

Practical Sailor



Bottom Paint Test

PS sinks a new batch of bottom paint panels and rates current contenders.

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Farewell to Skip Allan's *S/V Wildflower*

Anyone who has ever run before a gale knows how exhilarating it can be. On the right boat, in the right conditions, the adrenaline rush is as intense as any we'll feel in this world. Bull riders, surfers, and skydivers get a few seconds of excitement. An ocean gale can last for days ... and that's where the problem lies.

With your senses completely in tune with the boat, wind, and sea, the experience of hurtling down an ocean wave stirs the soul. But as the hours pass and day turns to night, the thrill gives way to exhaustion. Mostly, you're too busy to be afraid, but each mountain of green water that fills the cockpit brings doubt. How high will these waves get? How long can I last?

Even with a drogue streaming off the stern to slow down the boat, running before storm-driven waves entails a great deal of risk. There's danger enough aboard a fully crewed boat, as the rig, sails, and steering gear get pushed to the brink.

For the singlehander, the situation is especially precarious. Few autopilots or self-steering vanes can be trusted in a breaking stern sea. A single gear failure can spell doom. Once you have committed to this course, any attempt to change tactics can be disastrous.

In our June and July issues, noted single-handed sailor Skip Allan shared his insight into gear selection and tactics for solo racing and cruising aboard his 27-foot custom, Tom Wylie-designed sloop, *Wildflower*. Shortly after we published the second installment, Skip won the 30th Annual Singlehanded Trans-Pacific Race by a wide margin, covering the 2,120 miles from San Francisco to Honolulu in a corrected time of 10 days and 21 hours. Thirty years after his second-place finish in the inaugural race, Skip had taken care of—as he put it—“some unfinished business.”

Last month, on his return trip home, a seven-day gale planted itself between *Wildflower* and the California coast. Two days into the storm, Skip had problems with his drogues—his first broke, and the backup had a tendency to collapse and lose its bite. Running before 30-knot winds, *Wildflower* was being repeatedly knocked to 70 degrees on her beam. As the gale showed no signs of abating for days, Skip imagined it was only a matter of time before the huge seas, 12-foot breakers atop 30-foot crests, overwhelmed the boat's tiller pilot.

Thinking of his parents who depend on him back home in California, Skip made the difficult

decision to ask for assistance. A few hours later, a container ship bound for Los Angeles plucked him off *Wildflower*. Before scrambling up to the pilot's ladder, Skip pulled the engine intake hose off its open through-hull and scuttled the boat. The stout little fin-keeler that Skip had built, and his partner for 34 years of racing and cruising, scraped down the side of the ship's hull and went under the stern. Through tears, he watched it go.

Skip provides a detailed account of his experience on the SHTP race's online forum at www.sfbayss.net/. Given his long and storied career as a sailor, and his intimate knowledge of *Wildflower*, there can be no questioning his choice, one of the hardest that any sailor must make. But however sad it is when a sailor loses a cherished boat, it is far more tragic when the world loses a good sailor. *Practical Sailor*, and so many others, are thankful that Skip is still with us to continue to share his experience and wisdom.

Darrell Nicholson
Editor

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On the cover: The newest crop of antifouling paints are carefully applied to fiberglass panels for in-the-water testing. Photo by Al Herum.

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MAILPORT



Photo courtesy of Tom Wetherbee

SPOT-ON REPORTING

Your recent assessment of the locator service SPOT (*PS* September 2008) was spot on. We recently took it along on a Pacific Coast, offshore delivery of a 50-foot sailboat. We hit bad weather and had several mechanical failures. Our families ashore were able to follow our progress on the SPOT website throughout our trip.

The problem came when a panicked crew, unknown to me, hit the “911” button. I was able to cancel the 911 call a few hours later. Our families were simply alerted that we had a serious problem but did not know anything more for a couple days. The SPOT command central repeatedly called my cell phone, which was with me, 250 miles offshore and obviously out of range. They claimed they could not determine our position despite several days of track records.

Once I returned to cell-phone range and safety, I called to update the folks at SPOT. I reached an answering machine and never heard back from them. When I called the company to talk to a decision-maker, I was forwarded to “customer care,” which responded with a rehash of the unit’s features and benefits and had no interest in my insights. I will be switching to an EPIRB for future trips offshore.

Dan Bessmer
Cal 34
Tacoma, Wash.

SPOT ACROSS THE ATLANTIC

I made a Trans-Atlantic crossing in May and June of this year on my Jeanneau 43 DS, from Florida to France, and I had onboard both an



Reader Tom Wetherbee’s lovely wooden cutter, which he and his brothers built, soaks up a Lake Michigan morning in Beaver Island’s Paradise Bay. Tom adds another tip to reviving a Garmin GPS48 unit on page 5.

ACR GPS EPIRB and a SPOT device (*PS* September 2008). The crew religiously “pushed the button” on the SPOT device every change of the watch, and we were thereby able to keep our friends and family informed of our progress along the way. They greatly appreciated this information—except during one 22-hour period between Bermuda and the Azores, when we were out of range of the SPOT satellites. (One of our friends got a SPOT engineer out of bed to explain that there are some “dead spots” in the SPOT coverage.)

Overall, I thought that it was definitely worth the \$250 that I spent on it for the trip. I will wait until next year to see whether I renew the service, but I cannot fault the service I received on this trip.

Ralph Caruso
S/V *Petillan*, Jeanneau 43 DS

METAL BOATS

I am near to purchasing my first cruising sailboat. I have been reading everything I can find to ascertain which boats will be a good match for my goals. I will be a coastal sailor initially, and if I

enjoy it as much as I have while chartering, I may go offshore.

I acquired your two-volume guide “Practical Boat Buying” to help me choose. I noticed that not one of the reviews of boats in the upper 30- to 40-foot range are made of metal, why is this?

Dave Rose
Bend, Ore.
Via e-mail

PRACTICAL SAILOR ONLINE

Sailing south this fall? Planning to replace your keel bolts? Or looking for a freshwater bottom paint? Click “Tools and Techniques” on our website, www.practical-sailor.com, and you’re on your way. In “*PS Advisor: Keel Bolts*,” former Tartan Yachts project engineer Bill Seifert discusses the details of a replacement project. Our last freshwater bottom paint test and teak caulk test complement this month’s maintenance articles. And, Nick Nicholson’s account of his passage to Bermuda, “*Offshore Log: Bermuda-bound Trial by Water*,” offers insight into the challenges of a bluewater shakedown.



Cabo Rico advertises the use of "tinned" wire aboard its boats. Seen here is the back of the electrical panel for the Cabo Rico 42.

Most metal boats, principally made of steel or aluminum, are custom-built in small numbers, and we generally don't review custom-built boats. Unless you don't mind taking a financial hit on a possible resale, we would not recommend a metal boat for someone who is sticking their toe in the water. Steel boats in particular will depreciate quickly and can be hard to resell in the United States. They have a stronger following abroad.

There is no question that a well-made metal boat can make an excellent choice for a cruising boat. If you are dead set on a custom-built cruiser, it can be one of the most economical options. Regardless of whether you are commissioning a new metal boat or buying a used one, it is essential to work closely with an expert surveyor. A good source of information on metal boats is the Metal Boat Society, www.metalboatsociety.com, which also publishes a quarterly newsletter.

TINNED WIRING

I was surprised to read the *PS* response to a letter ("Tinned Wire Myth Busted," *PS* July 2008) questioning the use of untinned wire in a sailboat. It appeared to me to miss the point.

It might be true that some true "boat cable" uses untinned wire (although most of it uses tinned wire), but most untinned wire is

not boat cable. The writer was right to question the use of untinned wire in his boat.

Boat cable has to meet certain standards for moisture resistance, fire retardance, resistance to oil and chemicals, and copper strand construction. The use

of wire that is not boat cable, and in my opinion, is not tinned boat cable, is pure folly.

Quent Kinderman
S/V *Clairebuoyant*, Pearson 424
Annapolis, Md.

Reader Steven Krenz asked whether he should rewire a newly rewired Catalina 25 because the new wire, which was otherwise in excellent shape, was untinned. Our "don't replace" response and the explanation generated quite a buzz. Thank you for giving us the chance to clear things up. As stated in our reply to Mr. Krenz, more expensive tinned wire will resist corrosion better. The response was not meant to imply that cheap, poorly insulated, and undersized wire was fit for marine use. If you are re-wiring your boat or buying a new boat, you will get added protection with high-quality "marine grade" tinned boat cable. However, there is no need to start yanking out perfectly good un-tinned wire that otherwise meets acceptable standards for insulated conductors. The American Boat and Yacht Council cites several standards as acceptable minimums, the most

common being UL Standard 1426 for boat cables. UL style BC-5W2 offers the added protection of higher heat rating (105C dry, 75C wet), and the more flexible Type III is preferable to Type II. These ratings should be stamped on the insulator jacket. Another point we wanted to emphasize is that the best wire is no substitute for careful attention at the terminals. Four of the boats we use for testing are doing just fine with untinned wire ranging in age from 13 to 22 years.

BLUE SKY SOLAR CHARGER

Based on your recommendation, I purchased and installed Blue Sky charge controllers (*PS* August 2006) for my Sunware solar panels. Apparently, the controllers put out a fair bit of electrical noise, so much that the Mastervolt Mass Inverter Charger Control (MICC) would no longer read the shunt on the battery accurately. The MICC current readings were useless.

Blue Sky acknowledged the possibility of a problem and sent a set of noise suppressors. We installed these, but they did not address the problem. We finally removed the Blue Sky controllers and substituted Mastervolt solar charge controllers, and now the MICC is accurately reading the battery shunt.

Russ Irwin
S/V *New Morning*, custom 54-foot
Paine designed, Morse built
Sausalito, Calif. / St. Vincent



Solar Boost 3024i

Practical Sailor field tested the Blue Sky Solar Boost 3024i and Solar Boost 2000 in 2006. The units did have some radio frequency interference (RFI) issues but only on Marine SSB frequencies, and we have been

Photo courtesy of Tom Wetherbee

unable to duplicate your symptoms with either unit. (We have fielded another complaint about RFI in a different Blue Sky product that we have not tested or reviewed.) As more and more wireless products and electrical equipment developed for the RV and off-the-grid home market creep into the marine sphere, RFI is becoming more of an issue. We will address this topic in a future article and will offer suggestions on how to trace and correct problems.

In your case, if disconnecting your VHF antenna does not markedly reduce the noise generated on channels 9 and 16, then the interference is probably in the power supply wiring. You should be able to improve reception with clamp-on ferrite cores where needed. If disconnecting the antenna does reduce the noise, then it is radiating from the original source, and any attempt to reduce it with ferrite cores on the wires won't help.

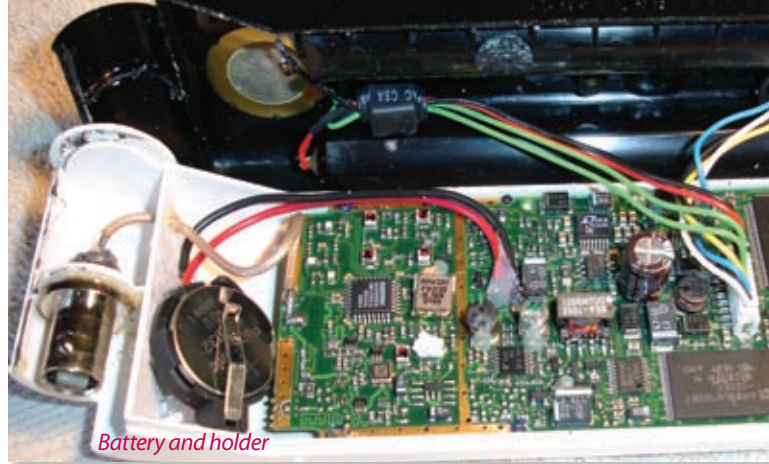
If you also have an energy

monitor, you may want to look at that. Others we have worked with have generated a fair amount of RFI. If disconnecting the monitor and the leads to the shunt quiets things down, then again, the heavy use of ferrite cores in these lines may help. Otherwise, we would consider the Link 10 monitor, which we know to be fairly quiet.

GARMIN GPS48 REVISITED

Thanks for Rick McLaren's write-up on replacing the Garmin GPS48 internal battery (Mailport, PS June 2008). I replaced mine but used a battery holder to avoid soldering directly to the lithium cell, and also to facilitate future replacement.

The parts required are available from www.digikey.com:



Battery and holder

Just add an inexpensive battery holder and a CR2032 battery, and your old Garmin GPS48 is good to go.

- BS-3-ND Battery Holder—68¢
 - P189-ND CR2032 Battery—28¢
- The total cost was under a dollar, not including shipping, two small pieces of wire, and a glob of silicone rubber.

Tom Wetherbee
Engineer, Wetherbee Boats
Halifax N.S., Canada

PRESERVING VARNISH

Adding to your discussion of preserving unused wood finish in last month's Mailport (September 2008), I've used a product called Bloxygen to get rid of excess oxy-

PRODUCT ALERT

SWITLIK LIFE RAFT VALVE RECALL

Switlik recently announced that it will replace all existing S-2630 inflation valves on its life rafts. The announcement was sparked by reports from two different life raft service stations that during annual performance inspections and testing, the valves had failed to operate properly and discharge the gas from the CO₂ cylinder into the life raft.

According to Switlik, the company inspected the valves in question and discovered clear signs of changes in the consistency of the O-ring lubricant and a degradation of the piston O-ring material. This resulted in the O-rings adhering to the pistons and valve bodies, causing the inflation valves to malfunction.

The company is replacing the faulty inflation valves with one that uses a different O-ring material and lubricant combination. While the instances and percentages of improper inflation system operation are relatively small, this issue directly affects whether a life raft will properly inflate.

Owners of Switlik life rafts with the S-2630 inflation valve must take the raft(s) to a service station for replacement. The service is free, but raft owners are responsible for getting the raft to the service station and for picking it up, the company announced.

For more information or to determine whether your Switlik



According to Switlik, some its SAR MkII life rafts—which PS reviewed in its last raft test (April 2007)—have the recalled valve.

life raft has the recalled valve, contact Switlik Parachute Co. at 609/587-3300. For a listing of service stations handling the valve replacement, go to www.switlik.com/stations online.



Our latest experiment with chemical coating removers pitted Technical Editor Ralph Naranjo against several layers of bottom paint as well as a 25-year-old epoxy barrier coat on his beloved Ericson 41, Windshadow (above). The results of that bout will be featured in a future issue of Practical Sailor.

gen in my partial cans of Interlux Schooner varnish and prevent them from skimming over. Spraying it into the varnish can is touchy; if you get the straw too close to the varnish it will splash the varnish out of the can. It's important to spray it at the metal insides of the can. It only takes about 70 squirts per can, and I still have about 60 squirts left in the one can I purchased two years ago.

At about \$10 per can, it is a cheap way to save expensive varnish. Bloxygen is available from many of the woodworker supply houses including Rockler and Woodcraft. I've also experimented using propane with a can of Pettit Captain's Varnish. Not a good idea.

Charles Boutell
Papillon, Boston Whaler Harpoon
Ephraim, Wisc.

REMOVING BOTTOM PAINT

We used Franmar Soy Strip last spring to strip three coats of paint from our 33-foot boat. The Soy Strip worked well in the somewhat cool weather. It worked better when less cool. We found that letting it dwell longer than 30 minutes didn't seem to help any. It was very important

to keep it moist. We lathered it on heavy and worked in 3-foot-square sections at a time. We applied one section, and while it dwelled, scraped off and wiped down the previously done section. The product was easy to apply and easy (if messy) to remove. The resulting glop was easy to dispose of safely.

Soy Strip did a great job in our case. The process was time-consuming and took some elbow grease, but was not especially difficult, certainly not noxious.

We were glad to find out about Soy Strip from *Practical Sailor*. It worked, but it was not a fun job.

Bruce Nelson
Via e-mail

With the rush of new eco-friendly paints to test (see pages 12-19), Practical Sailor undertook a number of paint-stripping projects this summer. One of the most ambitious involved a search for a chemical that would remove an epoxy barrier coat without harming the gelcoat. We will be reporting on this in a future issue.

MORE ON MEDICAL KITS

After using the Adventure Medical Marine kit aboard a vessel to Bermu-

da, I can confirm your conclusion that it is a good fit for most sailors. That kit has one overarching advantage: task packaging, which makes it more likely to be used quickly without a lot of confusion.

The article itself was a welcome read, but failed to point out that the typical physician would recommend prescription medications that would easily approach the cost of the base price of the Adventure kit. Therefore, readers should not be misled by your cost analysis: After-market add-on drugs are costly, and their shelf-life is fleeting. For instance, a pair of high-quality, wide-spectrum antibiotic regimens could cost upwards of \$200 at the pharmacy. The epinephrine kit is another \$100 or so. As well, more discussion is wanting about the liability of the skipper who uses prescription drugs to treat a crew person—drugs that the skipper can obtain ostensibly only for his personal use.

William Solberg, DDS
S/V *Wind Dancer*, T3800
Marina del Rey, Calif.

DIGITAL CHART BOYCOTT

The letter by Andrew F. Gillis in the August 2008 issue (Mailport), about updating electronic charts, was interesting. His suggested boycott cuts both ways, though, and the digital charts are just so nice to use. But an interesting point comes out from his discussion. We recently bought a chart-plotter that uses a C-Map chart from Jeppesen Marine. We bought it last February, with what should have been the latest versions of all of the charts.

This summer, we took the thing on a cruise off the coast of Nova Scotia. The chart happily showed us the characteristics of a light that had been extinguished three years before. Later, it had us sailing well inside the forest beside a narrow waterway, missing buoys on another part. Most of it,

though, was incredibly good.

Digital charts are really very good, but not perfect. This page is not up to date, that page has the wrong datum, and so it goes. Let's remember not to rely totally on any one aid to navigation. Keep your paper charts, and keep them up to date.

Emanuel Laufer
Ceol Mor, C&C 34

We've said it before, but it bears repeating. Practical Sailor receives many letters complaining about potentially dangerous errors in digital charts. Paper charts also perpetuate inaccurate data. As the technology evolves and the error-reporting system becomes more streamlined, we expect the situation to improve.

By reporting these errors to the chart makers, mariners can help. Digital charts are a terrific tool, but we've yet to meet one that replaces the utility, simplicity, and perspective of a paper chart.

BATTERY MONITOR

Regarding the article on the Xantrex XBM battery monitor (Chandlery, PS January 2008): Absolutely a dynamite little unit. I installed one in June 2007 before my summer cruise. It was just terrific having a little "gas gauge" for the batteries.

