1997 - #3 (FALL)

DIY boat owner

the MARINE MAINTENANCE MAGAZINE

Features

CABIN UPGRADES

Lighten Up
Here's how to upgrade your cabin interior lighting so that it's functional, flexible and decorative.

Wired for Light
Add-on lights are easily incorporated into most lighting schemes and will transform most cabins into a more efficient and safer living space.
By Daniel J. Gingras

Stoking the Home Fires Below
For fall, winter or early spring cruising, or just messing about below decks in the off-season, a cabin heater can make even a small boat a great place to be.

WINTERIZING

Off-Season Cradle Systems: An easy-to-built storage cradle for powerboats plus portable "legs" for any boat stored on the hard.

Tips for preparing your boat and engine for winter storage.

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For more winterizing tips, refer to DIY 1995-#3, 1996-#3, 1997-#3, 1998-#3, 1999-#3.

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By David & Zora Aiken

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TALKBACK Q&A

Adhesive Transfer

Q: While repairing my woodwork, I used high-quality 3M masking tape to protect my fiberglass hull. After a few days in the sun, the tape baked onto my fiberglass. What solvent or other methods do you recommend for the removal of the tape?
Mike Doran, myott, Meaford, Ont.

A: Conventional masking tapes (the yellow stuff), regardless of the quality, are not meant for outdoor use. A better choice is 3M 471 (good for seven days exposure), or 225, which can be left on for up to one month. However, there are various ways to remove your adhesive residue. One solution is to wipe the surface with lacquer thinner. Nail polish remover is also reported to remove the adhesive residue from masking tape: Just coat the tape, let it soften and carefully peel off. Another solution is to soak paper towels in turpentine and lay them on the residue for a few minutes to soften the adhesive. Use acetone or soap and water to remove the oily film left by the turpentine. We personally prefer 3M Adhesive Tape Remover (see our review on page 43), an item which would make a good addition to any boater's tool box.— JM

Cleaning Sails

Q: I need to wash my sails and would appreciate any tips.
Darvin Dolyniuk, Synergy, *Burlington, Ont.*

A: Synthetic sailcloth (Dacron and other fabrics) is covered in a coating that provides a water- and dirt-resistant finish. Washing may remove this protective coating and sails should be cleaned only when absolutely necessary or when you see signs of mildew. Never dry clean or put sails in a washing machine or dryer. Sails may be soaked in lukewarm water with a mild soap or detergent (such as Sunlight), or use a sail cleaner such as Davis Foaming Sail Cleaner, which also works well as a spot remover. Use a sponge or soft brush to loosen the dirt. Never use an abrasive cleanser (i.e. Ajax) as it will break down the finish and stitching. Rinse thoroughly with fresh water. Spread the sail on the lawn to dry or go for a sail. Keep in mind that mildew adheres to dirt, so keep your sails clean and dry. — JM

What is a Line Drive?

Q: I'm considering purchasing a Forespar Line Drive whisker pole, however, I don't fully understand how they operate, even after reading descriptions in various marine discount catalogs. Please clarify for me.
James Boyer, Mi Amour, *Tolchester Marina, Maryland*

A: Forespar's line-drive system is easier to set than traditional twist-lock or lock-button systems. A line runs along the outside of the pole, held in place with eyestraps and dead-ended with a stop knot at the outboard end. At the inboard end, a jam cleat is mounted on the top of the pole just before the end, then the line runs through the pole end fitting and inside the extrusion. To adjust the length of the pole, you uncleat the line and extend or retract the pole and recleat, then tie a half-hitch around the pole for safety. It's designed as a set-it-and-forget-it system; it's unlikely there's enough purchase to make adjustments when the pole is under load. — JM

Refrigeration Woes

Q: I have just purchased a '88 Bayliner 6m (20') Capri equipped with a 12-volt Koolatron that's defective, as it generates heat instead of cold. Is this unit repairable? Also, if the unit is to be scrapped, what type should I replace it with?
Claude Ladouceur, Coquin, *Lake Brome, Que.*

