, that diminished to a modest 82 dB.

The beefy, all-mechanical Whitlock steering linkage was surprisingly responsive. Stainless steel components comprise the linkage, which runs from the pedestal down through the engine compartment, beneath the aft cabin's sole, and under the master berth to the rudder post. Most every section is easily accessed.

PS unfurled the mainsail to the point of the first reef. Then we opened up the headsail. With 15 to 17 knots of breeze, the boat heeled about 15 degrees when closehauled, but didn't feel tender at all with its shoal-draft wing keel going to work. The sea presented us with a two-foot chop, and the 45 moved along at six to seven knots under these conditions. We tacked several times and noted that the boatspeed drops significantly through a tack, which isn't surprising for a

The Hunter's two-stateroom layout is ideal for cruising with children or for two couples. The center cockpit design allows for a spacious aft cabin.

CONSTRUCTION DETAILS

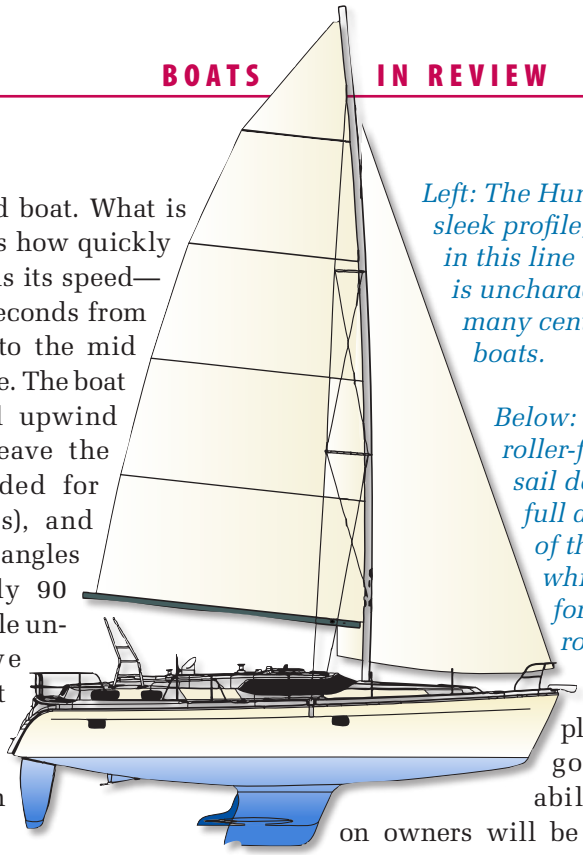
Hunter Marine now builds most of its boats (on average, 800 per year) using a modular construction technique wherein over 80 percent of the interior is assembled on a structural grid and then that unit is "dropped" into the hull. That grid is chemically bonded to the hull using Plexus and bulkheads are tabbed in at this juncture.

HULL: Hand-layed in female molds, the hulls are cored with end-grain balsa above the waterline. Below the waterline the hull is a solid laminate using chopped strand mat and woven roving. Beneath the waterline, from the keel forward, the hull is reinforced with Kevlar. Hunter uses polyester resin for laminations with a modified epoxy resin for blister resistance in the skin coat.

DECK: The deck is cored with marine plywood. Where hardware will be mounted, aluminum plates are glassed in. A laminate schedule similar to the topsides is applied to the deck.

KEEL/RUDDER: Antimonious lead appendage poured around a stainless-steel frame that is fastened to the hull using stainless plate washers and nuts. The seam is bedded with epoxy. The rudder on Hull No. 1 is a stainless tube, but the company is moving to solid stainless shafts on all future boats.

HULL-DECK JOINT: The outward turning flanges of both the hull and deck are chemically bonded with 3M 5200 and thereafter fastened on six-inch centers with ¼-inch stainless steel bolts. A sturdy rubber rail caps the joint, and a strip of stainless steel is screwed in place outboard of that to affix the rail in place.



Left: The Hunter 45's sleek profile, as revealed in this line drawing, is uncharacteristic of many center-cockpit boats.

Below: The boat's roller-furling mainsail doesn't take full advantage of the B & R rig, which allows for a powerful roach.

23,000-pound boat. What is remarkable is how quickly the 45 regains its speed—roughly 45 seconds from three knots to the mid six-knot range. The boat tracked well upwind (we could leave the helm untended for brief periods), and the tacking angles were roughly 90 degrees. While underway, we didn't detect any creaking or groaning noises down below, a sign of solid secondary bonds and good joinery work.

Sailing nearly dead downwind, the 45 made 5.5 knots (measured by our GPS over the ground). We had quartering waves at this juncture, with a steady 12-knot wind, but despite the relatively high elevation of the center cockpit, there was no untoward yawing or rolling motion.

We put the asymmetrical cruising spinnaker up and the GPS showed 7.4 knots. The increased sail also made steering noticeably more manageable. Then we hardened up to spend some time on a beam reach. The GPS registered 7.8 knots with a 78-degree apparent wind angle. When the occasional puffs hit, the 45 translated that additional energy into acceleration with minimal heel—a response that surprised many of us on board. It was a good, reassuring indication that the boat would stand up well to a blow if the sail trim was attended to properly.

CONCLUSIONS

Henderson and his design team have managed to achieve a workable balance of luxury amenities, low-maintenance equipment applications, and good sailing ability. Hands-on owners will be happy with the boat's excellent access to the engine and important system controls (battery banks, gauges, manifolds, valves, through hulls, etc.). And its sailing performance will generally be appreciated by most. But purists will likely shake their heads at many elements of the 45—particularly the gargantuan pedestal and the B & R rig.

The market *PS* perceives for this boat is the emerging coastal sailor with a small family to keep happy with creature comforts underway and at the dock. An owner who is unperturbed by non-conventional design, who is perhaps stepping up from a mid 30-footer and looking for something that can cover greater distances with more comfort, fits the bill here. At a very competitive base boat price of $269,900, that customer should find a lot to like in the 45.

THE B & R RIG

Like many of Hunter's auxiliary sailboats, the 45 sports a Bergstrom & Ridder (B & R) rig with spreaders swept back roughly 30 degrees. The setup eliminates the need for a backstay, simplifying the rig, but also allows the mainsail to have increased roach area. However, most of Hunter's keelboats come with in-mast furling systems that limit the amount of roach.

Cruisers should keep an eye out for sail chafe. When you ease the 45s mainsail out as far as you would on a boat with a conventional rig while sailing downwind, the spreader tips and shrouds poke into the sail. According to Hunter, many owners prefer to broad reach downwind to enhance both speed and stability. Flying an asymmetrical spinnaker will bring the apparent wind further forward. Chafe patches are standard.

Typically, the dealer tunes the B & R before the rig is installed. Mast pre-bend in these rigs relies upon adjustments to the diagonal stays aloft which makes tuning the rig from deck impossible. If adjustability is important, this rig won't satisfy those inclinations.

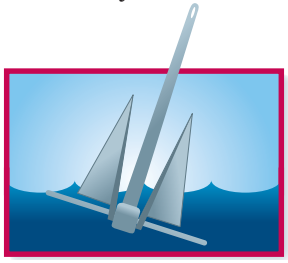
We think this concept makes the most sense when used with a mainsail with ample roach and jiffy reefing. With this setup, the compromises when sailing off the wind and the lack of adjustability are offset by a more efficient and powerful sailplan. Every rig involves tradeoffs. If sailing wing and wing, and making easy adjustments to mast bend and headstay tension are important considerations, then a B & R rig isn't for you. But, if you want a no-fuss rig with easy operation, look no further.

Left: With 300 watts of additional power the Lewmar H3 performed notably better than the its sibling, the H2. Right: The Muir Cougar, right, comes standard with a capstan for handling nylon rode.

HEFTY HORIZONTALS: POWERFUL LEWMAR H3 IS A RODE WARRIOR

Muir Cougar is mightier than Lewmar when handling chain, but Lewmar's performance and dual-purpose gypsy is more impressive

We wrap up our series of windlass reviews with a look at a trio of powerful horizontal windlasses. These heavyweight pullers are designed to handle relatively high loads aboard boats not well suited for a vertical windlass or where having a horizontal capstan would prove valuable for other winching duties. Two recent articles, ("Windlasses Under $1,000," July 2005) and September ("Big Vertical Windlasses," September 2005), compared other windlasses that may be better suited for your purposes.



WHAT WE TESTED

The windlasses ranged in price from $1,300 to $2,500 and are recommended for boats from 20 to 55 feet in length. All are designed to be powered by 12 volts DC.

Drive mechanisms in horizontal windlasses are normally housed on deck—and that's the case with the three tested here. The drive motor, reduction gears, and electrical components are all contained inside a metal case designed to be securely mounted to the foredeck. The gypsy and clutch assembly are fixed to a horizontal shaft exiting one side of the case, while a capstan (used for handling rope rodes or lines) is usually present on the opposite side. Selection of a horizontal windlass is most appropriate when an upward angle of the vessel's sheer or foredeck makes using a vertical windlass difficult or impossible. Another factor that would make a horizontal the right choice is insufficient belowdeck space to accommodate vertical windlass machinery.

Lewmar sent us a pair of its new horizontal windlass designs, the H2 and the H3. Muir participated with the Cougar HR1200 windlass.

LEWMAR H2

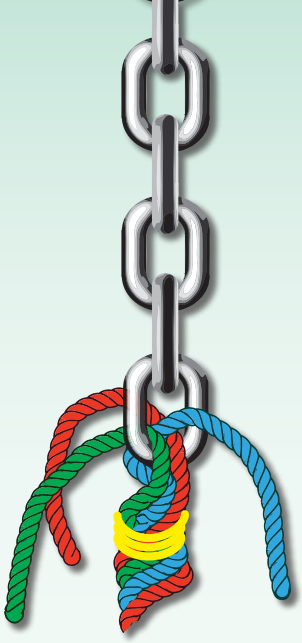
Lewmar's H2 is a horizontal windlass equipped with the same 700-watt motor and gearbox as the vertical V2; it is also available in a 24-volt version with a 900-watt drive motor.

Two styles of line-handling hardware are available—gypsy only or gypsy/capstan. We tested the gypsy-only model. A stylish, waterproof, aluminum and composite case finished with a high-gloss white paint houses the electric motor and worm-drive gearbox. The pressure finger is made from polished stainless steel, while the gypsy is chrome over bronze. The optional capstan is polished stainless steel. The H2 appears to be well-constructed with quality materials.

We found this Lewmar horizontal windlass packaged with a 90-amp circuit breaker, control switch, mounting hardware, clutch lever, and an owner's manual. The reversing solenoid is already installed inside the windlass case. This should speed up installation because you'll have to mount and wire one less part. The owner's manual instructions included a mounting template that made marking, drilling, and cutting our test deck easy. We wired the unit according to the easy-to-read wiring diagram.

The H2 managed a no-load speed of 61 fpm (feet per minute)—slightly less than its claim of 69 fpm. Lewmar rates its windlasses for no-load speed using a tachometer to measure gypsy rpm, and then converts that to fpm. Our slower speed measurements are to be expected considering the difference in test methodology. Working load speed measured 40 fpm against a claim of 56 fpm. Again, Lewmar tests for working speed with a 100-pound load while we used 150 pounds. This is likely the reason for the slightly slower speed attained in our testing. During maximum-pull testing with rode in the gypsy, the H2 managed a pull of 640 pounds. With chain, it peaked at 1,020 pounds. Lewmar rates the H2 to a maximum pull of 1,433 pounds, so it fell short of expectations here.

The four main pieces of data collected were the speeds of retrieval in feet per minute, one with no load and another under load. We also tested the maximum pulling power (with rode and with chain), by noting the point at which either the rode slipped or the breaker tripped. The final test gave our Dillon dynamometer a very strenuous workout.



Aim for a tight wrap at the link.

CHECK THAT SPLICE

The weak link in any combination rope-chain rode is the rope-to-chain splice, a necessary evil if you want to run a combination rode through a windlass. In a 1996 study, this splice reduced the breaking strength of some lines anywhere from 12 to 25 percent. Essentially a back splice that wraps through a link, the union slips down hawse pipes and is compatible with gypsies. It's critical that you monitor the splice for chafe and the inevitable stiffness, which will cause the rode to jump from the gypsy. Several books and websites, including New England Ropes www.neropes.com/splice/ offer photos and illustrations on making the splice (above and below). For maximum life, aim for a tight wrap at the chain to rope juncture to minimize chafe there.

A good rope-to-chain splice will taper an have at least five tucks.