On the negative side, during the install, I had to deal with a diabolical terminal board on the back of the unit. It is designed to take very small wires, and you darn near have to be a qualified micro-

surgeon to attach the wire harness to it. I finally got 'er done but not before I reviewed every expletive in my vocabulary—twice.

By the way, I bought the XBM and about \$1,500 in other electrical upgrade equipment from Jackrabbit Marine. They were absolutely a delight to work with and highly recommended.

Mike Cunningham
Jacqueline, Freedom 30
Stockton Sailing Club, Calif.

Practical Sailor welcomes letters from our readers. Please include your name, home port, boat type, and boat name. Send e-mail to practicalsailor@belvoirpubs.com and mail to Practical Sailor, 7820 Holiday Dr. S., Suite 315, Sarasota, FL 34231.

WHERE CREDIT IS DUE

GARHAUER

I am a long-time reader of your magazine, which has been very helpful to me and my boat partner, Olga Berde, over the years. We are the original owner's of a 1982 Cherabini-design Hunter 37 cutter-rigged sloop. Being a strong believer in giving credit where credit is due, I want to bring to your attention a very satisfactory interaction that I had with Garhauer Marine Hardware Corp. in California.

I had dealt well with them in the past. As I was very satisfied with the rigid boom vang I bought from them two years before, I called on them again when it was time to replace the mainsheet traveler on our boat.

I ordered the traveler after the fall sailing season last year and sent them the original traveler to use as a template so that its replacement would be easy.

Unfortunately, when the traveler arrived, I found that the pre-drilled holes did not coincide with the holes on the boat. I immediately explained this problem to the operation's manager (Guido) at Garhauer Marine. He made the appropriate corrections and sent me a new traveler, which arrived the very next



Garhauer boom vang

week, at no additional cost. The replacement fit perfectly. I have no hesitation in using Garhauer hardware in the future.

P.C. Wicemghe, M.D.
Hunter 37
Staten Island, N.Y.

made arrangements for a hassle-free sea-anchor upgrade. I highly recommend purchasing goods from a company that will quickly resolve issues with a simple phone call and zero paperwork!

Jason Trautz
S/V YOLO, PDQ 42 Antares

MORNINGSTAR SOLAR

I recently installed a MorningStar Sun-saver Duo solar regulator on my Alberg 37, however, the backlight on the separate remote meter readout was barely visible. I called the vendor from whom I purchased the Sun-saver Duo, and the staff suggested I call MorningStar.

A MorningStar representative told me that there were some production problems in 2007 and that the company would ship a complete new 2008 unit of both the regulator and remote meter to me. Two days later, the new meter arrived, along with a return shipping label to send the old unit back. An excellent and responsible company.

M.J. Mintz
Alberg 37
Washington, D.C.

SEA-TECH SEA ANCHOR

I purchased a Sea-Tech Sea-Anchor about a year ago. It remained in my aft locker during my recent passage from North Carolina to Trinidad. During a discussion with a boat owner who had a catamaran similar to mine, it was discovered that the salesman at one of the most popular marine retailers in the U.S. had sold me an undersized sea-anchor. A quick Skype call to Sea-Tech confirmed the mistake. The owner of Sea-Tech



Folding-transom RIBs

The Walker Bay Genesis 310 FTD soared to the top in terms of performance and features, putting it closer to the fixed-transom RIBs compared in our July issue. At a hefty 135 pounds, it also is closer in weight to the fixed-transom fleet.

These RIBs fit the bill for those with limited stowage on deck.

Practical Sailor corralled 11 lightweight rigid inflatable boats (RIBs) in the 10-foot range from seven manufacturers. We separated them into two groups—boats with rigid or fixed transoms and those with folding transoms.

In the July 2008 issue, we introduced eight rigid-transom boats, with the Achilles HB315-LX earning *Practical Sailor's* Best Choice title. The transoms and decks of those RIBs had the strength and stiffness needed to withstand the weight and thrust of four-stroke engines with 10 horsepower or more. The transoms also provided sturdy attachment points for eyebolts for lifting and lowering the boats on davits. But—and there's always a "but" when talking about boat design—many of these boats were too heavy to easily launch and stow on deck. Even with the help of a halyard, a dinghy weighing

more than 120 pounds makes deck stowage a back-straining chore for a two-member crew.

The fixed-transom boats we tested averaged 132 pounds, while two of the three folding-transom models we review here weigh just over 90 pounds. The third foldable-transom RIB tested is something of an anomaly, and actually compares favorably with those in our fixed-transom test. The two-piece transom on the Walker Bay Genesis 310 FTD (Folding Transom Deluxe) stands sturdily when assembled but also folds forward for storage. Here's the "but": The boat weighs in at 135 pounds.

How much space can be saved with a folding-transom boat? About 6 inches in height. It doesn't seem like much, but it's enough to allow the necessary clearance for a boom, jib, or staysail on some boats.

WHAT WE TESTED

For this review, we tested the Walker Bay Genesis 310 FTD, Avon Rover 310 Lite, and the Zodiac Zoom 310SR. All measure 10 feet, 2 inches in length. At 5 feet, 5 inches wide, the Walker Bay is the beamiest and offers the most interior volume. The Zodiac is the narrowest, with a beam of 4 feet, 11 inches, and has the least inside room.

Pricing differs substantially: The Avon comes in at \$3,300, the Zodiac Zoom \$2,000, and the Walker Bay \$3,900. All three boats come with zippered storage bags.

In the all-important weight category, the Avon (94 pounds) and the Zodiac (92 pounds) legitimately fall into the lightweight RIB category. The Walker Bay, however, does not. It's more than 40 pounds heavier. The test field includes two Hypalon RIBs and one PVC boat.

Hypalon vs. PVC

The fabric used for tube construction is usually categorized as either Hypalon (an elastomer developed by Dupont) or PVC (polyvinyl chloride, a plastomer). These terms generally refer to the outer layer of a multi-layer fabric, the part that sees the most wear and tear. Although neither material is immune to UV degradation, Hypalon stands up better to the sun's harmful rays. Pennel Industries' Orca material, which carries a 10-year limited warranty, is a common Hypalon-type fabric used in inflatable boats. Zodiac touts its PVC material, Strongan, citing the ability to thermo-weld (as opposed to glue) seams as a chief advantage. A five-year warranty is usually the limit on a PVC boat. An obvious advantage of PVC is its lower price. However, if warm-climate durability is a priority, a well-made Hypalon boat is worth the extra money.



The Zodiac Zoom (top) has tubes made of a proprietary PVC material, Strongan, while the tubes of the Avon Rover Lite 310 (bottom) are Hypalon.

(See "Hypalon vs. PVC," above.) It's less expensive to manufacture a RIB with PVC; this is evidenced by the Zodiac's lower price. The PVC boat has a five-year warranty, while both the Walker Bay and Avon are backed by 10 years of factory protection.

All three boats are designed to carry four people. The heavier Walker Bay can handle more horsepower—the manufacturer recommends 10 horsepower, compared to 8 horses for the other two dinghies.

AVON ROVER 310 LITE

Like its rigid-transom sibling, the Rover 315, Rover 310 Lite is also the most expensive among its test group, with a price tag of nearly \$3,000. Injection molding keeps the hull light and strong. *PS* testers liked the pivoting carrying handle at the bow. The Hypalon straps on the top of the tubes aft could be larger and padded, like on the Walker Bay, in our opinion. The boat has a secure means of holding the oars on top of

the tubes. Hypalon Straps hold the paddles, and elastic hooks secure the handle ends of the oars.

Nonskid covers the deck, which is flat aft and V-shaped from amidships forward. Four raised buttons fanned around the bow of our test boat are attachment points for an

optional dodger. The boat had only one lifting ring—on the forward portion of the deck.

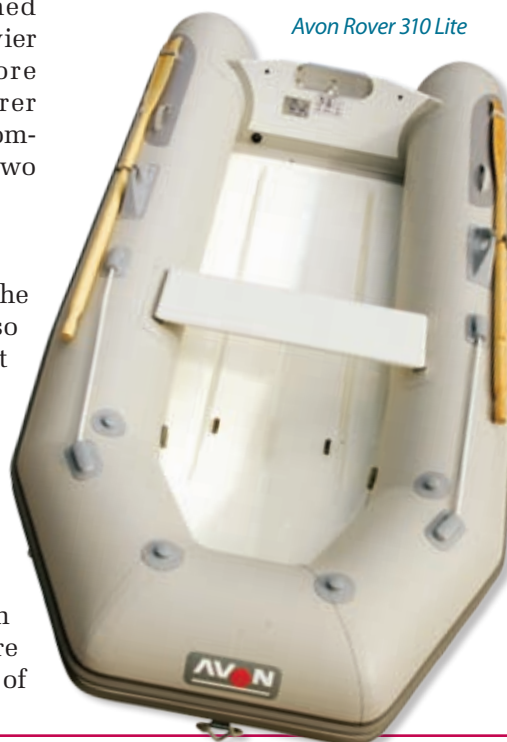
The drain plug was in the starboard corner instead of on centerline. And it is raised a good inch above the deck.

The rubrail is as thick as they come. Keeping with the light-is-right theme, this boat lacks forward storage. The aft section of the hull bottom is flatter than the Rover.

The Avon could be maneuvered easily at low speeds and in reverse. It also jumped up on plane quickly—6 seconds. The 310 was pretty fast, hitting 20.5 mph at full blast—3 mph faster than the Walker Bay. On the downside, the Avon skidded noticeably in high-speed cornering, and our testers reported that it was "very bouncy" during its sea trial.

The boat's molded oar locks failed to hold the oars very well. Testers managed to pop the oars out of the locks several times during their rowing exercise.

Bottom line: The Rover 310 Lite's strengths are its light weight, speed,



Taking the Dinks for a Spin

Practical Sailor testing was done in two stages. First, the boats were inflated to their specified air pressure and examined closely. *PS* examined grab and carrying handles, oars, lifting rings, seating, storage space, drain-plug design, rub strakes, nonskid, and towing eyes. Testers also looked at the transom design and construction. Each boat was folded and stowed in its respective bag twice.

For on-the-water testing on Sarasota Bay, Fla., the test motor was a 9.9-horsepower Mercury four-stroke, which we rated highly in the June 2007 issue. *PS* recorded each vessel's top

speed and time to plane with two passengers with a combined weight of 350 pounds. If performance seemed less than optimal (slow to plane, etc.), the riders' positions were adjusted to achieve the best result, and this shift was noted. *PS* evaluated how each RIB handled at low and high speeds. Testers judged their ability to track while cornering at high speeds. Stability at high speed and the riders' comfort level also played a part in recommendations. How well the boats deflected spray when powering through a 1- to 2-foot wake was also noted. Finally, testers rowed each boat with the engine tilted up.

and 10-year warranty. If a folding transom and light weight are your priorities, this is a good pick. It earns a *PS* Recommended rating.

WALKER BAY GENESIS 310 FTD

PS gave a thumbs-up to Walker Bay's smaller 270 Genesis FTD in the December 2007 issue, so testers expected much of its big brother. The manufacturer has lined the aft portions of each tube with three padded handholds, which are quite comfortable on the hands. There are also three robust, hard-rubber carrying handles—one on the bow and one on top of each tube all the way aft.

The two aft lifting rings are bolted through the transom instead of secured to the deck, so you won't be stubbing your toes. The bow ring is attached to the deck, but out of the way.

The boat comes with only one towing eye, rather than the standard pair. However, Walker Bay claims the deep-V hull enables the boat to track straight

when towed by the single point. The boat's nonskid-covered interlocking deck and center seat can be removed, shedding about 40 pounds from the total weight. The job takes some practice, but the pieces can be assembled and disassembled with relative ease. Unlike the other boats (including the featured rigid-transom models), the Walker Bay's bench seat includes storage space. It also has a removable tray, two cupholders, and an aft grabrail.

Other extras include bow seat and forward storage compartments. The seat is wider than the other boats, too—about 14 inches, compared to about 10 inches for those on the other boats.

The drain hole is 1 inch in diameter, which is pretty big compared to those on the competition's craft. The plug has a locking lever, and our test boat had a lanyard to keep it on board. The rubrail is beefy, but it does not extend to cover the aft portions of the tubes.

Clocking 17.5 mph, the Walker Bay was not the fastest in the test fleet, but it was the most stable

and delivered the smoothest ride. Testers reported excellent control at both high and low speeds. The Walker Bay's mini trim tabs are meant, in part, to help the boat reach plane quickly, but our test boat took its time to get onto plane—11 seconds. This would likely be improved with the maximum 15-horsepower outboard. We tested with a 9.9-horsepower.

Bottom line: The Walker Bay delivers a solid, stable ride. Many of its features—additional storage space and plenty of handholds—compare more closely to some of the fixed-transom models in this size range. The warranty is good, too. However, there's no joy in manhandling 130-plus pounds onto the deck of a sailboat. At the opposite end of the spectrum from the Avon, the Walker Bay earns a Recommended rating for those who value ride over light weight.

ZODIAC ZOOM 310 SR

The Zodiac is the smallest, lightest, and least expensive in our group. It also takes up the least amount of space when stowed.

The only PVC boat in this trio, the 310 SR lacks forward handrails or grablines. It does have lines on the aft portions of the tube tops, so the driver—unlike the passenger at the bow—has something to hold. The manufacturer provides two hard-plastic carrying handles on the aft portions of the tube tops and one at the bow just below the rubrail. In the testers' opinions, the bow handle needs more meat.

Two gutters are molded into the

Walker Bay
Genesis 310 FTD





Zodiac Zoom 310SR

raised nonskid deck for drainage. The nonskid provides effective traction. The lifting ring at the bow is a potential toe-stubber. The test boat had no lifting rings at the stern and a relatively thin rub rail.

Testers liked the oar and lock design, which allowed the oars to be feathered. The drain plug, attached by lanyard, inserts from outside the hull.

With the driver's weight adjusted slightly forward, the Zodiac hopped on top of the water in 5 seconds. Maneuverability at low speeds was flawless, but at high speeds, the Zodiac was the testers' least favorite in terms of ride comfort, cornering, and handling.

At full throttle, the Zoom certainly lived up to its name. It was the fastest boat tested, reaching an eye-watering 22.5 mph. Prudence demands a light hand on the throttle when there's just one person in this boat.

The oars have large paddles, but testers said the oarlocks flexed too much to get a good bite.

Bottom line: The boat is light and pricing is attractive, but too many downsides—bumpy ride, no forward handholds, anemic rubrail—bump it back to third in this category.

PS VALUE GUIDE 10-FOOT RIBs with FOLDING TRANSOMS				
MODEL	AVON	WALKER BAY	ZODIAC	
MODEL	Rover 310 Lite	Genesis 310 FTD	Zoom 310SR	
*MSRP PVC/HYPALON	NA / \$3,300	\$3,200 / \$3,900	\$2,000 / NA	
WARRANTY	10 years	10 years (hull) / 5 years (PVC) / 10 years (Hypalon)	10 years	
LENGTH OVERALL	10' 2"	10' 4"	10' 2"	
LENGTH INSIDE	6' 8"	7' 8"	6' 10"	
BEAM OUTSIDE	5' 1"	5' 5"	4' 11"	
BEAM INSIDE	2' 4"	2' 6"	2' 3"	
TUBE DIAMETER	16"	17"	16"	
CHAMBERS	2	3	2	
PUBLISHED WEIGHT	94 lbs.	135 lbs.	92 lbs.	
MAX hp	10 hp	15 hp	10 hp	
RECOMMENDED hp	NA	15 hp	8 hp	
MAX LOAD	1,102 lbs.	1,364 lbs.	881 lbs.	
PASSENGERS	4	4	4	
STOWED DIMENSIONS	7' 5" x 3' 3" x 12"	8' x 3' 3" x 1' 1"	7' 1" x 2' 11" x 12"	
RATINGS	MAX SPEED	20.5 mph	17.5 mph	22.5 mph
	SLOW SPEED/REVERSE	Good	Excellent	Excellent
	HIGH SPEED	Fair	Good	Fair
	HANDHOLDS AND OTHER KEY FEATURES	Good	Excellent	Fair
	SEATING	Good	Excellent	Fair
	ROWING	Good	Good	Fair
Recommended		*Retail prices may be as much as 20 percent cheaper.		

CONCLUSION

The Walker Bay Genesis 310 FTD offers the most for the money, but it's heavy. The extra weight is a concern, but the boat's other strengths—ride quality, handholds, storage, Hypalon construction—cannot be overlooked. It's a Recommended choice among these three boats and the fixed-transom dinghies this size.

We like the Avon Rover 310 Lite's light weight and warranty. Even though it didn't excel in terms of performance and features, the boat is a good choice for those looking at folding-transom dinghies.

The Zodiac Zoom, with its lower price, is a good candidate as a moor-

ing tender for the budget-oriented sailor in a temperate climate. But if you want a full-time, far-ranging battle wagon, it's worth paying more for the Avon or Walker Bay.

CONTACTS

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Twice a year, Practical Sailor's bottom paint test panels are raised from the depths and rated. Before evaluating the paints' performances, testers sluice the panels with a bucket of seawater to clear any loose debris or growth.

Changing of the Guard

Old antifouling panels pulled as Class of 2008 paints put to work.

The number of marine antifouling paints on the market today is nearing the century mark. We just finished applying 72 paints to our latest set of test panels. Rather than many new, nationally advertised and marketed products, we are seeing paints targeted at specific types of boats or niche markets. A number of the new paints are aimed at specific regional markets.

While these niche paints should help simplify the task of choosing the right bottom paint for your needs, the result is often the opposite. To help alleviate consumer confusion, *Practical Sailor* publishes semi-annual reports and ratings for bottom paints. This report focuses on test panels that have been in the water for one year. On pages 16 and 17 is a discussion on another set, which has reached the end of its

two-year term. The newest crop of paints, including some experimental, copper-free concoctions (see story, facing page), will be covered in an update early next year.

Most of the information a buyer needs is in the tables on pages 14-17. The tables covering the one-year-old panels (pages 14-15) have been divided into hard and ablative/copolymer paints. The table for the two-year-old panels has been whittled down to the best 20 paints (page 17). If you are looking for the longest possible protection from hard growth, refer primarily to the story and tables covering the two-year paints. If you want the cleanest bottom for up to a year, the one-year table is a good guide.

