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The Marine Maintenance Magazine

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Issue #3 2010

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The Cockpit Issue

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DIY BOAT OWNER

Issue #3 2010

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DIY One Year Later

It's hard for us editors to believe, but it was one year ago this month that Mad Mariner took the helm of DIY Boat Owner. It seems like just weeks ago that we were trying to figure out when the magazine was published and where the keys to the P.O. Box were stashed. A lot has changed in 12 months.

As you may have noticed (we hope so), we redesigned the magazine to give it a more modern feel, with an expanded table of contents to make articles easier to find. We also added honest tool and gear reviews, a section dedicated to marine technology in all forms, and a Success Stories feature that highlights projects done well.

But DIY is more than a magazine and we did not stop with the print edition. DIY-Boat.com now publishes a new story every weekday. Our hope is that the Solution Center blog will be a resource you can use to get questions answered, either in an article or directly in our Ask the Experts feature.

We also send you a newsletter every Friday, which highlights what's new on the website and includes a section on deals and discounts, which might save you a buck or two.

More recently, we launched a series of DIY Skills Classes nationwide, which are designed to provide information on specific topics like engine maintenance or rigging (you can read more on page 19). Unlike other classes, which take days and cost hundreds of dollars, Skills Classes are taught in a single afternoon—and the cost won't sink you.

Of course, we still offer 13 DIY eBook Archive Collections, with articles on topics like plumbing, fiberglass and refinishing. But we changed them to downloads, rather than CDs, so you get them right away and you don't have to pay for postage.

And there's more coming. For example, we are redesigning DIY-Boat.com to make the website easier to use and we are creating new eBooks on an expanded range of topics.

In the last year and into the future, our goal remains the same: to make your subscription more and more useful—more articles, more information, more help maintaining that hole in the water, so you don't have to pour in quite so much money.

As always, we hope it helps.

Glen Justice
Editor

DIY BOAT OWNER

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The Marine Maintenance Magazine ™
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Tools & Gear

We Test So You Don't Have To

Stain-Less Water Filter Softener Does the Job

8

There was a lot of curiosity on the dock when I showed up with the Stain-Less Water Filter Softener.

The filter removes minerals from the water by using resin beads that produce an ion exchange and extract hard water elements. If your marina is on well water, it removes calcium, magnesium and iron.

My test was on the standard-size filter ($350), which is rated to handle up to 5,000 gallons of water before "recharging." The mega size is rated for 8,500 gallons, and the mini for 1,000 gallons.

It took only 10 minutes to hook up. All I had to do was attach the supplied 4-foot hose to the filter and attach my water hose. I used Teflon tape on the threads, turned on the dockside water and there were no leaks. It was that easy.

After washing several boats, everyone agreed, the soap got the boats cleaner with the soft water. It was easy on people, too. Hard water also does a number on your hair, especially if anyone in your crew has permed or colored-treated locks.

Another benefit was the improvement of the water's taste and smell. One guy on the dock was so impressed that he filled his water tanks and a big cooler for drinking water before shoving off on a trip.

The filter is small enough to put on the boat if you're cruising. It could also be kept in a small dock box (cut holes in each end of the dock box for the hoses, and you can keep the filter locked up out of sight).

One problem was that there is no way to know when the filter needs recharging. But the good news was that recharging is easy: just use a handful of water softener salt pellets (available at any home improvement store) in the pre-filter and back flush for 15 minutes until the salt dissolves.

– Nyla Deputy

PROS: Priced lower than many filters and lighter than expected.

CONS: No way to determine when the unit needs recharging.

www.stainlesswaterfilters.com

DIY Rating System

10. *Everyone should own this*
9. *A very strong product*
8. *Strong, with a note or two*
7. *A fine product*
6. *Good for some applications*
5. *Think about it first*
4. *We don't recommend it*
3. *Product has major flaws*
2. *Don't buy this*
1. *Don't even look at it*

photo by Nyla Deputy

Bheestie Bag Earns Some Respect

Imagine you drop your phone, your iPod, your camera or some other precious electronic item into the drink. It shouldn't be hard. Most of us have done it.

Your gadget is dead, right?

7

Well, maybe not. The folks who make the Bheestie Bag say that their product, a sealable foil-covered plastic bag filled with absorbent chemicals, can revive soggy electronics much of the time.

The bag, which costs $20, has gained a lot of attention, with mentions in Bloomberg Businessweek and on NBC's "Today" show, and the company invited us to test it. The ability to dry electronics would be useful on just about any boat, so we took up the challenge.

After subjecting an innocent BlackBerry to some watery torment, we found that the bag shows promise. It is not a perfect solution—and it cannot bring back wet electronics all of the time—but it may still have a place on your boat.

THE WET

For starters, the bag is designed for maintenance, rather than emergencies. The company's theory is that personal electronics get wet, thanks to sweat, humidity and rain, and that these elements increase corrosion and wear. Dry your gear out regularly, the company reasons, and you will extend its life span.

The company also says it can save soaked electronics in some cases. In one website testimonial, a customer tells of dropping a mobile phone into his Coke at an Astros game and reviving it with a Bheestie Bag. But the company makes no guarantees.

The bags are 6 inches wide and 9 inches long, with a heavy-duty seal at the top, and they contain a packet of pellets that absorb water. They last about a year when used for normal drying, according to the company. Blue "indicator" beads in the bag turn gray when it is spent.

We tested the Bheestie Bag (the name comes from the dictionary definition, which is a servant who carries water) on a beach in Puerto Rico, trying hard to simulate an actual accident.

We took a well-worn—but fully functioning—BlackBerry phone with a full charge and dropped it into the sand at the waterline. We then let the salty ocean surf wash over it for a brief moment.

When we took the BlackBerry out of the water, it was vibrating and the screen was frozen. We disassembled it into phone, battery and backing plate; dried the components with a shirt as well as we could; and popped them into the Bheestie Bag, following the instructions. The wait was on.

THE DRY

The company that makes Bheestie is careful with its claims when it comes to truly wet electronics. It recommends drying them for 48 to 72

photos by Glen Justice

hours and makes it very clear that even that may not save your gadget.

"Bheestie was created for everyday moisture removal, but has also done some amazing revivals of soaked electronics," it says on the bag. "It has dried and returned to working condition, cell phones, iPods, watches and other electronics that have been washed in washing machines, soaked by rain, dropped in drinks and even gone swimming! We can't promise your electronic gear can be saved after an encounter of this kind, but Bheestie may be the only thing that can bring it back to life!"

A letter from the company that came with our bag elaborated: "Bheestie's success rate for drying out submerged electronics is about 96 percent, but we want to point out that there is no guarantee that an electronic will be saved," it said. "Every situation is different."

It does claim to be better than home-spun remedies like cat litter, rice, ovens and blow driers.

In our test, we waited about 26 hours before opening the bag and assembling the phone. When we pushed the button, the phone activated and rebooted. We got a desktop screen, but the battery died moments later.

We then put it in a charger and tried again. This time, we got an active screen and the track ball would move the cursor — but we could not get functions like phone or e-mail to load. It went back in the bag. About 23 hours later (49 hours total), we tried it again and got the same result. It went back in the bag again for another 26 hours (75 total), but to no avail.

THE RESULT

In the end, the Bheestie Bag could not revive our phone. The data were probably intact, because we could see a count of unopened e-mail, and a tech shop may have been able to bring it back. But we could not.

It is worth noting that we dropped it in saltwater, and that salt is heavily corrosive. A freshwater dunk (or rinse) may have brought a different outcome. Our phone was also worn, and a newer phone may have fared better.

Whatever the case, the Bheestie Bag is not a sure-fire way to bring back wet electronics. It gives you a shot—and that's all.

But that doesn't mean the Bheestie Bag has no value. The theory behind the product—using chemical drying agents to combat moisture—is sound. Legions of boaters practice this every year, using products like Star brite's No Damp to dry out lockers, drawers and cabins.

The Bheestie Bag trains that same idea on your electronics, with a relatively inexpensive product that is both rugged and mess-free. Budget-conscious boaters may argue that similar results can be had with a heavy resealable bag and some desiccant, which is available at most marine stores. That may be true—we have not tried it—but it may also be messy and it will definitely take more effort.

If you have a mobile phone, iPod or similar electronic device that lives on the boat, preventive maintenance to remove moisture is probably a good idea—especially if it's a device you rely on. The Bheestie Bag offers a simple and inexpensive solution that requires almost no effort. A bag or two in a locker for maintenance and emergencies will probably benefit most boats. Save or no save, the Bheestie Bag is a solid product.

– Glen Justice

PROS: A simple and relatively inexpensive solution for routine maintenance—and a shot at saving drowned gear.

CONS: There is no guarantee it can bring soggy electronics back to life.

www.bheestie.com

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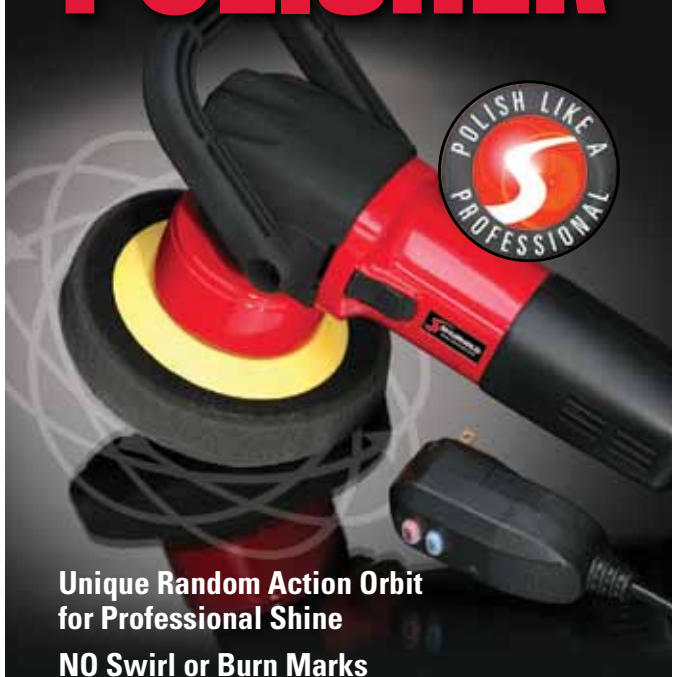

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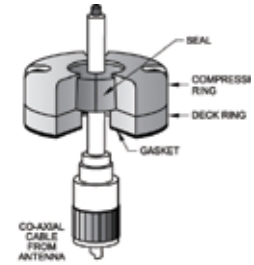
Tools & Gear

CableClam a Smart Solution

7

Deck glands, used to create watertight seals through which electrical cables pass and water does not, normally require connector ends to be removed and later reattached.



CableClam Cutaway Drawing

The CableClam by Blue Sea Systems, approximately $20 depending on size, dispenses with this, allowing the connector to stay on the wire. It can even be removed and reinstalled each season, which is especially helpful with mast VHF and multi-wire radar cables.

The product consists of a round shell that mounts on the boat and another shell with a modifiable gland that goes on your cable, together creating a watertight seal. Three sizes are available providing a hole for connectors up to 0.68, 0.83 and 1.39 inches.

Making the hole in the gland the correct size was a minor challenge (use a Dremel tool and don't slit the seal until the hole is sized correctly). Also, be warned that the hardware mating the two sides of the gland is easy to overtighten, though the instructions contain a clear written warning.

Overall, the installation took some care, but it was well worth the effort to avoid purchasing and reinstalling new VHF connectors.

– Dan Corcoran

PROS: Ideal for passing wires through your deck.
CONS: Far too easy to overtighten.

Little John Portable Urinal

9

There are times when popping below to relieve your bladder isn't safe or prudent. Even when you make it below, your aim can be compromised in rough weather. And using the rail can be a problem, especially in mixed company.

One solution is the Little John Portable Urinal ($9.99 at Amazon.com). The plastic bottles, which hold two cups, are a common and inexpensive feature in the sanitation aisle of most marine stores. It's easy to use, unless you're addicted to skin-tight skivvies, and can be discreetly inserted up the leg of your shorts to do the deed.

A secure cap can then be screwed on, where it stays until the contents can be properly disposed of in the head. There is also a "Lady Jane" adaptor available to fit the Little John opening, although it is more challenging to use.

This is a piece of personal gear, so you may want to put your name on the side if there's more than one on board. You should also plan to take them ashore and sanitize them periodically with bleach.

– Paul Esterle

PROS: Easy for guys to use when nature calls.
CONS: Not as easy for women to use.

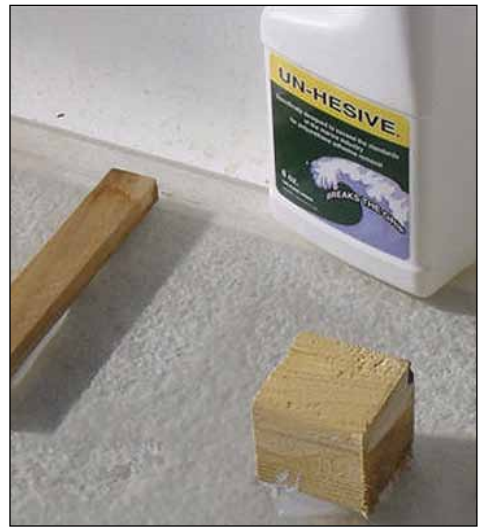
Un-Hesive Works

Anyone who has done boat repairs knows all about "removal." At some point in the boat's lifetime, something was installed with copious amounts of adhesive, usually 3M's 5200. Now, that thing has to be removed and the 5200 is doing exactly what it promised to do: adhere. Usually, the removal process requires cutting, scraping, sawing and swearing.

8

Un-Hesive ($14.95 for an eight-ounce spray bottle) is a product designed to remove adhesive without the cutting, scraping, sawing and, hopefully, without the swearing.

We tested Un-Hesive by putting a blob of 3M's 5200 and a blob of BoatLIFE's Life Seal on a clear plastic panel. We also used the Life Seal to adhere a block of wood and a piece of Starboard to the plastic. Finally, we used the 5200 to stick a block of wood to the plastic. We let the adhesives cure for 24 hours and then started our test.



The documentation from North Star Products, the U.S. distributor of Un-Hesive, indicated that the area to be debonded needed to be above 73 degrees. This wasn't a problem during our summer test, but a winter project may require a significant effort to raise temperatures to that level. The instructions said we should spray the product on generously and then let it sit for 20 minutes.

After sitting in the late afternoon sun, most of the Un-Hesive had evaporated. We started by trying to remove the 5200. Both the blob and the wood came loose easily and cleanly. The BoatLife also came up easily, but not as cleanly. While 5200 is a polyurethane adhesive, the Life Seal is a silicone-polyurethane mix and it appears that the silicone made a difference.

While it is not clear how well the product would work on material stuck on for years, or on various other surfaces one might encounter, it worked well in our test. That's why we gave it an 8 on our DIY Rating System. If a project requiring adhesive removal is in your future, Un-Hesive may be worth stashing in your tool kit.

