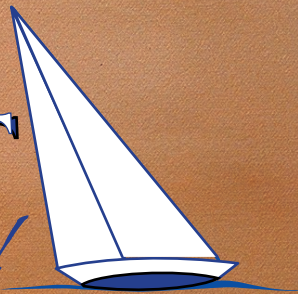


GOOD OLD BOAT

Still sailing after all these years!



MARCH/APRIL 2000
ISSUE 11



\$7⁰⁰ (Canada \$9⁹⁵CDN)



On newsstand until April 30

This Issue

GOOD OLD BOAT

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11 – Volume 3, Number 2 *Good Old Boat*,
(ISSN 1099-6354) published six times a year
by:

Partnership for Excellence, Inc.

7340 Niagara Ln. N.

Maple Grove, MN 55311-2655

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Application to mail at Periodical Postage Rate
is pending at Osseo, MN 55369.

U.S. Postmaster, send address corrections to:

Good Old Boat

7340 Niagara Ln. N.

Maple Grove, MN 55311-2655

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Editorial contributions are handled with
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Opinions expressed by the writers are not
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Subscription rates:

One year/two years:

U.S. and Canada – \$39.95/\$74.95US

Overseas – \$63.95/\$123.95US

Note: We have a new area code (763)
beginning in February 2000. The old one will
work for a while, but please make a note of
this.



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About the cover...

David Large's work is featured on the cover and on
Pages 40-41. David was a commercial fisherman in
Oregon until salmon fishing became less productive
and more restrictive and offshore tuna fishing became
too dangerous. Since his art had been taking over
anyway, he bowed to the inevitable, retired from
fishing, and moved home and business inland to
Montana. David's love of water and boats is evident in
his work. For more of his work and a wonderful
resource on sailing schooners, visit his website at
<<http://www.seadragon.com>>.



Voices from everywhere

Home ports for good old sailors in this issue



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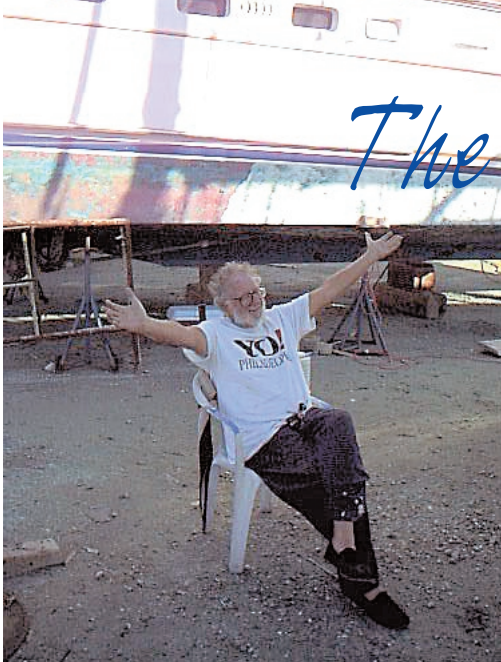
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The view from here

The lesser gift of sailing

Before I made my first ocean crossing, I would allow the water to run in the sink while I brushed my teeth. Then, one day in mid-Atlantic, the first time in my life that I had truly been on my own, a tiny, almost invisible pinhole in a stainless-steel tank sucked out all of my fresh water. When realization struck, the image that taunted me was all of that lovely water that I had allowed, unnecessarily, to wash down the drain as I brushed my teeth.

The tale of the lost water is a paradigm, a telling paradigm, of what the land-bound hordes do in their rush down their own drain. The waste of resources is, to an ocean passing sailor, an anathema, a “Thou Shalt Not” that might well be added as an Eleventh to the familiar Ten.

There was a time, when there were few of us on earth, when a gallon or two down the drain was no big deal. But when the gallon or two is multiplied by billions, waste becomes more than simple wastefulness; it becomes a form of suicide. The sailor in mid ocean knows deep in his soul something that folks on land have forgotten. The sailor knows the resources available to him and just how long they will sustain life.

A small sailboat a thousand miles from land is an exact exemplar of the earth that Man has been given to play with. The limits on your little floating universe are as clear and as crucial as the level of water remaining in your tanks. Not so on land, where remaining resources are imprecisely measured and mostly optimistically viewed, a misperception for which our children and our grandchildren will suffer.

Water is just one of many limited resources. Think of batteries and how carefully the sailor limits their use, and compare this with how recklessly extravagant we are with electrical power on land. And food and supplies and medicines and . . . the list is long. Sailing teaches us how precious our resources are. There are no profligate ocean pagemakers, since they are all long since dead.


There is a good sci-fi film in which trips to the moon are “bus rides” and where the physical problems of life are solved, save one. In the film, most public places are half-filled with ceiling-high piles of garbage bags. It is clear that waste has finally exceeded society’s ability to dispose of it. We are

inexcusably wasteful on land with the creation of garbage. The lesson that sailing teaches us concerning garbage is to “create little and store and bury the rest.” To respect the oceans, we have learned not to befoul them. It is a lesson that the land-bound must learn, lest mountains of undisposable garbage invade their lives.

Obsolescence is the god of waste. Consider the mountains of computers and the acres of autos we throw away. It’s cheaper to dump and buy new. The implications are much deeper than the waste of nice equipment. Obsolescence, planned and otherwise, leads to the ever more difficult question of disposal. The passage-making sailor learns that simple devices with very long lives are the best way to equip his vessel. Like a hammer that survives its first smashing blow and will then survive the rest, sailors need equipment that resists replacement.

A compass, a sextant, the much-deprecated radio direction-finder, some nylon, some Dacron, and some stainless steel, are all supplies which, when they survive their first use, can go on forever. Thus, by rejecting bells and whistles and reducing needs to a least common denominator, does the sailor avoid waste.

Sailing has not really changed much since the time of the Phoenicians. They required little more than a setting star, some bamboo, and some papyrus. Like the Phoenicians, we modern sailors lay, or should lay, a very light hand on the resources of our world. A bit of wind, a star to steer by, a reassuring sun, and a smidgen of water and power, carefully husbanded, can be the grist of great passages.

Less, in the sailing life, is more. That is the Lesser Gift of Sailing. 

Reese has written much but isn’t one to waste words on himself. He tells us, “No sense wasting a tree on ephemera. Here is my bio (and it will fit nicely on a stone):

Reese

Born 1922.

Did lotsa stuff; Wrote lotsa stuff.

Still sailin’.”

*Guest editorial
by Reese Palley*

Catch 22

As I prepare to step up to a bigger good old boat, the issue of bank financing has reared its ugly head. What I am finding is that some banks don't like the idea of lending money on an old boat . . . especially one that needs restoration. I was able to finance the boat I have now through a personal loan, but now I am looking at between \$10,000 and \$15,000, and my personal credit won't go that high. Some banks want to loan only 75 percent of the selling price of the boat. Others won't lend less than \$25,000. Most have sky-high interest rates. And some have a lending region that you must be in.

Do you folks know of any lending institution that is favorable to good old boat people?

Dennis Lancaster
Bellingham, Wash.

Dennis, we know the dilemma: you can't get insurance without a good survey, and you can't get a loan without insurance. We figure some of our readers must have faced and solved this problem. Who has banks and insurance groups to recommend for the rest of us?

Runaway diesels continued

With regard to the note on diesel shut-off problems, I agree with those who said combustion requires heat, oxygen, and fuel. But no one seems to have suggested that an effective way to deal with the problem is to cut off the last of these. This can be done by a manual fuel shutoff valve on the fuel line at its exit from the tank. The use of such a valve will depend upon the layout of the boat; I suspect that in many cases one may already be in place or could be installed fairly easily, perhaps reached through a cockpit locker (as ours is on our Ontario 32), rather than from more deeply in the engine compartment.

Judy Millard
aboard *Veleda IV* in England

Continued

Just read my first issue. Great work. Noticed a letter about runaway diesels. Diesel owners should know that diesels operate on compression to burn or ignite the fuel mixture. Most diesels I have seen in sailboats have compression levers on top of the cylinder. If you lift that lever, the engine quits quickly. This might be safer than trying to cut fuel supplies (not to mention trying to bleed them later) and cutting the air supply. Keeps those hands and clothes away (as far as possible, at least) from

rotating equipment. If you look on Page 13 of the November 1999 issue, you see a diesel motor. Right behind the small "tank" is a compression lever/handle. No fuss, no mess.

Bob Wheatley
via email

And continued

I noticed in a discussion of stopping a runaway diesel engine that someone said the best way to stop it is to cover the air intake with a folded blanket, etc. Actually, it's possible to suck a portion of the blanket into the intake and cause complicating damage. A more direct way may be to place a cutting board (or something strong and rigid) over the intake to choke off air supply and block the powerful air flow. A caution is in order: never place a hand over the air intake. This could cause severe injury.

In the article "Up the Mast" (September 1999), (which, by the way, is very helpful and informative), the author mentions that the purchase on a single-part tackle used to hoist oneself up the mast is two-to-one "for reasons that are confusing." The reason is that as one exerts tension on the fall, one is reducing his weight on the bosun's chair. Therefore, when the tension on the fall exceeds half the person's weight, the chair will be lifted. Mechanical advantage can be determined by counting the number of lines supporting the load. Both parts of the tackle are supporting the load, and the mechanical advantage is 2:1. Thanks for a very informative and interesting magazine.

Rhon Nelson
Annandale, Va.

VAT horror stories

We've all heard horror stories of how the VAT (Value Added Tax) is applied to cruising boats staying longer than six months in the European Union. It was one of our major concerns, especially when we decided to winter in London and go through France next fall to spend a couple of years in the Med. However, with the co-operation of the customs and excise officer here in London, we have learned of a format which permits us to transfer our "normal

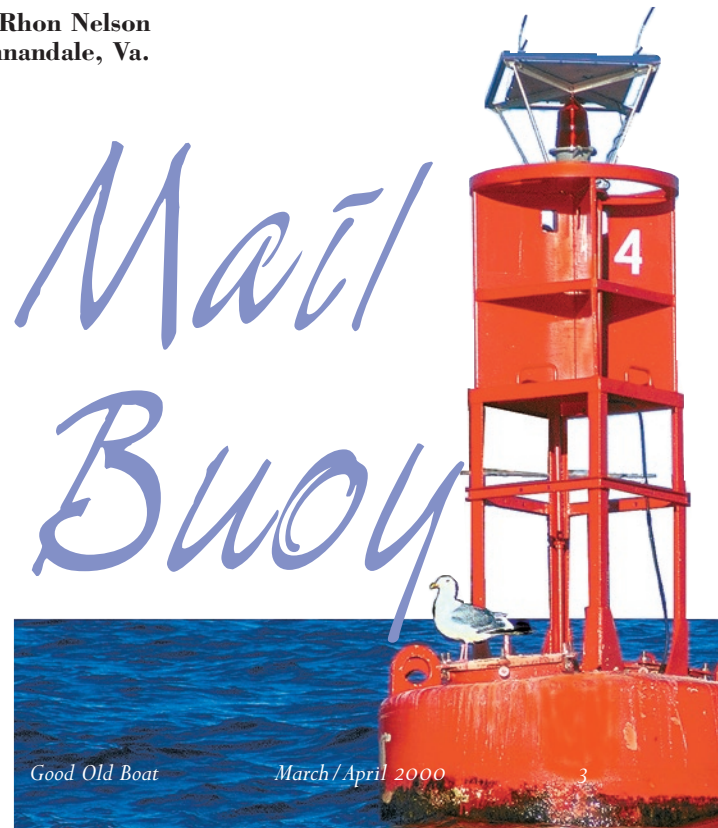
home" to our vessel in the U.K., if wintering for six months (185 days) or more (the requirements for transfer of normal home), to move "... home from a non-EC country to an EC* country, including the U.K. ..." and that we: "... may import a vessel free of custom duty and VAT if:

- you have lived outside the EC for at least 12 months (which, coming from the U.S. or Canada, we have).
- you have owned and used the vessel outside of the EC for at least 6 months.
- you did not get the vessel under a duty/tax-free scheme.
- you declare the vessel to our (customs and excise) officer.
- the vessel will be kept for your private use.
- the vessel is not lent, hired, used as security, or sold in the EC for 12 months after relief is granted."

The above quotes are from HM Customs and Excise Notice #8 of April, 1996, entitled *CUSTOMS - Sailing your pleasure craft to and from the United Kingdom*, section 22, page 9.

There is a form, #C 104A (vessels), "Importation of a Private Vessel on a Transfer of Normal Home to the United Kingdom," that must be filled out and submitted with appropriate documents, such as bill of sale or tax-paid status, which prove you have possessed and used the vessel outside of the EU for

Continued on 64



At home



on highway...

by John Vigor

THE PACIFIC SEACRAFT 25 IS A DARK horse. She's not built any longer, except perhaps to special order, and comparatively few people know her, yet she is remarkable in this respect: she is a trailerable sailboat that is fully fit to take on the ocean.

A *Cruising World* article once described this cocky little 25-footer as "the perfect trailerable offshore family cruiser offering seaworthiness, ease of handling, speed, comfort, and years of safe low-maintenance voyaging."

The magazine went on to say that "her traditional double-ended hull is patterned after the famous No Man's Land boats of the 19th century, which were able to carry heavy loads and sail swiftly and safely in all types of weather."

Well, perhaps the author of that glowing account had his or her rose-colored spectacles on that day. Perfect she is not, neither is she swift. But one has to admit that the hyperbole this rugged cruiser generates among her admirers is very infectious. And if she's not actually perfect, it hardly matters because she exudes that magical

combination of allure and seduction that makes perfection quite unnecessary.

Although she's trailerable, she's not the sort of weekend trailersailer you take to the lake for an afternoon's relaxation. This boat weighs more than 2 tons and draws more than 3 feet, so it would take time and planning to launch and retrieve her. On the other hand, you can haul her out, take her home, and leave her in your driveway for the winter. You can see her every day then, and drag the neighbors in to admire her. Like many fine cruising yachts, she shows her workboat heritage in her simple, no-nonsense lines. With a nearly plumb bow and mildly raked stern, she avoids the wasted space in long overhangs and has a long waterline for cargo-carrying capacity. No chrome, no tinsel, no smoke and mirrors, just good solid oak, teak, and bronze. She has the mien of a voyager about her, a restless, purposeful appearance. She wants to go to sea.

Basic design

The Pacific Seacraft Corporation's 25-footer looks as much like a ship's lifeboat as a fishing vessel. She's apple-cheeked and buoyant up forward, and her topsides are probably a little higher than those of a fishing boat but do not detract from her handsome looks. Her rudder hangs on a sharply raked sternpost, like a Folkboat's, and it is a measure of this boat's ruggedness that

Of his Pacific Seacraft 25, Raven, Ron Chappell writes, "She was my first offshore-capable vessel and will always be my first sailing love. My wife and I lived aboard her for more than a year, sailing her to Alaska and then the Florida Keys and out-islands. She taught us how to be sailors and the way of the sea."

the rudder's oak cheeks are fastened in place by no fewer than 11 bolts.

The hull is hand-laminated with a high glass-to-resin ratio for extra strength, and the topsides are scored lengthwise to resemble wooden carvel planking. The decks and cabintop are balsa cored for lightness and strength.

The forward face of the cabin trunk is high, boxy and unrelievedly white. It glares at you with a baleful blank stare, daring you to spray graffiti on it. It's probably the least attractive part of this boat but its looks could be improved considerably with the clever use of paint or a strip or two of teak.

There is a gunwale of sorts: it's a couple of inches high at the bow and gradually fades out to nothing at the cockpit. It's topped with a teak caprail almost wide enough to skateboard on.

Her keel is a modified traditional shape, a full-length keel cut away at the forefoot and also (because of the rake of the sternpost) at the heel. Nevertheless, a long straight section remains, flat on the bottom for a good length, so that she will take the ground without falling flat on her face.

The cabintop, although rather high, is not unduly obtrusive, except at its forward edge, as we have mentioned already, and the sidedecks are reasonably wide — getting wider, in fact, as you move forward. The sliding cover over the companionway hatch runs in deep grooves, but lacks a seahood, or turtle, to prevent heavy spray from driving underneath it and entering the cabin.

The self-draining cockpit is snug and solid. It has a very pleasing feeling

of security; and here, as everywhere else on this boat, the metal fittings are substantial hunks of stainless steel or bronze. It has two drains at the forward edge — it could probably do with two more for serious sea work — but it has no bridgedeck, only a 9-inch sill to keep water from flooding below. This means you'd need to keep one or two companionway washboards in place while you were at sea, and you'd have to make sure they were fixed in place with barrel bolts or some such arrangement.

The whole of the cockpit floor is one big hatch cover with downturned flanges that fit over a sill with upturned edges. If you undo 25 fat screws, you can lift it out and gain splendid access to the engine and the stuffing box, but it is a large area to seal satisfactorily,



...or ocean



As a trailerable boat, the PS 25 has a deck-stepped mast. A tabernacle allows the spar to be dropped and raised quickly.

Right up forward in the fo'c's'le there's a pretty teak door you should open with caution. It allows access to the chain locker. If the chain is piled up high, it will spill out all over you as soon as you slide back the barrel bolt.

Aft of the door is a V-berth in the form of an isosceles triangle. If you and your partner have sharply tapered hips, legs, and feet, it will fit you fine. Otherwise it's best left to kids. The hull up here is covered with a glued-on fabric that the kids will probably pull off. There is a deep storage locker under the V-berth.

Also in the forecabin are a head, to port, and a half-length hanging cupboard with a shelf on top, to starboard. A curtain on a swinging arm separates the forecabin from the main saloon.

Probably the most prominent feature of the saloon is the portside dinette, an arrangement of two thwartship seats with a raised table in between. The forward seat accommodates two people side by side, the aft seat just one. The outer edge of the table is tapered to fit neatly between them. The table can be lowered to turn the seats into a double berth, which, although it, too, is tapered, offers more foot room than does the V-berth.

To starboard, convenient to the double seat, is a galley of generous size with a two-burner alcohol stove, a sink, and neat teak racks for dishes, mugs, and cutlery. There is stowage for provisions beneath the stove and in an enormous louvered locker under the double seat.

and if it isn't watertight it will admit large portions of the ocean when a wave fills the cockpit.

The standard engine is an 8-horsepower Yanmar diesel that fits into the space under the cockpit as a finger fits in a glove. Access from the cabin is minimal; if you remove the companion-way step you can peer at the engine hopefully and wipe its little face, but that's about all. If you're desperate enough, you can undo four screws and remove a panel adjacent to the starboard quarterberth. Then you can get to the engine, or at least to one side of it, either by leaning around the corner awkwardly or by lying full-length on your side in the quarterberth.

Accommodations

It's surprising, given the height of the cabintop, that there isn't more headroom down below, but it's just as well that the impulse to make the cabintop even taller was resisted, for that would surely have turned her into a duckling so ugly not even her mother could have loved her. As it is, the headroom is about 5 feet, which is of no consequence when you're at sea and which you can endure with good grace in port if you are a person of even temper and likeable nature. There are no overhead beams to hit your head on — it's covered with a zippered headliner.

It is said that Henry Mohrschladt, the founder of Pacific Seacraft, took special interest in this boat and showered her with amenities. Ron notes that he "took up where Henry left off, putting more than 5,000 hours and many thousands of dollars more into her."



Aft of the galley is a snug quarterberth, bringing the total number of berths to five. That's three too many for a dedicated cruising boat of this size, but fine for family vacation cruising or short coastal hops.

The joinerwork is first-class, as is only to be expected from this manufacturer, and the fittings are substantial. Six solid bronze portlights, all opening, and an overhead hatch bring light and plenty of ventilation to both cabins. The cabin sole is oak parquet on a plywood backing.

The rig

The Pacific Seacraft 25 is a masthead cutter or sloop with a sail area of 250 square feet. Her bowsprit is quite short, and the staysail stay comes down to the stemhead, so there is not a lot of breathing room for the jib in the cutter version. Nevertheless, since she badly needs the extra area of a large genoa jib to keep her moving in light weather, it must breathe as best it can.

The spars are painted aluminum, and the mainsail is equipped with slab reefing. The mast, which has a single spreader and fore-and-aft lower shrouds, is stepped on deck in a tabernacle that allows the spar to be dropped and raised quickly. A substantial wooden compression post attached to a half bulkhead transfers the downward thrust of the rig to the keel.

The main boom is fairly short, so no boomkin is needed, just a split backstay, bowsed down to the quarters, to give the tiller swinging room. The shroud chainplates are placed on the outside of the hull and secured by four bolts each. The mainsheet runs through quarter blocks on either side of the tiller and is easily accessible to the person at the helm. Tracks for sliding foresail sheet blocks are screwed to the caprail on either side of the cockpit.

Performance

The fact that the PS 25 has earned a racing handicap rating must prove something, even if her PHRF number is 312, but no tactful person mentions speed and PS 25 in the same breath. Luckily, there are other facets to performance, and it is in these that she shines. Her buoyant ends will keep her dry, and her long keel will make her track straight and true. She'll heave to well and run before big seas in safety with just a windvane steering her.

Her little Yanmar produces more than 3 horsepower per ton of displacement, so she will reach her hull speed of 6 knots with ease in calm weather, although she might struggle just a little against a strong wind and heavy seas. It is important to fit the correct propeller — one that will allow the engine to reach top revolutions (and therefore produce full power) in heavy going. Yes, the PS 25 performs well, no doubt about it. She's just not known for speed.

Known weaknesses

- Check the cockpit floor for leaks.
- Check the main sliding hatch cover for leaks from driving spray, and fit a top cover if necessary.
- Install fittings that allow the two lower dropboards to be securely fastened in place at sea.

Inside Raven, Ron and Terrel painted all enclosed spaces, oiled the teak, stripped doors and hatches, and replaced the cushions.





Owner's opinion

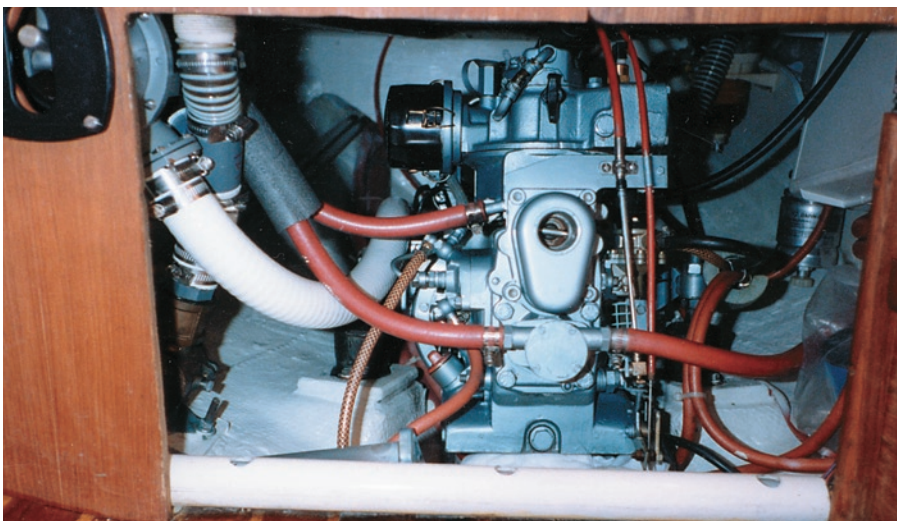
Steve Way, of Tacoma, Washington, owned a Pacific Seacraft 25 for nearly two years. He sailed her many hundreds of miles all over Puget Sound and the Canadian Gulf Islands and completed two circumnavigations of Vancouver Island in her.

"She was a great little boat," he said. "She was fun to sail. I sailed with kids, and they could handle her easily. I would take a PS 25 across an ocean without hesitation."

There's weight behind those words. Between 1993 and 1997, Way circumnavigated the world in a boat not much bigger than the PS 25. She was a Laurent Giles-designed bilge-keeler, a Westerly 26 named *Lookfar*.

His PS 25 was rigged as a sloop and had no bowsprit. "She was initially tender, he recalls, "but after heeling a little, she stiffened up. She wasn't a fast boat, but she went well on a reach." He carried a cruising spinnaker and found it an asset in light weather.

She behaved impeccably in heavy weather during one of Way's cruises around rugged Vancouver Island. "We were on the West Coast, which is wide open to the North Pacific, and it started to blow out of the north. The swells built up, too, and eventually we were running under storm jib only. She handled the swells beautifully with no tendency to broach. I don't know what the windspeed was, but a large powerboat came into port after we did and reported winds of 45 knots."



Raven (shown above) is launched in Port Townsend for her return to Alaska. She was outfitted with a BMW 7-hp diesel (shown at left) instead of the 8-hp Yanmar which was standard in the Pacific Seacraft 25. The whole cockpit floor can be removed to provide access to the auxiliary engine. Access from the cabin is minimal.

What about the lack of headroom?
 “It was a non-factor. It never bothered me.”

Way has owned several boats since then, but he still recalls that his PS 25 was well finished and very strong. “She also had a sweet little single-cylinder Yanmar engine that you could start by hand. It gave her full hull speed.”

The one piece of advice he has for anyone intending to go to sea in a PS 25 is this: “Keep the two lower dropboards in place all the time. Secure them well.”

Conclusion

You should be able to buy a used PS 25 for between \$15,000 and \$20,000 depending on her condition and upgrades. That makes her very reasonably priced for an ocean-going boat. Her tough construction makes her cheap to maintain, and the fact that you can pull her out on a trailer any time you want means you'll save on boatyard bills. If you're short of time, the trailer will also enable you to spend sailing vacations in exotic spots you'd never have time to reach ordinarily.

The PS 25 is a sweet-natured little boat and a good singlehander. It's almost certain she'd still be in production if she had the standing headroom that modern sailors have become used to. Meanwhile, if you don't mind doing the PS 25 crouch now and then, she's a bargain waiting to be snapped up.



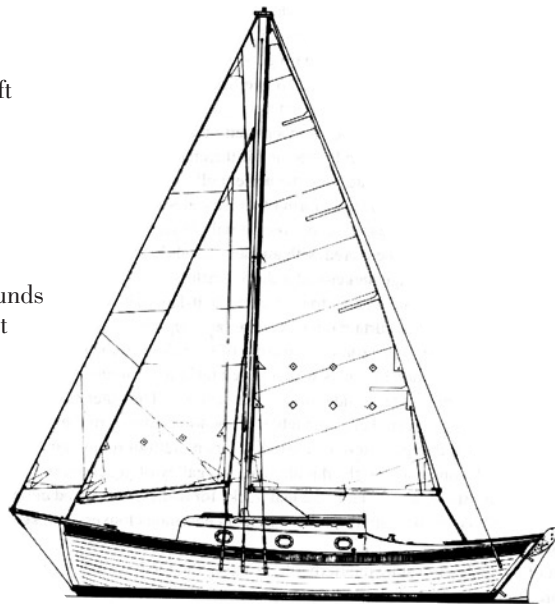
John Vigor is a freelance journalist based in Oak Harbor, Wash. He has raced, cruised, and written about boats for more than 30 years. He's the author of two new

books, The Seaworthy Offshore Sailboat: A Guide to Essential Features, Gear and Handling (International Marine), and Twenty Small Sailboats to Take You Anywhere (Paradise Cay), which is the source of this and other reviews in this series. He also wrote Danger, Dolphins and Ginger Beer (Simon and Schuster), a sailing adventure novel for 8- to 12-year-olds; The Practical Mariner's Book of Knowledge (International Marine); and The Sailors' Assistant (International Marine).

In short

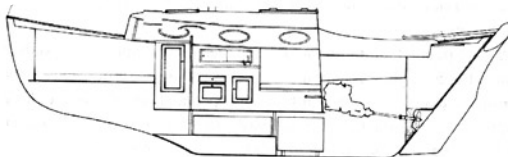
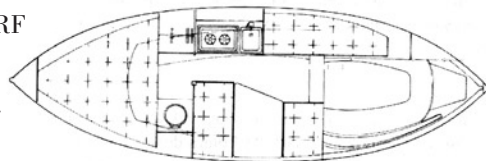
Pacific Seacraft 25

Designer: Pacific Seacraft Corporation, 1979
LOA: 26 feet 3 inches
LOD: 24 feet 6 inches
LWL: 21 feet 0 inches
Beam: 8 feet 0 inches
Draft: 3 feet 3 inches
Displacement: 4,750 pounds
Sail area: 250 square feet
Ballast: 1,750 pounds
Spars: Aluminum
Auxiliary: Yanmar 8-hp diesel
Designed as: Trailerable pocket offshore cruiser



In comparison

- **Safety-at-sea factor:** 6 (Rated out of 10, with 10 being the safest.)
- **Speed rating:** With a PHRF rating of 312, speed is not this boat's best asset. By way of comparison, another well-known 25-footer, the International Folkboat, rates 234, which means she covers a distance of one nautical mile 78 seconds faster than the PS 25, on average, around a race course.
- **Ocean comfort level:** One or two adults.



Resources for Pacific Seacraft Sailors

Pacific Seacraft 25 Contact

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Pacific Seacraft Email Discussion List

<http://www.sailnet.com/list/pacificseacraft/index.htm>

Pacific Seacraft Owners' Association (Northwest)

360-299-2526
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Pacific Seacraft Sea Talk Newsletter

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 Puyallup, WA 98375
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 Published four times a year for members of the Pacific Northwest Pacific Seacraft Association.

Flight of the *Raven*

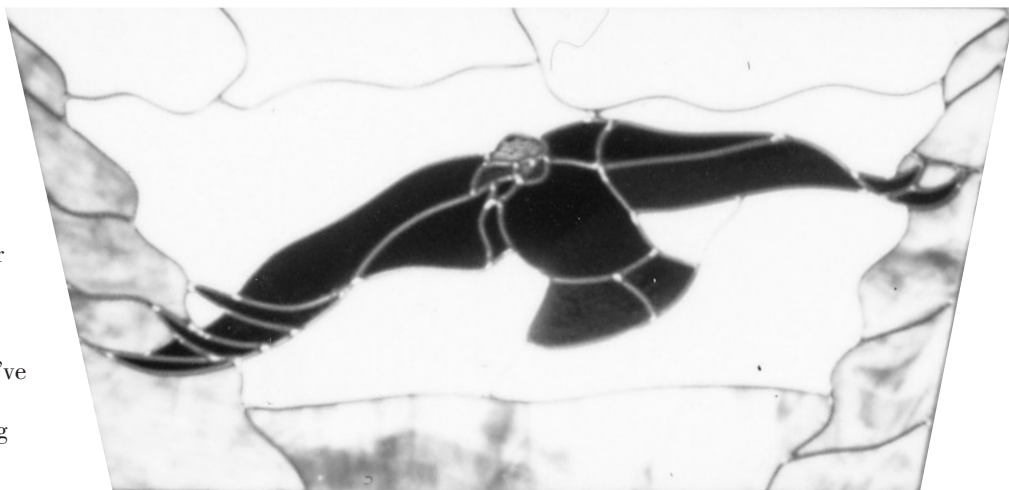
TOM COOPER HAD JUST STARTED Seacraft Yacht Sales on Lake Union, in Seattle, and as a struggling young broker, had gone far out of his way to find me this boat. He called me at home in Colorado early one morning in 1988. "I think I've located that Pacific Seacraft you've been wanting!"

"A 25?" I answered, hardly daring to think this might be the right one, after a year-long search.

"Yes . . . but she's in Alaska, and I haven't seen her myself. She's an '80, commissioned in '82 . . . the last one built . . . all factory options . . . she needs some work, but I think she's a good one and worth the effort." He paused. "She could be barged down to Seattle. The owner's thinking of listing her down here, so we might work something out." I took this for an omen as I had intended, ultimately, to sail to Alaska.

We did work something out, and two weeks later I was in Seattle with my truck and gooseneck trailer, watching her come off the freighter. As proof of my credentials, I had bought her sight unseen, no survey, no guarantee, all on the strength of a few pictures and Tom's cautious endorsement, thus ending a search that had taken me from California to Florida, and back to Seattle several times.

I felt I had done my homework though, debating over a year the pros and cons of a number of traditional, ocean-capable, pocket-cruisers. The Orion 27, by Pacific Seacraft, was a first choice, but too big to trailer conveniently and out of my price range in any case. Ditto the Nor'Sea 27, which I also liked. The Flicka fit the criteria and was probably even more seaworthy than the 25 but was just not as pleasing in my view. As an old salt once advised, "Get one that pleases your eye. You'll be looking at it more than you'll be sailing it." I admit I've always had a thing for double-enders. Throw in a bow-sprit, cutter rig, and a sweet sheer, and you've got me.



The longshoreman was an old seadog with Skye-blue eyes and a Scottish burr, watching me from the corner of his eye as he straightened the freighter's drop lines. "Your boat?" he asked, not taking his eyes off the crane swinging dockside.

"It is," I said, also riveted to the cradle above our heads.

The crane had swung a bit too far, and the old man motioned for the operator to bring her back on center, which he did with a jerk, causing my heart to flutter.

"Sailed her far?" he asked over his shoulder, and I could hear Dungeness in his voice.

"Round 'bout the Horn, Cap'n!" I wanted to say. But . . . "She's my first boat and I've not laid eyes on her before now."

He smiled hugely and looked at me for the first time "All's the better lad, you've got it all in front of you, then." He studied the lines of the Pacific Seacraft 25 in her oak cradle, settled now on my flatbed trailer. Her black hull gleamed in Puget Sound's morning mist, and the weathered teak hatch took on a varnished look. The old man kicked loose the line and stood, hands on hips, appraising the boat. "She's a yar boat, lad . . . a yar boat." He cocked his head at the vessel. "A wee bitch, I'll grant ya, but one for the sea."

by Ron Chappell

Special interest

The 25 was conceived by Henry Mohrschladt, creator and president of Pacific Seacraft, and was their first production model, soon followed by the Mariah 31, a larger version of the same boat. Being the last of her run, it appeared Pacific Seacraft had taken a special interest in this particular boat, showering her with amenities. I later heard that Henry himself kept a keen eye on the project, even though he was then deeply involved with the new Crealock designs which were soon to make Pacific Seacraft world-renowned.

I towed her back to Colorado for a refit, even though she had been lightly used. Her sails and engine were like new, but she had not been "tended to," and the Alaskan weather had taken its toll.

As one who had made a business of restoring classic European sports cars, I looked forward to renovating this neglected beauty. The teak decks, which had been a major factory option, were still sound, though badly weathered, as were the teak hatch, caprails, cockpit grate, hatch boards, and so on. One of the companionway trim pieces had split and would have to

Raven was shipped from Alaska to Seattle and then trucked inland to Colorado for a total refit before returning to Port Townsend, Wash., for launching and a return to the Gulf of Alaska and the Gulf of Mexico.

A Pacific Seacraft 25, the last of her kind, sets out for the Gulf of Alaska and beyond

be replaced, but for the most part, marathon sanding and varnishing would put the brightwork in order.