Keep in mind that the highest-rated paint might not be the best for your situation. For example, if you plan to haul out and repaint every

year, opting for an expensive multi-season paint will be a waste of money. The paints we test generally fall into one or more of the following major categories:

- **Ablative** paints that wear away through use, exposing a fresh layer of biocide and reducing the build-up of paint.
- **Hard** paints that can be loaded with copper and resist scrubbing but build up in layer-cakes.
- **Single-season** paints that are formulated for seasonal boating.
- **Multi-season** paints that are aimed at year-round boaters.
- **Racing** paints that are slick or can be polished to a smooth finish.
- **Water-based** paints that are easy to apply and clean up and are less harsh on the environment than solvent-based paints.
- **Eco-friendly** paints that have low

California Testing Spotlights Copper Alternatives

With the rising cost of copper and increasing concern over the environmental impact of copper-based bottom paints, much attention is being given to the development of effective, copper-free antifouling alternatives.

Already this year, several paint manufacturers have launched new low-copper or copper-free products, and more are on the horizon. New technologies are being explored, and consumers are likely to see the fruits of this labor this fall and winter.

In Southern California, where bottom paints were identified as a major source of copper pollution in some harbors, legislation—including limits on the copper in antifoulants—has been developed to reduce the copper levels in those waters. In an effort to find suitable, effective alternatives to copper-based bottom paints—and thereby reduce copper pollution in the Shelter Island Yacht Basin—the Unified Port of San Diego has launched a two-year test of dozens of copper-free paints.

The project, funded through the U.S. Environmental Protection Agency (EPA), follows a test protocol very similar to ours, combining blind panel testing and real-world boat tests. Forty-six copper-free paints are being tested. They are divided into three categories: zinc coatings (18 products), non-zinc organic biocide coatings (four), and non-biocide coatings (24). Two copper paints, chosen because they are commonly used in the area, have been included for comparison: Interlux's Super KL, a high-copper, hard

paint, and Sea Hawk's AF-33, a low-copper ablative.

A number of the San Diego test paints—and a few in the 2008 PS test lineup—use Ecomea, a relatively new organic biocide touted as more environmentally friendly than metal-based antifoulants. More expensive than copper, Ecomea is used alone and in conjunction with zinc-based formulas to keep hulls fouling-free.

Pettit, Blue Water, Epaint, and Interlux are among the paint makers exploring Ecomea as a viable alternative to copper and other metal-based paints. According to Pettit, the company will launch two new Ecomea-based formulas next year: the copper-free Vivid ECO and the water-based Hydrocoat ECO, which is among the San Diego and PS test paints. This year, Blue Water plans to release its first copper-free line of products, Blue Water Shelter Island and Drivesleek (an aerosol), which will be zinc-omadine based.

Historically, PS's test have found that water-based and copper-free paints do not offer as prolonged protection as their more potent copper counterparts. However, we're anxious to see how the new Ecomea products and paints using new composite technologies fare in San Diego and in our own evaluations.

Results of the San Diego panel tests are expected to be released later this fall. Top performers will be applied to area boats next year. The project is set to be completed in 2010.

For more info on the Port of San Diego project, visit www.portofsandiego.org/environment/alternative-hull-paints.html.

or no metal-based biocides and low VOCs. (These are usually compatible with metal hulls as well.)

- **Bright color** paints.
- **Freshwater** paints.

There are other niches, but they aren't as relevant, in our view. Among the paints on the one-year panels, editors were able to flag at least one Recommended paint of each major type. In the two-year-old batch, some niche paints didn't make the Top 20 table on page 17, but the best two-year performers by type are listed at the top of page 16.

NARROWING YOUR CHOICE

A key step when choosing a paint is to check with the manufacturer whether it is compatible with the bottom paint last applied, or whether special prep work is needed. Several makers have on their websites compatibility charts and advice for mystery paints. If you plan to haul and relaunch, be sure the paint will not lose its punch during storage.

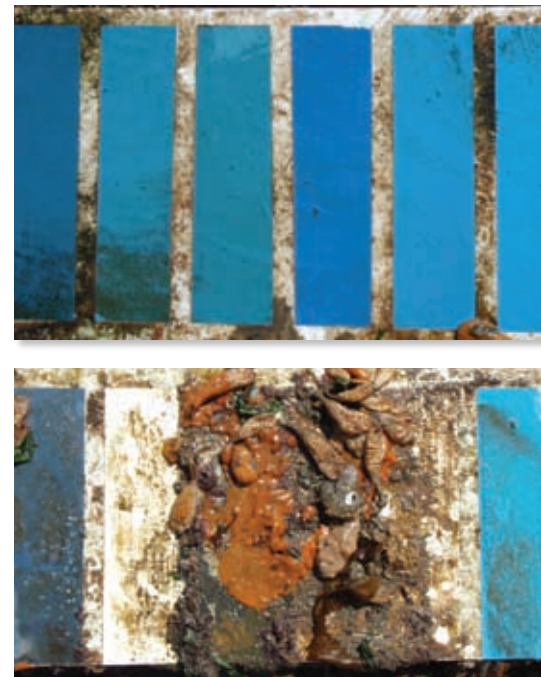
The choice between a hard or

ablative paint has less to do with effectiveness than with how the boat is used and maintained. Hard paints tend to have a smooth, tough finish that stands up well to frequent scrubbing or can be burnished for reduced drag. The downside to a hard paint is the build-up of paint layers over the years. Eventually, it will become necessary to strip off this old paint and begin again.

Ablative/copolymer paints wear away over time, exposing a renewed biocide-rich surface. Water friction promotes this process, so it works better if the boat is used regularly. These types of paints vary widely in hardness. Usually a pressure wash is sufficient prep for recoating, but some of the harder copolymer paints could require a hard sanding or even eventual stripping to maintain the bottom paint at an acceptable thickness.

HOW WE TESTED

Every summer, we paint two new sets of fiberglass panels. Panel and paint prep have remained the same for



Time certainly takes its toll on our test panels. At the one-year mark (top photo), most paints are in good shape and performing well. However, after two years, some resemble fabled sea monsters (bottom photo).

PS VALUE GUIDE ABLATIVE PAINTS at 1 YEAR (2007-2008)										
NAME	MAKER	PRICE PER GALLON	PRICE SOURCE	6-MONTH RATINGS		12-MONTH RATINGS		COPPER CONTENT	ANTI-SLIME AGENT	SEASON RATING
				FL	CN	FL	CN			
Copper Pro SCX 67	Blue Water	\$200	ipaint.us	Fair	Fair	Fair	Good	67%	Irgarol	Single
Copper Shield 45	Blue Water	\$120	ipaint.us	Fair	Good	Fair	Fair	45%	No	Multi
Copper Shield SCX 45 ✓	Blue Water	\$165	ipaint.us	Good	Good	Fair	Good	45%	Irgarol	Single
Copper Shield 45 Uno	Blue Water	\$80	ipaint.us	Fair	Fair	Fair	Good	45%	No	Single
Kolor ✓	Blue Water	\$170	ipaint.us	Good	Good	Fair	Fair	45%	No	Single
EP-21	Epaint	\$99	epaint.com	Fair	Fair	Fair	Poor	None	No	Single
ZO	Epaint	\$212	epaint.com	Fair	Fair	Fair	Good	None	Zinc Pyrithione	Multi
Aquagard Alumi-Koat (NEW) ✓	Flexdel	\$149	Flexdel	Good	Fair	Fair	Good	None	No	Multi
Aquagard Bottom Paint	Flexdel	\$99	Flexdel	Fair	Fair	Fair	Good	26%	No	Single
Super Ship Bottom (REINTRODUCED)	Innovative	\$140	supershipbottom.com	Good	Fair	Fair	Fair	63%	No	Single
Bottomkote	Interlux	\$134	boatersland.com	Fair	Fair	Fair	Fair	43%	No	Single
Epoxycop Ablative \$	Interlux	\$89	Interlux	Fair	Good	Fair	Good	43%	No	Multi
Fiberglass Bottomkote ACT	Interlux	\$120	defender.com	Fair	Fair	Fair	Good	42%	Irgarol	Single
Micron 66 ★	Interlux	\$220	jamestowndistributors.com	Excellent	Good	Excellent	Good	40%	Zinc Pyrithione	Multi
Micron CSC	Interlux	\$175	defender.com	Fair	Fair	Fair	Good	37%	No	Multi
Micron Extra	Interlux	\$199	defender.com	Fair	Fair	Fair	Good	39%	Irgarol	Single
Super Ablative ✓	Interlux	\$142	boatersland.com	Fair	Good	Fair	Excellent	42%	Irgarol	Single
Trilux II	Interlux	\$216	pyacht.com	Good	Fair	Fair	Fair	22%	No	Multi
Trilux 33	Interlux	\$190	defender.com	Fair	Fair	Fair	Fair	17%	Zinc Pyrithione	Multi
Trilux 33	Interlux	\$190	defender.com	Good	Fair	Fair	Fair	17%	Zinc Pyrithione	Multi
Trilux Prop and Drive	Interlux	\$29/16 oz.	defender.com	Fair	Fair	Poor	Fair	9%	Irgarol	Single
Trilux Prop and Drive	Interlux	\$29/16 oz.	defender.com	Poor	Good	Poor	Fair	9%	Irgarol	Single
Alumacoat SR	Pettit	\$176	boatersland.com	Fair	Fair	Fair	Good	None	Zinc Omadine	Multi
Horizons ✓	Pettit	\$130	defender.com	Good	Good	Fair	Good	48%	No	Single
Hydrocoat ✓	Pettit	\$105	defender.com	Good	Good	Fair	Good	40%	No	Multi
Premium SSA \$ (West* CPP)	Pettit	\$74	boatersland.com	Fair	Good	Fair	Good	36%	No	Single
Ultima SR ✓ (West* PCA)	Pettit	\$190	defender.com	Good	Fair	Fair	Excellent	40%	Irgarol	Multi
AF 33 (NEW)	Sea Hawk	Price not available	Sea Hawk	Fair	Fair	Fair	Good	34%	No	Multi
Biocop TF ✓	Sea Hawk	\$228	Sea Hawk	Fair	Good	Fair	Good	38%	Zinc Pyrthime	Multi
Cukote	Sea Hawk	\$189	Sea Hawk	Fair	Good	Fair	Good	48%	No	Multi
Cukote Biocide Plus	Sea Hawk	\$209	Sea Hawk	Fair	Good	Fair	Good	48%	Irgarol	Multi
Mission Bay CF	Sea Hawk	\$212	Sea Hawk	Fair	Fair	Fair	Good	None	Zinc Omadine	Single
Mission Bay CSF	Sea Hawk	\$224	Sea Hawk	Fair	Good	Fair	Good	None	Zinc Omadine	Single
Monterey ✓	Sea Hawk	\$194	Sea Hawk	Good	Good	Good	Good	55%	No	Single

✓ Recommended ★ Best Choice \$ Budget Buy

* West Marine rebranded products; for prices, go to westmarine.com

years: New polyester/fiberglass panels are washed with a de-waxing solvent, sanded lightly, and then hand washed with solvent. Panels are then taped into sections and applied following the manufacturer's instructions. Testers rate the paints with no reference to the paint name

or manufacturer.

The finished panels are mounted in salt water close to the water's surface to simulate paint near a boat's waterline. One complete set is secured to a dock in a saltwater canal in Tavernier, Fla., in the Florida Keys. The other set hangs from

a boatyard dock in eastern Long Island Sound (Groton, Conn.).

Although the panels do not move like a boat, the paints are rated after they have been sluiced once with a bucket of water. An Excellent rating is given to paints that show no hard growth and virtu-

PS VALUE GUIDE HARD PAINTS at 1 YEAR (2007-2008)										
NAME	MAKER	PRICE PER GALLON	PRICE SOURCE	6-MONTH RATINGS		12-MONTH RATINGS		COPPER CONTENT	ANTI-SLIME AGENT	SEASON RATING
				FL	CN	FL	CN			
Copper Shield 45 Hard	Blue Water	\$80	ipaint.us	Fair	Good	Fair	Good	45%	No	Single
EP 2000	Epaint	\$249	epaint.com	Fair	Fair	Fair	Good	None	Zinc Omadine	Single
ZO HP (NEW)	Epaint	\$249	Epaint	Fair	Fair	Fair	Good	None	Zinc Omadine	Single
Epoxycop	Interlux	\$80	boatersland.com	Fair	Fair	Fair	Good	41%	No	Multi
Fiberglass Bottomkote	Interlux	\$105	defender.com	Fair	Fair	Good	Good	43%	Irgarol	Multi
Fiberglass Bottomkote Aqua ✓	Interlux	\$112	boatersland.com	Good	Good	Good	Good	46%	No	Multi
Regatta Baltoplate Racing	Interlux	\$195	defender.com	Fair	Good	Fair	Good	59%	No	Multi
Super KL	Interlux	\$182	iboats.com	Good	Fair	Fair	Good	66%	Irgarol	Multi
Ultra	Interlux	\$200	defender.com	Fair	Fair	Fair	Good	67%	Irgarol	Multi
Ultra-Kote	Interlux	\$176	boatersland.com	Good	Good	Fair	Good	67%	No	Single
VC 17m	Interlux	\$48/qt.	jamestown distributors.com	Poor	Fair	Poor	Good	20%	No	Single
VC 17m Extra	Interlux	\$44/qt.	defender.com	Poor	Good	Poor	Good	20%	Irgarol	Single
VC Offshore ✓	Interlux	\$190	defender.com	Good	Good	Good	Good	41%	No	Single
SR-21	Pettit	\$40/qt.	Pettit Paints	Poor	Fair	Poor	Fair	21%	Irgarol	Single
Super Premium	Pettit	\$100	boatersland.com	Fair	Good	Good	Good	66%	No	Multi
Trinidad	Pettit	\$170	defender.com	Fair	Fair	Fair	Good	65%	No	Multi
Trinidad SR ✓	Pettit	\$200	defender.com	Good	Fair	Good	Excellent	70%	Irgarol	Multi
Unepoxy Plus ✓	Pettit	\$120	defender.com	Good	Fair	Excellent	Excellent	56%	No	Single
Unepoxy Standard \$	Pettit	\$80	Pettit Paints	Good	Good	Good	Good	46%	No	Single
Vivid ✓	Pettit	\$150	defender.com	Good	Fair	Good	Excellent	25%	Zinc Omadine	Multi
Sharkskin	Sea Hawk	\$119	Sea Hawk	Fair	Good	Fair	Good	45%	No	Single
Tropikote	Sea Hawk	\$185	Sea Hawk	Good	Good	Fair	Good	76%	No	Single
Tropikote Biocide Plus	Sea Hawk	\$219	Sea Hawk	Good	Fair	Fair	Good	74%	Irgarol	Multi

✓ Recommended \$ Budget Buy

ally no soft growth. A Poor rating is reserved for paints with hard growth or very heavy soft growth. In between, are the Good and Fair ratings, which are based on how much soft growth a paint has relative to the field. Good paints have no hard growth and a minimal amount of soft growth. Fair paints will clearly have more soft growth than a panel rated Good.

Occasionally, some paints rated Fair move up to a Good rating in a subsequent evaluation as the other paints lose their resistance to soft growth. Editors identify overall winners and the top paints in the various categories. If some similar

paints score equally in both locales, the lower-priced product is favored. Editors search the Web to find the lowest price for each paint so they can be compared on a per-dollar basis. However, prices can change without notice, so we recommend checking before you buy.

PS has generally found its field tests to be consistent with the panel results, but antifouling effectiveness can vary from boat to boat, year to year, and place to place. How frequently a boat is used (particularly among some ablative paints) and the variety of marine organisms present in a specific area can affect performance. We encour-

age readers to supplement our data with reports from local experts and other boat owners in your area. We welcome e-mail reports from the field; send to practicalsailor@belvoirpubs.com.

THE TEST FIELD GROWS

As our two-year-old 2006 panels were rated and sent to their final resting place, they were replaced by the latest crop of 2008 paints, 72 in total. We'll be reporting on these paints early next year, after they've been in the water long enough to evaluate. Most of the paints on the 2008 panels are the same as those from the 2007 and 2006 panels, but



The majority of this year's graduating paint class did not include anti-slime additives. The coatings were largely still intact after two years.

Last Call for Top-rated Paints After Two Years

Our two-year test wraps up with 20 top-rated paints. Unlike the last two-year results when hard paints dominated, the group is split with 10 self-polishing or ablative paints and 10 hard paints. Our Recommended, Best Choice, and Budget Buy picks also are divided pretty evenly.

In past rating cycles for this panel set (October 2007 and March 2008), Interlux Micron 66 and Sea Hawk Biocop TF were named top picks. These two still lead the pack at the two-year mark. Both are expensive, with Micron 66 costing \$220 per gallon and Biocop TF ringing in at \$228 per gallon. They also both use zinc pyrithione as an anti-slime agent.

Our top bright-color paint after two years in the water is Blue Water Kolor—another expensive paint, priced at \$170 per gallon. The top-performing two-year paint suitable for

the field has been expanded with some new paints and some experimental paints that don't yet have a launch date.

This year's group includes a new entry from Microphase and two new paints from Epaint. There are also two variants of Pettit Vivid called Vivid Free and Vivid Caribe. From Interlux, there's the new copper-free Pacifica and California Bottomkote. And from Sea Hawk, the Caribbean-marketed ablative, Islands 77. Awl-grip Allstar joined the fray, too.

Three Interlux paints have been removed from the 2008 lineup: Super KL, Epoxytop Ablative, and Super Ablative. The company is phasing these out this year.

ONE-YEAR PANELS

Micron 66 from Interlux has become a perennial favorite in our testing. It again is our Best Choice after one year, based on two Excellent ratings in Florida and two Good ratings in Connecticut. Micron 66 is a self-polishing bottom paint that provides a controlled release of copper anti-fouling over a long period of time. Our tests—both static panel tests and field tests (see pages 18-19)—are proof this paint works as well as or better than anything on the market today. It'll cost you though: It sells for a very pricey \$220 a gallon.

Our two top-rated bright-color paints, Pettit Vivid and Blue Water Kolor, are no strangers to the

race boats is Interlux's VC Offshore. Pettit Trinidad SR, well polished, would also be a good choice for racing.

Two hard paints tied for our Budget Buy picks at two years: Blue Water Sea Bowld Coastal 45 and Interlux Epoxytop. For the ablative paints, the Blue Water MarPro Super-B Ablative gets the Budget Buy pick.