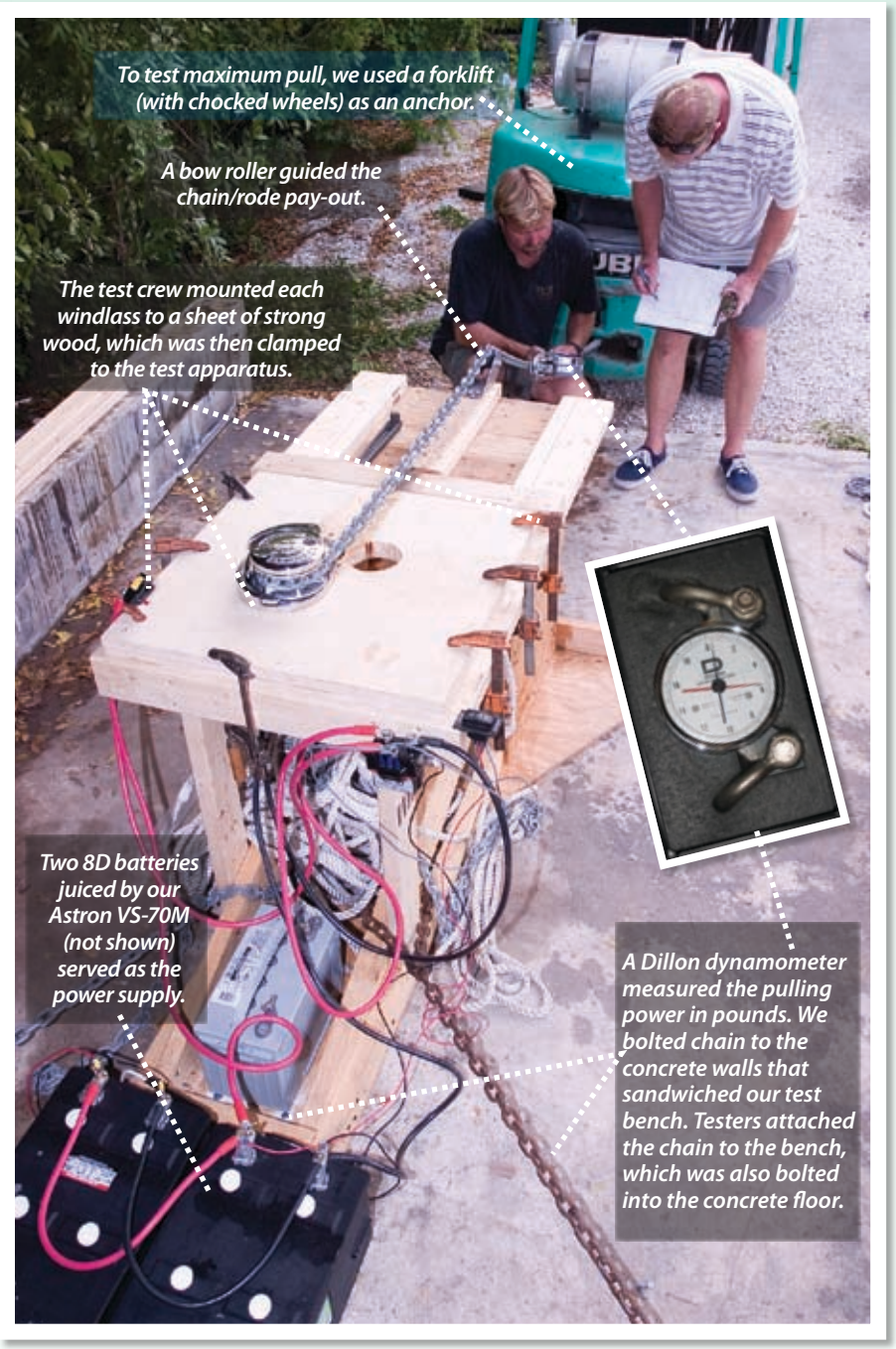
Windlass manufacturers make claims for their products that might include no-load speed, working-load speed, maximum pull, or all of the aforementioned. To verify these claims as both reasonable and accurate, we ran the windlasses through our full battery of tests. The three units were tested at an industrial location near our editorial offices in Sarasota, Florida.

Lewmar and Imtra (distributor for Muir) each supplied an anchor rode made from at least 100 feet of nylon three-strand line coupled to 20 feet of chain. We used the supplied rode to test each windlass. Prior to each test, the anchor rode was dunked in a water tank to better simulate pulling the anchor at sea.

We installed each windlass one at a time on a plywood test deck and then clamped it to the top of our test stand. Heavy chains anchored the stand to the concrete slab. If the supplier sent us electrical components like switches, reversing solenoids, and circuit breakers with the windlass, we used these. If not, we located and used appropriate alternatives. We sized all wires according to specifications, or larger. A pair of new 8D marine batteries were wired in parallel and hooked to our new Astron VS-70M regulated power supply. We set output voltage to 13.8 volts. This setup simulated a boat with tons of battery capacity and the engine running at idle or slightly above.

Each no-load test began by stretching 100 feet of line straight out in front of the test stand. We had two marks 50 feet apart on the pavement and set the chain-rode joint on the start mark. The weight of the chain at the far end held the rode taut. A tester made sure the rode continued in a straight line and flowed smoothly onto our lead roller. Then we ran the winch and measured the time it took for the windlass to pull in 50 feet of line. With the time recorded, calculations were made to convert the data into feet per minute (fpm). We used a Fluke 336 ammeter to measure amp draw at startup and while the anchor line was in transit.

Next, we set up for the working-load test by pulling the line back off the windlass and coupling the chain to a bridle rigged on our test load. Our test load consisted of a wooden pallet weighed down with large bricks. It measured a load of about 150 pounds, according to our Dillon dynamometer, as it was dragged across the level pavement. Again, for each windlass, we recorded both the speed and the current draw.



We tested maximum pull in two phases, first with rode in the gypsy and then chain. We used the dynamometer to measure the load during each pull. To prevent any movement and obtain good readings, we used the towing pin on a 5,000-pound forklift that had its drive wheels chocked to secure the tag end of our anchor rode. Using an additional section of chain, we installed the dynamometer between the forklift and the windlass chain. With rode in the gypsy and a small amount of slack in the line, we ran the windlass until either the rode slipped or the circuit breaker popped. We recorded the maximum dynamometer reading. The test was repeated a second time with chain in the gypsy.

We did not test the manual override feature on any of the windlasses that were so equipped.

The H-series windlasses from Lewmar have manual override available as an option. It is an attachment that permanently mounts on the outside of the gypsy and is supplied with a handle. If power to the windlass fails you can loosen the clutch nut, insert the handle into the slot on the top and use a ratcheting motion to manually raise the anchor.

We found the Lewmar H2 priced at $2,064. It carries a 3-year warranty.

Bottom Line: A good windlass with decent performance. But its big brother provides more bang for the buck.

LEWMAR H3

Big brother to the H2, the Lewmar H3 uses the same large drive motor and gearbox as its vertical cousin, the V3—one of our top picks in its class. Both use the same powerful 1,000-watt motor, available in either a 12- or 24-volt version. Case design and materials, options, and package contents are the same as the H2. The only exception: The H3 ships with a 110-amp circuit breaker because of its larger motor.

Installation and wiring of the H3 on our test deck was straightforward, but we did experience a delay. One mounting stud would not hand-thread into the bottom of the case, so we had to get a tap and chase the case threads to fix the problem.

The extra power provided by the H3's brawny motor and higher gearbox ratio was evident in both an increase in speed and pulling power. In no-load testing, the H3 pulled 73 fpm against a claim of 92 fpm, while working-load speed was 47 fpm against a claim of 59 fpm. The same caveats that apply to the H2 speed testing apply here. We think the speed claims made by Lewmar for the H3 are reasonable. Though the H3 delivered speed and pulling power somewhat below its vertical cousin (V3 equipped with the same motor and gearbox), we'd attribute the difference to the additional rode slippage normally found in a horizontal windlass. With rode in the gypsy, the H3 managed to pull a very respectable 660 pounds before the rode slipped in the gypsy. In chain testing, it fell short of its rated maximum pull of 1,962 pounds, managing a pull of 1,700 pounds.

The Lewmar H3 is priced at $2,364 and carries a 3-year warranty.

Bottom Line: Our top pick, the Lewmar H3 offers good overall per-

PS VALUE GUIDE — HORIZONTAL WINDLASSES

MAKER	LEWMAR		MUIR
Model	H2 GYPSY	H3 GYPSY ★	COUGAR HR 1200
Style	H	H	H
Cost	$2,064	$2,364	$1,811
Source	westmarine.com		seacraft.com
Recommended Boat Size (Feet)	30 - 50	40 - 55	29 - 42
Power Rating (Watts)	700	1000	1000
Circuit Breaker Rating (Amps)	90	110	110
Warranty Period (Years)	3	3	3
Adjustable Clutch	Yes	Yes	Yes
Manual Override	Optional	Optional	Standard
Claimed No Load Speed (ft./min.)	69	92	None
Tested No Load Speed (ft./min.)	61	73	105
No Load Current Draw (Amps)	47	55	67
Claimed Working Speed (ft./min.)	56	59	46
Tested Working Speed (ft./min.)	40	47	0
Working Load Current Draw (Amps)	62	72	N/A
Start-up Current Draw (Amps)	127	212	230
Claimed Maximum Pull (lbs.)	1433	1962	1200
Maximum Pull with Rope (lbs.)	640	660	0
Maximum Pull with Chain (lbs.)	1020	1700	1950
Unit Weight (lbs.)	47 to 52	52 to 56	55
Gypsy Chain Sizes	3/8	3/8	1/4 – 5/16 – 3/8
Gypsy Rope Sizes	9/16 – 5/8	9/16 – 5/8	1/2 – 9/16 – 5/8

$ Budget Buy PS Recommened ★ Best Choice

Lewmar rates its windlasses for no-load speed using a tachometer to measure gypsy rpm, and then converts that to fpm. Our slower speed measurements are to be expected considering the difference in test method. Although we tried several different nylon rodes meeting Muir's specifications, we could not get the gypsy to bite during load testing.

A TALE OF TWO GYPSIES ...

As our tests revealed, designing a gypsy that takes both rope and chain presents several challenges. The Lewmar gypsy and the Muir gypsy each had problems with rode, but the Lewmar clearly outperformed in this area. One difficulty is that nylon rodes of the same size and type can vary greatly. Dimensional stability, tightness (or hardness) of the twist, and diameter tolerances can all significantly impact performance. Bottom line, don't rely on off-the-shelf rode for your windlass, ask your windlass dealer which rode manufacturers can reliably meet your gypsy's requirements.

Lewmar H3

Muir Cougar HR1200

CONTACTS

IMTRA (Muir)
508/995-7000 • imtra.com

LEWMAR
203/458-6200 • lewmar.com

formance, a hefty maximum chain pull, and a long warranty in a good-looking package.

MUIR COUGAR HR1200

The Muir Cougar, designated the HR1200, comes standard with a 1,000-watt electric motor and both a gypsy and capstan. A 1,200-watt motor or hydraulically powered version is optional. The capstan and gypsy are both constructed from marine-grade bronze and finished with chrome. An aluminum windlass housing finished with marine-grade high-gloss white epoxy paint carries the components. You order the Muir with or without a built-in cleat atop the case. A rope chain management system (RCMS) is also optional.

The HR1200 comes with only a handle and owner's manual—the user must supply all other needed gear like switches and circuit breakers. This is frustrating, since these components are essential for the windlass to function. We had no problem using the template to cut our test deck for the HR1200. Electrical hookups were straightforward.

During our initial testing, the gypsy on the Muir Cougar did a poor job of preventing rode from slipping. During the first round of tests, the gypsy failed to pull any of the available rodes (we tried several). Even in no-load testing, the rode slipped. Eventually, we skipped over the rode speed and pull tests and went right to the chain.

Muir conservatively rates their windlasses for both speed and power. This was clear when we loaded the chain in the gypsy and performed a maximum pull test. The Cougar hit a whopping 1,950 pounds after the chain jumped the gypsy once and then locked in. Muir only rates the Cougar for a maximum pull of 1,200 pounds.

We contacted Imtra, the U.S. distributor for Muir, and told them of our results during rode testing. Imtra advised us to try the unit with the optional RCMS installed and immediately shipped us the only one it had in stock. After installing the RCMS, we repeated the rode test on the Cougar with mixed results. The no-load test produced impressive numbers with the HR1200 hitting a retrieve speed of 105 fpm. That is exceptionally fast and may have been the result of the rode riding the outer edge of the gypsy rather then the teeth. No matter what we did or which rodes we tried, the Muir Cougar would not grip the rode tight enough to successfully accomplish a working-load test.

We found the Muir Cougar HR1200 priced at $1,811. It carries a 3-year warranty.

Bottom Line: For people with all-chain rodes, the gypsy slippage won't be an issue, but those who rely on combinations rodes will be better off with a Lewmar until Muir fixes this shortcoming.

CONCLUSIONS

We like the standard package of accessories Lewmar ships with the H-series windlasses. It also carries an impressive 3-year warranty (at the upper end, most carry 2- to 3-year warranties). Performance on both the H2 and H3 was good. We'd pay the few hundred extra dollars for the more powerful pull and faster retrieve speeds found on the H3. It's our top pick for a hefty horizontal.

The Muir is a well-built product, but the gypsy's inability to handle nylon rode under load is unacceptable for boaters who use anything but all-chain rodes. Muir needs to resolve this apparent design problem before we can recommend it to anyone who intends to use a combination rope-and-chain rode.

EASYSTOW FENDER

For sailors short on storage space, this fender is a good fit

Whether you take a minimalist approach to sailing and limit the complexity of the maintenance and systems on your boat, or you're more inclined to swamp yourself in gadgetry, there are some things you simply can't do without. Fenders fall into this category. Even sailors who own small dry-sailed boats have need for a fender now and then, if only for those few moments when the vessel is tied to a dock while they're parking the car and trailer. But, the downside of owning fenders is that they inevitably occupy space, and space is almost always at a premium aboard sailboats.

