

Life Rafts Revisited

Winslow still leads, but the gap narrows. Viking's RescYou Pro earns a Best Buy.

by Doug Ritter

It's been only a couple of years since our exhaustive series of life raft reviews ("Life Rafts: The Good, The Bad, and The Ugly" in the May, June, July, August, and September 2000 issues), but there have been some developments worth covering.

Our current round of tests were held, as before, as a collaboration between *Practical Sailor*, *Powerboat Reports*, *Aviation Consumer*, and *Equipped to Survive*, the Web-based publication of the non-profit Equipped To Survive Foundation.

We tested 17 life rafts, six of them recreational marine rafts. For consistency, we tested under the same conditions as last time, using the same wave pool and testing protocols, and with the participation of many of the same volunteer testers. As before, we had a number of sailors preparing for extended cruises who came to learn more about life rafts. Also attending was the Coast Guard's senior rescue swimmer and a host of others with marine survival experience. After the in-water testing we moved the rafts to a vacant warehouse for detailed documentation.

We invited manufacturers to participate, asking them to provide us with any entirely new or improved life rafts. We received rafts from Avon, Viking, Zodiac, and Winslow. West Marine was understandably unable to loan us the lone prototype of the improved West Marine offshore raft by Zodiac Offshore (our Best Value offshore raft last time). This raft is slated for a 2003 introduction.

Survival Products and Crewsaver did not respond to our e-mails. DBC (now owned by Zodiac) and Plastimo advised that they had nothing new or of enough significance to warrant testing. Givens and Switlik declined to participate. Since it was the introduction of the Switlik Rescue Pod 8 and a



Boarding a liferaft in a PFD is no easy matter in a well-lighted wave pool, even for a person in good shape. Design of boarding aids is critical.

brief experience we had with the Search and Rescue version of this raft at a SAR conference that served as part of the stimulus for this round of testing, the Equipped To Survive Foundation elected to purchase one for evaluation.

(continued on page 4)

Also in this Issue

9 High-Tech Rope Shackles

Yale Loups, EquipLites, new Loop-Its from Aramid Rigging—ferociously strong fittings don't have to be made of steel, or even metal, any more.

2 **Mailport.** Looser Lifeline Challenge Responses. Fuel Filter Follow-Up.

3 **Credit Due.** Poly-Planar. Harken.

3 **Chandlery.** JHRG Supreme Protector Gear.

16 **PS Advisor.** Steel to Aluminum Corrosion. Cuprinol.

Practical Sailor

Editor

Douglas Logan

Executive Editor

Dale Nouse

Editor at Large

Nick Nicholson

Contributing Editors

Ken Delavigne, Ermanno Di Lorenzo, Richard Greenhaus, Ed Lawrence, Doug Ritter, Jay Chris Robbins, Robby Robinson, Scott Rosenthal, Rick Strand, Dan Spurr

Publisher

Timothy H. Cole

Editorial Offices

10 Bluff Ave. #111

Clinton, CT 06413

e-mail: practicalsailor@aol.com

Subscription Department

800/829-9087

pracsailor@palmcoastd.com

www.practical-sailor.com - click

"Subscribers Only"

Box 420235

Palm Coast, FL 32142-0235

for Canada

Box 7820 STN Main

London, Ontario N5Y 5W1

Web, Back Issues, Fax Service, Other

Customer Service

PO Box 2626

Greenwich, CT 06836-2626

800/424-7887

customer_service@belvoir.com

Quantity Reprints Available

Minimum Order: 1,000

Contact Mona Kornfeld, Belvoir

Publications, 203/422-7343

The *Practical Sailor* (ISSN No. 0161-8059) is published twice a month (except March, June, September, and December, which are combined) by Belvoir Publications, Inc., 75 Holly Hill Lane, Box 2626, Greenwich, CT 06836-2626, (203) 661-6111. Robert Englander, Chairman and CEO; Timothy H. Cole, Executive Vice President, Editorial Director; Philip L. Penny, Chief Operating Officer; Greg King, Senior Vice President; Marvin Cweibel, Senior Vice President, Marketing Operations; Andrew Thorne, Vice President, Group Circulation Director; Michael N. Pollet, Senior Vice President, General Counsel. Periodicals postage paid at Greenwich and at additional mailing offices. Copyright © 2003, Belvoir Publications, Inc. All rights reserved. Reproduction in whole or in part is strictly prohibited. Printed in USA. Revenue Canada GST Account #128044658. Canada Publishing Agreement Number #40016479.

Subscriptions: \$84 annually. Single copies, \$7.50 (U.S.). Bulk rate subscriptions for organizations and educational institutions are available upon request.

Postmaster: Please send address changes to Practical Sailor, Box 420235, Palm Coast, FL 32142. Practical Sailor, P.O. Box 39, Norwich ON, N0J 1P0 Canada. WDS return address in Canada: Station A, P.O. Box 54, Windsor, Ontario N9A 6J5.

**PRACTICAL SAILOR ACCEPTS NO
COMMERCIAL ADVERTISING**

MAILPORT

Looser Lifeline Debate

Ralph Alter's letter in favor of keeping lifelines looser rather than tighter (Mailport, November 1, 2002) offered a challenge: "Let the arguments begin!" That challenge has been answered by quite a few people. We'll lead with the first respondent, Eric Baicy from Seattle. His original letter was five pages long, and full of diagrams and sine language. We'll put the whole thing in Online Mailport, along with other letters we don't have room for here.

Ralph's analysis is essentially correct, but there is one assumption he made that is somewhat unrealistic. The force he describes for 1" of sag when 200 lbs. is applied is about 4,800lbs. The mistake is assuming that tension is caused by the 200 lbs. The correct way to re-word his solution is: If I tension my lifelines to 4,800 lbs. and then stand on them, they will only move 1" (assuming 48" to the center of the span).

The effective weight of the cable by itself is very small. It doesn't take much tension to make them run straight in between the stanchions, maybe 20-30 lbs.

The effect of pre-loading this small amount of tension won't be noticed in comparison to the application of 200 lbs., and the sag produced in both cases (tensioned and untensioned) should be very close to each other.

As a rule of thumb, if you find yourself tightening your lifelines often, then you are probably putting too much tension on them.

Eric Baicy
Seattle, WA

I am not a mechanical engineer or boat designer but Mr. Alter's calculations for lifeline tension produced by 200 lbs. of force applied against a tight lifeline are correct. I got 4801.04 lbs. of force as my answer. I agree with his conclusion as well. It would appear that if lifelines have a little slack in them the loads are dramatically reduced.

Similar techniques for multiplying force are used frequently on sail-

boats: the Y-shaped backstay tensioners and the technique of "horsing" a halyard to name two.

Don Karon
Via e-mail

Ralph Alter's engineering observations are essentially correct. The matter is resolved if one thinks of it in terms of trigonometry. However, substitute force, load, or speed and direction for length of line. Navigators are familiar with the technique when determining a course to steer after considering speed, current, set, and leeway. This is also why we "sweat" halyards to obtain a bit more luff tension. Further, this effect explains why upper shrouds have spreaders. The brace angle is larger, which reduces the total shroud tension for a given lateral support. However, the use of spreaders imparts lateral compression loads on the mast. That is why it is so important to balance shroud tensions. Otherwise, unbalanced loads will bend the mast sideways and the overtensioned side could be overloaded when on that tack. These are why I have wanted to name our humble little Precision 23 "Vector Sum." However, so far, my wife won't let me.

My lifelines are set to be loose with a bit of visual sag, or deflection.

Keep up the good work. If I spent more time reading financial publications instead of your fine magazine, I might be sailing a larger boat!

Blake W. Fulton
Via e-mail

What Ralph is missing is the fact that lifelines are also intended to keep you inside the plane of the deck of the boat. Slacking by 6" is kind of like putting up a fence 6" past the edge of a cliff.

If you read the US Sailing Rule 49.2, it states that if lifelines are required, they shall be taut.

Mark Rode
Winthrop Harbor, IL

Fuel Filters

Your article on fuel filters [November 15, 2002] was very interesting and informative. It was nice to see a comparison of the various filters. The

Baja filters have the reputation of being extremely effective but expensive. The test results in the article indicate that the West Marine unit is as good or better at cleaning fuel than the Baja filter, and sells at a much lower price.

An important feature which was not covered in the article is the rate that fuel flows through the filter. From a practical sense, a filter that cleans very well but allows a very slow rate of fuel may not be preferable to one that does not clean quite as well but that has a good flow rate. Without that information it is difficult to select the filter best suited for actual use.