Irgarol remains a common and effective anti-slime agent when used in conjunction with a copper antifoulant. Still, the majority of our top two-year paints use no anti-slime agents, and only three use the more expensive zinc-based compounds. When used as a standalone antifouling agent, neither Irgarol nor any zinc-based chemicals have stood up to long-term testing.

As we reported in the 18-month update on these test panels (March 2008), no water-based or aluminum-friendly paints performed well enough to make the cut for our long-term test. The best rated only Fair, so you won't find them in the two-year chart. (Only paints scoring Good or better make the long-term chart.) But of those water-based paints we tested, Pettit Hydrocoat, Flexdel Aquagard, and Interlux's Fiberglass Bottomkote Aqua performed the best at two years, earning mostly Fair ratings. For aluminum boats or those in areas where copper content is restricted,

SPECIALTY PAINTS at 2 YEARS

WHITE/ BRIGHT	BLUE WATER KOLOR
NO COPPER	EPAINT ZO, PETTIT ALUMACOAT SR
RACING	INTERLUX VC OFFSHORE
WATER-BASED	PETTIT HYDROCOAT, FLEXDEL AQUAGARD, INTERLUX FIBERGLASS BOTTOMKOTE AQUA

winner's circle either. This year, a slim edge goes to Pettit Vivid with its slightly higher ratings. It is available in four bright colors, a bright white, and black; combining colors can yield another 18 palette choices. Using zinc omadine in conjunction with a relatively low copper content (25 percent), Vivid rated Good in our tests.

Two water-based paints made our Recommended list after one year: Interlux Fiberglass Bottomkote Aqua and Pettit Hydrocoat. Fiberglass Bottomkote Aqua earned across-the-board Good ratings and gets the edge here. It is a multi-season hard paint that can be wet sanded to a racing finish. It's avail-

PS VALUE GUIDE ANTIFOULING PAINT 2-YEAR REPORT (2006-2008)

NAME	MAKER	PRICE PER GALLON	SOURCE	18-MONTH RATING		24-MONTH RATING		COPPER CONTENT	ANTI-SLIME AGENT	SEASON RATING	
				FL	CN	FL	CN				
HARD	Sea Bowld Coastal 45 \$	Blue Water	\$63	Blue Water Paints	Fair	Good	Fair	Good	45%	No	Single
	Epoxycop \$	Interlux	\$70	boatersland.com	Good	Fair	Good	Good	41%	No	Single
	Ultra ✓	Interlux	\$196	boatersland.com	Fair	Good	Fair	Good	67%	Irgarol	Single
	VC Offshore ✓	Interlux	\$190	defender.com	Good	Good	Fair	Good	41%	No	Single
	Super Premium ✓	Pettit	\$100	boatersland.com	Fair	Good	Fair	Good	67%	No	Single
	Trinidad SR ★	Pettit	\$200	defender.com	Good	Good	Good	Good	70%	Irgarol	Multi
	Unepoxy Plus ✓	Pettit	\$120	defender.com	Good	Good	Good	Good	56%	No	Single
	Vivid ✓	Pettit	\$150	defender.com	Good	Fair	Good	Good	25%	Zinc Omadine	Multi
	West Marine Bottomshield ✓	Pettit	\$100	westmarine.com	Good	Good	Fair	Good	46%	No	Single
	Sharkskin ✓	Sea Hawk	\$119	Sea Hawk	Good	Good	Fair	Good	45%	No	Single
ABLATIVE / COPOLYMER	Copper Shield 45 ✓	Blue Water	\$120	ipaint.us	Fair	Good	Fair	Good	45%	No	Multi
	Kolor ✓	Blue Water	\$170	ipaint.us	Good	Good	Good	Good	45%	No	Multi
	MarPro Super-B Ablative \$	Blue Water	\$90	Blue Water Paints	Good	Good	Good	Good	67%	No	Multi
	Sea Bowld Ablative 67 Pro ✓	Blue Water	\$145	Blue Water Paints	Fair	Good	Fair	Good	67%	Irgarol	Multi
	Micron 66 ★	Interlux	\$220	jamestown distributors.com	Good	Good	Fair	Good	40%	Zinc Pyrithione	Multi
	Micron CSC ✓	Interlux	\$160	boatersland.com	Fair	Good	Fair	Good	37%	No	Multi
	Trilux II ✓	Interlux	\$216	pyacht.com	Good	Good	Fair	Fair	22%	No	Single
	Ultima SR ✓	Pettit	\$190	defender.com	Good	Fair	Fair	Good	60%	Irgarol	Multi
	West Marine PCA Gold ✓	Pettit	\$170	westmarine.com	Fair	Good	Fair	Good	40%	Irgarol	Multi
	Biocop TF ★	Sea Hawk	\$228	Sea Hawk	Good	Good	Fair	Good	42%	Zinc Pyrithime	Multi

✓ Recommended ★ Best Choice \$ Budget Buy

we recommend Epaint ZO or Pettit Alumacoat SR.

Disregarding the freshwater paints that perennially do poorly in our long-term saltwater testing, we found two of the lowest-rating paints after two years to be Epaint EP-21

and Sea Hawk Mission Bay CSF. Another noteworthy finding was the collapse of Interlux Bottomkote XXX from mostly Good rating in the early going to only Poor and Fair ratings beyond the 18-month point.

able in black, blue, and red.

Hydrocoat performed nearly as well, earning mostly Good ratings. It is a multi-season ablative with a 40-percent copper load. It uses no anti-slime agent and is priced at a fairly reasonable \$105 a gallon. Blue, green, red, and black are the available colors.

Among paints for aluminum hulls, Flexdel Aquagard Alumi-Koat edged out Pettit Alumacoat, a perennial favorite in this category. It comes in black, white, red, or blue.

Other Recommended hard paints are Interlux VC Offshore (for racing); Pettit Unepoxy Plus; and Pettit Trinidad SR, which has a good record in previous longterm tests. At

\$80 a gallon, Pettit Unepoxy Standard earned a Budget Buy rating.

Recommended ablatives include Blue Water Copper Shield SCX 45, Pettit Horizons, Sea Hawk Monterey, Sea Hawk Biocop TF, and Pettit Ultima SR, which West Marine sells as West Marine PCA. Pettit Premium, also rebranded as West Marine CPP, gets the ablative Budget Buy.

Interlux's Super Ablative and Epoxycop Ablative also fared well, but both are due to be phased out. You may see clearance prices on these two paints as the stock dwindles, but be prepared for any prep work that may be required when it comes time to paint again. ▲

CONTACTS

BLUE WATER MARINE PAINT
800/628-8422,
bluewatermarinepaint.com

DONOVAN MARINE (MarPro Paints)
800/432-4333 ext. 31

EPAIN CO.
800/258-5998, epaint.net

FLEXDEL CORP., 888/353-9335
aquagard-boatpaint.com

INTERLUX YACHT FINISHES
800/468-7589, yachtpaint.com

KOP-COAT (PETTIT)
800/221-4466, pettitpaint.com

NEW NAUTICAL COATINGS
800/528-0997, seahawkpaints.com

WEST MARINE
800/262-8464, westmarine.com

BOATER'S WORLD
800/826-2628, boatersworld.com



Checking In with the Test-boat Fleet

In addition to our annual paint-panel tests, *Practical Sailor* has a host of ongoing head-to-head field tests of the top-performing antifouling paints. Our test-boat fleet allows us to evaluate paints in real-world conditions on boats that run the gamut in terms of usage, storage, and cruising grounds.

For the head-to-head tests, each boat's hull below the waterline is divided into four equal sections (two per side). One paint is applied to the port bow and starboard aft section, while another is painted onto the starboard bow and port after section, giving both paints equal exposure. Paints are applied following maker's instructions, and an extra coat is applied at the waterline.

OFF WITH THE OLD...

In our last test-boat checkup (March 2008), we reported on *PS*'s 21-foot Parker 2110 powerboat head-to-head test, which pit-

ted an inexpensive one-season, sloughing coating (Interlux Tarr & Wonson) against a pricey, multi-season paint that releases its copper at a controlled rate (Interlux Micron 66). We found Tarr & Wonson for \$79 (www.jamestowndistributors.com), and Micron 66 for \$220 (www.jamestowndistributors.com).

At 17 months, the Tarr & Wonson had lost its punch, allowing barnacles at the waterline, while the Micron 66 was free of hard growth. After two years, however, both paints had barnacles. The Micron 66 allowed only a sprinkling of barnacles on the port side. The Tarr & Wonson-covered port section gave up more barnacles. Both paints began having adhesion problems as well. As expected, the Micron 66 won this long war.

PS spent no less than 10 hours prepping the Parker for its next round of antifoulant testing. We used chemicals, scrapers, and a power sander to remove the stubborn

Practical Sailor chose to roll on two water-based antifoulants on this Union Cutter in Virginia.

hard growth.

This time, we matched up Blue Water Kolor and Micron 66. Like Micron 66, Kolor is an expensive, multi-season coating that falls into the ablative/copolymer category. (We found Kolor for \$162 a gallon at www.ship2shoremarine.com.) Kolor and Micron 66 contain similar amounts of copper too: 45 and 40 percent, respectively.

Kolor comes in bright colors and uses cuprous thicyanate, which doesn't dull the color like cuprous oxide does.

Micron 66 took about twice as long to apply as the Kolor, which rolled on easily and dried quickly. We used Seafit 4-inch mini rollers to apply each paint. Both manufacturers said the Parker's bare spots would benefit from a primer coating.

PS splashed the Parker in early September. Look for an update in early 2009.

WATER-BASED PAINTS

In March, *PS* testers hauled out and repainted another test boat, a 36-foot, full-keel Union Cutter out of Chesapeake Bay. The Union was previously the platform for an Interlux Micron Optima vs. Sea Hawk Monterey antifouling test (March 2008). However, Interlux has since pulled the plug on the two-part Micron Optima, so we did the same for the test.

Both the Optima and Monterey, a single-season ablative—applied in summer 2006—were found to be in good shape when the boat was hauled. Only a light sanding was needed to prepare the hull for repainting.



CHEAP VS. EXPENSIVE

We painted three coats of Interlux's top-line Micron 66 and three coats of its basic workboat paint, Tarr & Wonson, on our test powerboat, a Parker 2110. After two years in Florida waters and a low-pressure rinsing, the Micron 66 (left side in photo) was cleaner, but some sections of the cheap, soft sloughing Interlux Tarr & Wonson (right side) also fared well. While a good, cheap, soft ablative can serve a single-season boater well, these paints are falling out of favor as the environmental impact of solvents, scrubbing, and the uncontrolled release of biocides come under closer scrutiny. Practical Sailor expects more advanced water-based abrasives that better control the release of biocides to eventually replace these paints. Already, Interlux has begun phasing out Tarr & Wonson, Interlux Super Ablative, and Epoxycop, budget paints that have fared well in past tests.

As with any paint application where existing coats are not stripped completely, we confirmed with the makers that the new paints—Flexdel Aquagard and Pettit Hydrocoat—were compatible with the previous coatings.

Hydrocoat and Aquagard are water-based, “hard” abrasive paints that can be hauled and re-launched multiple times without loss of effectiveness. We found both for \$105 at www.defender.com.

Flexdel’s Aquagard releases low levels of volatile organic compounds (VOC) and heavy metals compared to other competing products. It is designed for use on wood and fiberglass boats. It was applied to the port bow and starboard aft sections of our test boat. It went on very smoothly, had little odor, and was easily cleaned up with soap and water.

Hydrocoat is thinner, but it has little odor and went on easily. It was applied to the starboard bow and port after sections. Pettit claims the coating withstands frequent trailering, beaching, and launching without loss of protection.

Six months after the application—the boat was kept at a dock off the Chesapeake—the entire hull was coated with a thick layer of slime that was easily dispersed with a wave of the hand (underwater). The thickness of the slime coating was uniform, with no noticeable difference between the different paints. No hard growth was noted.

Stay tuned for updates on how well they’re faring as our test boat cruises the Chesapeake and Intracoastal Waterway.

UNDERNEATH IT ALL

A third PS test boat, a 41-foot Ericson homeported in Annapolis, Md., was the platform for a test of two barrier-coat systems, Interlux InterProtect 2000E and Sherwin Williams Sea Guard. Both epoxy-based products, they were applied in July 2008 over a cleanly stripped and sanded bottom.

Four coats of barrier coat were rolled on using solvent-resistant foam rollers and vertical strokes. A chemical bond was maintained, no between-coat sanding was necessary, and each of the four layers was applied as soon as the previous coat was ready to overcoat. (Look for the full report in an upcoming issue.)



After nearly a yearlong review, PS testers decided the only thing cayenne pepper in bottom paint increases is drag. Mixed with Interlux Bottomkote, it had no impact on antifouling protection on this Cape Dory 25.

Interlux Micron 66 was chosen as the bottom paint. All three coats were applied with a foam roller using Interlux’s recommendations for a “no-sand” chemical bond. This was accomplished by carefully monitoring the coats as they dried, and waiting to overcoat until the paint on the masking tape at the waterline could be touched leaving a fingerprint in the paint but no residue on the finger. (If paint sticks to the finger, it’s too early to overcoat.)

The Ericson is kept at a dock in a creek on Upper Chesapeake Bay. No growth was reported on its hull at press time, two months after application.

SPICY EXPERIMENT

In November 2007, we enlisted one of our test boats, a Cape Dory 25 in Sarasota, Fla., to find out whether there is any validity to the old salt’s tale that adding cayenne pepper to bottom paint increases its antifouling ability. Now, nearly a year later, we can call this

myth busted.

The Cape Dory—daysailed several times a week, cruised occasionally, and kept on a mooring in the warm waters of Sarasota Bay—was a prime test platform for the experiment. Testers applied Interlux Bottomkote alone to the boat’s port bow and starboard after sections. Bottomkote mixed with a large amount of cayenne pepper was applied to the boat’s starboard bow and aft port quarters. The bottom was cleaned in the water every three to six weeks and was hauled for a serious scrubbing in late April 2008.

After 10 months, testers noted no difference in growth between the sections with and without cayenne. There was an even distribution of some hard growth and considerable soft growth.

One notable drawback to adding pepper to your bottom paint is the bumpy texture. A spicy bottom, it seems, can be a drag.

PS VALUE GUIDE		TEST BOAT REPORTS		
BOAT	LOCATION	DURATION	PAINT A / RATING	PAINT B / RATING
Union 36	Chesapeake, Va.	6 months	Flexdel Aquagard / Excellent	Pettit Hydrocoat / Excellent
Ericson 41	Annapolis, Md.	2 months	Micron 66 & InterProtect barrier / Excellent	Micron 66 & Sea Guard barrier / Excellent
Cape Dory 25	Sarasota, Fla.	10 months	Interlux Bottomkote / Good	Interlux Bottomkote with cayenne / Good
21-foot Parker powerboat	Sarasota, Fla.	24 months	Interlux Micron 66 / Fair	Interlux Tarr & Wonson / Poor



Petite Plotter-sounders

We ran each chartplotter-sounder package through a series of tests aboard a center-console powerboat. Each unit, mounted with its supplied bracket and hardware, was tested in various lighting conditions.

Garmin and Lowrance show good things can come in small packages.

Ordinary depthsounders are suitable in most cruising areas, but for those less-traveled channels and anchorages, being able to actually see what's under your keel can be a significant advantage. This is where fishfinders offer a navigational edge: They allow you to see seabottom contours—and fish, of course—rather than a simple spot reading for depth.

We last tested chartplotter-sounders in 2006. The Lowrance LMS-337CDF topped 4-inch units in “Small-screen Plotter-sounders” (April 2006), while the Navman Trackfish 6600 bested 6- to 7-inch combos in “Diving into Plotter-sounders” (June 2006).

For this test, *Practical Sailor's* goal was to test complete small-screen units capable of handling chartplotting duties on a detailed map and providing bottom contours on a single display screen. We took a look at five products with finely detailed chart pages using either internal maps or cartography on a card. All were outfitted with high-powered sounders.

WHAT WE TESTED

To keep things economical, we chose units with 5-inch display screens. Total package pricing including display, sounder, transducer, and cartography was kept near the \$1,000 mark.

Two units we tested, the Garmin 545s and Lowrance LMS-525CDF, include both a chartplotter and sounder in a single integrated housing. Our other three picks—Raymarine A60, SI-TEX Colormax 5E, and Standard Horizon CP180—use black-box sounders connected to the plotter display for fishfinder capabilities.

Some of the machines we tested are also capable of interfacing with radar, satellite weather receivers, and AIS units, but none is capable of displaying video. All are compatible to the older NMEA 0183 standard, but only the Lowrance is compatible with NMEA 2000. All have split screens that show two views at once, and all have one slot for map cards. None has an alphanumeric key pad.

The Garmin and Raymarine prod-

ucts were the only ones rated to the IPX7 standard, which means their components can withstand temporary submersion in water. All others were rated to handle powerful jetting water or were merely splashproof.

All of the sounders tested operate on two frequencies, 50 and 200 kHz; have auto depth ranging as well as auto and manual gain control; and give water temperature readings.

GARMIN GPSMAP 545s

Garmin's compact 500-series chartplotters offer a wide variety of configurations. Our test unit, the 545s, ships with an internal sounder, pre-loaded cartography, an internal GPS receiver, and internal antenna. (We used the optional external antenna for our testing.) Our test unit had Garmin's BlueChart g2 U.S. Coastal cartography covering both mainland coasts from Canada to Mexico and the Bahamas, Puerto Rico, Hawaii, and Guam.

All 500-series units have 5-inch

Testers Play a Little 'Ping'-pong

We ran each unit through day and night viewability testing as well as a full-series of functionality checks to see how they handle chartplotting chores.

Displays were rated under a variety of lighting conditions that included bright sunlight, cloudy skies, twilight, and nighttime conditions. Each screen was viewed from straight on and severe side angles, with and without polarized sunglasses, and using different background color palettes. No screen fogging was reported on any of the test units.

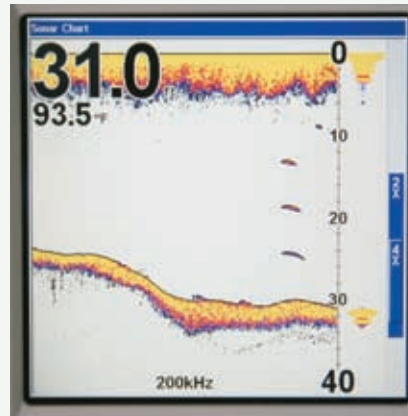
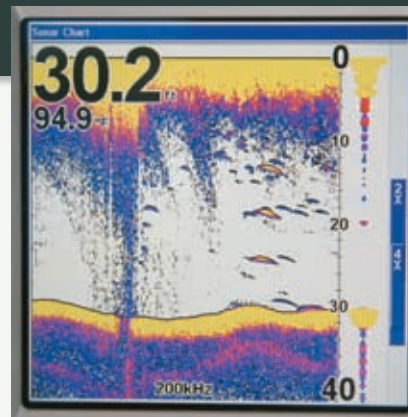
Each plotter was tested with live GPS fix information provided by its supplied GPS sensor. Testers evaluated chartplotter user interface by performing various actions like creating waypoints, building routes, changing map ranges, and varying the chart orientation. Intuitive software, easy

data entry, and dedicated function keys improved ratings.