Above: Pillow-shaped when inflated, the Easystow fender resists the tendency to roll. Left: *A protective flap conceals the screw-type inflation valve.*

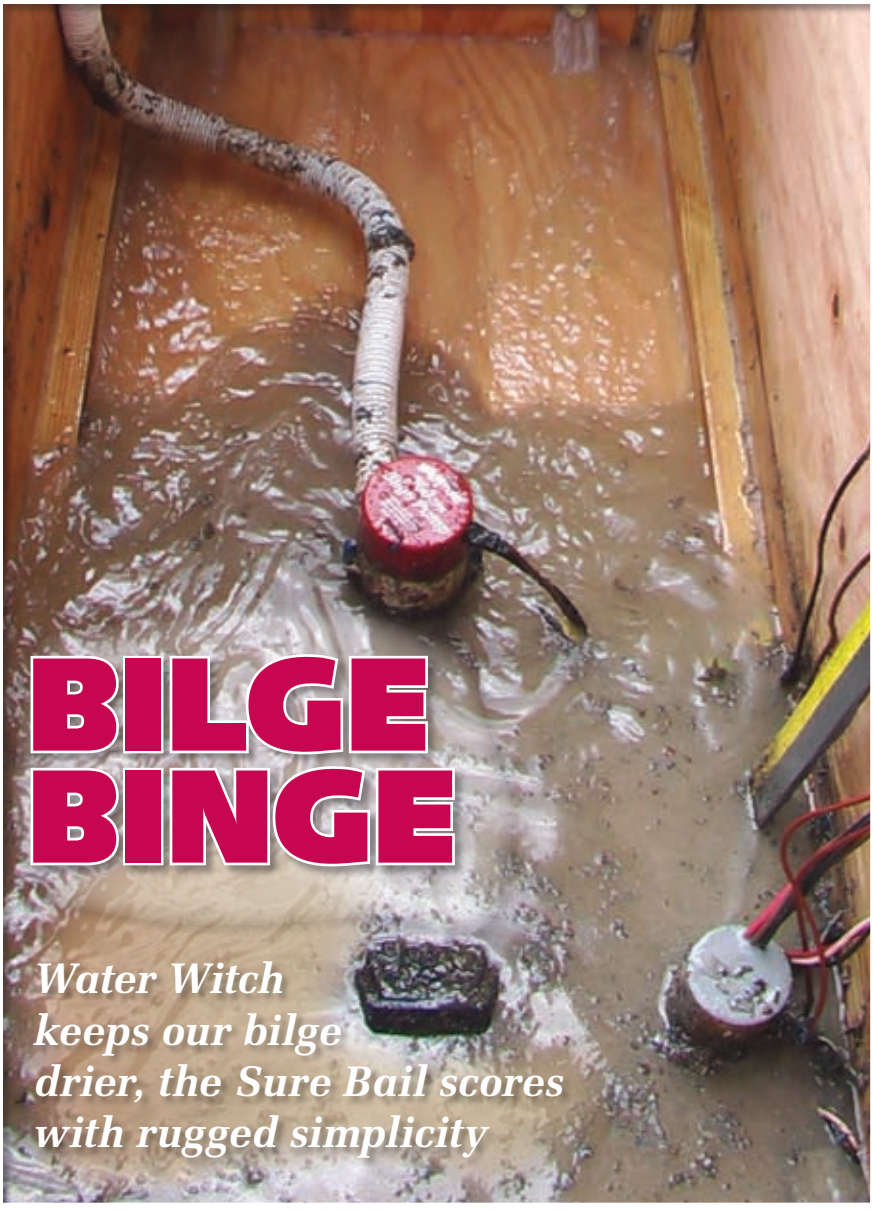
Enter the **Easystow fender**, a simple, rugged device that can save your boat's topsides from the marring effects of docks, sea walls, and other vessels. This product marries an inflatable composite film bladder with a thick extruded PVC exterior (reinforced with polyester fabric), and a screw-type valve. Because the no-marking exterior is a one-piece tube, there are no seams except at the top and the bottom of the fender, and those are capped with thick polyester webbing (with loops for attaching lines) that's sewn closed using industrial strength, UV-resistant thread. When inflated, these fenders take on a rectangular pillow shape. When deflated, they can be folded up into compact stacks.

Easystow fenders are made by a small company based in LaGrange, IL, which calls itself Seoladair. Some readers might recognize that name as the same firm that produces the distinctive Boomkicker vang, as well as several other useful products for sailors. Proprietor Ted Corlett has been building these fenders for three years now. He said that customers like the versatility of the Easystow. Some have indicated to him that the fenders are very handy for protecting docked boats in storm situations. (Because of the pillow shape, these fenders stay in place and don't roll when set against a piling or dock.) And one boat owner, said Corlett, even used an Easystow fender to jack up his on-board generator, because a conventional jack wouldn't fit.

Easystow Fenders are made in sizes ranging from 8" x 27", to 12" x 60", and come in black, dark red, green, and blue. Corlett and his colleagues make both the standard fender and a heavy duty line as well (available only in blue), the largest of which, he said, are popular with boat owners who use them in lieu of fenderboards. The heavy duty fenders are built to sustain punishment from concrete piers, wooden pilings, and even the occasional metal fastener. The products range in price from $49 for the smallest standard fender to $179 for the largest heavy duty one. Seoladair also sells fleece covers for each (from $22 to $50). The fenders are relatively light; the smallest one weighs just 3 lbs. 8 oz.. And Seoladair also offers a double-action pump with three different nozzle sizes for inflating the fenders ($12). Easystow Fenders are sold only through the company's website and at select boat shows.

We obtained a standard, 8" x 27" Easystow Fender, and we'll be putting it to the test every chance we get.

Seoladair Ltd.; 800/437.7654; www.boomkicker.com

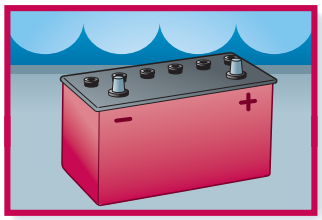


BILGE BINGE

Water Witch keeps our bilge drier, the Sure Bail scores with rugged simplicity

The combination of oil, water, fiberglass shavings and Doritos (yes, Doritos) colored our test bilge Mississippi River brown.

The automatic bilge pump switch is the lowly guardian of our bilge. Its sole purpose: switch the bilge pump on when a predetermined level of water is detected in the bilge, and then turn the pump off when the bilge is dry. The job may sound easy, but sloshing, corrosive seawater, oil, fiberglass shards and other debris typically found in a bilge can foil even the simplest task.



SYSTEMS

Shopping for the ideal pump switch presents its own sticky challenge. At least 30 different bilge pump switches flood the marine market today.

For this comparison, we kept our focus on stand-alone switches, units that would be suitable companions to the West Marine High Performance 2200 GPH (part #491720), the Shurflo Piranha 1000, the Rule 25D and the Shurflo Piranha 380, the pumps that did the best in our bilge pump comparison ("Electric Bilge Pumps," February, 15 2004). These types of switches are usually grouped into four basic categories: the pivoting arm, the air pressure, the vertical float, and the electronic pump switch. (See "Types Tested," page 19). To preserve the sanity of our tester, we further narrowed the field to 17 switches, so this round of testing did not include the air pressure type, which we'll look at in a later article.

HOW WE TESTED

For testing, we built a simulated bilge, complete with seawater, debris, and motor oil. Our test bilge consists of 6-foot-long plywood water box, 16 inches deep and 16 inches wide with a dividing bulkhead wall in the middle of the box. The bulkhead wall has a series of 1-inch holes, each with plastic flow control flaps. We mounted a small Rule 350 bilge pump on one side of the bulkhead wall and pumped the seawater over to the opposite side of the compartment.

Ten gallons of salt water, one pint of very used motor oil, two handfuls of sawdust, two handfuls of fiberglass hole saw shavings, and a half bag of Doritos were added to the test bilge. To make our test more interesting, we slid a 6-inch diameter piece of schedule-40 PVC pipe under the middle of the bilge box, creating our very own sea-saw slosh box. This allowed us to really stir the bilge stew and simulate a moderate sea state. Each bilge pump float switch that we tested was required to empty

the pump compartment three times with the bilge at rest, followed by three times with the bilge water and debris surging in from the holding compartment.

We performed the routine twice for each switch. After the wet portion of our test, we removed each switch from the tank, cleaned it up with bilge cleaner, and then inspected it. To evaluate such a large field, we opted for a divide and conquer approach, grouping the switches according to type, and then see if an overall winner emerged.

A cutaway view of the Sure Bail's float arm reveals its mercury capsule.

PIVOTING FLOAT SWITCHES

The **Rule 40 Plus** float switch is a mercury contact switch, housed in a hollow plastic float arm. Although mercury is no friend of the environment, this switch is well made and the vial of mercury is very small. The wires exiting the pivot arm on the Rule 40 Plus are high grade and, unlike the Sure Bail and West Marine, are protected with a strain-relief grommet.

The unit comes standard with a non-removable guard cage and is fitted with a float test knob, allowing local testing of the switch. Our primary gripe was that the hollow plastic arm of this switch is very light, and so tended to miss-cycle when subjected to a large in-rush of water.

The **Sure Bail** by Marine Products International is a urethane-foam-filled pivoting arm switch that contains a large glass vial of mercury which acts as the contact switch. Despite our aversion to mercury, it's hard to find a float switch that is built

Because each type of bilge switch has its drawbacks, a cruising sailor who is serious about having a failsafe system to keep out bilge water should consider two completely independent pumps (including independent hose runs and wiring), activated by distinct types of switches.

PIVOTING ARM FLOAT

This is the simplest type of switch on the market. As the bilge water rises, the pivoting arm floats up and closes the switch circuit (continuity) at a preset level.

Pros: The low-tech design makes it the least expensive. Testing is usually simple: lift the float and see if your pump works. Installation is a snap.

Cons: It requires flexible, smaller diameter wiring (usually 16-18 gauge) that limits the switch's maximum amperage capacity and increases the likelihood of failure. Float switches are prone to excessive pump cycling as water surges through the bilge.

Bottom line: This type is best suited for narrow bilges or sumps where surge is not an issue, and it will serve well as an inexpensive backup or secondary switch. A robust one, like the Sure Bail, is a perfect fit for those who favor simplicity.

VERTICAL FLOAT SWITCHES

This design features a vertical guide tube that is fitted with a life ring-style float, embedded with a small magnet. As the bilge water rises, the ring floats up the guide tube, and the magnet inside activates a micro-switch located in a separate watertight compartment in the unit's case.

Pros: The vertical switch promises a longer life cycle because the circuit connection is made via a magnetic reed switch, similar to wired door sensors found on most residential home security systems.

Cons: Added complexity can be a drawback with any mechanical system trying to survive the bilge. Inspection and manual testing is difficult on some units.

Bottom line: If sloshing water is causing false pump cycling and you're skeptical of electronic switches, then an upgrade to a vertical float like the Johnson Electronic Switch (part #36152) or its twin, the West Marine Magnum (part #3685443), or it) might be in order. For an industrial strength switch (at an equally hefty pricetag), pick one of the switches from Ultra Safety Systems.

ELECTRONIC SWITCHES

All switches we tested of this type used either capacitance sensors or Mirus field technology. In a capacitance sensor, the switch is activated by changes in capacitance when water is present. In Mirus field technology, a sensitive micro-electrical field within the switch is disrupted when water touches it, activating the pump.

Pros: Completely sealed and with no moving parts, these switches shouldn't fail. Internal microprocessors can delay pumping to counteract surging, and extend pumping to better purge a pump's hose runs. Environment-friendly, these switches won't pump pure oil.

Cons: Electrical power is required, though this is nominal, typically .004 amps per hour or less. A bilge severely contaminated with oil, or other petroleum-based products, could prevent some of these units from functioning. Installation on some units can be more of a chore.

Bottom line: Technophiles, and dry bilge fanatics cursed with wide shallow bilges will be pleased with the Water Witch 230. Purists need not apply.

PS VALUE GUIDE BILGE PUMP SWITCHES

TYPE AND MODEL	AVG STREET PRICE	PRICE SOURCE	CONTAINS MERCURY	PUMP AMPERAGE RATING	PUMP DELAY "ON"	PUMP DELAY "OFF"
PIVOT ARM FLOAT						
MPI Sure Bail DEL-30 ✓	$24.99	Boater's World	Yes	15 Amps	No	No
Rule Model 40 ✓	$27.99	Boater's World	Yes	20 Amps	No	No
West Marine 543561 $	$19.99	Manufacturer	No	15 Amps	No	No
Rule Super SW Model 37	$34.99	Boater's World	No	20 Amps	No	No
Attwood 4201-7	$20.99	Defender	No	12 Amps	No	No
VERTICAL FLOAT						
Johnson Pumps 36152 $	$21.94	Boatfix.com	No	15 Amps	No	No
West Marine 3685443	$25.99	Manufacturer	No	15 Amps	No	No
Ultra Safety Mini ✓	$99.00	Manufacturer	No	20 Amps	No	No
Ultra Safety Jr. ✓	$99.00	Manufacturer	No	15 Amps	No	No
Ultra Safety Sr. ✓	$129.00	Manufacturer	No	15 Amps	No	No
Aqualarm SS-209-12	$74.99	Fisheries Supply	No	30 Amps	No	15 Sec
Aqualarm PS-309-12	$49.00	Manufacturer	No	30 Amps	No	15 Sec
Shurflo Piranha	$30.99	West Marine	No	10 Amps	2 Sec	10 Sec
ELECTRONIC						
Water Witch 230 ★	$36.99	Defender	No	20 Amps	6 Sec	14 Sec
Johnson Pumps Ultima SW	$29.99	Defender	No	20 Amps	3 Sec	5 Sec
Touch Sensor Sensa-SW	$34.99	West Marine	No	20 Amps	3 Sec	5 Sec
See Water 79701	$40.99	West Marine	No	15 Amps	2 Sec	8 Sec

$ Budget Buy ✓ Recommended ★ Best Choice

as robustly as this one. The wires are flexible and long (handy for keeping connections out of deep bilges) and an integral guard cage is standard.