A: The Koolatron is a sealed unit that's not repairable. These units are power-hungry and rather inefficient for boat use. The simplest remedy is to replace it with a 12-volt compressor-driven ice box refrigeration system available from Nova Kool, Adler/Barber, EZ Kold and others. These units consume little power and are usually very reliable. Conversion units are available for a refrigerator-style stand-up ice box, a stand-up refrigerator or a built-in ice box. Norcold also offers an efficient AC/DC refrigerator unit. Most installations can be handled by the DIYer. — JM

Relocating a Panel

Q: Our boat has a Perkins 108 engine and we recently moved the engine control panel. Is there an extension available for the wiring harness?
Tom Smith, Becky S, *Manasquan, N.J.*

A: Yes, a wiring harness is available but the end plugs only fit a Perkins instrument panel; apparently 99% of engine panels supplied by boat manufacturers are off-brands. The length of the Perkins harness is 3m (10') and costs about US$100.

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Your nearest distributor is W.A. Kraft in Teterboro, N.J. (201/288-4485). The distributor will need to know the name of the boatbuilder and/or the panel manufacturer to research the availability of a harness extension. — JM

Caulking Planks

Q: I have just removed all the paint from the hull of my 1960 Trojan and most of the caulking is gone. How should this be replaced? Should cotton be put in first? There is none above the waterline and some of the gaps are 12mm (1/2") wide. *Brian Ferguson, Intrepid, Kemble*

A: Gaps of this size in the planking are really huge. It's unlikely they will swell enough to close. If large gaps are caulked, it may create other problems — the swelling planks compress the edges even further creating even larger gaps next year or buckling. It's common to fill large gaps with a glued-in-place strip of wood. This usually requires using a circular saw to clean out the groove (gap) and provide a new and clean wood surface for gluing. This process is fairly time- and labor-intensive and may not be the best solution, depending upon the value of your boat. Probably it's best just to pack in the cotton, cover it with a soft (polysulfide) caulk and put the boat in the water. When it swells, the polysulfide will bulge out. Haul the boat, scrape off the caulk flush with the hull and paint the boat. Steps should be taken to minimize shrinkage by storing the boat in a wooden boat friendly manner.— WR

Wizzard Info Wanted

Pat Thomason recently purchased a 4.2m (14') fiberglass Wizzard skiboat at an auction and is looking for information on the design and the builder. A plate on the boat lists two locations: Cosa Mesa, Calif., and St. Joseph, Mich. Send e-mail replies to devin@insolwwb.net.

TECHNICAL HELPLINE

Need help with a problem? Unable to find information on products or do-it-yourself projects?

DIY TALKBACK is a special reader service that makes available to you the resources of marine industry experts on topics such as boat repair, engines, trailers, electricity, plumbing, electronics, sails, maintenance and more.

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TECH TIPS

KEY REMINDER: Stow your ignition keys on the freshwater intake thru-hull. That way you'll always remember to turn on the valve before starting the engine and turn it off before leaving.

PROP SAVER: To remove algae from a stainless-steel propeller, put it in a bucket of vinegar with a bit of baking soda, soak for about 30 minutes, then wipe with a clean cloth or sponge. It will sparkle.
Jim and Marion Carter, The Boat, *Bayfield, Ont.*

TAPE CLOSURE: On long cruises, tape the pelican hooks on lifeline gates using rigging or electrical tape to prevent accidental opening. Duct tape will work but leaves an adhesive residue and deteriorates quickly.

DECK PIPE PLUG: To prevent seawater from flowing down the anchor rode deck pipe, plug the hole with a generous wad of Plasticine (modeling clay). Mold it into a tube, wrap it firmly around the chain, then shape it to fit the deck pipe and replace the cover.