Each sounder was rated for both presentation and usage. Feature-rich units that were easy to use received the highest ratings.

We deployed three ping-pong balls; each mounted 6 feet apart on heavy monofilament line in a depth of 32 feet to serve as our sounder targets. The line was held on the bottom with several pounds of lead and marked on the surface with a float. We did not test for maximum depth capability on any sounder.

.....
Among the features testers looked at were the auto gain (top photo) and manual gain (bottom photo) functions. With the Lowrance LMS-525C DF (right), fine-tuning with manual gain made a big difference in minimizing "noise."



screens, and those designations ending with a "5"—like our 545s test unit—have 480 x 640-pixel screen resolution. All are capable of using Garmin BlueChart g2 Vision cards, which offer 3D views above and below the water as well as extensive satellite and aerial photo coverage.

Power and NMEA 0183 data pass through a single cable that fastens to the case back with a twist-lock connector. An additional leg on this cable connects the supplied transom-mount transducer. Flush-mounting requires an optional kit.

The viewability on the high-resolution, portrait-oriented Garmin screen was Excellent. Though it was not as bright as some others tested, its details are sharp and readable. Wearing polarized sunglasses and viewing the screen straight on, testers noted slight screen darkening.

The 545s has an automatic backlight control system that works via a sensor on the front of the display. We found it worked very well.

With a limited number of pushbuttons, onscreen menus lead the user through most functions, starting at

the home page, where the user can select from six main pages: Chart, Sonar, Chart/Sonar, Where To, Information, and Configure.

To create a waypoint at the boat's present position, you hit the "Mark" button. A menu allows users to edit, delete, select the point as a man-overboard (MOB) position, or go back to the chart page. To navigate to a waypoint, you first select it from the chart or off a waypoint list, then select the "Go To" function. This puts data boxes up with course and distance to the point, plus shows a course line to follow on the chart page. Route building is just as easy.

To initiate the MOB function, press "Mark," select the MOB function, and confirm. The unit then creates a way-

point, switches to the chart page—if you're not already on it—and opens data boxes giving navigation information back to the MOB position. The Garmin MOB function is good, but we prefer to be able to activate it with only a single button push.

Garmin Senior Communications Manager Ted Gartner said the company will be improving the MOB function in a future software update so that pressing the "Mark" button twice activates the MOB function. According to Gartner, with the current software, the position is captured the first time the button is pushed, so there's no delay in getting the right location locked into the machine.

Screen redraws on the 545s are fast under most circumstances and slowed only when we built a route that required map range changes.

Users can customize the sounder setup and how its data is displayed. The 545s internal sounder is capable of putting out 1,000 watts of power, and it has all the features you'd want in a fishfinder, including A-scope and bottom lock. (See "Buyer's Guide," page 24, for more on these features.) The only thing it lacks is a shift function.



Garmin GPSMap 545s



During our testing, it marked all three submerged targets clearly, even with auto gain set. This fishfinder has plenty of features, was easy to operate, and worked well in all auto modes.

Bottom line: Razor-sharp screen details combine with high ratings to earn the Garmin 545s Best Choice.

LOWRANCE LMS-525C DF

Lowrance, now under the Navico umbrella of marine electronics brands, packages the LMS-525C DF, a chartplotter and 500-watt dual-frequency fishfinder in one unit, with a transom-mount transducer and NMEA 2000 GPS sensor. This unit does have a built-in base map, however for detailed cartography, a map card is required.

We tested the unit without the map card. Other models of this machine are available with an internal antenna and/or a single frequency lower-power internal sounder.

Electrical connections are all made on the back panel with color-coded locking connectors. The LMS-525C is capable of interfacing with Lowrance radar. When installing this combo, you'll need to provide power to the display unit and an NMEA 2000 network because the GPS sensor communicates with the display using this protocol. Flush-mounting requires an optional kit.

We rated the square Lowrance display screen Excellent for night and day viewability. It has three color palettes: normal, high contrast, and night. We found little difference between the normal and high contrast modes for day. The screen provides a clean, sharp picture, but dark-

Lowrance LMS-525C DF

Despite its petite stature, the Garmin GPSMap 545s display is easy to read. It shows a lot of information in a little space without being cluttered.

ened slightly when viewed at steep angles or from straight on with polarized sunglasses.

Frequently used functions like waypoint and pages have dedicated function keys, a feature testers liked. Other options are carried out by selecting the appropriate menu.

A waypoint can be created by pressing the "Wpt" key twice. If the cursor has been moved off the boat position, a waypoint will be created there, otherwise it will be created at the boat's present position.

To build a route, we selected the "Route Planning" page from the navigation menu. There, you can name the route and add legs. Testers found it an easy procedure.

To activate the MOB function, press the "Zoom In" and "Zoom Out" pushbuttons simultaneously. Once an MOB waypoint is created, the unit switches to a compass-rose plus data-box display, providing navigation information to the MOB point. We like the single-step MOB activation, but testers did not like being taken off the chart page.

Screen redraws on the Lowrance were lightning fast with the base map. However, with a chart card installed, we'd expect updates to take a bit longer.

We reviewed the sonar features using a full-screen display with A-scope turned on. Another useful display option is split screen with low frequency on one side and high frequency on the other. This unit

has a 500-watt sounder built in with zoom capability but no bottom lock or shift.

With the Lowrance set to auto gain for the sounder testing, it marked lots of noise and all three submerged targets. When we manually lowered the gain, we got a sharp fix on our targets. The Lowrance fishfinder was fairly easy to operate and worked well.

Bottom line: The Lowrance performed very well and we like that it uses Navionics cartography. With a price tag \$200 below most others, it gets the Budget Buy rating.

RAYMARINE A60

Raymarine's system ships with the A60 landscape-oriented display unit, a DSM25 black-box sounder, the RS12 GPS sensor, and a map card.

An important note about the RS12 GPS sensor: Satellite changes made last year have rendered the sensor incapable of receiving WAAS signals. It remains fully functional as a GPS receiver, but lacks the additional WAAS accuracy. Upgrading to the Raymarine RS125 GPS sensor costs approximately \$300 and restores WAAS capability to the A60.

The Raymarine comes with Navionics Silver All-in-One cartography, which has rated highly in previous testing. Connections for power, GPS sensor, transducer, and NMEA 0183 data are through twist-lock connectors on the back panel. With the rear panel bezel removed, the A60 can be flush-mounted.

Chart redraws on the A60 were comparatively slow: It took as long as five seconds to fully redraw all data after a long-range change.

The A60 had the largest screen in our test group, but with a 320-x-240-pixel resolution, it had the fewest pixels per square inch of screen. This made fine details hard to read. Sunlight visibility was also hindered by a lack of selectable color palettes, high screen reflectivity, and less screen brightness than



PS VALUE GUIDE		CHARTPLOTTER-FISHFINDER COMBOS with 5-INCH DISPLAYS				
Manufacturer	GARMIN ★	LOWRANCE \$	RAYMARINE	SI-TEX	STANDARD HORIZON	
Chartplotter/Display	545s	LMS-525C DF	A60 System Pack	Colomax 5E	CP180	
Price	\$999	\$629	\$999	\$514	\$409	
Price source	thegpsstore.com	thegpsstore.com	basspro.com	consumersmarine.com	thegpsstore.com	
DISPLAY UNIT FEATURES AND RATINGS	Unit dimensions (W x H x D)	6.4 x 5.9 x 2.9 in.	6.9 x 5.4 x 3.4 in.	9.6 x 6.8 x 3.4 in.	5.8 x 6.1 x 2.9 in.	7.3 x 4.4 x 3.2 in.
	Screen dimensions (diagonal)	5 in.	5 in.	5.7 in.	5 in.	5 in.
	Screen resolution	480 x 640	480 x 480	320 x 240	320 x 240	320 x 240
	Push buttons	7	8	9	7	11
	Soft keys	0	0	5	4	0
	Brightness levels	Min to max, 2% steps	11	5-100% in 19 steps	6	6
	GPS sensor	GPS 29 (\$60)	LGC-3000 GPS (included)	RS12 (included)	Smart GPS (included)	Smart GPS (included)
	Radar / AIS optional	No / Yes	Yes / No	No / No	No / Yes	Yes / Yes
	Weather receiver optional	Yes	No	No	No	No
	Power usage	0.9 amps	0.7 amps	0.8 amps	0.9 amps	0.9 amps
	Water resistant	Yes (IPX7)	Yes	Yes (IPX7)	Yes (IPX6)	Yes (IPX6)
	Warranty period	1 year	1 year	2 year	2 years (parts)	3 years
	Day view	Excellent	Excellent	Fair	Good	Excellent
	Night view	Excellent	Excellent	Good	Good	Good
PLOTTER FEATURES & RATINGS	GPS antenna	Internal (External optional)	External	External	External	External
	Cartography	Preloaded Garmin Bluechart g2	Navionics or Lowrance	Navionics US All-in-One Silver	C-Map NT+ or C-Map Max	C-Map NT+ or C-Map Max
	Card price	N/A	\$180	Included	\$190	\$190
	Waypoint storage	1,500	1,000	1,000	500	600
	Route storage	20	100	495	25	20
	Waypoint symbols	70	63	6	16	16
	Waypoint max. # of characters	10	Over 100	16	9	10
	Additional waypoint info	Water temp, depth	Depth	34-character comment	8 color options	Distance, bearing
Plotter user interface	Good	Good	Excellent	Good	Good	
SOUNDER FEATURES AND RATINGS	Sounder model	545s (internal)	LMS-525C DF (internal)	DSM25 black box	ES502 black box	FF520 black box
	Water resistant	N/A	N/A	Yes (IPX7)	Splashproof (IP54)	No
	Price	Included	Included	Included	\$300	\$235
	Max. power output	1,000 watts	500 watts	500 watts	1,000 watts	1,000 watts
	Supplied transducer	Garmin	Lowrance	Airmar P58	None	None
	Tested transducer	Supplied	Supplied	Supplied	Airmar P58 (\$85)	Airmar P58 (\$120)
	Manual depth ranges	17	16	22	Set by the foot	Set by the foot
	Zoom	2x, 4x	2x, 4x	2x, 3x, 4x, Range	Yes	Yes
	Bottom lock	Yes	No	Yes	Yes	Yes
	A-Scope	Yes	Yes	Yes	Yes	Yes
	Shift	No	No	Yes	Yes	Yes
	Presentation rating	Good	Good	Good	Good	Good
Usage rating	Good	Good	Excellent	Good	Fair	
Package price	\$1,059	\$808	\$999	\$1,089	\$954	

★ Best Choice \$ Budget Buy

Feature Feast: What Fits Your Tastes

A combination chartplotter-fishfinder offers several advantages over purchasing a separate plotter and sounder. You'll likely save a bundle of cash as you're only buying one display screen, one component chassis, and one case. You'll be simplifying the install and wiring job, too. Significant space savings and having all important data on one screen are also pluses to having a combo unit.

The drawback? Putting all your electronics eggs in one basket, so to speak. If a multi-function device dies, rather than losing one function as you would with a stand-alone unit, you lose the whole kit-and-kaboodle. Having backup navigation tools onboard is a must.

When shopping for a combination chartplotter-fishfinder, here are some features to consider:

- **Screen size/resolution:** Be sure the display screen will fit the space limitations of where it will be mounted, and be sure it has a high enough resolution to be readable from where ever you're most likely to be viewing it from.

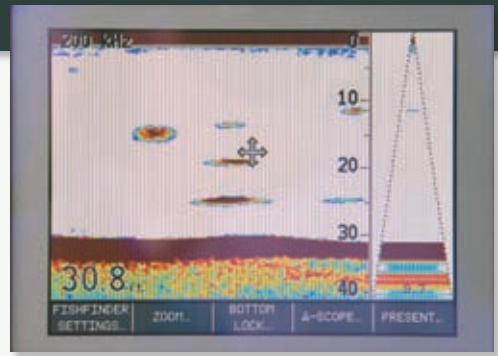
- **Cartography:** You may already own or be able to trade up on a certain brand of chart card. If so, it might be in your best interest to choose a plotter brand that uses your preferred cartography. However, sometimes it's cheaper and easier to start from scratch. Weigh your options.

- **Dual-frequency transducer:** Look for a unit with at least 500 watts of power and the ability to use a dual-frequency transducer, which allows you to optimize the system according to the conditions and your needs.

The high frequency, normally 200 kHz, offers a narrower beam with better bottom detail. The low frequency, typically 50 kHz, allows you to probe deep into the depths.

- **Water temperature:** Most all combo sounders have the ability to read water temperature. This can be valuable information when you're trying to follow current changes, as you would in the Gulf Stream.

- **A-scope:** A-scope shows the sonar's acoustic pulse downward and is the real-



At the right of the Raymarine A60 screen (above), you can see the A-scope function, one of three selectable A-scopes on the A60.

time display of what the transducer is seeing. It can be useful in detecting and identifying objects—or fish—just above the seabed. It is often shown in its own column.

- **Shift:** This allows the user to manually expand a certain section of the water column for better onscreen interpretation.

- **Bottom Lock:** Usually displayed in a split-screen window, this shows the bottom and a small section of the water column, normally 10 to 30 feet. The view will stay locked on the bottom even as depth or bottom contours vary, allowing the user to better determine bottom composition.

some of the others.

The A60 screen darkened when viewed from side angles, gradually getting worse as the angle increased, earning it a Fair for day viewability. We rated the Raymarine A60 Good for night viewability as the standard color palette seems to be better for night viewing than day.

Dedicated pushbuttons for page selection and waypoint functions plus five soft keys with page-specific functionality earned the Raymarine

A60 an Excellent for chartplotter user interface.

A present-position waypoint is saved with two pushes of "Wpts/MOB." Pushing it once, then pressing a soft key saves the position at the cursor, vessel, or present position. Navigating to a displayed waypoint is a simple matter of placing the cursor over the point, then hitting the "Go to Waypoint" soft key—easy and intuitive in our opinion.

Route construction was also easy: Press the "Route" soft key, then "New Route," move the cursor, and press "Add Waypoint" for each point in the route. When done, press "Save Route." That's it.

Holding down the MOB key takes the A60 into man-overboard mode. This

Raymarine A60 and DSM25 black-box sounder

single button push will generate an audible alarm and switch the screen to a page with chart/highway/data displayed in a split screen with navigation information directing you to the MOB point. The Raymarine A60 had the best MOB function of the tested units, in our opinion.

Raymarine's DSM25 500-watt black-box sounder, housed in a waterproof box measuring 8x5x2 inches, must be mounted near the display unit.

The A60/DSM25 capabilities surpass any other unit in our test and are normally found only on much more expensive fishfinders. Some of the most exotic features are three different A-scope looks, a four-function zoom, adjustable-range bottom lock and shift, and a rotary knob for gain control. Testers particularly liked the unit's knob control for manual gain. It was the only unit in our test to have that capability.

During testing, it marked the three



submerged targets fairly well in auto gain, and manual gain fine-tuning improved the view. The A60 display presents over 20 sounder tasks and adjustments through page-specific soft keys. A whole slew of additional features are accessed through the sounder menu. The ease with which users can change the most used sounder functions and access those used less often earned the Raymarine A60/ DSM25 combo an Excellent in sounder user-interface.

Bottom line: The A60/DSM25 combo has superior software and sounder hardware. The display screen holds the A60 back.

SI-TEX COLORMAX 5E

SI-TEX ships the Colormax 5E with a Smart GPS sensor. To complete our test package, we added the ES502 black-box sounder, an Airmar transducer, and a C-Map Max chart card.

We mounted the Colormax display with the supplied plastic tilt and swivel bracket, but it can also be flush-mounted with supplied hardware. It is rated to withstand powerful jetting water, but not submersion. The ES502, however, should be mounted in a protected area since it is only splashproof.

The SI-TEX Colormax 5E screen was bright during daylight viewing. Slight screen darkening was noted when it was viewed at steep angles, and this was worse when viewed with polarized sunglasses. At night, it showed some screen white-out from steep angles.

The Colormax offers four color palettes, six brightness levels, and 11 contrast levels. Data sometimes appeared somewhat cluttered, depending on the range settings.



Pressing “MOB” once executes the man-overboard function. The unit then flashes a warning that the MOB function is active. If data boxes are already displayed on the chart page, they will give bearing and distance to the MOB. However, executing MOB from any other page results in the visual MOB alarm only; users will need return to the chart page for navigation data. Testers liked that the SI-TEX MOB function has single-button activation, but we would prefer to not have to hunt around for the navigation information in the event the unit wasn’t on the chart page to begin with.

Multiple functions for the “Enter” key and four soft keys with page-specific functionality garnered the Colormax 5E a Good rating for chartplotter user interface. Pressing “Enter” while on the chart page brings up a “Create Object” menu with four options: Go To, Mark, Waypoint, or Range/Bearing.

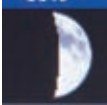
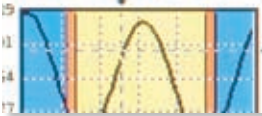
“Go To” creates a waypoint at the cursor, draws a course line, and displays navigation information in data boxes. “Mark” creates the waypoint, displays a databox with waypoint information, and labels soft keys with waypoint tools. Routes are built using the cursor pad and “Waypoint.”

The Colormax does not allow rapid range changes. When testers tried to check chart redraw speeds by rapidly changing the map range, the Colormax would shift only one step at a time, and the chart would have to redraw before it could be shifted further. However, redraw rates still seemed fairly fast with this unit.