Hap Pudewa
Long Beach, CA

No water = No HUMBugs is absolutely true. Getting rid of any water in the fuel tank is essential, for diesel fuel or gasoline.

There is very little chance that the loudmouth at the fuel dock will put any water in with your fuel. Virtually every fuel dispensing pump has a final filter that will shut down the flow if any water tries to get by. I can't vouch for the fuel dock in Tonga or the other exotic ports, but I'm sure that none of them wants a bad reputation. Incidentally, the pick-up in most fuel dispenser's tanks is six or more inches off the bottom of the tank. The tanks are frequently tested for water, and if any is found, it is removed long before it gets close to the pick-up pipe. These tanks are never shaken.

By far the largest contributing factor to water getting into the fuel tank is the O-ring seal at the fill cap. I have long been pushing this point wherever I can. The O-rings crack with age (some very young) and water can seep by. The gap around the fill cap acts like a funnel and keeps water against the O-ring until it can get through. Each time it rains, each time you wash the deck, each time a sea comes aboard, and even each time there is heavy dew, some water is trying to get past that O-ring. I stress this point when I conduct engine seminars. Our gas dock loudmouths are constantly reminded to check the O-ring whenever

they have a fill cap in their hands, the same advice that I give to boat owners.

As you state, you don't know how much stuff is in the tank until you shake it up. You have room between the pick-up tube and the bottom of the tank to allow a half-inch or more of water to accumulate before it can cause a problem, unless the motion of the boat creates a wave at the water/fuel boundary to get to the pick-up. Many times I am told, "I was just sold a batch of bad fuel." That's probably never the case. A slow accumulation followed by a shake-up is the real reason. No matter how good your filter, it won't stop this.

Getting water (and the associated bugs) out from under the fuel is relatively easy. You simply get a pump suction to the very lowest point in the tank and pump a bit. If the tank is absolutely flat-bottomed, heel the boat to make a lowest point. A halyard pulled to one side is an easy way to do it. The water will go promptly to the lowest point. The longer you maintain the heel, the more of the slower-moving sludge will get to your pump.

Pumping out all the fuel and putting in new will not necessarily get rid of water and other contaminants unless the bottom of the tank is also dried.

Fuel additives are another of my pet peeves. If you read the labels on the additive containers, each is the best. There is virtually no way to perform meaningful testing since each fuel formulator has already put additives in the fuel they sell, depending upon the climate of a given area. No fuel manufacturer wants to get negative press, so they all make the fuel to work and to last. Taking a bottle of something off the auto store's shelf and dumping it into your fuel has little chance of making an improvement. As your article states, many additives are mostly alcohol, probably priced higher per ounce than some very good Scotch. If you add too much alcohol-based additive, the result could be that the diesel fuel gets so volatile that the engine will not run once it gets hot.

Gordon Torresen
Torresen Marine, Muskegon, MI

...WHERE CREDIT IS DUE

To Poly-Planar, Warminster, PA: "The perforated center grilles on the Poly-Planar speakers in the cockpit of my 7-year-old SR33 had become battered until one of them gave up, exposing the speaker cone to further abuse. I called Poly-Planar's customer service line to ask for the name of the nearest distributor so that I could buy replacement speakers. Poly-Planar's response was immediate: 'Send us the damaged speaker and we will send you a replacement speaker plus a new grille for the second speaker.' The new parts arrived as promised, with no charge for the parts and no shipping charges even though they had to be shipped to Canada. I will buy my next set of speakers from Poly-Planar."

—Gunnar Jonsson, Vancouver, B.C.

To Harken, Pewaukee, WI: "Recently, one of the two 57mm Carbo AirBlocks that are part of the choker system on my Wyliecat 30, exploded during a particularly heavy load-up. I sent the remains to Harken for evaluation, and promptly received a call from the engineer in charge of the Carbo products line. After discussing the application and his observations, we both agreed that the block wasn't defective. I thanked him for his time, and told him that I'd upgrade over the winter. A few days later, I received not one, but *two* new 75 blocks at no charge! I've always like Harken products, but this kind of service guarantees them a customer for life!"

—Lincoln Schoenberger, Shelton, CT

Life Rafts

(continued from page 1)

Most manufacturers told us they would wait to see the pending rules update from the Offshore Racing Council (ORC) before developing new products, though Winslow has already made modifications in the raft we tested that, they are confident, will satisfy the final rule.

Avon Open Ocean

Avon, the venerable British life raft company, is now a Zodiac brand. The rafts are manufactured in Hungary. Though most of the equipment and instructions are obviously not of British origin (the English is occasionally hilarious), construction quality does not appear to have suffered. In fact, based on some reports, it may have improved.

We received an eight-person Avon Open Ocean packed in a canister. When stepped upon, it yielded significantly underfoot, but it seemed resilient. There are molded-in handholds at each end; deep enough for a good grasp and wide enough for two hands.

The Avon has glued, lapped seams. The pair of 10" buoyancy tubes are made of double-coated neoprene fabric. Exterior placarding is poor. The low single-arch canopy is red, inside

Canopies (Avon pictured) were subjected to a fire hose test—with occupants inside.



and out, and translucent.

There is a single triangular opening for entry that is closed by means of one-inch Velcro and cloth ties. While the Velcro held in our fire hose test, even without the ties, it was too narrow to align well and leaked badly.

A nearly universal complaint was that the low canopy and single small door made the raft claustrophobic. Some occupants complained that it was difficult to

breathe, and there was no way to get any ventilation. Considering that this 8-person raft had the second highest floor space per person, 4.3 sq. ft. (behind the Winslow Ocean Rescue) this is indicative of what a deficit in a single area can have on mental well-being, a critical element of survival.

The tight entry made boarding difficult for some larger testers. The entry aids consist of a three-rung webbing ladder with the bottom rung a piece of hard plastic tube, and a triangular boarding assist ladder inside. The tube rolled underfoot, causing feet to slip off. The first handhold of the interior ladder was too far away to be reached by some shorter testers. The toggle used to disconnect the inside ladder was difficult to operate; it would be extremely difficult with cold hands. There's an integral inflatable floor and five V-shaped ballast pockets around the raft. The sea anchor has to be threaded through the observation port to be deployed, and this created some confusion.

The raft knife used to sever the painter is secured to the inside of the canopy beside the entry and is largely hidden from easy view. Above it are



The 255-lb. volunteer at lower left struggled mightily to board some rafts, and couldn't board the Viking RescYou 6 Pro at all. He became so exhausted that he had to call a lifeguard to pull him out of the waves to shallow water. This volunteer was no novice—he had previously lived aboard a sailboat for 20 years. 'No way should I have been humbled by some damn life raft,' he reported, 'But I was. It was a sobering experience.'

the Immediate Action instructions, also not very prominent. Most of the other interior placarding was also printed on the canopy, high enough to be readily noticed.

Switlik Rescue Pod 8

Switlik's bright yellow Rescue Pod 8 is a unique offering that doesn't exactly compete with any other manufacturer's products. It was developed in part to provide the U.S. Coast Guard with an affordable, air-droppable raft, suitable for short-term survival until a rescue can be made.

The most notable difference between the Coast Guard's version and the one you can buy is that the former is equipped with Switlik's excellent Toroidal ballast as used on the SAR 6 Mk II that we rated highly in the previous test, while this one has four moderately large ballast bags. Based on limited experience in trying to overturn the USCG version of the Pod 8, the Toroidal ballast does make a significant difference, though this conventionally ballasted raft is still a very good performer in this respect. Stability is assisted by the self-deploying parachute sea anchor

equipped with a swivel in the rode. Richard Switlik, company president, told us that a swivel is now standard on all their rafts.

The octagonal raft has a single 15" buoyancy tube with Switlik's internal sleeve system, which maintains 50% buoyancy in most cases if there's a puncture. There's no question that it's better in this respect than a single tube with conventional bulkheads. It also means you can re-inflate to essentially full buoyancy without stopping to repair the tube in most instances. The yellow double-coated polyurethane material is lighter than Switlik uses on their other marine life rafts, but does meet TSO C70a aviation specifications—plenty strong from our perspective.