The Sure Bail performed very well in the test tank the arm's extra weight gave it an edge when subjected to bilge surge.

The **West Marine Automatic Float Switch** (part #543561) uses a steel ball that rolls up and down a channeled pocket inside of the float's hollow arm. As the float arm tips up in the water, the ball rolls to the back of the arm and the ball's weight closes a micro switch. If you secure the lead wires too tightly near the switch, you could restrict the float's ability to pivot. During surge testing, the weight of the ball did a good job keeping the float arm from popping up prematurely.

The Attwood Marine Bilge Pump Switch # 4201-7 is a mercury-free design with a big switch. It's only rated at 12 amps and we could find no way to contact the company by telephone either on the retail packaging or the website. At $24 plus approximately $8 for the optional guard, this switch in our opinion does not represent a great value.

The **Rule Super Switch** Model 37WG is a mercury switch with a highly recognizable name. The lower mounting flange tab is located directly under the float arm, which makes the installation a bear, and the wires' insulation jackets don't seat well in the switch, leaving the wire core exposed. We think that $47 is too expensive for passé design.

Bottom Line: We liked the self-test arrangement and secure wiring on the Rule 40, and the West Marine switch is a solid mercury-free performer, but our top pick in this group, the Sure Bail is, in our view, built the toughest and will definitely survive being accidentally stepped on a few times a season.

VERTICAL FLOAT SWITCH

The Johnson Electronic Switch (part #36152) and its near twin the **West Marine Magnum** (part #3685443) are vertical float switches that use a small sealed plastic pod that floats "up" inside of the switch's internal chamber when the appropriate level of water is present. Once the small plastic pod floats to the top of the chamber, the magnet inside of the pod activates an opposing magnetic reed switch, which in turn activates the pump circuit.

The Johnson pump model has a small float test

CURRENT DRAW / STANDYBY MODE	WARRANTY	TEST TANK	QUALITY AND CONSTRUCTION
None	5 Yrs.	Pass	Excellent
None	2 Yrs.	Pass	Excellent
None	1 Yr.	Pass	Good
None	2 Yrs.	Pass	Good
None	3 Yrs.	Pass	Good
None	3 Yrs.	Pass	Good
None	1 Yr.	Pass	Good
None	5 Yrs.	Pass	Excellent
None	5 Yrs.	Pass	Excellent
None	5 Yrs.	Pass	Excellent
None	1 Yr.	Pass	Fair
None	1 Yr.	Pass	Fair
None	3 Yrs.	Pass	Good
.006 A	7 Yrs.	Pass	Excellent
.000016 A	3 Yrs	Pass	Good
.000016 A	3 Yrs.	Pass	Good
.004 A	1 Yr.	Pass	Good

Our winner's circle included bilge pumps of all three types tested. Among float switches, the mercury-free West Marine is a bargain, the Rule 40 Plus gets the job done, but our favorite was the more rugged Sure Bail. The Johnson vertical switch, also marketed by West Marine under its own brand, would be a good choice for an upgrade from a float switch. The Ultra Mini is a pricey, bullet-proof vertical switch suited for serious cruisers. Offering outstanding performance at a fair price, the Water Witch 230 was our top pick overall.

lever on its side and you can easily disassemble it with a Phillips screw driver. This switch is simple, serviceable, attractively priced, and should provide many years of trouble-free service.

In the tank of gunk, the Johnson performed very well. Bilge surge wasn't an issue with this switch. An air vent at the top helps equalize the pressure exerted on the internal float chamber, which in turn regulates the movement of the float. Either switch would be a reliable upgrade from an ordinary float switch

Ultra Safety Systems (USS) makes three versions of its **Ultra Pumpswitch: Senior, Junior, and Mini.** With a loyal following among serious cruisers, they are the most robust switches in the test group. They all feature stainless steel vertical float shafts, 30-inch lead wires and clear Plexiglas tanks with thick walls. A unique stainless-steel mounting flange allows you to clamp them directly onto the bilge pump's case.

These rugged switches never faltered when immersed in our test tank of mixed debris and oil, but after testing we found quite a bit of oil residue in the interior of the cylinder that protects the vertical float from debris.

Realistically, anyone who keeps their bilge as dirty as our test bilge doesn't deserve one of these top-end switches. But at $100 per switch, we'd expect a design that would simplify maintenance.

Aqualarm's SS-209-12 and PS-309-12 vertical float switches mirror the USS's Ultra line but they are manufactured with lower-cost materials. Aqualarm uses a vertical shaft made of plastic and its tank is made of thin wall plastic. During the pump test, we inadvertently popped off the bottom screen guard of the switch. Needless to say, the thin plastic guard was invisible in our small compartment of dirty bilge water.

The Aqualarm performed well in our test tank. Although this switch is half the cost of an Ultra Pumpswitch, we're not convinced the cost savings is worth opting for a less formidable design.

The **Piranha pump switch** by Shurflo has a small round float ring that rides up the center of a ¼-inch plastic shaft, which trips a magnetic reed switch. This is a compact switch with a nice size mounting base, but it lacks a switch test knob, and its case is sealed on all sides. During the test tank evaluations, twice we observed the Piranha

Left: We prefer the rugged Ultra Mini (on right) to the cheaper Aqualarm (with a pencil indicating the elastic retaining latch).

Right: Switches let you test the West Marine and its twin the Johnson.

activating four seconds later than its specified two-second delay.

Bottom Line: The high-quality switches from Ultra Safety Systems have no equal in this field, but for the average sailor, we don't believe this justifies paying $99. The Johnson and West Marine switches are priced about the same as a pivoting arm float switch, but perform better when subjected to surging bilge water. For the money, we'd recommend either the West Marine or the Johnson.

ELECTRONIC PUMP SWITCH

All the switches we tested of this type used capacitance detection technology or Mirus field effect technology. One of the key motivations behind developing these sensors was to prevent the pumping of oil or fuel into the environment.

The manufacturers of each electronic switch that we tested claim that their switch can detect if a bilge is full of gas, diesel, or oil and will prevent the bilge pump from automatically activating until the hydrocarbons are removed. Generally, the concentration of hydrocarbons needed to shut down the pump is nearly 100 percent and the oily mix in our test bilge never triggered this function.

TouchSensor Technologies, (formerly MSC-Electronic Materials and Devices Group) **Sensa-Switch Marine 20** and **Johnson Pump's UltimaSwitch** are similar units, based on patented Mirus detector cell technology. The magic behind this technology involves dual micro-electrical fields created inside of a small sealed plastic housing.

Mirus field effect sensors detect disruptions in the dual microelectric fields caused by the presence of bilge water touching the outside of the switch's housing. When the Mirus sensor set at the 2-inch, high-water level detects a disruption in the micro electrical fields for more than three seconds, it will turn the pump on.

The **Johnson UltimaSwitch** is sealed in a sonically welded housing, while the SensaSwitch is potted. They should in theory outlast the vessel. Per the installation manuals, you must mount these switches vertically on top of a 3/8" hull spacer block. (Some people have mounted the SensaSwitch at angles that can reduce the on/off distance, and it has still worked properly.)

Both of these switches operated admirably in our bilge of mire, with no difficulty in determining high or low water levels.

SeeWater's Water Smart Pump switch uses a four-inch long exposed probe that is 1/8-inch in diameter to sense the presence of bilge water. Although this switch is rated for an eight-second delay after pump activation to help keep the pump's discharge hose clear, the delay that we observed was more in the four second range.

Although the SeeWater performed properly in our test tank, we prefer switches that don't have 4-inch long sensing probes fully exposed to bilge hazards.

The Water Witch 230 was the only electronic pump switch in our test group that performed like a vertical float switch. The 230 has an exposed capacitance sensor element embedded on its matchbox-sized case. The capacitance sensors detect changes in capacitance when water is present. You can mount the Water Witch on any plane and at any angle.

When water touches the switch's lower sensing element for six to eight seconds, the switch will activate. Thus you have complete control of when the switch will activate by altering the mounting height of the switch during installation. Additionally, this switch also has a very nice 14-second end-of-cycle delay, which

allows more than ample time to clear the bilge pump's discharge hose.

During our 1996 bilge switch comparison, an earlier version of the Switch Witch delivered lackluster performance, but the manufacturer says it has undergone several design improvements since then. One complaint that came up in 1996 was that soap residue could fool the switch into thinking there is water in the bilge. We can report that we thoroughly washed our test tank with a heavy dose of bilge cleaner at the end of our test, and the Water Witch 230 operated flawlessly.

The Water Witch 230 was the last one into the tank and the one subjected to the most oil and froth of the units tested. During the test, the Water Witch's 230 was completely immune to pump stutter and performed flawlessly under the worst of conditions. The Water Witch company manufactures five different models of this switch design, along with a complete line of bilge high-water alarm panels and bilge pump cycle counters. The 230 is backed by an unequaled 7-year warranty and we received outstanding customer service during a test call to the manufacturer.

According to engineers at Water Witch, the switch does have a unique problem with non-biodegradable suds, like Joy dishwashing liquid. Effectively, the switch might read a bubble on its sensor as water, which would cause the switch to activate the pump. For this reason, we would hesitate to recommend these units for shower sump pumps, unless the sump was easily accessible.

Bottom Line: For less than half the cost of an Ultra Safety Systems switch, the Water Witch 230 electronic switch easily matches the performance levels we observed in USS Jr's mechanical switch, with the added advantage of no moving parts. The Witch's seven year warranty, a 20-amp rating and a 14-second "pump off delay" are all very compelling reasons to forego a conventional mechanical float switch and upgrade to an electronic unit. This is also why the Water Witch 230 is our top pick overall for a bilge pump switch. As skeptical as we are about putting microprocessors in the bilge, the Water Witch 230 is our top pick in this field.

A steel ball triggers the mercury-free West Marine float switch.

MANUFACTURERS

AQUALARM, Chula Vista, CA;
Aqualarm.net • 888/298-6206

ATTWOOD CORP, Lowell, MI
attwoodmarine.com

JOHNSON PUMPS, Schiller Park IL
johnson-pumps.com • 847/671-7867

TOUCHSENSOR TECHNOLOGIES
touchsensor.com • 630/221-9000

MARINE PRODUCTS INTERNATIONAL
(MPI / Sure Bail); Solon, OH • 800/845-5255

RULE, Gloucester, MA
rule-industries.com • 978/281-0440

SEE WATER INC., San Jacinto, CA,
seewaterinc.com • 888/733-9283

SURFLO PUMP, Cypress, CA,
shurflo.com • 800/854-3218

ULTRA SAFETY SYSTEMS, Mangonia Park, FL
ultrasafetysystems.com • 800/433-boat

TECH TIPS

When installing a pivoting arm float switch, always mount the switch on the centerline of the bilge with the arm facing aft, and within 3 inches of a bulkhead wall to protect against bilge water surge. If the pivoting arm is mounted facing the bow, surging water entering the compartment can tear the float arm off of the switch. Additionally, a float switch needs to be mounted adjacent to the bilge pump and on the same fore and aft plane. If the pump switch is mounted so that it is higher in the bilge than the pump when the boat is heeled on a particular tack, the switch will not activate until the bilge water level rises high enough to reach the switch.

The same arrangement on the opposite tack would put the the offset switch lower in the bilge than the bilge pump. In this case the bilge pump is up and out of the water, while the float switch is immersed in water. While the switch is calling for the pump to be energized, the bilge pump is running dry, heating up, and drawing excessive battery current.

If your boat isn't fitted with a high water alarm, get one or make it part of your routine to check the bilge on every watch. If you are resistant to installing an alarm, then install a redundant bilge pump and switch in the main engine compartment and aft lazarette bilge. Be sure to mount the back-up pump and float at a higher level in the bilge than the primary pump system, to guard against clogging debris.

Protect the wire connections from the float switch to the bilge pump by enclosing them in a plastic junction box, high up in the bilge. Make sure to leave enough wire in the junction box for future switch repair or replacement. Hanging wires that are butt spliced in the bilge are subject to condensation drips from the deck above. Enclosing the wire splices in a plastic workbox adds another layer of protection against corrosion and provides an accessible electrical test point.

SLINGS, SCOOPS & LADDERS

In Part II of our safety series, we find that conventional overboard recovery gear like the Lifesling prove the most useful to sailors

BY JOHN ROUSMANIERE

PHOTOS BY JOHN ROUSMANIERE AND PHIL COWLEY

The toughest problem with a crew-overboard rescue is the last step, the retrieval on deck. This is not to say that there's anything easy about making contact ("COB Recovery—Making Contact," November 1, 2005) or performing maneuvers. But everything can go perfectly until you have to get the victim up those final two or three feet. Many ingenious people have been trying for years to solve this problem, and we tested some of their ideas at the 2005 Crew Overboard Retrieval Symposium on San Francisco Bay last summer. I helped run the event, which was sponsored by West Marine and Sausalito's Modern Sailing Academy, with the support of several charitable and other

organizations concerned with boating safety. Over four days and two nights, 115 people in 15 boats (keel, multihull, and power) took part in some 400 rescue exercises.