North Up chart orientation on the SI-TEX works fine, but when

SI-TEX Colormax 5E and ES502 black-box sounder



CELESTIAL			
38%	MOONRISE 10:34 AM L	SUNRISE 05:31 AM L	GPS 30
	MOONSET 11:42 PM L	SUNSET 07:10 PM L	LOCAL OFFSET -5
HEIGHT 0.82 Ft	DRAUGHT 0.96 Ft	DATE 06/08/08	TIME 10:11 AM L
	AVERNIER CREEK, HWY. 1 BR		HIGH WATER 139 Ft
			LOW WATER -0.11 Ft
		00:15 AM L	06:45 PM L

From the Standard Horizon CP180’s main menu, you can select the celestial data display (above).

the unit was set to Track Up, we found it slow to respond. After a 180-degree turn, it would take as long as 30 seconds to figure out the direction of travel and adjust the chart display to match.

We reviewed the ES502 black-box fishfinder with the Colormax 5E set to a full-screen sounder page with A-scope displayed on the right side of the screen. The ES502 black box measures about 7 inches square and a tad over 2 inches high. This sounder has all the basic fishfinder functions plus a few more sophisticated ones like zoom, bottom lock, and shift.

On initial passes over the sounder test targets, the SI-TEX marked them well but had too much noise and clutter displayed.

The four soft keys on the Colormax 5E are fully functional in sounder mode and let the user quickly adjust gain, range, and frequency. Zoom is available by using the range keys and cursor pad. The soft key functionality and range buttons made the SI-TEX sounder easy to operate.

Bottom line: Overall, the SI-TEX Colormax 5E is a decent performer, just not quite on the level of the best, in our opinion. It was the highest priced unit in our test.

STANDARD HORIZON CP180

The CP180 chartplotter comes with a Smart GPS sensor. For the test, we added the Standard Horizon FF520 black-box sounder, an Airmar transom-mount transducer, and a C-Map Max chart card, which all must be purchased separately.

The CP180 display comes with a



Standard Horizon CP180 and FF520 black-box sounder

plastic tilt-and-swivel bracket and hardware for flush mounting. Connections are made on the back panel of the unit with twist-lock connectors. The CP180 will interface with radar and AIS.

The FF520 must be mounted in a protected area, as it is not waterproof, and near the display unit, so it can be connected via a cable. According to Standard Horizon Product Manager Scott Iverson, the FF520 black box is being redesigned to meet IPX6 waterproofing standards by February 2009. This means that, like the Standard Horizon CP180 display, it will be rated to withstand powerful jetting water, but not submersion.

When rating day viewability, we noted the CP180 had the brightest screen in this test. Even when viewed from angles, it remained bright and readable. However, the onscreen data sometimes appeared cluttered, depending on the range setting.

The CP180 has five color palettes.



Testers rated night-time viewability Good as slight screen darkening was reported. The unit also has six brightness and 20 contrast levels.

The CP180 can display three main navigation pages—chart, navigation, and highway. Chart displays a map page that can be user customized. Navigation displays data boxes

and a compass rose, and Highway shows data, a compass tape, and a virtual highway. Other main menu data selections include celestial, GPS status, and NMEA data display.

To create a waypoint from the chart page, hit the “Mark” button. To edit the newly created waypoint, move the cursor over the point and select an action. The CP180 has a dedicated “Go To” pushbutton.

Building a route with the CP180 is simple and intuitive: From the chart page, press the “Route” pushbutton and use the joystick to move the cursor to the next waypoint position, then hit “Route” once more.

A single press of the MOB button executes the man-overboard function. The MOB waypoint and a visual warning are immediately displayed. If you have data boxes displayed on the chart page, they will give bearing and distance to the MOB. On any other page, only the visual MOB alarm is seen. Users must switch pages to navigate to the MOB. Not a great system, in our opinion.

Quick, successive range changes cannot be done on the CP180. The screen must redraw each time before it will go to the next range step. However, redraws were still fairly fast.

The CP180’s “North Up” orientation worked well, but “Course Up” mode was a little slow to follow as we made turns with the test boat.

We reviewed the FF520 sounder

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The Garmin’s excellent auto gain helped push it to the head of the pack. Very little manual gain fine-tuning was needed to get a clear picture.

using the full-screen display with A-scope on. Data boxes take up about a quarter of the screen. The FF520 black box measures about 7-inches square and 2-inches high and is not waterproof. This sounder has zoom, bottom lock, and shift functions.

This unit painted the sample targets well. Fine-tuning with manual gain improved the picture. On the downside, this particular display, because of its landscape layout, has about 20 percent less vertical screen space to present sounder data when compared to other test units.

Because of the necessity to delve into multi-layered menus for many functions, we rated the Standard Horizon CP180 and FF520 black box fishfinder only Fair for user interface.

Bottom line: With a street price of \$409 and a three-year warranty, the Standard Horizon CP180 is a bargain for a standalone chartplotter. However, the sounder’s cumbersome user-interface keeps the package out of the winner’s circle.

CONCLUSIONS

Our top picks are the Best Choice Garmin 545s and Budget Buy Lowrance LMS-525C DF. Both had across-the-board Excellent ratings for viewability, Good for both plotter and sounder user interface, and Good for sounder presentation. Another plus with these two is their internal sounders, which simplify installation and wiring, and save on precious space, too. We’d like to see longer warranties on these units. ▲

CONTACTS

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Diddy Bagg is More Than a Tool Bag

Practical Sailor testers are constantly schlepping tools between the *PS* workshop, our own garages, and—of course—our boats. So we're always on the lookout for a tool bag that makes said schlepping a little easier. Enter the Original Nantucket Diddy Bag, which we came across at a recent boat show.

It is the first tool bag we've seen that is reversible and convertible. Designed by a Nantucket carpenter, the bag's well-thought-out design is practical and versatile. With 36 various-sized pockets (including a hidden one in the bottom), the bag makes tools easy to find and keep organized—no more digging to the depths of a cluttered tool bag.

One unique design feature is the bag's double-headed zipper. Unzipped, the bag can be laid out flat or can be hung flat for access to everything. Zipped up, the bag can



The Original Nantucket Diddy Bag we tested is made of a rugged, heavy-duty canvas, but the same design is available in polyester.

be stood up with the tools exposed (above). Zip it the other way and cinch the tote bag's drawstring top, and the tools are secured and ready for storage or transport.

An adjustable 1.25-inch strap and cotton webbing handle allow the bag to be carried as a tote bag, over the shoulder, or as a backpack. Zipped, the bag measures 12 inches long, 6 inches wide, and about 16 inches tall.

You can find the Diddy Bag for \$70 online at www.nantucketbagg.com. The price is a bit steep, but we're confident the bag will last the longhaul, and the company offers free stateside shipping and a money-back guarantee. ▲

CONTACT
THE NANTUCKET BAGG CO.
 508/257-4682, nantucketbagg.com

Wera: Stainfree with Stainless

According to German toolmaker Wera Tools, much of the corrosion we find in the cross-hairs of our Phillips-head and other stainless-steel fasteners is a result of cross-contamination during the tightening process when traditional, carbon-steel tools are used to secure the fastener. Small bits of the carbon steel are embedded in the fastener, and the particles form galvanic cells that quickly corrode or leave a pit. Solution? Stainless steel tools—the logic being that using stainless on stainless, there will not be any contact corrosion, and therefore no rust.

Last year, the toolmaker launched a line of stainless tools aimed at curing this problem. The line includes screwdrivers, screwdriver insert bits, quick-release bolt-holders, and hex keys. *Practical Sailor* had the opportunity to try out Wera's Kraftform Kompakt 60 set, which comes with a Kraftform bit-holding handle; 16 interchangeable, 89-millimeter bits (Phillips-style screwdriver, Torx drivers, hex head, etc.); and a wallet-style belt pack. Aside from no longer having to clean corroded screws and their inevitable trail of rust, an-

other bonus of stainless tools is that you don't have to worry about them rusting, if they are properly cared for.

The drawback? They're expensive. The Kompakt 60 costs \$148. (Apparently stainless is worth its weight in gold these days.) While we are impressed with the tools' craftsmanship and like the idea of rust-free fasteners, at such a high price, we'll be sticking to trusty, inexpensive Craftsman set from Sears. But for those of you who spend a lot of time building boats and have a spare-no-expense budget, these are quality tools worth looking into. ▲



Wera Kraftform Kompakt 60

CONTACT

WERA TOOLS, 800/267-5541,
stainlesscrewdrivers.com, weratools.com

Another Take on Battery Life

Rugged wet-cell batteries, alternative energy sources, and careful maintenance pay off over the long haul.



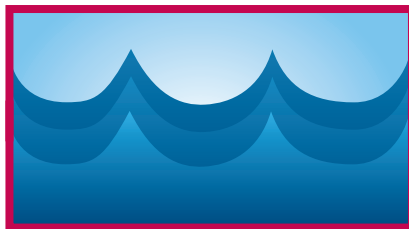
The energy demands of Balæna, a double-ended cutter designed by Kiwi Denis Brown, have increased greatly over the course of the last 10 years. Even so, its 450-amp-hour house bank is modest compared to other world cruisers.

By ANDY O'GRADY, S/V BALÆNA

While building *Balæna*, I was sure that we would never need a large battery capacity. With no electronic navigation aids and kerosene lighting—this was in the early 1990s—the only significant power drain was from a tricolor light that we used when there was shipping around, otherwise we used a kerosene lantern.

About 10 years ago, the rot set in, and we added radar, GPS, radios, computers, and other goodies. Though still meager, our power demands increased, and to meet those new loads, I fitted a higher-output alternator, multi-stage regulator, and deep-cycle batteries.

Two years later, we started a cruise that has taken us to every climate between the Southern Ocean and Arctic. During that time, we've followed a strict approach to onboard power management. By keeping our batteries charged and avoiding deep discharges, we've gotten eight long years of service from some relatively inexpensive



OCEAN TESTED

wet-cell batteries. Admittedly, our path may be impractical aboard some of the more power-hungry boats cruising today, but we hope this field report on specific products will be useful to all sailors.

The accompanying article, "Getting the Most Out of Wet-cell Batteries" (page 27), profiles a more standard approach to battery selection, charging, and maintenance.

UPPING THE AMP HOURS

After going through our first set of batteries far too quickly, I was lucky enough to meet Nelson Stevens, who had moved from the United States to open Wireless Chile, an alternative energy business in Chile. Stevens helped redesign the boat's system

Photos by Andy O'Grady

and supplied four Trojan 6-volt T105 deep-cycle batteries, rated at 225 amp hours each. The batteries were paired in series, and then the pairs were wired in parallel to create a house bank with a 450 amp-hour capacity. An 85-amp heavy-duty Bosch alternator, a Solarex 55-watt solar panel, a 75-watt Shell solar panel, and a Rutland wind generator (rated at 90 watts in a 22-mph wind) handle charging duties. Ideally, we'd like one more solar panel.

BATTERY INSTALLATION

Batteries like to be cool. Securing them fairly low in the hull keeps them cooler, and it also puts weight where it belongs. Batteries release hydrogen gas during charging, so the battery space should also be well ventilated. Unfortunately, our only available space is close to the engine compartment, so the batteries are occasionally warmer than I would like. With regard to battery performance and ambient temperatures, we've found that our wet-cell Trojan batteries hold up very well in the cold. While the boat was laid up in Labrador, cabin temperature dipped well below zero degrees F, but the electrolyte in the fully charged batteries did not freeze and the batteries held their voltage surprisingly well.

BATTERY CYCLING

Trojan recommends that these deep-cycle batteries should not be discharged greater than 50 percent of capacity and advises users to routinely recharge them to full capacity. We try to always keep our batteries above 70 percent and routinely recharge them as fully as possible. In practice, recharging batteries back to 100 percent presents a challenge for sailboats that do not have access to shore power.

The amount of current accepted by a battery tapers as it is being recharged. If a battery is deeply discharged, it accepts more current. As the state of charge increases, the battery will accept only a small current. Since we do not often cycle our



A wind generator and two solar panels (rated at a combined 120 watts) help keep up with charging demands for Balæna's house battery bank.

batteries beyond the 20 percent discharge level, the battery only accepts a fraction of our alternator's maximum 85-amp output. So, in our case, relying solely on the engine to top-off our batteries every day would be a waste of fuel. In fact, many people who rely primarily on engine time to charge their batteries adopt a deeper charging cycle—discharging to 50 percent and recharging to about 85 percent, the “sweet spot” in which the highest rate of charging can take place.

To maximize charging cycles without gobbling up our limited fuel supplies or incurring costly engine time, we quickly discovered the importance of solar panels. Even in Southern Patagonia, there can be plenty of sunshine in the middle of winter. The panels deliver the sort of current needed to top off the batteries. So even if you plan to rely on your alternator for charging, it still makes sense to have solar input and not use fuel trying to top off your batteries.

TRACKING SULFATION

Deep cycling and infrequent charging can lead to sulfation on the battery plates, which ultimately can shorten battery life.

This is not a major problem in our case, but to monitor this, we check the specific gravity of individual cells when fully charged. If there is a difference between cells, or worse still, none of the cells reaches the specified value, then we equalize. This involves raising charging voltage to 15-16 volts to soften up the hardened sulfates. This is tricky business. During equalization, the batteries become hot and lose water, so both temperature and water level have to be monitored. Otherwise you run the risk of ruining batteries or even causing a fire. *Practical Sailor* is long-term testing some of the newer “pulse” chargers that claim to combat sulfation without the risks commonly associated with equalization.

FLOATING HOME AND OFFICE

With our combination of solar (120 watts) and wind power, an 85-amp alternator, multi-step regulator, and efficient battery monitor, we are able to supply power for computers, navigation, lighting, SSB radio, modem, refrigeration, and best of all, music. We don't often run the engine solely for the purpose of battery charging.

Getting the Most Out of Wet-cell Batteries

Charging and discharging improperly are the most common causes of short life and premature battery failure, but starting with the right batteries is everything.

For house bank applications, batteries with thick plates designed for deep discharge cycles are needed. Unfortunately, batteries of all kinds now sport the deep-cycle label. Some thin-plate versions are billed as combination deep-cycle and starting batteries. Others are just automotive batteries with a marine label. True deep-cycle batteries are available, but you must ask. Several big names in the battery industry offer excellent marine deep-cycle batteries, but frequently, battery dealers offer lesser versions sold under the same label. A little research will go a long way here. Don't hesitate to contact the manufacturer directly for information on selecting batteries for deep-cycle service.

Sizing the battery bank correctly is important. Deep-cycle batteries only can be discharged to 50 percent of total capacity without the risk of permanent damage and shorter battery life. On a daily basis, it's common to only charge to 85-90 percent, particularly when the engine is used for charging. Charging to 100 percent requires an intolerably long engine run, and it's just not practical unless you're motoring anyway. This means that only 35-40 percent of the house bank's capacity is available to support loads between charges. If the battery bank is too small, it's easy to frequently drop below the 50-percent mark. A good temperature compensated battery hydrometer/density meter can help keep track of specific gravity. This, along with a high quality battery monitor should help you track battery state and charging regimens.

Poor charging habits contribute to poor battery performance. Temperature-compensated three-stage chargers and regulators do the best job of regulating the charge voltage, but you have to do your part. For maximum life, flooded-cell batteries need to be regularly brought to a full charge (at least each month), and should be equalized as needed. This isn't always easy to do when cruising, but alternate energy sources



The Trojan T105s wired in series have proven a durable combination aboard Balæna.

Photo courtesy of Trojan Batteries

like wind and solar power can ease the task by bringing the charge up the rest of the way after the engine is shut down, if onboard loads are light enough. Many cruisers with high power loads find the ideal re-charging impractical, and cycle the batteries between 50 and 80 percent with only infrequent full charges. Shorter battery life is an accepted consequence.

Flooded cells give off a small amount of vapor at the end of the charge cycle when some gassing is common. Overcharging prolongs this process and reduces the electrolyte or water level of the battery fairly quickly. Regular checking and servicing of the battery electrolyte is essential with flooded cell batteries. A charging system that reverts to a lower voltage or float mode when the batteries are fully charged will help to minimize loss of electrolyte due to gassing. Vapors created by charging are both explosive and very corrosive. Battery connections must be kept clean and coated with a good anti-corrosion lubricant to prevent corrosion. Among a whole host of other evils, corroded connections can adversely affect the operation of the battery monitoring and charging system.

BALÆNA'S BATTERY AND CHARGING EQUIPMENT

Compared to many modern cruising boats, which can chew through 120 amp-hours or more per day, our power demands are meager. I estimate our daily power consumption to average around 45 amp-hours in the tropics and 25 amp-hours in higher latitudes. We occasionally have much higher demands that we try to synchronize with periods of motoring.

While there may be better ap-

proaches for others, we're happy with the system. Eight years with one set of wet-cell house batteries and limited engine idling offers living proof of its economy. We hope the following summary of our experiences with the battery and related equipment will aid some other like-minded sailors:

- **Trojan batteries:** Relatively inexpensive and readily available worldwide, our thick-plate, 6-volt wet-cell batteries have served us well. Our four Trojan T105 batter-

ies are in excellent shape after eight years. Manufacturers talk in terms of the number of cycles a battery will last with either 50-percent or 80-percent discharge for each cycle. According to Trojan, our batteries will go through more than twice as many cycles if discharged only to 80 percent instead of 50, and our experience bears that out. In eight years, we have rarely, if ever, exceeded 50 percent. Our typical cycle is closer to half that. We constantly receive a charge from solar and wind power,

and it is not unusual for the battery state to remain steady even when we have high demands.

We have not found regular checking and maintenance to be a big chore. The only disadvantage is that, because the deep-cycle design leads to slow electrolyte percolation, high energy demands can cause the voltage to drop below what one would expect. This sometimes creates a problem with voltage-sensitive equipment.

• **Xantrex XAR “Smart” alternator regulator:** There is a growing field of “smart” alternator regulators marketed to the recreational marine market. *Practical Sailor’s* last test of regulators (Feb. 1, 1997) featured products from Balmar and Hehr Power Systems. On *Balæna*, we’ve been quite happy with our Xantrex XAR. All the circuitry is potted in resin to protect against moisture. Installation was easy. Bulk, absorption, and float stages are automatically controlled, and there is a manual equalization option. The user can select preset values for different battery types.

• **85-amp alternator:** Our Bosch alternator is a heavy-duty, high-output automotive model, internationally available, and therefore, inexpensive and easily serviced and repaired. The built-in regulator is easily replaced by a brush set from BEP electronics to which the Xantrex regulator is connected. We have had no problems with it, and the original brushes are fine after 10 years of use.

• **Battery monitor:** A precise battery monitor is essential to maintaining good battery health. Ours is a BMV 501 designed by Victron Energy, a European company that makes a full line of charging and power supply equipment for boats. The monitor provides an accurate measure of voltage, current, and the battery state of charge. *Practical Sailor* has also had good luck with the Xantrex XBM battery monitor (Chandlery, January 2008).