There's no need to look for the entry, it's right in front of you—but that didn't stop some testers from searching in vain for a better one. Each segment of the octagon has its own boarding ladder, a two-rung webbing design with flat semi-rigid rungs. The interrupted two-inch webbing lifeline serves as a grab handle centered on the exterior of the tube, and there's a similar one inside. An additional grab line is attached to the floor, but it was out of reach for our shorter testers. Many ended up grabbing hold of the rolled canopy atop the tube for assistance, with no ill effects on the canopy. Those shorter, seriously overweight, or bottom-heavy had a difficult time boarding. The aids were adequate. A common suggestion was that one or two really good aids would be better than eight aids that merely get the job done.

The canopy is similar to that on the smaller RescuePod we tested last time—a segmented inflatable affair that's tied down to the tube upon deployment. Material is the same as used in Switlik's inflatable aviation life vests and PFDs. Where each segment is joined, the exterior is trimmed with retro-reflective fabric.

The far-larger size of the Pod 8 dictated some other means for inflating the canopy besides huffing and puffing into the oral inflation tubes. Each of the five canopy segments has

its own PFD-style CO₂ inflator. There are two segments on one side, three on the other. Double-action zippers close the canopy, forming a teepee.

One thing that troubled every tester, and seriously troubled a few, is that the interior of the canopy is black. Even with a water-activated light on in the interior, once zipped up tight, claustrophobia quickly set in for some who had no such issues with any other canopies. In addition, two testers reported becoming nauseous almost immediately. Even given enough time to adapt, it's still a very black hole inside; you'll need the included flashlight. Switlik advised us that the Coast Guard "requested (a) black interior on (the) POD-8 for lessening of vertigo." We also have some concern about getting out quickly if the raft inverts. On the positive side, the canopy becomes your back-up buoyancy device—sort of an oversized air mattress.

The inflated canopy will likely work adequately in moderate conditions and moderate winds. The insulation will be an advantage, particularly in cold conditions. However, in wilder conditions the canopy isn't likely to fare as well. In our fire hose test, which all the other rafts took in stride, the canopy whipped about, leaked a lot through the top at the zipper, then quickly collapsed in the middle, forming a pool of water in the center of the raft, with the canopy supported on the bent heads of the occupants.

The Pod 8 has minimal floor space—a hair under 3 sq. ft. per person by our measurements. Said Switlik, "The USCG rates the raft for eight persons, hence the name. At 4 sq. ft. per person (normal marine specification) it rates at 6-person with a 9-person overload capacity." Remember, this pod is not intended for long-term survival.

Lack of space was one of the most common complaints. Downrate the capacity and this isn't a factor, but we test at the capacity advertised, and Switlik promotes it as an 8-person.

The survival equipment pack (SEP) is pretty good, considering the projected use of this raft. Besides the



The Viking was turned upside down and quickly righted itself. Note the water-ballast bags.

flashlight, it includes three SOLAS-grade handheld flares—but, surprisingly, no signal mirror.

Our Pod 8 came in an ill-fitting valise—the least expensive option. Other than a choice of valise or canister, the only other option is Switlik's independent inflatable floor with oral inflation (\$225), a good choice if you expect to travel in colder waters.

Viking RescYou Pro 6

The Viking RescYou Pro 6 is a self-righting boat-shaped offshore life raft, the first such that we've tested for the recreational marine market, though the Givens we tested last time came close. "Self-righting" means that if the raft inflates upside down, it automatically rights itself. This is accomplished on the RescYou Pro 6 via a pair of oversized canopy support tubes that make it unstable when inverted.

What occurs if you happen to be inside if it capsizes, as has been the case in real-life survival episodes such as the infamous 1998 Sydney to Hobart Race? We simulated this, and with occupants dropped down onto the inside of the canopy it stabilized on its side. Exiting the raft resulted in it turning back on its bottom immediately. We expect that a skilled crew should be able to right it relatively easily from inside if they can keep their wits about them.

Value Guide: Life Rafts

| Manufacturer / Model / SEP (as tested) | Capacity (*size tested) | Tube Sizes ¹ (inches) | Retail Price (base / as tested) ² | Weight as tested; Lbs. ³ | Freeboard Normal / Reserve ⁴ |
|--|----------------------------|-------------------------------------|---|--|--|
| Avon Open Ocean / E-Pack | 4,6,8* | 10/10 | \$3675 / \$3875 | 102.6 ⁵ | 15.7 / 8.3 |
| Switlik Rescue Pod 8 / Standard | 8* | 15 | \$3795 | 74.5 | 10.3 / 5.9 |
| Viking RescYou Pro 6 / E-Pack | 4,6*,8 | 9.5/9.5 | \$3100 / \$3300 | 105.6 ⁵ | 12.2 / 5.25 |
| Winslow Super-Light Canopied Coastal Plus/ Pelican Pac / Basic Coastal | 4,6*,8 | 10 | \$2995 / \$3861 | 60 ⁵ | 9.25/NA |
| Winslow Super-Light Offshore ORC / ORC | 4,6*,8,10,12 | 10/10 | \$3895 / \$4035 | 76 | 16.7 / 8.5 |
| Winslow Super-Light Ocean Rescue / SOLAS-A Plus ⁶ | 4,6,8* | 12/12 | \$8840 / \$11116 | 120 ⁵ | 20.33 / 10.17 |
| Zodiac / Class Ocean / Standard | 6* | 8.7/9.8 | \$3800 | 97.6 ⁵ | 13.25 / 7.25 |

NOTES:

¹ Top tube/bottom tube, as tested. Some manufacturers adjust tube sizes as capacity increases or decreases.

² Base price for size of raft as tested with valise or canister; standard included survival equipment pack, and options.

³ As tested including valise or canister; standard included survival equipment pack, and options.

⁴ Freeboard (top of tubes to water) at rated capacity / Reserve Freeboard with one tube deflated. Average of measurements around raft, floor uninflated, except for Normal Freeboard on Winslow Ocean Rescue with auto-inflating floor.

⁵ Includes weight of canister for those with valise options: Avon - 14 lbs., Viking - 17 lbs., Winslow Pelican Pac - 12.5 lbs., Winslow - 22 lbs.

Viking has eliminated the righting line common on conventional rafts, but we'd prefer it there as backup. The self-righting capability is dependent upon the canopy supports being fully inflated, and this might not always be the case.

Viking's primary boarding aid consists of a wide, fat, tapered inflatable tube that protrudes 12" from the lower buoyancy tube, and is the same as used on their SOLAS rafts. The top of this mini-platform is orange for better visibility. There's a single grab handle at the outboard end with a single loop of webbing hanging down from the end. No one noticed it in the water. There are also grab handles on the interior of both buoyancy tubes (pretty much hidden from view) and one more on the floor of the raft.

This boarding aid proved adequate for most of our testers, but one extra large volunteer found it impossible to board, despite the lowest freeboard of any offshore raft we've tested. Determined to succeed, he eventually became so exhausted that he called for assistance from the lifeguards. Better grab-handle locations or an interior assist ladder might have made a big difference.

The secondary entry aid consists of a single loop of webbing hanging

down over the hard inflation cylinder and a good vee-shaped interior boarding assist ladder. The ladder easily disconnects from the floor.

Compared to previous Vikings, the RescYou is constructed of lighter natural rubber fabric (with much less noticeable smell) that reportedly still meets SOLAS specification, built with the same double-taped seams and robust construction we've seen before. Two semi-circular entries—one big and the other bigger—open up the sides of the raft for excellent ventilation in good weather. There's also the spaciousness of the double-arch, semi-opaque orange canopy, giving much more headroom and volume than other rafts we've tested. The rectangular interior lends itself to somewhat more comfortable seating, and there's an integral inflatable floor.

The immediate-action instructions are hung from the water collector in the canopy, and are readily accessible. Some testers were unable to read the fine print. Placarding was minimal inside and out, and received numerous negative comments. The exterior and interior lighting was the best of this bunch, fully SOLAS-compliant and very bright.

In our fire hose test, the raft was "dry, dry dry!," to quote one tester.

There are four voluminous ballast bags, two on each side and located well outboard for maximum effect. The self-deploying sea anchor is equipped with a swivel, and performs decently.

The raft is equipped with a drain tube that acts as a partial self-bailer. This open fabric tube at one end of the raft will help drain the raft down to a more manageable level—approximately the top of the bottom buoyancy tube—if it is filled with water by a wave before it can be closed up.

The Viking heaving line remains the only one we've tested that actually pays out neatly when thrown. The Viking's standard "E" offshore survival equipment pack was of good quality, with the exception of the raft repair gear. The sealed SOLAS med kit had a leaking container of "paraffin dressings." We weren't impressed with the manual topping pump (also used by Zodiac in their Class Ocean), a plastic affair sold in the U.S. to inflate balloons.