– Frank Mummert

PROS: Un-Hesive did what it said it would do.

CONS: Weather may cause some difficult limitations.

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PART 2 OF A 2-PART SERIES

In With the New

After Many Installation Hours and Lots of Double-Checking, the Phasor Rewards its Owners With a Satisfying Start

By David Aiken

When the raw-water-cooled Volvo diesel in our center-cockpit Chris-Craft finally quit, I wasn't surprised and I could hardly be upset. After 25 years of mainly trouble-free service, it was time for a new engine.

"Which one" seems such a small question. The dollars involved, however, were not a small consideration, so first I looked at a used engine. The prices were appealing, but as red flags popped up on certain models, my wife, Zora, and I both worried about inheriting a set of problems.

Engines

Our attention quickly shifted to buying a new diesel. Engines had changed a lot since we last researched them, so we needed information. We gathered brochures and browsed websites. We looked for boats similar to ours in shape and displacement, and we pestered their owners for opinions. We heard good reports about a few brands, but it was the Kubota diesels that seemed to prompt real enthusiasm, with "reliability" and "reasonable and accessible parts" as top selling points. Our choice came down to two manufacturers that not only marinize Kubotas, but whose tech people were willing to answer a long list of questions. Good communication was important, for all the questions that would undoubtedly crop up during the installation.

Beta Marine is well recognized and well regarded, but its delivery time for the four-cylinder, 37.5-horsepower model we wanted did not match our schedule. A Phasor motor, however, could be delivered within two weeks. Though not well known in sailboat circles, Phasor has sold the same model Kubotas as generators for some time. As soon as the motor was ordered, I checked the specs and started

photos by Zora Aiken

Friends helped guide the new engine into the covered center cockpit during this DIY engine refit.

David Aiken has lived aboard a classic Chris-Craft sailboat for more than 25 years. He and his wife, Zora, are the authors of Good Boatkeeping, 2nd Edition*;* Cruising, the Basics*; and* Fiberglass Repair: Polyester or Epoxy.

to ready the engine room.

ENGINE BED AND SHAFT COUPLER

As expected, the new engine didn't fit the existing engine bed. The Phasor was narrower than the Volvo, so I had to close up the gap. Earlier, I'd moved the shaft aft to facilitate removal of the old transmission. I repositioned it now and installed the new coupler, a split coupler with a set key.

I measured the distance from the shaft coupler to the approximate location of the new engine, to indicate the fore-and-aft placement of two new 4-by-4 oak beams. I also had to place the beams at the right vertical level so the transmission (which drops down from the base of the engine) would meet the coupler correctly. Finally, the beams had to match the 5-degree angle of the shaft. I took all the measurements from the engine's spec sheet (then did it again, and yet again). Finally, I through-bolted the new wood to the existing engine bed using ½-inch stainless steel threaded rods, with stainless lock washers and nuts at both ends.

I coated the new wood with epoxy resin for protection, and then marked the motor-mount centers on the engine bed, in preparation for lowering the engine into place.

EXHAUST SYSTEM

I'd written an outline of the steps involved with the installation to see which jobs were better done, or at least started, before the engine was in place. The motor would be installed below the waterline. In addition to discharging water and exhaust gas, the system must be planned to prevent any backward flow of water into the engine. For me, it was easier to put in the waterlift muffler (or "waterbox") before putting in the engine. I bought a Vernalift and used new, marine wet exhaust hose to connect it to the transom discharge fitting. The American Boat and Yacht Council recommends wet exhaust hose that meets SAE J2006, Marine Exhaust Hose standards, such as those supplied by Trident Marine Systems. The ends of each exhaust hose should be secured with two stainless steel hose clamps.

To make a solid supprt for the chain hoist, the author used 4-by-4 uprights and a 4-by-6 cross beam.

FUEL SYSTEM

I wasn't changing fuel type, so I didn't have to replace the fuel tanks. The Volvo didn't have return lines for excess fuel, but luckily, the tanks were set up for their use. I added the return fuel lines (USCG Type A-1, A-2 or A1-15), along with a two-way valve, so fuel could be returned to the tank in use.

A Racor fuel/water separator was already in place, and the fuel lines could be led to the fuel-pump side of the engine without remounting the Racor. With the Phasor, the primary fuel filter can be placed on or off the engine. I positioned ours off the engine in an accessible spot, where it would be easy to change the filters.

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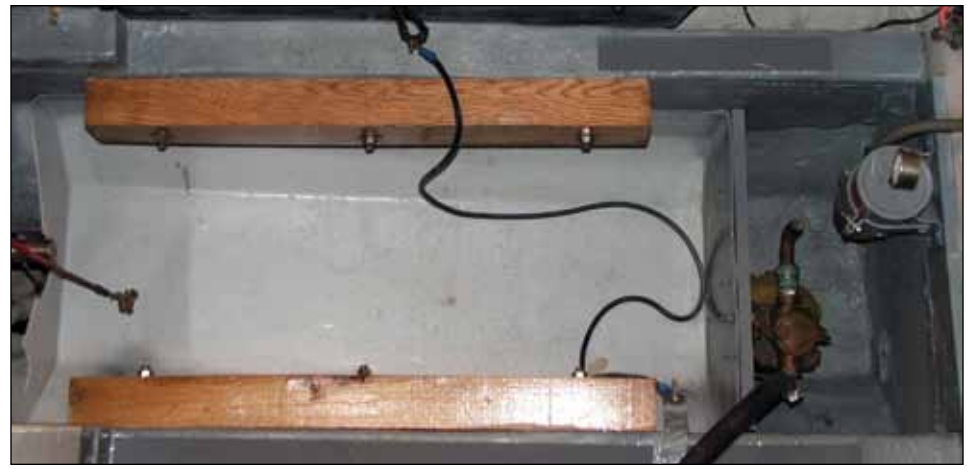
COOLING WATER SYSTEMS

To provide a better lead to the new engine's water pump, I moved the existing raw-water strainer to a different location in the engine room. I replaced both hoses (intake-to-strainer and strainer-to-pump) with heavy-duty marine hose (wet exhaust hose works well for this, too), and used stainless hose clamps everywhere. If the boat's water intake is a scoop-type, Phasor recommends that it be mounted to face aft, to prevent the possibility of too much water being pushed through the strainer and into the engine itself. It's a good idea to check with the engine manufacturer about such details.

The Phasor is freshwater-cooled through a self-contained heat-exchange system that needs only regular checks to maintain the correct coolant level. Engine manufacturers recommend the type of antifreeze to use, as well as the proper ratio of antifreeze to water. The antifreeze is obviously useful in cold climes, but more importantly from the boat owner's perspective, it contains additives that prevent internal corrosion.



photos by Zora Aiken

The author through-bolted epoxy-coated oak beams to the existing engine bed and moved the water strainer to a better location. The Racor filter remained in the same spot.

PLACING THE ENGINE

The boat was tied to the end of a T-dock. The marina owner had not only consented to let us do the in-and-out work there, he volunteered to help with man- and machine power when needed. The boat's center cockpit is covered by a permanent hardtop, so the use of a crane wasn't an option. To prepare for the engine drop-in, I set up a sturdy support brace over the engine room hatch, using 4-by-4 uprights and a 4-by-6 oak cross beam to hold a chain hoist. Outside, I swung the boom

out over the dock, almost perpendicular to the hull. I rigged a block-and-tackle onto the boom, then looped and tied a halyard around the boom's midpoint to take some of the strain as the engine was hoisted and swung into the cockpit.

On installation day, the marina owner loaded the motor onto a forklift and brought it to the land end of the dock. From there, the motor was moved onto a "pallet jack," a heavy-duty flatbed dolly. Three friends rolled it down the length of the main dock and waited to lend hands for backup lifting and moving. At 354 pounds, the new engine can be handled with enough muscle power.

The day's lone hang-up arrived next in the form of an isolated thunderstorm timed perfectly to interfere with our motor parade. Despite the rain, everyone managed to hang on to the motor, to the boat, and to each other, more proof that boating friends are best friends.

The motor was safe inside the cockpit, and one friend stayed with me to finish the job. We peeled off the shrink-wrap, dried the motor and attached the chain hoist. With encouragement from the clanking chain and guidance from an occasional shove, the motor moved forward along the plywood-covered cockpit seat to its approximate fore-and-aft position. With more tension on the chain, the motor swung into the center of the hatch opening and dropped in slowly until the back of the transmission touched the coupling and the motor mounts touched their marks. The engine was still hanging from the chain hoist, to temporarily keep pressure off the mounts. And that was enough for a rainy day. Aligning the engine and shaft could wait.

A chain hoist was used to lower the new motor into the engine room.

The next morning, I began working on the alignment but soon realized I wasn't confident about finishing this most critical task. I called a mechanic friend who had already checked each step in the installation.

In a perfect alignment, the transmission output flange matches the shaft coupling exactly. Such perfection may be rare, but when the two parts are closely matched, the mechanic uses a feeler gauge to measure the gap between them at the top, bottom and both sides. If any gap is beyond the acceptable limits, more adjustments are done, to raise or lower the engine, shift it to one side or alter the angle at which it faces the shaft. On a very good day, alignment might be accomplished in an hour, but more often, the job turns into an all-day effort, which is why it is helpful to have a knowledgeable perfectionist on the job.

I was fortunate; our perfectionist succeeded in about three hours. Had the installation been done while the boat was hauled, alignment would have been postponed until the boat was launched and fully loaded with all usual gear and stores. The alignment should be rechecked periodically as part of a general maintenance schedule; at the very least the cutless bearing should be checked at every haulout. The original bearing will probably need to be replaced with the first haulout, because it is unlikely that the new alignment will wear the rubber in the same areas as the previous alignment. This will enlarge the overall inside diameter of the bearing, and a sloppy bearing fit can cause vibration if it is severe enough. Of course, if the engine is installed while the boat is on land, a new cutless bearing should also be installed.

FINISHING THE EXHAUST

The exhaust system could now be finished. I took measurements for the exhaust riser, which would carry the engine's exhaust gases to an elbow above the waterline before sending it to the Vernalift, thereby preventing any backflow of seawater from the transom discharge fitting. I made a pattern and adjusted it for

the best fit, then had the riser welded from galvanized pipe.

I added one more hose loop to the system, this one to carry the seawater circulating inside the exhaust manifold's water-cooling jacket into the exhaust system at the down side of the riser, where it mixes in to cool exhaust gases before entering the wet exhaust hose. I led the hose up above the waterline and fitted it with a vented loop to prevent a siphoning effect that might draw seawater back into the engine. In our installation, the vent hose reaches up into the cockpit just behind the helm, so I built a narrow wooden cover to hide it.

Later, one last task would finish the exhaust system. After the engine was running, I checked the whole system for leaks, then wrapped the riser with Hotshield insulating tape to contain the heat.

photo by Zora Aiken

After checking the engine installation for leaks, the author wrapped the riser with insulating tape. The complete project cost $9,510, which includes $350 for labor, and took the author about 47 hours to complete. (Total doesn't include friends' labor.)

TEST START

Overall, the Phasor installation cost $9,510, of which $350 was labor. A new prop would later add $550. Like most DIY projects, this was not a steady, start-to-finish job, but rather was done a step at a time over a few weeks, with my effort totaling about 47 hours.

The last step was to connect the throttle and shifting cables and the battery cables and electrical panel. It was time to see if everything had been done right. I checked the list at least twice: engine oil and transmission fluid; fuel lines; coolant; seacock; battery switch. Finally, I turned the key and was rewarded with an instant start. I looked for exhaust water—saw plenty—and listened to the steady hum of the new engine. I waited long enough to feel some measure of assurance and breathed a long, relieved sigh.

DIY

Technology

The Re-Rig

Deadeyes, Lashings and Spliced Line: **Synthetic Rigging** for a Classic Yawl

By Andy Schell

The stainless standing rigging on *Arcturus* was nearly 30 years old when my fiancée, Mia, and I set sail from Wilmington, N.C., bound for Florida. The weather was fine, with a brisk northerly blowing offshore. In the first 24 hours, our 35-foot yawl ran 160 miles, an incredible run for our 24-foot waterline.

The second night, however, brought dark clouds and increasing wind, and soon we were deeply reefed, touching 9 knots on building waves. *Arcturus* was handling the conditions marvelously, but my nerves were deteriorating with each gust.

I had no confidence in the old rig, and it was past time to replace it.

A NEW RIG DESIGN

We'd purchased *Arcturus*, a 1966 Allied Seabreeze yawl, in Oxford, Md., on the Chesapeake Bay, in 2008, and have been living aboard and improving it for the past two years. With ambitions of heading offshore, we needed to start making the boat seaworthy.

At the 2009 Annapolis Sailboat Show, Colligo Marine, in conjunction with Southbound Cruising Services, displayed a 1970s-era Westsail cutter, completely re-rigged with synthetics. What caught my eye were the deadeyes. This was not the PBO or carbon rigging of multihulls and maxi racers. This was a traditional cruising boat utilizing traditional technology. Sailboat rigging, I thought to myself, had come about—and I was not the only one to think this.

Master rigger Brion Toss, who wrote the classic *The Rigger's Apprentice*, elegantly summarized the full-circle situation synthetics have brought to rigging: "Steel rigging will be a 150-year anomaly in the history of sailboat rigging. The evolution toward synthetics is putting rigging back into the

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Andy Schell is a professional captain and freelance writer. After re-rigging Arcturus, *which he lives aboard with his fiancée, Mia, he began working for Southbound Cruising Services.*

hands of the sailor."

The rope we saw in Annapolis was called Dynex Dux, a synthetic fiber that begins life as SK-75 (known more commonly as "dyneema" or "spectra"). It then goes through a process of pre-heating and pre-stretching, resulting in Dux, a rope originally developed for the commercial fishing and logging industry. It is stronger than steel, with less stretch and a fraction of the weight.

Designing a rig for Dux is fundamentally different than designing for wire. Where wire size is designed around breaking strength, Dux is designed around creep, which is the elongation of the individual fibers under load over time. Where stretch is elastic and reversible (think of a rubber band), creep is permanent.

We consulted the creep charts available from Colligo for the correct Dux diameter (9 mm, in the case of *Arcturus*). The resulting breaking strength for a given design is two to five times that of wire, essentially eliminating this concern. The design process, like the material itself, marks a paradigm shift in sailboat rigging.

THE RE-RIG

I intended to do all the work myself—the only tools required for the job were a decent bosun's chair, a few fids of different sizes, a Magic Marker, electrical tape and a really good knife. I purchased a ceramic riggers knife online, for about $50. The thing is like a light saber, a boon to cutting through rope strong enough to hank a sail onto.

My sailing experience has been gained over a lifetime of sailing, mainly on the Chesapeake and in the Bahamas. I have worked professionally on the 74-foot schooner *Woodwind* in Annapolis, and I skippered boats in the Caribbean, New Zealand and Sweden. Most of my projects on *Arcturus* are inspired by reading the classics, from the aforementioned *The Rigger's Apprentice* to Hal and Margaret Roth's refit on their *Whisper* in *After 50,000 Miles*.