We tested a range of products and concepts, from a few new devices put together expressly for the event to the tried-and-true **Lifesling**. We also challenged old assumptions. During the trials I asked the crew of the Grand Banks 42 trawler to test the theory that a fixed boarding platform is an adequate recovery aid. The conclusion? In a seaway, an elevated platform can be a very effective hammer, and the legs of transom ladders can act as spears.

The Lifesling, paired with a 5:1 lifting tackle, proved the most versatile recovery device during the trials on San Francisco Bay.

And when rescue crews folded up the ladders for safety, our trial "victims" had nothing to hold onto because the nearest grab rail was too high. Boatbuilders should also be paying attention to the findings from these trials.

One discovery that should not have surprised us, but did, was that the charter boats that Modern Sailing Academy provided — Beneteau sloops between 33 and 43 feet — weren't well equipped to undergo the standard rescue methods as taught in sailing schools and manuals like my *The Annapolis Book of Seamanship*. On a boat with two relatively small roller-furling sails, no spare halyards, and small winches, simply rigging a Lifesling takes considerable imagination.

RECOVERY DEVICES

Karen Prioleau, one of my four colleagues on the event's organizing committee, responded by inventing a new test that she called "creative boarding." She asked crews to improvise rescues from the limited gear at hand. Dan Rugg, a senior instructor in the U.S. Naval Academy's sailing program, detached a boom topping lift (the boom was also supported by a rigid vang) and turned it into a halyard to support a Lifesling's hoisting tackle. Another improvisation that many crews tried successfully was the elevator method (see photo page 30.). But ultimately, we wanted to see how useful the available recovery gear, much of which carry a pretty hefty price tag, actually was.

Recovery devices break down into either ladders or hoists. Several "soft" cloth ladders and ladder-like devices were tested. The results were mixed because soft ladders tend to be buoyant. We experienced the best success with these devices on the boats with slab sides—the Seawind 1000 33-foot cruising catamaran and the Grand Banks 42 trawler. Given the round bottoms of most keelboats, the victims who tried to climb the narrow steps of the **Plastimo Quick Launch Safety Ladder** and the **Markus Safety-ladder** reported that their feet and legs slid under the hulls. Either the bottom steps should be heavier, or the manuals should instruct users to hang a weight (say, a winch handle or

Top: A cradle of straps and lines, the Markusnet offers a secure ride for a helpless victim, but it is bulky, complicated, and difficult to climb into.

Bottom Left: The Morlift is a par-buckle, but with attachment points so far apart, it dropped the victim right back into the drink .

Bottom Right: The MOM9's raft and sea anchor lack drains, so the ride is uneasy for the victim and hoisting the device is difficult.

PS VALUE GUIDE CREW OVER BOARD GEAR

COMPANY	PRODUCT	DESCRIPTION	PRICE	CONCLUSION	RECOVERY TIMES (MINUTES)* 0–2	2–6	6–10
WEST MARINE 800/262-8464 westmarine.com	Lifesling ★	Life ring with fixed buoyancy at end of line capable of being used as a hoisting device.	$100	Worked well as contact device, life ring, and hoisting sling. Maneuvers need not be perfect circles. A testers' favorite.	0%	90%	5%
	Inflatable Lifesling ✓	Inflatable life ring in a throw bag with heaving line; capable of being used as a hoisting device.	$150	Light weight requires different maneuvers than Lifesling, Needs CO^2 cartridge. Another favorite that worked well.	14%	85%	0 %
	Lifting Tackle ✓	3:1 block and tackle to pull Lifesling and victim on deck.	$130	Usually needed to hoist victim. Must be led properly which takes forethought.	N/A		
MORLIFT	Morlift	A mesh parbuckle used to roll a victim up to the rail.	$250	Works best on small boats with low freeboard. Victims did slip out.	0%	66%	33%
PLASTIMO 800/383-1888 plastimousa.com	Quick Launch Safety	A five-step collapsible "soft" ladder with plastic steps that can be pulled down from the water	$90	Easy to rig. Narrow steps swing under round-bottom hull. Hard to climb while wearing PFD.	100%	0%	0%
	MOB Safety-ladder	Another collapsible ladder with fiberglass steps	$142	Similar to Plastimo, bottom step needs to be weighted for rounder hulls.	0%	100%	0%
MARKUS markuslifenet.com	Markusnet	A large net in which the victim is seated or lies or stands before being hoisted on deck.		Victim very secure once in it, but getting passive person inside is slow and awkward.	50 %	50%	0%
	Scramble Net	A net hung over the side to serve as a wide ladder	$877	Wide soft ladder that is easier to climb than narrow ones. May also work as a parbuckle.	10%	80%	10%
NOODLEVATOR noodlevator @pacbell.net	Noodlevator	Hoisting sling improvised from swim pool noodle.	N/A	Worked with hoisting tackle, but not as advertised.	20%	80%	0%
LIFE SCOOP 800/995-1668 modernsailing.com	Life Scoop	Prototype hoisting device; stretcher with long handle	N/A	Intended for passive victims. Device was still in development	0%	0%	100%
SWITLIK/SURVIVAL TECHNOLOGIES 609/587-3300, switlik.com/stg/	Mom9	Inflatable raft with lifting sling, pylon, drogue, and light	$1,300	Hoisted by halyard. Water didn't drain and raft tilted. Must have CO^2 cartridge.	0%	100%	0%
OCEAN MARINE SYSTEMS 800/883-2848 oceanmarinesystems.com/tocnew.html	Bobsling	Looks like a ladder, works like a parbuckle	$695	Parbuckle-type device. Sets up on one side only. Testers said it was awkward to use.	0%	50%	50%

* These figures represent the percentage of recoveries made with each device within the indicated time period, beginning at the moment of initial of contact. For example, 90 percent of the Lifesling recoveries took between 2 and 6 minutes. In total, there were 105 recovery attempts.

$ Budget Buy ✓ Recommended ★ Best Choice

block or bucket) off the bottom step. And testers complained that with both ladders, the steps were too short and narrow for secure footing. Many also suggested better handholds.

The wider **Markus Scramble Net**, which is something like a cargo net suspended from the side, offered more support, although setting it up to a grab rail on the cabin trunk did take some time.

We also tested the **Noodlevator**. The inventor of this device (a loop of line with some foam around it) promised that once someone connected it to the main boom topping lift and the victim climbed in, you could swing the victim on board. The theory evidently needed more noodling, as our testers eventually resorted to a Lifesling lifting tackle.

HOISTING DEVICES

Sometimes it's not necessary to hoist the COB victim vertically out of the water. The crew of the 40-foot trimaran in our tests was able to haul a victim over the low, sloping stern of an ama like a giant tuna. But with normal high-sided sailboats with lifelines, a hoisting device is almost always mandatory.

In our on-the-water tests, the familiar **Lifesling** was generally well-received. It's been around for so long and has been so well covered in manuals and magazines that its operation should be widely understood. (See "The Delusion of Textbook Recovery," page 28). After the person goes over, the device—a yoke-shaped sling at the end of a long line—is deployed and dragged astern. The boat maneuvers in the best way that puts the line or the sling in the hands of the victim, either by circling or by letting the device drift downwind or down current. (Don't expect a swimmer to get to a rescue device that's several yards away.) Then the boat is stopped, the victim is pulled in, and a halyard pulls the sling and victim out of the water.

Many testers concluded that the **3:1 hoisting tackle** was tricky to set up properly and may be insufficient on a boat with small winches. Some practice will solve the first problem, and a bigger tackle the second. Another worry was that maneuvering to deliver the line and sling to the victim can be time-consuming, stretching to over 10 minutes in some cases (see "Maneuver Times," page 31). Again, the solution is practice, coupled with a feel for the helm. While the nimble J/105 maneuvered very quickly, crews of heavy, slow-turning boats discovered that it's a mistake to just put the helm down all the way and follow the perfect oval pattern shown on page 29. The long-keel, heavy-displacement Island Packet 38 made 11 perfect circles before the crew stretched out their turn a little. Egg- or D-shaped turns will help the vessel maintain headway while pulling the line to the victim within two or three passes. The payoff for a little bit of practice and forethought is reliable contact and a hoisting device that is immediately ready.

The **Inflatable Lifesling** received a thorough tryout in our trials. Uninflated, it's a throw bag that can be heaved much farther and more accurately than the standard Lifesling. After it hits the water, the automatic inflation system kicks in and it becomes another buoyant Lifesling able to keep a victim afloat and, after it's hauled to the boat, able to support the victim as he or she is lifted out of the water via a halyard.

(continued on page 30)

Lifesling

Plastimo Safety Ladder

Switlik MOM9

Inflatable Lifesling

Marcus MOB Safety-ladder

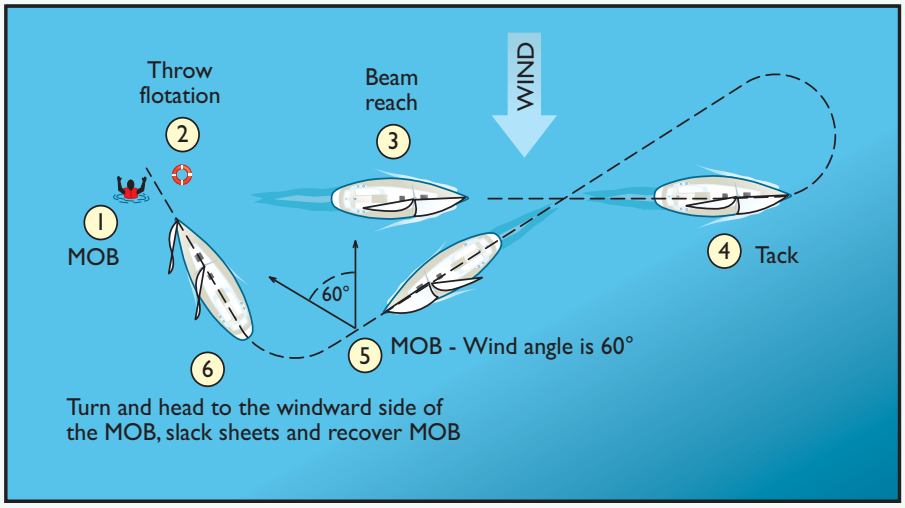
THE DELUSION OF A TEXTBOOK RECOVERY

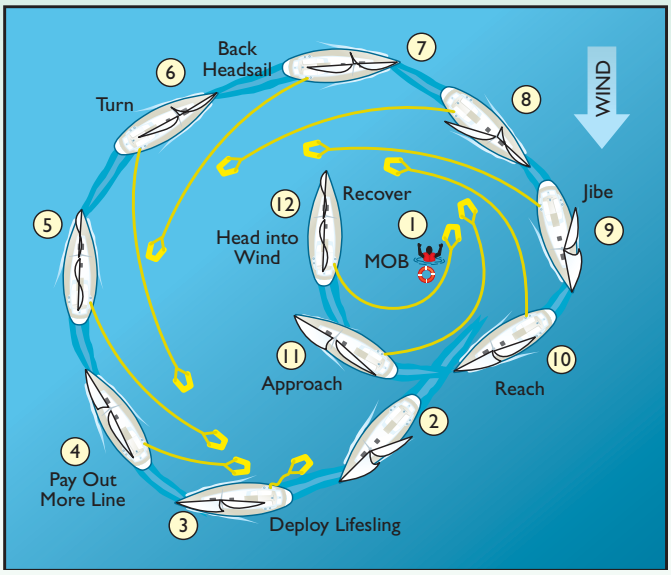
A perfect rescue almost always requires some improvisation

Many sailors hope that one single recovery maneuver is all they need to know. Our trials, however, indicated that this is neither advisable nor regularly the case. There was no debate, however, about the importance of turning back quickly, no matter how you do it. Hypothermia is one concern, but the overriding issue is staying within sight of the person in the water.

Consider the implications of a formula we all learned in grade school to determine the area of a circle: $A = \pi r^2$. The size of the circle—the search area—increases exponentially with the distance from its center—the distance the boat sails after the person goes over the side. If you're making 6 knots, you're advancing at a rate of about 600 feet every minute. Turn around after 30 seconds and you'll be 300 feet from the victim and at the edge of a search area that's about two-thirds of an acre. Turn around after four minutes and your wife or son or best friend is somewhere ahead of you in an area of cold water sprawling 42 acres.

With the need for a quick return in mind, sailors testing at Seattle, the U. S. Naval Academy, and San Francisco Bay over the past 25 years developed two rescue maneuvers that have become standard. One is the Quick Stop — a quick luff upwind and subsequent circle around and near the victim with the jib backed (trimmed to windward) on one tack to accelerate the turn and slow the boat to a seamanlike speed. The other maneuver is the Figure 8 (also called the Reach-and-Reach), developed on gusty San Francisco Bay as a maneuver that, unlike the Quick Stop , does not require a jibe. After the person goes over, alter course to a beam reach,





LIFESLING RESCUE: *While trailing the sling, the boat either circles or lets the device drift downwind or down current. (Don't expect a swimmer to reach a device that's several yards away.)*

and, after five boat lengths (usually less than 30 seconds), tack, bear off, then head up to a point just to windward of the victim and throw a line.

Two more recent maneuvers call for much quicker action, and in fact closely approximate what a typical crew might do on their own. In the Deep Beam Reach method, assume a broad reach for two boat lengths, then tack and come back directly to the victim on a close reach. In the Fast Return, after about two boat lengths, tack with the jib backed, then stop near the victim with sheets freed.