Viking's new and robustly constructed lightweight fiberglass canister looks like what you might expect from a Danish company—a sleek contemporary design. Unfortunately, while pleasing to the eye, it failed an important functional test. The hand-

| Boarding Rating | Stability Rating | Firehose Rating | Comfort Rating | SEP & Equip. Rating ⁹ | Overall Rating ^{7,9} | Comments |
|-----------------|------------------|-------------------|----------------|----------------------------------|-------------------------------|---|
| Poor | Poor | Poor | Poor | Fair | Poor | 4.3 ft ² /person |
| Fair | Fair | Poor | Poor | Good | Good | 3 ft ² /person, inflatable insulated canopy |
| Fair | V. Good | Excellent | V. Good | Good | V. Good | Self-righting, 4.2 ft ² /person |
| Excellent | V. Good | V. Good | Fair | V. Good | V. Good | Viewing windows, optional boarding platform, optional tri-arch canopy |
| Excellent | V. Good | V. good | V. Good | Good | V. Good | Meets proposed ORC Appendix A, part 2 incl. 121.5 MHz PLB |
| Excellent | V. Good | V. Good | Excellent | Excellent | Excellent | Best Overall, 5 ft ² /person, Survivor 06 watermaker, auto-inflating floor. Upgrade to 406 MHz GPS EPIRB |
| Excellent | Fair | Fair ⁸ | V. Good | Fair ⁸ | Good | Minimal SEP – requires Abandon Ship Bag |

⁶ Indicates optional enhanced survival equipment pack over standard.

⁷ With respect to intended use of life raft and for raft as tested. If options included, take into account when comparing rafts.

Overall rating is not based entirely on other ratings published in this table.

⁸ Downrated due to difficulty closing top canopy, otherwise would rate V. Good. Available only with minimal SEP.

⁹ With respect to intended use of life raft

holds, vital to allow you to lift the raft for launching, were nothing more than glossy-smooth, sloped indentations; virtually useless, even in dry, stable conditions. Responding to our query and concerns, Viking redesigned the handholds to provide a decent grip with no-slip tape adding an extra measure of security. The strap bisecting the handhold is less than perfect, but the grip is effective.

Winslow

Winslow had no totally new rafts, but showed refinements and added features on their established line of rafts that won top honors last time. They provided three rafts, a Canopied Coastal Plus, Offshore ORC (simply their Super-Light Offshore Plus with additional ORC-required features) and their top-of-the-line Ocean Rescue. Unless noted, performance and features were the same as previously reported—excellent for class in most all respects.

Winslow now vacuum-packs its rafts. As we noted previously, while not essential, it's hard to argue against the benefits of sealing the raft against the marine environment. With this change comes an increase in the recommended service interval to every two years.

Their vacuum packaging is unique compared to the PVC used by others—a 6-ply laminated aluminized film that is claimed to be more cold, heat, flame, moisture, puncture, abrasion and ozone-resistant and impervious to ultraviolet. They claim UV blocking is an advantage for deck-mounting where even heavy fiberglass canisters allow some damaging UV through.

Winslow has added an inflatable boarding platform as standard on all their offshore rafts; it's a \$260 option on the coastal and inshore rafts. Similar in concept to the DBC boarding platform that was top-rated last time around, this platform has more support. Even our shortest and heaviest volunteers were able to board easily using the new platform and the robust interior boarding ladder. This is especially noteworthy considering that the Ocean Rescue has 20.33" of freeboard, far more than any of the others, but the platform was still effective for the heavy tester who didn't make it aboard the Viking.

The 8-person Ocean Rescue (5 sq. ft. per person) was fitted with a boarding platform at all three of its entries, which we thought a bit extreme. Winslow later advised us that the two auxiliary entries come standard with

their ladder entry; the additional boarding platforms are optional.

Winslow has significantly upgraded the integral inflatable insulated floor. The floor now has 21 reeds (these restrain the floor from ballooning)—more than four times what was used previously and more by far than the other such floors we tested. The result is something akin to tufted upholstery, both more comfortable and providing more even insulation while reducing the total volume of air required to inflate the floor to an effective state. Inflated reasonably hard, like an air mattress, it was impossible to feel someone punching the bottom, even with just a single person in the raft—a tough test that only the Switlik independent floors have passed previously. Testers who had previously tested the top-rated Switlik drop-stitched floor rated the new Winslow floor nearly as comfortable.

Nobody would ever suggest that manually inflating an insulated floor with the topping pumps provided in any of these rafts (while sitting aboard) is effortless. Winslow has addressed this issue with an automatic or semi-automatic inflatable floor. Standard on the Ocean Rescue and a \$250 option on all other models, inflation is provided by its own cylinder. It can

either be automatically activated when the raft is deployed, or manually by a survivor. On larger rafts, 10-person and up, this may not fully inflate the floor at lower ambient temperatures, but will still give a survivor a big head start. This feature was a big hit with our volunteer testers. The downside, besides cost, is the 4 lbs. of added weight. If we were cruising colder waters, it would be high on our option list.

Winslow has also upgraded its already excellent placarding with the use of detailed pictograms, common on European rafts. This feature received numerous positive comments.

Winslow's survival equipment packs carry individually vacuum-packed items grouped by use with a list of what's inside, and packed into the SEP bag in logical order. They have also upgraded to SOLAS handheld flares as standard throughout their product line, addressing one of their few weaknesses.

The optional "SOLAS-A Plus" SEP included in our Ocean Rescue remains the most complete by far of any we've tested, though it means extra weight (5.5 lbs. in our raft)—and the price is a staggering \$1,727. Ours was also fitted with a 406-MHz GPSEPIRB, a \$598 option over the included standard 406-MHz EPIRB.

Winslow's new polyurethane-coated fabric valise is bright yellow and appears even tougher than the one used previously.

The list of Winslow improvements goes on, covering dozens of items including new ballast construction for quicker filling and an improved interior boarding ladder, to note a couple.

Zodiac Class Ocean

Zodiac's Class Ocean represents a significant advance for the inflatable conglomerate, their first raft to compete head-on with the higher-end specialty U.S. manufacturers. Their raft is similar in many respects and features to Switlik's top-of-the-line Search and Rescue Mk II.

The six-person boat-shaped raft deploys open-topped for easy entry

and retrieval. Survivors must unroll the canopy top from one side and attach it to the other with a zipper, as with the SAR Mk II. In our test a cloth tie came loose and the canopy came partially unrolled upon deployment, though this didn't seem to hamper entry. We had considerable difficulty getting the zipper to work, because of how it was sewn into the canopy. In darkness, with cold hands and numb fingers, this would have been an even greater challenge.

The canopy openings on both sides zip up from the tube. The closures can be adjusted to suit conditions and for ventilation. The entire canopy is insulated via lightweight blue fabric, which provides a trapped airspace and a blue canopy interior, per SOLAS specifications. Testers said it was quite watertight.

The boarding ramp looked like a jumble of webbing and fabric, but worked well with the relatively low freeboard. The fabric platform is loosely attached to the ramp's ample inflatable support. This provided good purchase for climbing aboard, with plenty of bright yellow one-inch webbing for handholds. With ramp support deflated, the webbing handholds can still act as ladder rungs.

There was also a four-rung webbing ladder hanging from the end of the ramp. The auxiliary entry was comprised solely of a five-rung webbing boarding ladder and wasn't all that effective, lacking any interior assists.

The Class Ocean is equipped with Zodiac's insulated foam floor with a reflective interior coating—good in cold climes, less good, we think, in the tropics.

A self-bailer of sorts is fitted to the center of the floor. We say "of sorts," because survivors must operate it manually, lifting it up repeatedly to drain the water. On the other hand,



A volunteer wrestles with the canopy zipper on the Zodiac Class Ocean raft.

this is still a lot easier than using a traditional bailer. If survivors have the presence of mind to twist the bailer cone open and hold it there, then it will self-bail. Our testers didn't, and there's no placard to lend advice.

We were pleased to see Zodiac abandon the screw-in raft repair plugs heretofore favored by the European manufacturers, and provide instead superior-design U.S. MilSpec-style repair clamps, one each 3", 5", and 7" (the 3" was missing; Zodiac had no explanation). Instructions for use would also be helpful.