Before tackling the project, I chatted personally with Toss after a boat show seminar and consulted with Mike Meer of Southbound Cruising, the rigging shop that did the work on the Westsail (disclosure: after re-rigging *Arcturus* in Florida, I returned to Annapolis where I now work for Southbound).

In my experience, the easiest way to measure for length—a challenging aspect of the process—was to splice one end, pre-stretch it on a winch, attach it to the mast fitting, and dry-fit the deck end, temporarily placing a thimble where I thought I wanted it to be, then adding the length needed for the splice (about 40 inches for 9 mm). Dux will shrink 4 inches (for 9 mm) after splicing, then re-stretch 2 inches once the braid is set. To measure correctly, add 2 inches (for 9 mm) before splicing—it will shrink 4, then come back 2, making a perfect fit. If you're using turnbuckles, shroud length is crucial. Colligo has detailed measuring instructions (to within 5⁄16 of an inch) available upon request and is in the process of designing long-travel turnbuckles to account for the variability in measuring.

The mizzen upper shroud, attached to new clevis brackets at the masthead.

photos by Maria Karlsson

The author used a synthetic line called Dynex Dux and completed all the splices aboard the *Arcturus*. Each took about seven minutes to complete.

The standard splice is called a "Modified (or Locking) Brummel Splice." This splice is fairly straightforward, and by the time I'd finished the re-rig, I could complete one in about seven minutes. The line is tucked through itself twice (creating the "lock") and the tail is buried and tapered. The bury/taper step is the most important, and if done correctly—buried for a length 72 times the diameter of the rope and tapered evenly—the line, according to Colligo's pull-testing, will never break at the splice.

Dux's braid must be reset after splicing. The fibers in a new splice of the 12-strand rope will stretch until they lock back into place. Accomplishing this requires tensioning the finished shroud up to 2,000 pounds. I fixed one end of each shroud to the main halyard and the other to a stout chainplate on deck, then cranked on the winch for all I was worth.

To install, I attached the upper end of the shroud to the mast fitting, brought the lower end to the deck and rove the lashing

line through the deadeyes. Colligo designs a special chainplate distributor fitting that matches its terminators and is pre-drilled and radiused. I used a double figure-eight stopper knot in the shroud terminator and proceeded to reeve the lashing line through the seven-part purchase. By using the main halyard and simultaneously sweating each lashing, we were able to quite easily get plenty of pre-tension on the shrouds. The lashings are then tied off around themselves, using a simple lashing knot, also described on Colligo's website. Any remaining line can be wrapped neatly around the lashing. The end result is a simple, traditional and incredibly strong rigging system that's had hundreds of years to evolve.

CHALLENGES AND SUCCESSES

The only real challenges associated with the new rig change came from the spreaders and the mast fittings. *Arcturus* has double lower shrouds, which required that the lower mast tangs be replaced to accommodate the extra width of the shroud terminators versus wire eyes. These were replaced with titanium fittings, also from Colligo, both to save weight and eliminate corrosion once and for all. I used a round file to smooth out the spreader tips. I then served the shrouds with tarred nylon where they meet the spreader tips and was also careful to seize them snugly in place—chafe is a bigger concern with synthetics, and it's imperative to combat it from the start.

Pre-fitting an aluminum "terminator" thimble.

In total, the project took us about 10 days to complete, working four hours per day. I did all the splices either in *Arcturus*' cockpit or main salon. Dux is slightly more expensive than wire on a foot-by-foot basis, but including new mast tangs ($80 each), terminator and distributor (deadeye) fittings ($50 each), and lashing line, to name a few key items, the bill came to about $3,000, not including the mizzen mast.

The conditions off of Fort Lauderdale were gusty and unsettled and gave me a chance to evaluate the boat's performance. Tensioning the lashings under sail was admittedly more work than turnbuckles; but by tensioning the slack leeward shrouds, I was able to remove any leftover stretch.

In total, I removed at least 50 pounds of metal from the rig, thereby considerably reducing the boat's righting moment. With a shallow-draft/centerboard configuration, *Arcturus* is and will always be a tender boat. But I noticed immediately that once heeled, the boat stood up to the puffs more confidently than ever, the decks never getting wet in conditions under which they would have been awash with the old rig.

It remains to be seen how the rig will stand up to the rigors of ocean sailing in the long term. But the installation and initial performance have convinced me that we made the right decision for the re-rig. Dynex Dux's simplicity, traditional appearance, ease of use, weight savings and emergency replacement potential combine to create, in my mind, the ideal rig for the serious cruising sailboat. **DIY**

The Downsides To Synthetic Fiber Rigging

Inevitably the first question we get about our new synthetic rig is, "What are the downsides?" With any new product, skepticism rules the day. That said, the real and imagined downsides of Dux are small.

Chafe is the main, obvious concern. Again, back to guru Brion Toss, who says giving sailors the privilege of performing their own rigging work also implies a certain responsibility for that work. Dynex Dux is, in fact, strong enough to hank a sail onto, using traditional bronze hanks. But they must be new, and smooth, and they should be inspected often for signs that they're wearing the stay.

Where saltwater corrodes and ultimately destroys steel, the sun damages synthetics. Colligo has hard data backing up the claim that a rig of Dux can go at least five years before it needs to be replaced. And Colligo expects to be able to match or exceed the seven- to 10-year useful life most manufacturers recommend for wire in a saltwater environment, once the data are made available to substantiate such claims (Dux started life in the commercial fishing industry in Alaska in 1999).

Dynex Dux marks a trend away from stainless steel in sailboat rigging. Most of Colligo's fittings are either anodized aluminum or titanium. Indeed, my boat, Arcturus, now has all titanium mast hardware and chainplates. It's worth inspecting both the mast tangs and especially the chainplates when replacing standing rigging (I found the mounting holes in the mast tangs were severely deformed and far beyond requiring replacement). With Grade II titanium becoming easier (read: cheaper) to produce, prices are now in line with stainless fittings, as are the strength ratings, eliminating the havoc that crevice corrosion wreaks on stainless.

The advent of synthetic fiber, as Toss noted, favors DIY sailors who take pride in their projects and enjoy the work and the responsibility. Dux rigging certainly requires more attention than wire—chafe must be identified and eliminated; lashings are harder to tension; and in some cases serving part of the shroud has real advantages. That said, the fact that the DIY sailor is actually able to perform all of these tasks, from installation to long-term use without calling for professional help, is the single biggest upside of Dynex Dux.

– Andy Schell

The iPad on the Water

Electronics

Imagine a chartplotter about the size of clipboard and almost as light. Imagine it has a touchscreen, that it is portable (with 10 hours of battery life), and that it can pull in weather and navigation information from the Internet

Oh yeah, and the price starts at about $500.

The device is Apple's iPad—and it may have serious utility for boaters.

Mad Mariner's review takes the iPad out on the water and offers some first impressions on what the device can and cannot do—and how it fits into a world that is increasingly cluttered with capable gadgets.

And that's only the beginning. Mad Mariner will come back at the end of the season with a full-scale review that puts the iPad through its paces.

If you are considering an onboard computer anytime soon, read this before you spend money.

Read the review at: www.diy-boat.com/iPad.

– Glen Justice

iPad photo by Apple; inset photo by Glen Justice

DIY Launches Skills Classes

Dozens of do-it-yourself boaters gathered in Dallas to spend hours discussing engines and maintenance at DIY's first Skills Class.

Skills Classes are an opportunity for boaters to learn essential skills in a single afternoon, at a price that won't sink anybody. They will be held nationwide.

In Dallas, the weather was hot, and so was the topic: how to solve the common problems that many boaters encounter.

"A lot of the expensive repairs we run into are caused when people don't do routine maintenance," said Kent Nielson, a service manager at Marine Max.

HANDS-ON LEARNING

Dennis Gibbs, a professional surveyor who hosts a radio program for boaters, opened the class by addressing some of those problems, from batteries and bilge pumps to leaky topsides. Gibbs brought large photos to illustrate each point.

Nielson took over from there, discussing engine maintenance, including impeller changes, oil changes, winterization and more.

Kent Nielson at the DIY Skills Class in Dallas

Nielson and his mechanics brought a selection of gear that had been worn or damaged, giving boaters a chance to see first hand how engine components fail and what causes those failures. Clustered around a table, boaters fired questions at Nielson for the better part of an hour.

Demonstrations continued as Brian Piper of Texas Harbor Helpers explained proper techniques and products when it comes to cleaning, buffing, polishing and waxing. Piper worked directly on a boat that was trucked in for the occasion, resulting in a "before and after" comparison.

QUESTIONS ANSWERED

When presentations ended, Gibbs, Nielson and Piper stayed to talk with boaters one-on-one, allowing attendees to discuss problems they encounter on their boats. The Coast Guard Auxiliary was also on hand to discuss safety gear, and Interstate Batteries sent experts to answer questions.

A raffle was held, and eight boaters won prizes that included a marine security system by Paradox Marine, hand-held VHF radios by Icom and Cobra Marine, an iPod Touch, and boat and engine covers by Coveralls. Attendees also received a gift bag, packed with products and discount coupons.

The event, sponsored by Star brite, Coveralls, BoatNameGear.com, Interstate Batteries, Shurhold Industries, Navimatics and other companies, drew the attention of the *Dallas Morning News* and several local radio shows.

Next Class: Annapolis

DIY's next class will tackle sailboat rigging, in Annapolis on Friday, Oct. 8. Visit www.DIY-Boat.com/rigging.

Learn the Basics of Rigging

DIY's Skills Class Teaches You Inspection, Maintenance, Tuning — Plus Synthetic Rigging

Location: Annapolis Marriott, right at the boat show.* Free Food and Snacks — and a gift bag with gear worth more than $100

Date: Friday, October 8

Time: 5:30 p.m.

Price: $45 for individuals and $75 for couples

Join us at the Annapolis sail show* to learn The Basics of Rigging at DIY's latest Skills Class. This isn't some airy lecture -- this is hands-on learning. Three experts explain how to inspect, maintain and tune your rigging properly, and introduce you to synthetic rigging. The class covers all the basics -- and you can ask all the questions you like.

For Information and Signup, visit www.DIY-Boat.com/rigging

BONUS: Sign up early online and get DIY's Sailboat Rigging CD, which usually costs $20, for FREE!

SPONSORS: Colligo Marine, Southbound Cruising Services, Father Son Sailing, Star brite, West Systems, Shurhold, Navimatics, Coveralls, Autotether

* You do not need to attend the show to attend the class.

The Path to Illumination

Rethink Those Patio Lights Right into Your Cockpit

By Edward McDermott

For cruisers, energy and light are important for all kinds of reasons—and patio lights can be a nice flexible option in both categories.

So what is a patio light? You have probably seen them in hardware or gardening stores: those self-sufficient, solar-powered accent lights that can be put on a spike and stuffed into the ground in your garden. No wiring. No electrical cords. No fuss.

As you might imagine, these can play a larger role than just illuminating a walkway. You can use them to create romantic light in the cockpit, give your boat additional visibility on deck or illuminate just about anyplace.

Installation is simple. Place them where they will be in daytime contact with the sun and where they will cast a needed glow at night. I have drilled holes in them and tied them to my standing rigging. I've also used plastic ties to connect them to my bimini frame.

Be sure to attach the lights so that they won't come loose in rough weather, and play around with location to get the optimum results. Also, remember that, while these are outdoor equipment, they are not marine equipment, and they may not last forever—especially on saltwater boats.

Marine models that come with a clamp to attach to your railing are available for about $40. But bargains abound, and it pays to shop around. I recently purchased an LED light from Walmart. And if it disappears, I won't care—I'll be out only $3.

If you want to optimize, LED lights emit more light and require less power to operate, and white lights are the most flexible option. To get optimum performance, check the number and size of the rechargeable batteries needed (the more battery capacity, the more light over the course of a night). You can also compare models by checking how bright the light is (in lumens) and how long it will keep shining, all information you can generally find on the package.

photos above and below left by Edward McDermott; rail light from westmarine.com

Some creative sourcing and a little ingenuity can repurpose a $5 solar light from Home Depot.

Do keep in mind that patio lights should not be used in place of proper anchor lights, running lights or other regulation lighting. These have specific visibility requirements, and you should use lights designed for the job.

But for everyday deck lighting, patio lights work pretty well. **DIY**

Speedseal Offers Something New

By Adam Gonzales

I've seen ads for Speedseal, the easy-to-remove impeller covers, since 2001, the year I bought my Islander 29. I've always thought the product would be a smart addition to my auxiliary power, a Volvo 2002 retrofitted by a previous owner in the 1980s. But other projects were always higher on the priority list.

This year, it finally felt like the right time to purchase a Speedseal—and I found that the manufacturer had something new to offer.

One can order only by phone, so I called 800-675-1105 and an English gentleman answered. I had planned to purchase the Speedseal Basic, but I was asked if I'd like to upgrade to SpeedsealLife ($89). "It costs only twenty dollars more," said my salesman, who went on to explain that Britain's Royal Navy was testing Speed-

Speedseal

sealLife on some ships in its fleet.

I figured what's good for Her Royal Majesty would be good enough for me. Having experienced the consequences of Murphy's Law more than once, I also ordered the two extra screws with machine knurled heads, three extra O-rings, and a pair of extra synthetic and bronze plates.

The installation to remove my old plate and install the new one took about 45 minutes. The inside surface of the SpeedsealLife cover has room for a synthetic and a bronze washer (included) to reduce friction on the impeller. The company claims the new design extends impeller life.

I ran the engine to test for leaks and, finding none, declared the job finished. The Volvo 2002 is raw water cooled, and while I think I see evidence of greater circulation, it may simply be wishful thinking. I do have peace of mind knowing I've installed an elegantly designed device to help maintain an essential component in the engine's cooling system.

There is no way to say yet whether the unit will extend the life of my impeller—but I will be watching. DIY

Ask the Expert

Clogged Injectors. Leaking Hoses. Nonskid Decks. Our Expert Weighs In.

By Paul Esterle

Are there any additives that one can use to prevent clogging of injectors? Thank you.

– Michael Krebs

Yes, there are many diesel fuel injector cleaners on the market. However, the first line of defense is to have a 2-micon secondary fuel filter clean your fuel after a 20-micron primary filter. Injectors usually lose effectiveness when carbon or varnish builds up on the injector tip. Many additives claim to remove this buildup.

Remember, if you are adding this to your fuel tank, it will also clean the tank of any gunk and send it downstream to the filters. It may be worthwhile to have a qualified diesel mechanic pull an injector and test it. Injectors are precision devices and should be reconditioned and recalibrated only by experts.

My fuel fill hose is the stiff rubber 1½-inch reinforced kind. Connections between the deck fill and the tank include bronze hose barbs, which are double-clamped. I want to improve the seal at these connections, because I developed a small leak at the tank connection, which is not resolved by tightening the clamps. Can you suggest a sealant that is impervious to gasoline that I can apply to the connections to eliminate the leak?