SMOOTHER EDGES: To smooth bedding compounds or sealant adhesives, here's a good trick: Dip your gloved finger in water then run it along the bead of sealant. The water prevents the adhesive from sticking to your glove and allows you to create a smooth concave edge.

RUST EXTRACTOR: To remove rust from Formica countertops, gelcoat or plastic, try a liquid teak cleaner. Apply, then let it soak in for no more than 30 seconds — longer and the cleaner may attack the plastics — and wipe off. Repeat until all rust is removed, then rinse well with water. (Do a test patch to ensure compatibility.)

CLEARLY A HOT IDEA: To clear a blockage in an intake thru-hull, attach a short hose on the expansion relief valve for the hot-water system. Pull off the intake hose for the blocked thru-hull and attach the hot-water pressure hose.

OIL REMOVER: To remove engine oil from gelcoat and painted surfaces, try automotive bug and tar remover. Do a test patch first to ensure it won't harm the finish.

MILDEW EATER: To reduce condensation buildup in a boat that is stored for long periods, such as during winter haulout, place a few boxes of cat litter in the cabin. It will absorb moisture and soak up odors.

GEAR STORAGE: A plastic or wire bike basket makes a handy carryall for a camera, sunscreen, flashlight or other gear, and the curved hangers fit nicely over a small boat's gunwale.

PROTECT-ALLS: Protect your hands, feet, head and other body parts by covering boat protrusions with tennis balls. Carve tight-fitting holes in the balls and slip over the ends of flukes and stokes of deck-stowed anchors, the hydraulic ram end of an outboard engine or any other obstacle onboard.

ADHESIVE REMOVER: Use a moisture-displacing lubricant (i.e. WD-40) to remove tar and adhesive residue from hard surfaces. Spray on liberally, let it sit for a minute or so (scrubbing, if necessary), then wipe.

VEGETABLE WASH: Try vegetable oil to remove paint and varnish from hands when you're without a proper hand cleaner. It's safer on the skin than a solvent.

BRASS CLEANER: To clean brass, rub it with a lemon dipped in salt. Wipe on, wipe off.

JUMP STARTER: When the solenoid switch on your engine's starter is stuck and the starter won't turn over, try this: Momentarily short across the switch terminals with a heavy screwdriver — be careful to touch only the non-conductive handle of the screwdriver and withdraw the screwdriver as soon as the engine starts.
Phil Friedman, Port Royal Marine, Pompano Beach, Fla.

BATTERY CARE: Clean battery terminals with a solution of baking soda and warm water, and wipe clean. Reconnect the battery terminals, then lightly brush polyurethane varnish on the terminal connectors after tightening. Don't grease your battery terminals. Grease heats up, liquefies, then forms a pool of melted grease, salt, dirt and grime that can cause a mild short.

Tech Tips welcomes contributions from readers. If you have a boat-tested tip you'd like to share, send complete information along with your name, boat name and home port to: **DIY Tech Tips, P.O. Box 22473, Alexandria, VA, 22304 or E-mail to info@diy-boat.com.**

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ShopTalk

WOOD STRIP BUILDING

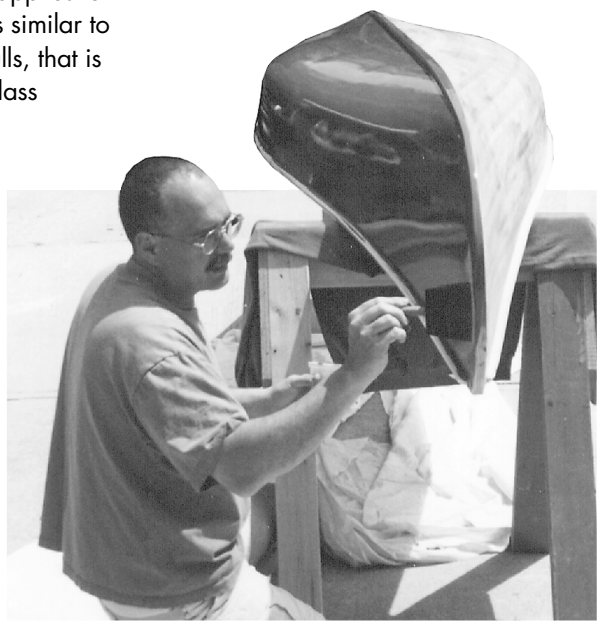
Strip building is one of the most effective and forgiving methods for constructing a strong, attractive, nimble wooden boat. But things can go wrong.