The SEP is minimal for offshore use; no water or medical kit and no optional extended offshore kit, as some provide. It includes SOLAS-grade flares, but no signal mirror. Alan Brocious of Zodiac explained that owners can choose their own equipment and this reduces the repacking cost.

Zodiac continues to fold and tightly roll up their difficult-to-read immediate-action instructions, attaching them to an interior grab line with a rubber band, about the only piece of reading material in any of the rafts that testers didn't access. The time-critical nature of this information doesn't seem to be given much priority. Zodiac includes a video on using the life raft, but that's no substitute for good placarding and instructions on board.

Unlike previous Zodiacs we've tested, this one came in a well-constructed and sturdy fiberglass canister. A valise-packed raft is not available.

Conclusions

Street prices can vary a good deal. Prices shown in the chart are suggested list. Boat shows and the Internet often offer the best opportunity to get a deal.

Switlik's Rescue Pod 8 fills a niche and may offer just the right combination of features for some. Not a full-fledged coastal life raft, but with better redundancy than many coastal rafts and most inshore rescue platforms, the canopy is its biggest drawback for more serious use. Don't buy one if you are claustrophobic. On the other hand, with the insulated canopy and adding the optional insulated floor, it makes a dandy cold-water rescue platform or inshore raft. Entry aids are adequate, but if you're on the bulky side we'd suggest a raft with better ones.

Switlik's robust construction means greater weight and more space demands. It also isn't inexpensive. For a slightly greater investment at street prices you can get a reasonably capable double-tube offshore raft like the Viking we tested.

The **Avon Open Ocean** is an uninspired raft at an inexpensive price, a generation behind the other designs, with nothing in particular, except price, to recommend it. We think the West Marine by Zodiac Offshore we tested last time represents a far better raft overall, and a better value.

The latest top-of-the-line European rafts are closing the gap with Winslow and Switlik, and exceeding them in some areas. Keeping the **Zodiac Class Ocean** from surpassing Switlik's SAR 6 Mk II is the ballast—not even close to as effective as Switlik's Toroidal, and the problems we had with closing the canopy top (easily addressed). In other areas—boarding aids, integral bailer, and nice insulated canopy—it's superior. The foam floor isn't as comfortable as Switlik's optional drop-stitched or air mattress style, and there's that reflective fin-

ish, which could be good or bad depending on where you're cruising.

Nobody beats Switlik's fabric for toughness, even Zodiac with their PVC. On the other hand, the Zodiac is \$3,800 list, the SAR 6 Mk II is \$5,295 list, without an insulated floor, but with a more capable SEP. That's a big difference, and the value scale has to tip towards Zodiac. While still not the performance equal of the SAR 6 Mk II or the well-equipped Winslows, this raft is head and shoulders above previous offerings from Zodiac.

Viking's RescYou Pro 6 has some very nice features, especially its self-righting design, and we think it's way ahead of the raft we tested previously in some other respects. It was popular with testers, who liked the open, airy canopy and feeling of spaciousness that it provided. It's stoutly constructed, and we don't see the lighter-weight fabric as an issue. It also has a good offshore SEP and bit of extra room. The improved ballast helps to compensate for the boat shape.

The entry aids, better by far than the previous raft, remain a concern—fine for those in reasonable shape or not already exhausted from fighting a storm, but there's significant room for improvement based on what we've seen on other rafts. The revised canister is beautiful, and that alone may prove an important selling point for some. At \$3,100 or \$3,300, valise or canister respectively, it's well worth consideration—a Best Buy (just for the Pro series, not the basic RescYou, a substantially different raft in critical respects, that we didn't test).

Winslow has not stood still, and the improvements to both their coastal and offshore rafts are worthy of note. Their new boarding platform and floor make a very good raft even better. They remain the overall performance leader as tested, in our opin-



Effective boarding platforms like the one on this Zodiac Class Ocean raft make entry much easier.

ion, and in the opinion of the majority of our testers. None of the other manufacturers seem to take into account human factors the way Winslow does. As one tester said, "Someone thought about the guy who might use this thing."

Nobody offers the custom pack options or the breadth of available life raft and survival equipment options that Winslow does. Considering the entire lifesaving system, the scale still tips in Winslow's favor, though you will pay a premium price.

Winslow has added service stations and still picks up continental U.S. shipping for factory service, but lags behind others in the number of authorized service stations, especially Zodiac and Switlik. Consider that if your cruising takes you to faraway places.

Be careful to compare standard versus optional equipment. The ratings on our chart cover the rafts as tested, including options, and encompass more than we could possibly discuss here. ■

Contributing Editor Doug Ritter is the editor of Equipped To Survive (www.equipped.org).

Avon Marine, 410/643-4141, www.avoninflatables.co.uk

Switlik Parachute Company, 609/587-3300, www.switlik.com

Viking Life-Saving Equipment, 305/374-5115, www.viking-life.com

Winslow LifeRaft Company, 941/613-6666, www.winslowliferaft.com

Zodiac of North America, 410/643-4141, www.zodiac.com

High-Tech Rope Shackles

The future is here, and it looks quite a bit like the past. Within a couple of years, rope may be replacing stainless shackles on boats of all stripes and budgets.

For some time, it has been our view that, as a stand-in for a standard 10-inch steel I-beam 50 feet long and weighing 1,720 pounds, there will be, sooner than you think, a piece of rigid foamed plastic that you can pick up with one hand. And the plastic beam will never corrode or fatigue—which means that you could pair it with glass (the world's other wonder material) and build something to last forever.

A bellwether for this world-of-tomorrow view is rope, which has progressed rapidly from manila to nylon to Dacron and now to some of the most amazing stuff ever conjured up.

Rope using Kevlar has been used for some time now, especially for running backstays, to which custom metal terminals are fitted. As things have progressed, *PS* has presented quite a bit of material about UHMW-PEs (ultra high molecular weight polyethylenes), as the new chemically engineered ropes are designated.

It sets our jaw agape that Yale Cordage is making a new line out of Zylon that, in the 1/8" size, has a breaking strength of 5,000 pounds. (The newest "hot line" is made in Italy by Gottifredi Maffioli; a name like that is bound to acquire "glitz" with the racing clan. Maffioli makes Dyneema single and double braid in 6-14 mm and a small boat line, 3-9 mm, called Swiftcord, with a fuzzy cover.)



Doubled (or 'basketed') Yale Loups restrain the blocks for runners and checkstays on a modern racer. The blocks have to be disassembled to accept the loops. If such a loop is to live in a padeye, it has to be made in place.

These high-tech ropes are bald-facedly challenging steel wire in virtually every application—not only for boats but in architecture, industry, utilities, and telecommunications. "I've got a rope for every wire ever made," said one rope manufacturer. The potential usage of these modern ropes has everyone scrambling.

In the September 2001 issue, *PS* published a market scan on what was available (at that time), using basic fibers called Vectran, Kevlar, Twaron, Technora, Spectra, Dyneema, and Zylon. A chart explained their properties and who owns each.

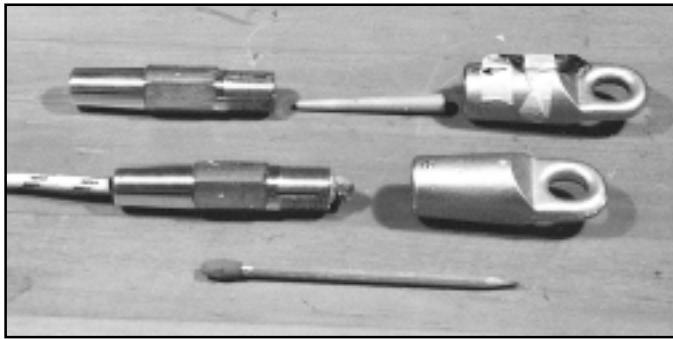
In the same issue was a bench test report on how well conventional knots and splices hold in the slippery lines made with these fibers (not well) and, more importantly, how much of their breaking strength is surrendered when the line is knotted. It was a shock: High-tech line loses much of its strength—50% is common—when knotted. Sure, there's usually plenty

of strength left, but we felt then, and still feel, that high-tech line is not well-suited to roles in which it needs to be quickly knotted and trusted to stay put. When knotted, it should be set tightly by hand and finished with an extra hitch or two. We found that buntline hitches were quite reliable, since they lock and put pressure on the bitter end.