The list of factory options was impressive: in addition to the teak deck, cockpit grate, and main hatch, they included a private cabin forward, with a real door, a teak-and-holly sole, a marine head, a kerosene stove (I thought this was a real plus at the time), a BMW 7-hp diesel, a black hull, and a cutter rig with a club-footed staysail. All lines were led aft, and the heavy cruising main had two sets of reef points with a jiffy-reefing system. All hardware was bronze, including ports, winches, through-hulls and deck fittings.

Sailing sabbatical

Though she had sat in the water for six years, there was not a single blister on the hull. This I attributed to her heavy gelcoat, high quality lay-up, and the very cold salt water of Alaska. Nonetheless, our first major project was sanding the hull down to gel and applying six coats of good epoxy barrier, then bottom paint. I was looking at a two-year sailing sabbatical,

the last portion of which was to be in the Florida Keys. Warm salt water and tropical critters might not be so kind to an unprotected hull.

The interior cushions were sent off to the upholsterer to be copied in four-inch high-density foam covered in quality marine fabric. With the cushions out, we could strip the interior of locker doors and covers, bilge hatches, and so forth, and thoroughly clean and paint all the enclosed spaces. We could also clean and oil the interior teak.

We were then ready for the custom interior joinery we felt was needed for extended cruising and living aboard such a small boat. A poor but honest young cabinetmaker had recently moved to town and opened a small shop, and we were fortunate enough to discover him in time to give him a considerable amount of our money. Though admitting he knew nothing about boats, he was enthralled with the *Raven* and her "teak furniture."

Together we designed pull-out drawers in every available space, and two additional hatch boards for the cabin sole, for added bilge access. There were to be louvered teak vent

panels installed in the hanging locker, lower V-berth panels, and cabin door, along with several custom-made, roll-front, teak cabinets, one in the head area as a medicine chest and several in the main saloon. A friend had made us a stained-glass raven panel, which was framed as a companionway drop-board, along with another featuring an insert of insect screening, a decision we later applauded, both in Alaska and Florida.

Matched to perfection

The cabinetmaker proved to be an excellent craftsman and took the project quite seriously, since it was his only job, working day and night for the next three weeks to meet our self-imposed deadline. Upon completion, the greatest compliment I could offer was that "I couldn't see where he had touched a thing." Everything looked factory-original and matched to perfection. We were delighted.

While the boat was at the cabinet shop, we turned our attention to the standing rigging, which was inspected and deemed good, other than a few lock rings and cotter pins. The mast and boom, on the other hand, were showing



some signs of abrasion, probably suffered on the freighter from Alaska. We decided to do the spars in white two-part epoxy, which became a pretty involved process but turned out well and later exceeded my expectations for durability (this included the overspray on the house, patio furniture, and dog). A tri-color light with emergency strobe was fitted at the masthead along with a Windex and new VHF antenna. I also took this opportunity to stuff the mast with foam blocks for two reasons: first, to keep the wiring from slapping around in there; and second, to provide additional buoyancy for the mast in the event of a knockdown (as advised by a fellow down at the pool hall who once raced Lasers).

We now turned our attention to the ground tackle, replacing the original anchoring gear with a 22-pound Bruce, which fit the bow roller as though designed for it, coupled to 100 feet of chain, followed by 200 feet of 5/8-inch nylon rode. After long deliberation, I decided to really wreck the budget (West Marine was already sending me warm personal notes of encouragement on a regular basis) and ordered a Simpson-Lawrence manual windlass, which some might have considered overkill on a boat this size. But it certainly did look salty up there on the bow, just as my West advisor said it would, and it did prove handy, later on, for raising the first mate in the bosun's chair . . . until a bow-wave from an Alaskan ferry pretty much curtailed that usage.

Not a problem

Next stop was the welding shop, run by a giant of a man we locals affectionately referred to as the Poo-Bear (not in his presence, of course) where a bow chock, side arms, and adjustable pads were added to the trailer. How to remove the original oak cradle from around the boat had been puzzling me, as we had no suitable lifting device.

"Not a problem," Poo-Bear said, grabbing a chainsaw. Before I could come up with a reason not to, he had cut it away from the hull — in less time than it takes to carve a Thanksgiving turkey actually. "Not a problem," he said again, stacking the oak wood (now in stove-size chunks) next to his woodstove.

*"I had bought her
sight unseen,
no survey, no guarantee,
all on the strength
of a few pictures."*

While I don't recommend the following, ever, we did support the weight of the entire boat on the screw-jack pads while slipping a new support plank under the keel. There was absolutely no sign of flex or stress in the hull during this maneuver — a tribute to Pacific Seacraft's lay-up schedule, coupled with their generous bonding of bulkheads and cabinetry. Happily, later in our voyaging, I would see even more evidence of their bullet-proof construction. A good compounding and waxing of the black hull completed all

*"Being the last of her run,
it appeared Pacific Seacraft
had taken a special interest
in this particular boat,
showering her with amenities."*

we could do in Colorado, and after collecting the new cushions, we were ready to haul her back to Washington state for final commissioning and preparation for our maiden voyage to Alaska.

Arriving in Port Townsend, Wash., in May, we were right on schedule for a proper departure north to Alaska (the rush was on) and quickly made arrangements to have the renovated *Raven* lifted off the trailer and placed in the water, where the mast was stepped and rigging adjusted for the short trip under motor to the Alcohol Plant Marina at Port Hadlock, where a slip had been arranged for the final preparations.


Custom dodger

Chief among the necessities for such an arduous voyage would be a spray dodger; so counseled the dockside experts. A Northwest passage could not be attempted without one, in their view.

Thus, a custom dodger and matching canvas by Petric & Hassey, of Port Townsend, were fitted at no little expense of time and money. (It turned out that the dockside experts were right, too, and the dodger became our most cherished modification.)

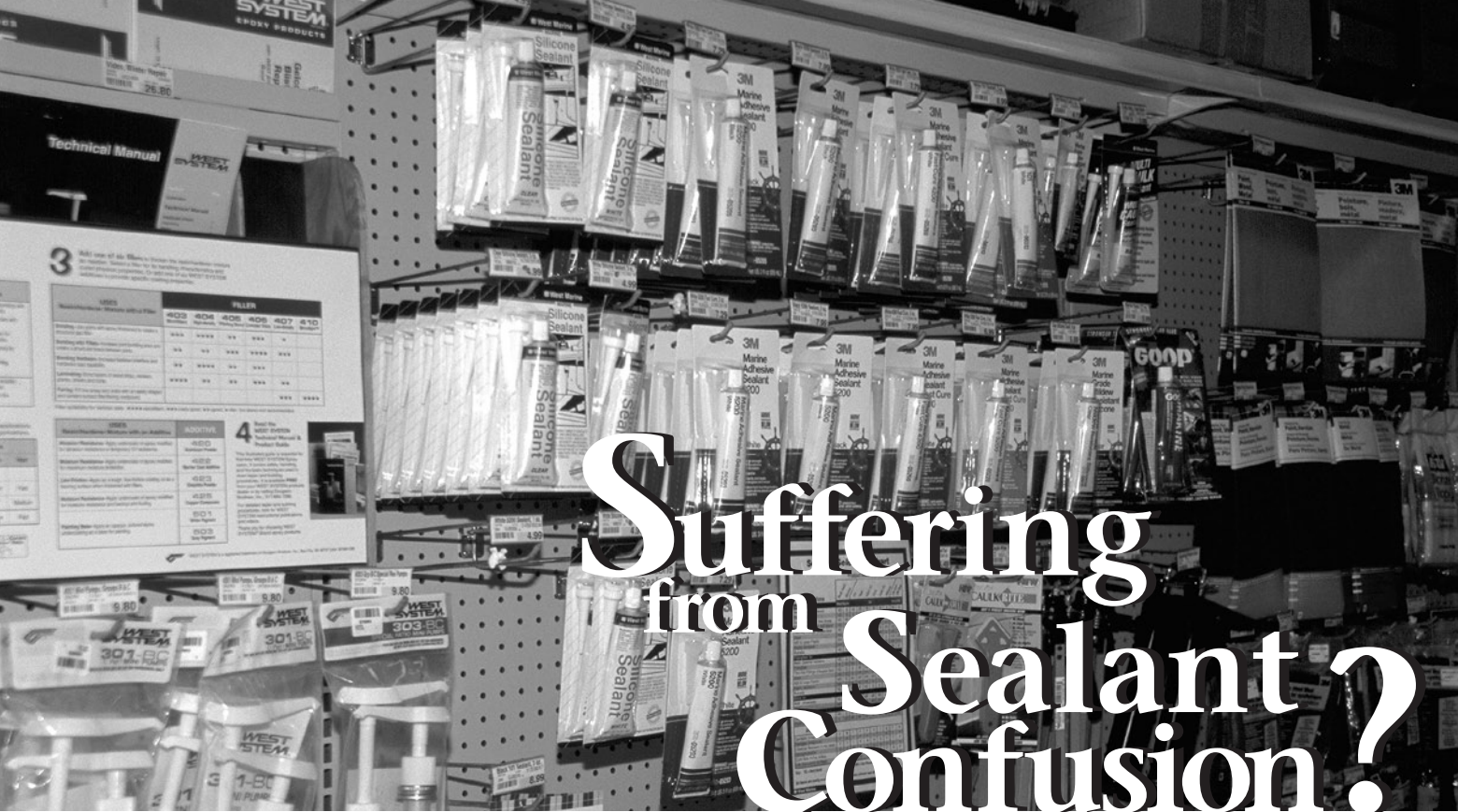
We were now running behind schedule, and the main pack had set sail, if not for Alaska, at least for the San Juans and Gulf Islands. By now, the hangers-on at the marina had us figured for the ubiquitous cruiser wanna-bees whose boats are never quite ready, and whose umbilical cord to the dock tethers them forever.

But, in fact, all that was left to do was one final "feeding frenzy" at West Marine, in Seattle, where we were received as those feared lost at sea, seeing as how no orders had been received from us in several days. Two huge shopping carts full of merchandise soon restored their faith. We now had an inflatable dinghy, electronics in the form of a loran, new VHF, and depth sounder, and enough additional "stuff" to put the boat several inches below the designer's projected waterline. The first mate had been busy at the local markets, and it was a comfort that should our vessel be swept out to sea, we had stores enough to last at least until Japan. Truly it was time to go.

The next morning dawned cool and foggy as we slipped our lines and pointed her north, past Wilson Point and into the Strait of Juan De Fuca. Thus began a great voyage (relatively speaking) and one which would take the little PS 25 to the Gulf of Alaska, followed by the Gulf of Mexico and beyond. She was all we had hoped for, and by far a better boat than we were sailors, a fact which would stand us in good stead in many a tight spot we unwittingly put her in. She was indeed "a yar boat." 



Ron and Terrel Chappell have sailed and lived aboard small boats, off and on, for the past 14 years, from Alaska to the Keys. They currently trailersail a Com-Pac 23D, primarily in the Pacific Northwest in summer and Baja in winter.



Suffering from Sealant Confusion?

*Your job requires a sealant.
You don't have to be a chemist
to choose the right one*

In my experience, there are always two things trying to get into your boat that you don't want there: water and your annoying brother-in-law. While there's not much you can do about family problems, there is something you can do about the water.

The old saw describes a boat as a hole in the water, but the reality is that your boat is full of holes. Most of them were put there intentionally: to drain rainwater or to let water flush through, to cool a motor or to flush a head. But uncontrolled water is the stuff we worry about. It's what rots our balsa-cored decks, drips on our bunks on a rainy night, or causes the boat to sink when we're not paying attention. It can make us uncomfortable, cost us more money than we want to spend, or, ultimately, destroy that which we've worked so hard for and on.

Any time a hole is drilled, even partially, through a solid structure, it provides a place for water to enter. That hole is probably at least partially filled, either by a screw or a piece of hardware. The problem is that the two

parts, shaped to their own purpose, have different shapes, and it's rare for the two parts to match exactly. What is needed, whenever two or more solid objects are fastened together, is something that will keep even the smallest amount of water out, something to seal the two mating surfaces and dam the trickle before it becomes a flood . . . in other words, a sealant.

The idea is not new. Historical records show that early boatbuilders were confronted by the same problem. The rediscovered vessels of Native Americans and Vikings show evidence that thickened organic materials were used in the construction and repair of their hulls. This was usually a pitch- or tar-based material, derived from the same sources as their other building materials. They first used sap from trees, boiled to thicken it, and later used steeped and rendered animal by-products, such as cartilage and horn.

by Scott Thurston

Eventual decay

"Stockholm tar" is still fondly remembered mostly for its pleasant aroma. This was used to waterproof hulls and rigging back in the days of wooden ships and iron men. These old products worked reasonably well and (within the technology of the day) demanded no more maintenance than did the rest of the vessel. But because they were organic, they would eventually dry out or decay. The basic families of these mastics are still available, even today, under the generic title of "bedding compounds," though their chemistry has become a little more refined over the years.

But boats and society became more plastic, and boaters demanded more use for less maintenance. Other

industries, in particular the aerospace industry, were developing materials to seal

panels that made up flight surfaces and withstand the rigors of flight and space travel. As the performance level of boats increased, as speeds grew larger from more efficient engines and lighter but stronger materials, the stresses and vibrations grew correspondingly. Naval architects, who had looked to the aerospace industry for new building materials such as glass-reinforced plastics and acrylics, also looked there for materials to seal them.

Today, we have available a whole range of sealants and, though they are designed to do much the same job, each has its own purpose. Some are quick-curing, for convenience and to aid in the economics of construction. Others have high bond strength, both to the part to which they're applied and internally, so the adhesion won't break along the glue line. Over the last several years, the distinction between sealants and adhesives has become blurred, as greater experience with the chemical combinations bridge the gulf between the historical tradeoffs of quick cure and strong bond.

Three families

Today, there are three basic families of chemicals used in marine sealants: silicones, polysulfides, and polyurethanes. Recent advances in epoxy technology are starting to increase their utility in boat construction, however. (See sidebar on Page 15.) All of them are designed to adhere to a surface, cure, and remain flexible. By doing so, they accomplish three things: they form a water- and airtight seal between two or more surfaces; they help join the surfaces together, often with the aid of mechanical fasteners; and they isolate the surfaces, to help prevent the passage of noise or electricity.

Silicone

Silicone is perhaps the most basic of the three. It is created from combining silica, one of the most useful of the industrial chemicals we have and one of the most common building blocks of Planet Earth, with a variety of other organic compounds. The stuff we squeeze out of a tube is chemically similar to the spray lubricants we use, and we also find it in paints, waxes, and other protective coatings and in electrical insulation. Common in household and automotive applications, it is among the first things we think of when we use the term "sealants."

Polysulfides

As the name suggests, polysulfides are derivatives of the element sulfur, another common earth element. Early in this century, there was an explosion

in the use of sulfur for industrial and medicinal applications as the particular properties of the element were explored. Heated nearly to the boiling point and then immersed in water, it forms a clear, sticky material that, when combined with other compounds, has high adhesive properties and is not particularly affected by long-term exposure to moisture. It's easily identified by its strong aroma and good tooling properties

Polyurethanes

Like the other two sealants, polyurethanes are blends of other materials in a base, this time urea. Urea is a naturally occurring by-product of metabolism, though now mostly created synthetically. (When you read about slaves harvesting guano from remote, bird-populated islands a century ago, it was the urea content they were after.) It's an acidic compound used in fertilizers, among other things, whose elements combine hydrogen, nitrogen, carbon, and oxygen into long molecular chains, longer than the molecules of silicones and polysulfides. These longer, more complex chains mesh within each other more intricately, and this gives them greater bonds within the sealant and to other materials. As a result, they have greater shear strength than the other two families and are less likely to break along a glue line.

Since the job is the same, why are there so many different types of sealants, and why should I use one and not the others when I'm working on my boat?

The simple answer is materials. What am I trying to keep from leaking, what is it exposed to, and what am I trying to bond to it? A modern boat is built of many materials, and the variety of coatings and other chemicals with which it may come into contact are just as varied. The specialized world of chemicals being what it is, not all of them work as well together as they might. Think of the different boats around you in your

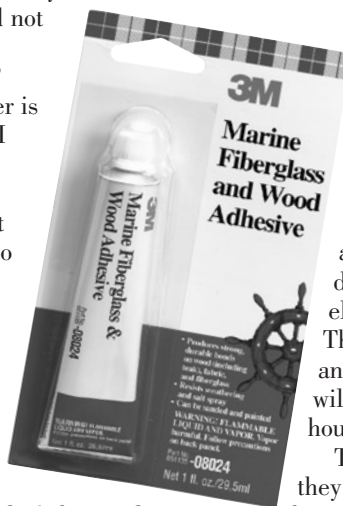
marina. They're made of aluminum and mild steel, ferroconcrete, wood (both raw and resin-coated), carbon fiber and graphite, ABS and polyethylene plastics, and fiber-reinforced plastics — whose bonding agents can be polyester, vinylester, or epoxy products. And after the hull has been created, it can be finished in gels or paints in any range of chemical combinations, from lacquers and enamels to urethanes and polyurethanes.

Diverse hardware

Hardware materials are just as diverse: aluminum, zinc, bronze, and stainless steels are some of the metals, and there are alloy choices in each of those. Some of the hardware can be plastic, either nylon or reinforced ethylene. Portlights can have tempered glass in them, or Lexan, or Plexiglas, and frames of ABS or metal with rubber or vinyl inserts for linings. Other chemicals are found on board: fuels and oils, cleaning solvents and waxes. The solvents and characteristics of each of the families of sealants have properties that make each one better suited to a particular kind of work.

Silicones, for instance, are very flexible. They will "give" in response to slight shocks and vibrations without tearing or separating from the substrate, and they tend to be chemically impervious. Fuels and oils won't break them down as fast. They are chemically compatible with most plastics and are very good at creating a dividing line between electrically dissimilar pieces. The cure rate is fairly rapid, too, and in most cases the material will be tack-free in a couple of hours.

The down side is that, though they are elastic, most silicones don't have much bond strength, particularly to fiberglass, and won't do much more than hold themselves together. The prudent boatbuilder won't



use them for much more than a gasket material and will depend on mechanical fasteners for strength in part assembly. You can't sand or paint them; in fact they can contaminate a surface that might be painted or glassed, and their bond to raw wood is not very good. When they are applied in areas of high heat, they can over-cure and become brittle, causing them to fail sooner. Purer forms of silicone can allow mold to grow, and this can contribute to rot in wood (as well as a decline in aesthetic appeal) although most used in marine applications have a mildicide mixed in. A marine-grade silicone also differs from household-use silicone in that it has inhibitors to protect against ultraviolet light degradation and tends to retain its flexibility much longer in the marine environment.

Twenty-year joint

The polysulfides, such as BoatLIFE's Life Calk or 3M's 101, bond to wood better than silicone does and also bond fairly well to metals and fiberglass. However, they can melt some plastics and acrylics, such as Lexan, and some vinyls can become softened by exposure to their solvents. Because of the metallic nature of sulfur, they are not particularly suited to electrical insulation and should not be used between two items of dissimilar metals.

Polysulfides are not as elastic as silicones and shouldn't be used where constant vibration will occur while the part is under stress or expected to flex too much. They can be affected by common ship-board chemicals, though degradation doesn't happen immediately to fully cured products. Cure times are more dependent on temperature and humidity and generally can take one to three days to cure completely, but you can sand them, and they won't contaminate a surface to be painted. In fact, they will retain paint once the solvents have evaporated. With luck, a polysulfide joint can last 20 years or more, and there are many good old boats out there keeping

their integrity because of polysulfide sealants.

Polyurethanes, though they've been around for a while now, are the most recent development of the three and were created to seal and join laminated panels in the aerospace industry. As a result, they bring extreme adhesion to sealants and bond well to most modern boatbuilding materials. They are best exemplified by 3M's well-known 5200, or Sikaflex 292. (There is a story, apocryphal in the industry, about a 35-foot sailboat hull being loaded by a crane onto a trailer. After the hull had been lifted into the air and settled on the truck, someone noticed that the keelbolts had not been fastened and that the only thing holding the lead ballast keel to the hull was the 5200 applied as sealant.) The advice usually given about polyurethanes is: *if you think you might ever want to take the pieces apart again, use something else.*



Weaker polyurethane

Chemical companies have, however, been modifying this characteristic. For example, 3M has created a new product known as 4200, which has nearly the same strength characteristics as 5200 but lacks the same internal shear strength, so two joined parts can be separated without the usual amount of cutting, wedging, and swearing. Cure times for polyurethanes are relatively slow (they cure completely in five to seven days and are tack-free in 48 hours), which can be a boon if you're not quite sure about the fit of two parts. As with polysulfides, though, curing times can be speeded up by misting water on the exposed glue line.

There are other products that blur the distinctions between the families of sealants and their properties, and they create even more havoc when you're trying to decipher the right product for the job. BoatLIFE introduced its Life Seal several years ago. It is a blend of silicone and polyurethane formulated specifically for use with fiberglass. It looks and handles like silicone and comes in clear as well as the white and black of the silicone family, but it has greater bond strength even when applied to wood and fiberglass. It can


Epoxy breakthrough

The Pettit Paint Company recently came out with a new epoxy-based product that is redefining the use of that material in boat repair. Called Flexbond Marine Epoxy, it (unlike other epoxy materials on the market) retains a high elasticity component of about 40 percent of volume. It bonds to fiberglass, wood, steel, and aluminum, above or below the waterline, and after curing can be drilled and tapped, sawn, planed, filed, screwed, or nailed without fracturing.

When it's applied to overhead or vertical surfaces, it will not sag or run. It cures under water. It doesn't shrink or crack due to overheating while curing, and it can be pre-tinted with all types of alkyd, polyurethane-, or epoxy-based paints or tints without losing significant strength.

These attributes make it a fine repair product, much like any other epoxy product on the market. What sets it apart is its flexibility. Epoxies bond like there is no tomorrow to most other common substrates, except for some plastics and glass. However, they are brittle and the more of the proprietary fillers you use in the mix or the thicker you apply them, the more brittle they become. Flexbond works the other way. You use it as it comes out of the two-part tubes, without the need to mix anything else into the matrix. You still get the bond you need, but it is much better at flexing with the substrate as the part moves with use.

This makes it a possible sealant in places where the greatest strength in a bond line is necessary. The flexible joint that sometimes develops between a ballast keel and the hull of a sailboat comes to mind, a joint at which no other material seems to hold. Certain repairs on wooden hulls could benefit, particularly with Flexbond's ability to hold a fastener. And it might be good for a quick-and-dirty repair patch.

It's too expensive to use just anywhere, and with a bond strength even greater than that of the polyurethanes, you probably would want to think about exactly how the part so joined was going to be used. However, it seems to be a breakthrough in materials technology, one which I think is going to spur a whole development of similar products and one which will really expand our bag of boat repair tricks. 

be cut apart more readily than the polyurethanes, and it cures faster than they do, too. It's still not sandable or paintable, or ultimately as flexible as silicones, but it is more so than the others and doesn't have the strong odor of the polysulfides. BoatLIFE says it'll bond well to glass, a difficult substrate to seal, and they recommend it for use either above or below the waterline.

In addition to the 4200 and 5200 products, 3M also makes a 5200 with quicker cure times. Called Fast-Cure 5200, it has most of the strength of

in any color you want, as long as it's white, though the rumor mill suggests that black may on be the way.

Sandable sealant

BoatLIFE also makes what the company calls a sandable sealant. They market it as a product with which to pay the seams in teak decks. While polysulfides have been the usual treatment for leaky deck seams, this silicone-based product is a classic example of changes in sealant chemistry blurring the lines of distinction between product lines. The main selling point is that, unlike polysulfides, it fully cures in 24 hours and is tack-free and sandable within 30

minutes, a real consideration on a project that is literally underfoot. They say it has good-to-excellent bonding to most materials and recommend it for sealing everything, in fact, except for wooden seams under water. Like the



other silicones, it is not paintable. It comes in the standard deck-seam colors of black and white.

Deck seam sealants are obviously a large market, because 3M has also developed a new product called Marine Teak and Wood Seam Sealant. A one-part polyurethane, it's an offshoot from the 4200 product. It differs from BoatLIFE's seam compound

in that it takes a little longer to cure, though not as long as the polysulfides. But, if need be, it can be painted other than its normal black color by using lacquers. It might last a little longer than the silicone but might be harder to remove later.

What's right for your job

What to use? It depends on what you're going to do with it. Are you asking it to hold back water and create a custom gasket, or do you want it to glue two parts together? Are you doing deck seams or mounting a through-hull fitting. A deck fill? An exhaust tip?

For further information, contact:

BoatLIFE Industries	843-566-1225
3M Marine	877-366-2746
Pettit Paint Company	800-221-4466
Sika Corporation	800-688-7452

regular 5200, but the cure time is significantly reduced: to tack-free in 1 hour and fully cured in 24 hours — a real plus for manufacturers and others working on small areas with lots of bedding. Like 5200, it can be cleaned up with mineral spirits, though petroleum products won't affect it once it's fully cured. At this writing, it comes

Thanks to the West Marine Master Catalog for allowing us to reprint the sealant chart below. It's the best we've seen. For more information, call 800-BOATING or visit their website at <<http://www.westmarine.com>>.

Sealant Selection Chart

Applications	West Marine		3M						BoatLife		Sika	
	Multi-Caulk	Silicone	101	Teak	4200FC	5200	5200 FC	Silicone	Life Calk	Life Seal	240	291
Wood to:												
Metal (Deck/Hull Hardware)	VG	G	VG	VG	VG	VG	VG	G	VG	G	VG	VG
Wood (Wood Trim)	VG	G	G	VG	VG	VG	VG	G	VG	G	VG	VG
Deck Seams (Teak, Other Woods)	VG	NR	NR	VG	NR	NR	NR	NR	VG	NR	NR	NR
Underwater Wooden Hull Seams	VG	NR	NR	VG	VG	VG	VG	NR	VG	NR	NR	NR
Thru-Hull Fittings (Wooden Boat)	VG	G	VG	VG	VG	VG	VG	NR	VG	G	VG	VG
Glass	VG	G	G	NR	NR	NR	NR	G	VG	G	G	G
ABS & Lexan Plastic	NR	G	NR	NR	NR	NR	NR	G	NR	VG	NR	NR
Plastic Hardware	NR	G	VG	VG	VG	G	G	G	NR	VG	NR	NR
Rubrails	VG	G	VG	VG	VG	G	G	G	VG	G	G	G
Fiberglass to:												
Metal (Deck/Hull Hardware)	VG	G	VG	VG	VG	VG	VG	G	VG	VG	VG	VG
Fiberglass	G	G	VG	VG	VG	VG	VG	G	G	VG	VG	VG
Thru-Hull Fittings (Fiberglass Boat)	VG	G	G	VG	VG	VG	VG	NR	VG	VG	G	G
Glass	VG	G	G	NR	NR	NR	NR	G	VG	VG	VG	VG
ABS & Lexan Plastic	NR	G	NR	NR	NR	NR	NR	G	NR	VG	NR	NR
Plastic Hardware	NR	G	VG	VG	VG	G	G	G	NR	VG	NR	NR
Rubrails	VG	G	VG	VG	VG	G	G	G	VG	VG	VG	VG
Glass to:												
Metal (Windshields)	VG	G	G	NR	NR	NR	NR	G	VG	VG	VG	VG
Vinyl	NR	G	NR	NR	NR	NR	NR	NR	NR	VG	NR	NR
Other:												
Deck to Hull Joints	VG	G	NR	VG	VG	VG	VG	NR	VG	VG	VG	VG
Electrical Insulation	G	VG	NR	NR	VG	NR	NR	NR	G	VG	VG	VG
Attributes												
Sandable (Y=Yes, N=No)	Y	N	Y	Y	Y	Y	Y	N	Y	N	Y	Y
Paintable (Y=Yes, N=No)	Y	N	Y	Y	Y	Y	Y	N	Y	N	Y	Y
Chemical Resistant (Y=Yes, N=No)	Y	Y	Y	Y	N	N	N	Y	Y	Y	Y	Y
Gruing/Adhesion	G	G	NR	G	G	VG	VG	G	G	G	VG	VG
Cure Rate (F=Fast, S=Slow)	S	F	S	F	F	S	F	F	S	F	F	F
Life Expectancy In Years	20	20	20	10	20	20	20	5	20	20	20	20
VG = Very Good, G = Good, NR = Not Recommended												

How long can you leave it to cure before the dog walks through it or you have to set sail and thrash it through the ocean? And, like that ballast keel, is there a possibility that you might someday need it to really hold?

Nine times out of 10, I find one of the general bedding products, like Life Seal or 4200, works best. I mostly bed hardware to the hull or deck and, having renovated a couple of boats, I'm very mindful of the fact that nothing lasts forever. Some day somebody's going to have to do maintenance on the thing, and that next guy who has to tear it apart might just be me. As a result, I don't often have any use for something with the near-permanence of 5200 or 292. Nor do I do much work on classic wooden hulls, so when I buy Life Calk and 3M's 101, I get it in the smallest tubes I can find.

I think that the most difficult decision would be what to use on those deck seams, particularly since the two new alternatives seem to be such good products. In general polysulfides in either one- or two-part mixtures, were the best of the available choices, because until BoatLIFE's development, silicones weren't recommended for wood, and the polyurethanes just took too long (and the mess you could create

with them was all but permanent).

The two-parts have been recommended over the one-parts, as they cure faster and fill voids better, though they can be a little "goopier" to work with. You are somewhat limited by choice, as not all are available in both colors; but all are advertised as having similar imperviousness to chemicals and similar lifespans. One-part polysulfides, the silicones, and 3M's product all cost roughly the same, and the two-part polysulfide is the most expensive of the lot. Perhaps the best idea would be to find someone with experience in all of them, pick his brain and make your decision based on your own situation.

Clean and prime

With any of the products, remember: nothing is going to help them stick to fresh-sawn, oily woods better than first cleaning the wood with products such as BoatLIFE's Life Calk Solvent and Cleaner and priming with their Life

Calk Primer or Sika's 203 Primer. It's false economy to try to do the job and skip a step — it would be a shame to have to re-clean and re-pay all those seams, either deck or hull, just to save the cost of the primer. The old rule of thumb, *When in doubt, prime it out*, works just as well

for sealants as it does for paint.

For years, the biggest problem with all sealants has been the economy of the packaging of the stuff. Fortunately, manufacturers have become aware of the fact that, while a 10-ounce tube worked well for big jobs and boatbuilders, most of the rest of us waste more than we use by having the stuff harden in the tubes between uses. They've started selling most of their products in one- and three-ounce toothpaste tubes that fit well in a toolbox and contain just the right amount for the small jobs.

They are also a lot easier to handle in tight corners than caulking guns.

In the end, follow the manufacturers' recommendations, be mindful of the materials involved and the amount of bond strength you need, and don't be afraid to be liberal with the goop. More of it means less water in places where you don't want it.

Scott has returned three boatyard monsters to solid sailboat status with the primary addition of elbow grease. He and his wife sail Penelope, their 1968 Camper-Nicholson 32, from Falmouth, Maine.



Apply it properly

The biggest complaint about any sealing job is, "I put two ounces of stuff there, *so how come it still leaks?*" Invariably, when the autopsy is performed and the part is removed, the sealant that is there is microscopically thin and has failed because there wasn't enough of it to fill the space.

What happens is that the part installer becomes too gung-ho and tries to do too much in one day. He's applied the goop, installed the part, cranked down hard on the fastenings, wiped off all the stuff that leaked out around the edges, and gone on to the next piece. Well, all that sealant is now on the rag, which will eventually end up in the dumpster, not between the part and the hull where it will do him some good.

Remember, that part is intended to be fastened to the hull for a good long time and the space of a couple of hours isn't going to be much in the life span of the hull. Goop the part in a place where it will have good contact with the substrate, install it *lightly*, and let it sit a few hours for the sealant to cure. When you come back and tighten the screws, there will be a nice, solid gasket under the part that will compress and keep the water out. Keep the goop where it belongs, under the part or in the tube. Boats are already too expensive to be throwing away supplies because of misapplication.

Sealant selection

All the sealants in the West Marine selection chart are acceptable for use with "fiberglass," even the ones which are not recommended for use with other plastics like polycarbonate (Lexan), ABS, and "plastic hardware," which is often glass-filled nylon or acetyl.

We asked several manufacturers why polysulfides are recommended for "fiberglass" hulls and decks but not for some other plastics.

Two things can cause a manufacturer to not recommend a sealant for use on a particular material: poor adhesion and chemical attack. Manufacturers were much more concerned with poor adhesion than chemical attack. They said they preferred to test and recommend on a case-by-case basis. Naturally, selection charts are going to deal in general cases. So follow the general selection chart, but double-check the container and the manufacturer's selection chart as well.

Some silicones are not intended for use below the waterline. Such misapplication has caused boats to sink.



Is your boat stable?

The speed of a sailing yacht in any given wind is determined, to a large extent, by the amount of sail she can carry. In heavier weather, that sail area is governed by the ability of the hull to remain on its feet; in other words, her stability. In extreme weather conditions, of course, the vessel's stability also determines her ability to recover from a knockdown, and thus it can be a major contributor to safety.

Consider the advantages of a "stiff" or "powerful" sailboat beating to windward in a good breeze. The heel angle of the stiff hull will be less than that of a tender sister, so the sails will present greater effective area to the wind, and the boat will move faster as a result. Also, the lateral plane under water will be more upright, so it will be working to its maximum potential, and the boat will be making less leeway and perhaps pointing a degree or two higher as well. The sailboat that is making better speed, pointing higher, and making less leeway than the competition is bound to be a winner (see Fig. 1 below).

Stability, in essence, can be defined as the tendency of a vessel to return to an upright condition after it is inclined by external forces: wind, seas, weight shifts, and so on. The inclination can be athwartships or fore-and-aft, of course, but we'll concentrate on athwartship stability as it is the prime factor in both the power to carry sail and the safety of the craft.

The drawing (Fig. 2 at top right) shows the basics of athwartship stability: a boat heeled from her normal upright waterline condition to a heeled waterline with no change in her displacement. The upward thrust of buoyancy always

Top designer Ted Brewer explains stability and how it affects safety and speed

by Ted Brewer

acts vertically to the waterline but now it is acting vertically to the heeled waterline. The shape of the hull moves this buoyant upward thrust from its original centerline position (B) to a point outboard (B1), where it exerts an upward force vertical to the heeled waterline and equal to the displacement of the boat.