– Bob Griffiths

While you might get away with using a sealant on other hoses—sanitation, for example—I would strongly advise against it on a fuel fill hose, as any leakage can have explosive results. ABYC standards require that the inside diameter of the hose not exceed the outside diameter of the barb by more than 0.065 inches, which in reality is a tight fit even without hose clamps; and that no helical threading be used to reinforce the hose, which can provide a path for fuel leakage.

A leak probably indicates that the hose is not an exact fit, or that it is old and stiff and will not allow the two hose clamps to seal the hose. I would replace the fuel hose with approved USCG Type A1, A2, or A1-15 hose. The hose clamps should have ½-inch band widths. Make sure the clamps are all stainless steel, including the worm screw, and don't forget to ground the fuel fill.

I would like to know how to repaint nonskid decks on my Hunter 30-foot sailboat. They have begun to have small crazing cracks and have lost the nonskid surface. It appears that it was rolled on with a roller, and has a gelcoat-type hardness in solid white.

I have concerns about using a paint, namely that once I start it will have to be done every year or two. What can you suggest for this project? I received a quote for $2,000, and he would not tell me what he was going to use (only a paint with sand particles). What would you do?

– David Poss

Gelcoat, if applied too thickly, has a habit of cracking as it shrinks over time. A typical repair is a layer of paint with sand sprinkled onto the wet paint. After it dries, the excess sand is vacuumed up. A good quality, one-part marine polyurethane paint should hold up to three to five years. A two-part paint is more abrasion-resistant and should last about five to 10 years. However, the paint film is thinner and will require more coats to build up an adequate thickness. A good choice is the Interlux Perfection series. It is designed for DIY roll-and-tip application. Keep in mind that spraying two-part paints requires special safety gear as it can be hazardous to breathe.

Other options are nonskid additives, small beads added to the paint, or coarse salt or sugar sprinkled on. After the paint dries, the salt or sugar are washed away, leaving a nonskid surface. Crushed walnut shells are also an option. If the resulting surface is too abrasive, a second layer of paint will lessen the abrasiveness and be kinder on your knees.

A different option would be to apply a nonskid mat, such as Treadmaster (www.treadmaster.co.uk) or SeaDek (www.seadek.com). SeaDek is self-adhesive and easily applied, while Treadmaster will need to be attached in place with epoxy. My personal choice would be SeaDek.

An inveterate DIYer, Paul Esterle is a boating writer and editor when he isn't working on his fleet of old boats.

The information in ***Ask the Expert*** *is advice only and should not be used as a substitute for the services or opinions of a marine professional who can directly assess your boat and equipment.*

Tech Tips

THE RIGHT GLOVES

Those of us who do our own work face a host of dangers, and many of those dangers are to our hands.

Paints, solvents, epoxies and chemicals of all types are prevalent in boatyards. Repeated or prolonged use can remove skin oils, producing dermatitis, marked by dryness, irritation and cracking of the skin.

Most marine stores carry two kinds of protective gloves for just this reason. The first is made from common latex, but these are easily torn and the gloves are not resistant to some solvents. The second type of glove is made from nitrile (also known as neoprene), which is more resistant to solvents and a little tougher.

But all gloves are easily punctured on sharp edges. This is especially true when working around cured fiberglass: Exposed strands can feel like little needles as they push through glove materials.

So what to do?

I go to my local discount store and buy dishwashing gloves, which are much, much thicker than either latex or nitrile. They are available in several styles, including those with longer cuffs to protect the wrists. You give up a little in the way of feel, but these gloves are relatively cheap and can be reused many times.

- Paul Esterle

photo by Paul Esterle

YOUR ENGINE'S SMOKE SIGNALS

The exhaust from a diesel engine can tell you a lot about its health. Exhaust can be blue, black, white or gray, and each color can be an indicator of specific mechanical problems.

Diesel exhaust should be clear on a healthy engine, though it may be a little gray at first if the engine is cold. It is common to see this for the first minute or so after ignition.

But other colors can point to problems. Blue can be an indicator of excessive oil in the upper cylinders; black may indicate unburned diesel fuel; and white is often water vapor.

The exhaust may not tell you exactly what is wrong, but it is a useful benchmark when monitoring the health of your power plant.

Have a Tech Tip?

Share your expertise and experience. Send us an e-mail with your tip, name and contact info to the DIY managing editor at leefsmithbarnes@madmariner.com

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Friendly Fire

Welding Isn't Just for the Pros. Throw Some Sparks of Your Own.

By Garrett Lambert

On any boat with a DIY owner, ideas for improvements are a constant itch. There's always a use for another anchor or fender holder, attachment plate, bracket, railing, step or flagpole and more. However, at commercial prices, scratching those itches can be expensive.

For example, when I wanted to raise my trawler's boom to make it easier to launch the dinghy, the cost estimates to have a new mast saddle made and installed approached $500. Instead, after I acquired a short piece of aluminum pipe and a scrap of plate from the local metal market, did some cutting and drilling, made a couple of welds, and applied a coat of paint, the saddle was made for less than $50.

The most frustrating part of the project was finding a welder willing to take on such a small job. Learn to weld, however, and that problem disappears.

Welding and metal boats obviously go hand-in-hand, but welding has applications for owners of fiberglass and wood boats, too. Learning is mostly a matter of practice—and it's a skill that has 1,000 uses.

Garrett Lambert is a freelance writer. He cruises in the northwest Pacific, and is circumnavigating Vancouver Island this summer.

WELDING 101

While there are many ways to weld metals, all are based on the concept of melting a puddle across a joint and pushing or pulling that puddle along the joint while adding filler metal. As the puddle cools behind the heat source, the metal fuses and the two pieces become a single unit.

Since boaters deal primarily with stainless steel and aluminum, two technologies that handle these metals, as well as mild steel, are particularly helpful and relatively easy to learn. Both use inert gases that shield the joint from oxidation to eliminate slag and produce an attractive weld.

MIG (METAL INERT GAS) WELDING creates the puddle and adds material in a single action by feeding an almost endless wire through a gun to create a high temperature arc between the wire and the pieces to be joined. Hold the tip of the wire about ¼ inch away from the work, press the trigger, and an electric spark melts the puddle while the wire feeds out to add material.

TIG (TUNGSTEN INERT GAS) WELDING passes ultra-high amperage through a pencil-like torch with a finely pointed tungsten tip to generate a stream of plasma that creates and moves the puddle. Because the additional material is infused from a handheld rod, TIG requires more hand-eye coordination and is slower than MIG, but when done well produces delicate work and fine, art-quality welds. It is the type of welding you see most often on TV shows like "Monster Garage" and "American Chopper."

Both MIG and TIG use a "hose-in-a-hose" system in which the outer carries inert gases that pass through holes in the gun/torch to envelop the work area. Both processes are relatively gentle, generating bright light, a moderate buzzing sound, and confining heat and sparks to a limited area.

Even so, always remember Rule Number One: No welding should ever be done on the boat. Aside from the danger of fire, no matter how careful you are, sparks and hot bits will almost surely damage gelcoat or varnish.

WELDING CLASS

For the amateur, inert gas welding's singular advantage is that it is simple to do. The video instructions that come with welding machines, plus a little introductory help from a local vendor, are probably enough to get most people under way. There is also a wealth of instructional video on the Internet.

Because the supplies are inexpensive, the best advice on learning how to weld is to simply practice, practice, practice. I was able to make an equipment cart out of an old bed frame first time out, and while it's no objet d'art, I'm still using it.

However, at some point I decided to depart from my usual approach of learning by trial and error and signed on for a five-day MIG welding course at a local

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community college. The cost was about $400 for instruction, equipment and materials. I thought the course was good value, but only because the instructor offered us exposure to many different kinds of welding.

The seven students in my class—a commercial fisherman with an aluminum boat, five young guys who wanted to restore cars or build chopper bikes, and me—each had a fabulously equipped booth to use for the week.

After a brief demo of wire welding by our dedicated instructor, we went over to a shear, where he sliced off several hundred random pieces of 5/16-inch plate. We took what we could carry and went back to our booths. From that point on, instruction was individual. The instructor first ensured I was properly set up, gave another demo, answered my questions and watched me weld a bead.

About the only mistake you can make with a MIG welder is to get the tip too close to the work. When that happens, the wire burns into the gun's tip. Remove the tip, cut the wire off at the rear leaving about ¼ inch exposed, then rap it sharply against something hard. Odds are the wire will punch right out of the tip. I got quite good at this, and ended using the tip I started with. (Since tips cost about a dollar, replacing one is not a big issue.)

With the instructor popping in and out, I spent the next two days making modern sculptures. I welded pieces together in every possible combination by push and pull strokes in horizontal and vertical positions. By the end of day two, I'd melted miles of wire, and my beads were becoming quite presentable. I was also getting bored.

So, it seems, were the other participants, and we quickly agreed when the instructor asked if we'd like to depart from the course syllabus to try other technologies. On the third day, we cut heavy steel plate with plasma streams and learned to use oxy-acetylene torches to weld and cut (and a gouger to un-weld). None of these was particularly relevant to our interests, but all were great fun.

The final two days were more usefully spent on TIG, and I was impressed by the control it offered, especially for aluminum, which has such a low melting point that care must be taken to prevent melting a hole right through the material. Stainless steel, on the other hand, was much easier.

photo by Miller Electric Mfg. Co.

TIG welding, while slightly more difficult, provides cleaner joints and may be ideal for marine use.

TIG is more difficult to master than MIG, and two of the students who had had no trouble with MIG were frustrated by their inability to make the transition. They just couldn't seem to manage the simultaneous actions required to maintain the tip distance, form the puddle, and push or pull the puddle along a marked line, all the while feeding filler material at the correct rate with the other hand. However, we were sharing a couple of TIG machines, and no one doubted they'd be fine after a little more practice.

WHAT TO BUY

I found TIG welding only a little more difficult and was seduced by the quality of the joints one could produce. Clearly, if all I wanted to do was boat-related, TIG would be the way to go. At the time, however, it was significantly more expensive, and I had other hobbies where welding would be useful, so finally decided that a MIG unit offered the better combination of cost and flexibility for my needs.

photo by Garrett Lambert

A welded aluminum mast saddle.

I chose a Millermatic 175, a model Miller has since tweaked and renamed the 180, but it's essentially the same machine. The controls are simple—just two knobs on the front to select current and the feed rate of the wire, as well as a power switch. A settings chart is printed on the back of the side cover panel, which opens to provide access to the simple, quick-change wire feed mechanism.

The 180 is sold as a package that includes the power unit and gun, a set of gauges that regulate the flow of gas delivered through the gun, and both video and written instructions. Also necessary are a tank of gas, an auto-darkening helmet, a spool or two of different gauge wire with a few tips to match, tip cleaner, tip pliers, leather gauntlets and a leather apron (I use an old leather jacket).

For multi-metal welding, MIG units require a couple of accessories that TIG units do not, and their costs narrow the price gap. To avoid contaminating a stainless steel weld with mild steel residue, manufacturers recommend a separate liner for the gun. And because aluminum is so soft, feeding the wire from the base unit is like pushing a cooked noodle, so for more than a small job, a spool gun that pulls the wire through will eliminate the feed problem.

Prices for TIG have come down since I made my purchase, and if TIG is your

technology of choice, a Miller 165 currently costs about two-thirds more than the corresponding MIG 180. The TIG package includes the same gear as its MIG counterpart, including the power unit, gauges, hose and pencil, and instructional video. A similar package of protective gear and start-up supplies is also necessary.

MIG and TIG each require a single tank for each gas, but the same set of gauges to control the rate of flow can be used. Argon is used for both aluminum and mild steel, but if aluminum is not in play, the preference is a mix of argon and CO_2. Tri-mix, primarily helium with smaller proportions of argon and CO_2, is the gas for stainless steel. There's no need to understand the chemistry. The local supplier will be able to advise you and provide what is required.

Welding is important to so many businesses that most communities have welding supply shops nearby. They sell and service the machines and supply the consumable materials such as wire, rods, tips, and gas mixtures. Tanks, which can be purchased or rented, come in different sizes, but for the casual user, the smallest will usually suffice.

If you express serious interest in purchasing, many welding stores will both demonstrate and let you go hands-on with various units to help you choose. Also bear in mind that there are list prices and street prices, so shop around. I was able to buy everything described above, as well as the bits and pieces required to run a 230 volt circuit from the fuse panel to the garage, for $1,000—about the list price of the 180 alone.

Be aware that home-use MIG welders also come in cheaper, convenient 110-volt versions. However, they lack the power and flexibility of the 230-volt models, so think long and hard before deciding. Also, don't be taken in by an inexpensive wire-welder without the gas attachment. It looks just like a MIG machine, but it isn't and buyer's remorse may ensue.

photo by Garrett Lambert

The author chose to purchase a MIG system, like the one above, because it offered lower cost and better flexibility.

photo by Miller Electric Mfg. Co.

A MIG unit, like this Millermatic 180, is less expensive than a comparable TIG units but requires more accessories.

Justifying tool purchases is always a game, and this one is expensive. My decision-making approach is both disciplined and self-serving. If I want to do a job that requires a tool I don't have, I apply two criteria prior to purchase: Will the savings from DIY versus outsourcing pay for the tool? Or, can I foresee enough use for the tool over time to warrant the investment? If neither of the above provides a thumbs-up, I apply criterion three: Do I nevertheless want the tool? Needless to say, I have a lot of tools.

The MIG welder purchase lies somewhere between reasons two and three. I have been able to take on several projects that I could not have done without it, but I can't yet say it has paid for itself. On the other hand, I'm glad it sits there patiently waiting for the switch to be flicked on. **DIY**

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Cover Story

At Home in the Cockpi

By Rory Harley

While it may be interiors that draw attention at boat shows, it's the cockpit where boaters spend the most time. That's where you trim, steer and drink your beer.

Yet anyone who owns a boat built before the 1990s is likely to be envious of the larger cockpits molded into the boats produced in later years. The space allows not only for comfort, but also for amenities that can make for far nicer cruising.

While we can't really do much to physically enlarge cockpits, there are some enhancements you can make to older boats (and some newer boats, too) to make them more ergonomically friendly and comfortable. Whether you own a sailboat or powerboat—but especially if you sail—the addition of tables, drink holders, backrests or even something as simple as cushions or some space for your gear can make a big difference. Many enhancements you can do yourself.

My own quest to improve and get comfortable on hard fiberglass cockpit seats has gone on for 30 years, across two separate sailboats, and it continues today. Through it all, I have found that a few well-chosen DIY projects, along with the judicious use of professionals and some prefabricated parts, can be transformative.

TAKING ON THE COCKPIT

I have found that the development of cockpit enhancements really comes in three phases. First, you must observe how you sit and move, and determine what bothers you about this space in order to choose which modifications can be made to enhance the cockpit's ergonomics.

Then, depending on how sure you are with the modification, you may want to construct a mock-up out of plywood and use it as a template to create the final design out of solid wood.

The third phase usually involves trimming the wood on your project by a few critical inches to make it all fit, easy to use and to prevent chafe or interference. The use of solid wood over ply in the final product allows the DIYer to happily trim away wood in straight lines or curves and use a router to round corners without showing plywood end grain.