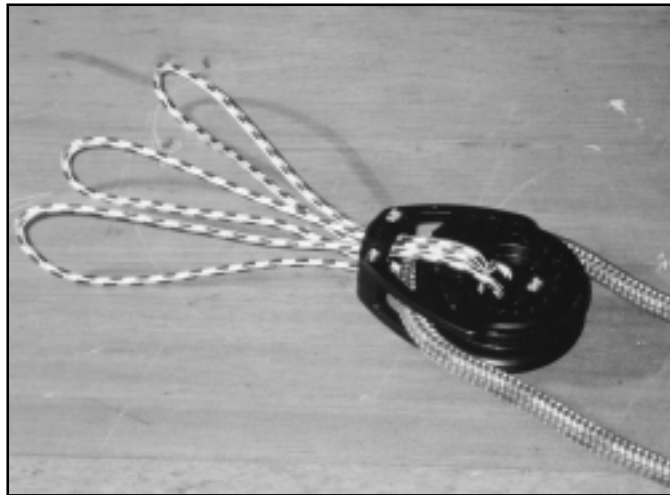
High-tech line, on the other hand, seems extremely well-suited to applications like halyards, running backstays, and (as we've been discussing in recent issues) lifelines—where it can be terminated by a splice or a custom metal or composite fitting. And, as we'll see, high-tech line is beginning to replace metal fittings themselves.

Metal-to-Rope Terminals

There are a number of companies and individuals working on ways to capitalize on the almost unbelievable strength of these new fibers. Again,



Above: These Esmet fittings, used for years with wire in industrial applications, now can be used for some synthetic line. They are the same in principle as a Norseman or Sta-Lok terminal used for wire. The problem is that they are huge (see pencil for scale). On the top is a dismantled eye. The line is passed through the male part of the fitting, strands are loosened, and the long cone is slipped into the core. The strands are then gathered carefully and wired tightly with the supplied wire (shown taped to the female part) and then fused with heat. The two parts are then threaded together and locked down with the set screw (arrow on tape), which fits in a groove on the male part shown on the left. At the bottom is an Esmet fitted to a piece of line, wired and fused, but not yet locked up.



Above: The beautifully engineered Harken Ti-Lite™ Carbo Airblock® uses several strands of Yale 'Pulse' line to yield the same strength as a conventional Harken block with a stainless shackle and post, with a weight savings of close to 25%. The ends of the 'small stuff' can be locked with Allen-head set screws or secured very quickly with Figure-of-Eight knots. The Ti-Lite can be rigged in many different ways, including tied long or tied tight (to stand up on a deck). It is shown with the lashing splayed out and a line rove in the sheave.

the emphasis is on not only running rigging, but standing rigging, too.

The goal is to replace wire, rod, and metal fittings with much lighter line. It's mostly to save weight aloft, which is vital on a racing boat but is also of concern on any boat. Unless it's a keel, wrecking ball, or offensive tackle, any engineer will take "light and strong" over "heavy and strong."

For the moment, let's talk about end fittings—shackles, turnbuckles, toggles, etc. We checked with a couple of terminal-makers familiar to sailors around the world—Norseman and Sta-Lok—to see if they were yet fabricating metal or composite swageless terminals to be used with UHMWP line made with Spectra, Dyneema or Zylon.

"We have done some work with synthetic rope," said Terence Barfield, Sta-Lok's managing director, "We have developed prototypes. However, we have not finalized designs."

Ty Goss of Navtec, the leading maker of rod rigging, and also maker of Norseman terminals, says that the company has been concentrating on higher-end, higher-load PBO and car-

bon products, largely for the America's Cup, but that they've also been working on terminals for UHMWP line. "We're of the philosophy that if someone's going to obsolete rod rigging, it might as well be us," says Goss. As for terminals that can be afforded, fitted easily, and trusted by the cruising community, Goss says, "We're still very much in the development stage. We've been able to design fittings that will take a breaking load test, but we haven't gotten to the Navtec standard for fatigue life." Knowing Navtec, we have no doubt that it will happen.

An old-line company called Esmet, Inc., in Canton, Ohio, has for years made wire cable terminals for military, industrial, and heavy construction applications. Esmet's terminals, which resemble Sta-Lok and Norseman fittings, are now offered for some synthetic line. However, the fittings are huge (see photo above).

Esmet's chief engineer, Bob Shaw, said that because synthetic line is so slippery, the internal, gripping cone used in these fitting must be long, which makes the fittings cumbersome. Even then, the ends of the fibers must

be both seized and fused to further discourage the slippery fibers from creeping.

Rope and hardware manufacturers, stimulated by creative riggers, currently are having a determined run at metal shackles. There are a lot of shackles on boats. (This is *PS*'s second recent report on shackles; see last month's issue for a market scan on metal shackles.)

Ti-Lites™ and the Like

It might be said that the movement to make stainless steel shackles obsolete was started by Harken, the ever-innovative Wisconsin company. Seeking lightness (because it caters to those who seriously race boats), Harken started offering webbing attachments for its blocks some time ago. Webbing is, by any measure, much stronger than conventional Dacron rope.

The strength of the new UHMW-PE line (it's stronger than Dacron webbing) stimulated Harken to bring out, in 1999, a line of versatile blocks called Ti-Lites™ (see photo at the top of this page), which utilize a lacing of three turns of 1/8" Spectra. The line is Yale's

"Pulse," which has a Spectra fiber core and a Dacron cover. In the 1/8" size it has a breaking strength of 800 pounds. With a six-part lacing, the strength of the "shackle" jumps to 2,380 pounds. Because the lashing eliminates not only the shackle but also the head post and swivel, the weight savings is impressive—3.1 oz. for the conventional block vs. 2.4 oz. for the Ti-Lite. In any endeavor, a weight saving of that magnitude (without sacrificing strength) is big news.

The next development was already in the works. It doesn't matter much who came first with the idea of using just a loop (or ring) of UHMW-PE line in lieu of a stainless shackle. In essence, they're not much different than old-fashioned manila grommets, which were often used as strops.

Yale Loups

Yale Cordage in Biddeford, Maine, announced last January that it was bringing to the marketplace a device to replace a metal shackle. Called a Yale "Loup," its basic purpose is to reduce weight. On one racing boat, *Team Adventure*, which sailed in The Race, 30 Yale Loups replaced metal shackles and attachment points, with a weight saving of more than 200 pounds.

"After the race," said Yale vice president Dick Hildebrand, "some of the Loups tested better than when they left the factory. They don't look like they've been around the world."

The Loup was a joint creation of Yale CEO Tom Yale and the extremely competent rigger Brian Fisher, of Aramid Rigging in Portsmouth, R.I.

Fisher said he and Yale spent eight months developing the product, which is basically a ring of Dyneema with a Spectra cover. He good-naturedly declined to say how the ends of the Dyneema are joined.

"Secret," he smiled.

(Naturally, Aramid is the sole licensed manufacturer of the Loup.)

Fisher explained that to add about 15% to 20% more strength, the Loup is annealed, meaning that the ring is pulled under a heavy load and hit with live steam.



The Yale Loup entails some additions to a sailor's rope lexicon. A Loup can be rigged four ways—'vertical,' 'basket,' 'choker,' or 'boned.' Shown here, at the far left, is a Yale Loup in what Aramid Rigging calls the simple 'vertical' shape. It is a ring of Dyneema with a Spectra cover, whose ends are hand-sewn in place. Second from the left is Aramid Rigging's LoopIt, which has a spool (or bobbin) to permit splicing a halyard or sheet in the large groove in the spool. Note in the smaller groove the shiny head of the stainless pin that holds the fixed end of the loop inside the spool. Aramid calls this configuration 'pinned.' The notion of using a loop to encircle something is not new. Also shown in this photo are grommets (pronounced 'grummits') made of manila rope. Grommets of all kinds, big and small, were used as strops to lift or secure anything from spar fittings to whale oil barrels to the captain's gig... or for the block straps so often seen in photographs of old sailing ships. These two manila grommets are used just to illustrate the other two configurations for these new 'shackles'. The smaller grommet is in what Aramid Rigging calls a 'basket' configuration; the larger one is rigged on a varnished belaying pin, just to show how the 'choker' works.

Depending on how it's rigged, the safe working load of the Yale Loup, which is made of 9 mm to 21 mm line in stretched-out lengths from 4" to 24", ranges from 3,604 to 44,100 pounds. Yet they weigh from a half ounce to 4 ounces, about a third of the weight of stainless shackles of equivalent strengths...and that doesn't count the weight saving from eliminating the posts on the blocks.

The Yale Loup is, of course, a closed ring. To affix one to a block, the block must be dismantled. For padeyes and other applications, the Loups must to made in place.