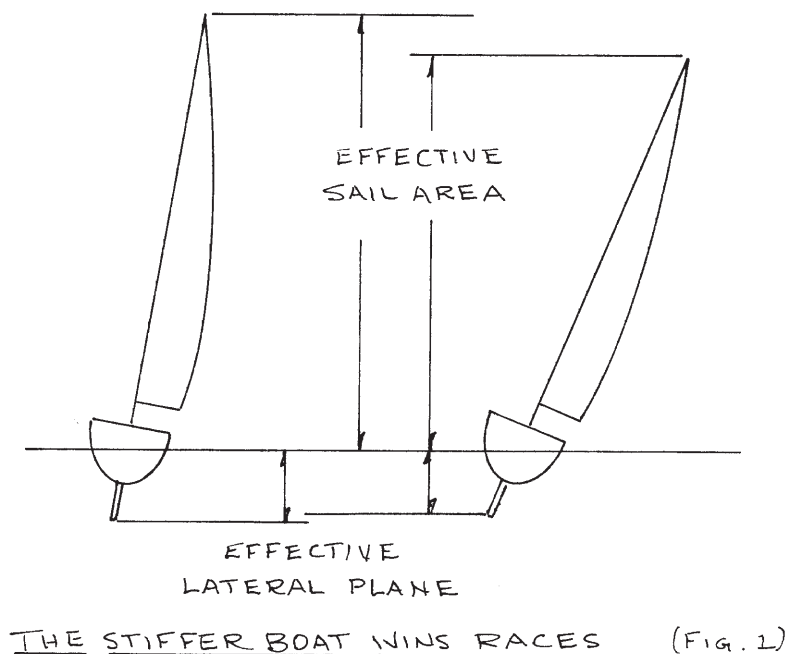
The righting lever

The center of gravity (G), barring unforeseen circumstances, does not change position as the boat heels and remains on the centerline, acting downward through the heeled waterline. The horizontal distance from G to a vertical line drawn through B1 is

termed the righting arm, or righting lever, (GZ). So with the buoyancy of the hull acting upward through B1 and the weight of the hull acting downward through G, we have a force, or couple, tending to return the boat to its upright position. This force is known as the righting moment and is equal to the vessel's displacement times the length of the righting arm (Disp. x GZ).

To illustrate, if our boat weighed (displaced) 1,000 pounds and the GZ was 1.75 feet long, the righting moment would be $1,000 \times 1.75 = 1,750$ foot-pounds. It would take that much force of wind on the sails to heel the boat to that angle or, if no sails were set, it would require the equivalent in weight shift — 500 pounds of crew or other weight moved 3.5 feet to one side.

To sum up, the stability of the boat is directly related to two factors: her displacement, and the length of the righting arm. The heavier the displacement and/or the longer the righting arm, the greater the stability. In turn, the length of the righting arm depends on the location of the center of gravity (CG) and the location of the heeled center of buoyancy (CB).



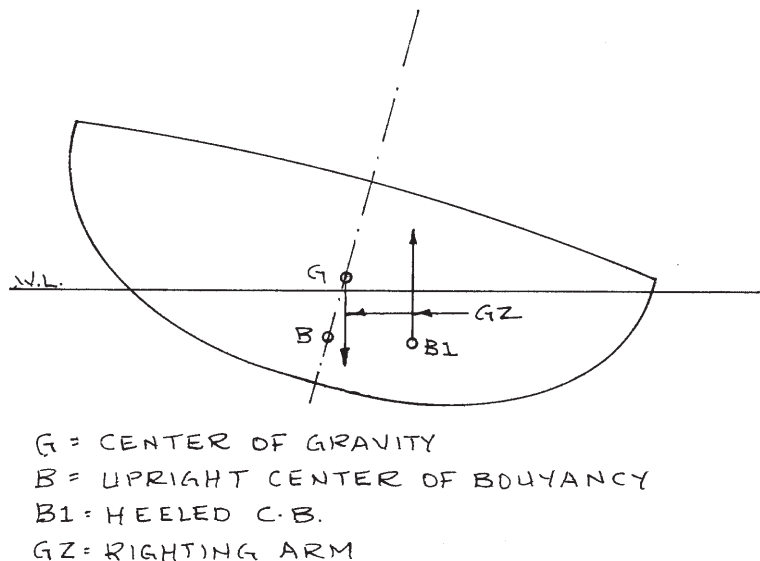
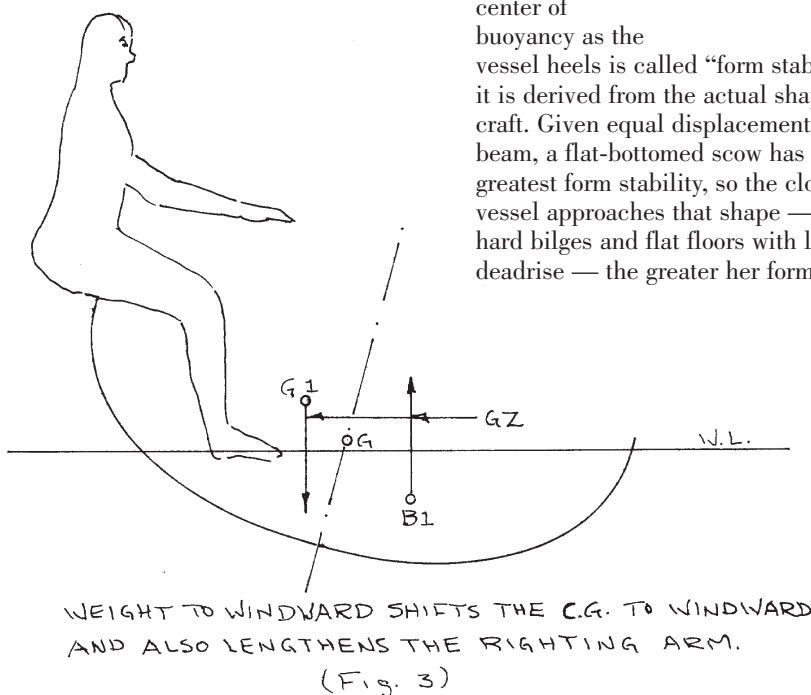
The lower the CG, the longer the righting arm. The further outboard the heeled CB, the longer the righting arm. It's that simple.

However, a very stable vessel may be uncomfortable in a seaway, as it can develop a snap roll. Back in the "good old days," when there were still coasting schooners carrying lumber from Maine to Boston and New York, it was not unusual for the skipper to hoist heavy weights to the mastheads on windless days in order to raise the center of gravity and slow the roll. This was particularly necessary if there was a leftover sea or swell from a storm offshore, as the snap roll of the heavily laden schooner could damage the rig. With modern sailboats, however, we usually want to increase stability to reduce the heel angle or enable us to carry more sail in a breeze. One way to do this is to increase the displacement, but bear in mind that the added weight must be near the original center of gravity, in order not to raise the CG and thus shorten the righting arm.

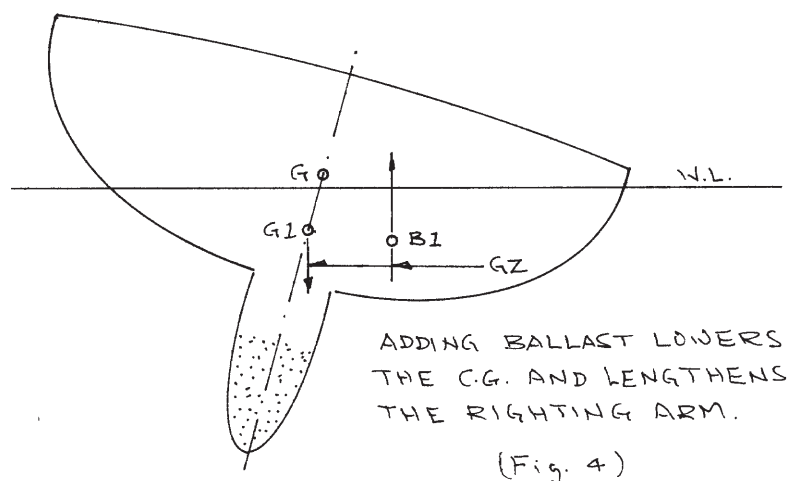
We can also carry more sail if we lengthen the righting arm, and we can do this by moving the crew to the windward side (Fig. 3 below), or by shifting weights, to lower the center of gravity. It's obvious that adding ballast low in the hull (Fig. 4 at right) will increase stability in two ways: by increased displacement as well as by the lowered center of gravity.

Form stability

The shift of the center of buoyancy as the vessel heels is called "form stability," as it is derived from the actual shape of the craft. Given equal displacement and beam, a flat-bottomed scow has the greatest form stability, so the closer a vessel approaches that shape — with hard bilges and flat floors with little deadrise — the greater her form



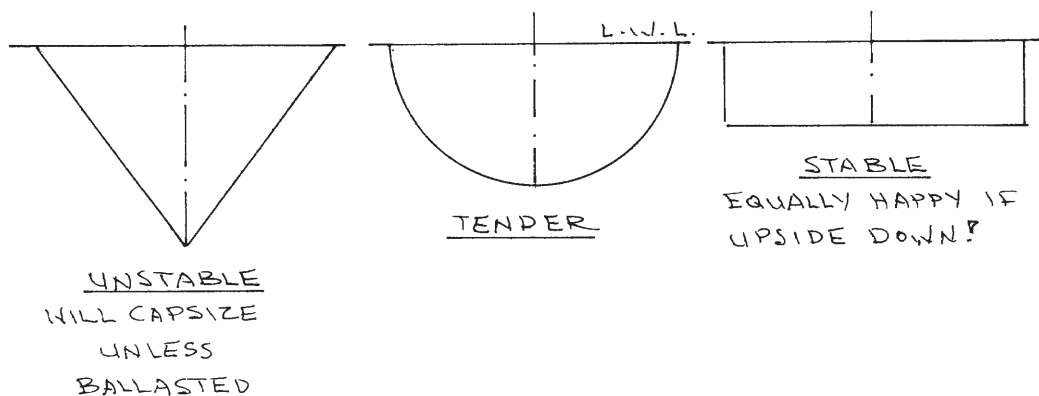
STABILITY TERMS (Fig. 2)



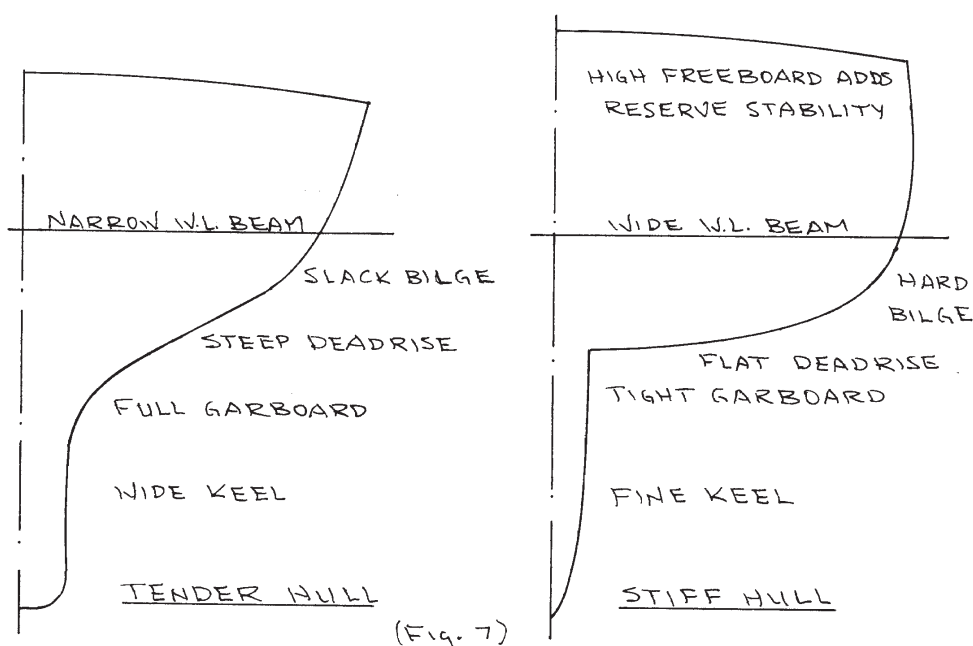
stability will be (see Fig. 5 on Page 20). Carrying the beam aft to a wide, flat stern that will begin to immerse as the boat heels will also add to form stability.

A simple way to design a boat with greater form stability is to increase the beam, but this can create problems of safety if carried to excess. The stable hull always tries to remain parallel to the water's surface, but if that surface is the face of a great wave at an angle of 50 or 60 degrees to the horizon, then the super-stable boat is definitely in trouble (see Fig. 6 on Page 20).

Light-displacement craft with overly generous beam may be almost as stable upside down as they are right side up, like Huck Finn's raft. If they are rolled 180 degrees in extreme conditions of wind and sea, they may not right themselves, or they can right so slowly that the hull fills with water through



THE BASIC HULL SHAPES (Fig. 5)



hatches, vents, and other openings. When the boat eventually does right itself, it may well be in a dangerously swamped condition.

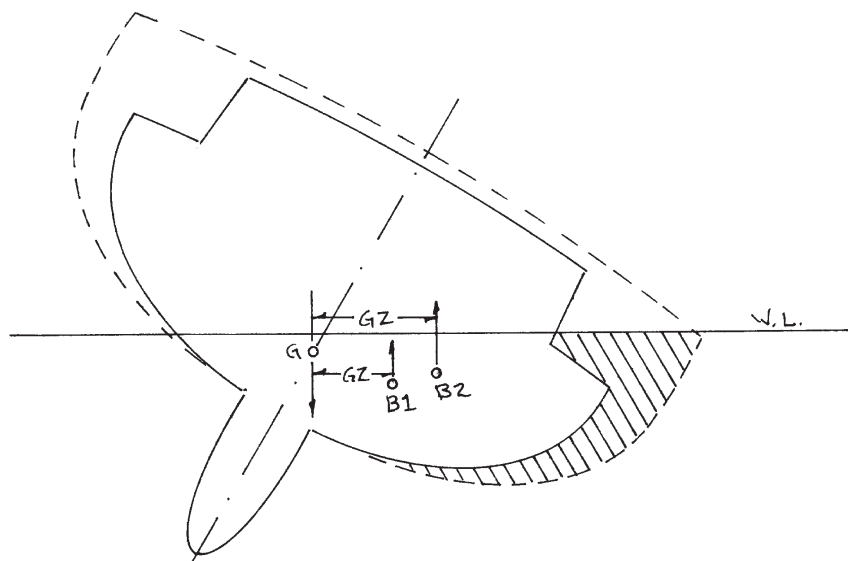
Bear in mind the Capsize Screening Formula: the maximum beam divided by the cube root of the displacement in pounds (Max. beam/Displ. pounds^{.333}). If the result is greater than 2.0, the boat fails the test and may be considered unsafe for ocean voyaging.

Multihulls, of course, do have tremendous form stability due to their extreme beam and are typical of vessels that are just as happy upside down as right side up. To offset this problem some sailing catamarans have floats or even inflatable bags at their mastheads so they cannot be knocked down much past a 90-degree angle.

Heeling changes buoyancy

Though form stability increases with beam, yachts with the same beam can vary widely in form stability (see Fig. 7 at left). The craft, with her maximum beam high up at deck level and narrowing gradually toward the waterline, will have less form stability than her equally beamy but wall-sided sister if the latter carries her full beam all the way down to the waterline. Similarly, given two yachts of equal waterline beam, the one with a U-shaped hull, having flat deadrise and hard bilges, will have greater form stability than her wineglass-shaped sister with deep deadrise and slack bilges. It all boils down to the fact that form stability depends on the shift of the heeled center of buoyancy, and the closer the vessel resembles a raft, the greater the shift of the CB as she heels.

Factors that decrease form stability are soft bilges, deep deadrise angle, large-radius garboards joining the hull to the keel, a fine stern (double ender) and narrow beam. If these factors are not carried to excess, they may indicate a more



INCREASED BOUANCY, BY HARDER BILGES, HIGHER FREEBOARD, WIDER BEAM, MOVES THE HEELED C.B. OUTBOARD (B2) AND LENGTHENS THE RIGHTING ARM.

(Fig. 8)

comfortable vessel in a seaway . . . one with an easier motion. Many designers and owners believe that excess form stability is not desirable for serious offshore work; it can create a harsh, snappy motion that is hard on the crew and hard on the gear and rig and, as is evident, can be unsafe if carried to extremes.

Another point to consider in comparing section shape is "reserve" stability. This is the increasing stability picked up as the hull heels over to a decks-awash condition. Reasonably high freeboard is important to stability at higher heel angles because once the deck-edge is awash further heeling will move the CB inboard and shorten the righting arm.

In open daysailers and powerboats, immersing the deck edge allows water to pour into the hull, where it remains on the low side and moves the CG to the low side or to leeward. This rapidly shortens the righting arm to the point where a capsize results if sail pressure is not relieved instantly — as some readers may already have found to their dismay. I did! By getting the crew weight to windward, the

righting arm is lengthened and stability increased.

Hiking straps and trapezes are simply means of getting the weight even farther to windward and lengthening the righting arm even more. Having the deck-edge awash is not disastrous on a decked cruising yacht, of course. However, sailing with the deck awash does create considerable added resistance, and a few more inches of freeboard might well eliminate the problem. Indeed, high freeboard, if not carried to excess, can provide substantial added reserve stability (see Fig. 8 above). Flush-decked yachts usually benefit from this extra safety as they are generally given the highest freeboard of any normal type of vessel.

Moderation is good

In general, sailing yachts with moderate beam, moderate displacement, and

ample ballast are safe vessels and, usually, good performers. Cruising sailboats have been designed with all-inside ballast, but this is unusual today except in replica types and shoal centerboarders such as the Cape Cod catboat.

Where maximum stability is desired, in order to increase the power to carry sail, the majority of the ballast should be in the keel, with only sufficient inside ballast for trimming purposes, perhaps 5 to 10 percent of the total. This trim ballast should be strapped down to prevent it from moving in case of a knockdown, of course. Ballast can be lead or iron, but lead is preferred for performance yachts as its greater density allows the weight to be concentrated lower. Bulb keels and wing keels also lower the ballast but, since these are

generally associated with shoal-draft yachts, the stability is not necessarily increased. The amount of ballast will vary widely depending on the type and use of the yacht; the table (Fig. 9 below) is a very general guide.


Obviously, the yachts with great form stability can perform well with a lower ballast ratio, at least until they get into extreme conditions. In any case, if you feel that your boat's stability needs to be enhanced there is only one way to do it. You cannot change her hull shape (unless you are very wealthy or very handy) so the solution is weight; add ballast as low as possible, reduce weight aloft in the rig and on deck, get rid of that library of ponderous yachting tomes, and move weights such as heavy batteries, machinery, tanks, anchor chain, and so forth lower in the hull. You'll be rewarded with added performance all around. 

Fig. 9

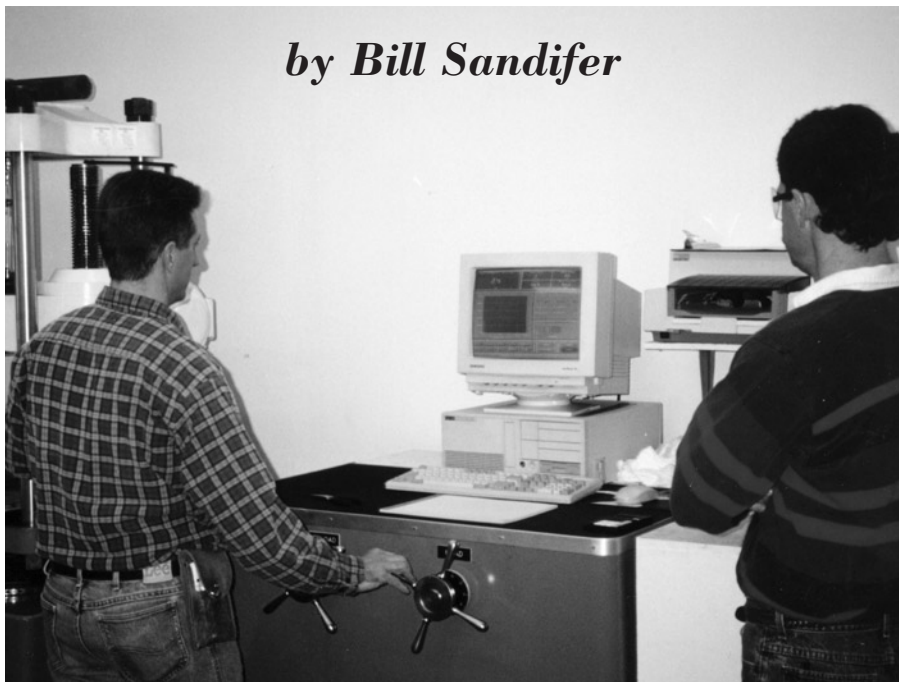
Boat type	Ballast ratio %
Cape Cod catboat	15-25
Motorsailer	20-30
Keel/centerboard cruiser	30-35
Keel cruiser-racer	38-45
Heavy auxiliary cruiser	25-35
12 Meter yacht	68-72
5.5 Meter sloop	75-79
Contemporary light, beamy cruiser	29-32



Ted Brewer is one of North America's best-known yacht designers, having worked on the America's Cup boats, American Eagle and Weatherly, as well as boats that won the Olympics, the Gold Cup, and dozens of celebrated ocean races. He also is the man who designed scores of good old boats . . . the ones still sailing after all these years.

New swageless fitting shows

by Bill Sandifer



In my article “Do-It-Yourself Rigging,” (*Good Old Boat*, September 1999), I said that after having rerigged my boat I was not sure it had been cost-effective to do it myself. I reasoned that, between the cost of the tools I bought and the cost of the swageless fitting I ruined (by getting a wire pinched between the upper and lower terminal and stripping the threads), I was close to the cost of having the job done by a professional rigger.

That opinion was based, to a large extent, on how time-consuming and difficult it was to assemble the swageless fittings I used.

Recently, I was contacted by *Good Old Boat* and asked to evaluate another fitting manufactured by a Danish company called Blue Wave. I wasn’t aware of this fitting when I rerigged my boat. The new fitting promised to be much easier to use. So easy, in fact, that I had reservations about its ability to match the full strength of the wire.

Suncor Stainless is the sole importer of this part and collaborated on its engineering and development. They supplied a sample fitting and a length of 3/16-inch stainless-steel wire. The fitting looked first-class. In fact, it appeared to be the most robust casting of all the swageless fittings on the market. It was easy to install because the wire does not have to be unlaidd, there is no cone to be inserted, and there is no bending of the wire over the cone. Total assembly time was under one minute. Very impressive. But was it strong enough?

ABS-approved lab, pictured at top, tests breaking strength of Suncor assembly. Suncor assembly, at far left, breaks at 107 percent of the wire’s rated breaking strength. To assemble, simply slide the parts on the wire, leaving 5mm extended beyond the pressure ring. Screw the fitting together and tighten. Then tighten the lock nut. Finished assembly shown at left.



promise

Oil rigs

In a prior life, I was a construction superintendent overseeing the building of North Sea, semi-submersible, giant oil rigs. These are the brutes that work year-round in the harsh weather of one of the world's roughest bodies of water. As part of my responsibilities, I arranged for and witnessed stress-testing of "coupons" of steel cut from plate to be used in high-stress areas of the rigs. The purpose of the tests was to be certain that the material intended for use in the rig actually met the specifications called for on the drawings. I decided to test this new swageless fitting at a lab similar to the ones I used for the steel testing.

To conduct a fair test, I purchased a length of 3/16-inch, 316 stainless-steel, 1x19 rigging wire sufficient for several tests. I could cut the wire into pieces for each sample test. Each section of wire, therefore, would be the same. I also obtained equivalent-sized fittings from two other manufacturers who supply swageless fittings. The variable would be the fittings.

In a test of this type of assembly, it's expected that the wire will be the part that fails. It is also expected that the terminal will not weaken the wire where it's attached to the terminal. The wire used in the test has a breaking strength of 4,000 pounds, so that was the ultimate test goal.

When I arranged for the tests for the oil rigs, the lab had to be approved by the American Bureau of Shipping, as the rigs were U.S. flag vessels and built to a class certification to comply with the ABS rules. I located an ABS-approved lab in Baton Rouge, La., to run the tests.

Overkill

Quality Testing Inc., run by Dale Delaville, has all the required equipment, fully certified, to pull a load of up to 120,000 pounds of force on a sample. A little overkill for my needs, perhaps, but they agreed to do the tests.

One problem we discussed was how to secure the standing part of the wire so we did not pointload one small section of wire. The solution was to build a loop in the wire with two Nicopress compression fittings and a stainless-steel wire clamp backup. A three-inch, heavy-wall piece of pipe was slid through the loop and formed the top secure point of the standing part of the wire.

To secure the fitting to the test stand, we machined a piece of steel plate with a hole in it to receive the pin of the fork from the fitting. I had Charley, a master rigger from Sintex Boat Works, in New Orleans, make up a swage fitting on another section of the same wire so we could test it, along with the other two fittings, as a part of the baseline. Charley has rigged many of the raceboats in the New Orleans area for the past 30 years.

Continued on Page 24

What does all this mean?

When we asked Bill Sandifer to evaluate the Suncor terminal we half expected him to say, "It's too easy to be true." He could simply have presumed that these things worked as claimed, but he's a cynic. He has had his share of surprises with rigging terminals. So he ran tests.

To provide a proper baseline for the test, he tested the two other swageless terminals he knew of, Norseman and Sta-Lok, as well as a C. Sherman Johnson Co. swaged terminal, with the swaged wire assembly professionally made.

The swaged terminal, as well as the Sta-Lok and the Suncor swageless terminals, passed the initial round of tests by breaking at a load

by Jerry Powlas

slightly in excess of the wire's rated ultimate breaking strength. The Norseman terminal failed at 69 percent of the wire's rated ultimate breaking strength. When the supplier was contacted concerning this, they offered to supply another terminal and wire assembly made up by their own staff. This terminal and wire assembly also failed the test, breaking at 80 percent of the rated breaking strength of the wire.


There are very narrow limits to what can be inferred from testing only one sample assembly of each terminal (or in the one case, two samples). Many samples of each terminal would need to be tested to make definitive statements about the performance of these parts. At nearly \$100 a test sample, we were not inclined to do that, although we hope the manufacturers of these critical parts are so inclined.

Not significant

Respecting these narrow limits, it should be said that the differences in the ultimate breaking strength of these assemblies (the highest load before failure) are not significant in the case of the three assemblies that had ultimate strengths higher than the wire rating. If the terminal functions properly, the test becomes a test of the breaking strength of the wire, not the terminal. This is true even in cases where the wire deforms and pulls out of the terminal without breaking.

In the cases of the two Norseman terminal-and-wire assemblies that failed to reach the breaking strength of the wire, many explanations are possible. Without more evidence (more testing to achieve statistical significance and professional engineering evaluation of the failures), it is not fair to speculate.

One of the appeals of swageless terminals is that they do not require a (very expensive) swaging machine, so they allow the boatowner the opportunity to do this job personally. If spare wire and terminals are carried, it's even possible for the owner to make repairs in remote ports, or in a worst case, at sea.

There are many critical attributes to a swageless rigging terminal. It must be consistently strong, corrosion-resistant, and affordable. If it's to be offered for use by amateurs, it must also be easy to use, so that the likelihood of proper and satisfactory assembly is extremely high. We tested only a few samples, so our opinion must be tentative, but this evaluation certainly suggests that the Suncor terminal is extremely easy to use. Bill considered the Sta-Lok terminal easier to use than the Norseman terminal. In at least some instances, the Norseman terminals may not be able to allow the full strength of the wire to be utilized. 

Jerry is Good Old Boat technical editor.

Continued from Page 22

The fittings were ready, and the lab was all set. The first fitting to be tested was the “baseline” swage fitting. One of the functions of the test machine is to monitor and record the loads as they are applied to the test specimen. If you look at the first graph (Test 1), you will see that the swage fitting held onto the wire to a peak load of 4,112 pounds before slipping. The wire did not break; it pulled out of the fitting. This was a successful test as the wire breaking strength was rated at 4,000 pounds, and the fitting exceeded that load. The other two fittings were tested to verify the baseline. One test was satisfactory, and one tested well below the breaking strength of the wire. (This terminal brand was retested at a later time with an assembly made up by the supplier. It also failed the second test.)

Held the load

The new Suncor fitting was next in line. The graph (Test 4) for fitting number four shows that the Suncor fitting held the load all the way to 4,278 pounds, 166 pounds higher than the swage fitting. This assembly also successfully passed the test. Not only that, but the outer strands of the wire actually broke, leaving the inner core of the wire attached to the fitting. I do not think the inner core would support too much load, but it did stay together. This was true of one other type of swageless fitting we tested as part of establishing the baseline.

If a picture is worth a thousand words, the accompanying pictures tell a great story of a new fitting on the market that gives good old boaters an easy way to repair or replace the standing rigging on their pride and joy.

The Suncor fittings have some qualifiers that must be observed. They should be used only with the specific size of wire for which they are made — and they are not made for all sizes of wire. The 9/32-inch Dyform wire on my boat does not have a corresponding fitting from Suncor. The closest is 5/16 inch, so I could not have used these fittings with the wire I chose. It is imperative that the directions be followed carefully as to the length of wire to protrude above the inner wedge and pressure ring. Other than that, the fitting is easy to use and has proven itself under a verified load.

For more information, contact Suncor Stainless, 7 Riverside Drive, Pembroke, MA 02359, 781-829-8899, <<http://www.suncorstainless.com>>.

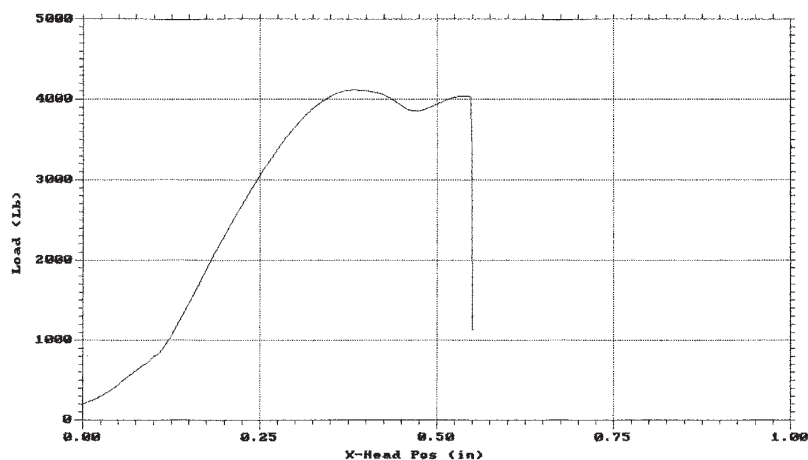


Bill Sandifer is a marine surveyor and small boatbuilder who's been living, eating, and sleeping boats since he first assisted at Pete Layton's Boat Shop building small wooden boats. He's worked for Charlie Morgan (Heritage), Don Arnow (Cigarette), and owned a commercial fiberglass boatbuilding company (Tugboats).

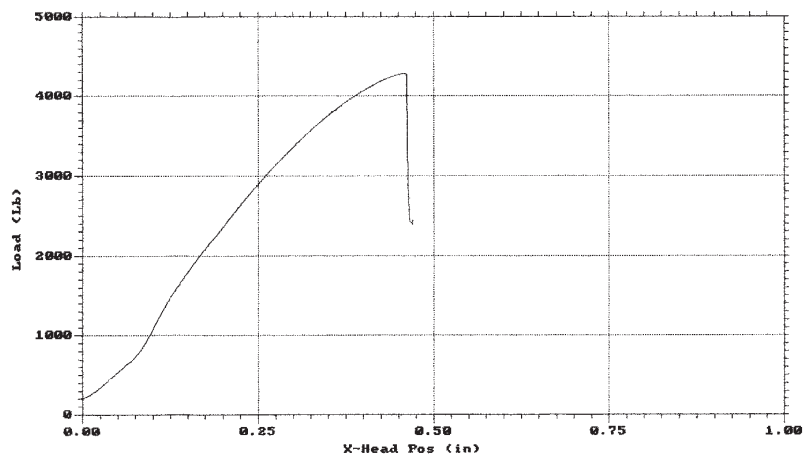


Suncor terminal parts, shown above. Serrated jaws are held together by the O-ring during assembly. Below are stress curves for the swaged fitting which served as the baseline (Test 1) and the Suncor fitting (Test 2). Both passed the test by exceeding the breaking strength of the wire (4,000 pounds).

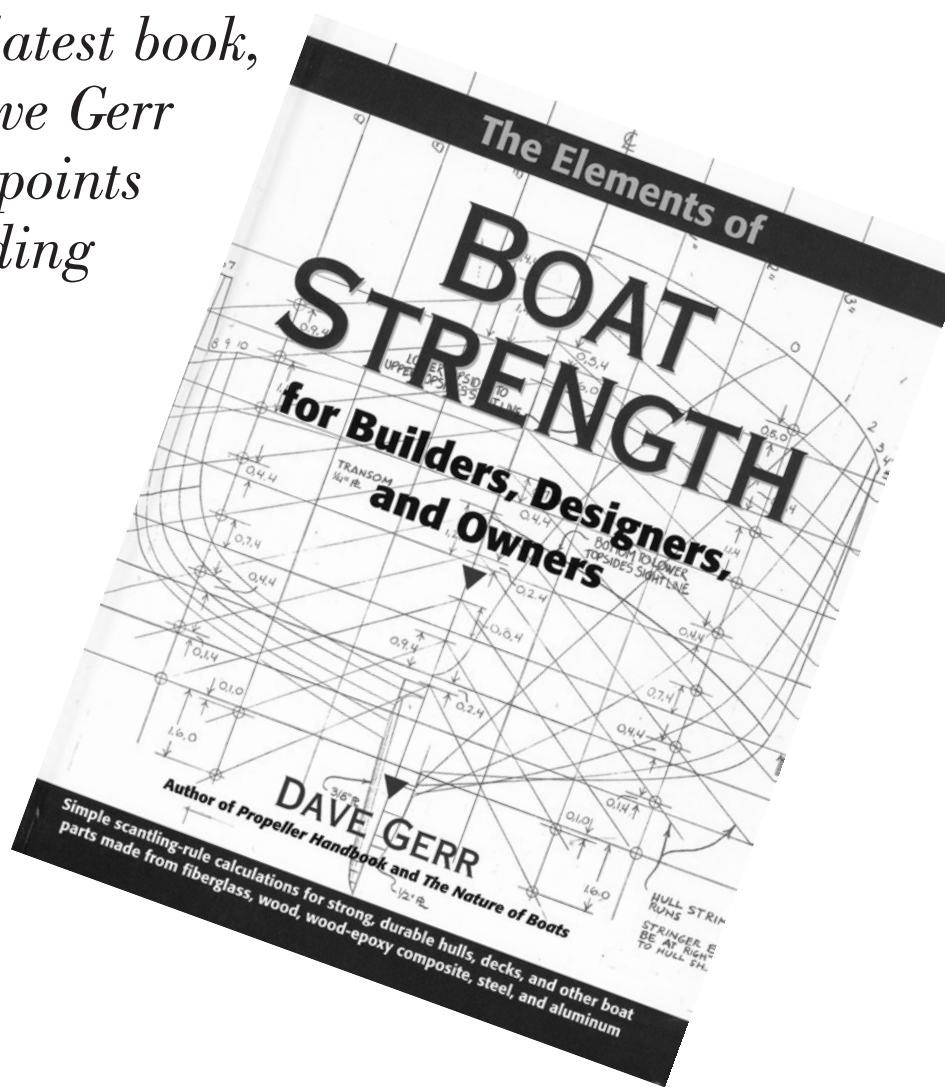
Test 1



Test 4



*In excerpts from his latest book,
yacht designer Dave Gerr
explains the finer points
of good boatbuilding
practice*



To be a good old boat, a vessel must be well built. Easily said, but how do you know whether it's well built or not? What is considered good practice, and what can you tell just by looking at the way a boat was designed and built? If your boat, like most, has a hull and deck of fiberglass, there is, in fact, a great deal you can learn from a close inspection. But you need to know what you're looking for.