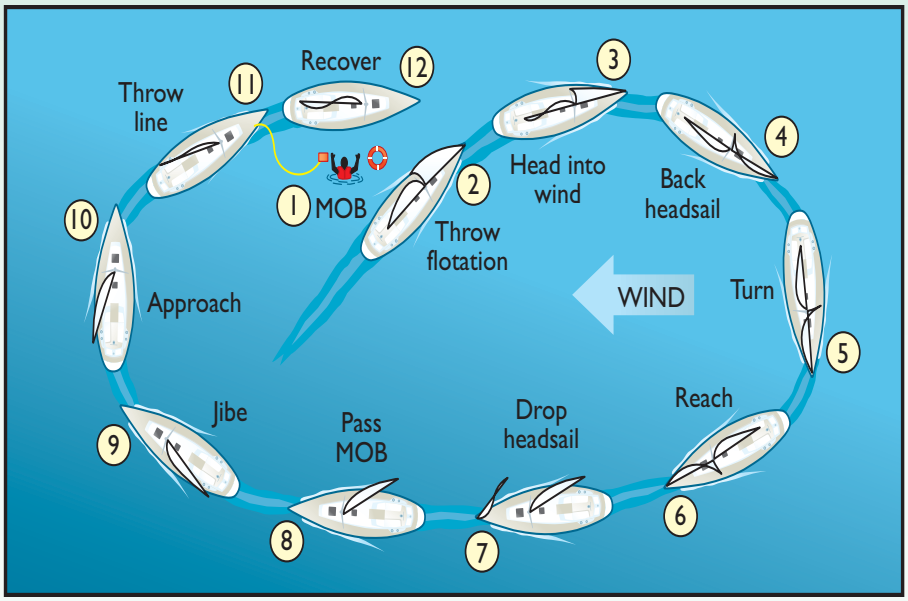
While each doctrine addresses the first part of the maneuver in a different way, all four end with the boat making a slow, controlled close-hauled or close-reaching approach from downwind, with the victim on the leeward side (and the jib furled to tame the flogging jib sheet). The leeward side affords a lee calming the water around the swimmer, and a heeled boat's leeward deck is almost always closer to the water than the windward deck.

To evaluate how well these maneuvers worked with different type of boats, the test crews tried each maneuver three to five times, first with small

FIGURE 8 RESCUE: *The boat alters course to a beam reach and then tacks back to the victim. The heavier displacement boats fared better with this maneuver than they did with the Quick Stop.*

foam heads in the water, later with a life-size, 150-pound mannequin, and finally with our patient diver/victims in both "helpful and conscious" and "passive and unconscious" modes. Besides assigning these maneuvers, we encouraged crews to take time to work on them or to develop their own maneuvers.

During the first two days, many crews either turned too hard in the Quick Stop and stopped dead, or mistimed the turns of the other maneuvers and came back on a reach at speeds in excess of 3 knots. Our victims quickly learned to lie on their backs with their faces clear of the water to keep from being drowned. It was quickly established that the maximum safe and effective speed for a rescue approach is 1.5 knots through the water (though at the U. S. Naval Academy, where victims and rescuers are extremely fit, the rule is 1 knot).



QUICK STOP RESCUE: *The helmsman shoves the helm down and heads immediately into the wind to tack. During the trials, we found this maneuver was best suited for the more maneuverable moderate displacement sailboats.*

Sailors in our tests were divided about the effectiveness of the various maneuvers. The Quick Stop and Figure 8 had broad support, though people improvised on them in fascinating ways. The Deep Beam Reach and Fast Return took a while to find a following until their nuances became more familiar. With practice, crews figured out how to get their boats low enough so the return was with the wind forward of the beam.

If any non-equipment lesson was pounded in during our trials, it was that the search for the "perfect maneuver" is doomed to failure. Boat-handling trumps doctrine every time.

The multihulls, in particular, had trouble trying to duplicate textbook rescues. After the Corsair F-28 trimaran missed the victim four straight times while trying a Figure 8, the crew concluded that the tack was taking them too far to windward to make a proper, controlled approach. While typical monohulls don't like to jibe in heavy wind, many multihulls can jibe relatively easily. The Corsair's data recorder described the Modified Figure 8 this way: "Go to beam reach, jibe instead of tack, head back on beam reach, then when 45 degrees from the victim, head directly to victim." They were soon making pickups in less than two minutes.

The crew of a 33-foot Seawind 1000 cruising catamaran had the same opinion as the Corsair's crew, and added another twist to the Modified Figure 8. After the jibe they headed up to a close reach and when slightly upwind of the victim, they hove-to by trimming the jib to windward and easing the mainsheet slightly. As the stopped boat very slowly slid down to the victim, a heaving line was tossed and retrieval gear was prepared.

As another example of creative seamanship, after the victim jumped off the very fast little Corsair F-24 trimaran, owner Ross Stein did a normal Quick Stop by tacking, towed the Lifesling into the victim's hands, and then settled down to a relatively sedate close reach, with the jib trimmed to windward and the mainsail well eased.

It's appropriate to conclude this discussion of maneuvers with three cautions. First, practice making effective turns before you find yourself in a COB situation. If you put the rudder over too hard, it will stall and become ineffective, and the boat may stop dead.

Second, there's no law saying you have to make the recovery under sail. If the boat stops dead, if the crew is incompetent, or if conditions are so flat or windy that you can't maneuver, turn on the engine. In the infamous 1979 Fastnet Race, one of the most dramatic rescues was made by a sailboat under power. Before getting anywhere near the victim, shift into neutral or shut down the engine to keep the prop from freewheeling and injuring the victim.

And third, all sailors' natural tendency to obsess about hardware and doctrinal theory can often distract them from the most important factor on any boat, which is sailing. As Naval Academy instructor Dan Rugg wisely said, "If someone has a rescue method committed to memory and doesn't know what direction the wind is coming from, they can't do a rescue. You must have wind awareness."

In the elevator method, a dock line or other large-diameter line is looped over the topsides and winched-up. Our "victims" discovered that they benefited from another line running down from the rail to serve as a support.

OVERBOARD

(continued from page 27)

Because the inflated sling is so lightweight, it skated on the water and would not follow the boat like the foam version. Sailing slowly upwind of the victim and letting the device drift down seemed to work better. Some victims said that the buckle system's black-on-black color scheme confused them when they tried to secure the sling around their chests. Once testers got used to it, the Inflatable Lifesling became quite popular. On the second day the data recorder on the catamaran noted, "Inflatable Lifesling rated overall best single piece of equipment."

The **MOM 9** is another hoisting device we tested. It's an inflatable system with a pylon and a small life raft. The victim crawls into the life raft and is pulled or paddles to the boat, where someone onboard hooks a halyard into the device's lifting strap. Because there are no drain holes in the raft or its drogue, they can hold enough water to make the hoist even more difficult. In one hoist I observed, the water shifted and the raft tilted precariously.

We also tried two somewhat large halyard-hoisted recovery devices that, while showing potential for big boats, are too bulky to be stowed aboard normal cruising sailboats and too complicated to be used except after considerable practice. The **Markusnet** from Iceland is a scoop-shaped assembly of straps in which the victim can stand, sit, or lie in a fetal position. One of our victims fell out of it. The **Lifescoop**, which is still in development, is a stretcher with a long handle that's used to push the stretcher out from the boat and under the victim, and then pull it back so a halyard can be attached.

We also had a parbuckle to test. This ancient hoisting method uses a large triangular cloth, with one edge connected to the vessel's rail and the third corner out in the water. Once the victim is maneuvered into the bunt, the crew on deck pulls on the outer corner with a line or halyard and, taking advantage of the built-in leverage, rolls the victim up to the rail. The version we tested, the **Morlift**, is made of mesh so water drains out and victims don't feel like they're drowning. Because the cloth is buoyant and may even kite above the water, it's not always easy to climb in or get an unconscious person into position. We found that the lower the rail is, the less chance there is of kiting, so parbuckles may be best suited for small boats. Another problem was that the Morlift did not have enough attachments along the rail. A gap would open and our long-suffering victims were spilled back into the drink. Another parbuckle-like device was the BOB Sling, a long roll-up ladder-like system of webbing and stainless steel rungs. Its utility and flexibility were limited by the fact that it could be set up on only one side of the boat.

Of all the hoisting devices, we still prefer the **Lifesling**. It is a little bulky, true. But its operation is so simple that most of what you need to know is in the instructions on the pouch. And it's well suited to a variety of rescue scenarios. Statistics compiled by the Seattle Sailing Foundation based on 105 rescues using the Lifesling showed that even when the device is not employed in a textbook fashion, it still does the job whether as an improvised heaving line or as a hoisting device. And if it fails the first time, it can always be reused immediately. Just pull it in, sort out the line, and try again. As anybody who has spent time around boats will know, sailors are always looking for second chances.

UNCONSCIOUS VICTIMS

Most of the devices discussed thus far require some activity on the part of the victim. The big problem in crew-overboard recovery is connecting with and retrieving an unconscious or otherwise helpless person. We used a 150-pound mannequin nicknamed "Bob" to glean an up-close lesson in the problems of grabbing an unconscious victim and either hauling all that dead weight on board from alongside or getting it into a Lifesling, parbuckle, or other hoisting

Multihulls like the 24-foot Corsair used a modified Figure 8 to return to make contact. The victim in a Lifesling will be hoisted on deck with a block and tackle.

device. We discovered that the lower the deck, the easier the job.

Ultimately, recovering an unconscious victim may require putting another person on the water in a small boat or even in the water. These are steps not to be taken lightly. In either case, the rescuer must wear buoyancy and be tethered to the boat so he can be quickly recovered.

CONCLUSIONS

The trials raised four key points:

- **Buy and practice with proven gear.** That means a throw bag and the Lifesling. Each has multiple uses, makes contact with victims at a distance, and is tied to the boat (which means if it doesn't work the first time, you can try again).
- **Try out textbook maneuvers on different** points of sail and in different wind and sea conditions, and be prepared to improvise. I like the Quick Stop because it automatically keeps the boat within sight of the victim, but any one of us may well find that the best rule is, "Get back there now! Any way you can!"
- **Work on your sailing skills in** as many conditions as possible.
- **And stay on board so none** of this is necessary. Buy good safety harnesses, set up the boat for them, and use them.

MANEUVER CONTACT TIMES

These tables summarize over 200 recorded returns to contact by sailboats of four types (multihulls, moderate-displacement racer/cruisers, heavy-displacement cruisers, and the high-performance J/105). (Contact means physical connection to the victim via a line, a recovery device, the boat's hull, or in the case of a mannequin, a boat hook.) The data was derived from each of the four days of the 2005 Crew Overboard Retrieval Symposium in San Francisco Bay, August 2005, and reflects a variety of sea conditions. If average sailors can come close to these results, they are doing very well.

Heavy Displacement Cruisers: Boats that alter course slowly due to long keels or small sail plans may have trouble with the Quick Stop, which requires repeated turns. This is especially true in light and moderate winds.

Moderate Displacement Racer/Cruiser: All methods work satisfactorily, but require practice and clear communication. Although the Deep Beam Reach was not tested as often as the others, this relatively new maneuver worked well after the crews had spent some time practicing it.

J/105: A fast, highly maneuverable boat usually finds a way to get back to a crew member in the water quickly in any condition, but because the large sails may make a jibe in a strong wind inadvisable, the Quick Stop may not be the ideal maneuver for all conditions.

Multihulls: Because small multihulls accelerate, stop, and turn very quickly, they can be handled like dinghies. But since many multihulls have trouble tacking, they may prefer to jibe back to the victim. The modified Figure 8 with a jibe was extremely successful on the 28-foot foot trimaran and the catamaran. Once near the victim, a multihull can stop and hold position by heaving-to.

MANEUVER DATASHEET

BOAT DESIGN	MANEUVER	MINUTES 0-2	2-4	4-6	6-10
MODERATE DISPLACEMENT CRUISER/RACER (Islander 30, Beneteau 33, Beneteau 39, Beneteau 42, Beneteau 43)	Deep Beam Reach	5	4	4	
	Fast Return	16	6	1	
	Figure 8	18	7	1	3
	Quick Stop	17	16	1	
HEAVY DISPLACEMENT SAIL CRUISER (Island Packet 38, Islander 53)	Deep Beam Reach		4		
	Fast Return	5	3	1	
	Figure 8	2	8	3	1
	Quick Stop	1	6	1	6
HIGH-PERFORMANCE MONOHULL (J/105)	Deep Beam Reach	1			
	Fast Return	1	2	1	
	Figure 8	1	1		
	Quick Stop	1			
MULTIHULL (Corsair F-24 Trimaran, Corsair F-28 Trimaran, Seawind 1000 Catamaran, Dragonfly 40 Trimaran)	Deep Beam Reach	7			
	Fast Return	1	1		
	Figure 8 (with jibe)	9	2	1	
	Modified Figure 8	9	2	1	
	Quick Stop	4	2		

Sailtime's base in Austin, Texas hopes to attract sailors looking for regular access to local waters, without the hassles of ownership.

LEARNING TO SHARE

For avid sailors with flexible schedules, timeshare sailing can offer a cheaper alternative to sailing clubs or chartering.

Hurricane Wilma splintered your hull. The condo crush absorbed your marina. Maintenance chores are putting blisters on your blisters. Whatever the reason, suppose you find yourself in the market for regular or semi-regular access to a keel boat in your local area with overnight cruising amenities—one that can be had without the full financial commitment of ownership What are your alternatives?