For the final product, I have used whatever teak or mahogany I had in the basement at the time. I used standard spar varnish. As a point of construction, I always made sure my enhancements would come off

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with just a couple of bolts attached with wing nuts, to allow the annual brightwork varnishing to be done in March in my basement. (StarBoard will also work, for those who don't want the maintenance associated with wood.)

TAKING THE WHEEL

My first sailboat, an Aloha 8.2, came equipped with the standard cockpit: hard fiberglass seats with twin cockpit lockers under each, a traveler mounted on a bridge deck and a tiller mounted on the rudder post off the stern. Cockpit cushions made life easier on derrières, but there was more to be done.

While a tiller is hinged and can be rotated up out of the way against the backstay when not in use, I elected to convert to a wheel for several reasons. For starters, the arc of the long tiller sweeping through the cockpit consumed a lot of volume and was continuously getting in the way. Like a lot of round-bilge boats, my Aloha could easily be deviated off its course by just a small tap on the tiller, thus requiring constant vigilance and care to ensure that the boat was headed in the right direction. I also thought that the wheel, with the helmsman sitting behind it, would provide a better orientation, with a view forward on both sides of the vessel.

Observe how you sit and move, and determine what bothers you about this space in order to choose which modifications can be made to enhance the cockpit's ergonomics.

At the time, my local chandlery had imported some European pedestals and wheels, and I bought one. That was a mistake, especially for a DIYer, because it came with no installation instructions. A ship's steering system is the one part of the vessel that needs to be robust. It must merit the owner's complete confidence. Given the job at hand—installing sound rudder stops, getting the quadrant on and aligning the cables correctly—I opted to have a professional do the installation. In hindsight, I would have bought a kit from Edson or another manufacturer, which comes with thorough instructions—even videos, in some cases—and an abundance of technical support.

But the installation did work out. In fact, the boat became easier to handle because the wheel's constant mechanical advantage meant that less force was required to achieve the same rudder control, making it easier to steer in a seaway. Correlating the degree of turn on the wheel needed to change course was also easier, making the boat's steering more predictable. And, the steering could be locked with a quick turn of the wheel brake. Given its good balance, the Aloha would happily sail close-hauled forever in consistent winds.

I also found the permanent wheel pedestal wasn't much of an imposition. In fact, it quickly became an old friend. It was always there when you needed to brace yourself in a seaway, and grabbing its guard for support became second nature. A pedestal also gives you the opportunity to mount things—some very useful things.

Rory Harley is a semi-retired mechanical engineer living in Ottawa. He sails his boat, a swing keel Tanzer 10.5, out of Kingston on Lake Ontario and among the Thousand Islands.

Mount Up

Several mounting systems on the market can make customizing a cockpit–and the rest of the boat–a simple task. They are not always cheap, but they are extremely flexible, allowing you to add everything from drink and wine bottle holders to mounts for a cell phone or a bait table. While most of us have bought cheap mounts only to have them break, the systems shown here are a cut above what you will find off the shelf, and facilitate a custom approach to cockpit upgrades.

TREEFROGPAD (www.treefrogpad.com) is a flexible rubber pad that makes mounting small items on the dash easy.

GEAR HOLDERS

Some 20 years ago, there was a proliferation of wire drink holders that fitted over lifelines. While I suppose they did hold a can, I could never get used to using them. For starters, all boats have their seating facing the centerline, thus every time you wanted to stow your drink, you had to turn around and put it in a movable, swaying receptacle. I've found that solid holders, integral to the ship's construction, worked better than any gimbaled affair.

Because I sailed the Aloha on a landlocked river, and the boat already had a compass mounted on the bulkhead, I elected to install a drink and binocular holder on the open space left on the binnacle.

The design was straightforward: I used a teak board for the base and two sides, and I placed a vertical board forward for securing my older autohelm control box. I then gathered up my binoculars and glasses and figured out the configuration for the best separation. Once I had estab-

V-LOCK (www.v-lock.com) is an aluminum bracket that can be mounted anywhere and accepts inserts, either vertical or a 90-degree "shelf'" on which to mount gear. It's simple and strong.

TALLON (www.tallonsystems.com) offers a sophisticated mounting system with universal brackets that fit a variety of different mounts, accommodating anything from a wine glass to scuba tanks. Powered brackets, which must be wired to the DC system, allow you to mount powered accessories, like lighting.

SEA SUCKER (www.seasucker.com) offers an alternative for captains who don't want to drill holes in the boat. Instead, mounts use vacuum technology to bind an object to a surface.

TreeFrogPad photos by Glen Jutice; V-Lock, Tallon and Sea Sucker photos from the manufacturers

lished their placement, I screwed in some teak strips to act as separation rails. The result was a custom holder, sized to fit my gear.

The wheel pedestal had four compass mounting bolts that I used for securing the unit. I countersunk the holes for the carriage bolts holding on the drink holder, so the base was flush.

The steering pedestal continued to be a friend when I moved to my next boat, a pilothouse Tanzer 10.5 that had an equally small cockpit but was equipped with hydraulic steering. That meant that the binnacle housing the helm pump was larger, allowing me to construct a "two part" assembly for the drink and equipment holder, with a vertical separator dividing the forward and aft compartments. I divided the forward compartment into three sections, sized to hold glasses or a wine bottle. The divisions are glued between the base and the two vertical pieces, providing more strength. I also left access to reach the dip stick for the helm pump hydraulic reservoir. The compass takes up the majority of the aft compartment, but there is sufficient space for several glasses. The open back facilitates access and allows for coffee cup handles to face the helmsman.

In addition, I built a small shelf extending backward to the middle of the compass, where I added a 12-volt outlet and mounts for my GPS and autohelm remote control.

COCKPIT TABLES

Sooner or later, every sailor with a wheel pedestal wants a table. In lieu of purchasing something prefabricated, I made a cockpit table using the standard foldout design seen on so many boats.

I used marine plywood on my Aloha's table and the hardware from a local chandlery. Essentially the hardware consisted of a bent rod table support that hinged near the binnacle top. To collapse, the table braces slid down the vertical component of the guard. This hardware can be found in the accessory section of Edson's online catalog.

My Tanzer's larger pedestal presented some different challenges. I didn't have as much space forward, but the pedestal allowed sufficient room for side tables, between the helm and the handhold. Using side tables and tables that extended forward (see photo, page 36), I figured that I could make space for four people for dinner. But the mahogany table leaves would have to fold up while sailing and allow access to the engine controls. I used some brass card table hinges that hold a 180-degree posi-

Tight Squeeze

Building a Folding Wheel

By Rory Harley

I wasn't able to squeeze past the steering wheel on my Tanzer without walking on the cockpit seats. While this probably wasn't such an issue before the advent of biminis, the crunching motion of getting past the wheel and my advancing age made my boat a prime candidate for a folding wheel.

While there are some fine folding wheels on the market from Lewmar and other manufacturers, I decided to make my own and save about half the cost.

The decision to make your own or purchase a folding wheel from a manufacturer will depend upon your ability to economically obtain a ½-inch aluminum plate for the wheel (it is heavy and hard to find) and your access to a machine shop to make up a stainless wheel hub and cut a keyway.

I was able to get a hub made for about $200 and the plate for an additional $100. My other costs included six stainless table hinges, the ½-inch bolts holding the aluminum plate to the central hub flange, and #6-32 NC machine screws, which hold the hinges and wood trim to the wheel. Appropriate-sized drill bits and a tap set are required.

Lewmar makes a wheel that retails for about $700, and it is a good value. Lewmar developed a pin hinge that is built into the rim and plastic screw-on arms that hold the wheel in the open position. Both of these features were beyond my home workshop capabilities (and, they are patented).

CREATING THE WHEEL

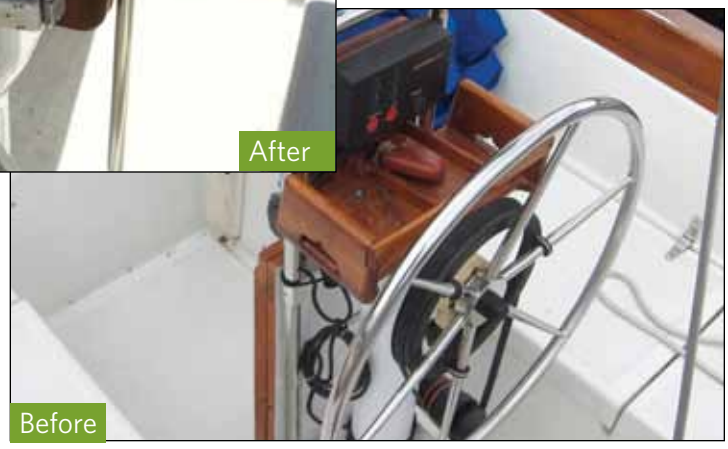
I first scribed out the wheel's circumference—a ¾-inch rim and six tapered wheel spokes 60 degrees apart—on the aluminum plate. I included a center area on which the hub would be bolted and areas for the mounting of the table hinges.

I scribed out the tapered spokes that were 1½ inches at the center and 1 inch at the rim. I left space at the end of the rim for mounting the table hinges and a matching surface for the folding sections to butt against the stationary center when the wheel was in its open position.

Cutting the plate was done with a quality jigsaw, metal cutting blades and lots of oil. It's also best to have a large worktable to hold the entire wheel and be sure to wear steel-toed shoes while making the cuts. Once the two sides are cut, their crescent shapes are unwieldy and could sever a toe, Protective eyewear is also recommended as the aluminum cuttings are sharp and can get hot.

I found that while the Dewalt jigsaw did a reasonable job cutting the plate, I could get straight spokes by cutting first and then grinding out the highs to make the lines as straight as possible.

I used a standard Sears router with a round-over carbide bit to create the curved edges. I mounted the router on its table for this job, and tightened all the bolts holding it together to minimize vibration and chatter when cutting the aluminum on the



photos by Rory Harley

A folding wheel proves advantageous when switching helmsmen and getting around the cockpit. The author decided to construct his own to save nearly half the cost of purchasing a wheel at retail.

wheel. I performed the cutting in several passes. Surprisingly, the carbide router bit survived the project and is still cutting well.

ASSEMBLING THE WHEEL

The six stainless table hinges have a 180-degree stop, and, in combination with the butting surfaces on the aluminum plate, prevent the two crescent-shaped arcs from rotating forward when the wheel is open. To ensure a firm butting of the two edges, I drilled and tapped the holes for the 6-32 machine screws that hold the hinges to the plate toward the middle of the hinge pins. This way, when the machine screws are tightened, they draw the aluminum plate closer together, ensuring some spring back and resistance when you unfold the wheel completely.

I found that this feature always kept a positive force on the locking arm when it was unfolded. You may want to experiment with hole location, drilling and tapping some scrap pieces to get the correct amount of spring back.

I cut out a recess for the hub, then placed it on the plate and drilled and tapped holes for four bolts that secure the two pieces together. I have a rotary hydraulic valve to easily center my wheel with an amidships rudder position. Otherwise the DIYer will have to either be very careful in aligning the wheel folds for the amidships position, or have slots in the hub for a trial-and-error alignment. I cut out matching mahogany pieces to go over each 60-degree wheel arc, then drilled and tapped machine screws to hold the pieces on. I left a small space on the edges of the mahogany pieces to each side, which I filled with some thin veneer strips, secured in place with Gorilla Glue. I belt sanded the circumference to get a smooth edge and again used my router to round over the wheel rim. The cutouts of the mahogany pieces near the hinges on the forward portion of the wheel were sanded to prevent the wood from binding against the aluminum in the folded position.

I also made up two locking arm pieces, which I held on with round-head machine screws. Slots in the folding arms meet up with another set of machine screws to hold the wheel in the open position. I had intended to use some device to hold the locking arms in place, but found it unnecessary because the "spring back" in the crescent shapes holds these locking arms in place.

I sanded, buffed and coated the aluminum and wood components with West 105/207 Clear Coat Epoxy and then Interthane clear varnish. I also installed two small pieces of shock cord to hold the crescent components in the open position.

The big advantage of the folding wheel is that it allows an easier change of helmsman, as two people will be able to walk past the wheel; before, there was a crude choreography of crawling on the seats to get aft and forward of the steering position. When at an anchorage, before going to sleep, I always take note of the boats around me that have removed their wheels and tied them off against a rail, knowing that if the wind pipes up in the night, they will have the added burden of having to find and secure their wheel before any attempt is made to deal with a dragging anchor or get under way.

I leave my wheel folded when motoring and most of the time in light to moderate airs. I tend to leave the wheel in its open position in heavy air and in a seaway where one instinctively wants the assurance and mechanical advantage of a consistent full diameter. The slight out-of-round on the rim caused by the wood trim wasn't hard to adjust to. Also, the spring back of the folded arcs against the locking arms is solid, and I have not experienced any unwanted folds to date.

Whether purchased from Lewmar or made yourself, a folding wheel can make a significant difference in cockpit livability while stationary or under way. **DIY**

tion when unfolded. Card table hinges are also available in stainless at chandleries.

The side tables unfold to port and starboard of the helmsman. On the first foldout, two recesses that retain glasses, which I cut into the wood, become exposed. On the second foldout, the dining surface (small, but sufficient to hold a plate) is revealed. I used two barrel bolts to drop down into two holes in the leaves to securely hold them in the up position when under way.

The forward hinged table bolts to the pedestal and folds completely underneath it. It is supported by a Swedish Rakego folding bracket, which sells at my chandlery for $75, and is made of stainless and aluminum. It is well suited to cockpit tables because it locks automatically in the up position and won't fold accidentally, but it can be easily folded by allowing a spring-loaded aluminum sleeve to ride over a stop.

The "single" table mode is sometimes raised while under way, so I rounded the ends to facilitate access around it. When the small vinyl catch is unclipped, the two top leaves are unfolded and held open with card table hinges. The top component (drink holder and side tables) and the bottom component (forward table) are held together with two vertical bolts that pass through the pedestal and join with wing nuts for easy removal.

BACKRESTS

My Aloha did not have a particularly good backrest design. The cockpit coamings, although curved, came to about the lower middle of my back and didn't offer good support. The boat had the winches and large cleats for securing the jib mounted on top of the coaming, which tended to poke me.

I decided to make some backrests, but again had design constraints (when is that not the case?). I couldn't make them so high that it would be difficult to get in and out of the cockpit. I also didn't want to cut off access to the winches. The result was that I elected to mount two backrests on each side, one forward and one aft of the winches. The backrests were angled away from the winches so they would not interfere with the jib sheet handling; the height of the back rests was designed to allow the winch handles to rotate freely.

I built a box around the forward backrests, which served as a catchall and drink holder. After I installed my dodger, I could no longer easily see forward while sitting on the cock-

Finding (and Afford

By Lenny Rudow

Chiropractors must love boats, not necessarily because they're all boaters but because boats—especially small powerboats—probably create lots of customers.