Some history

Modern fiberglass boat construction is based on an ancient principle: adding just 2 percent of a fiber-like impurity to something like clay or plaster of Paris will dramatically increase its strength

— especially its resistance to cracking on impact, or to bending. This is why, for instance, you can't make bricks without straw — at least, not strong, usable bricks. The more fiber you add, in proportion to the binder, the stronger the combination — the composite. As you can see, the first “composite material” application is several thousand years old. Of course, if you try to combine much more than 2 percent fiber (straw or whatever), things get too stiff to mix or work properly. Instead, you have to add the binder to the fiber, rather than the other way around.

by Dave Gerr

Mashed paper

Papier-mâché, for example, is nothing more than another “high-tech” composite that's been with us for three or more millennia. The ancient Egyptians used it to make sarcophagi; 18th-century Europeans used it to make jewelry boxes and furniture; and during World War II, it was even employed — in a big way, believe it or not — to make airplane fuel tanks! Papier-mâché has its drawbacks

— it's not especially strong; it's not at all fire-resistant; and, worst of all, it's unable to stand up to moisture. As long as it's kept well-painted or varnished, and in a reasonably dry environment, fine; get it wet, though, and it's finished.

Dave Gerr on glass



Chopper gun in use. At the very least, this worker should be wearing goggles and a respirator. Skin protection is also important. (Photo courtesy of Owens-Corning Fiberglass Corp.)

Bakelite

Strangely, it was largely the pressures of the new-fangled electronics industry that encouraged improved composites. The old insulators — gutta-percha, waxed paper, shellac, and ceramics — that had been adequate for the ordinary telegraph-line voltages, weren't up to the job as we began using higher levels of power. It was the Belgian chemist, Leo Baekeland, who found that reacting phenol and formaldehyde would produce a reasonably tough and somewhat water-resistant resin. The year was 1906. Even so, it wasn't until many months later that he realized that adding fibers (in this case, in powdered form) to his brittle resin would generate superior strength. The result was Bakelite, the very first "modern" high-tech composite and the beginning of our contemporary plastics revolution. Between the two world wars many household appliances and a vast amount of electrical equipment was fitted with Bakelite handles, knobs, cases, and insulators.

Asbestos, too

From here on it was a regular, ongoing process to increase strength, stiffness, and weather resistance in these new, highly moldable composite wonder goos. All sorts of binder/chemical combinations were tried along with all manner of fibers — everything from wood pulp to asbestos. Indeed, asbestos-phenolic composites seemed

to have all the answers at the end of World War II. Known largely as Durestos, this material was tough, strong, and quite stiff, rivaling even modern laminates in some respects. Back then, no one was much concerned with asbestos health risks, so I guess we can consider ourselves lucky that Durestos didn't gain wide acceptance. Think of the multi-million-dollar Durestos clean-ups that would be underway today if it had.

Fiberglass

Today, we've settled on glass fibers (nothing more than modern-day straw) in polyester resin (modern-day clay) as the most suitable and cost-effective combination for building large, waterproof, composite structures — boats. The process most builders use is almost identical to the application of papier-mâché employed by the ancient Egyptians. For ancient papier-mâché sarcophagi (highly molded and brightly painted coffins), a hollow female mold was made out of clay or plaster of Paris; it was coated with a mold-release agent (the Egyptians used soap or linseed oil) so the layup wouldn't stick; next, alternating layers of paste or glue and paper were laid in and pressed tightly down until the desired thickness was built up.

The vast majority of modern production hulls are built-up in exactly

this way. If you were building a new boat, *Glass Slipper*, you'd build a hollow female mold in the shape of her hull. You'd then coat it with a mold-release-agent (today a wax). Next, you'd lay on alternating layers of polyester resin and fiberglass cloth (of varying styles and weights) until the desired thickness was reached. Maybe, "modern" technology isn't quite as modern as we think it is.

Layup methods

What we've described above is commonly known as "hand layup." It's the most widely used and one of the most successful methods of forming a hull. There are, however, two standard alternatives. The first is really a hand-layup enhancement: the entire hand-layup process on *Glass Slipper* is performed as above, but — after the layup and before the resin cures — a vacuum bag (really a sheet of plastic) is taped in place over the fiberglass in the hollow, female mold. Some of the air is sucked out by a pump, causing the outside air to press down evenly on the entire plastic sheet, and thus the laminate, with great force. The result is extremely dense, strong, even layups — considerably stronger than hand layups. This is because vacuum-bagged layups have more glass in proportion to the resin. (Remember, the more fiber you use — if properly applied — the stronger the laminate.)

Atmospheric pressure, by the way, is about 14.7 pounds per square inch (psi). If — using *Glass Slipper's* builder's trusty vacuum pump — pressure were reduced by 25 percent, to 11 psi, the resulting pressure on and through the vacuum bag would be 3.7 psi. Doesn't sound like much? Well 3.7 psi equals 533 pounds per square foot. And if *Slipper* were, say, an average 28-footer, she'd have about 480 square feet of hull surface. Net result: 255,800 pounds total force — about equal to a 128-ton hydraulic press! (In practice, pressures of 7 to 9 psi are common.)

At the other end of the spectrum, is the chopper-gun layup. What the builder does here is to blow small, short glass fibers mixed with liquid resin onto the surface of the mold with a special gun. This is then rolled down by hand. (The short fibers are called "chopped fibers," hence the name "chopper gun.") Since the fibers are short, run in

random directions, and laid down without precise thickness control, a chopper-gun-laid-up *Glass-Slipper* hull is less dense and weaker than a hand-laid-up one, and far weaker than one that's been vacuum-bagged. The attraction of chopper-gun layup is that it's quick and cheap.

Does this mean chopper guns are bad? No it doesn't. But, as always, you get what you pay for. Clearly, chopper-gun layups have to be thicker, and thus heavier, for the same approximate strength. And, even so, they still don't quite reach the reserves of strength and longevity that a good hand-laid-up hull has. Still, if cutting-edge performance is not a major factor, and getting boats out on the water inexpensively is, properly engineered chopper-gun hulls can fill the bill well.

The pros and cons

Knowing all this, we can assess the pros and cons of the three standard laminating methods. Hand layup is the industry standard. A properly hand-laid-up hull has a smooth, even surface inside and out and constant thickness throughout each specific region of the hull. The mechanical properties of the hull will be more than adequate for the large majority of vessels.

Vacuum-bagged laminates are denser, with less resin in proportion to the glass fiber reinforcement. Such laminates have better mechanical properties for the same thickness. Though this technique is not required for sound hulls, designers and builders can reduce weight, increase performance, or both, by using vacuum bagging. The vacuum bagging procedure can add some cost to construction (though often less than expected) and these thinner skins, particularly on sandwich construction, may become too thin for safety on smaller craft or high-speed vessels.

Chopper-gun layups are low cost and — since they have the highest resin content per weight — the weakest with the lowest mechanical properties. Chopper-gun layups are suited to mass production of hulls where weight and performance are not critical. Chopper-gun layups can also be used effectively

to fabricate internal and secondary components on otherwise hand-laidup hulls. Of course, these same parts would be lighter if they were laid up by hand or vacuum bagged, but the cost savings in production applications may be well worth this compromise.

Sandwich construction

Contrary to some common misconceptions, fiberglass is neither particularly strong for its weight nor particularly stiff; indeed, fiberglass is rather bendy. To compensate for this, many boats these days are laid up using *sandwich construction*. Such vessels have cores of end-grain balsa, closed-cell foam, plastic honeycomb, or plastic-impregnated paper honeycomb. In areas of high loads, cores may be of plywood or solid wood with thin fiberglass skins inside and out. This is excellent

“The proper core-installation procedure is to lay up the outside skin, then lay down a wet, resin-rich layer of chopped strand mat, and squish down the pre-coated core onto the still-wet, resin-soggy mat.”

construction if properly engineered. It increases stiffness without adding weight and — as a bonus — adds built-in insulation.

Core installation

While on the subject of cores, it's important to note that any of the closed-cell foams from major manufacturers is acceptable. End-grain balsa core is also extremely good. Indeed, it currently provides the highest stiffness for the lowest cost of any core. The critical thing is that the balsa core must be pre-saturated with resin before layup. If it isn't, when the first layer of fiberglass mat is applied against the new *Glass Slipper's* core, the dry balsa will wick away the resin, and this will lead ultimately to a core-bond failure. *This is a really big problem, and frequently uncorrectable.*

A good bond

The proper core-installation procedure is to lay up the outside skin (inside the

female mold), then lay down a wet, resin-rich layer of chopped strand mat, and squish down the pre-coated (or pre-saturated) core onto the still-wet, resin-soggy mat.

Since hulls have compound curvature, almost all cores (balsa and foam) come in sheets cut with kerfs into little squares, which in turn are bonded to a thin, flexible (usually light fiberglass) binder sheet. These kerfs are necessary if the core sheet is to bend and mold into the hull shape. When installed, however, the kerfs also spread open, leaving small voids running along the core. It's *critical* that these kerfs be filled with as much resin as possible. For both balsa and foam, the best procedure is to drape the core sheets over the edge of a barrel so the sheet flexes open in two planes. This spreads the kerfs so the builder can spray (hot coat) the core with resin with maximum penetration into the open cuts (kerfs).

Prepared and pre-coated like this, the core must be rolled down hard by hand while both the core and soggy mat are still wet. The purpose of the resin-rich squishy mat in conjunction with the pre-coated core is to ensure a good bond between the skin laminate and the core and to squish as much resin up into the core's kerfs as possible. Properly done, this procedure will produce a very sound, long-lasting hull.

Some companies manufacture special core-bond putties to be used in place of the wet mat. These putties are applied or troweled onto the hull and the pre-coated core. Next, a vibrator is used on top of the core to help further press the core down on the putty and to work as much putty up into the core kerfs as possible. Core-bond putties can be used instead of the resin-rich mat as specified by the core manufacturer. Correctly applied, such putties are excellent, but the builder *absolutely must* use either resin-rich mat or a proper dedicated core-bond putty between the core and the skin laminates to ensure a proper bond. You cannot *ever* use ordinary Bondo or some home-brewed putty for core bonding.

In a female mold, the core kerfs are almost always laid down with the kerfs facing the mold, however, the builder

must still use either resin-rich mat or putty between the core and the inside skins as well. It cannot be overemphasized how critical careful attention to detail in bonding and installing cores is to a successful hull.

The very best method of bonding a core to a hull is to vacuum bag it — even if the rest of the laminate is not vacuum bagged. Most builders report virtually no additional labor in vacuum bagging cores. At the same time, vacuum bagging presses the core down onto the skins with the maximum pressure attainable and sucks resin up to fill all the kerfs nearly 100 percent with resin.

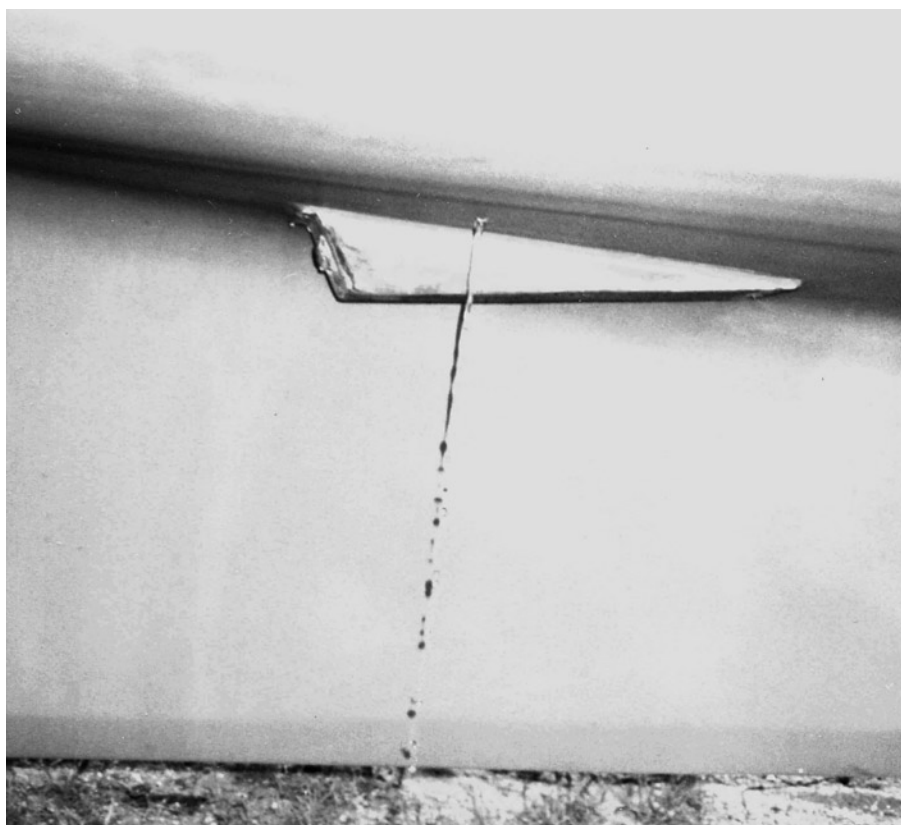
Core failures

Virtually the opposite of high-quality, hand-layup, FRP with foam core, or pre-saturated balsa core, are the inexpensive chopper-gun boats with balsa cores in, say, their transoms as stiffening for the outboard mount.

Again, the only, *and I do mean only*, way to get a good bond between the fiberglass layers and the balsa core is to press down hard — hand rolling or vacuum bagging. Chopper-gun spraying, even after rolling, applies less reliable and predictable pressure.

What's worse, such boats — built in small shops — are often constructed on a lean budget and tight schedule. The builder will be tempted to skimp on (or even ignore totally) pre-saturating the core.

What with the engine-mount fastening gear and the continuous engine and prop vibrations, it's not a question of whether the transom and core will fail but when. I've seen instances of boats with such construction in the shop for repairs. When the transoms were taken apart — often you could peel them open with your fingertips — the rotten balsa inside resembled nothing so much as congealed, decaying pea soup. It's this kind of third- or fourth-rate construction that's given balsa a questionable reputation in some circles. Such a reputation's undeserved. Balsa's one of the very best cores if it's been installed correctly. (The proper chopper-gun transom core, by the way, is marine plywood carefully pre-saturated with three coats of polyester resin *before* it's laid in and sprayed up or chopped over.)



This 34-foot foam core hull was ruined by improper core bedding. All this water was forced into the boat through improperly sealed fasteners. When the boat was hauled, more than 20 test holes drilled in the hull leaked like this.

Water-filled cores

Similarly, I've seen boats that were hand laid up with foam cores using ordinary auto-body Bondo as core putty with no mat and no core pre-saturation or hot coating. One of these vessels, a 34-foot fishing boat, leaked through an improperly bedded spray strip. Water was forced, under pressure, so effectively through the screw holes and into all the open channels left by the unfilled kerfs that nearly the entire hull shell — from keel to sheer — was filled with water. When this boat was hauled out, water literally shot out of holes drilled in her bottom. One hole alone filled a one-gallon coffee can three-quarters full in just a few minutes. This was a new boat, and she was never fully repairable. None of this would have happened with proper core-bonding procedures.

Avoid excess resin

Although the mat layers between the cores and the skins should be resin-rich and squishy, this is the *only* place a layup should be soggy. The *sole* way to get a strong, light layup is to use just

enough resin to get a thorough wet-out and a good bond — *not one whit more*. Again, the more fiber used in proportion to the binder, the stronger the laminate. Any additional resin actually reduces strength. Strangely, some builders don't know this. Whether you're designing or building, it's vital to keep this principle in mind.

Traditional glass laminates

Since fiberglass was introduced for hull construction in the late 1940s and early 1950s, there have been just three "standard" fiberglass materials, all commonly composed of E-glass (ordinary electrical- or construction-grade fiberglass). They are:

- **Chopped strand mat (CSM)** — This is frequently known simply as "mat" and is literally that. Strands of glass fibers are chopped into short pieces (about 1/2 inch to 2 inches long) and mashed together with a temporary binder called a sizing. The result is a mat-like material. Because the fibers are short and run every

which way, it's not particularly strong; however, it's fairly easy to wet out, and — because it's soft, thick, bulky, and somewhat sponge-like when wet — it's good for bonding to layers of other types of glass and cores. For this reason, the most common way to lay up a hull is with alternating layers of mat and woven roving.

- **Woven roving** — This is a heavy, coarse fabric literally woven from bundles of glass fibers. Since the fibers run for long lengths in two specific directions (at right angles to each other), woven roving forms a strong reinforcement. In fact, an all-roving laminate can be nearly twice as strong, for the same weight, as the standard combined roving-mat laminate. It takes great skill and attention to detail, however, to produce a high-quality, all-roving layup. Without soft spongy mat between the roving layers, it's difficult to make the comparatively hard, flat plies of roving stick to each other reliably. Since the combined-roving-mat layups have proved adequate for ordinary boats, very few builders go to this extra expense.

- **Fiberglass cloth** — True glass cloth is also quite strong. It is almost exclusively used in small boats and for finish work, though, because it's fairly expensive. Unlike woven roving, glass cloth has a very fine weave, not dissimilar to the fireproof fiberglass curtains you can get in department stores. Glass cloth is often used as a surface layer to smooth out the roughness of mat and woven roving. For instance, a single layer of glass cloth on the inside of a hull makes a nice smooth finish. Accordingly, lightweight fiberglass

cloth is sometimes termed “finishing cloth.”

Standard polyester resin

The most common resin for fiberglass construction is ortho-polyester resin. The liquid polyester is mixed with a catalyst and an accelerator to produce a chemical reaction chemists call polymerization. Boatbuilders — being practical — just call it curing. What this all means is that the molecules in the plastic interlock with each other to form a very rigid unit. Ideally, the whole hull (or at least its plastic part) is just one long-chain (interlinked) molecule. If you visualize this giant “molecule” wrapped around all that glass reinforcement, you get an idea why glass boats work so well.

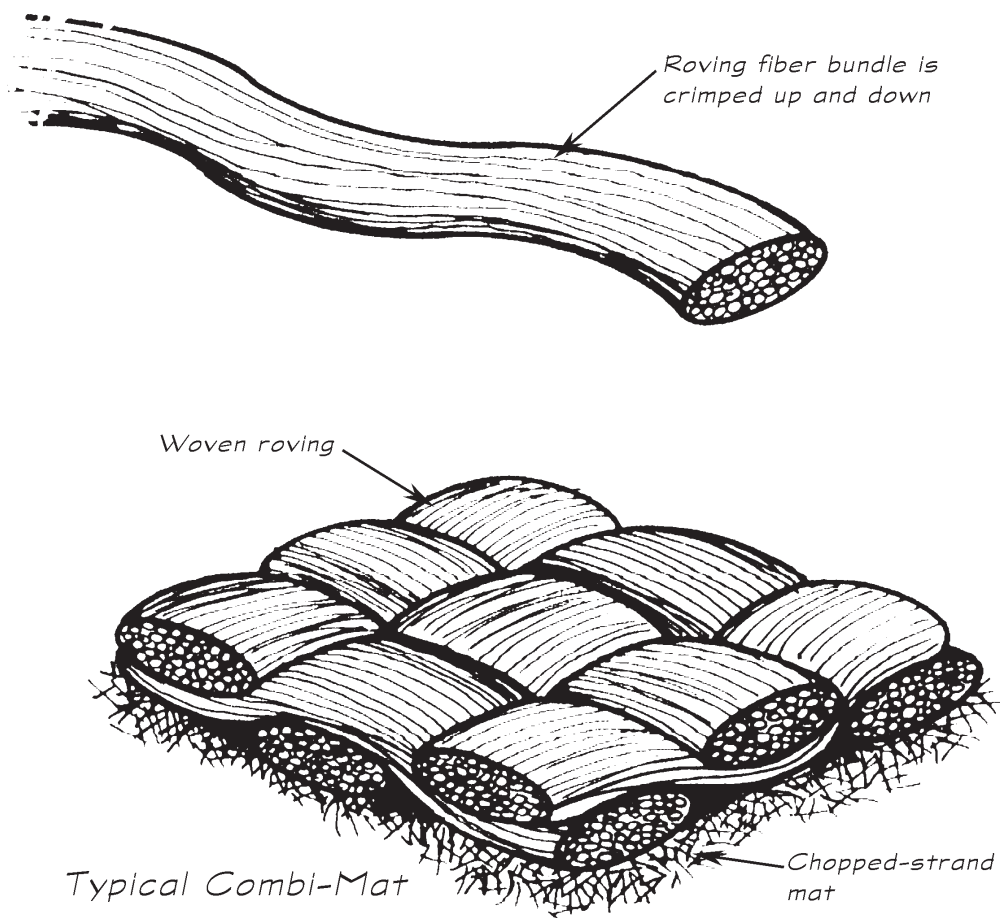
MEKP — the catalyst

Although there are a number of catalysts available, the most frequently

used is methylethylketone reacted with hydrogen peroxide or MEKP. This is tricky stuff. It's highly corrosive, and if it touches your skin you'd better wash quickly. Even more exciting, MEKP is rather volatile. In fact, if the accelerator used to speed up the curing process were to come in direct contact with the MEKP, you could get an explosion and certainly a fire. Accordingly, most polyester resins used in boatbuilding come with an accelerator already mixed in.

Standard layup

As we've seen, over the past 40 years or so, the standard, plain-vanilla hull layup has become alternating layers of woven roving and chopped strand mat. As with the core, the mat between roving layers produces better adhesion between layers (a better interlaminar bond) but, except at the core, the mat shouldn't be any wetter than absolutely



Artwork courtesy of Burnswick Technologies, Inc.



A clear view of the robust, smooth continuous bulkhead tabbing on the Cape Dory 40.

necessary. Most frequently, builders will purchase this combination already stitched together — a woven roving with a mat stitched or glued to it. Such fabrics are often referred to as “fab-mat,” “bi-ply,” or “combi-mat.” They save labor in construction by allowing the builder to apply the two layers as one.

The fiber-to-binder ratio is called the “glass-to-resin ratio,” or “glass content” and for standard hand layup, using alternating layers of woven roving and chopped strand mat, it is about 35 percent by weight. For an all-mat layup, the glass content is about 28 percent by weight, while for an all-woven-roving layup, the glass content or ratio is about 40 percent by weight. Again, it’s important to note that the higher the glass content (the glass-to-resin-ratio), the higher the laminate’s mechanical properties (the greater its strength).

Plywood bottom framing

One fairly common way to reinforce the interior of a hull is to install a framework of longitudinal and transverse plywood panels across the hull bottom. These plywood bottom stiffeners and frames are sprayed with several coats of resin. Then they are tabbed in place to the bottom of the hull, and the whole — both tabbing and ply — are usually sprayed with a finish coat of gelcoat. This method is proven and works. It is common on many smaller production powerboats.

I prefer cored framing because its wider forms spread loads and reduce stress concentrations. Further, there is no partially exposed plywood (not covered all around with FRP laminate) in the bilge, where small scratches and cracks can permit water penetration and potential long-term degradation.

Engine beds

Engine bearers or stringers have to be long and continuous. The bigger and more powerful the engine, the longer

and stronger they ought to be. This is particularly true on fiberglass boats. Fiberglass is plenty strong in tension; it has high tensile strength. But it is very low in stiffness; its flexural modulus is low. This is why decks on many fiberglass boats will flex slightly as you walk on them. They’re strong enough to support your weight, but they bend as they do it.

Too much flexure, though, is bad news for any structure. Sooner or later, cracks occur. As the flexing continues the cracks grow, and you have a true structural failure.

To generate sufficient stiffness, engine beds on FRP boats thus have to be particularly deep, wide, and long. On most glass powerboat hulls, the engine stringers should run the full length of the bottom. On sailboats, this is a good idea, but not required. The beds should be a minimum length of twice the distance between the fore-and-aft mount spacing, unless they end at bulkheads. If they don’t end at bulkheads, the beds should be tapered at their ends. It’s also very important that these stringers be shaped in smooth or evenly tapered contours. Sharp corners and hard spots concentrate loads and aggravate vibration, increasing the chance of structural failure.

A proper engine mount should use heavy steel or aluminum angle, through-bolted to the FRP engine stringers and running continuously the full fore-and-aft length of the engines, on either side. A good rule of thumb is to fasten each angle to the stringer with four bolts, whose diameter in inches is: *bolt diameter (in.) = engine weight (lb.) divided by 4,000. No bolt should ever be less than 3/8 inch.*

If the angles are of aluminum, they should be about the same thickness as the bolt’s diameter. If they are of steel, the angles should be about three-quarters of the bolt’s diameter. The engine mounts should then be bolted to this angle. This system further spreads the loads along the engine beds to reduce flexure and stress concentrations. Even though wood is much stiffer for the same weight than fiberglass, wooden boats require much the same reinforcing at the engines. Long continuous engine beds or stringers are fundamental to sound hull structure and smooth-running boats.

“A good rough rule for both fiberglass and wooden boats is that the width of each engine bed or stringer should be at least 1/40th of the overall beam of the hull, and at least this same height for most of the length of the bed.”

The basic engine beds should be wide and deep. In fact, a common mistake some builders make is to build their engine beds deep (high) but narrow. This concentrates the loads from the engine beds along several narrow strips down the length of the hull. On small lower-powered fiberglass craft, you can get away with this, but as you move up to larger diesels — engines that deliver real torque and plenty of power — you have to be sure to make the engine beds wide to spread the loads even more.

A good rough rule for both fiberglass and wooden boats is that the width of each engine bed or stringer should be at least 1/40th of the overall beam of the hull and at least this same height for most of the length of the bed.

From engine mount to engine mount, the stringer height should be at least 1.5 times its width. In fact, the deeper the better, assuming you have the space. (At the deeper engine stringer section, where the angle fastens, a fir or solid plywood core should be installed to provide a stronger bearing surface for the mounting bolts.) On a twin-engined, V-bottom hull the outboard stringers are the factor controlling depth. Because the hull is shallower here, the stringers are at their lowest. The inboard stringers are usually quite a bit deeper than the 1.5 times rule.

On a wooden boat, these stringers are simply made of solid timbers notched over the floors and bolted securely in place. (They shouldn't touch the inside of the planking, in most cases.) On a fiberglass boat, the strongest and easiest stringer to fabricate is a foam-core “hat”-section stringer. Foam blocks are easily cut to shape and glued to the bottom inside of the hull. Foam fillets should be glued to the corners of each stringer along both sides where it meets the hull to spread the load even further

Numerous bulkheads add strength to this Cape Dory 40. All are well tabbed in, and all the wood is sealed.

and to avoid a hard corner in the glass laminate. Then the builder should apply a laminate (about equal in thickness to the boat's length overall (LOA) in inches divided by 1,600) over the entire foam stringer assembly. At the higher stringer section — around the engine itself — the stringer laminate should be increased in thickness to about equal the LOA in inches divided by 1,200.

This stringer laminate should run out onto the inside of the hull, on either side of the stringer, for about the width of the stringer. What's more, the stringer laminate, where it lies on the hull, should be tapered away, in progressively fewer layers of glass, so it ends in a feather edge — again reducing stress concentrations and hard spots. A hull laid up with stringers like this and following basic rules for fiberglass hull layups, will last a lifetime without giving trouble.

Avoid hard spots

Because fiberglass is quite flexible or bendy, and because most fiberglass layups are also fairly thin, they can flex

repeatedly. This happens especially at hard spots, tight bends, machinery mounts, bolt and fastening holes, and so on. It's vitally important that large backing plates be employed to spread out loads.

It's also important to use extended tabbing/bonding areas to fasten stringers, bulkheads, and other attachments and to gradually taper all transitions in laminate thickness throughout.

It's also critical that all corners in the laminate and in secondary bonds be made with a radius or fillet. Fiberglass laminates do not work well with hard sharp corners. The builder must use foam or balsa fillets or putty-grout fillets to round over any layup making a sharp inside turn. This is equally true for a transom corner, a stem, tabbing a bulkhead or stringer in place, or bonding in machinery or tank flats.

Core tapering

Since cored fiberglass laminates are even thinner than solid laminates, spreading loads and avoiding hard spots is — if anything — more important. Indeed, the Coast Guard and ABS require that the transition from a cored area of the hull to a solid, uncored area be done gradually with an angle or slope in the core.





This secondary bond failed when yanked on with one hand. The builder didn't pay attention to getting a good secondary bond and didn't fillet the corners before tabbing.

Careful timing

On properly manufactured fiberglass craft, the hull is laid up in one continuous process, with no more than 16 hours (less is better) between applying layers.

A still better rule is that no more than twice the resin's gel time should be permitted between the application of each successive layer.

The resin in each subsequent layer then forms crosslinked chemical bonds with the preceding layer. If this is done, all of these layers, more or less, cure together to form a single unit locked together in a *primary bond*. Of course, bulkheads, stiffeners, and interior structure have to be added later — after the hull proper has fully cured. The tabbing that attaches such items to

the inside of the hull makes a *secondary bond*, which is never as strong as any primary bond. (There is little significant chemical cross-linking.)

Clearly, this is unavoidable. Happily, it's also perfectly OK; however, the builder must take proper steps to get a *good* secondary bond. The area to be bonded must be ground slightly (roughed up to produce a good "tooth" to glue to), vacuumed clean, and then wiped down and cleaned of oil with acetone or styrene. (Styrene is preferable when bonding to laminates that are more than three months old; it softens the old resin more for better secondary adhesion.) Only then can the tabbing/bonding be wet out, rolled, and pressed down. Most builders use ordinary polyester resin for all laminating, including critical secondary bonds.

Again — if done with care — this is fine; however, a few of the finest builders use vinylester resin for all structural secondary bonds. Vinylester yields still stronger, longer-lasting secondary bonds.

What if these basic secondary bonding steps aren't taken? The photo at left shows a boat that came to one of my builder's shops for repairs. (They did not build this boat.) This vessel had literally started to come apart in a storm. The bulkhead/stiffener panel pulled out when it was yanked on with one hand. Not only had this builder neglected to prep for good secondary bond, but — as you can see — he didn't use foam spacers or even fillets to ease the radius at the corner of the tabbing.

Avoid naked wood

Solid wooden or solid plywood cores are frequently used in fiberglass hulls. Also, wood cleats and panels are almost always found in the interior, whether supporting machinery or for joinerwork. For structural woodwork (as opposed to interior cabinetry) there must be *no bare wood in the boat* — period! Every single piece of wood simply must be sealed. If it isn't, not only can it rot but, worse still, it will expand and contract from the constant moisture changes found on any boat. In time — sometimes an amazingly short time — this will cause the wood to split and to separate away from the FRP structure — bad news indeed.

Usually, wood that's otherwise exposed but is in contact with the glass structure should be coated liberally with resin and sprayed with gelcoat. Unless you've got a good eye, it can even be hard to spot timber that's been so treated. If the wood's not partially laminated or structurally fastened to the glass structure, it's OK to set it in marine bedding compound and seal it with Cuprinol or to paint it — but coat it with something, coat it all around, and coat it well.

Avoiding print-through

Print-through is the term used to describe a smooth-finished surface that's been marred by the weave of the underlying fiberglass reinforcement showing as distinct ridges. The usual layup procedure is to wax the inside of the female mold then spray it evenly with a gelcoat 20 to 30 mils (20 to 30 thousandths of an inch) thick. (More than 30 mils is prone to crack, and less than 20 mils is too thin for adequate coverage and surface quality.) Gelcoat is high-quality resin pigmented to the color desired for the surface finish. The gelcoat is allowed to reach partial cure (about three to four hours, depending on the resin system). Next, a layer of mat is laid down on the partially cured gelcoat. This is known as the skin coat.

For most vessels longer than 25 or 30 feet, the skin coat is 1- to 1 1/2-oz./sq. yd. mat. For boats less than 25 feet, the skin coat is usually 3/4-oz. to 1-oz. mat. The mat skin coat is allowed to cure fully (usually overnight), then the remainder of the structural laminate is applied. Again, on vessels longer than

30 feet or so, this next layer is usually another 1- to 1 1/2-oz. mat, while on vessels less than 25 feet, the next layer is usually 3/4-oz. mat. The purpose of the mat is to eliminate the print-through — showing the rough weave or the structural reinforcing cloth behind it (usually roving). Mat accomplishes this because it's soft and squishy with a high resin (or low glass) content.

Most builders will try for a total of 2 oz. of mat (or a bit more) between the gelcoat and the balance of the structural laminate (3/4 oz. to 1 oz. on vessels less than 25 feet). This is necessary but unfortunate because — as we've discussed — the mat is relatively heavy and weak. You must allow for this mat skin on most average design laminates, however. A factor to keep in mind is that the finer the weave of the structural cloth, the less it will print through. Thus, some of the light stitch-mat styles can use somewhat less mat in the skin coat. Alternately, if most of the laminate is standard 24-15 fab-mat (24-oz. roving plus 1.5-oz.

mat), you could make the layer immediately under the skin coat of 14-oz. roving. This, too, would help reduce print-through.

When the resin cures, it generates heat. This is a natural product of the chemical reaction, which is an *exothermic* reaction, meaning simply “gives off heat.” Many builders refer to the heat as *exotherm*. The greater the heat or exotherm during cure, the more the laminate will shrink when it cools down after cure. This shrinkage aggravates print-through. Accordingly, print-through can also be reduced by using the slowest-cure resin mixture practically permissible, by keeping the initial layup skins thinner, and by keeping the entire shop cool to reduce temperature overall. All this is truly a delicate balancing act, and it's critical that the resin manufacturer be consulted as to the best procedure for the exact resin system and formulation you are using.