The rigging variety has given rise to some new terms. A Loup can be rigged vertically (just stretched out), as a "basket" (doubled), as a "choker" (looped back on itself), or "boned," which means with a pin. The photo

and caption above might make that clearer.

Yale Loups, simple but labor intensive, range in price from about \$25 for a little half-ounce 9 mm version, 4" long, with a basket safe working load of 7,208 pounds, to \$45 for a 21 mm, 10" long model with a basket SWL of 44,100 pounds. Pretty stunning, no?

EquipLite Shackles

On the other side of this little sphere on whose surface we swarm, a professional engineer named Don Curchod was noodling. After spending 25 years working in the United States, Curchod had returned to Sydney, Australia, for his retirement years.

Unable to tolerate idleness, he got thinking about using what he calls the "superbraids" to "overcome the weight and cost problems in metal boat hard-



Shown here are four EquipLites, the innovative rope shackles developed in Australia and imported to this county by Hall Spars. Note the hook-and-loop straps on each. At left is a medium size EquipLite, affixed to a halyard, with the hook-and-loop open. Next is a large version, shown closed and locked with the hook-and-loop strap. Second from the right is the model that, with a sheave mounted on the spool, provides a two-block system. At the far right, shown open, is the swiveling version. It doesn't swivel very well. Across the bottom is an EquipLite dismantled to show the double-tapered pin used to secure one end of the loop. The aluminum pin settles into a recess in the spool.

ware." After a year or two of prototypes, he came up with what he now calls "EquipLites," which, until you see one, is difficult to explain.

Let's try: An EquipLite is a loop of exotic line with the ends cold-fused, one end of which is inserted and secured in an aluminum double-spool (or bobbin, as Curchod calls it), one groove of which engages the other end of the loop, with the other groove for splicing to a halyard, sheet, etc.

Right? Please see the photo above.

Curchod said he tried "to no avail" to interest Lewmar, Harken, and Ronstan in his idea. So he formed his own company, filed for a patent, and hit the market about a year ago. He now has five employees and has sold "well over a thousand" EquipLites, which, while substituting for shackles, swivels, and deck loops can give weight savings of 65 to 90 percent. He also attracted a very prestigious U.S. dis-

tributor—Hall Spars & Rigging in Bristol, R. I.

Although priced at near the cost of equivalent stainless hardware, EquipLites are not cheap. They go for \$65 for a small one (.2 ounces) with a breaking strength of 5,000 pounds, and \$279 for a biggie (5.6 ounces) that'll take 55,000 pounds.

Curchod makes other versions, including a two-block arrangement, a swivel version, etc. (See photo.)

An Explosion Called UHMW-PE

The industry making ultra high molecular weight polymers, spun into fine fibers, seems to be exploding—every week.

A good example is DSM (we know not what the acronym stands for), a Dutch company with 20,000 employees scattered in plants and offices in 40 countries.

Although polyethylene filament has been around since the 1930s, it has been only in the last few years that chemists figured out how to manipulate its molecular structure. In effect, they make all the tangled molecules line up in one powerful direction. In liquid form, the goop often is called a liquid crystal polymer.

DSM worked out gel-spinning machinery that throws the fiber out at high speed. The company now is making the fiber, which it calls Dyneema, at a 2,000-ton-a-year rate. The business is expand-

ing so fast that DSM sold off its other petrochemical operations.

DSM has some sort of agreement with Honeywell, which makes the fiber called Spectra, and Toyobo, a Japanese company that makes a new fiber called Zylon. Another Japanese company, Teijin, Ltd., even makes a fiber called Ecopet, from recycled plastic bottles. There you go!

It's unclear whether some or all of these fibers are virtually the same or simply chemically different, but they do have somewhat different properties. The companies involved tend to be very close-mouthed.

DSM announced a couple of months ago that its Dyneema is being used by a California company that fabricated the first FAA-approved bulletproof cockpit door for Boeing 737s and 757s, and then for airliners made by Bombardier, Embraer, and McDonnell Douglas.

Even more recently, DSM an-

nounced that a "felted" type of Dyneema has been developed for use in bulletproof cars. Shaped panels made of the material are a tiny fraction of the weight of steel.

DSM's Dyneema already has gone through a half dozen improvements, primarily meaning stronger fibers, but also with different properties. There's the multipurpose SK50 to SK60 series, and now the SK70 series. SK75, which is being used in Australia to make EquipLites, is a high-tenacity variety. SK 76 is an energy absorbing/dissipation type used for bullet-proofing. There's even a fragment-resistant tent being made of a Dyneema called "Fraglight." It's a strange world out there.

For an example of the myriad uses to which UHMWP fiber is being used, see the Chandlery item on page 15.

As an innovator, Curchod has had some developmental problems. When it was explained that a maker of conventional shackles had told *PS* that the flanges on EquipLites tend to bend out of shape, a Hall Spars spokesman nodded affirmatively. No doubt, this is being ironed out as we type.

At this point, the plot thickens. Aramid Rigging has a device that is almost an exact duplicate. Aramid calls it a "LoopIt"—a ring of Dyneema with a Spectra sleeve and an aluminum spool with two grooves. So far the LoopIt comes in but one size—a 20,000-pounder for about \$100.

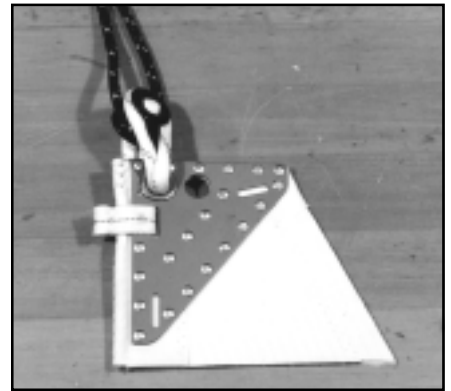
Brian Fisher said that Aramid had the same problem with the LoopIt spool flange bending as Curchod and Hall had with the EquipLite, but solved the problem by beefing up the flange and using a superior grade of aluminum. Further, to avoid the problems experienced by Curchod in securing the fixed end of the loop in the hole in the spool (he tried gluing and an enlarged socket seat), Fisher said Aramid went directly to a cylindrical metal pin in the spool.

Although a piece of hook-and-loop

tape comes attached to each EquipLite to make sure the loop doesn't inadvertently fly open, there's no such need with a LoopIt, whose grooves are deeper.

These weight-saving gadgets are fast popping up on big racing boats. If you watch the America's Cup coverage on cable television, you'll occasionally catch a glimpse of one.

They're a bit strange to look at, but eminently utilitarian. Price aside (and they should come down in time), it's the light weight that is alluring. Almost as sure as the rising sun, they'll soon appear on chandlery shelves and on stock cruising boats. And they are further testaments to the eventual fate of steel I-beams, H-beams, girders, trusses... ■



Shown here is Aramid Rigging's LoopIt affixed to the grommet in a mainsail headboard. The LoopIt is twisted slightly to better show how it works, and a halyard is fitted but not spliced in place. This Valiant 47 headboard was obtained from Tom Braisted, service manager for the Hood sail loft in Middletown, RI.

Aramid Rigging, 401/683-6966, www.aramidrigging.com

EquipLite, 02 9974 6645, www.equiplite.com

Esmet, 800/321-0870, www.esmet.com

Hall Spars, 401/253-4858, www.hallspars.com

Harken, 262/691-3320, www.harken.com

Navtec, 203/453-9878, www.navtecnorsemangibb.co.uk

Sta-Lok, 800/458-1074, www.stalok.com

Yale, 207/282-3396, www.yalecordage.com

Long-Lived Line?

These notes come from Editor-at-Large Nick Nicholson, who's in New Zealand as an official measurer at the America's Cup. See his sidebar on composite rigging in the "Offshore Log," December '02. This is a continuation.

One downside of composite rigging is its unknown lifespan. The obvious weak points of steel rigging—fatigue at terminals for rod rigging, and the potential for corrosion or damaged wire during installation for wire rigging—go away with continuous-fiber composite standing rigging.

Steel rod and wire, however, have well-established cycle lives which make them extremely predictable and reliable for offshore

sailing. No one, to the best of our knowledge, has performed definitive cycle testing on composite rigging to establish its performance under real-world conditions over an extended time.

In a period of boredom during a long light-air downwind passage across the Pacific, I once estimated that we went through about 180,000 rig loading cycles on a 3,000-mile passage. I never worried about our wire rigging on *Calypso*: It's set up very, very tight to minimize shock loading during cycling. I don't know how I would have felt with composite rigging in those conditions.