Banging through rough seas at 20-plus knots can take a serious toll on your back and even wallowing through rollers on a trawler or cruiser can lead to pain, thanks to hours spent on your feet or in the same chair.

Your helm chair can be your first and best line of defense against boating aches and pains—and a nice way to upgrade your cockpit or helm station. But what exactly makes for a good helm chair?

ERRR ... GONOMIC

The key to a comfy chair is ergonomics, whether you're talking about the helm or household. Unfortunately, few boat seats are designed with ergonomics in mind.

Why? Price is a limiting factor. Roto-molded plastic chairs are most commonly found at the helm, and these are designed more for easy manufacturing and eye appeal than the proper fit. Space is another common issue. Generally speaking, helm chairs are sized and placed to fit the average American. If you're not average, you're out of luck.

Here are some elements that make a healthy seat—and some of the reasons they often get ignored on most production boats:

- With your feet resting on a footrest, the angle between your torso and legs should be slightly greater than 90 degrees. But most boats don't come with a footrest, and the chair's first job is to ensure that the captain can see over the helm.
- Two to 4 inches of space should be between the front of the seat cushion and the back of your knees. But on a boat, seat cushion size is often determined by how much space is available at the helm.
- Armrests should support your forearms, while elbows and wrists are in a neutral position. But on a boat, armrests are usually short and low, so—if they exist at all—they don't interfere with the captain's movements.
- The backrest should be adjusted nearly upright or slightly reclined with head support and should provide lumbar support. Many helm chairs don't allow any adjustment, taking a one-size-fits-all approach.

EXPENSIVE UPGRADE

The problem with helm chair upgrades is almost always price. Land-based furniture can be mass-produced cheaply, thanks to economy of scale. Marine seating, on the other hand, tends to be far more expensive because it must withstand the elements. Even roto-molded pedestal seats often sell for several hundred dollars.

The deluxe, and expe

ing) the Right Helm Chair

Leaning posts are incredibly popular on small, open boats, but you're probably going to bounce around quite a bit and a post simply allows you to stand—not sit—more comfortably.

Drop-down bolster seats are another option. In its seating configuration, these are fairly comfortable and meet some ergonomic requirements, though few have good armrests or footrests. Release the seat bottom, and it drops down to turn into a leaning post. These can be a strong option for many small boats, but they also don't come cheap. Simple versions can be found for about $500, but they offer little support and generally have no footrests or armrests. Better versions cost thousands of dollars.

So, how much should you expect to pay for a truly comfortable, ergonomic helm seat? After trying out literally hundreds through the years, there's one standout in my mind that has outclassed every other seat in which I've planted my boating butt: a Stidd 500.

This chair is semi-custom, has extremely comfortable padding and a reclining backrest with head support, good armrests and Ultraleather covering. It usually costs—are you sitting down?—a hair over $4,000.

That's an awful lot of cash to lay out for a helm chair. But there are alternatives. An enterprising captain can upgrade the helm seat, either modifying what's on board, taking advantage of the used market or building something new altogether. Whatever your strategy, there are some considerations.

YOUR BODY, YOUR SEARCH

Before figuring out which helm seat will be the ultimate tote for your tush, you'll need to establish the limits determined by your boat. On large yachts, trawlers, cruisers and sportfishers over 50 feet, you shouldn't have too many limiting factors. But on smaller boats, you'll be constrained by how much room is available at your helm. So take some measurements to establish just how large a chair you can accommodate.

Next, consider the base. Many chairs are available on tracks (remember that adjustability boosts your comfort) that can be mounted either on a flat base or on a pedestal, but some are available in only one option or the other. And others are available already built onto a base. Before deciding which is right for you, you'll have to see what fits at your helm, what base options are already installed and if they can be changed.

ensive, Stidd 500.

The next limiting factor is height. Again, you'll need to take some measurements to ensure that your new helm chair is high enough for you to see when seated. And remember the footrest. If you can, look for a chair that has an adjustable footrest built onto the pedestal or consider adding a separate footrest at the appropriate height.

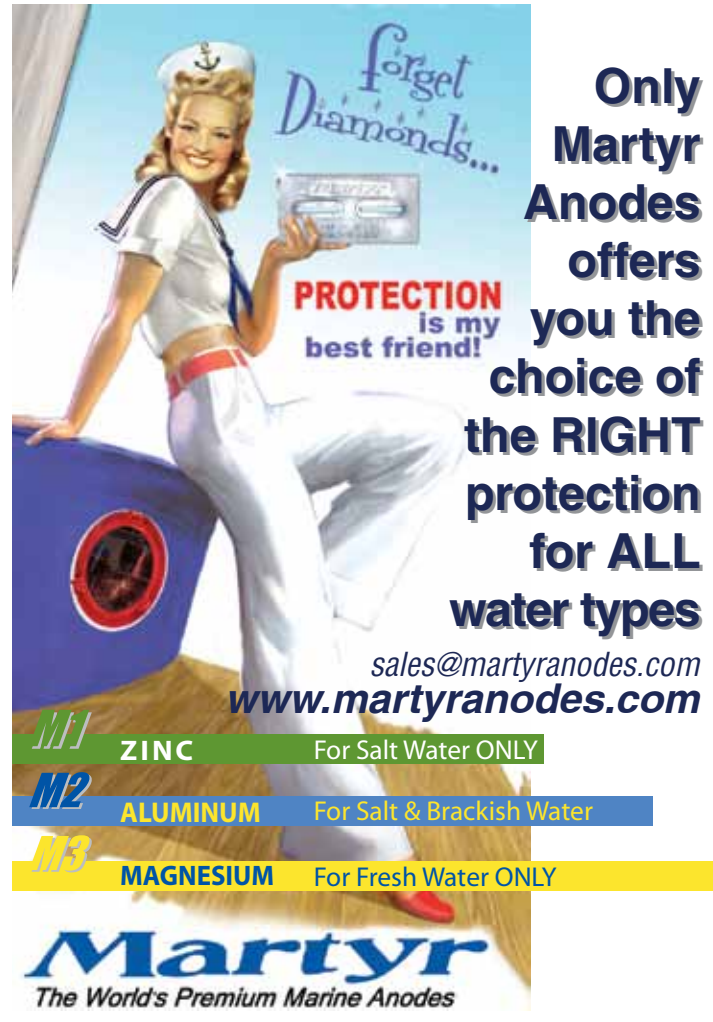
You'll need a tape measure again when you take armrests and seat sizes into account. You'll need to ensure you have sufficient room to pass between your steering wheel and the seat and armrests. Look for armrests that are overbuilt, too, because they often become handholds.

Finally, consider cushions and coverings. If the chair will be exposed to the elements, vinyl is virtually the only game in town and will be found on 99 percent of the helm chairs out there. A 24-ounce vinyl should be considered a bare minimum for marine seat cushions and don't believe it when you read that 28-ounce vinyl (which is common) is "heavy-duty." The best marine vinyls are 32 ounces and above. Foam in the cushions should be firm enough that you won't "bottom out" on the hard seat frame when the boat slams down off of a wave.

Remember, too, that the bottom of the seat cushions should allow water to drain, because the foam inside is sure to become saturated at some point. "Flow foam" is better than regular closed-cell foam, because it will allow moisture to pass through it and drain more easily.

Whatever you choose will probably be more expensive than some other upgrades. But you can probably keep it out of the four-figure range. And think of the money you'll save on chiropractors. **DIY**

Lenny Rudow was senior technical editor for Boating *magazine for more than 10 years and is currently the electronics editor for* Marlin *and* GoBoating *magazines.*



pit coaming. Consequently, on the aft back rests, I also decided to add a small, hinged storage box, which served double duty as a mini-seat that elevated me the required few inches to get a clear forward view over the dodger. I used a router to get rid of hard edges. I also recessed the piano hinge for the lid top on the storage seat, so it wouldn't catch on my pants and would instead provide a smooth sitting surface.

I purchased a couple of tubular, Sunbrella-covered lifeline cushions to make leaning against the lifelines easier, and I made sure to close the lifeline pelican clips with electrical ties while under way to make sure they didn't undo while I was leaning against them.

I added two cam cleats instead of the traditional cleats to hold the jib sheets, and I mounted a traditional wood cleat on the port backrest to secure the roller furling line. I found that someone invariably pulled the jib sheet over the top of the backrest, cutting through the varnish, so I I purchased some rounded stainless steel chafe guards and mounted them on the backrests to give needed protection.

I secured the backrests with through-bolts, again using wing nuts inside the coaming that I can access from the cockpit lockers to allow for quick fall removal and spring installation.

Overall, focusing on the cockpit has resulted in a far more functional—and better looking—boat, which is easier to handle and softer on the crew. And the price was certainly right—none of these projects, with the exception of the wheel kit, cost more than $200.

photo by Rory Harley

The author used mahogany and card table hinges to make folding cockpit tables mounted to the pedestal. With the forward table and side tables (shown folded), the boat can seat four for dinner.

But the key is not to emulate what I've done. Instead, think about your cockpit and your needs, and you'll soon have a list of projects all your own. It will usually take more time deciding what works than actually building the final product. But whatever you choose, focusing on the cockpit almost always pays off—after all, that's where we spend most of our time. DIY

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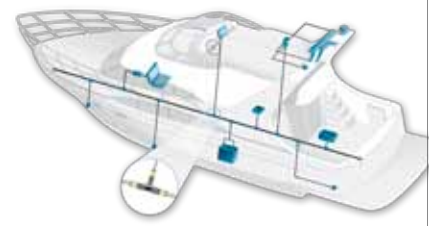

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Cutting a Rug

Installing an Exterior Boat Carpet Is About Time, Not Money

By Bruce W. Smith

An older boat is a lot like an older home—the fastest way to make it feel like new is to put down new carpeting and give the whole thing a good cleaning.

Laying down a new exterior rug in a boat takes little money. The biggest investment is time, because it's a slow and tedious process to do the job right. But when it's done, it's a thing of beauty.

We took on refurbishing an abused 10-year-old Stratos 20-foot bass boat and got great results with about 10 hours of work and an investment of about $500.

MATERIALS AND TOOLS

Finding a source for marine-grade carpet was just one click away on the computer: http://marinecarpeting.com. The company has everything you need to refurbish an older boat, from bulk carpet to pre-cut carpet kits. It also includes complete instructions, and the tools to do the job—carpet shears, razor knives, scrapers—are sometimes included right in the kit.

When it comes to boat carpet, you do get what you pay for—just as you do in home carpeting. It's one of the most important items, and you're spending a lot of time and additional money refurbishing, so don't scrimp.

Marine carpet quality is based on weight in ounces. The higher the weight, the better the quality because it has more fibers per square yard. For example, 20-ounce carpet has 25 percent more fi-

Bruce W. Smith is a boating writer/author who has seen his fair share of smallcraft DIY restoration projects over the years.

photos by Bruce W. Smith

Replacing carpet on your boat is easy with the right equipment and a little time.

bers than 16-ounce carpet. The heavier grade will wear longer and look nicer.

Marine-grade carpet is specifically designed for use in and around water. It has a rubber backing (softer on the feet and better on the back) and is heavily UV-treated to withstand years of sun exposure. Most have a three-year warranty. Other carpets will not stand up to marine use.

Good sources of bulk carpet are home improvement centers and online stores such as www.boatcarpetbuys.com, Overtons.com, corinthian-marine-carpet.com and marinecarpeting.com.

The basic re-carpet kit we ordered, which included a 6-foot-wide, 20-foot-long roll of heavy 20-ounce marine carpet, cost less than $200. If you want to save the time of measuring and cutting each piece, they also have pre-cut carpet kits for specific boats starting at $265.

An option for areas of your boat that require a more heavily padded floor immune to spills and stains is BedRug (www.bedrug.com). The carpet-like material is made out of polymers and bonded to a closed-cell foam pad. It's been used for years in the beds of pickup trucks and is now available directly from the manufacturer in flat-surface, five-foot-wide rolls. The cost is $11.49 per linear foot in lengths of 10 feet or longer. BedRug isn't affected by any petroleum products, battery acid, mud, grime, wine or even fish scents. This can be used instead of regular marine-grade carpet and can be glued down or held in place tucked under edge trim because it's heavy enough to remain flat on the deck without gluing.

What carpet suppliers can't ship are the flammable contact cement and cleaning solvent you'll need to clean the surface and apply carpet. You can find those at Home Depot, Lowe's, Ace Hardware or just about any other home improvement center. A 20-foot boat will take about 2 gallons of each.

You can buy contact cement in 5-gallon containers from home improvement centers and countertop installers for about the same price you would pay for 1 gallon at a hardware store. We chose DAP Weldwood Original Contact Cement, because it is easily available and has proven effective in the marine environment.

OUT WITH THE OLD

Re-carpeting requires removing the old carpet and gluing down the new. It sounds easy—and is, in theory. But there are some things you can do to ease the process.

For starters, you might get a couple of your buddies to do their boats at the same time. It's nice to have a pool of labor when the going gets tough.

Start by removing hatches and small pieces to be re-carpeted, along with any hardware that gets in the way. Label every hinge and lid so they go back exactly where they were came from. That way, you won't waste time drilling new holes and aligning latches.

Then you are ready to remove the old carpet. The carpet removal goes a lot faster if one person gently pulls the carpet up while the other uses a razor scraper and a little lacquer thinner dribbled along the bonding edge to get the carpet to release.

It's not a rip-and-tear job. The more intact you can keep the old carpet, the less time you'll spend patterning a replacement piece if you are buying marine carpet in bulk. (Pre-cut kits are a lot easier to install, but add to the tab.) In cases where you don't have old carpet to use as a template, creating one from cardboard works well.

It also helps to place the old carpet pieces inside the lockers from where they were removed. That way when you are ready to cut new carpet for that livewell or rod-locker lid, you have the piece of old carpet ready to use as a pattern.

Once you have the old rug removed, all that remains is to thoroughly clean the surfaces that are to be re-carpeted. Cleaning is a simple matter of a little brawn behind a razor scraper, supplemented by some lacquer thinner and a handful of rags to remove the old carpet glue.

CUTTING THE RUG

The next step is to roll out a length of the new carpet—bottom side up—running bow-to-stern in relation to the boat. This

photos by Bruce W. Smith

Brush on a liberal coat of contact cement to each piece of carpet and on the surface its to be placed. Let both dry according to the instructions on the contact cement.

Helping hands makes glueing carpet and aligning hatches and lids easier during the carpeting process.

facilitates marking and cutting the pieces for installation.

"Aligning the new carpet before cutting is the most critical part of the process," cautions Rick Kornmeier Jr., one of the owners of MarineCarpeting.com. "You must make sure the grain of the carpet runs the same direction for every piece that is cut. If you don't, when the carpet job is done, some areas will look lighter than others, depending on the angle [from which] they are viewed."

It also helps if only one person does the cutting. Carpet shears are a must for the rough cuts, and a razor knife for the fine trimming. Kornmeier recommends starting at the stern of the boat and working forward. This gives you a little practice working on smaller parts, such as battery compartment and dry storage locker lids, before attempting the deck and cockpit.