Final judge

All the processes mentioned in this article have evolved over 30 years or more and constitute what we now believe to be the best methods of building and strengthening fiberglass boats. Your good old boat was probably built this way, and the mere fact that it's still going strong, like many thousands of others of its age, must prove that these boatbuilding methods really work well. Time, after all, is the final judge.



A total secondary bond failure. This builder tabbed uncoated wood beams to the hull without any prep, mechanical fasteners, or fillets.

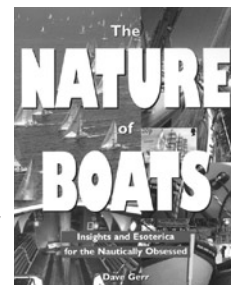


Naked structural wood next to poorly laid up roving tabbing. You can see the crack between the wood and the FRP already. It will only get worse.

Dave Gerr is a naval architect based in New York City. His firm — Gerr Marine, Inc., founded in 1983 — designs a wide variety of yachts and commercial vessels. Dave is contributing editor for several boating magazines and is frequently published in many nautical periodicals.



This article was excerpted from two of Dave's books. It is primarily from his newest, *The Elements of Boat Strength*, just published by International Marine/McGraw-Hill. The material on engine beds comes from an earlier book, also published by International Marine/McGraw-Hill, 1992, *The Nature of Boats*. Gerr is also the author of the well-known *Propeller Handbook*.



End the “dinghy

Dinghies are a mixed blessing. They are a “must” for cruising, allowing you the option of anchoring out in a quiet cove or in a busy harbor when all the docks are full, and they are wonderful for entertaining the kids in a quiet anchorage. A dinghy also makes cruising safer, since you can use it to carry out a second anchor on a windy night, or to kedge your cruiser off, if she is not too inexorably grounded.

However, finding a good dinghy that meets your needs and desires is no simple task. An ideal dinghy in our view was one we could sail, row, or tow, while being stable but still fairly lightweight. It also had to be narrow enough to fit on our 32-footer’s foredeck. (As a good old boat, she’s not

It’s quick and inexpensive to stitch together the one that suits you best

too beamy.) We soon concluded that the only way to get the dinghy we wanted was to build it ourselves.

Where and how to transport the dinghy while you’re under way is a common cruisers’ dilemma. Small mother-ships all too often lack space to carry a dink on board. Towing it leads to frayed painters and nerves

and the occasional embarrassment. More than one cruiser has managed to wrap a prop shaft up in a lovely bundle of dinghy painter while working into a strange harbor.

Limited deck space, especially on good old boats of 30 feet and less,

prompts many sailors to opt for inflatables. These skippers reason that their blow-up boats can be easily deflated and stowed compactly. The only thing is, they usually aren’t. It’s too much of a pain to disassemble and re-assemble the

darned things every day. So they end up dragging astern just like hard dinks.

Inflatables have a couple of drawbacks, too, when compared to rigid dinghies. In my opinion, the worst is their utter dependence on outboards. In anything more than a light breeze, your standard inflatable rows like a wet noodle. The stubby little oars are so short you can’t manage more than a dainty little snatch at the water with the oar tip at best. And the bulky blow-up boat presents ample sail area to the wind, making manual propulsion in anything more than a light breeze problematic at best.

Build your own

One solution is to customize your own dinghy to fit the available deck space aboard your cruiser. With new materials and techniques, even amateur carpenters with five thumbs can manage a fairly serviceable and completely watertight dinghy. Thanks to epoxy and fiberglass cloth, it should prove fairly durable, too, given normal usage. And those assorted sticky-goos and cloth coverings allow you to slide by with something far short of the perfect bevel. Three or four winter



Susan’s first homebuilt dinghy fit on the afterdeck and boomkin of her 23-foot sloop, Ariel. She says, “I carried it back on the boomkin (well lashed) in some fairly rough water. Once in a while, when we heeled, the ends would dip in, and the dink would try to launch itself. The roughest crossing we ever made with it on deck we had a few honest seven-footers. We were on a beam reach to a close reach, and the dink behaved fine. The biggest problem was on a run with following seas and heavy rolling.”

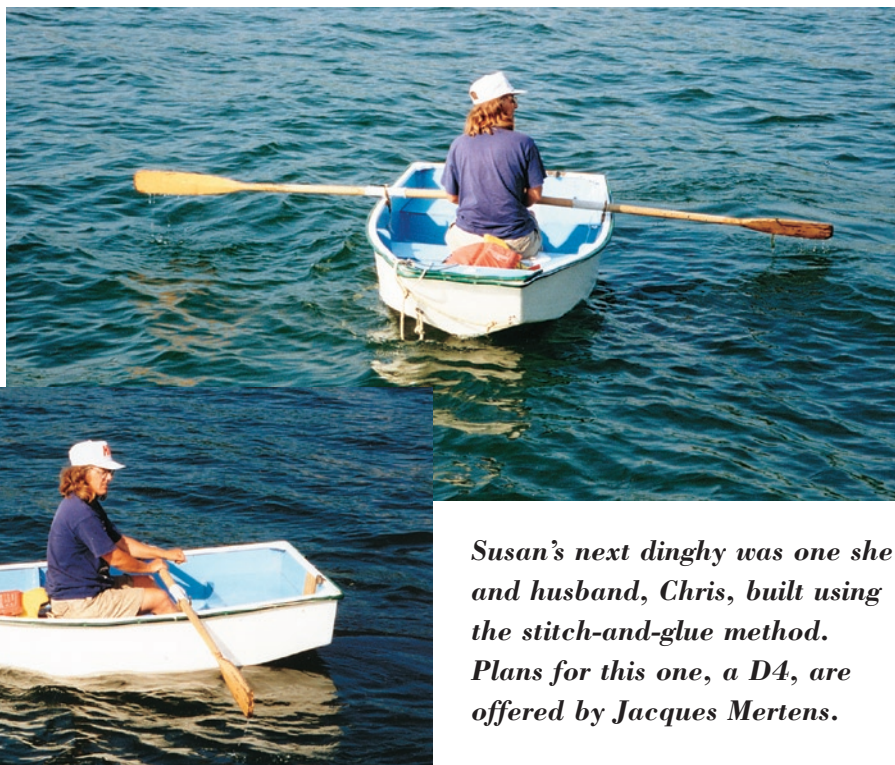
dilemma”

weekends in the basement with a minimal tool kit (that should include a circular saw and an electric drill for speed's sake) will produce a very serviceable custom-made plywood dinghy.

My first custom-fitted dinghy was an Itty Bitty pram (shown at left), designed many years ago by master naval architect William Atkin. He wrote that, inch for inch, you get maximum carrying capacity in minimum space with the basic boxy pram. By flaring the sides outward sharply, you gain additional carrying capacity and stability in a very small dink. Putting as much rocker as the quarter-inch plywood will tolerate greatly improves rowing performance and seaworthiness of prams.

I built my tender several inches narrower than the usual beam of most production dinghies. This allowed me to jam the 7-foot 7-inch pram onto my 23 footer's afterdeck and boomkin, between her rudderpost and backstay. If a small tender is still too big for available deck space, another alternative is to build a two-piece dinghy. Each piece is a discrete watertight entity, and each will float independently. By joining the two halves with a latch or hinge arrangement, you end up with a more-or-less regular-sized dinghy. (Phil Bolger carried this folding boat idea to an extreme a few years back with his folding 30-foot schooner.)

“In anything more than a light breeze, your standard inflatable rows like a wet noodle”



Downloaded plans

Thanks to the rise of the stitch-and-glue technique so well promoted by Harold (“Dynamite”) Payson and others, almost anybody can craft a watertight dinghy. This was the method we used recently to build the dinghy pictured above. We used plans

downloaded off the Internet for a tender called the D4 Dinghy, whose creator supplied dimensions for the bottom and side panels of plywood. This eliminated any tricky lofting steps. The D4 tender plans were developed by Jacques Mertens, who operates a website called Boat Plans Online. Mertens has been selling marine supplies and books online since 1986, when he operated from a bulletin board via Fidonet. Today, he offers plans for several small tenders, including the D4, whose plans were downloaded by more than 80,000 people last year.

Susan’s next dinghy was one she and husband, Chris, built using the stitch-and-glue method. Plans for this one, a D4, are offered by Jacques Mertens.


After cutting out the sides and bottom of plywood and the stiffening athwartships bulkheads, the stitch-and-glue method of building requires that you drill approximately two million holes, spaced about three inches apart, near the edges of adjoining plywood pieces. Then you stitch your boat together, using bits of copper or steel wire three or four inches long. We twisted the wires together on the outside, giving the developing dinghy a distinctly prickly aspect. The next step was to build up a fillet of epoxy putty along the inside joints between the bottom and the sides and the bulkheads. A light bulb worked well for shaping and smoothing the fillet of putty.

After this had set up, the developing hull was quite rigid. We then clipped the excess wires off the outside and faired out the joints externally with more putty before applying 3-inch biaxial cloth tape on the seams for strength. The seams were glassed on both sides and now, even with just two bulkheads in place, the developing dinghy hull was stiff and strong.

Prone to checking

Ultimately, we also covered the entire plywood exterior with a fine-weave, 3-ounce cloth to increase the dinghy's durability. We also tried to seal all exposed edge grain with epoxy resin. Fir plywood is very prone to checking and weathering, and we thought that covering the dinghy's bottom and sides might extend its life as it sat upside down through the summer. My previous pram of painted plywood had to have a new bottom installed after only four years of daily use to and from a mooring and being left upside down on the dinghy float between trips. The

epoxied and painted stitch-and-glue hull has weathered well to date after a full year of upside-down exterior storage.

The finished D4 pram proved highly satisfactory as a tender and sailing dinghy. I found it more stable to step down into than a friend's Dyer dinghy, and it seems to tow well in a Lake Ontario chop of up to, perhaps, four feet. Best of all, when it gets really rough, we don't have to tow it because it will fit on our foredeck. 

Susan Peterson Gateley (featured in the January 2000 issue of Good Old Boat)

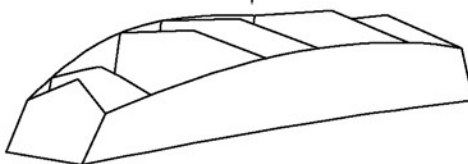
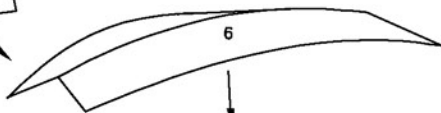
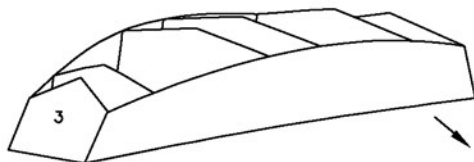
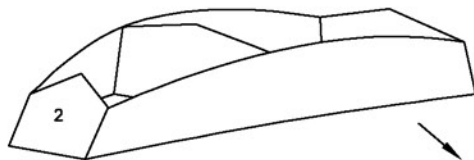
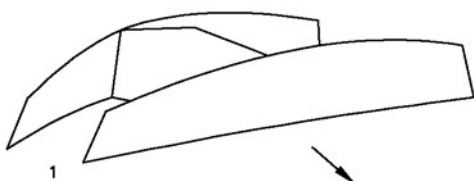
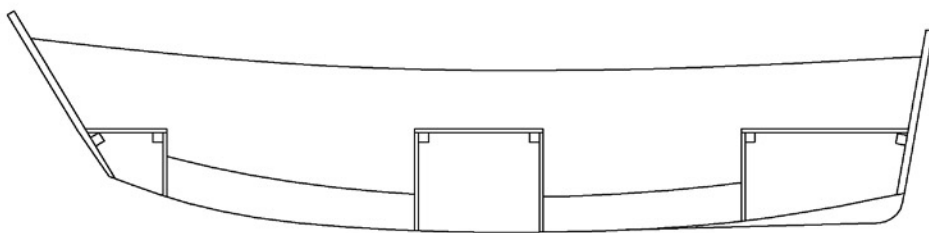
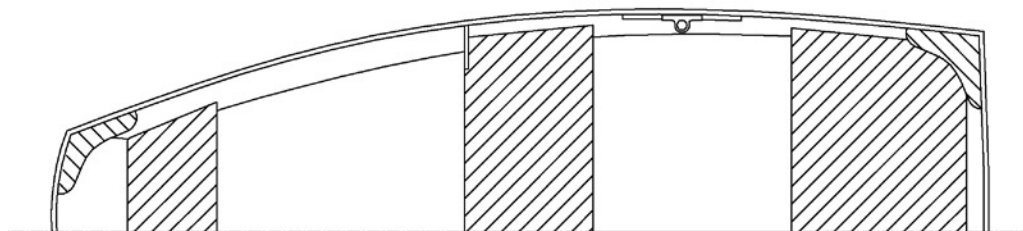
has written two books about boats she has known. Ariel's World and Sweet Water both feature her good old 23-foot 1930s vintage homebuilt sloop. She now sails Lake Ontario with her

husband, Chris, on Titania, a 32-foot Chris-Craft, and gives sailing lessons with a Lippincott Lightning. Both are circa 1968. Visit Susan's website at <<http://www.silverwaters.com>>.



For more on the stitch-and-glue method of boatbuilding, email: Jacques Mertens at jmg2@aol.com or visit his website at <<http://www.bateau.com/>>. The postal address is Mertens-Goosens Inc., 2032 Old Dixie, Ste. 3, Vero Beach, FL 32962.

The book *Building New Instant Boats*, by Harold Payson, also contains information on stitch-and-glue building. It's available through Jacques' website.





Restoration relived

Cozying up your cabin

*Allied Seabreeze 35 refit: Make your refuge from the elements
a place in which you're happy to spend time*

Your boat's cabin is your refuge from the elements. It's where you spend the quiet evenings relaxing with a favorite book or waiting out the fog with game after game of cribbage. Many good old boats are going strong, and many will be taking us wonderful places for years to come, but their interiors are often looking the worse for wear. While the obvious thing to spruce up the old girl is a slick and expensive topside paint job, it seems a lot of boats never really get the same degree of attention down below. Updating the interior is something we do for ourselves, not just for dockside admirers. Modern laminates are a viable, inexpensive solution for upgrading the dark surfaces of older fiberglass boats.

Step below aboard the average production yacht built in the early era of fiberglass. It is evident that builders were conscious of a certain chilling quality of fiberglass. Their solution was to revert to an age-old material that dependably conveys a feeling of warmth: wood. They built a boat from test-tube materials and then turned to mother nature to hide their handiwork.

Because they loved their modern materials, they primarily used laminates with a wood-grain appearance. Formica is one brand of decorative high-pressure laminate, which, like Kleenex, has become a generic term.

Interestingly enough, Formica largely comes from trees. It's basically made of paper and a binder with a top layer of decorative plastic, all laminated together under high pressure. It's relatively cheap, not terribly difficult to work with, easy to care for, and so durable it seems to last forever.

by Art Hall

However, what looked good to builders in the 1960s unfortunately doesn't necessarily thrill us today. If some manager was partial to pea green, you're stuck with pea green. The most common pattern you'll find is an attempt at teakwood grain, which turns many cabins dark and gloomy.

A few years ago, we purchased an aging Allied Seabreeze 35. Naturally, we consider her one of the best looking boats of her size and type. She's got just the right bounce to her sheer, long overhangs, low freeboard, and a traditional transom with just the right amount of rake to it. (*More on this*

Allied Seabreeze in September 2000, when she will be our feature boat. -eds.)

We're delighted with her outward appearance, but down below she was a cave. Virtually all the bulkheads and cabinetry were covered with teak-grained laminate. The table and countertops were a light, textured pattern and actually quite attractive but, like the other surfaces, were showing the wear and tear of 35 years' use. While the laminates may have looked passable when new, after three decades they were decidedly faded. They were also riddled with screw holes from every gadget marketed to the boating public. (Why is it that so many old boats seem to have at least one of those tacky plaques reminding us about the ineptitude of the skipper?) To compound the problem, the solid teak trim had never seen a varnish brush and was blackened with mold spores. Drastic measures were necessary to brighten things up.

One relatively simple approach that has gained popularity is to properly prepare the surface and paint it with a high-quality polyurethane paint. This is fine if you have the patience to cut in many linear feet of trim. The newly



painted surface is still subject to nicks and dings, and you'll likely feel the need to re-paint in a few years. I figured that since the original laminate has lasted more than 30 years and was still firmly bonded, I should make use of it again. My objective was to overlay the original plastic laminates by bonding the new material directly over the old.

The tools required are neither too exotic nor too expensive. If you are handy enough to consider this approach, you probably have the usual collection of shop tools. The only special tools I purchased for the task were a high-speed laminate trimmer, laminate shears, and a set of Forstner drill bits. The high-speed trimmer and shears are available at your local Home Depot. This is also a source for the laminate, and they usually will have a modest selection of popular colors and patterns in stock. Generally speaking, you will have to make a special order of your selection. The Forstner drill bits are unique in that they produce a very accurate, flat-bottomed hole. They are available at good suppliers such as the Woodworkers Warehouse. (It is safer to order them through the mail, as I have discovered a personal visit can be a very expensive experience.)

To get a professional appearance, it is necessary to remove the existing trim. This allows you to cut the new laminate pieces a bit less than perfectly, so the rough edge will be covered when the trim goes back. Each

builder installed trim in his own unique way, and its removal is perhaps the trickiest part of the job. Trim pieces can often be removed by carefully getting a wide woodworking chisel under an edge and slowly working it loose. If it was installed with brads, you may want to drive them through the trim with a small-diameter nail set and then fill the hole afterwards.

If you find it has been applied with a tenacious glue, you may want to rethink the project. There will undoubtedly be some pieces that are screwed in with the screw holes bunged with a wood plug. The simplest way to remove the bungs without destroying things is to select the proper diameter Forstner drill bit, usually 3/8 inch, center it carefully, and drill out the bung down to the screw head. You may have to clean the old glue out of the screw slot with a fine pick to back out the screw. This method also prepares the hole for the new bung. It's entirely likely that you will break or damage several pieces, so be prepared to make a few replacements or glue up the remains with epoxy. Practice in an inconspicuous place on a piece that will be easy to replicate.

While the trim is off, take the time to sand and refinish it. My home has the good fortune to have the nearly perfect varnish shop. It is well lit and clean. It has doors to shut out airborne dust and a large, flat work surface. This same space reverts to its original function as a dining room for dinner parties and holidays. (I must add that my wife has attained sainthood status.)

A good brand of polyurethane varnish will stand up well for many years. Plan on a minimum of four coats, preferably six, to obtain a silky smooth finish that wipes down for easy maintenance. Gloss is traditional, but a satin finish is softer and more forgiving. (Many builders sold their boats with bare wood inside and out under the premise that teak doesn't require any finish. The truth is that finishing woodwork properly is very labor-intensive and would have driven up the cost of the new boat significantly.)

Cutting and fitting the laminate is done with laminate shears. These specialized scissors actually remove a 3/16-inch kerf of material so the sheet of laminate doesn't tend to curl, much as sheet metal will. I suggest you practice with smaller pieces and work up to the more difficult ones as you develop your technique. Always dry-fit the piece before gluing. Large complex

areas such as bulkheads are best laid out with a full-sized paper pattern.

The old laminate requires a little simple preparation. Once the trim is off, wash down the surface liberally with alcohol. This will remove waxes and oils that may be present. Then simply rough it up with some very coarse sandpaper to give it a bit of "tooth." Make sure that any old screws are removed. Run your hand over the area, feel for high spots, and make sure they are sanded off. Old holes, up to about one inch in diameter, need not be filled. The new laminate needs no special preparation other than assurance that no debris is on the surface to be glued. Any chips that get left behind in the glue joint can produce a slightly raised area.

The most common adhesive used for laminating is contact cement. I strongly urge anyone to use the new water-soluble neoprene-based products. They are much safer and easier to use and have the same bonding abilities as the traditional cement. If you have never worked with contact cement before, follow directions and keep in mind that you only get one chance to position the material. The laminate cannot be removed or shifted once it is applied. It's a good idea to get a helping hand to position the large pieces. After you have it in place, you can tap it down with a hammer and a piece of soft wood to make a complete bond. (The pros use a J-roller, but buy one only if you're a tool junkie. OK, I confess . . . I have one.)

Do not try to fit the material around openings such as drawers and lockers. Simply pretend they aren't there. After the laminate is in place, trim these openings with the high-speed trimmer. Wherever you have used the trimmer, whether on an outside edge or an opening, it is wise to soften the machined edge with a file or 120-grit sandpaper. The edge left by the trimmer is very sharp. Also check to see that the new laminate edge is flush with the old. Any material standing proud will be prone to catching and damage.

This is not a task that can be tackled in a couple of weekends. It makes a good off-season project or can be done piecemeal over the span of a few years. If you elect to do it over a period of several years, it's wise to purchase all the laminate stock you

will need, as certain colors and patterns can be discontinued. I chose to work with an almond color. It's been around a long time, it's bright without being stark, and it should be available for the foreseeable future. Styles that have patterns or wood grain must be oriented in a certain direction, causing significant waste.

When it comes time to replace the trim, you will find that it doesn't always fit quite right. This is because the laminate, thin as it is at approximately 1/32 inch, will cause the dimensions of some cabinetry to increase. This sometimes leads to narrow gaps at corners. I have found that by using tinted wood fillers, then varnishing, the small gap can be concealed. Good paint stores have a wide selection of colored fillers, putties, and crayons to choose from. Another source for a wood filler is to simply make a paste out of fine sawdust and your varnish.

This assures a perfect color match but tends to be a little harder to work with. If you drilled out old bungs with the Forstner bit, you can buy new bungs from most marine suppliers. I would suggest you purchase your own bung cutter, also available at Woodworkers Warehouse. (The rest of the world will refer to this as a plug cutter, but aboard a boat it's always referred to as a bung.) The advantage of having your own cutter is that you can match the wood species, grain, and color to match whatever project you're working on.

The Allied Seabreeze is a pedigreed class with renowned sailing qualities. The reputation she enjoys makes her an excellent candidate for the investment of time and money. The interior now has a new and larger feel, it is bright and easy to clean, and it will serve well for many years to come. I'm even looking forward to a day of fog and game after game of cribbage.

Art, a licensed chief engineer of steam and motor vessels of unlimited horsepower, is a lover of CCA-era "project boats." So far a Pearson Triton and an Allied Seabreeze

have seen vast improvements with Art's ministrings. He sails coastal Maine with his wife, Sandy, and two daughters.



The sea:



One mo

David Large tells us he was limited to high school art, but he was in architecture and later a fisherman, but the sea called. He bought a commercial fishing boat and painted the scenes he loved so much. Making model boats. Over time, he became more restrictive. He focused on one subject: his artwork was becoming more coastal waters, by celebrating the sea. He seized this chance to move beyond distance. The scenes, however, were. Besides a chance to view the sea, he created an index of schooner



Mariner's celebration

he's primarily a self-taught artist, since the art schooling he had was a few classes at Pasadena City College. His early work experience was in boat building and planning. It's not clear how a guy like this ends up as a commercial artist, but it happened to him, and before long he'd moved his family to Oregon where he started a fishing vessel and began chasing salmon and tuna in the summer and recreating in the winter. One-dimensional art was not enough; he also began painting. Over the years, David writes, salmon fishing became less productive and more dangerous, so he switched to offshore fishing for tuna until that became increasingly dangerous. Since tuna fishing is more successful, he switched to the much safer way to appreciate the sea: painting them with works of art. The irony is that his wife, a native of Montana, started the art operation there, and David now celebrates the sea from quite a distance. However, they remain in his mind. Visit his website at <http://www.seadragon.com>. In David's artwork, there's a further surprise for schooner sailors there: he's a sailor himself, a seadragon that verges on the phenomenal.

illustrations by David Large



A tale



Bob Drake photo

I'm sailing." As Bob Howe speaks those words, his eyes sparkle, and the grin common to born-again sailors spreads broadly across his face. Six years ago, the 54-year-old East Harpswell, Maine, resident stopped at a boat brokerage on a whim. He walked out owning a 1973 Tanzer 22. "The next day my business partner remarked, 'Oh, those are good boats,'" Howe says.

Tanzer Industries, Ltd., of Dorion, Quebec, built more than 2,000 of the one-design fiberglass sloops in Quebec, plus a few hundred in North Carolina and Washington, between 1970 and 1986. Each carries 222 square feet of sail (main and working jib) plus optional

A pair of tough mini racer/cruisers strut their stuff in Maine and New York

genoas and spinnakers. Below are a forward V-berth, a convertible dinette to port, a tiny galley, and a quarter-berth to starboard. Most owners mount a 5- or 6-hp outboard on the transom.

Once he had bought the Tanzer 22, Bob

Howe and his wife, Kathy, went looking for a lot along mid-coast Maine's

rocky wooded peninsulas, carrying a nautical chart to ensure the water would be deep enough for a mooring. "A very expensive dock" is what Bob calls the passive solar home they designed and built on the New Meadows River, three miles from Casco Bay.

A self-sufficient Mainer, Bob built a boat cradle, modified a low-bed, car-carrier trailer, and bought a double-wheel dump truck so he can launch and haul his 2,900-pound keel sloop from his neighbor's level yard, then tow it home. "Saves \$300 or \$400 a year," he says. "Besides, our mile-long driveway is so steep that the trucker who towed the boat down the first year said he would never, ever do it again."

To Bob's delight, his summers are free for sailing. (Most of his work as a health-care lobbyist at the Maine State Legislature occurs between January and April or June). He launches *Svoboda* (Russian for "freedom") in April, and often is the last one out sailing in November. Kathy is a nurse practitioner, so they sail together on weekends. Weekdays, Bob may sail his homebuilt Bolger-designed Gypsy. The Howes usually sail east, for Bob spent many summers exploring the nearby waters in



Bob Howe, above, sailing the Tanzer 22 he bought on a whim six years ago. Above, the boat is set for winter storage in Maine. At left, Kathy Howe enjoying a moment on the water. Svoboda, on the opposite page and on Page 45, is also enjoying her moments on the water.



a 13-foot wooden skiff with his daughter.

Annual cruise

Each August, Bob singlehands *Svoboda* to Penobscot Bay, Maine's fabled island-dotted cruising grounds. After Kathy completes a monthly clinic on Vinalhaven Island, they take off on their annual week-long cruise.

"It takes a while to get used to living on the boat together," Bob says. "By the second afternoon, Kathy enjoys sailing. By week's end, she wants to sail longer on a bigger boat." Since they usually try to do more than is practical, they often venture to outer islands, including Damariscove and less-visited Matinicus, 16 miles offshore.

Once, fog marooned them on Matinicus for two days, so they chatted with locals, attended the annual island-wide bean supper, and basked in the respect of fishermen because they arrived in little *Svoboda*. When Kathy pointed out their sloop to an island patriarch, he looked at the boat, then at her, and said, "That took courage."

At the end of Kathy's vacation, they leave the boat in Vinalhaven and drive home. Bob returns later to sail back. "It's an easy boat to singlehand, especially since I've added an Autohelm ST 1000," says Bob. "'Otto' makes my solo trips a lot safer." Unlike self-steering windvanes that follow the wind direction, the 12-volt battery-powered "Otto" has an internal compass to maintain the course Bob programs in.

Since Bob only raced once, in 1995, he disregards Tanzer 22 class rules about modifications. "I've put just as much money into upgrades as I spent on the boat originally," he says. "It's easy to get parts for my 27-year-old boat because John Charters, the class association vice president, runs a parts company."

Restricts movement

Bob added lifelines ("so I won't lose Kathy overboard"), a 130-percent genoa with Furler roller furling, larger winches, a traveler, a vang/preventer, a compass, a depth finder, a GPS, a boom tent, and a solar-powered vent

fan. He devised jiffy reefing for the mainsail and replaced the wiring and the four-fuse circuit panel with a seven-fuse panel.

All are successful except the traveler. "It restricts movement in the cockpit, so it's more trouble than it's worth," he says. "We aren't racing sailors who demand every last tenth of a knot."

Upkeep is simple — except when the coating pulled away from the iron keel. That required sandblasting down to bare metal, then priming and painting. Now all the boat requires is annual bottom painting.

"*Svoboda* is easy to sail, performs well, feels like a bigger, heavier boat and is very seaworthy," he says. "I don't know what it would take to capsize it. I had it over 40 degrees and never worried that it would roll farther."

Because they like to cruise overnight or longer, the Howes find the sloop's most serious flaw is lack of standing headroom. "It just isn't big enough for two to be comfortable on a long cruise or in bad weather. Also, the cockpit is large enough to sleep in, but if it filled, the water would pour below, and we'd be in big trouble."

Bob dreams of cruising the tradewinds some day in a larger, full-keel boat. He's learning to use a sextant and satisfies his offshore cravings on other people's boats. Twice, he's sailed from New York to Bermuda through Ocean Passage Opportunities, an organization that matches boats and captains with crew. In October last year, tropical storm Irene's 50-knot

winds and 25-foot seas pummeled the Beneteau 411 he was crewing on. Safe arrival in Bermuda ended the ordeal.

Bob prefers a previous winter cruise he took aboard a chartered 39-foot catamaran with two other couples in Tortola, British Virgin Islands.

Meanwhile, Bob sails *Svoboda*, usually with Kathy and sometimes alone. One December, he

rounded a nearby island during a slight snow squall while reading *Kon Tiki*. "Other things being equal, I like warm-weather sailing. But I was sailing in *December*, albeit with gloves on."

by Mary
Maynard Drake



Bob Drake

of two **Tanzers**



Bill O'Reilly in a quiet moment above. Dulse, sailing at right, on New York's Lake George.

As a teen, Bill belonged, along with his father, to a small Tanzer 22 fleet on mountain-rimmed Lake George. They both waited impatiently for the monthly class newsletter and enjoyed the camaraderie.

"Everyone participated in the low-key races," Bill says. "We had no spinnaker, so we'd race the two upwind legs only. When everyone popped their spinnakers on the downwind leg, we'd pull out our lunch bags and eat our sandwiches. We'd



Bill scheduled his summer classes (he's completing an MBA at Rensselaer Polytechnic Institute) on evenings and Saturdays, leaving weekdays free for sailing. They stay home weekends, Deborah says, because the boat is a 4-mph target for the powerboats, parasailers, and jetskis that zoom around Lake George's touristy southern end.

As they introduce their children to sailing, two-hour sails have stretched into all-day cruises, and overnights are planned. "On a nice day when the wind's out of the south, off we go, wing-and-wing with the whisker pole out," says Bill. "It's so beautiful and quiet, with no tacking . . . sailing at its best."

A four-mile cruise from their dock at his mother's house takes them to a favorite place — Sandy Bay Community Park. "We pick up a mooring, jump off the boat into shallow water, and swim ashore where the kids can run around on the beach.

"Sailing on the lake is a challenge, for the wind can whip up whitecaps or switch direction in no time," he says. "We keep an ear to the radio and an eye to the west. If we see thunder clouds rolling over the mountains, we batten down, start the motor and head for home quick."

Three generations later

Bill O'Reilly Jr. grew up on New York State's Lake George, learning to sail as a child in dinghies and an O'Day 19. "The summer I was 15, my dad (Bill O'Reilly Sr.) ordered a new Tanzer 22, hull #1685, with keel and optional black hull," he says. "I have lots of great memories sailing her."

Twenty years later, as he teaches his son, Bill, and daughter, Chelsea, to sail, the sloop is enchanting the third generation of Bill O'Reillys.

"The Tanzer 22 is a great boat for kids," says O'Reilly, 35, a globe-hopping power plant manager who sails whatever, whenever, and wherever he can. "It's solid with a big cockpit, small sails that are easy to handle, and plenty of room below for the kids to play. A self-tending jib would make it perfect, though, because the genoa sometimes hangs up."

The O'Reilly children sailed before they could walk. Now Billy, 6, handles the tiller, keeping the boat headed into the wind while Chelsea, 9, pops up through the forward hatch and pulls up the sails. "Billy's big thing is letting us know when motorboats are coming," says Deborah O'Reilly, 33, Bill's wife. She was raised on a New Hampshire farm and learned to sail after their marriage.

reach the finish in time for the party." Bill hasn't raced as an adult, preferring to share the fun of sailing with his family, and not let them get all tense and hyped about racing. "Sometimes the kids would like to go faster," he says, admitting that he roared around in his own motorboat as a youth.

A 4-mph target

The O'Reillys consider their Tanzer 22 perfect for sailing on 32-mile-long Lake George. *Dulse* (from the Gaelic word for "seaweed") draws 3 feet 6 inches, allowing them to sail or tie up almost anywhere.



Billy and Chelsea, above, learning to be sailors, and Deborah with Billy at right.

Sleek bottom

Freshwater sailing makes it easier to keep *Dulse* shipshape. When Bill's job transferred the family and their boat to the Connecticut shore for a year, marina workers were amazed at the 18-year-old sloop's sleek bottom. However, the antifouling wax the O'Reillys applied didn't stop saltwater marine growth.

"When we pulled her out of the Thames River, I almost lost it. Six inches of slimy stuff were growing on her," says Deborah. "We'll never put her in the ocean again."



Back on Lake George, the O'Reillys sail into November, enjoying having the waters almost to themselves. Chelsea and Billy's schooling restricts boating time, though Deborah admits they occasionally take the children sailing on a really great school day. Bill's return to work in June 2000 will further restrict their cruising. But, they agree, boating has top priority.

"Dulse is the one steady thing in my life," says Bill. "She was there during my teens, through my parents' divorce, and when I had vacations from Maine Maritime Academy. We sailed her in

Long Island Sound, then came back to Lake George. She was waiting when I returned from two years working in Kazakhstan."

Bill is fulfilling his dream: involving his wife and children, so all enjoy sailing together.

In her previous life, newspaper reporter Mary Maynard Drake and her then-husband, George Maynard, built Scud, an engineless replica of Capt. Joshua Slocum's Spray, in their backyard and sailed it around the world with their three children from 1973 to 1978. Later

she and her husband, Bob Drake, sailed his Cape Dory Typhoon and a 23-foot Sailmaster on Fishers Island Sound before they moved to Maine. Mary prefers writing about boats and boaters and sails whenever



possible often in the Grumman aluminum 15-foot outboard boat they rigged with a windsurfer sail.



Bob Drake

Resources for Tanzer sailors

Day racing. Singlehanded. Family weekending. Short-term cruising. The uses for this captivating good old boat are as varied as their owners' dreams.

The Tanzer 22 official website <<http://www.magma.ca/~tanzer22/>> covers much more than the class association's mission: to provide assistance to Tanzer 22 owners with technical matters, hard-to-find parts, tuning, maintenance, and sail specifications.

For more, try these sites listed on the *Good Old Boat* Website Associations Page (start at <<http://www.goodoldboat.com>>, and click the associations button for links to many boats' associations):

Tanzer Owners' Association Newsletter

John Charters
P.O. Box 22

Ste. Anne de Bellevue, QC
Canada H9X 3L4

John is past product manager for Tanzer. Owners say he is a wealth of information about these sturdy Canadian beauties.