As with most bits of sailboat gear that offer big weight savings, composite rigging isn't cheap. As part of my job with the America's Cup Class tech-

nical management, I'm helping to explore avenues for development within this cutting-edge class, including allowing the use of composite standing rigging. While we're still waiting for definitive quotes, our best estimate is that composite standing rigging would be somewhere between 1.5 and two times the cost of the conventional, custom-sized steel alloy rod currently used.

In a game where mainsails cost \$75,000 and a spinnaker costs as much as a very, very nice car, who's counting?

It won't be tomorrow that rope replaces wire or rod rigging and machine-swaged fittings on the typical 35-footer. But it won't be very long from now, either.

Practical Sailor Subscription Service

Three Ways to Contact Practical Sailor

1. Log onto our website: www.practical-sailor.com. As a registered web user, you can check your expire date, payment status, update your mailing or e-mail address, renew your subscription — online, any time, day or night.

Simply click on **Subscribers Only**, then click the **Customer Service** or **Renew** button.

2. Email us your subscription question at: pracsailor@palmcoastd.com.

3. Mail this coupon (or a photocopy) to:

Practical Sailor
P.O. Box 420235
Palm Coast FL 32142

To change your address, attach your present mailing label to this form and enter your new address here:

Name _____

Company _____

Street _____

City _____

State _____ Zip _____

E-mail _____

To order or extend your current subscription, enter your name and address above and check the subscription term you prefer:

- One year: \$69
- Two years: \$119

These rates are good in the U.S. only. In Canada, 1 year CDN \$87, 2 years CDN \$147. For all other countries, 1 year US \$84 (air), 2 years US \$168 (air).

JHRG Supreme Protector Gear

About a year ago (how times flies) a *PS* reader named Dan Nathan e-mailed to offer some ideas about chafe guards, and we fell into conversation about his company's products. He sent us some interesting demo units.

Nathan is the vice president of a small company that is primarily engaged in making body armor out of UHMW-PE. (That's for "ultra high molecular weight polyethylene." It's better-known by names like Spectra, Dyneema, etc. See sidebar, page 13, for more on that.)

The 12-year-old company, called JHRG (for the four individuals who own it), is in Spring Hope, North Carolina. There are from a dozen to 80 employees, depending on the status of government contracts. (It recently finished making 14,000 flak jackets for the U.S. military.)

The company also makes nets (they call them "cargo restraint curtains") for positioning cargo in commercial airplanes; hovercraft skirts; and the fanciest aprons you've ever seen—for use in the slaughterhouse business. (To meet safety regulations, butchers used to wear segmented metal aprons whose construction resembled medieval armor. The meatcutters hated them. The lightweight UHMW-PE aprons suit them fine.)

Nathan's products are made of cloth woven from UHMW-PE, and stitched together with UHMW thread developed by JHRG. The cloth is called "Supreme Protector." With a breaking strength of 1,000 lbs, per linear inch, the stuff is pretty nearly indestructible, at least by mere force. To make the material impenetrable, especially to water, Nathan's company has patents for coatings of EVA (ethylene vinyl acetate) and PE (polyethylene).

As is well-known to those dependent on government contracts (or on the hovercraft skirt market), if you want to even out the peaks and valleys, you need to diversify. Four of Nathan's efforts in this direction will be of interest to his fellow sailors:

1. A fabric anchor-sentinel bag. Filled



Above: the anchor-sentinel bag. Note drain holes. Left: the utility bag can carry a load of tools. Below it lies a 'cranked' hammer owned by Dale Nouse. Best not to ask.

with chain, divers' lead weights, grapefruit-sized rocks, or anything else heavy, it can be slid down an anchor rode to reduce catenary and achieve a better rode angle to the bottom. 2. A chafe guard to slip over docking lines, fastened lengthwise by hook-and-loop strips. 3. A spiral version of the chafe guard, to protect an anchor rode or mooring line. It's made with ties at both ends. 4. A lightweight, rot and mildew resistant fabric bucket.

The four items, now at the go-to-market stage, are ready for submission to those whom Nathan considers the best testers in the world—*Practical Sailor* readers.

The anchor sentinel bag and fabric bucket are priced at \$29.95. The sleeved docking line chafeguard, available in 18" and 24" versions (don't try to cut it to fit; can't be done) is \$14.95. The anchor rode version, which is 24" long, is \$19.95. Everything is postage paid. If you want a bulletproof vest, they cost from \$500 to \$1,500—in large lots only. ■

JHRG, 800/849-4997
www.hsarmor.com.

Aluminum-Stainless Corrosion

I have a problem with my pedestal steering mount. I have to move the instrument-mounting arms. I removed the securing screws, but the arms won't budge. They're immobile, even resisting taps with a rubber mallet. I suspect the cast aluminum arms and the stainless guard have developed the dreaded dissimilar metal reaction fostered by the salt environment. My research has not produced any information on a reasonable way to free the bond. Do you have any suggestions or pointers? Clearly, WD 40 is not an answer.

Paul Souval
Via e-mail

But time and patience can help. At least that's been our experience.

Sometimes called hydrogen embrittlement, electromechanical, electrochemical, intergranular, stress or galvanic corrosion, the bonding of dissimilar materials costs the industrial world billions of dollars a year.

With refined metals, it occurs when two alloys (one anode, one cathode) come in contact. Add moisture (an electrolyte) and things really go to hell in a hurry. The metal that is the anode (the least noble) suffers most.

Nobody seems to know what the white stuff is... maybe pure atomic particles in a mash you could use to improve on Jim Beam's Kentucky Straight, maybe an oxide, chloride, bromide, or Gorilla Glue.

For an answer about what to do about it, we crawled around the Internet; pored over encyclopedias and our treasured Machinery's Handbook (25th edition yet, with a marvelous 72-page index), and called a couple of metallurgist friends. Everybody seemed to know how to prevent it, via insulation with lubricants or hard coatings of various kinds, or by providing cathodic protection. But nobody seems to know how to attack, dissolve or soften the white stuff.

The metallurgists said they had had success, as have we, by applying a penetrating oil, perhaps thinned with kerosene, or just plain kerosene—or maybe Liquid Wrench, which we

...ON THE HORIZON

Fixed-Mount GPS Plotters: We look at some of the reasonably priced color plotters. The decision whether to go with one of these or a notebook computer-based charting solution is always difficult.

Topside Paints: It's been a little over a year (time flies!) since we applied the "bracelet" of do-it-yourself paints to the old Boston Whaler. Time for a close inspection.

find works a good deal better than WD-40 for jobs like this...and just waiting, waiting, waiting... and reapplying as many as a half dozen times over a couple of weeks. Tapping with a rubber mallet each time helps.

Sooner or later, the joint will soften and come free. The next problem may be dealing with the damaged surfaces where the aluminum and the stainless tried to get married, but, alas, made a mess of it.

Cuprinol, Anyone?

Having owned and worked for more than 40 years on wooden boats, I am disturbed by the apparent current unavailability of dry rot inhibitors. It seems that the dominance of fiberglass has relegated wooden boats to the backwaters. For many years, Cuprinol® was the standard treatment, and it worked fairly well if properly applied. Later, a tin-based product called Halts appeared and was very effective, but soon was banned by environmental laws. I don't know that Cuprinol has now been similarly banned, but it is no longer generally available. Are there now any prod-

ucts that can help preserve our heritage boats?

Bill Zieman
Wilton, Connecticut

Cuprinol is still legal and available. Its active ingredient is copper naphthate, as opposed to chromated copper arsenate, as in arsenic, as in much of the pressure-treated lumber on the market. The EPA is setting new regulations and prohibitions on certain uses of chromated copper arsenate starting on January 1, 2004, but it seems that boatbuilders will be exempted. You can get Cuprinol from Jamestown Distributors (800/423-0030) among other places.

Cuprinol #10—the green stuff for use on wood exposed to water—sells for \$24.82 a gallon. The clear version (#20) is not the stuff you want.

And there's still Git-Rot, sold by BoatLife. It's a 2-part epoxy that's drawn into rotten wood by capillary action and then sets up hard in the usual fashion. At \$15.00 for 4 ounces, \$28 for a pint kit (BoatU.S. prices) you wouldn't want to tackle a big "turn-it-to-stone" job with it.

**Practical
Sailor** 

Periodicals Mail