The newly cut piece of new carpet is then slathered in contact cement, along with the surface where it's going to be applied. Allow the cement to dry according to the directions on the container. Once both surfaces are nearly dry, they will bond instantly, which is both good and bad.

Replace hinges and latches using new stainless hardware.

One thing we learned after the first attempt at putting a new piece of carpet on a locker lid is having two people work together is a lot more effective than going it alone. That extra pair of hands can help.

Also, save the cockpit for last. This is the area where you will spend the most time, and which arguably should be done with the most care. By doing it last, you'll have gained some experience and better understand the techniques that work.

Of course, while you are re-carpeting, you may want to make other changes to spruce up the boat or add utility.

On our Stratos, the last item of business was putting on new rubber edge trim, purchased from Trim-Lok (www.trimlok.com), around the lips of the locker lids and the exposed edges of the console. We also had a local upholstery shop redo the bench seat, which cost about $300.

That brought the total cost of the job to just under $500—not a bad investment when you consider the end result: The deck is a nice shade of medium gray, and there is no rust, fish stains, worn areas or even a trace of ground-in dirt or grime. The old Stratos looks like new—and that's what we wanted. **DIY**

Tender Care

Give Your Dinghy the Once-Over — New Paint and All

By Frank Mummert

The West Marine inflatable tender that came with our ketch had seen some hard use. While the seams were all airtight and the fiberglass bottom and transom were sound, the material was faded.

Measures like keeping your dinghy covered and out of the water when it's not in use will extend the life of the fabric, but eventually you will need to take more aggressive steps to keep the air inside the tubes.

In my case, I decided to paint the dinghy top to bottom.

Yes, you can paint an inflatable, but you need a strategy to address the project, because the materials can be tough to work with. But with proper preparation, the end result can be excellent.

photos by Frank Mummert

Before cleaning, below, the bottom was covered by a mixture of dried mud and plant material that resisted scrubbing. The author completely repainted the dinghy, including reapplying the registration numbers by hand with a permanent marker, as seen above.

CLEANING AND LEAKS

The first order of business on our tender was undertaking a thorough cleaning. Although there are cleaners designed for inflatables, dish soap generally does a sound job. Using a scrub brush and soapy water, I went over the entire fabric surface, using a nonabrasive scouring pad for stubborn stains. On the fiberglass sections, dried mud and plant material had accumulated, which stuck despite scrubbing and soaking. For these areas, I resorted to a soft plastic scraper.

If you suspect the seams are leaking air, you'll need to conduct a test by inflating each tube and applying a light coating of soapy water to the seam. If there are any leaks, the soap will bubble. Check both tubes at the same time, even if you suspect only one tube, and keep checking until you find every possible leak. I found no leaks, but I discovered that the rubber buttons that hold the oars when they were not in use were loose.

If there are no seam leaks but you're still losing air, leakage may have developed from pinholes in the fabric itself. Sealing the tubes (both PVC and Hypalon) from the inside involves pouring a liquid latex material (there are several to choose from, including West Marine Inflatable Boat Sealant, Inland Marine Boat Sealant and Bixler's ToobSeal) into each tube, inflating the tube and then shifting the boat end over end and side to side so the liquid flows to all areas. The latex is thick enough that it will seal any small leaks, although it will not fix large leaks (the material will simply blow out). When using an internal sealant, the boat must be rotated every half hour for several hours to ensure that the latex is coating the tubes and not forming puddles.

After the tubes were sealed, I reattached the oar buttons using the contact cement from a patch kit. Inflatables can be made of either PVC fabric or Hypalon, and while some glues will stick equally well to either material, it's better to get the right glue for the material you're working with. In my case, that was PVC. I also glued down some places where the thick rub rail had been torn up in encounters with unforgiving dock pilings.

Frank and Suzanne Mummert currently live aboard their 45-foot Morgan ketch, Rockhopper, in Richmond, Va. Frank is a Coast Guard-certified captain and former U.S. Navy engineer. Suzanne also holds her Coast Guard captain's license.

PAINTING TOP AND BOTTOM

Although we keep the boat in freshwater, the effort involved in cleaning the growth off the bottom persuaded me to apply bottom paint. I used a quart of Pettit Inflatable Antifouling Paint to coat the fiberglass bottom and the bottom half of the tubes all the way around.

The top coating paint was available in gray and black at my local West Marine. Since I had painted the bottom of the boat black and the rub rail was white with blue trim, I chose a gray to create a two-tone effect. There was a significant amount of surface prep involved in painting the topsides. First, I washed the area again with a more aggressive cleanser. Next, I roughened the surface using 100 grit sandpaper and wiped it down with methyl ethyl ketone, available at a hardware store. MEK has two functions—as a solvent to remove any old adhesive or restorer compound that might prevent a good adhesion and as a chemical abrasive. It melts a small amount of the PVC so the surface is roughened slightly. MEK is very potent, and I took precautions to ensure that it went only where it was supposed to go. Use gloves and eye protection, and wear long sleeves. Be absolutely sure you have adequate ventilation.

As with all painting jobs, the key to success is following the manufacturer's instructions. Because inflatables have to be able to flex, getting the paint to adhere completely is very important. Even if the paint can be used on either PVC fabric or Hypalon, the materials need to be prepared differently. For example, Hypalon, because it is generally thicker and stronger, can be sanded more aggressively than PVC fabric, which allows the paint to grip better. Because of this difference, it may difficult to get good adhesion on PVC without thorough preparation. That's why it's important is to ensure all traces of waxes, polishes or any other surface contaminants are completely removed.

The topside paint was much thinner than the bottom paint and, with high temperature and low humidity, drying time was measured in minutes. I had to work quickly to smooth out any surface irregularities. Because it is very difficult to sand out surface imperfections between coats, it is important to get each coat right the first time.

The new topside paint, above, is a much deeper shade of gray than the original. Some areas, like the rub rail at left, had to be repaired with contact cement before the painting could begin.

LETTERING AND NUMBERS

After the topside paint was dry, I used a West Marine numbering kit to put the state registration numbers on the bow. In the past, I have used plastic display strips, but I dislike this system for several reasons. The display strips did not actually meet the legal requirement that the numbers be permanently fixed to the forward half of the hull. Also, since I would remove the strips when I stored the boat, I occasionally found myself without registration numbers, having forgotten to reinstall them.

The kit came with a collection of cardboard stencils and black paint. The instructions were to put the stencils together as a unit, tape it to the side of the boat and pencil in the number, then remove the stencil and apply the paint. I did not use the recommended "pencil and paint" system. Instead, I used a black permanent marker to first trace and then fill in each letter and number. I do not know if this will last as long as the paint, but since a permanent marker is significantly easier to keep on hand than the bottle of paint, I felt that it was worth the change.

It took the better part of three days to complete all of the cleaning, inspecting, sealing and painting. The tendency for the tubes to deflate over time appears to be gone, and the new paint scheme makes our dinghy distinctive. The sealant ($60), bottom paint ($70), topside paint ($40), and the lettering kit ($22) were all available off the shelf from West Marine, and the painting and cleaning supplies, with the exception of the MEK, were materials that I already owned. While some steps were definitely "learning opportunities," the results should last for several years with proper care. **DIY**

photo above © istockphoto/knape; below by Gene Bjerke

Finding North

Install it Properly and Your Compass Can Be Your Best Friend

By Gene Bjerke

The mariner's compass, first developed in the 15th century, has been refined and improved to produce a reliable, trouble-free instrument you can buy today for just a few dollars.

Despite the proliferation of ever more sophisticated navigation electronics, you need a compass on your boat. If the electrical systems go—a scenario more common than you think—the compass will get you home.

A compass always works, and it is always accurate—provided it has been installed correctly. It can also be a beautiful addition to a cockpit. But there are a few special considerations to attend to in order for your compass to work properly.

MAGNETIC INFLUENCES

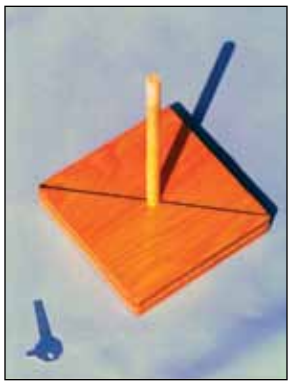
Compasses today come in three basic configurations: flush-mounted compasses, which are designed to be inset into a vertical or horizontal surface; bracket-mounted compasses, which sit completely clear of the mounting surface and are supported by a metal bracket; and surface-mounted compasses, which sit directly on the surface like a binnacle for a pedestal steering wheel.

While the details of each of these configurations differ, they all require the same considerations when mounting, such as visibility (the person at the helm should be able to see the compass easily), magnetic influences and alignment.

A compass is a device for detecting the magnetic field of the Earth. This field can be distorted by items on a boat, such as large masses of iron and electrical currents, which can create a magnetic field around them.

Before drilling mounting holes, the wise mariner places the compass in its proposed location temporarily and notices if the card deflects slightly as it is set in place. If that doesn't happen, turn on the engine(s) and turn various circuits on and off, again looking to see if anything affects the compass. If possible, all wiring in the vicinity of the compass should be twisted to neutralize any induced magnetic fields.

A small amount of deflection, called deviation, can be corrected if the compass has compensating magnets. But note that a compass cannot be properly compensated if magnetic influences vary with the operation of surrounding equipment, such as a windshield wiper motor. If deviation cannot be consistently corrected by compensation, find an alternate location for the compass—or the device distorting it.



A shadow pin will help calibrate your new compass.

COMPENSATING A COMPASS

In most cases, you can compensate your own compass. What you need is a nonmagnetic de-

Gene Bjerke is a sailor with 50 years experience on boats from dinghies to square-riggers. He has written for magazines including Cruising World, Multihulls, Chesapeake Bay, *and* Mad Mariner.

vice to turn the compensating screws (one may come with the compass), a shadow pin and a helper.

A shadow pin can be made by taking, a 4-inch square piece of ¾-inch plywood, drawing a straight line across it, and inserting a piece of ¼-inch dowel in the middle of the line. The dowel must be plumb to the board.

The procedure is simple. Out on the water, one person steers north by the compass and the other sets the shadow pin on a level surface in the sun and lines it up so the shadow from the pin lies along the line. Then the person on the helm turns the boat around and steers so that the shadow lies along the other half of the line. If the compass does not read South, the other person turns the proper compensating magnet to remove half of the error. Repeat until the error is gone. Do the same on an east-west course. Finally, run the north-south course again to make sure nothing has changed. Constant deviations that cannot be compensated can be recorded in a deviation table that gives varying degrees of deviation on different compass headings. But it is better to find a location that provides trouble-free operation.

ALIGNMENT

Every modern compass has at least one primary lubber line—the index mark you use to read the direction the compass indicates. Some compasses also have secondary lubber lines at 45 degrees on either side of the primary. These are very useful for people who use a single, center-mounted compass but steer from either side of the cockpit. Just remember to add or subtract 45 degrees from the course as appropriate.

It cannot be emphasized too strongly that a line from the primary lubber line through the center pin of the compass card must be either right on the center line of the boat or exactly parallel to it. Any deviation from that introduces a permanent error to the compass. The compass will read incorrectly by however many degrees it is mounted off the proper alignment.

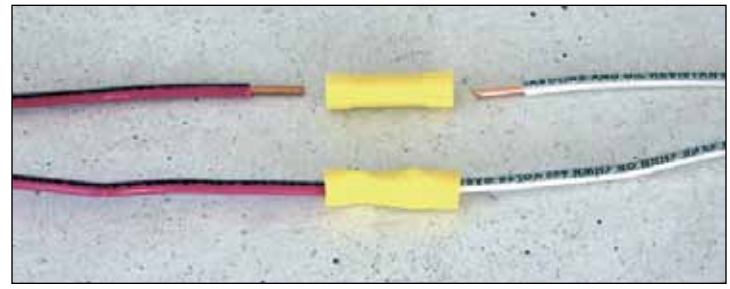
A bulkhead-mounted compass is made assuming that the bulkhead on which it is mounted is placed at right angles to the centerline of the boat. With bracket-mount compasses, the bracket is usually oriented at right angles to the centerline of the compass, so mounting such a compass on a bulkhead or drop board is a simple matter. In any other situation, great care must be taken to be sure the centerline of the compass is lined up with the centerline of the boat.

MOUNTING

If the compass does not come with mounting screws (or even if it does), make sure the fasteners are nonmagnetic, either stainless steel or bronze. If there is any doubt, they can be quickly tested with a magnet.

If the compass has a light for night use, it is easier to make the electrical connections before the compass is screwed in place, especially if the body is out of sight behind a bulkhead or in a dash. It is important to twist the positive and negative wires (16 gage minimum) to neutralize the magnetic field created when the light is on.

Crimp-on terminals of the proper size are the best for these connections, and heat shrink tubing should be used to protect them. A dimmer switch can help preserve night vision. A dome shield that partially opens is another option to dim a compass light, shield sunlight and protect the compass from damaging UV exposure.



Use crimp-on connectors to attach the wiring for the light.

Any holes for the body of the compass and for the fasteners should be snug, and a good bedding compound should be used to seal out moisture.

CHECKING YOUR NEW COMPASS

Now that you have your compass installed, you want to check it. You can check it against the GPS or the chart—but remember that the GPS shows the course the boat is actually following (COG) and the compass shows the boat's heading (not necessarily the same).

You should check the compass in a place and time where there is minimal (preferably no) current. To use the chart: Lay out a number of different courses that you can maintain visually, such as between close-spaced buoys or some kind of range. Then steer those courses and glance at the compass. When it reads correctly, it will give you confidence that your compass will reliably get you where you want to go. **DIY**

The Right Track

Soggy Crackers Exposed a Leaky Jib Track. A Drill and Some Epoxy Fixed It.

By Chris Ferro

Leaky jib tracks, or any through-deck fittings, are a common problem on older sailboats, and my 27-year-old Seidelmann is no exception.

My tracks each have 20 5/16-inch bolts: 18 for the track itself and two for the end caps that prevent the car from escaping. The bolts go through the balsa-cored deck, and most of those on the starboard track end up in the galley cabinet where I keep the food. When my crackers started getting soggy, I realized that the track was leaking.

Not only was water dripping from a few of the bolts themselves, but water was getting into the surrounding core, then dripping down through a few spots in the deck's fiberglass skin.

photos by Chris Ferro

The jib track with its ugly and futile smear of silicone.

No amount of silicone sealant or Creeping Crack Cure seemed to help—the deck got uglier and my crackers got soggier. Instead of a huge re-coring project, I decided to just remove and reseal the track, using epoxy to seal off the core from further water intrusion. As long as the deck doesn't develop a soft spot, I'm not going to worry about a little wet core (thought I understand that others might). At first I thought I'd need to enlist help to remove the track, one person to hold the nut down below and one person to unscrew the Phillip's-headed bolt up above. But I soon found that the nut wouldn't spin if I grabbed it with a vise-grip, which would lodge itself against a bulkhead or the next nearest bolt. I used the biggest screwdriver I could find to minimize the likelihood of stripping and to give me a good grip. The bolts probably hadn't been touched since 1983, and a few of them didn't budge until I grabbed the screwdriver with a channel-lock for extra leverage.