Tanzer 26

Michael McGoldrick
mcsail@magma.ca
<<http://www.magma.ca/~mcsail/taz/tanzer26.htm>>

Butch Rufino and Rosemary Furno

bklynrose@earthlink.net
<<http://www.home.earthlink.net/~bklynrose>>

The Tanzer 22

A sensible, good-looking family coastal cruiser

I've always liked the Tanzer raised-deck yachts as the style is a sensible solution that enables the designer to obtain the maximum interior volume in a small cruising yacht. Probably the prettiest raised-deck yachts ever built were those designed by the late S. S. Crocker and, while the Tanzers cannot compete with the Crocker designs in classic beauty, they certainly can in function and practicality.

Also, in as small a boat as the 22, the raised-deck styling can provide an illusion of lower freeboard and sleekness when compared to more conventionally styled craft and, in my opinion, the Tanzer 22 compares favorably with any cruiser in her size range when it comes to appearance as well as practicality.

Another strong point in the favor of the raised-deck yacht is that it extends the cabinside to the deck edge and this, in turn, increases reserve stability quite substantially.

In the chart at right, let's compare the Tanzer to a couple of other 22s to see how she stacks up.

First, let me say a few things before readers start to yell at me. One book gives the Tanzer 22's sail area as 312 square feet, but that is in error, and her measured sail area with 100-percent foretriangle is as I have it above. Second, yes I know there is a centerboard model of the Columbia 22, but the info I have shows that it carries 300 pounds more ballast than her finny sister, but has the same displacement. That's just not possible in my opinion, so I left it out.

Regarding the Comfort Ratio, none of these boats is going to give you a smooth ride in a choppy sea or in big leftover swells. They are simply too small and light. Still, the Tanzers are certainly the best of the batch with their extra 700 pounds displacement, and that extra weight may also translate into thicker


fiberglass, greater strength, and longevity. Note also that the Capsize Number indicates that these boats are not intended for bluewater passages either. I'm sure that boats of this type and size have crossed, or will cross, oceans but not with me aboard!

These are small coastal cruisers, well suited to lakes, bays, and semi-

protected waters, and intended for pleasant daysailing, week-ending, and even

longer cruises with some planning. The accommodations in the Tanzer and the Columbia are quite comparable and should be adequate for a couple or a small family for a week or two. The Capri's layout is more limiting due to its longer cockpit and lack of any galley facilities, although I have cruised

happily for many days in boats with even less in the way of creature comforts.

In the performance category, I'd have to put my money on the Capri as her deeper fin, high SA/Disp. Ratio, and low Disp./LWL ratio should give her the edge. The Columbia numbers look good, too, but her hull appears to be considerably fuller forward than the Tanzer's and this could affect her windward ability, particularly in a choppy sea. In any case, these are not racing yachts, and any of the three will provide a great deal of pleasurable sailing and — within the limits of their size — fun-filled weekends or weeks of cruising. In the long run, on the basis of appearance, accommodations, and general cruising ability, the Tanzer 22 would get my vote. 

by Ted Brewer

	Tanzer 22	Tanzer 22	Columbia 22	Capri 22
	Fin	C.B.	Fin	Fin
LOA	22 ft. 6 in.	22 ft. 6 in.	22 ft. 6 in.	22 ft. 0 in.
LWL	19 ft. 9 in.	19 ft. 9 in.	20 ft. 1 in.	20 ft. 0 in.
Beam	7 ft. 10 in.	7 ft. 10 in.	7 ft. 9 in.	8 ft. 0 in.
Draft	3 ft. 5 in.	2 ft. 0 in.	3 ft. 2 in.	4 ft. 0 in.
		4 ft. 0 in.		
Displacement	2,900 lb.	3,100 lb.	2,200 lb.	2,150 lb.
Ballast	1,250 lb.	1,500 lb.	1,006 lb.	800 lb.
Bal/Disp Ratio	43%	48%	46%	37%
Disp/LWL Ratio	168	179.6	121.3	120
Sail Area	225 sq. ft.	225 sq. ft.	232 sq. ft.	229 sq. ft.
SA/Disp. Ratio	17.7	16.9	21.9	22
Comfort Ratio	14	14.9	10.7	10
Capsize Number	2.2	2.15	2.38	2.48

Boats for this review were selected in cooperation with Brian Coffay at Sassafras Yacht Sales, whose database of sailboats has more than 7,000 boat records and more than 10,000 boatbuilder/importer records. Brian has been building the database since 1992 and has finally opened the closet door! He is able to search for sailboats based on his clients' wishes as expressed by boat dimensions, comparative ratios, designer name, builder name, and even configurational parameters. P.O. Box 36, Georgetown, MD 21930, 410-275-8001 (phone), 410-275-2420 (fax), email to sass@eclipse1.com.

A clean look at the “dirty” half dozen

When it comes to choosing a marine stove fuel there is rarely anyone completely happy with the choice. All fuels have a “dirty” side to them, and some sides are deadly as well. Alcohol is heating-impaired. Kerosene is maintenance-dependent, and a mess if spills occur. Diesel is *hot* and has sooting problems. Electricity is power-hungry and generator-dependent. Compressed natural gas (CNG) is explosive and expensive, as well as hard to find.

And what about liquefied petroleum gas (LPG)? The potential for a massive explosion aboard your good old boat gives LPG both a deadly and a “dirty” side.

After talking to more than 30 marine stove owners about their fuel and stove choices, I learned that, like me, almost every one of them had learned to cook and live with whatever stove and fuel came with the boat when they bought it. But, even though it was chance that decided it, most owners were happy with their stoves and fuels.

As the years go by, however, good old boats need refitting. We may need to replace our stoves. Then when it comes to fuels, choosing one of the dirty half dozen is unavoidable, and this time it won't be chance that decides. We are wrestling with this decision aboard *Lindsay Christine*, our Mercator Offshore

30. Our propane stove is more than 20 years old. And it looks it, at least what you can see of it, because most of it has rusted away. In the hopes of making the “right” decision, I did extensive research and asked many boaters about the marine stoves and fuels they use.

by Theresa Fort



Pros and cons of the six main fuels for galley stoves

What follows are some pros and cons of marine stove fuels from my own research and some advice from the experts — other stove owners — to help you decide which is the best choice for you.

Heat vs. cost

The heat output of fuels is determined by test. The table on the next page shows approximate heating values — approximate because, with the exception of electricity, all of these fuels are mixtures, and their exact content varies from source to source.

One Btu, or British thermal unit, is the amount of heat energy needed to raise the temperature of 1 pound of water 1°F, starting at 60°F. One Btu is also equivalent to 252 calories, and 1 calorie is the amount of energy needed to raise the temperature of 1 gram of water 1°C.

The Btu/lb. column in the table offers a way to compare all fuels (except

electricity) with each other. Btu/lb. would only be a significant figure of merit, however, in cases where the major consideration was the weight of the fuel load. If you are doing a serious weight comparison, you will want to include the weight of all parts of the cooking system, including the tanks, plumbing, and stove.

Most sailors will care more about the cost and availability than about the weight difference. The column showing Btu per significant unit is provided to show the heat content of the unit of measure in which the fuel is normally purchased.

The cost per 500,000 Btu shows how significant the difference is between various fuel costs. For purposes of comparison, 500,000 Btu may be taken to be (very roughly) the heat required to cook for four people for 90 days. If you live aboard your boat, multiply that figure by four for an estimate of annual cost. If you sail in a northern climate on weekends

Average heat content of marine stove fuels

Fuel type	Btu/lb.	Btu/significant unit	Cost	Cost/5,000 Btu
Alcohol	11,935	80,919 Btu/gal.	\$9/gal.	\$55.61
CNG	23,601	1,000 Btu/ft. ³	\$.16/ft.	\$77.38
Diesel	19,557	139,400 Btu/gal.	\$1.30/gal.	\$4.66
Kerosene	19,800	134,950 Btu/gal.	\$2.07/gal.	\$7.67
LPG	21,560	21,560 Btu/lb.	\$.50/lb.	\$11.60
Electricity	—	3,412 Btu/kwh	\$.10/kwh	\$14.65

and get in a two-week vacation, your annual fuel requirement will likely be only about half of the 500,000 Btu shown.

Generally speaking, the cost difference between these fuels for weekend sailors is not significant enough to be the reason for changing fuel types, because the cost of new equipment is high relative to the cost differences between fuels. Liveaboards and long-range cruisers may find the cost differences more interesting.

Fuel availability

Here is a table showing the availability of fuels — excluding electricity, since

Availability of fuels

	Inside the U.S.	Outside the U.S.
Alcohol	Yes	Random
CNG	Random-Rare	Rare
Diesel	Yes	Yes
Kerosene	Yes	Yes
LPG	Yes	Yes

electricity is generated by using another fuel. I used the word random to describe the availability of CNG in the U.S. because, even with a long list of available stations, I had great difficulty finding a place that really did refill CNG cylinders in Florida, where I live. But I've been told it's much easier to find in other parts of the country where EPA standards have forced the use of CNG as a motor fuel and where natural gas is a common fuel for heating.

Auto-ignition temperature

The table on the next page shows the characteristics of fuels, also excluding electricity. It gives the auto-ignition temperature of each fuel. This is the temperature at which a fuel will automatically ignite without a spark or flame. The flash point, on the other hand, is the temperature at which the fuel will ignite when there is oxygen and a spark for ignition.

Stove fuels one by one

Alcohol

Alcohol fuels for stoves are generally composed of ethanol, methanol (added as a denaturing agent), methyl ethyl ketone, acetone, and water. The exact percentage of these components varies

rather widely from one supplier to another. Nigel Calder, in his book, *Boat Owner's Mechanical and Electrical Manual*, states that the best fuel for stoves is ethanol. For practical purposes, this would be a fuel like

Tru Heat, which is 92 percent ethanol, 5 percent water, and 3 percent methanol. It has only trace amounts of other compounds, such as methyl isobutyl ketone, ethyl acetate, and rubber cement. In

contrast to this fuel, Soot-Free, the fuel endorsed by Origo for use in their stoves, is not a high-ethanol-content fuel. Soot-Free contains roughly 71 percent ethanol and 20 percent methanol, as well as methyl ethyl ketone, acetone, and water.

You can also buy suitable fuel in paint and hardware stores labeled as “denatured alcohol.” Klean-Strip is one brand that notes on the container that it is suitable as a shellac thinner and as marine stove fuel.

One test Nigel suggests is to pour a sample of the fuel into a clean (ovenproof) dish and burn it. If there is any residue after the fuel is completely burned, it's unsuited for use as a stove fuel. In addition, stove-fuel vendors will send you a Material Safety Data Sheet (MSDS) for their products listing the chemicals in the fuel by percentage.

Alcohol has been advertised to be the perfect environmentally correct fuel because it is mostly produced from renewable resources (plant matter). It is a relatively safe fuel because of its low volatility. This makes it safer than other

fuels in the closed environment of a boat. Alcohol-stove owners like the fact that there is no hauling of heavy and cumbersome storage tanks, that fires can be extinguished just by adding water to the fire or fuel, and that it is a clean-burning fuel.

But it's not the perfect fuel. Some people say the sweet smell of burning alcohol makes them nauseous. It's more expensive per Btu than all the other alternatives except CNG, averaging \$9 a gallon across the U.S., and its availability is irregular outside of the U.S. and Canada. The price of alcohol outside the U.S. is also quite high.

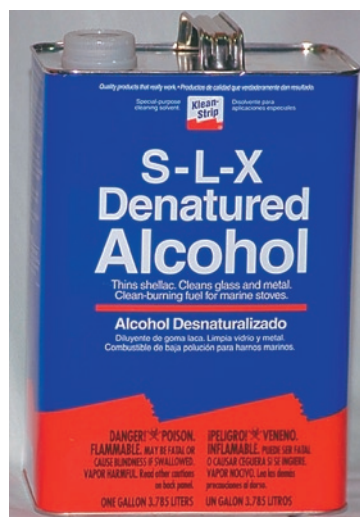
There are two basic types of marine stoves that use alcohol as a fuel, pressurized stoves and non-pressurized stoves. Each has advantages and disadvantages.

Pressurized alcohol. I chuckled as I read LaDonna Bubak's description of lighting her pressurized alcohol stove. She sails her boat out of Portland, Ore., and writes:

“(First you) have to fill a small tank, pump it up to pressurize it . . . preheat the burner by allowing a puddle of fuel to develop, light it, jump back so flames don't singe eyebrows, extinguish (any) flaming curtains, etc., then, when the puddle-flame almost dies, you turn on the burner and hope it catches.”

A lost memory flashed into my mind. It was my first and only attempt to light the pressurized alcohol stove aboard our Catalina 22. As

flames shot up above my head and within reach of the cabintop, I heard the kids approaching. They were arguing



about whose idea it was to have lunch aboard *Gypsy Rose*. Trembling, I made sure the burner was off, then nervously searched for something with which I could extinguish the flame. There was no water. *Gypsy Rose* was in our driveway. I found a pot lid that had fallen on the cabin sole in the confusion of the flare-up. The fire went out as I covered it. I took a deep breath. Amie arrived first with Alex close behind, full of spit and vinegar.

“Mommy, tell Amie that I thought of it first! Here’s the soup . . .” Then there was silence as they both watched me pack up everything and start to close up the boat. “Mommy, are you OK?”

I vowed never to light that stove again as I replaced the tarp and walked back to the house. I had no idea that this experience was almost normal for lighting a pressurized alcohol stove until I talked to other boaters about their stoves.

A few of the boatowners I questioned were happy with their pressurized alcohol stoves, but the majority were looking to replace them. Many were not comfortable using the oven because of concerns with priming and flare-ups. A few owners commented on being bothered by the sickeningly sweet smell of the alcohol and the paleness of the

flame, which makes it almost impossible to see in bright light.

The real danger of flare-ups seems to come from failing to light the burner on the first try. After the first try, the burner may not be hot enough to sufficiently vaporize the fuel by the time all the fuel in the priming cup has been burned. So the chef opens the control knob to allow more fuel into the priming cup, and the fuel ignites sending flames sky high. While the burner was not hot enough to vaporize the fuel the first time, it was hot enough to ignite the liquid alcohol added again. If the stove is gimbaled at the time of lighting, flaming fuel can splash onto other parts of the boat and the cook. According to Optimus International, the best advice is to let the burner cool off before filling the priming cup with fuel again.

Pressurized alcohol stoves are not maintenance-free. The customer service department of Kenyon Stoves explains that severe pulsing of a burner or a glowing red cap during operation are caused by dirt and scale buildup in the filter and burner body. The burner should be stripped of all removable parts, cleaned, and rebuilt.

With Kenyon alcohol stoves, a wick in the center of the burner is lit. Pressure builds up in the burner as the available fuel heats up, causing alcohol

vapors to be released into the burner to be used. Regardless, most alcohol burners work in the same way and require the same maintenance.

One stove owner, known as “Captain Key West,” from Key West, Florida, commented that he thought the bad press about pressurized alcohol stoves comes from the fact that they need to be maintained to work well, especially after many years of use. He writes, “I think many people disenchanted with alcohol stoves may have based their opinions on only having used poorly maintained stoves. I used to be surprised how alcohol stoves got a bad “rap” since mine worked great for many years before it started getting “fussy.” Now, I realize many users are not aware that these stove are not maintenance-free. They buy a used boat, never can get the stove to work right, then complain about how poor alcohol stoves are. They’re not listening to their stoves which are *begging* for maintenance!”

I know I never gave my pressurized alcohol stove a chance after that first lighting.

Non-pressurized alcohol. Non-pressurized alcohol stoves are quite popular. The Origo brand stoves have helped to keep alcohol in fuel-option lists for boaters. All non-pressurized

Characteristics of the five liquid or gaseous marine stove fuels

	Alcohol		CNG	Diesel	LPG (Propane)	Kerosene
	Methanol	Ethanol				
Toxic to skin	Moderate-high	Slight	No	Moderate	No	Moderate
Toxic to lungs	Moderate	Slight	No	Moderate	No	Moderate
Specific gravity lighter or heavier than air (air=1.00)	1.11	1.59	0.55 lighter than air	>4	1.52	>4
Auto-ignition temp °F (temp. required for spontaneous ignition)	867	793	1,000	~600	850-950	410
Flash point closed cup, °F	52	55	-300	165	-100 to -150	100
Luminous flame	No	Faint	Yes	Yes	Yes	Yes
Source	Natural gas and other hydrocarbons	Grain, biomass	Natural gas	Petroleum	Natural gas, petroleum	Petroleum, coal, shale

alcohol stove owners I questioned are happy with their stoves. Some even commented that they cook faster than pressurized alcohol stoves and claimed speed close to propane. But the fuel is expensive.

These non-pressurized stoves use a wicking action to deliver fuel to the flame, instead of pressure, making them very safe, with no flare-ups. The fuel is stored in canisters under the cooktop. The canisters contain nonflammable wadding with a shield-type cover that closes over the canister to extinguish the flame, somewhat like cooking with Sterno.

These stove users/experts seem to agree that non-pressurized alcohol stoves are the way to go if you are interested in using alcohol as a marine stove fuel. In fact, two of the pressurized kerosene stove owners are switching to non-pressurized alcohol with their next refit.

Safety considerations (alcohol)

While it is true that alcohol fires can be put out with water, sometimes the water displaces the alcohol, and the fire continues to burn.

- Fill the fuel tank no more than three-quarters full to allow space for increased air pressure.
- Before lighting and throughout the burner's use, pressure in the storage tank needs to be around 7 pounds per square inch (psi).
- Once you have successfully lit the burner, run it on a low setting until the burner gets really hot; then it can be adjusted for your cooking. Turning the valve all the way open will put out the flame, because there is a cleaning needle that comes out when you turn the knob all the way counterclockwise.
- Never refill the priming cup or stove while the burner is on or even hot. The alcohol in the container may ignite.
- Clear the area above and around your stove of any flammable objects, including your eyebrows, before priming your stove.

Special hints (alcohol)

- Experienced users of alcohol stoves recommend that you use heavy cookware to reduce the scorching that can occur if the burner has a hot spot.

- On pressurized stoves, cook and bake using a strong flame to reduce chances of the flame's dwindling and being blown out.
- Most owners agree that it helps to use the stove manufacturer's fuel because it burns more cleanly.
- One owner uses a contact-solution bottle to hold alcohol for the priming process. It gives you better aim and more control over the amount released.
- Pressurized alcohol stoves can be converted to kerosene by replacing the burners. As a caution though, one stove owner commented that he was witness to one such conversion exploding aboard a friend's boat. Make sure the conversion is done correctly.
- Several owners use small bicycle pumps with pressure gauges to pressurize the fuel tank to the proper pressure. Ferenc Maté's book, *Shipshape: The Art of Sailboat Maintenance*, explains the use of a bicycle pump for pressurized alcohol and pressurized kerosene stoves. He suggests getting rid of the pump that came with the stove and finding a valve from a bicycle tube. Solder this valve into a washer and use the nut that came with the tank to thread it into place with a small rubber gasket between.
- Dan Spurr, in his book, *Upgrading the Cruising Sailboat*, recommends putting a pot on the burner when priming. It will partially contain the flames and provide a darkened area which enables you to see the flames better.

Compressed Natural Gas

There's a lot of technical merit to compressed natural gas, but its popularity has never developed. Natural gas is a mixture of hydrocarbons — mainly methane (CH₄) — and is produced from gas wells or in conjunction with crude-oil production. It's a very clean-burning fuel and burns hotter than alcohol. It also has an advantage over LPG in that it is lighter than air. So it is a much safer gas. Any leaks tend to rise to the cabintop and

escape through any point that has an opening to the outside. But vapors could still build up in areas of the cabin that have poor ventilation, so care should be taken to have good airflow aboard. I know of one boatowner who has had trouble-free use of his CNG stove for the last 16 years.

CNG's disadvantages are much the same as LPG's. It's a highly volatile gas stored under pressure, much higher

than LPG. CNG is stored at 2,250 psi, compared to LPG's 150 to 180 psi. The cylinders are heavier and more cumbersome because CNG requires a thicker-walled tank. The tanks also require recertification periodically. CNG also costs more per Btu than LPG. I found the price of a refill in



Florida to be between \$10 and \$16 for 84 cubic feet.

But the biggest drawback seems to be the lack of availability outside the U.S., as well as in some areas within the U.S. A special quick-release fitting can be bought through Corp Brothers, Inc., to allow you to fill your tanks from a utility-company or automobile-station pump, when found.

Safety considerations (CNG)

A good-quality, spark-proofed alarm and sniffer should be installed aboard any boat with a compressed natural gas stove.

- CNG cylinders should be stored away from the cabin in self-contained storage lockers that are vented overboard above the waterline, with venting at the compartment's highest level. Or they may be stored outside on deck.
- Cylinders should never be painted a dark color. In direct sunlight a cylinder could absorb enough heat to cause it to rupture.
- CNG and LPG cannot be interchanged without modification to the stove.

Marine stove fuel survey results

Fuel	Happy	Safe	Feel limited in use	High fuel price
Alcohol (pressurized)	Yes: 1 No: 3	Yes: 1 No: 3	Yes: 2 No: 2	Yes: 3 No: 1
Alcohol (non-pressurized)	Yes: 6 No: 0	Yes: 6 No: 0	Yes: 1 No: 5	Yes: 3 No: 3
CNG	Yes: 1 No: 0	Yes: 1 No: 0	Yes: 0 No: 1	Yes: 1 No: 0
Diesel	Yes: 1 No: 0	Yes: 1 No: 0	Yes: 0 No: 1	Yes: 1 No: 0
Electricity	Yes: 2 No: 0	Yes: 2 No: 0	Yes: 0 No: 2	Yes: 2 No: 0
LPG	Yes: 15 No: 0	Yes: 1 No: 14	Yes: 0 No: 15	Yes: 15 No: 0
Kerosene (pressurized only)	Yes: 2 No: 1	Yes: 3 No: 0	Yes: 0 No: 3	Yes: 3 No: 0

- CNG burned in LPG stoves will produce only about half of the designed output.

Diesel

Diesel is a high-energy fuel that is not volatile. It does not give off flammable fumes, and it is inexpensive and available worldwide, especially in areas of commercial fishing. There are pressurized and non-pressurized diesel stoves. Pressurized diesel stoves are operated much like kerosene and alcohol stoves. Non-pressurized “drip pot” diesel stoves use a metering valve to deliver fuel to a drip-pot-style combustion chamber. The burner can be fed by gravity or by a pump. The drip-pot-type stoves are quite popular on commercial fishing boats and aboard yachts in northern regions.

They are known for producing a dry heat because they draw in moist air from the cabin for combustion and expel it through the chimney as flue gas. For boaters living in cool climates most of the year, this means a warmer and drier boat. Drip-pot diesel stoves can also be used to produce hot water when a water coil is added to the stove. Another advantage is the fact that you will only

be using one type of fuel if your auxiliary engine is diesel.

A downside for drip-pot diesel stoves is that they tend to heat the cabin as well as the food. They are slow to warm up and cool down because they are made of heavy cast iron. With a constant oven temperature of 350°F, a cabin can get quite warm in the tropics. Sooting and down drafting can also be problems when a drip-pot diesel stove is not properly adjusted or if poor-quality fuel is burned. Installation of the drip-

pot variety can be quite difficult just because of the weight of the stove itself. And, because of their weight and the chimney required, drip-pot diesel stoves cannot be gimbaled. It would be best to install one athwartship. Since the flue removes combustion products from the cabin, the build-up of carbon monoxide gases is

not a concern as long as the stove is working properly and outside make-up air is brought into the cabin.



Special tips (diesel)

The key to being happy with your diesel stove is to learn how to operate and adjust it. Understanding how your stove works, and adjusting it properly, will save your sails (as well as the rest of your boat) from soot. Jeannie and Jack, aboard their Columbia 50, *Terri Knot*, had terrible sooting problems with their diesel stove on their trip to Alaska. After several phone calls to the manufacturer, they were finally able to adjust it properly. They are pleased with the heat it generated while cruising in the cool north. But Jeannie commented that it would have made the trip more enjoyable if they could have worked out the stove's idiosyncrasies before their trip.

- Filtering your diesel fuel with a “Baja” filter will increase the efficiency of your stove and reduce sooting. If you don’t have a very fine filter of this type, you can also filter fuel to some extent using panty hose.
- If you are planning on cruising in tropical climates with a diesel stove, consider bringing along a small cook-top that uses an alternate fuel — such as propane, butane, or alcohol — to reduce heat in the cabin.
- Diesel stoves will burn cleanly with sufficient draft. Make sure your flue is the proper length and diameter. It is important that the flue be installed without any bends to restrict the air flow. Make-up air must be allowed into the cabin for the stove to have proper draft.

Electricity

For those boaters who have an alternating current (A/C) generator, or who find themselves close to shorepower quite often, electricity may be the answer. It is highly efficient, there are no problems about storage and fumes, and the fact that you may already have shorepower aboard your boat makes it easy to install. If your electrical cooking appliances include a microwave, it will speed up cooking times, helping you to use less energy. It will also conserve vitamins during cooking, and it will not heat up the cabin. Because electricity is a dry heat, it will also mean a drier cabin, something that helps with all boats.

But, if you will be relying on a generator to power your stove, there will be an increased need for diesel or gas, depending on your energy source. Increased use of your generator also means increased wear and maintenance, increasing the total expense of this type of fuel. The noise of having to run the generator or engine each time you use your electric appliance can also be a disadvantage.

Special tips (electricity)

- Make sure all wiring is accessible so you can check for corrosion periodically. If some of the wires are hidden or difficult to get to, it will be a tedious job to find the cause of a malfunction.
- Proper maintenance of your generator is a necessity when relying on electricity for your cooking. Consider having a small back-up stove aboard.
- If you will be running your generator in quiet anchorages, consider anchoring farther away from other boaters. It will go a long way toward improving relationships with those who are living without generators.
- Try to combine stove needs with battery charging to enable you to run the generator less frequently.

Kerosene

Kerosene, also called paraffin outside the United States, is a colorless, thin oil. It's less dense than water, and it's made of a mixture of hydrocarbons commonly obtained from the fractional distillation of petroleum. As with

alcohol, there are pressurized kerosene stoves and non-pressurized kerosene stoves. Pressurized ones function much like pressurized alcohol stoves. Kerosene burns hot — much hotter than alcohol. It is inexpensive and widely available in the U.S. as well as overseas.

Eric Freeman, who sails *Blackguard*, an old Seawolf ketch, in northern Washington state, commented that kerosene is easy to find, being available anywhere jets fly. Kerosene is not as volatile as alcohol and can be easily stored. Because kerosene — like alcohol and diesel — doesn't have to be under pressure, it is easy to be aware of

how much fuel you have left. A well-maintained and properly running stove is odorless and soot-free without any flammable fumes to worry about.

But kerosene stoves can be hard to light. These stoves require priming with alcohol, a tricky business. They can also have a sooting problem if the burners are not

adjusted properly. They can smoke liberally when firing up and smell terrible. Spills take a long time to evaporate and can be a problem because they will soak into cushions and be a fire hazard for a long time.

Non-pressurized kerosene stoves are often discussed with diesel drip-pot stoves since they are so similar. Kerosene can be burned in a diesel stove and is the cleaner of the two in that application. The advantages and disadvantages of non-pressurized kerosene stoves are the same as those for diesel stoves. Like diesel stoves, kerosene drip-pot stoves cannot be gimbaled and are usually made of heavy cast iron with a flue.

Special tips (kerosene)

- It's important to buy the best-quality kerosene possible to reduce the chances of clogged burners. Good-quality kerosene is colorless and as clear as good drinking water.
- You can check the quality by burning a small puddle in an ovenproof dish. Any gooey remainders mean a poor-quality fuel for your stove.



- Filter your kerosene through a “Baja” filter to eliminate particulates.
- Keep a small spray or squirt bottle of alcohol (like a contact solution bottle) close by to use when priming the burner.

Liquefied Petroleum Gas

LPG is a gaseous paraffin hydrocarbon, extracted from crude petroleum or natural gas, containing propane and butane. Most LPG produced and sold in the U.S. is primarily propane. It seems to be the fuel choice for a large number of marine-stove owners, especially international cruisers. They seem drawn to it because it is cheap, burns hot and clean, and has world-wide availability. I found the average price to fill a 20-pound cylinder was \$10, which lasts our family of four an average of three months while traveling. But, it has some major drawbacks that can make it a very dangerous fuel to have aboard.

LPG is highly explosive and heavier than air. Any leaks in the system can go undetected, sinking into bilges and creating a very dangerous situation. And, on stoves without thermocouples, it is too easy to leave a burner on accidentally after the flame goes out, leaving an explosion waiting to happen when the cook goes to re-light a burner.

Thermocouple-controlled solenoid valves control the flow of gas on some stoves. When heated, the dissimilar metals in the thermocouple generate electrical current that causes the solenoid valve to open. When the thermocouple cools, it does not generate the electrical current and thus the valve closes, cutting the supply to the burner. This is why, upon lighting your burner, you need to hold the valve open for at least 30 seconds to allow the metals to become warm enough to generate the electrical current which will hold the solenoid valve open.

LPG (as well as CNG) requires constant vigilance in its use and storage on board. All crewmembers should check and re-check to make sure all switches and shut-off valves are in the proper position.

LPG's high volatility also creates a transportation problem. Transporting cylinders to be re-filled can be difficult. The thick-walled cylinders are heavy and cumbersome. These cylinders, like CNG cylinders, have to be re-certified after several years. The date of the next re-certification should be stamped on the cylinder. Due to safety concerns, many buses and taxis will not allow

them aboard. Plus, LPG companies are usually outside of town in order to reduce loss of life and property should there be an explosion. This makes them difficult for cruisers to reach without transport.

Though propane and butane are usually lumped together and called LPG for simplicity, they have a few differences.

Butane. This gas liquefies at higher temperatures than propane does. At extremely low temperatures, butane's evaporation rate will be so low that the stove will not operate. But butane can be stored in a propane container.

Propane. In extremely cold conditions, propane can be used when butane would fail to evaporate. Propane can be used interchangeably with butane. But propane cannot be stored in butane cylinders because it has a higher cylinder pressure.

Safety considerations (LPG)

For excellent instructions on the proper installation of an LPG system, read Chapter 14 of Nigel Calder's *Boat-owner's Mechanical and Electrical Manual*.

- It is a good idea to install a good quality sniffer that will sound an alarm when vapors are detected. But be sure it is spark-proofed so that turning it on will not ignite any vapors already present.
- LPG cylinders should be stored away from the cabin in self-contained storage lockers that are vented overboard above the waterline, with venting at the compartment's *lowest* level. Or, they may be stored outside on deck.
- Cylinders should never be painted a dark color. In direct sunlight, a cylinder could absorb enough heat to cause it to rupture.
- Install a lighted manual switch at the stove with a solenoid valve to shut off the gas at the tank when the stove isn't in use.
- LPG cannot be interchanged with CNG (compressed natural gas) without modifications to the stove. Propane burned in a CNG stove will produce extremely high flames and dangerous overheating of the appliance.
- When re-filling cylinders outside the U.S., make sure the LPG has a smell to it. It is not safe to have LPG (or CNG) aboard if it is odorless.

- Be careful not to have your cylinders filled beyond 80 percent capacity. There should be two weights stamped into your cylinder, the empty weight, called tare weight, and its net fill weight, the safe weight of LPG that can be added. Upon weighing your filled tank, it should not weigh more than your tare weight plus your net fill weight. If it has been overfilled, some of the gas will need to be vented carefully away from flames and sparks. An overfilled cylinder is a terrible danger aboard your boat. Increases in the ambient temperature could cause a rupture of the cylinder or could cause liquid LPG to be pushed into the low-pressure lines, a very dangerous situation that would ruin, at the least, an oven's thermostat.

Special tips (LPG)

Having an easy shutoff valve close to the storage cylinder helps reduce dangers. Aboard *Rhiannon*, Debbie Lyons, of Seattle, stores her propane cylinder on deck near an opening portlight over her sink. She only has to open the portlight to shut off the propane *right* at the tank. She shuts off the propane at the cylinder as her cooking is completed and when the flame dies, signaling that all the propane has been used in the lines, she turns off the burner. Before lighting, as a double check, she makes sure that all burners are turned off first. (Make sure the portlight will not allow LPG to drain into the cabin if there is a leak at the cylinder.)

Hunting for leaks is required maintenance for propane stove owners. It is a good idea to periodically apply soapy water to all tubing connections in your installation. Bubbling signals a leak that should be immediately fixed. Also use your nose for finding leaks. As with CNG, an odor has been added to LPG. *Never use a flame to test for leaks.*

To check the level of your propane tank, boil a cup or so of water and pour it on the outside of your propane tank. Right afterward, feel for the level of much cooler propane in the cylinder.

Propane and CNG are serious materials to have aboard a boat. The ABYC (a voluntary boat construction standards organization) recommends that the following label be placed near LPG fuel tanks:

Caution

(1) This system is designed for use with liquefied petroleum gas (LPG) only. Do



Debbie Lyons, reaches through the portlight to shut the propane off at the tank aboard *Rhiannon*.

not connect compressed natural gas (CNG) to this system.

(2) Keep cylinder valves and solenoid valves closed when boat is unattended.

Close them immediately in any emergency. When on board, cylinder valves or solenoid valves shall be closed when appliances are not in use. Keep empty cylinder valves tightly closed.

(3) Close appliance valves before opening cylinder valves.

(4) Test for system leakage each time the cylinder supply valve is opened for appliance use. Close all appliance valves. Open, then close, cylinder supply valve. Observe pressure gauge at the regulating valve and see that it remains constant for not less than three minutes before any appliance is used. If any leakage is evidenced by a pressure drop, check system with a leak detection fluid or detergent solution which does not contain ammonia and repair before operating the system.

(5) Never use flame to check for leaks.

At the end of the ABYC standard on LPG systems is the following note:

(1) Never use flame to check for leaks!

(2) Never use solutions containing ammonia. Ammonia, which is present in soaps and detergent, attacks brass fittings. Undetectable at first, in a matter months these fittings may develop cracks and leaks.

Ammonia which is present in some soaps also attacks copper tubing in the same way. In fact, it is the copper in the brass that is attacked by the ammonia.

Continued on Page 71

Baking aboard

No oven! Now what do I do? When my husband, Dan, came back to our boat, *Catherine L*, with a two-burner kerosene stovetop to replace the original, but inefficient, alcohol stove/oven, I had to experiment with baking things we love to eat on top of the stove.