To answer this question, *Practical Sailor* compared the economics of chartering, chartering through membership in a sailing school or for-profit club, community access sailing clubs, and timesharing. For this comparison, we put ourselves in the shoes of a sailor in the San Francisco Bay Area who is seeking to take out guests on a 30- to 35-foot keelboat for trips of at least an overnight duration. Here are the options, and our outlook:

CONSUMER'S EDGE

TIMESHARING

In a timeshare arrangement, a group of people share the use of a boat by dividing among themselves the right to use that property for specific time periods. This arrangement gives an individual access to a boat for a limited period at a cost much less than that of sole ownership.

SailTime is an Austin, Texas-based company that has been expanding over the past year its operations around North America, selling memberships that pertain to the use of its Hunter sailboats. Two other companies that arrived not long ago on the timeshare scene are Pinnacle Yachts and Windpath Sailing. As of this writing, Pinnacle had nine bases offering the use of its Jeanneau sailboats and Windpath had four bases with Catalina 350s available.

There are two kinds of timeshare arrangements: those that share title and those that do not. The former has given rise to the term "fractional ownership," because title is indeed divided into eighths, or some other fraction thereof. In the latter, the title remains with a sole property owner, while other participants merely have a right to use the property. SailTime bills its services as "fractional sailing," which is a convenient use of this phrase, because the structure of a SailTime agreement essentially means that only one in eight participants will have title to the boat.

SailTime's business model depends on one person purchasing a new Hunter 33 or 36, and turning it over to SailTime to manage. SailTime, which currently has bases in 16 U.S. cities and Toronto, pays the vessel owner approximately $1,100 per month, which its representatives say is enough to cover any bank financing. (Actual payments may vary from franchise to franchise.) SailTime is also responsible for insurance, slip rental, fuel, cleaning and maintenance costs—at least for the first three years.

For each boat purchased, SailTime sells memberships to seven other individuals, who collectively share the use of that vessel with the owner. Each non-owning member in the vessel pays $425 monthly, on top of a one-time initiation fee of $1,000. (Again, actual payments may vary depending upon the franchise.) The non-owning member also puts up a $2,000 security deposit, which is

refundable minus a $500 "remarketing fee" if the individual leaves the program prematurely. Non-owning members must commit to a full season. Some SailTime bases have an eight-month sailing season, while others are year-round. In either case, the non-owning member must pay 12 monthly installments.

Under the SailTime plan, the day is divided into two time slots: from 10:30 a.m. to 6:00 p.m., and from 6:00 p.m. to 10:30 a.m. the next day. Each member gets seven time slots per month, with a maximum of two of the seven periods usable on weekends. The owner gets the same amount of time as the seven members. And members can borrow time from an adjacent month, meaning that it's possible to sign out the vessel for a full week, every other month.

However, enjoying the vessel for a full weekend appears to be ruled out. There is unlimited use of any time slot not reserved and confirmed prior to 24 hours in advance. All scheduling is conducted online, through a password-protected website. Like some resort timeshare companies, SailTime offers its members access to other locations in the company's network. For a $100 fee, one can book a vessel at another SailTime location, but only when that vessel is not otherwise reserved, and not on weekends.

Members check in and out of a vessel through a personal digital assistant (PDA) carried on board the boat. The PDA communicates wirelessly with the SailTime boat manager, relaying the member's check-in and check-out times, as well as fuel levels, and any cleaning or maintenance issues that might require attention. While SailTime touts this high-tech system as way to instill more "pride in ownership," the $2,000 damage deposit and the electronic log tracking who used the vessel last, will likely provide the most incentive for keeping the boat in good condition.

INITIATION

The first-year investment by a non-owning member amounts to $8,100 (including the $2,000 refundable security deposit). For this outlay, the non-owning member is allocated 84 hours per month. Based on those figures, the total cost works out to $12 per hour of access to the vessel for an eight-month sailing season, and $8 per hour for year-round sailing.

We don't think it's realistic that members will utilize all 84 hours each month. Perhaps 40 hours of actual time spent on board each month is a more reasonable figure. Say on average you use the boat for five weeknight cruises of three hours duration each, one weekend daysail for six hours, a weekend overnight of 14 hours, and an opportunistic five hours per month at times when the vessel is left unreserved; that level of usage still leaves the hourly cost at under $20/hour for the first year. Although this article pertains to options for those who don't want to own a vessel, *PS* also examined the economics of SailTime from the point of view of the owning member. The price of a new Hunter 33 is approximately $155,000. To secure bank financing requires a 20% down payment, or $31,000. A loan of $124,000 at 6% interest amortized over 15 years produces a monthly payment of $1,046.

At the end of five years, the owner will have paid $33,034 in interest, and $29,749 in principal, for a balance owing at the end of 60 months of $94,251. The monthly payments that SailTime makes to the owner would leave that person with a slightly positive cash flow. However, since the owner shares maintenance costs after the third year, that could put him slightly in red at the latter end of his five-year agreement. Standard depreciation calculations for sailing

Sailing clubs like the Olympic Circle Sailing Center are often a better fit for sailors interested in learning, racing and club events,

If a week-long escape to the Virgin Islands is part of your plan, then you'll have to look outside the time-share plan.

yachts (10 percent the first year, 6 percent the second and 4 percent for the last three years) would put the book value of the vessel after five years at approximately $116,000. With $94,000 owing on the loan after that period, it looks like the owner could be substantially ahead. However, the actual market value of a five-year old vessel, sailed by 8 people, 56 times per month might be quite a bit lower than the blue-book figure. Buyers typically expect a 10-15 percent discount for boats coming out of charter fleets. We recommend that owners accept the shortfall as the price for having a vessel maintained by a management company. If they come out ahead in the end, it will be a pleasant surprise.

CLUB CHARTERING

Around the U.S., it's not uncommon for sailing schools to offer chartering opportunities as a means of gaining more revenue from their fleets. Some offer discounted charter rates to people who pay so-called 'membership' fees to join a sailing 'club' operating within the auspices of the school. Membership packages may include sailing lessons, but typically users must meet the school's certification standards before they can take out a vessel on their own. In many cases you can either take a full course of instruction or challenge the school's exam. *PS* found that, for members, discounts on charter rates can be in the range of 30 to 40 percent. Here are the details on three such sailing-school-cum-charter-companies that operate in the San Francisco Bay area: Club Nautique, OCSC Sailing, and Spinnaker-Sailing.

Club Nautique charges experienced sailors an initiation fee of $595 and monthly fees of $70, for an annual fixed cost of $1,435. The closest comparable vessel in the Club Nautique fleet to SailTime's Hunter 33 is a Hunter 320. The half-day charter rate for members who wish to use this boat on a weekday is $205, which amounts to roughly a 1/3 discount on the non-member rate of $305. A weekend, full-day charter of the same vessel is $320 for members and $483 for non-members.

Membership fees and charter rates at OCSC Sailing (Olympic Circle Sailing Club) are: a $595 initiation fee and a $59 monthly fee, giving you access to a Catalina 320, among other vessels. For $205, members can have the boat on a weekday (half-day) and $325 secures the boat for a full weekend day (9:00 a.m. to 8:00 a.m.).

And Spinnaker-Sailing requires a $475 initiation fee and $40 monthly dues, which gives you access to, among others, a Hunter 310 for $202 for a half-day during the week, or $316 for a full weekend day. The monthly $40 fee can be applied to a charter fee, but only for that month.

While the San Francisco Bay Area seems to have a high concentration of such businesses (the Modern Sailing Academy and Tradewinds Sailing are two others in the area), similar businesses can be found elsewhere in the U.S. Boston Harbor Sailing, for instance, follows the same business model, in which annual membership fees buy the right to discounted charter rates on keelboats with overnight amenities.

COMMUNITY SAILING

Another alternative to boat ownership is joining a nonprofit community sailing center. Our imaginary sailor in San Francisco could join the Cal Sailing Club of Berkeley, where for membership fees of $200 annually, he would have essentially unlimited access to sailboats from 14 to 26 feet in length. However, the daysailing keelboats at the Cal Sail-

PS VALUE GUIDE ANNUAL COST COMPARISON

USAGE BASIS	SAILTIME	CHARTER CLUB*	CHARTERING**	CONVENTIONAL OWNERSHIP
Annual Fixed Costs	$6,100	$1,270	$0	$19,902***
2 one-week cruises / year	$0, but only available by trading time slots	$3,920 / year ($1,960 /week)	$4,870 / year ($2,435 / week)	$0
8 halfday weekdays / month	$0, but only 7 time slots allotted to each member / month	$1,640 / month ($205 x 8) or $19,680 / year	$2,000 / month ($250 x 8) or $24,000 / year	$0
2 weekend days / month	$0	$650 / month ($325 x 2) or $7,800 / year	$870 / month ($435 / day) or $10,440 / year	$0
1 weekend / month	No full weekends are available with SailTime	$585 / month or $7,020	$595 / month or $7,140 /year	$0
TOTAL	$6,100	$38,420	$46,450	$19,902

*Olympic Circle Sailing Club **Spinnaker-Sailing, non-member rate
*** Based on boat loan payment of $1,046 per month, $300/month dockage, $550 insurance, $200/month maintenance, and $800 in taxes.

FEE STRUCTURES

TYPE/PERIOD	SAILTIME	CHARTER CLUB	CHARTERING
VARIABLE COSTS			
Full day on weekend	$0	$320	$450
Full Weekend	Boat Not Available	$580	$800
FIXED COSTS			
Annual Payment	$1000	$550	N/A
Monthly Payment	$425	$60	N/A
ANNUAL FIXED COSTS	$6,100	$1,270	$0

These tables show the costs of using a Hunter 33 in San Francisco under the SailTime timeshare program. The Annual Cost Comparison table, above, assumes you want to use the boat for two one-week cruises each year, 8 half days during the week each month, 2 Saturdays each month and one full weekend each month. As the table shows, SailTime can't meet all of these expectations, but it comes close at a significant savings. The Fee Structures table, left, shows the cost breakdown under various plans.

ing Club don't meet the parameters of our comparison. Similar community sailing centers exist around the U.S. Two others we're aware of are the Community Sailing Center in Burlington, VT, and the Downtown Sailing Center in Baltimore, MD; the latter has cruising keelboats up to 30 feet in its fleet.

CHARTERING

Instead of opting for the long-term financial commitment of a timeshare or the relatively shorter one for charter club, sailors can simply charter a vessel from a conventional chartering business and sail when and as often as they please (or their budgets will allow). The sailing school-charter clubs also offer boats to the general public, at different rates. And, we found other conventional chartering companies in the bay area with similar sized boats that are chartered for similar rates ($350 to $450 for a weekday or weekend day aboard a keelboat in the mid 30-foot range).

Of course there are a plethora of charter companies doing business in alluring destinations in the Caribbean, the Mediterranean, and elsewhere, but these don't meet our need for a local boat.

CONCLUSIONS

The cost of becoming a member of a chartering club has an inherent break-even point, at which time the money you have saved off regular charter rates equals the costs of joining the chartering club.

Just where the break-even point lies is impossible to pinpoint, since the actual dollars saved on each charter will vary according to the length and timing of the charter—either half- or full day, weekday or weekend. In rough terms, though, joining a charter club should pay back after approximately nine to 10 half-day charters during the week, or after six full weekend charters. However, since chartering clubs operate on a pay-as-you-go basis, the costs will begin to go up steadily after you pass the break-even point. To get the same number of hours, in the same weekday and

(continued on page 39)

Above: Our line-up included from left, base layers from Mureadritte, Patagonia, Victory, Nike, Helly Hansen, Ibex, Musto and Under Armour.

Right: In the evaporation test, we secured the shirts over jars of water and 'baked' them at 110 degrees for three hours.

NIKE SHOWS ITS SALTY SIDE IN BASE-LAYER TEST

Helly Hansen, Musto and Victory Wetsuits also measure up in our fabric test

Not too many years ago, racing sailors in the grand prix arena began turning up at regattas with uniformed crew shirts that had an unmistakable synthetic sheen to them. Their owners boasted that they were comfortable to wear, dried in minutes, and offered some measure of protection from the sun's UV rays. Most of these garments evolved from technical advances in the realm of fabric technology for high-end professional sports. The intent of their inventors was to replace cotton, which can absorb up to 30 percent of its own weight in water (or sweat). Some of these shirts carried claims that they absorbed just 2 percent of their weight in moisture. Others were advertised to have "moisture transport systems" that move perspiration away from the skin to the outer side of the fabric. Each of the shirts we tested is purported to move, or "wick" moisture away from the skin.

For this test, we obtained long-sleeve, base-layer tops from Helly Hansen, Patagonia, Musto, Victoria Wetsuits, Mureadritta, Nike, Under Armour, and Ibex. For the most part, these garments are made of blends using synthetic fibers, principally polyester, though the Ibex product is made of 100 percent merino wool. And each company professes proprietary fabric technology or fiber treatment.

HOW WE TESTED

We ran each of the garments through a series of tests. First we evaluated their construction with the assistance of a seamstress—one with 25 years of experience—and rated the shirts accordingly. Then we used the opinions of two testers to judge the feel and comfort of the fabric, and whether the seams and collars were noticeable, and assigned ratings accordingly. Then each shirt was subjected to an evaporation test to judge how well it could transport moisture. Using a heat chamber with an average temperature of 110F for three hours, we affixed a portion of each garment over the opening of a small jar, each

with precisely the same amount of water in it. We again measured the water to learn which shirts effectively wicked the moisture. Surprisingly, only the Musto and the Nike jars showed minimal change, If any of the other shirts wicked moisture, it wasn't measureable. For our penultimate test, we soaked each shirt in brackish seawater, sealed it in a plastic bag and placed it in the sun for two days. They were then taken out and rated regarding their respective resistance odor. Finally, we washed and dried each garment according to the manufacturers' instructions to check the fabric's color fastness and dimensional stability.