• **Battery relay:** It is essential to



The multi-stage Xantrex XAR alternator regulator (above) was set to match the charging specs for the Trojan T105. Victron’s BMV-501 (right) kept accurate track of the battery system’s health.



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separate the domestic and engine battery banks. The simplest system involves a manual 1-2-Both-Off switch. We had a BEP voltage sensing relay that directed charge to both batteries when needed, but that gave up the ghost. Although less than ideal, the new approach employs a heavy-duty 80-amp relay (activated with the starter switch) to insure the two battery banks remain isolated unless the engine is running.

• **Solar panels:** The total capacity is 120 watts, which yields a maximum of about 7.5 amps. This keeps pace with most regular requirements. However, as we spend more and more time on the computer, we would like to add another 75 watts.

CONCLUSION

By building a system from the ground up, we were able to select equipment that met our specific demands. While there may be better equipment out there, our selection has served us fine for more than eight hard years. We almost never use a marina and can’t imagine cruising any other way. ▲

CONTACTS

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TROJAN BATTERIES
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trojanbattery.com

VICTRON ENERGY
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victronenergy.com

XANTREX
408/987-6030
xantrex.com

The carefully machined drive gear in an Ideal windlass increases the torque created by the electric motor and delivers it to a vertical or horizontal capstan or chain gypsy.

Windlass Warning

The boatbuilding trend toward shiny, anemic anchor-haulers needs some careful watching.

There was a time when “built to last” was the bold theme that drove marine manufacturing. Cast bronze cleats, stem fittings, and other simple pieces of hardware commonly outlasted boats and their owners.

Today, however, there is an alarming trend toward obsolescence and carefully engineered adequacy instead of excellence. Accelerated gear deterioration has crept in from the automotive arena into the marine industry. For sailors today, the state of affairs is a lot like the days of clipper ships, when some mercenary owners settled on a 15-year lifespan as the right formula for a grain-carrying ship.

Today, premature obsolescence in recreational sailboats hurts both the builder and the owner. Fashion

trends and perceived value can be spun to close the initial sale, but real value is linked to how a boat and its hardware hold up over time. And when it comes to sailboats, there’s an assumption that down the road, there will be some lasting value left. Nothing demonstrates this better than high-quality marine equipment in used-gear chandleries or on deck, working like new.

A robust, rock-solid anchor



windlass is the classic example of gear that must stand the test of time. It qualifies as safety gear and is part of the insurance policy for a serious long-distance voyager. Its structure and reliability are counted on in a rough, gale-swept anchorage when being able to handle an oversized anchor and a hefty all-chain rode is a high-stakes game. And when the chips are down, and the primary anchor has fouled itself on a discarded bucket or abandoned scrap of twisted steel, rapid anchor retrieval and fluke clearing can mean the difference between safety and dragging ashore. Indeed, skimping on the windlass aboard a serious cruiser makes little sense.

Conversely, the day sailor, marina hopper, or those who infrequently anchor overnight may need neither heavy-duty ground tackle nor a heavy-duty windlass and its all-chain rode. For these sailors, the shiny chrome mushroom-like foredeck protrusion that in optimum conditions can choke down both rope and chain, may be just fine. But if heavy-duty ground tackle, and day-to-day anchoring are at the heart of your cruising game, the growing trend toward the faux-windlasses is a serious step in the wrong direction. Over the past five years, *Practical Sailor* has noticed that these minimal duty windlasses have migrated from lunch hook uses on production powerboats to the foredeck of smaller sailboats, and finally to larger sailboats deemed “long-range cruisers.”

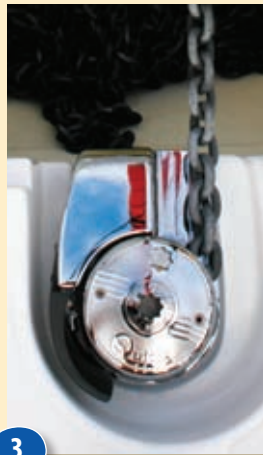
In order to get a second opinion on ground tackle handling systems, *Practical Sailor* Technical Editor Ralph Naranjo took a road trip to visit Cliffe Raymond, the owner of Ideal Windlass, a three-generation family-run marine manufacturer based in East Greenwich, R.I.



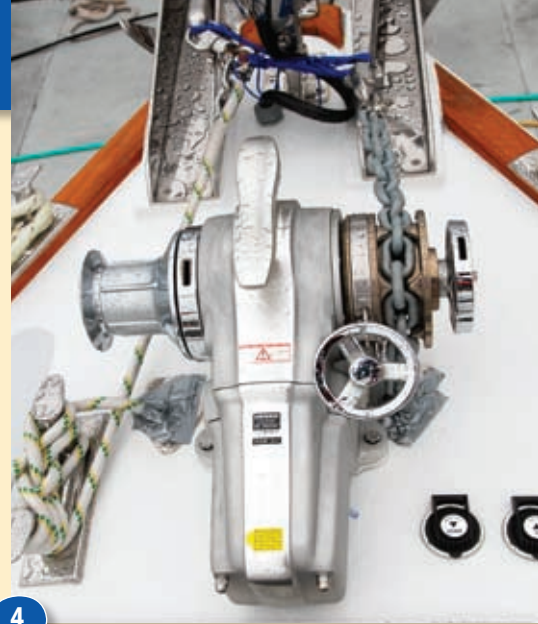
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4

Making Sense of Windlass Choices

Lighter-duty anchor retrieval can be handled by smaller, less obtrusive windlasses (photos 1-3, and 5), but when it comes to situations where the boat's safety and the crew's well-being are at stake, a heavy-duty, horizontal axis windlass—like the Lofrans Falkon on the Ted Hood-designed Expedition 55 (photo 4) or the Ideal vertical capstan windlass mentioned in the main story—is a more sensible choice.

The trend toward compact windlasses with average pulling power is apparent in the Lewmar V-Series (photos 1 and 2) and the Aster series vertical windlasses from Quick (photos 3 and 5). What *PS* finds most striking is how boat manufacturers are molding foredecks to accommodate these windlasses, complicating an upgrade or retrofit, should the owner decide to go cruising where serious pulling power is required.



5

In 1936, Ideal began making yacht ground tackle handling gear, and the company continues to follow the same basic design principals. Its gear has evolved, and market pressure has caused the company to add a line of “lightweight” alternatives, but what remains constant is an underlying premise that the structural safety margin of a windlass must be set up to accept the energy associated with the surging mass of a vessel, not just the weight of an anchor and chain.

One marine catalog states that “strain on the windlass should be limited to the weight of the anchor and rode.” Yes, under perfect conditions, a sailboat's auxiliary is used to break the anchor free, and the job of the windlass is simply to haul up the combined weight of the anchor and a length of chain equal to the depth of the water. Buoyancy even helps ease the windlass' burden slightly,

and a switch to a combination line-and-chain rode can make the “big lift” seem pretty lightweight indeed. However, this best-case scenario has caused many boatbuilders to downsize windlass power and structural ruggedness. Their assumption is: Why put all that extra weight and sheet-trapping bulk up on the foredeck where it will rob performance, increase cost, and clutter up the limited space?

The argument and trend toward light weight, less powerful ground-tackle handling gear sounds great right up until one realizes that windlass use isn't confined to calm-weather days. In truth, the worse the weather, the more important a windlass becomes, for the pitching mass of a 10- or 15-ton cruising boat will put four-digit strains on an anchor rode.

All anchor windlasses function in a somewhat similar fashion.

There's a power source—whether it be electric, hydraulic, or human-arm strength—that creates energy used to rotate a drum-like structure capable of engaging rope, chain, or a combination thereof. The case or housing transfers the loads imparted by the ground tackle, and it must be attached to the boat via bolts that penetrate the deck and are backed to spread significant loads.

Many manufacturers use a cast-aluminum housing that is secured to the deck with stainless-steel machine bolts, and due to the dissimilar metals and abundance of seawater cascading over the stem, galvanic corrosion can damage these attachment points. Most alloy housings now incorporate sleeved bolt holes that utilize a dielectric plastic to eliminate metal-to-metal contact. Adding a sealant to the bolt also helps to lessen the chance of corrosion.



Brushing Up on Windlass Repair

Cleaning up the drive motor and polishing the commutator and brushes can improve windlass performance. Many tried and proven windlasses used modified starter motors that incorporated a front plate ball bearing on the drive shaft. Water damage can cause this bearing to bind, and rust to accumulate on ferrous metal portions of the motor itself. Disassembly and a wire brush cleanup does wonders for adding longevity, and it's also a great time to check brush wear and commutator scarring. Check with your windlass manufacturer for gaskets, bearings, brushes, and other parts.

The commutator seats inside the spring-loaded brushes. Fine sandpaper can be used to clean the brush contacts, which are prone to wear and corrosion. A vice comes in handy (left) when trying to re-install the rotor assembly.

Windlass design, drive train construction quality, and reliability vary among products. Both vertical and horizontal capstan windlasses need a means of changing moderate torque and high RPM motor spin into high torque and low-speed rope capstan or chain gypsy rotation. The premier approach remains the use of a large gear driven by a small gear, with all rotating parts submerged in an oil bath lubricating the gears and heavy-duty bearings. The housing must be strong enough not to deflect under the full operational range of working loads. Smaller units utilize alloy-cased angle drives that also act as reduction gears. Their continuous load-carrying capability is much less than the rugged drive train shown in the Ideal BHW vertical capstan windlass.

The best drive systems utilize a shaft to engage a rope or chain drum by means of a clutch system. This approach allows the anchor and rode to be dropped quickly via a free-spinning drum rather than slowly deployed with a “power

down/power up” drive that’s permanently engaged. The latter is cheaper to make because no clutch is necessary, but an emergency recovery and reset process, done in the middle of a stormy night, can be quite challenging for those with a clutchless windlass.

Electric-powered windlasses normally use 12- or 24-volt DC series wound or permanent magnet motors. The latter can work in forward or reverse by a simple change of polarity. These windlass motors, like starters on diesel engines, have grown smaller and smaller. They do produce more torque per given size than older technology, but the small motors also tend to produce more heat. In the early days of electric windlasses, automotive starter motors were given a longer armature shaft, a ball bearing race to carry thrust loads, and put into service as the prime power source. Their rugged, heavy case, stout commutator, and brush assembly made for a long-term reliable power source, and one that could be rebuilt in any automotive electrical shop around the world. More vulner-

able to excess strain and overheating, today’s smaller, higher torque motors are more like fragile thoroughbreds compared to the plowhorse motors of the past.

POWER TO THE POINTY END

Delivering sufficient current is also a big factor in windlass wisdom. Wire gauge is dependent upon the length of the run as well as the demand of the unit, and many electric windlasses will draw 100 amps or more. Breakers that can handle 150 amps make sense, as do such ratings for solenoids that handle the current.

This kind of current load may require 0/2 or 0/4 cable being ducted forward to the bow. Such an effort and expense is more palatable if the boat has a bow thruster and these heavy-capacity conductors can do double duty.

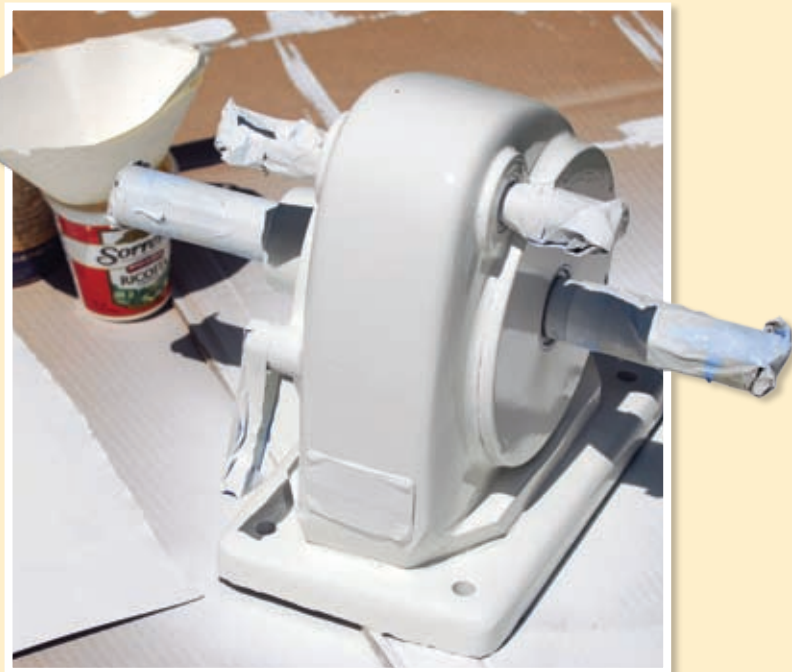
An alternative to such an extreme commitment to copper is going to a 24-volt system, which according to Ohm’s law, reduces the current demand by 50 percent and consequently allows for a reduction in wire gauge. It also adds charging complexity and

A Cosmetic Makeover for a Well-used Windlass

A complete anchor windlass makeover is more than a check of bearings, gears, seals, and the housing itself. This reliable hand-crank Nilsson windlass (right) is in the final stages of a refit, and paint work can turn a derelict looking piece of hardware into a “like-new” foredeck appendage. As with all durable high-gloss paint work, success hinges on thorough prep work. This is especially true with cast-aluminum housings that love to oxidize, especially under a glossy finish coat.

The key to success lies in the abrasive removal of all old paint, primer, and oxidation. Next comes a solvent wipe down, followed up with a single, very thin coat of etching primer, such as Interlux’s acid etch primer 353/354. As soon as the surface dries, overcoat with 404/414 barrier coat, scuff sand, and apply two or more coats of a one- or two-part urethane topcoat such as Toplac or Perfection.

Spray application offers the best results, but carefully follow all safety precautions. Insulating the bolt holes and windlass body from the stainless-steel mounting bolts will prevent galvanic corrosion that can harm the finish.



The proper primer and a durable two-part linear polyurethane paint can renew a decades-old windlass.

other undesirable constraints. So many look to the third option, placing a battery close to the windlass and sending forward only wires capable of carrying the charging current that the battery will need. Once again, what is saved in copper expenditure is more than made up for in charging complexity and concern over another battery. Most pros continue to recommend that welding size cables are the right answer, and they remind installers to protect this cable with a fuse or circuit breaker that’s close to the battery terminal.

MANUAL WINDLASS

The world is not short of savvy old salts who continue to row dinghies and crank up anchors and chain by hand. They recognize that less complexity and more reliability makes sailing more enjoyable. They also see the merit of keeping sailing as a physical rather than button-pushing activity. Manual windlasses are a viable alternative, not just for smaller cruisers. Their longevity and ability to be rebuilt make them a product that can re-

ally stand up to the test of time.

Back in the late 1970s, Naranjo swapped an unopened box of B&G wind instruments he never found a pressing need to install for an all-chain anchor rode and a hand-crank Nilsson windlass. Since then, the windlass has been unbolted from his 41-foot Ericson’s foredeck a couple of times to be sanded and painted and its aluminum mounting feet replaced with a solid GRP base.

The oversized reduction gear and large double-clutch plates make chain handling a safe and easy process, and the horizontal pattern allows gravity alone to strip the chain from the gypsy. A simple rotary cranking motion with a 10-inch diameter handle provides enough force to manually retrieve a 45-pound CQR and 3/8-inch BBB chain. The boat’s engine and buoyancy are used to break the anchor free, and when surging loads are transferred to and from the windlass, its extra heavy-duty structure and design have paid off.

Robust solid bronze castings, a

substantial main shaft, and large chain gypsy and rope drum diameters are all signs of a well-made and useful piece of gear, regardless of whether it’s manually, electrically, or hydraulically powered. For new boat buyers whose cruising plans include a good night’s sleep in strange new anchorages, it pays to confirm that your boat’s chosen windlass was selected for ruggedness and reliability, not for its pretty looks, sleek profile, and cost effectiveness. ▲

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Teak Sealants: Chemical Fanfare

A fresh look at our test panels reveals how the products stand up to chemicals commonly on board.

Two years after the test began, Practical Sailor rates the teak caulks on durability and chemical resistance. Among the leaders is the still-pliable Teakdecking Systems SIS 440, shown here being flooded into a decking seam at the company's Sarasota, Fla., facilities.

In June 2006, we began our test of seven caulks advertised for use in teak-deck seams. The goal was to evaluate each product on the four basic qualities anyone choosing a teak-deck caulk would want: ease of application, adhesion, durability, and resistance to chemicals.

The September 2006 issue reported on each product's ease of application, and in the March 2007 issue, *PS* rated the caulks on pliability, durability, and adhesion. In this update, we take a look at long-term durability and how each caulk reacts to multiple chemicals. Down the road, we'll test the products' strengths to failures and will rate the caulks' overall performances, based on all of the previous tests.

WHAT WE TESTED

Our caulk test group is a mix of polysulfide, polyether, silyl modified polymer (SMP), and silicone-based products, as well as both one- and two-part products that include three BoatLIFE caulks, Bostik/Simson Marine Special Range Deck Caulk Plus, MARITIME Teak Deck Caulk, Teakdecking Systems (TDS) SIS 440 Teak Deck Caulking, and West Marine's Multi Caulk Sealant.

Noticeably absent are products from 3M and SIKA, both well known companies in the marine caulking arena that either do not have a product recommended for use on teak decks, or (in the case of SIKA) have one, but do not market it in the United States.

HOW WE TESTED




One of our primary goals was to see how well each caulk could hold up not only to the torture of ultraviolet (UV) rays, but to the chemicals that teak decks are likely to be exposed to during their lifetime. So, we applied a 4-inch bead of each test caulk to 16 different teak panels (8 inches by 4 inches), and then doused them regularly with the chemicals.



Thirteen of the panels were exposed to a single chemical; one was alternately exposed to each chemical; and another (our control panel) was exposed to no chemicals. Yet another

The teak caulks being tested are: (from left) BoatLIFE Life-Caulk Type P, BoatLIFE Teak Deck Sealant, BoatLIFE Life-Caulk, Teakdecking Systems SIS 440, MARITIME Teak Deck Caulk, West Marine Multi-Caulk, and Bostik/Simson MSR Deck Caulk Plus.