Kerosene burns hotter than alcohol, is harder to regulate, and requires the use of a heat diffuser. This flat metal utensil spreads the heat over the bottom of a pan or skillet and allows for slower, more even heat. Cakes, breads, and pizza can be made in a skillet with a lid. The heat diffuser is sold in kitchen-supply stores and will be needed on propane stovetops also. (*We had never heard of this device but were able to get one at the first kitchen supply store we*

*Bake delicious cake, bread, pizza —
on your boat's stovetop
in a skillet or pressure cooker*

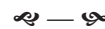
tried. It appears to be just the thing for simmering on a gas stove in the home also. -eds.)



A family favorite is a **Pineapple Upside Down Cake** that I cook in a deep nine-inch skillet, because it rises so high. I also use this heavy skillet for baking bread. A pressure cooker could be substituted.

- 1 8-ounce can pineapple slices, halved
- 2 tablespoons butter
- 4 maraschino cherries, halved
- 1/2 cup packed brown sugar
- 1 1/2 cups flour
- 1/4 teaspoon salt
- 2 1/2 teaspoons baking powder
- 3/4 cup white sugar
- 1/3 cup shortening
- 1 egg
- 1 1/2 teaspoons vanilla

Drain pineapple slices and reserve liquid. Melt butter in the skillet. Stir in brown sugar and 1 tablespoon pineapple liquid. Add water to remaining juice to make 2/3 cup; set aside. Arrange pineapple and cherries in skillet. Combine flour, baking powder, and salt. Beat shortening about 30 seconds. Add granulated sugar; beat until well combined. Add egg and vanilla; beat 1 minute. Add dry ingredients and the 2/3 cup liquid alternately to the mixture, beating after each addition. Spread in pan. Bake for 30 to 40 minutes, using heat diffuser and a cover on the skillet. Cool 5 minutes; invert onto a plate or serve in the skillet without turning. Serve warm. Serves 8.



Many Caribbean islands — such as Georgetown, Bahamas; Salinas, Puerto Rico; Dewey, Culebra; and Cruz Bay, St. John's, U.S. Virgins — have wonderful bakeries, but for times when we are not near a bakery or store, I

Flame tamer shown here in the Good Old Boat “test kitchens.”



without an oven

make **Pressure Cooker Bread**. No kneading is necessary.

1 1/2 cups lukewarm, non-chlorinated water (or one cup fresh water and 1/2 cup clean sea water)
1 tablespoon dry yeast
2 tablespoons sugar
2 teaspoons salt (only if using all fresh water)
4 cups flour
2 tablespoons cornmeal

In a bowl, combine water, yeast, salt, and sugar. Let stand 15 minutes. Stir in flour and let rise in a warm place for 90 minutes or until double in bulk. Stir down and let rise again. Grease the pressure cooker thoroughly; add the corn meal and shake to coat the sides and bottom evenly. Place dough in pressure cooker and let rise again. Cook over low heat for 45 minutes using the heat diffuser. Lock on the lid, but don't use the regulator valve. Steam will escape through the vent. Do **not** remove the lid during cooking. Remove from heat and let sit a few minutes. The bread will be white on top, but the sides and bottom will be a rich, crusty brown because of the cornmeal. So, serve upside down.



Our daughter, nine-year-old Mara, loves to prepare this **Yeastless Pizza Dough**. It makes two 9-inch skillet pizzas.

1 cup whole wheat flour (or 1 3/4 cup white flour)
3/4 cup white flour in addition to above flour
3/4 tablespoons baking powder
2/3 cup milk
1/4 cup oil

Sift and stir dry ingredients together and add the liquids. Stir with a fork. Knead 10 times in the bowl without adding additional flour. Divide the dough into two equal parts. Pat the

dough out and up about an inch in the skillet bottoms. Top each with (as desired):

2 ounces tomato sauce
1/2 teaspoon dried oregano
onions, finely chopped
green peppers, finely chopped
mushrooms
pepperoni
cheese

Cover and bake, using the heat diffuser, for 20 minutes. We bake one pizza and eat it as the second one bakes.



For chocolate addicts, these **Chewy Brownies** bake well in a skillet:

3/4 cup granulated sugar
5 tablespoons melted margarine
1 tablespoon water
1 egg

1 teaspoon vanilla
2/3 cup all-purpose flour
5 tablespoons baking cocoa

1/4 teaspoon baking powder
a pinch of salt
(optional: 1/4 cup chopped nuts)

In a large bowl, stir sugar, melted margarine, and water together. Stir in the egg and vanilla. Combine dry ingredients and stir into the sugar mixture. Spread in a greased skillet and cover. Bake, using a heat diffuser, for 18 to 20 minutes. Cool in the pan. Makes about one dozen.



This moist **Cornbread** was a hit at a potluck supper in Salinas, Puerto Rico. But it may have had something to do with the number of liveaboards from Texas!

1 cup yellow cornmeal
1 cup sifted all-purpose flour
4 teaspoons baking powder
1 tablespoon sugar
1 teaspoon salt
2 eggs

1 cup milk
1/4 cup cooking oil

Grease the skillet. Put cornmeal, flour, baking powder, sugar, and salt in a large bowl and stir to combine. Beat egg, milk, and oil together. Pour all at once into cornmeal mixture and stir vigorously until thoroughly combined. Spread evenly in skillet. Cover and bake on the stovetop, using a heat diffuser, for 20 minutes or until the top springs back lightly when touched. Serves 8.



Without refrigeration, we tend to stay well stocked with fresh produce. Occasionally the carrots get limp, but they are great in this delicious **Carrot Cake** I've adapted for stovetop baking.

1 cup all-purpose flour
1 cup sugar
1/2 teaspoon baking powder
1/2 teaspoon baking soda
1/2 teaspoon salt
1/4 teaspoon cinnamon
1/4 teaspoon nutmeg
1 1/2 cups shredded carrot
1/2 cup cooking oil
2 eggs

Mix dry ingredients together in a large bowl. Mix eggs and oil together. Add carrots, eggs, and oil to the dry ingredients. Beat for two minutes. Pour into a skillet that has been greased and floured. Bake, covered, for 20 minutes using a heat diffuser. The cake can be sprinkled with powdered sugar or frosted when cool. Serves 6.

Cathy Haupert started sailing with her husband, Dan, on Lake Superior. Before long, they bought an Ericson 35 and took it to the Caribbean, where they sail during the winter months. Cathy is pictured here with daughter, Mara, because Mara's just too cute to cut out of the shot.





The classic:

An updated cruising classic has become a classic in her own right

John G. (“Jack”) Hanna designed his famous Tahiti ketch during the Depression years of the 1930s. He created a great, sea-kindly craft an amateur builder could put together for a relatively modest amount of money. Since money was very hard to come by during those years, a boat you could afford to build while you were dreaming about sailing to the South Pacific and maybe taking life easier was attractive indeed. It has been estimated that during the ensuing years more than 3,000 boats have been built to this design, and at any given time there are perhaps dozens passagemaking somewhere in the world.

Early in his naval-architecture career, Jack became very interested in the sailing and sea-keeping qualities of the double-enders among the Mediterranean-type used in the sponge fisheries at Tarpon Springs, Florida, and made an extensive study of them. These craft were heavily influenced by the Colin Archer “redningskoite,” his double-ended rescue boat used extensively by the Norwegian lifesaving service, and Jack believed this design approach would lend itself well to a cruising sailboat for Everyman. As they say, the rest is history.

by Wes Farmer

In the 1920s, Jack designed and built a double-ended sailboat he named *Orca*, and then another double-ender he named *Carcassonne*, both of which were influenced by his study of the Greek spongers. He was on his way to a career in naval architecture when the Great Depression hit, and it became extremely

tough to make a living in this field. By the time the 1930s had rolled around, Jack — who, in later years of

his life was known as “The Sage of Dunedin” (Florida) — had designed a third boat of this genre, unnamed, and was looking for a sale of his work in order to eat.

First publication

Enter my father, E. Weston Farmer, N.A., who at the time was editor of *Fawcett’s Modern Mechanix and Inventions* magazine (later re-named *Mechanix Illustrated*). “Westy,” as he was known, and Jack were friends. Dad became interested in being the first one to publish Jack’s design of his new, as-yet-unnamed cruising ketch. He was able to offer Jack the munificent sum of \$150 for his design and article, over the violent objection of his boss and publisher, Roscoe Fawcett, who feared that paying this exorbitant amount would put him out of business.

Before publishing Jack’s design, Westy suggested the name Tahiti for a couple of reasons. First of all, he figured the name had just the magic to take the builder’s (and/or dreamer’s) mind off his Depression-caused woes and economic troubles — most people had them in those days. Secondly, someone in the office was going on a trip to Tahiti and agreed that was what he would name the boat if *he* were to sail her there. So the name stuck and has since come to mean a romantic attachment to the concept of sailing off into the sunset, heading for the balmy breezes of the South Pacific, where there is nary a care.

As more and more Tahiti sailboats were built and sailed around the seven seas by passagemakers, the craft gained a great reputation for sea-kindliness, comfort of motion, and safety. Many were the true tales of sailors riding out hurricanes and typhoons and returning to port safely. However, she also gained a reputation of being somewhat slow and not pointing especially well to weather.

Under-rigged

About 1975, quite some time after Jack’s death, Dad began to “noodle” about these concerns, as was his wont. He came to the conclusion that Tahiti was simply under-rigged, and her slowness was not in any way due to her

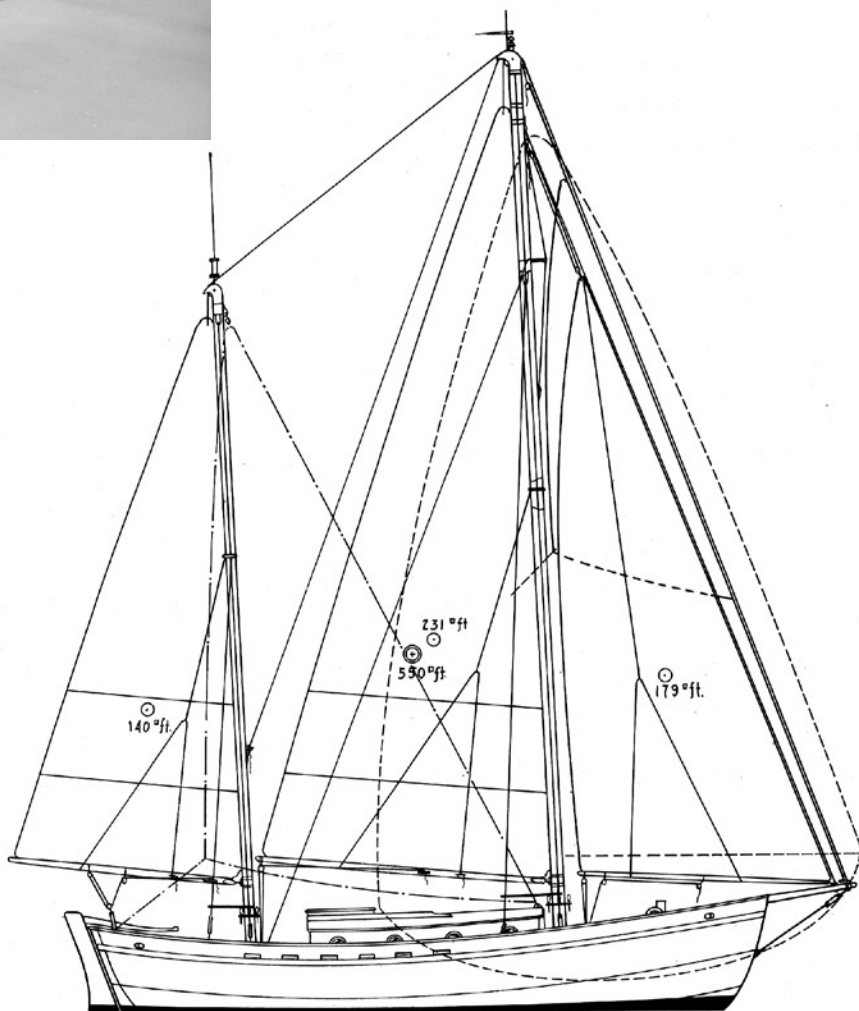
Tahitiana

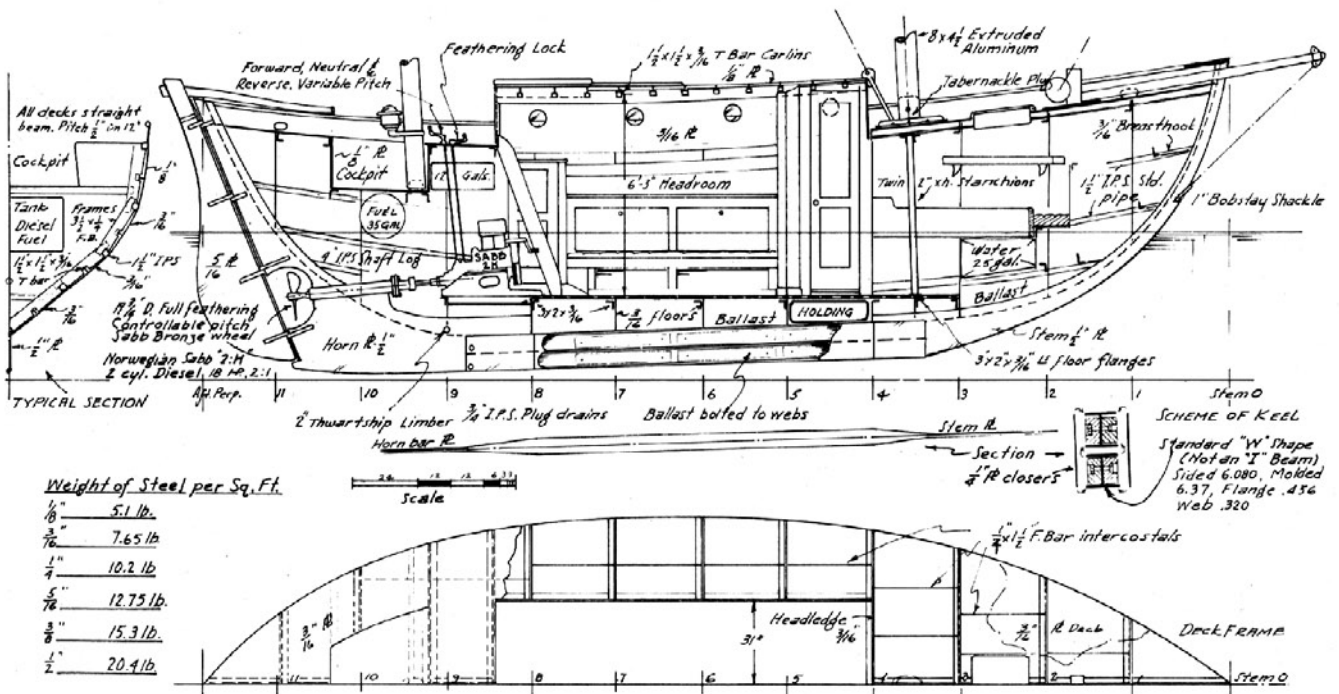


E. Weston Farmer, N.A., at the drafting table, at left, and the Tahitiana's sail plan, below.

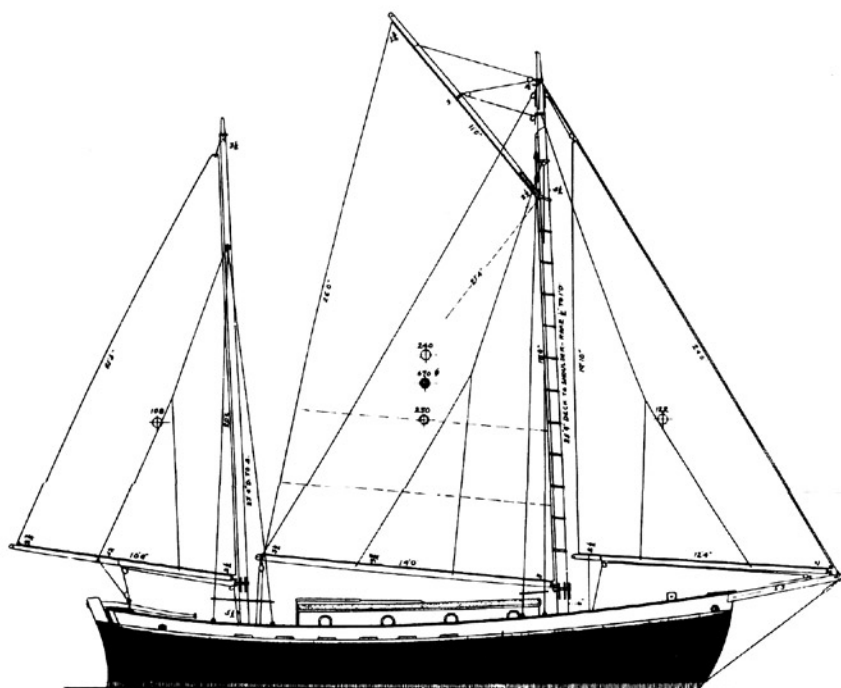
hull shape. Of the known 3,000-plus Tahitis registered in the world's nations, a small percentage had been provided with beefed-up rigs, measurably increasing her speed. Westy came to the conclusion that she was simply starved for sail area — Jack Hanna was not trying to design a racer, but rather a comfortable, conservative heavy-weather cruiser. Of her, Westy wrote, "Hanna's original design carried but 420 square feet in her rig, and but 50 square feet extra (for a total of 470 square feet) after I had asked him for more. This works out to be about 44 pounds of boat lugged by each square foot of sail; whereas *Svaap*, almost the same boat technically, carries sail [which is] asked to lug but 29 pounds per square foot of sail. Sail is horsepower, and Tahiti just didn't have enough."

This "noodling" also encompassed the knowledge that by 1975, amateur boatbuilding of a craft the size of Tahiti was actually less expensive in steel and took less skill. More amateur builders out there had welding skills





Line drawings for the Tahitiana by Weston Farmer, with his notes.



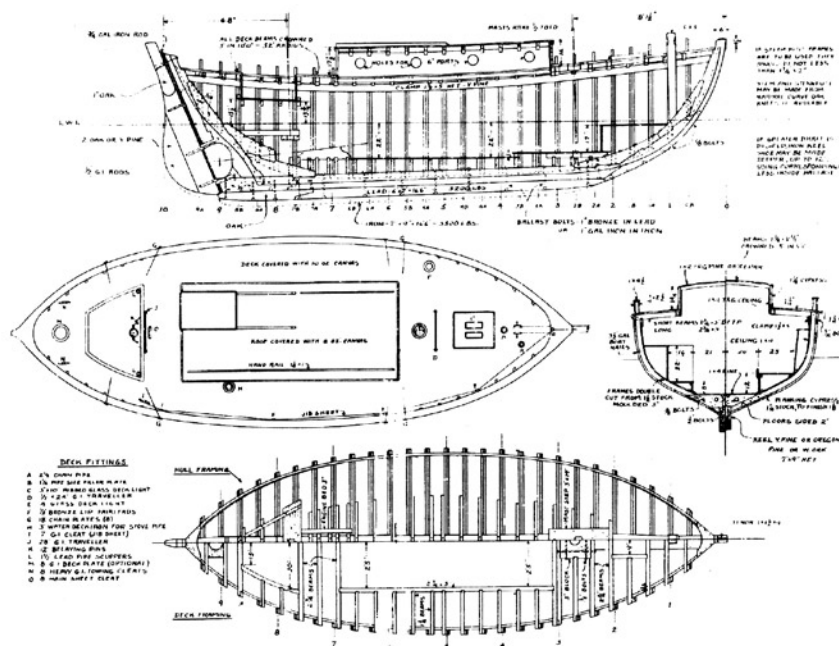
The Tahiti ketch by Jack Hanna above and at right below.

than had woodworking skills. A steel version of Tahiti, if properly designed, would be less expensive, go together in less time, be stronger than wood, and stand up under the rigors of sea water better over the long haul. For one thing, worms can't eat steel, he reasoned.

So Westy set about to design a steel version of the by-now-famous Hanna ketch. The lines for this new craft are shown superimposed on the lines of Tahiti in the top figure on the facing page. He achieved a very close approximation by the technique of giving her multiple chines; this type of construction is easier for the amateur builder to put together because the steel plates do not have to be pre-formed by large and expensive equipment. Rather, they can simply be clamped to the frames and welded in place. Westy added about a foot of length and gave her a more gentle entry at the stem in order to make it easier to bend the plates there properly. Note at the top right of the first illustration on Page 58 the notation, "dotted line shows discarded old Tahiti bow. Too blunt to plate."

More headroom

The profile and accommodations drawings at the bottom of the facing page demonstrate that the accommodations of Tahitiana are essentially the same as those of Hanna's Tahiti. However, Tahiti had less than 6 feet of headroom in the main cabin, and Westy



figured this was inadequate, especially for long passages, so he gave her headroom of 6 feet 3 inches and an enlarged forepeak for stowing sails and ground tackle.

He also reasoned that owners might prefer a cutter rig to the ketch rig, so he gave her two sailplans, both of which appear on his drawings and both of which carry significantly more sail area than the original. As a result, she is a faster craft, and points better to windward.

Like her predecessor, Tahitiana has proven to be seaworthy, comfortable,

and safe for passagemaking. This is, in part, due to her lines, which were essentially true to the original. For years after Jack Hanna's death, his widow, Dorothy, sold his Tahiti designs by mail order. *Mechanix Illustrated* also had a designer come up with a design for a Tahiti II, which was two feet longer. These plans were offered in the magazine for many years.

These days only Tahitiana seems to go on and on. I still get orders for the boat plans from builders all over the world. Since the first hull was built and floated, I have received many letters from owners who have safely sailed in at least most of the oceans. One letter described a rather harrowing journey that included riding out a hurricane bare-poled for three days off Cape Hatteras. The owner praised Tahitiana's stability and seakindliness even under the most extreme conditions of wind and wave.

Wes Farmer is the son of the late E. Weston Farmer, N.A., the designer of Tahitiana. The latter passed away in 1981, but Wes still sells 23 of his father's designs created specifically for the amateur builder. A catalog of these designs can be obtained by sending \$2 to Weston Farmer Associates, 18970 Azure Road, Wayzata, MN 55391.



Boat Economics 101

I called my friend Phil one afternoon to ask his opinion of a 19-foot Spacesailer I had seen at a boatyard in Spokane. I had been halfheartedly looking for a daysailer for a few months and knew Phil had once owned a similar boat. When I told him the price, he said, "Offer them half the asking price, but be prepared when they say 'Yes.'"

So began my education in the commerce of sailboats.

Phil was without a sailboat at the time, and he suggested that perhaps I would be interested in a partnership. That way, we could get twice the boat for the same money.

I had shared a dog with a neighbor boy when I was young. You know the arrangement: two boys find a stray and decide to share it. One week the dog was to be at my house, next week at his. The first week at my house lasted 14 years. I figured, "Hey, a partnership in a boat might not be too bad."

Or, why the ex-owner's wife sends me cheerful cards every Christmas

The Spacesailer deal didn't work out, so for the next few months I had a great time. I made my own spec sheet for prospective boats. I looked at dozens of private-sale boats. I hauled myself to at least 20 brokers. One day I saw an ad in Seattle's *48° North* magazine for a 23-

foot Ranger, designed by Gary Mull, for sale in the south Puget

Sound area. I called the number and talked to Robert, the owner, and apparently an eager seller. On the phone, he reminded me of the singer James Taylor. I figured what the heck, he was going by the name of Robert to avoid the press. He suggested that perhaps, if it were convenient, he could

send a limo to pick me up so that he could show me his boat. I had seen 300 boats by that time, which computes to 300 owners eager to sell, 150 very hungry brokers, and 279 really ugly boats.

Reasonable price

Anyway, the offer of the limo wasn't really surprising. I didn't accept the limo ride, but Phil and I did take a look at the boat and were quite impressed and felt the price was reasonable. Then again, there were so many boats and so few buyers, we could probably afford to continue to look. Cripes, this boat would probably be on the market for another year or so. What was the rush?

The phone rang one Sunday afternoon. It was Phil. He was sorry, and he hoped I would understand, but he really couldn't go in on a boat at this time. I hung up, thinking the quest would have to continue on a smaller scale, when the phone rang again. It was Robert.

"Hi," Robert said, "have you bought a boat

The Ranger 23 that won Frank's heart, after he crawled in and around only 300 other sailboats.

by Frank Johnston



yet?" I told him I hadn't. There were a lot of boats out there. It was winter, and I was having too great a time looking at boats to be actually buying one. The long, dark, wet winters in Puget Sound can really get to you. Take a tip from me. Go boat hunting. You don't even have to be in the market for a boat. Just put on your raingear and go. Brokers will kiss you just for coming in, and boatowners will treat you like the son they never had. Never give them your real name or phone number because Tim and his brother Tom from that boat place on Lake Union will call you every week for the next 20 weeks hoping you'll buy that Olson 30 they showed you. If you really want your grass mowed, tell them you're a doctor, or a dentist, or an attorney, or someone else who has a great deal of money.

Ten-year sale

As I see it, the average boat is probably on the market for perhaps 10 years before anyone even looks at it. The first nine years or so, the sale is only in the mind of the owner's wife, and when she finally convinces him that the ad needs to go into the paper, it takes another year or so for the encrusted hulk to finally be sold. Be prepared to be treated like visiting royalty when dealing with a private-party sale.

"I'd like to make you an offer," Robert said. Whoa! Here is a really motivated seller. You know the kind, the guy who would be willing to include a first-born child, Sonics tickets for a year, and an autographed picture of Ted Kennedy if you would just take this boat off his hands. Then he quoted me a figure less than half the price he originally had asked.

"Robert," I said, "that's not the way it's supposed to work. I am the one who makes the ridiculous offer. You make a counter offer, and we negotiate until I

feel like I am getting a good deal and you get rid of your boat without feeling like you were robbed."

"No," he said, "you don't understand. I really need to sell this boat."

OK. Do I write a check, or do I take this guy to my credit union and withdraw

the cash in small bills? Then he says, "Oh yeah, if you want, I will sell you everything I have ever bought or had

given to me that has anything to do with boats that I have stored in my garage for an extra \$200."

I hadn't been this happy since I took a flyer on a Super Double Cheese Chili Burger and found out that it also came with home-cut curly fries and a large Coke. All the time this phone conversation was going on, I could hear his wife in the background yelling, "Give him a great deal . . . I don't care if we lose money . . . tell him you'll take monthly payments."

Popular fellow

Now I was thinking, "I'm not only going to get a great bargain on a boat, but I'm going to be a really popular fellow with this guy's wife." I can see it now. He bought the boat thinking she would love it. He took it out with his friends a couple of times, and then on a really windy day he took out the missus. She didn't like the boat heeling past five degrees, and then he yelled at her when she didn't know her downhaul from a seat cushion. Now she

won't go sailing with him anymore. He has poured a ton of money into this obsession, and she resents it. I'll bet I get a Christmas card from this woman every year for the next 10 years. She even offered to help me find financing if

I needed it. She probably would lend me the money herself, interest free. There is nothing better than a really motivated seller unless it is a motivated seller's wife.

Thirty minutes later I had the combination to the boat, the transferred title, and a pickup load from his garage. His wife stood there with an enormous Disney smile that said, "Thank you, thank you, thank you." As I was getting into my truck, I saw her put her arm around his shoulder and say, "Honey, your psychiatrist will be very happy you did this." When I got home and went through the boxes from his garage there was almost a thousand dollars worth of boat gear and equipment. Four years later, I'm still finding things I didn't know I'd bought.

A couple of days after the deal, I had a rather uneasy feeling that Robert would be down at the dock on a regular basis, making sure I was taking good care of his ex-boat. So I looked around for different moorage. I found it at Deferred Maintenance Marina. That's not really the name of the marina; that's just what my kids called it after they had been out there a couple of times.

Emmy winner

Deferred Maintenance Marina was run by a woman who obviously didn't like being there and resented any

intrusion into her constant meditative state. Yes, she did have a slip open, she admitted, and by the way, how

much water does the boat need? Now, any marina where the boats tip over when the tide goes out has got to be a little suspect, but the price was right. As it turned out, at the

"Brokers will kiss you just for coming in, and boatowners will treat you like the son they never had."

"He suggested that perhaps, if it were convenient, he could send a limo to pick me up so that he could show me his boat."

lowest tide of the year there were actually 3 1/2 inches of water under my keel. Better still, Robert didn't know where his ex-boat was going to be.

This place could have been given an Emmy for neglect. The docks had been replaced a few years previously with untreated hemlock. Within minutes of installation, the nails began to rust, and the wood began to rot. I hear tell that the owner borrowed a truckload of money, went cheap on the dock fixup and ran off to Reno with the rest of the money and a dental hygienist from Humptulips. In any case, his wife divorced him, and she was now running the marina and attending law school. She must have seen what the attorneys got in the settlement and figured it was more lucrative than running a marina.

The end of the slip where I kept my boat was half submerged because the Styrofoam flotation had melted when the gas line at the fuel dock sprang a leak one evening. Come to think of it,

the entire dock system appeared to be sinking. One day, when I plugged back into the shorepower, nothing worked. I walked to the end of the dock to bang on the breaker box, hoping the technique I had mastered years ago to keep my television from constantly rolling would work again.

Cool fireworks

Before I could get to the box, sparks and smoke and that unpleasant odor of burning insulation erupted from the dock halfway to my boat. The wires had been run through plastic conduit, but as the dock system began to sink, one of the junction boxes took on water, and the fireworks began. "Cool!" my son said, "And we didn't even have to go to the reservation to buy the stuff." The zincs on all the boats in the marina were probably toasted in that one nano-second, and the depth sounder on my boat began to work for the first time since I bought it.

As winter passed into summer and beyond, Deferred Maintenance Marina began to take on a certain charm. A patina that comes only through contact and use began to show through the years of neglect. I have spent many wonderful hours sailing out of this marina and still look forward to the time I spend there. The people who keep their boats there have helped me understand that it isn't just a place to keep my boat, but a small community of characters.

They are eccentric and wonderfully helpful, and as I've come to know the sailors who keep their boats there, I've learned that owning a boat means having new friends who represent a large accumulation of knowledge and experience that would take years to learn from books. All that and more make me look forward to just going



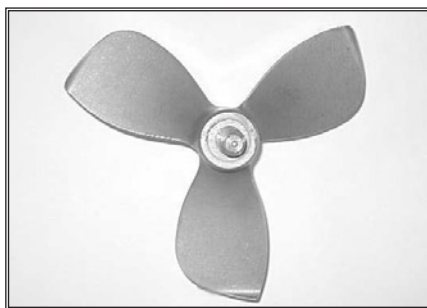
Deferred Maintenance Marina may not seem like much at first, but it grows on you.

there, even if under the pretense of making sure that my little boat is properly tied or covered. Sure, the ramp from the dock to the store and the parking lot still looks like it could drop into the bay the first time some over-appetited boater assaults the ramparts at low tide, but I quit worrying about it when one of the other boaters said, "Hell, why worry about the ramp? If it fails while you're on it, you'll own the marina."

Let's hope I don't survive the fall.

Frank Johnston, the proud owner of a 1972 Gary Mull-designed Ranger 23, sails the Northwest Coast. We'd tell you where Deferred Maintenance Marina is, but we fear Robert would find him.

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Boat: Bayfield 40 feature boat; Pacific Seacraft Flicka boat review

Features: Vessel in the fog; Why?; Christmas Eve on Kinery Rock; Scott Kennedy, artist

History: Pearson era and the birth of fiberglass

Small Boat Journal Remembered: Removing immovable objects

January/February 2000

Technical articles: Repowering, replacing your diesel (part 2); Bottom paints;

Riding sails; How we keep time (and why); Heating and cooling your boat; Restoration of an Alberg 30

Boat: C&C Redwing 30 feature boat; International Folkboat boat review

Features: The Git-Rot boat; Good old consignment shops; Iceboating photo essay; Sailing women role models; Georgetown wooden boat challenge

Small Boat Journal Remembered: Whisker poles

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Continued from 3

the qualifying period. Most cruisers wintering in an EU country will fall into this category, and there should be no problem (unless you are trying to pull a fast one such as selling your boat over here or using it for chartering, or if you just bought it before crossing to the EU). This completed form, signed by a customs officer, then establishes your boat as your normal home temporarily imported into the U.K. (and also the EU) free of custom duty and VAT for an indefinite period of time. Also, there is no charge for this permit.

These are EU regulations, not just the U.K.'s. Still, we have all heard horror stories, especially those associated with France. They should honor this regulation, and I will report back, after transiting through France to the Med, as to how we made out.

Boaters still have to ensure their personal immigration visas are current. The U.K. seems to be co-operative and after the first six-month period has expired, will help in extending a visitor's visa for another six months. I personally am pursuing a "Right of Abode" status which will give me an indefinite working and residential visa and, if I wish, a British (now EU) passport. As my father was born in England, upon my submitting documentation, including his birth and marriage certificate and my long-form birth certificate, I can qualify for this status.

We have found the U.K. customs and excise and the immigration officers over here most co-operative and accommodating. However the U.K. has great concern about keeping rabies out and are very strict about animals on board. Regardless of the vaccination certificates, etc., that boaters may have for their pets, until the current law is changed, pets will not be allowed to land (even on the docks or pontoons) without a six-month quarantine period.

* The term EC, which stood for European Community is used in the Notice #8 dated April 1996 as that was the term then; now replaced by the current designation, European Union.

Aubrey Millard
London, England

Siphon breaks, schmifon breaks

Your December 1999 newsletter talks about siphon breaks in the head plumbing, and one correspondent states that a siphon break cannot be installed in the inlet loop. I have installed a primitive sort of break in my head inlet hose, consisting of a plastic plug screwed into the wall of the hose, with a half millimeter hole drilled down the center of the plug. The hole is not big enough to prevent the pump from being primed, as the toilet flushes well. The only problem is that a small amount of water sprays out from the plug. I have solved this by hanging an old face washcloth over the plug which absorbs the water (which eventually evaporates), and I rinse the salt out of the cloth once or twice a year. As a siphon break, it works perfectly. I feel the inlet side is the one most at risk of siphoning water into the boat, as it is the natural direction of water flow. The outlet hose I have left without a break as the natural

with a 3mm hole at the top of the loop and insert the plug. This is enough to ensure a siphon break but too small to be of significance to pumping efficiency or to leakage.

Chris Waln
South Riding, Va.

What's this about whisker poles?

I just received my January 2000 issue of *Good Old Boat* and was browsing through when my eye caught Small Wonders: "The small convenience of a whisker pole." When I came to the last paragraph on the first page where Ken Textor states, "It's always best to have the jib and whisker pole set on the side opposite to the main boom, etc.," I immediately stopped reading and put the magazine down.