PATAGONIA CAPILENE

Patagonia's 100 percent polyester shirt is assembled in Mexico and built to be loose-fitting. Five panels comprise the garment: front, back, the two sleeves, and the crew neck collar.

We found the fabric to be soft and comfortable against the skin, with low-profile seams. Patagonia claims no specific ultraviolet protection factor with this shirt, but it does carry a money-back guarantee.

Bottom Line: This shirt dries quickly, but our expert seamstress wasn't impressed by the single stitching in the seams. At $34 each, these shirts are among the least expensive in our test, and the only ones we tested that come in decorative patterns.

IBEX WOOLIES

Based in Woodstock, Vermont, Ibex is a 20-person company whose directors are bent on proving that high-quality merino wool can outperform synthetic options in active-wear garments. Made of 100 percent merino wool, Woolies is the company's lightest base-layer fabric. The shirts are made in the Fiji Islands, come in three colors in both men's and women's versions, four sizes and several styles.

Of this group, the Ibex will offer the best insular layer should the weather turn cold, but it would be the least comfortable in hot climates. The downside of wool is that care is paramount. You'll want to limit wash cycles with products like the Woolie, and you should lay them flat to dry rather than hanging them.

Bottom Line: We like that the Woolie is made from a natural, renewable resource. It carries a $58 price tag, and had the worst rating for resistance to odor.

HELLY HANSEN TRANSPORTER

The Transporter is made of LIFA Versa, Helly Hansen's lightest base-layer fabric, featuring two layers—LIFA inside and polyester outside. Essentially, LIFA Versa has a polypropylene inner layer and a polyester outer layer.

The Transporter—a crew-neck, long-sleeve garment built in Thailand—felt very smooth on the skin and the seams weren't noticeable at all. This product is designed to have a loose fit for increased air circulation, but it retains contact with the skin as you move.

Bottom Line: Among the most comfortable tops we evaluated, Helly Hansen's Transporter scored well in both comfort and construction and carries a reasonable price tag.

VICTORY WETSUITS DRYSHIRT

Victory's RSD or REPEL fabrics reportedly repel water from the outside, but allow sweat to migrate through and evaporate once it reaches the exterior.

The Nike Dri-FIT earned high marks in every test. The Helly-Hansen Transporter and the Musto Technical were among the most comfortable. Victory scored for sun and sea protection.

Nike Dri-FIT

Helly Hansen Transporter

Musto Technical Shirt

Victory Wetsuits Dryshirt

PS VALUE GUIDE BASE-LAYER GARMENTS

COMPANY	PRODUCT	FABRIC	UPF* #	EVAPORATION**
PATAGONIA 800.638.6464, patagonia.com	Silkweight Capiline	100% Polyester	None Claimed	Poor
IBEX 800/773-9647ibexwear.com	Woolie	100% Merino Wool	None Claimed	Poor
HELLY HANSEN ✓ 425/378-8700, hellyhansen.com	Transporter	47% Polyproplene 53% Polyester	None Claimed	Poor
VICTORY WETSUITS ✓ phone, website.com	Dryshirt	80% Nylon 20% Lycra	50	Poor
NIKE ★ 800/344-6453, nike.com	Dri-FIT	84% Polyester 16% Spandex	None Claimed	Good
UNDER ARMOUR 888/427-6687, underarmour.com	Turf Gear/Loose Gear	84% Polyester 16% Spandex	None Claimed	Poor
MUREADRITTA (OHS Marketing), 888/400-3472, fwgita.com	Crew	90% Polyester 10% Spandex	None Claimed	Poor
MUSTO (TEAM 1) ✓ 800/847-4327, musto.com	Technical Shirt	44% Polyester 56% Nylon	None Claimed	Fair

* Ultra Violet Protection Factor, higher is better. **Only two shirts permitted measurable evaporation, the Nike and the Musto.
$ Budget Buy ✓ Recommened ★ Best Choice

The base material was developed by 3M using a nylon/polycotton yarn that's coated with Teflon. Victory recommended a fresh-water rinse for cleaning and advised that you hang-dry it somewhere out of the sun, which might be inconvenient when underway.

Bottom Line: This shirt fared well in most of our tests. Though it's the heaviest one we evaluated, it absorbs less water by far. Small boat sailors will appreciate, the high SPF number and the solid construction.

NIKE'S DRI-FIT

Nike's Dri-FIT concept is based on two layers comprising a single fabric: an inner layer that wicks moisture away, and an outer layer that pushes moisture to the surface and spreads it out over a large area for rapid evaporation.

The Dry-FIT shirt that we tested was made in Mexico and carried a label claiming it's made of 84 percent polyester and 16 percent spandex. Dry-FIT shirts are sold in numerous colors. The company makes no UPF claim with this shirt, but does produce a UV Reflective garment that sells for $40.

The fabric used to make the Dry-FIT shirt that PS tested has a smooth, silky feel on the skin. The double-stitched seams were particularly smooth and low in profile.

Bottom Line: This shirt is comfortable and fared well in all of our tests. It's also priced right. The downside is its lack of any ultra violet protection for the wearer.

UNDER ARMOUR TURF GEAR

Built in the Dominican Republic, this snug-fitting shirt was the lightest of all the shirts we tested, but it was also judged the least comfortable by our testers. (Under Armour also makes a looser fitting line called LooseGear.) Under Armour's shirt comes in a range of sizes from XS to XXXL, and 11 colors and sells for $30.

We were surprised to notice picking along the seam of one shoulder and near the collar on the Under Armour shirt we purchased. (Picking happens when the threads break and come apart in the weave.) Plastic panels in some of the seams also bothered us.

Bottom Line: This was the least comfortable of the eight garments we tested. It had the highest profile seams and some suspicious picking. We'd give it a miss.

MUREADRITTA

Dubbed Airframe, the fabric in this Italian-made shirt is manufactured from hollow polypropylene fibers woven into cloth. The maker claims that it will absorb no more than 2 percent of its weight in moisture.

Like the Transporter from Helly Hansen, this garment is cut to fit loosely, but it maintains contact with the wearer as he moves.

Bottom Line: This is the most expensive item in our test at $67, and some of the less expensive shirts were more comfortable.

MUSTO TECHNICAL SHIRT

The fabric in this shirt is 44 percent polyester, 56 percent nylon pique,

	COLOR FASTNESS	FABRIC COMFORT	ODOR RESISTANCE	CONSTRUCTION	COST
	Excellent	Good	Good	Good	$34
	Excellent	Good	Poor	Excellent	$58
	Excellent	Excellent	Good	Excellent	$40
	Excellent	Good	Excellent	Excellent	$45
	Excellent	Excellent	Excellent	Excellent	$35
	Excellent	Fair	Good	Good	$25
	Excellent	Good	Good	Excellent	$63
	Excellent	Excellent	Fair	Excellent	$55

which the company claims will absorb only .5 percent of its weight in moisture.

The MicroDry fabric had a natural feel, almost like cotton. It requires more care than some of the other shirts. You can machine wash it, but it can't be tumbled dry. Also, this shirt developed the second worst odor among the eight we tested.

Bottom Line: One of the most comfortable garments in our test, Musto's Technical Shirt scored well in every category but the odor resistance test. At $38 each, this would otherwise be a good buy.

CONCLUSIONS

Sailors of small boats and those who make long passages will benefit the most from the technical advances in these garments. And the shirts that offer some protection from the sun are even more versatile.

Each shirt had unique features that would appeal to certain individuals. If you get wet a lot on your boat or want a garment with UV protection, the best option is the Dryshirt from Victory Wetsuit. For hot climates, we think either of the garments from Patagonia or Nike would serve you best. If you're a cold climate sailor, the Ibex shirt would be the likely choice. And the garment from Mureadritta, though relatively expensive, is a good all around choice for either extreme.

However, based on our testing, three shirts stood out for overall performance and comfort: Helly Hansen's Transporter, Nike's Dri-FIT, and Musto's Technical Shirt. Because of its poor resistance to absorbing odor, we rated the Musto a distant third. Nike's product undersells Helly Hansen's by $5, scored marginally better for evaporation and fared better in the odor resistance test. Thus it earns top honors in this test by a narrow margin. Finally, we also are recommending the Victory Dryshirt. Because of its outstanding UV protection and water-repellancy, we believe it will be an effective single layer for small boat adventures or dinghy sailing.

(continued from pg. 35)

weekend proportions, through a chartering club as one would paying a flat rate at SailTime requires nearly double the investment. And buying the same amount of time on the open chartering market will cost nearly triple. (See "Cost Comparison" table pg. 35.)

On the other hand, adhering to the SailTime sailing schedule may be difficult for some. So, those sailors might opt to join a chartering club and use the boat for one full weekend each month—an option that is not available under the SailTime rules. At the end of an eight-month season, those sailors would spend about the same amount as a SailTime member ($5,910), albeit for fewer hours on the water, but they'd be establishing a schedule that might better fit their lifestyle.

Certainly SailTime and similar timeshare arrangements like Pinnacle Yachts and Windpath Sailing offer individuals a viable alternative to outright ownership. And the actual owner of the vessel can get others to help with the bank payments, in exchange for sharing use of the property with up to seven strangers. But the owner has full title to a depreciating asset, and so may be faced with owing more money at the end of the loan's term than the boat can fetch. However, for the non-owning participants, a timeshare is without a doubt a lower cost way to get time on the water under sail. The non-owning participants in a system such as SailTime's pay a flat rate, so the actual value depends on how much they take advantage of their allotted time per month. For others with fewer hours to devote to sailing, it may make more sense economically to join a chartering club and pay-to-sail on a schedule of ones own devising.

ON THE HORIZON:

DIGITAL CHARTS: *We look at the latest offerings from Navionics, C-Map and Garmin*

Practical Sailor

SAILDRIVE CORROSION

When you're replacing your drive unit every two years, surely something is amiss

PS ADVISOR

I purchased a 1983 Sweden 41 in September, 1999. Since that time I have had to purchase three saildrives because of corrosion. I have installed galvanic isolation, zincs, and an expensive electric galvanic isolator. I've now been told by the boatyard, that my third saildrive is corroded beyond repair. These run about $5,000, so the thought of putting in a fourth to have it corrode away is not an option. What can be done? What is the history of saildrives in salt water? What can be done to protect them from corrosion? Why are they built of aluminum? Any suggestions or assistance will be enormously appreciated.

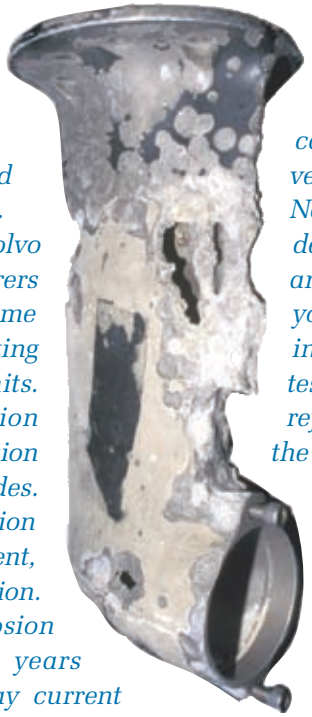
Barbara Nylund
Corte Madera, CA

Saildrives (a generic term that refers to sailboat outdrives from various makers), along with thousands of inboard-outboard sterndrives and other sail-oriented propulsion units are made of aluminum primarily because it's well-suited for manufacturing and keeps the units affordable. Aluminum is one of the least noble metals, which means that it is anodic to, or it will corrode when it remains in contact with, nearly every other metal while it's immersed in an electrolyte, seawater in this case. This is known as dissimilar metal or galvanic corrosion.

The primary advantages of these units are a reduction in vibration (quieter running), fixed alignment and less underwater drag (thus their appeal to racers), However, because of corrosion problems and maintenance issues associated with these units, we much prefer inboard propulsion for cruising.

The engineers at Volvo and other manufacturers spend a great deal of time studying ways of thwarting corrosion in these units. The primary protection against galvanic corrosion is the use of zinc anodes. Other types of corrosion involve stray DC current, or stray current corrosion. Where galvanic corrosion may take months or years to cause damage, stray current corrosion can damage underwater metals in days or even hours. If you eliminate these problems and keep up with maintenance (including religious zinc renewal), you should get about 10 years of service from these units, though we've seen some powerboat stern drives last as long as 18 years. You should note that neither your zincs, nor your galvanic isolator will provide adequate protection against a bad case of stray current.

We suspect stray current in your case (or perhaps an incompatible copper-based paint on the unit that would cause galvanic corrosion), but it's difficult to know without an on site analysis. An experienced electrician or corrosion technician who is certified by the American Boat & Yacht Council should carefully inspect your vessel for electrical faults. Next, the technician should determine the level of anodic protection afforded your saildrive by performing a reference electrode test using a silver-chloride reference electrode. With the results of these tests, it will then be possible to determine why your saildrives have wasted away so rapidly and frequently and you can decide what will be your next step.



A victim of stray current corrosion, this saildrive-type unit is well beyond repair.