PS VALUE GUIDE TEAK CAULKS at 2 YEARS

CAULK	BOATLIFE LIFE CAULK	BOATLIFE TEAK DECK SEALANT	BOATLIFE TYPE P	BOSTIK / SIMSON 	MARITIME TDC 	TEAKDECKING SYSTEMS 	WEST MARINE MULTI-CAULK
TYPE	Polysulfide based	Silicone based	Polysulfide based	Silyl modified polymer	Silicone based	Silane polymer	Polyether based
PRICE*	\$19 Cleaner: \$16 (pt.) Primer: \$18 (6 oz.)	\$16	\$68 / qt.	\$12.50 Cleaner: \$11.50 (pt.) Primer: \$39.50 (pt.)	\$9.50 (Sold by the case)	\$11	\$13
CURE TIME	7-10 days	24 hours	24 hours	7 days	24-48 hours	48 hours	2 days
EASE OF APPLICATION	Good	Good	Fair	Good	Excellent	Excellent	Good
DURABILITY/CHEMICAL RESISTANCE (AT 2 YEARS)	Fair	Poor	Fair	Excellent	Excellent	Excellent	Fair

 Recommended  Best Choice *per 10.6-oz. caulking gun cartridge, unless noted

er—coated with a wood finish—was dropped from the test when it was obvious no chemicals were getting through the finish.

After a two-week curing period, all test panels were mounted outside, fully exposed to the weather, and given the initial chemical dose. Testers then applied the chemicals once a month for the following two years. The panels and each caulk bead were thoroughly saturated each time.

The chemical lineup included gasoline, diesel, motor oil, ammonia, household bleach, acetone, Star brite Teak brightener (oxalic acid), WD-40, brush cleaner, Fantastic multi-purpose cleaner, Murphy's Oil soap, Methyl Ethyl Ketone (MEK), and a heavy-duty bilge cleaner from West Marine. The caulks seemed to have the hardest time with acetone and MEK.

Our test was admittedly harsh—it's doubtful any teak deck has been tortured to the extent our test panels were. But it was intended to determine which caulks held up the best to chemicals.

A number of factors come into play when deciding just what makes a teak-deck caulk the easiest to apply. Everything else being equal (product quality, durability, etc.), ease of application to us means a quick curing, one-part caulk requiring no special cleaners or primers (both of which can add significantly to the job in terms of money and time). Spending \$18 for a 6-ounce can of seam primer plus the additional step required to prime each seam—and waiting for the primer to dry before caulking—

are good examples of things that impact application ratings.

Similarly, a caulk that can be sanded after 24 hours is preferable. We also consider one-part caulks to be less of a potential headache than two-part caulks. Even though you follow the directions for mixing to the letter, there's always that nagging worry it won't cure properly, or—horror of horrors—you somehow manage to tip over the can during mixing. (You were mixing it on the dock and not the deck, right?) One-part caulks come pre-mixed in nice, safe tubes or sausages, helping us protect ourselves from such self-inflicted woes.

For this evaluation, testers scratched, poked, and probed each caulk bead with their fingernails, and then ranked each on its pliability, texture, and overall physical condition for each chemical panel. A rating of Excellent indicates the caulk was still firm, supple, and in excellent condition. A rating of Fair indicates that the product was still in decent shape, but that testers were able to make permanent indentions in the caulk with a thumb nail and were able to remove some of it by scratching along the length of the bead. A rating of Poor indicates that large chunks of the caulk were easily removed with a thumb nail and that overall, the caulk's condition was clearly inferior.

WHAT WE FOUND

During our first caulk checkup (March 2007 issue), which was just eight months into our long-term evaluation, testers found that each of

the seven products was holding its own with no signs of deterioration or damage. At that time, the softest caulk (West Marine Multi-Caulk) had the resilience of a neoprene wetsuit, while the hardest caulk (BoatLIFE Life Caulk) was slightly firmer than a pencil eraser.

However, now—two years after the application—testers found some eye-opening differences.

BOATLIFE LIFE-CAULK

Life-Caulk is a one-part, polysulfide-based rubber compound advertised for use above and below the waterline on fiberglass, wood, metal, and glass. It's not recommended for use on plastics.

It was in the middle of the pack in our chemical test, earning good ratings on most panels, but only fair on the acetone, MEK, and WD-40 panels. The Life-Caulk beads on those panels hardened considerably, lost some adhesion, and were dry to the point that chunks of caulk were easily scratched off.

Bottom line: At \$19, Life-Caulk Type P was one of the more expensive caulks tested. As for chemical resistance and longevity, Life-Caulk rated Fair overall and was not at the head of the class after two years.

BOATLIFE TEAK DECK SEALANT

Teak Deck Sealant is a one-part, silicone-based caulk advertised as resistant to teak cleaners, teak oils, gasoline, and diesel fuel. The Teak Deck Sealant test beads appeared in good shape, but all of them—including the control—were easily damaged with



Beads of each test caulk were applied to more than a dozen wood panels, which were mounted outside and exposed to various chemicals regularly.

a tester's thumb nail. Most of them maintained their elasticity, however, the bead on the All Chemicals panel lost adhesion, and testers were able to scratch chunks off the MEK victim with little effort.

Bottom line: BoatLIFE Teak Deck Sealant received a Poor in this durability test.

BOATLIFE LIFE-CAULK TYPE P

This product is a pourable, two-part polysulfide deck and hull seam compound advertised as resistant to teak cleaners, oils, fumes, gasoline, and diesel.

Testers found that the Life-Caulk Type P was holding up well after two years, rating Good on most chemical panels. The acetone bath did the most damage, however, the control panel bead still looked



good—supple and not dried out like the BoatLIFE Deck Sealant.

Bottom line: The only two-part caulk tested, Life-Caulk Type P costs \$68/qt and requires no special seam primers. It rated Fair overall in our chemical resistance/durability test. Performance-wise, it's comparable to BoatLIFE Life-Caulk.

BOSTIK / SIMSON MSR DECK CAULK PLUS

MSR Deck Caulk Plus is a one-part, silyl-modified, polymer-based caulk. According to the manufacturer, it is permanently elastic between -40°C to 100°C, and is extremely resistant to UV, temperature extremes, cleaners, and exposure to fresh and salt water. Our test beads of the MSR Deck Caulk Plus are still in excellent condition, maintaining pliability and adhesion.

Bottom line: MSR Deck Caulk Plus lives up to its claims and is impressive even after two years of chemical baths. It's one of our three top picks so far. MSR's downside is the need to prime each seam, and the cost of the special seam cleaner (\$12 a pint) and primer (\$40 a pint).

BoatLIFE Teak Deck Sealant performed in the middle of the pack. After two years, the test beads had dried out and were cracking.

MARITIME TEAK DECK CAULK

MARITIME Teak Deck Caulk is a one-part, “neutral curing, silicone adhesive sealant specially formulated for caulking teak decks” with “excellent temperature stability and resistance to chemicals and ultraviolet rays.”

Another top performer, the MARITIME test samples are still pliable and strong. All but one test bead received top ratings—the one that was doused with ammonia—and it still received a Good rating.

Bottom line: MARITIME Teak Deck Caulk is rated Excellent and is included in our top three picks.

TEAKDECKING SYSTEMS SIS 440

According to TDS's literature, SIS 440 is a one-part, paste-like oxime cure system that forms a tough, flexible rubber compound; it does not sag during cure, and when cured, it has excellent temperature stability and chemical resistance. SIS 440 held up admirably to the onslaught of chemicals and cleaners. Testers gave it across-the-board Excellent ratings as it maintained adhesion and pliability without drying out or crumbling.

Bottom line: The TDS product showed Excellent chemical resistance and shows long-term durability at the two-year mark.

WEST MARINE MULTI-CAULK

Multi-Caulk Sealant is a polyether-based caulk billed as a versatile, waterproof sealant for use in teak-deck seams, bedding fittings, etc. It can be used above and below the waterline; with fiberglass, wood, glass, and metal; and claims to be unaffected by teak cleaners and brighteners, and oils and fuel.

Multi-Caulk received a mix of ratings, Good to Poor, in the chemical resistance test and had a particularly hard time with motor oil, MEK, Murphy's oil, ammonia, and the Fantastic. Although the Multi-Caulk beads were still somewhat pliable, many were easily scratched by our tester's

thumbnail. The control panel Multi Caulk, with no chemical interaction, was rated Good.

Bottom line: The West Marine Multi-Caulk performed in the middle of the pack in this test.

CONCLUSION

Although the challenges of evaluating in two years a product that should last seven to 10 years are readily apparent, we were still able to make some hard and fast conclusions about the caulks and whether we would or would not use them on our own teak seams, particularly considering the time and effort involved in the re-caulking process.

Two silyl-modified polymers, Teakdecking Systems and Bostik/Simson MSR Deck Caulk Plus, along with the silicone-based MARITIME, are our top picks for chemical resistance and durability at two years. We gave the TDS caulk the edge due to its slightly better performance in chemical testing, and its better pricing and availability.

For more on teak caulk application notes and ratings, revisit “The Great Goo Chase Begins” (September 2006) or check out “Teak Caulk Update 2007” (March 2007) at www.practical-sailor.com in the “Tools and Techniques” section. ▲

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- **AUGUST 2008:** Navy 44 MkII; Inflatable PFDs with Harnesses; Garmin vs. Raymarine chartplotter head-to-head; Topside Paints Test; Catalina 22 refit report; Storm Trysails; Snatch Blocks Update: Ronstan Blocks; Chandlery: Boatsense boat alarm; PS Advisor: Painting Your Deck
- **JULY 2008:** 10-foot Rigid Inflatable Dinghy Shootout; Safety and Electronics for the Singlehander; Standard Horizon CPV550 review; Foul-weather Gear for Women; Inflatable Fenders; Mooring Chain Test Finale; Chandlery: Summer reading list, Walker Bay Airis inflatable kayak, Crocs kneepads; PS Advisor: Troubleshooting AC units
- **JUNE 2008:** Singlehanded Sailing Part 1; New Inflatable PFDs without Harnesses; Flir Thermal-imaging Camera Review; Aftermarket Bowsprit Kits; Baseball-cap Style Hat Test; Medical Kits for Coastal Cruisers; 12-volt Inflators; Chandlery: Natrapel bug spray, Freezer Safe fridge thermometer, West System G-Flex epoxy kit, power tools for restoring gelcoat
- **MAY 2008:** Weta multihull; Practically Green: 'Green' Maintenance products for boaters; Aussie Barbecue Grills; MOB alarms and direction-finding devices; Internal Holding Tank Sensors; Collinite vs. Meguiar's topsides wax; Headlamp Test; Chandlery: Norcross Hawkkey handheld depth sounder
- **APRIL 2008:** Beneteau 46; Forward-looking Sonar; Medical Kits for Small Boat Sailors; Updating Digital Charts; Exterior Wood Coatings Test: Teak Oils; 12-volt Cabin Fans; Paint Stripper Redux; Chandlery: Whirley Bird, FiveFingers, Steer-iT tiller tool
- **MARCH 2008:** Etap 28s; Furlers for Light-air Sails; Walker Bay Tubes on Rigid Dinghy; Bi-annual Bottom Paint Test; Teak Cleaners Test; Inflatable Boat Cleaners; Chandlery: Rydlyme vs. MaryKate On&Off
- **FEBRUARY 2008:** 30-foot Classics Under \$20,000 (Tartan 30, Pearson 30, Catalina 30); Mainsail Handling Systems; Men's Foul Weather Gear Test; Holding Tank Gauges; Hand-bearing Compasses; 'Master and Commander' Review; Chandlery: A METS Recap
- **JANUARY 2008:** Shannon 37 and 38; Special Report: Navigation Basics; Anchor Test Update; Raritan vs. Jabsco marine heads; VHF External Speakers; Trailer Jacks Test; Navigation Software; Chandlery: Xantrex battery products
- **DECEMBER 2007:** Gear of the Year 2007; Exterior Wood Coatings: Two-part varnishes; Flashlight Test; Special Report: Nylon Lines; Riding Sails; Winter Reads; Walker Bay Genesis Review; Chandlery: Port-o-Flush, boat show update, and Slam Waterproof Laptop Pack
- **NOVEMBER 2007:** Hanse 400; Remote VHF Mics; Torquedo Electric Outboard Review; Radar-reflective Tape Myth Buster; Hull Cleaners Test; Power Tools for Cruising; Bottom Paint and Wax Field Test Results; Chandlery: Multitools, LED lights, Dax OneTouch winch handle, and Bridgenorth Bailer
- **OCTOBER 2007:** TomCat 9.7; Semi-annual Bottom Paint test; Cheap Charting Software; Exterior Wood Coatings: Synthetics and Stains; Special Report: Core Materials; Flexible Water Tanks; Chandlery: Velocitek and Cruising Solutions headset
- **SEPTEMBER 2007:** Sydney 36CR; Outboard Brackets Test; Cruising Software: Offshore Essentials; High-tech Rigging Review; Standard Horizon CPV350 Evaluation; Dock Cart Test; Anti-corrosion Sprays; Chandlery: Solar Stik solar panel and mounts
- **AUGUST 2007:** Pearson 32; Cordage Review: Halyards; Snatch Block Test; The Dark Side of Fiberglass; Plotter/Sounder Update: Garmin 498C; Navigation Software: Nobeltec Admiral 9.1; Exterior Wood Coatings: One-part Varnishes; Chandlery: Fast-drying Wick-er Warmup Towel and Waterproof Ego iPod Case
- **JULY 2007:** Far Harbour 39; Wind Generators Part II; Survival Suits Test; Galley Range Bake-off; Mooring Chain Check-up; Women's Sailing Shoes; Chandlery: Sea Breathe snuba rig
- **JUNE 2007:** Balboa 26; 9.9 hp Outboards; Wind Generators Part I; Satellite Weather Services Test; Infant PFD Follow-up; Sunscreen Review; Men's Sailing Shoes; Chandlery: Hurricane Mooring Bridle Plate
- **MAY 2007:** Hallberg-Rassy 342; Life Raft Survival Packs; Fuel Tank Replacements; Ocean Tested: *Southern Cross* reports; Handheld Weather Instruments; Portable, 12-volt Fridges; Hull Restorer Finale; Chandlery: Barnacle Buster
- **APRIL 2007:** Six-man life rafts test; Throwable MOB Devices; Jacklines Evaluation; Ocean Tested: Raytech RNS 6.0; Thermoelectric Coolers; Corrosion Inhibitors; Chandlery: FilterBoss fuel filter and Bike Friday
- **MARCH 2007:** Morgan 41, Life Rafts Guide, VHF Antennas (big sticks); Ocean Tested: AIS Radar; Tool Tips; Maintenance Special: One-step Waxes, Freshwater Paints, Teak Caulks; Chandlery: Wonder Wash, Countertop Spin Dryer, Fish Bags
- **FEBRUARY 2007:** Ocean Tested: Drivetrain, KiwiProp; Bottom Paint Checkup; 3-dB VHF Antennas; Float Coats; Ralph's Rant: Marine Metals; Riprap: Shoaling concerns and the new EPIRB ban; Chandlery: OneTouch Winch Handle, SeaPak desal system
- **JANUARY 2007:** Ericon 41; Safety Tethers; Pet PFDs; New Anchors; Ocean Tested: Gear that Survived 85,000 Miles; Ethanol vs. Fuel Tanks; Bronze Cleaners/Polishes; Chandlery: Battery Desulfators, Jabsco Oil Changer
- **DECEMBER 2006:** Valiant 42; Gear of the Year; Small Outboards Test (2-2.5 hp); Safety Harnesses; IS Binoculars; Chandlery: Quickline, SeaFever gear, Shackle Dog, Key Buoy, Calendars

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Wanted: A DC-DC Converter

Reader looks to downsize his battery bank.

I've created a 24-volt system by connecting two 200-amp-hour 12-volt batteries in series to drive an electric outboard as auxiliary power for our 25-foot sailboat. The 24-volt bank will be charged using a 24-volt charger on shore power and by a 24-volt series of solar panels when mooring.



PS ADVISOR

characteristics that make the use of a typical DC-DC converter as a replacement for batteries essentially impossible. Besides the back EMF (electromotive force) issue that you mention—which is quite correct—there is also

the matter of motor start-up current measured in amps, as well as the typically high amperage that motors need to run continuously. Start-up current for any motor, AC- or DC-powered, can often run as much as four to six times the continuous running current or amperage. So let's say the running current draw for a motor is 5 amps; its start-up current draw might be as high as 30 amps. A motor that draws 50 amps continuously could conceivably draw as much as 300 amps on initial start-up. Granted, this start-up current draw is usually measured in milliseconds. None-the-less, the power-providing equipment has to be capable of delivering the needed current just to get things going.

In our search of DC-DC converters, we found no such equipment available. Batteries as power-storage devices, with high current discharge capability—typically measured in either CCA (cold cranking amps) or MCA (marine cranking amps)—are the only way to power your system.

I would like to eliminate the 12-volt batteries. I bought a 24- to 12-volt converter to stand in place of the 12-volt batteries, but I learned that the converter is not compatible with driving any kind of motor due to the back-voltage created by the collapsing field when the motor stops. I have a freshwater pump and a motorized outboard-motor bracket, so this particular converter is out of the question.

Do you have any suggestions? Must I maintain a 12-volt battery for all the 12-volt equipment or is there a step-down technique?

Michael Hoffman
Concord, Mass.
Puffin, Com-Pac 25

Unfortunately, you are working with electric motor circuits in your electric outboard, its lifting bracket, and your potable water pump.

In electrical systems, motor circuits fall into a special category generally described as “inductive” loads. This load type has several

SEALING LPG FITTINGS

Planning to change my propane regulator and fittings, I began looking for the best sealant to use on the brass NPT fittings. After a half-hour on the Internet, and talking to a couple of chandleries and other boaters, I was surprised at the varied information I received.

What do you think is the best way to seal the brass fittings for marine use? I tried the “use nothing, brass NPT will self-seal” approach and can say that, in my experience, it does not.

Frank Tansley
Grace, Hans Christian 41/T
Ventura, Calif.

According to Trident Marine, maker of marine hose and LPG systems, the only self-sealing NPT fitting is the 45-degree SAE flare fitting. For others, the company suggests Teflon tape, a Teflon thread compound, or Loctite.

Brad Clarke at Force 10, which manufactures top-rated LPG galley stoves (July 2007) and marine grills (June 2006), said you must be sure to use a high-temperature acrylic sealant. He recommended Loctite 567, a smooth and creamy, one-part thread sealant. To apply, clean the fittings with a compatible solvent. Distribute a 360-degree bead of the 567 to the male fitting and put the fittings together. Properly sealed fittings will seal instantly. A minimum 24-hour cure time is required.

For more on Loctite and its application, visit the manufacturer's website, www.loctite.com.