I would have you know, Ken, that a whisker pole has as much merit or usefulness holding the jib out on the leeward side of the boat as holding it out on the windward side "opposite to the main boom, etc." because the jib without the benefit of a whisker pole has the disadvantage of not having an optimum sheeting position except when close-hauled, if then. When set in any manner but close-hauled, the jib will have too much draft and/or twist to pull optimally. Two factors in the design of many sailboats work against a jib having an ideal spot to be sheeted to: 1) The shrouds are often in the way; 2) The boat doesn't have enough beam. Behold the whisker pole!

The whisker pole can be used when the apparent wind is most anywhere except close-hauled to further enhance the shape of the jib. Mind you, I don't advocate using it close reaching right next to close hauled when sliding the car

forward is a better compromise, but I do set it aft (as well as forward) of the shrouds sometimes, letting the sheet run through the eye at the end of the pole to keep undue forces off the shrouds if the sheet is released. In this way, I can put less draft in the jib, helping it to keep laminar flow farther along its camber, thus using more of the aftermost portion of the sail.

When there is too much draft in a sail, you only get the use of the forward part of the sail for drive and the after part is drag. This also keeps the jib



We don't mean to brag, but (well, actually we do mean to brag) some people go to great lengths for Good Old Boat magazine. This is Alan Oberlander. He's become such an evangelist for this magazine that when asked to climb someone else's mast he agreed to do it only if they'd promise to subscribe!

flow is overboard, and my through-hull is a few inches below the toilet outlet.

Alan Porter
Victoria, British Columbia

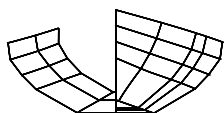
While we're on the subject

About venting head hoses: it is not universally true that supply lines are not vented. The LAVAC head supply line must be vented for proper operation. The issue is the diameter of the vent hole. LAVAC supplies a small plastic plug with a hole about 1/2mm in diameter. You pierce the supply hose

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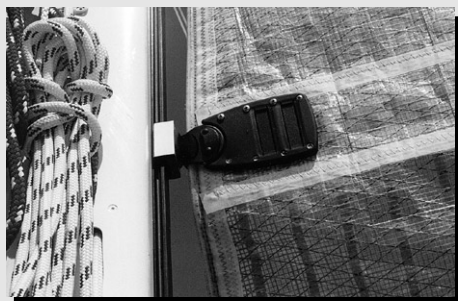
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from back-winding the mainsail, allowing it to be sheeted out more and thus be more efficient. We all know that a sail's drive is perpendicular to the cloth, so the farther out the sail, the closer to forward it is pulling. I might add that while my pole is not adjustable, I keep an adjustable line on the pad-eye on the mast to go between pole and mast. My pole is longer than the J dimension, as well it should be if maximum efficiency is to be had.

And now about Jerry Powlas' article, "Not just for running anymore:" when was the whisker pole ever just used for running? Jerry, you make good sense carrying the jib winged out closer to the wind than broad reaching. On a boat, the farther two sails are from each other until they stop interacting, in my humble opinion, the more efficient they each are despite what you might read about overlapping sails. I have along the leach of my jib knitting yarns about six inches from the leach in like fashion to the luff for when I'm using the jib backward. But the maximum draft, of course, should be forward and when the sail is turned around . . . well it's your call, but I very often use the pole on the leeward side. I also jibe the main without touching the jib. Gosh, I wish I were sailing now.

Joe Creecy
Portsmouth, Va.

What to do about diesel smell

I have a problem with my good old boat, a 1972 Swan 40. The previous owner had cut an auxiliary fuel line without plugging it. This resulted in venting diesel directly into the bilges on my maiden voyage.

Some of the bilge is not accessible as the engine compartment is enclosed above the bilge. Sooo, I have wiped, flushed, scrubbed, etc., and still have a strong odor of diesel in the boat. I installed a bilge plug when the boat was pulled for the winter. This helps flush the bilge, but I still cannot get the smell out. I suspect there is a black, slimy, smelly residue which I cannot reach.

Is there a product which will get the mess out without direct hand wiping/scrubbing contact? I did find that using Goo Gone to clean up some brushes and a sponge worked better than the best of bilge cleaners offered by the boatyard. But gallons of Goo Gone in the bilge may qualify as a hazardous waste disposal issue.

Any suggestions will be appreciated. Need I say, I really enjoy the magazine

and find that the subjects fill my needs for information and ideas.

Steve Edmondson and Kiki Randall
Cape Elizabeth, Maine

I've never had to solve a problem like yours before, but I'll give you some untested suggestions. Simple Green is a product that is used to clean up oil spills. We've asked the manufacturer all the questions we could think of, and we think (note: no actual experience here) that it is both safe and effective in a situation like yours. It is basically an emulsifier and surfactant which, when mixed with a little water, just might carry away the fuel residue.

Try to form a pickup out of a copper tube (soft copper tubing is easily bent to different shapes), and then use a self-priming pump (like a Par Jabsco) to pump from the lowest point you can. Flush with Simple Green and pump from a low point. Some water may actually help since it will tend to float the fuel to the top. Oil floats on water.

After the Simple Green has done what it can, try a dish detergent like Dawn. Simple Green is not a detergent, so the two may do different things, but between the two of them, you are likely to flush your bilge clean.

Once you have had your best shot at cleaning out the fuel, you may be able to get rid of the odors that remain with charcoal. Buy the simple cheap (non self-lighting) kind, put it in loose mesh bags, and fill the (now dry) bilge with it. Activated carbon is a popular odor absorbent. I don't know that I could do the chemistry and physics justice, but I do know that I have seen charcoal used that way to remove odors in refrigeration cases. I think diesel vapors are a particularly good candidate for removal with charcoal. A small fan blowing the bilge vapors on the charcoal will help speed the process. Later, you can burn the charcoal to dispose of it. Use a lot of air exchange with the boat's interior to speed the deodorizing process.

Good luck with this. I've not tried any of it quite like what you have to do in this case, but I have removed oil from our bilge with Simple Green, and I've seen charcoal used as stated above. Let us know if any of this (or anything else) works. We'll pass it along.

Fixer uppers webpage scores

Thank you for listing the fixer uppers page (on the *Good Old Boat* website) as I am now completing a deal on a 1976 O'Day 27 that was listed on that page. She will have a new home on the Ghost Lake west of Calgary, Alberta. I will

send some pics in the spring when she is in the water.

Lee Hunt
Calgary, Alberta

I recommend

Captain George Leonard, C.M.S. (president and senior surveyor with Associated Marine Surveyors, Inc. 207-846-4900) personally conducted the pre-purchase survey for my boat in 1997. He has many years of experience on all types and manufacturers of boats and was very thorough in his survey of my boat. I wanted to have a surveyor who was familiar with and had done previous surveys on a 1969 vintage Swan. Captain Leonard was the only one I could find in the Maine area where my boat was located for sale.

Hiro Nakajima
Stamford, Conn.

Happy New Year

Hasn't it been nice owning old, Y2K-compliant boats? They'll probably be ready for Y3K.

Mike Berg
Golden, Colo.

Fiberglass is fiberglass

I just read a book that anyone thinking about painting their good old boat should read. *Painting Your Corvette* by Mid America Designs published by Classic Motorbooks. 800-826-6600. 100701C. 1985. 42 pages. \$6.50. Don't let the car reference distract you. A fiberglass car is just a boat turned upside down and stuck on a set of wheels.

This book is not about how to apply paint. There are plenty of books around that do that. This book is about what makes a fiberglass paint job succeed or fail. It covers little things like which body putty expands at the same rate as FRP and which strippers and reducers will soften which putties.

The chapter on Paint Failures — Causes & Remedies is an education. Readers will be able to walk around their boats with the book open to this section, recognize what's wrong and what caused it, and understand what it will take to fix it.

Even if readers are not painting their boats themselves, they will learn enough to know whether their hull is being prepped correctly. And who knows, their professional painter might find something useful between the pages, even if he's been painting hulls for years.

Peter C. King
Signal Mountain, Tenn.

What about the BI 40?

As the owner of a 1958 Block Island 40 I have been looking at the history of fiberglass boating very closely for 12 years now and was very excited when I first saw the history article in your November 1999 issue. After reading it, however, I was disappointed that the Block Island 40 story was not even mentioned. It appears, from periodicals I have read, the Block Islands were in fact the grandfathers (or grandmothers) of all production boatbuilding as we know it today . . . using molds, gelcoat and interior assembly prior to hull/deck marriage.

It seems that a group of people were amassed by a lawyer/boat racer named Frederic Lorenzen to construct a large fiberglass raceboat because Frederic hated leaky wooden boats (and had the money). He found or met William Tripp Jr. wanting to try his hand at designing a fiberglass boat. Mr. Dow agreed to supply the glass and polyester materials, and the Beetle Boat Co. of Greenwich, R.I., came on board to do actual construction of a hull and deck from which the first production large ocean racer molds were pulled.

The first hull and deck were assembled to form *Seal* (which we have come to call home for the last 12 years.) However the story continues that *Seal* was launched in the spring of 1958 (about the time the Pearson group was trying to get the first Pearson Triton done for the 1959 boat show) and immediately began winning open ocean yacht races. Soon many more of these first production, big ocean racer/cruisers were pulled from first production fiberglass molds and joined *Seal* in her early domination of those yacht races of the '60s.

OK, let's recap: which company was the first big fiberglass boat producer in America where the molding methods of today were used (not one-offs)? Next question, why do people think

Pearson was the first production fiberglass boat? Some of you think the Bounty people were first . . . Well even author Steve Mitchell throws up his hands on that one, as he said at the end of his article, "the pocketbook somehow counts."

Jerry Packer
aboard *Seal*, Puerto Rico

Not just for men anymore

Found your magazine through the recommendation of a friend of mine and subscribed. I really enjoy it, and my significant other fell upon it like a man starved. (He subscribes to every other boating magazine on the planet.) You are *my* one and only.

Constance Mussells
East Greenwich, Conn.

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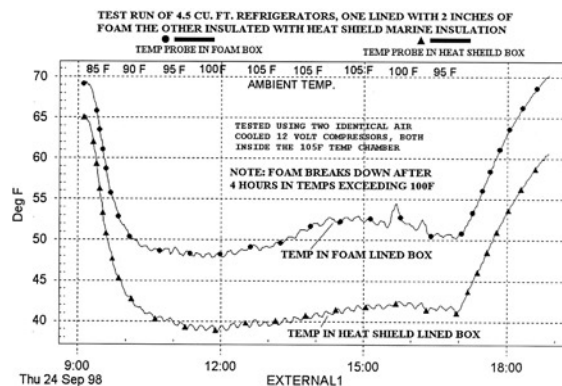
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I'd be nuts

Well, what can I say? Since receiving his subscription and the three back issues, my husband has read each and every issue from cover to cover. He has read several issues two and three times through. I believe this newlywed wife of 15 months has purchased **the perfect gift** of all times. I would be **nuts** not to renew, so I shall. I will send my check before Jan. 1, 2000, but the check will be dated 01/01/00. I want it to be the first check I write in the new millennium! So please, keep us on the subscription list! (It could be a matter of happiness/necessity, or I walk the plank!)

To let you know, some of Greg's favorite articles are the ones on cooking. **He** is the cook of the home and boat. He *loves* to read articles and recipes on cooking with a pressure cooker. He went out and purchased two books on pressure cooking before we set sail for a six-week adventure to the North Channel this past summer.

Keep writing, you two, as you help to keep us all "close" together.

D. Gregory and Carol Fox
Marblehead, Ohio

Carol, it sounds like Greg's lucky to have found a sailing woman, and you're lucky to have found a cooking sailor! This marriage should work out just fine.

Refreshing approach to life

I want to encourage you and thank you for your refreshing approach to life as demonstrated by your magazine content and way of doing business.

As to the content, it is both inspiring and practical. I was particularly touched by the psalm of praise, "Reflections," by Brian Backstrand, especially by the fact that you chose to publish it. It is good to know that your appreciation of "old things" goes beyond the realm of boats. On the practical side, as former owners of and live-aboarders on a Tahiti Ketch in Hawaii looking forward to early retirement, we appreciate the wealth of information your magazine affords as we sort out what kind of boat to buy for our sort of sailing.

I am also amazed to receive the notice of a decrease in subscription rate for us here in Canada. Thank you for your good sense and integrity. You are truly providing a much-needed service to a growing segment of society.

Sylvia Horvath
Waterdown, Ontario

Sylvia, you'll be interested in our mention of the Tahiti Ketch and

Tahitiana in this issue on Page 56. For those who didn't know about our Canadian price reduction, we were able to eliminate the postage surcharge on Canadian subscriptions once we began printing the magazine in Canada. It seemed like the right thing to do.

Keep feeding the passion

As the end of the rolling year approaches, I wish to express my thanks for the great efforts you and your colleagues have made to provide us, the *Good Old Boat* readership, with a well-written, useful,

satisfying, and entertaining journal. As you so well realize, sailing and sailboat ownership elicit passion. Your writing and editorial efforts help feed that passion. You have my best wishes for continued success, health, and happiness for you and your family.

John L. Reizian
Madison, Conn.

Send questions and comments to Good Old Boat, 7340 Niagara Lane North, Maple Grove, MN 55311 or by email to jerry@goodoldboat.com. Please limit them to 150 or fewer words (we reserve the right to edit).



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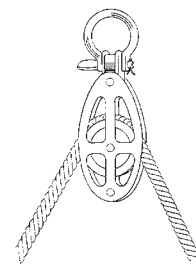
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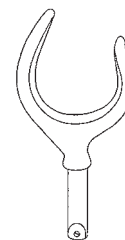
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Stove fuels continued from Page 53

Watch out for CO

With electricity as the exception, it's important to make sure that the galley has sufficient oxygen to keep the stove working properly. A deficiency of oxygen causes any fuel to burn improperly, resulting in an output of carbon monoxide, rather than carbon dioxide.


For this reason, a carbon-monoxide detector is a worthwhile investment. We have one aboard our boat that saved our lives in Alaska. One night after having hot cocoa before bed, we accidentally left the pilot light in our oven on. Even with a cracked hatch, there was not enough oxygen inside the cabin. We were slowly awakened when our CO detector went off, releasing a mind-boggling blare of noise that just barely woke my husband, Chuck, and me. The kids were sound asleep with the detector right above their heads. We were able to get the kids and ourselves out of our cabin in time, with only headaches to complain about. The fresh air never felt better. Now we make sure the CO detector always has a good battery.

Decisions, decisions

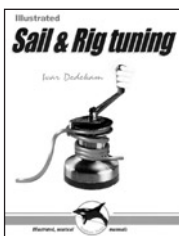
In Jimmy Cornell's book, *World Cruising Survey*, the most popular cooking fuel was LPG. In fact, 138 boaters chose LPG with the other fuels barely showing up: 17 others chose kerosene; two chose diesel; one chose alcohol; and two chose electricity. LPG was the most popular choice among the people I talked to, as well. But I found many more owners who chose alcohol than Jimmy did. This is probably because I talked to coastal cruisers and weekend boaters. I also talked to only 32 stove owners. For what it's worth, refer to the chart of my findings on Page 53.

Which to choose?

After weighing the pros and cons of the dirty half-dozen, I still haven't made up my mind about which to choose. But our plans for cruising outside the U.S. have ruled out CNG and alcohol. And electricity won't work aboard our boat without a generator. LPG is at the top of our list, but I hesitate because of memories of singed arms, flames in my face lighting our oven, and waking up to our carbon monoxide detector blaring. All these are memories from forgotten pilot lights and burners not turned off completely. It makes me gun-shy. I know the safety mechanisms on the new LPG stoves, as well as a proper installation, will take care of those problems. But should I choose to have our family depend on that?

Then there's kerosene and diesel to consider. Decisions, decisions. Maybe we could buy a new good old boat with a stove already installed so I could leave this decision to chance. Maybe I'll make Chuck decide. 

Theresa and family have lived and cruised aboard Lindsay Christine, a Mercator Offshore 30, since 1995. In another life long, long ago and far away, Theresa was a home economist with a specialization in consumer education. After receiving her BA in home economics at the University of Montana, she went on to become a master food preserver with the co-operative extension office in Montana.



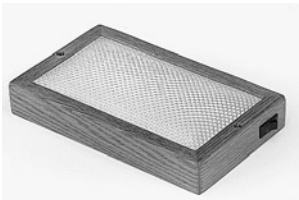
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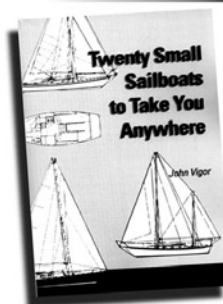
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Amazing variety in sailing books

For history buffs

The Custom of the Sea, by Neil Hanson (John Wiley & Sons; 1999; 315 pages; \$24.95). Available in April, 2000.

Review by Bill Hammond, Minneapolis, Minn.

A book like this comes around rarely. It reads like a gothic novel but has all the research and facts of a court presentation. It is a true story, but its truth may be instinctively denied by the reader, so terrible is its basis. Despite an absorbing and well-written plot, the reader may at times be tempted to stop reading — if not in revulsion, at least in prayerful contemplation — but the urge to turn another page will prove too irresistible.

In brief, *The Custom of the Sea* is a masterpiece of literature, historic jurisprudence, and English maritime history. Above all, it is a stark testament to Man's will to survive.

It is a sailor's book, but the ethical and legal points it raises will be debated with equal passion by lawyers, priests, housewives, CEOs, and others who may not know a bowline from a bow line.

It's the 1890s and the "golden age of yachting" is in full swing in England. Tom Dudley has been commissioned to deliver a racing yacht, *Mignonette*, from Essex, England, to her owner in New South Wales, Australia. At first it is difficult for Dudley to secure a crew, there being some question regarding the yacht's seaworthiness. But ultimately he is able to settle on three: two able-bodied seamen, Stephens and Brooks, and a young lad, Richard Parker, who is keen on adventure and the romance of sailing.

Off the coast of Africa the *Mignonette* is hit by a ferocious storm. For five days the ship runs barepoled with the hurricane-force winds until a

rogue wave broaches and swamps her. With only a sextant, a chronometer, a wooden baler, and two tins of turnips, the men crawl into a 13-foot lifeboat and watch the *Mignonette* slip beneath the waves.

What follows are the horrific details of three weeks in an open boat with sporadic rainwater to drink and no food to eat beyond the turnips and a sea turtle they happen upon. Their suffering and agony intensify as each hour of each day passes with no ship sighted on the horizon.

On the 24th day Captain Dudley says, in little more than a whisper so swollen is his tongue, that the time has come to follow the well-established "custom of the sea." Lots must be drawn to determine who will die so his body and blood might sustain the others. The deed done and their bodies now nourished, the three remaining men hang on until a German vessel sights them and returns them to England.

At home, a new wave of horror awaits them. Captain Dudley has done nothing to hide the truth of what happened in the lifeboat. To his mind, he has only done what others before him in similar circumstances have done for centuries, without punishment.

But the home office in London has been waiting for

an opportunity to expose and forever outlaw the custom of the sea. The citizens of Southampton and other seafaring towns may greet Dudley and his shipmates as heroes, but English law regards them as murderers. The trial that ensues becomes as engrossing as the deeds in the lifeboat, as both sides argue their case before the bench, the press, and God.

However large one's personal library may be, there are only a few books therein that have the power to leave a lifelong impression upon the reader. I predict this will be one such book.



For lovers of beauty

Sails & Sailing, by Franco Giorgetti, (Mystic Seaport Museum; 1999; 175 pages; \$50).

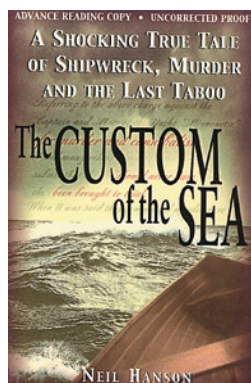
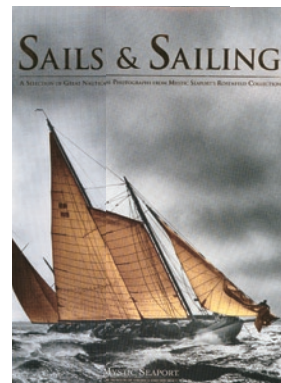
Review by Karen Larson, Minneapolis, Minn.

Lovers of sailboats, the shapes of their hulls, and the shapes of their sails (no matter how many masts or how the sails are cut) . . . people who are caught immobile in contemplative reflection at the silhouette of a sailing vessel or the lines of one at anchor . . . sailors whose hearts sing at the sight of a sailboat, whether lighted or muted by any of nature's moods . . . these connoisseurs will be captivated by this new book.

Mystic Seaport is home to the Rosenfield Collection, an archive of nearly a million treasured photographs focusing on boating throughout the 20th century as father and son, Morris and Stanley Rosenfield, photographed recreational and competitive boating and collected the images of other nautical photographers. Devoted to sailing images only, this book captures the history, the exuberance, and the beauty of North American sailing in 85 images both breathtaking and insightful.

This new arrival to an exclusive group of coffee-table masterpieces, *Sails & Sailing* is lavish without pretentiousness. Its gorgeous black-and-white photos are subtly touched with amber in a duotone process — a printer's rich understatement of classy good taste. While it looks like a historical collection of black-and-white images, do not be fooled. No expense was spared in selecting these images and publishing them as powerful expressions of the photographic art.

Sails & Sailing itself is a work of art because of the quality with which it was crafted and the images on which these crafts are focused.



For West Coast boaters

Revised and Expanded Cruising Guide to San Francisco Bay, by Bob and Carolyn Mehaffy, Paradise Cay Publications; \$29.95).

Review by Denece Vincent, Tracy, Calif.

San Francisco is one of the top tourist destinations in the world. What better way to see the city and its environs than from your own cruising yacht?

Bob and Carolyn Mehaffy, using many photos, chartlets, and lush descriptions of the available attractions at each stop, have shown San Francisco Bay to be a multi-faceted sailing destination. Their new guide surpasses even their previous book on this topic.

The Mehaffys spend the first third of their book familiarizing the reader with the history and geography of the area and providing information useful to the mariner. For the benefit of visiting voyagers, they have a small section dealing with gear commonly used by local sailors. This is presented in a friendly and conversational tone that carries through to the rest of the book.

At the heart of a cruising guide are descriptions of local anchorages and attractions. Here the Mehaffys' new guide shines. Dozens of potential

weekend or vacation spots suiting all moods and seasons are vividly described. I was delighted to find their descriptions of the places I was most familiar with to be quite accurate. This gives me very high expectations for the other sites I have yet to explore.

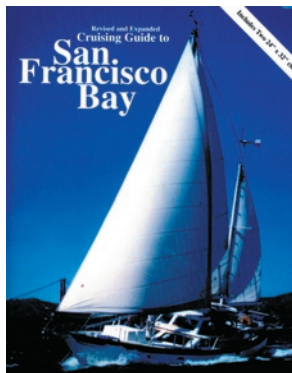
The one exception is that no mention is made of the often tumultuous wakes and strong currents that can trouble boaters anchored at Paradise Cove.

Perhaps the authors felt these would be so obvious to experienced cruisers that they didn't merit a mention, but it did make me wonder if anything negative might have been left out of any of the other descriptions.

On the other hand, the section on Tomales Bay, much of which appeared in *Cruising World* (June 1999), now carries a photo

of the sobering "Notice to Mariners" about the Tomales Bar and additional information about the often-dangerous bar across the entrance to that bay. It also rhapsodizes less on the enticements of this cruising area than the earlier version does.

I would not hesitate to recommend that local boaters take a good look at adding this volume to their bookshelves. Voyagers planning to pass through the area should consider this book a must-have. They will find even more reason to spend time sailing San Francisco Bay once they are aware of all this area has to offer them.



For handy, capable types

The Epoxy Book, by W. Kern Hendricks (A System Three Resin publication; 48 pages; \$5 — but free with the System Three Epoxy Trial Kit Phone: 800-333-5514. <<http://www.systemthree.com>>).

Review by Peter C. King, Signal Mountain, Tenn.

This is not a book about boat construction; it's a book about using epoxy resin in boat construction. The value of this book lies in the background of its authors. These people are chemists. They explain why they sell four different formulae for epoxy resins, and they pull no punches about safety — they suggest you take your business elsewhere if you're not going to pay attention.

The chapter on measuring and mixing systems alone makes this book worth reading. It deals with weight and volume techniques, error ranges, and problem symptoms.

The heart of the book concerns the techniques of epoxy use. Coating, fiberglassing, fillers, structural adhesives, filling, fairing, and molding are all covered. Do you know the difference between thixotropic and bulking agents? Maybe you should. What about the different additives that improve tensile strength? You'll read this section many times. It's packed with real advice. For example: "We now recommend against using acetone or similar solvents for cleaning the surface

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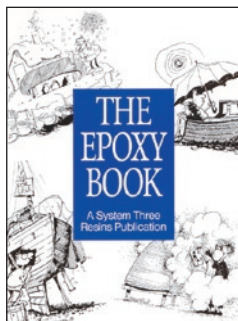
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to be glassed. Much acetone sold today is reclaimed and may have impurities that interfere with secondary bonding by leaving a film of residue on the surface."

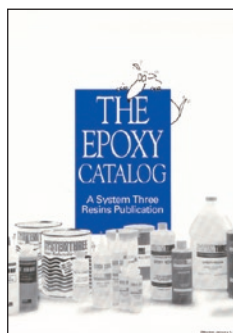
There's more good advice about painting epoxy and its use for specific jobs on boats of all materials, but it doesn't stop at the back cover. There's also a free booklet called *The Epoxy Catalog* that lists the materials you need, including resins, cloth, fillers, additives, and measuring and mixing systems. And, while the subject is serious, the illustrations are not. Both books are filled with cartoons by an artist from Queensland, Australia. Very droll.

Aren't these books simply a marketing tool? Of course. But at least



you understand their agenda. By teaching you about a confusing subject, they hope that you will buy their products instead of someone else's.

Even if you decide to use another brand of epoxy, the rules are the same. And, even if you don't fix anything with it, won't it be nice to understand your repair people when they talk about applying diglycidol ether of biphenyl A?

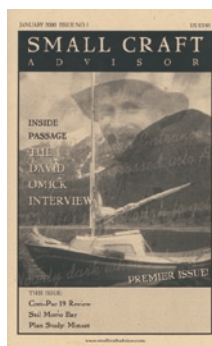


For small boat sailors

Small Craft Advisory, by Craig Wagner and Joshua Colvin; \$19.95 subscription. smallcraftadvisor@thegrid.net, 805-771-9393.

Review by Karen Larson, Minneapolis, Minn.

We just received the premier issue of the newest sailing magazine on the block. Called *Small Craft Advisor*, this one's likely to pick up where *Small Boat Journal* left off. It's hard to tell what all this hybrid between a magazine and a newsletter will become when it's fully grown, but it will be fun watching the evolution. It is currently a booklet-sized publication with 32 pages, counting the cover.



The publishers have chosen to include a boat review (starting with the Com-Pac 19), a destination article (Morro Bay, Calif.), an interview (a nice focus on David Omick, who helped establish the reputation of the West Wight Pottery), and a plan study (the Glen-L Minuet).

These types of articles are indicative of the content planned for coming issues.

In his introductory editorial, Craig Wagner expresses the view of the publication, "A 14-foot mini-cruiser is minimalist. A 19 is comfortable, and anything larger than a 25 borders on ostentatious . . . Josh and I are minimalists at heart."

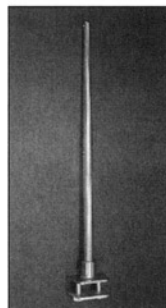
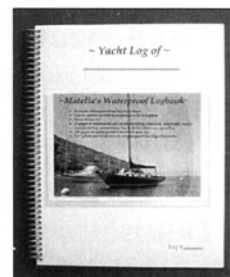


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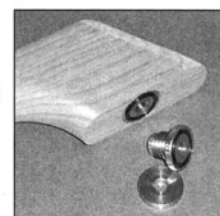
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Michael and Patty Facius, C&C 30 sailors.



Maker of these shirts and hats, Ken Kloeber, and Puppy.



Jerry Powlas, Good Old Boat technical editor.



Jim McCarty, sailor of a Hurley 22, Dutch Treat.



Mike Perlman and Zephyr.

Michael and Patty Facius sail a C&C 30, named *Callisto*, wearing *Good Old Boat* ball caps.

Ken Kloeber is the guy who really makes the *Good Old Boat* hats, shirts, and embroidery happen. Puppy helps Ken sail *Positive Impact*, a Catalina 30.

Jerry Powlas is modeling the Tilley hat. If someone else would send us a photo of himself or herself in one of these, we'd dump this shot in a heartbeat. We print enough photos of Jerry.

Jim McCarty sails *Dutch Treat*, a Hurley 22. Jim's the Hurley contact person on the *Good Old Boat* website associations page. If you haven't visited this site recently, you should take a look. It's amazing how many good old boats there are out there sailing.

Mike Perlman sails a Pearson Ensign, *Zephyr*.

Last tack



Relevance, superlatives, and the price of speed

People are exposed to a lot of “media” these days. More so than at any other time in our history. There is so much material being pushed at us that it is appropriate to ask, “What does this have to do with me?”

As an example, I see that another America’s Cup boat broke up. I’ve always had trouble relating to the America’s Cup. The relevance hook is supposed to be the trickle-down of all that high technology into the average sailor’s boat and gear. That’s questionable. My good old C&C 30 can already sail in “unusually large waves” in 17 knots of wind without breaking up. In fact, what little I do know about the America’s Cup tempts me to say, “Never have so few done so little with so much.” I tend to pass over most of the coverage of the America’s Cup and often can’t finish the articles I start. It just doesn’t seem like any of the racing I’ve known and loved. It seems not so much a competition as an extravaganza.


The thing that makes an extravaganza like a circus or the America’s Cup seem interesting is the superlatives: most expensive boat, or greatest number of expensive boats on a team, or perhaps the most expensive sails. The superlatives add interest, but there is a serious problem with superlatives in our culture. They make couch potatoes out of most of us and freaks out of the rest.

In contrast, there was a time in human history when even a modest musical talent was considered a plus for the average person. In the time before recording equipment, all music was live music, and there was always a demand for performers.

Ordinary people with modest talents sang and played for each other. It was an important form of entertainment. The same was true of acting and storytelling. Today, we can buy compact disks made by the best artists and hunt through 100 television channels to find high-budget films, some of which may even be well written and acted. Then we sit — passively — and listen and watch.

Fortunately, sailing is not a passive activity. Also fortunately, it makes a particularly poor spectator sport. It is something you must actively do to enjoy. I know I’m preaching to the choir here. *Good Old Boat* readers actively participate in their hobby.

So why do today’s Cup boats break up in moderate conditions? Why, indeed, are today’s crop of very serious racing boats not particularly good candidates for retirement as good old boats?

What is the price of speed? If you don’t close all the loopholes in a racing rule, somebody will always make a lighter hull for the advantage it confers, and perhaps win — or swim if it is just a little too light. We don’t really want that kind of thinking to trickle down into our good old boats. In a good cruising boat, well sailed, all sailors with smiles on their faces are winners. In big-ticket extravaganzas, the guys with the deepest pockets are most likely to win. The other participants lose, and most people just watch without participating at all. Perhaps that is the real price. 

by Jerry Powlas

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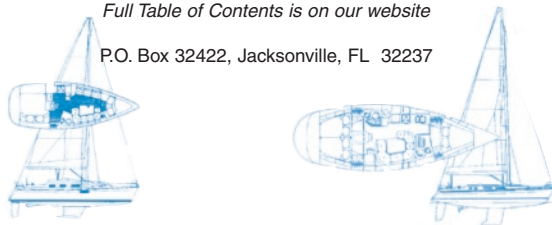
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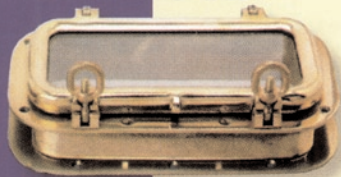
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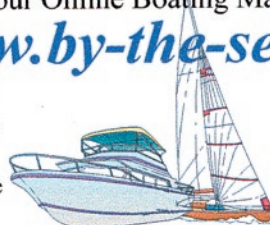
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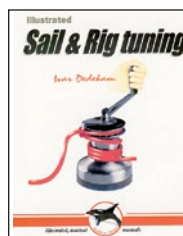
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Reflections

by Pat and Ken
O'Driscoll



Time flies. Whoever thought we'd become "good old boaters"? It's been just 20 years since we picked the site to dock our newly purchased 21-footer. Ten years ago we bought our present boat, a Niagara 35, that was featured in the November 1998 issue of *Good Old Boat* magazine. Although our boat barely qualified as a good old boat, the magazine's editor, Karen Larson, said *Good Old Boat* was also interested in good old boaters, so we qualified.

As the years went by we made many good friends among fellow sailors and dockmates. Now that we've earned good-old-boater status, we're beginning to reflect on what happens as we and fellow good old boaters sail further into the sunset, couples in their late 50s, 60s, and 70s who have been sailing for decades. They seem to fall into three groups, one or more of which we're all going to join eventually.

Good Old Boaters Group 1: The first, and least enviable, group usually has one, but sometimes both, of the good old boaters declaring that they've had enough of boating or they "want more time for ____." (*Fill in the blank with golf, gardening, grandchildren, gallivanting, or any other word, not necessarily beginning with "g."*) How do you respond to such a declaration, except to wish them a speedy sale and a good price for their boat? These folks disappear quickly from our boating life and are sorely missed.

Good Old Boaters Group 2: Some members of the first group probably are unwilling to admit that they really are part of the second group: those whose age, aches, and aches are catching up with them. Arthritis is particularly hard on a good old boater. After all, strenuous activity in a cool, moist, sometimes cramped environment is seldom recommended as a pain reliever.

As we age we not only ache but also tire more easily. The 40-mile jaunt to another port, that we did with such joy 10 years ago, now becomes a source of discomfort or weariness. Our observation is that most unwilling members of this second group, which includes ourselves, put up with the discomforts for a while. Then we gradually ease them by giving up the harder parts — but not the joys — of sailing. We pick our times and trips with a heightened knowledge of the conditions of weather, winds, distances, and our joints.

This knowledge, enhanced by the experience gained over decades, lets us enjoy sailing almost as much as we did 20 years ago. Eventually, some of the infirmities of age catch up even with those who have tried to accommodate them. It's a sad day when it happens, and some try to delay it by switching to trawlers. It works for some; but it's not for us.

Good Old Boaters Group 3: The third group consists of those wonderful paragons of good health, wisdom, and energy who seem to go on forever. They eventually reach a point where they (or the executors of their wills) decide the boat must go. Our advice is not to do it too soon, though; one of our dockmates forsook sailing to avoid injuries and fell off a ladder while trimming a hedge. That gardening stuff is dangerous.



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