A vise-grip down below served as the author's "assistant."

Once every bolt was removed, the track pulled off easily. I then scraped the old sealant off and sanded the deck smooth and clean with a small palm sander. Next, I used a ¾-inch Forstner drill bit and expanded each of the existing holes, drilling only through the top fiberglass skin and core and leaving the bottom skin alone. I didn't do anything special to avoid drilling through the bottom skin. A Forstner bit is easy to control, and once you drill through the top skin, a few light pushes down into the balsa gets it done.

A few of the holes revealed wet core, and I dug out as much of the wet balsa as I could reach. Aiming a hair dryer at each hole for five to 10 minutes dried them out a bit more. Digging out the dry core was much harder, but a Swiss Army knife did a pretty good job. I cleaned everything up with a Shop-Vac.

Dark, wet core spewed out of some of the holes, left. Other holes had light-colored, dry and healthy core.

I then taped the bottom of the holes and started filling them in groups of three or four. I used a liquid epoxy first to penetrate the nooks and crannies, and to serve as the connector between the existing core and the new filler, which was a thick putty (the kind that comes in the form of a stick). I squirted a small amount of the liquid epoxy into each hole, using a kind that is specially formulated to cure in the presence of water because of the wet core. After spreading the liquid around with a popsicle stick, I inserted the putty (also made for wet environments), using my rubber-gloved fingers to push it into any empty spaces. Because most decks are not level—they slope away to prevent pooling water—you cannot count on gravity to do the work for you.

As the epoxy starts to cure, it heats up and expands, forming a dome of extra epoxy that needs to be removed and leveled off.

Chris Ferro is in the midst of updating his 1983 Seidelmann 30T for another summer of cruising the Chesapeake.

The enlarged holes filled with epoxy. More sanding will smooth them.

In about an hour, it was rock-hard and ready to be sanded and re-drilled. I left the last three holes unfilled, using them to bolt the track back (without attaching the nuts) so that I could use it as a guide to drill out the other holes in the right places. I then filled those three holes and bolted the track on again as a guide for drilling.

A ¼-inch bit started the holes, then a 5⁄16-inch bit finished them once the track was removed. After all of the holes were ready, I used polysulfide sealant (Life-Caulk) and bolted the track back down, reversing the vise-grip technique on the nuts down below. I also made sure to spread some sealant on the threads of each bolt before installing them. A week later, after a heavy rain, my crackers were bone-dry.

Done, just a little more cleaning and the 27-year-old track won't look a day over...20.

The project took about four hours, mainly due to the time it took to unscrew and then re-screw the 20 bolts, going down below to move the vise-grip for each (an assistant would have come in handy) and waiting for the epoxy to cure. The costs were minimal: $25 for five sticks of putty, $10 for Life-Caulk and $10 for liquid epoxy. **DIY**

The products used.

DIY on CD-Rom

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Rebuilding a Helm and Dash

Changes to One Boat Didn't Have to Break the Bank

By Mark Yeates

When I built my 17-foot bowrider from an old hull and deck back in 2000, I liked the way it turned out. But time and tastes change, and I decided to redesign the interior—and that included a new helm and dash.

I retained the old gauges, compass and solar panel, which kept the costs down, leaving only cosmetic changes. What I wanted to change was the location of the gauges, the color and the finish. I also wanted to make the dash on the passenger side more accessible.

I did like the original solid oak material, but with larger pieces of wood required, I was wary of cupping and splitting. I decided to go with veneered plywood, with a real oak finish on both sides.

Mark Yeates is an avid DIYer and is continually making changes and improvements to the boat he built. His original build and consequent refits have appeared in past issues of DIY Boat Owner.

photos by Mark Yeates

The author reconfigured the helm and dash in the bowrider he built in 2000. To keep costs down, he retained the old instruments and used veneered plywood.

TEMPLATES FIRST

I started by disassembling the dash. When removing the old parts, I made sure to take digital photos for reference, and then to label, tag and bag all parts. I also labeled and inspected each connection, as well as the wiring.

I then set about using scrap wood to try various layouts. I started with things that had specific locations, such as the steering column, gauges and the access areas. As I adjusted my layout, I scribbled notes right on the templates to be sure they were transferred to the final parts. As I worked, I allowed for the added thickness of the finished parts and clearance for other components.

In my final design, the top and front sections joined at specific angles. I screwed and braced my templates in place to allow me to measure the proper angle with a bevel gauge. This was transferred to a sheet of thin cardboard, and my working templates were cut out.

I ensured that the saw blade was in good condition and made a couple of test pieces. The angle joint was very prominent in the finished product, and I didn't want to take any chances. The templates were used to set the table saw blade. I cut both the face boards and a backing support strip, which was used to strengthen the angle on the main joint using marine glue as a fastener. I then screwed the support strip in place using stainless steel

screws. Once the joint was secured, I wiped off the excess glue and allowed the parts to dry (any glue left on the surface could prevent the stain from penetrating the wood).

On the helm, I used a hole saw to cut the round openings for the two gauges, steering column and for the 12-volt plug, and then used a jigsaw to cut the hole for the switches and the opening for the passenger dash. When I cut the long lines of the dash opening, I clamped a straight edge in place and used it a guide.

I pre-fit all of the parts and tweaked them to sit perfectly. The old switches fit, but as soon as I started reinstalling I decided they weren't good enough for the new design. I went out and bought a new set in blue anodized metal.

FINISH AND INSTALLATION

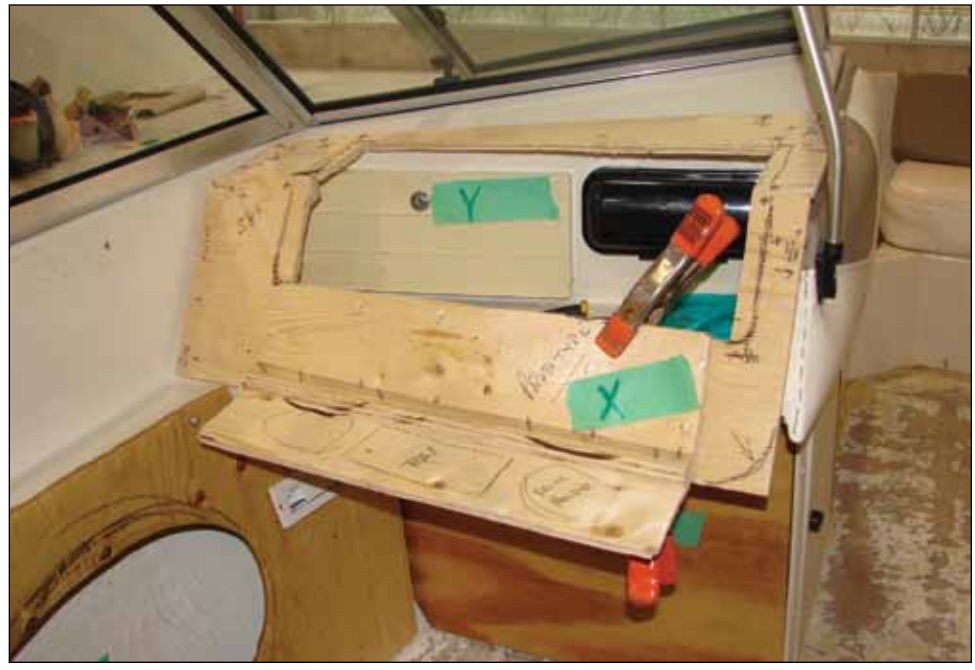
Next I sanded the surface and all edges. Since this was veneered wood, it already had a fine finish, so I started with 200 grit and worked my way to 400. The angled joints were very tight but did require some filler. I was then ready to start staining.

The first coat of stain raised the grain slightly, so it required a light sanding to regain a smooth surface. I used three coats of blue stain to acquire my desired finish. I left each coat on for a few minutes, then wiped off the excess. The final finish was acquired using a semigloss polyurethane. I used four coats with a foam brush and made sure I got into every nook and cranny.

The glove compartment was prepared prior to installing the main passenger dash. It was lined using cork, applied with contact cement. I coated both the cork and the fiberglass base and allowed them to dry before installation.

The lockable glove box was repainted using paint that bonds to plastic. The glove box and the CD player were both reinstalled using stainless steel screws. For the opening in the passenger dash, I used brass hinges and a stop block on the inside top. For something different, I used a blind magnetic latch; that way, no latch is visible from the outside, but it opens when a reverse polarity magnet is passed over the latch inside. This leaves a nice clean finish.

For the helm, I did as much wiring as I could before the components were reinstalled. Fiberglass angles were installed to hold up the original parts, and only slight changes had to be made to fit the new parts. The new parts were installed using stainless steel screws from underneath. The remaining wires were connected and the steering column installed.



To reconfigure the dash on the passenger side to make it more accessible, scrap wood was used to create a template before any final cuts were made. Clamps kept it in place.


To make reassembly of the reconfigured helm easy, each of the instruments was labeled before disassembly, left. When making straight cuts, top, it's best to use a straight edge.

Padded trim panels are located on the end on of the panels on the aisle where people pass. They were made using ¼-inch plywood that was coated with polyester resin to seal the surface. The wood was set in place, and I drilled through the wood and the fiberglass mounting surface. A T-nut was installed and glued to ensure it won't move. Next I used 1-inch foam padding and a polyester batting and covered them with a white vinyl. The vinyl is held in place with stainless steel staples. Vinyl piping was used to finish off the edge. They were then mounted with stainless screws.

Latex caulking was used to eliminate gaps between the wooden parts and the fiberglass body. The wood was masked off, then any large gaps were filled with foam. The caulking was applied, and I used a wet finger to smooth the surface. This keeps any water from migrating into the cracks and damaging the wood.

The helm redesign took about 50 hours in all, but the costs were low—about $240—because I was able to reuse many of the original parts. The largest expenses were the switches, at $60, and the wood, at $55. **DIY**

Success Stories

First-Time Boat Owner Tackles Starcraft Renovation

Kevin Bruns, 21, was in the market for his first boat, one that he could use for fishing and skiing with his buddies on Illinois waterways. He found what he was looking for: a 1986 18-foot Starcraft Bowrider for $2,000.

It included a trolling motor, a fish finder, a mount for a fishing seat in the bow and a 140 horsepower Cobra stern drive.

"It was a great deal, because [the seller] gave me water ski tow ropes and a bunch of other accessories," Bruns said.

But good deals often come with extra work. Bruns spent about 60 hours and invested about $400 to make repairs, mostly to the paint and electrical systems.

"The previous owner added a battery for the trolling motor and didn't do a very good wiring job," Bruns said. The faulty wiring ended up damaging the alternator, which Bruns had rebuilt for about $80. Two trim solenoids also needed replacing.

With the floor over the fuel tank beginning to rot, Bruns made a repair using some spare lumber coated with polyurethane. He discovered a piece of old carpet in the ski well that fit perfectly over the patch.

Hull oxidation and old decals were cosmetic quirks that needed attention, so Bruns removed the stickers with a razor blade and then wet sanded, buffed and polished the fiberglass. A new driver's seat was acquired from a neighbor for $5 and installed with a coat of vinyl paint.

Relying on materials that he could obtain for practically nothing, repair costs were the perfect fit for a starting boat owner. "I'm very happy with the amount of money I spent," Bruns said.

Bruns has been fishing and cruising with friends on his Starcraft for the last two seasons. Future plans for *Cold Shot* (named for the Stevie Ray Vaughan song) include a fresh paint job and a new interior. "Red and white," says Bruns. "Or I may go with a gray metallic to match my truck." **– Karen Jewell**

Kevin Bruns bought the 1986 18-foot Starcraft Bowrider two seasons ago for only $2,000. The boat needed some cosmetic work and new seats. Bruns had to repair the floor above the fuel tank.

Successes are worth sharing.
Whether you're knee-deep in renovating an old boat or you've just finished a project, we'd like to hear about it. Drop us an e-mail with a before and after pictures and a 200-word-or-less description of your work at LeefSmithBarnes@Diy-Boat.com. *If we publish your story, we'll give you a one-year subscription to DIY Boat Owner.*

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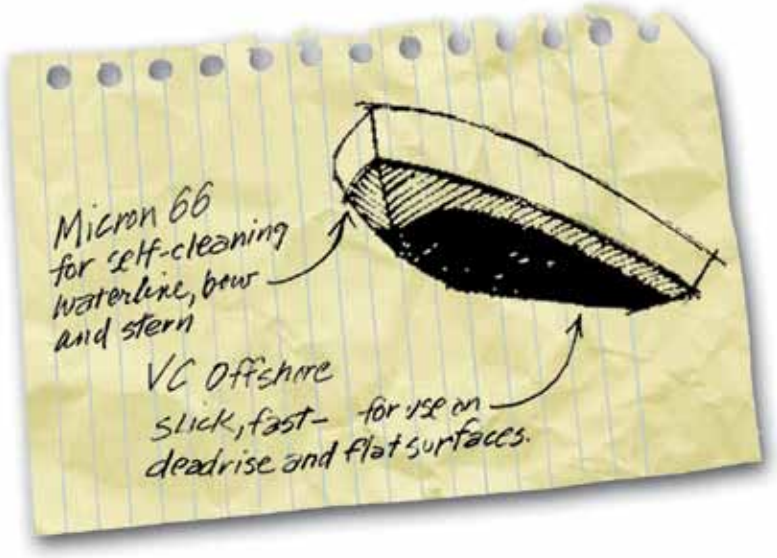
"What is the 'Carolina Smile'?"

Travis Johnson
Regional Sales Manager

Interlux
yachtpaint.com

The **'Carolina Smile'** is a bottom paint treatment that was initiated many years ago in the Carolinas', where captains were seeking faster and smarter ways of reaching fishing destinations at optimized engine power.

Most of us would agree that the first and foremost priority for anyone in the Sportfish world is to catch fish and the second most important priority behind catching fish, is going fast. These days, getting the most out of your tank of fuel without compromising on speed is even more attractive, since it offers both time and money efficiencies.



Here's how it works: The 'Carolina Smile' uses a combination of a polishing antifouling such as the long lasting **Micron® 66** and a low friction antifouling for super speed, such as **VC® Offshore**. The Micron antifouling is applied to the bow, stern and waterline areas. This will provide premium protection against fouling on the areas most exposed to fouling challenges. On the flat and dead rise areas, VC Offshore is spray applied for a super smooth finish. You'll fly through the water on it's low-friction, fluoro microadditive enhanced surface. A smooth paint job could also help contribute to a reduction in carbon dioxide and sulfur dioxide emissions into the air, simply by improving the operational efficiency of the boat.*

By getting there faster and getting back quicker you will be able to cover more water, catch more fish & potentially save on fuel!

So, just how bad do you want to stay cleaner, go faster and catch more fish?

* When compared at identical nautical route & miles using a standard ablative or hard coating system

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