By Wayne Redditt

Readers of this magazine surely fall into the category of tinkerers and do-it-yourselfers. The ultimate project would just as surely have to be building your own boat. A fairly recent innovation in construction allows most people the chance to pursue the dream of building a craft without having to own large stationary equipment or spending years learning traditional skills. The method is termed woodstrip/epoxy building. While this method is most often used on canoes, kayaks and tenders, the basic principles can be applied to larger boats.

The engineering that applies to this construction method is similar to that of other composite hulls, that is the inner and outer fiberglass skin of the hull (and deck) are separated by a core material. In the case of the small strippers the strips are usually cedar or redwood, 6mm (1/4") thick, less than 2.54cm (1") wide and the length of the boat. Larger composite boats use structural foam or end-grain balsa for the core material. The cored composite creates an incredibly strong, tough yet light structure capable of incredible abuse. The wooden core used in strip building gives the builder the illusion that he or she is building in wood, and if finished with a clear coating, furthers the impression of varnished wood. The fiberglass skins are the key to the whole structure though, and things can go dramatically wrong in the application and finishing.

...sunlight has an adverse effect on cured epoxy, turning it an ugly splotchy white when exposed if not protected from UV.



WAYNE REDDITT

When UV rays turned this canoe hull an unsightly splotchy white, my only option was to paint it.

There are plenty of books that describe the necessary preparations for wood-strip construction in step-by-step detail. My personal favorite is *Canoecraft* by Ted Moores (co-owner of Bear Mountain Boat Shop in Peterborough, Ont.) and Marilyn Mohr (146 pages, CDN$16.95). Videos (available from Bear Mountain, tel: 705/742-8258) are highly recommended for the first-time builder.

I would like to pass along some hints from slightly less-than-successful forays into the stripbuilding world in the hopes that you can learn from others' mistakes.

Hint #1: The books warn you about the effect of temperature on the cure time of epoxy resin, but they don't mention the fact that if you are working in high temperatures and drip perspiration into the liquid epoxy you will have unsightly white splotches in your brightly finished prize forever.

Hint #2: The books also warn that sunlight has an adverse effect on cured epoxy, turning it an ugly splotchy white when exposed if not protected (with a varnish or paint) from UV. I, unfortunately, stored an unprotected canoe hull under a tarp for a short time outside. The entire exterior skin devel-

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oped white splotches. There is no cure for UV damage. The now-traditional green-painted hull turned out to be a nice contrast to the varnished interior, though.

Hint #3: The sun is not the only source of damaging UV. I built a kayak for myself a few years ago and left it inside my shop, epoxied but unvarnished. The overhead fluorescent lights destroyed the clarity of the epoxy over the year that the kayak sat unfinished. I haven't decided whether to paint this one or grind the offending material back to wood and start again. I dislike grinding fiberglass.

Hint #4: Finish what you've started. My latest attempt at a strip canoe became delayed between the application of the inner and outer skin. I knew the uneven rate of water absorption from the air would create differential expansion and contraction problems with the hull. This is really no different than veneering one side of a laminate, or painting one side of a solid wood project. The moisture enters and leaves the wood at a different rate on each side, causing warpage. To prevent this, I shrink-wrapped the hull. The theory was sound, but the execution was flawed. The boat was wrapped in August and unwrapped the following June. Since it was more humid last August than it was this June, the boat reacted by curling up like a sheet of untreated fax paper as the sheers bowed in toward each other. Luckily, the last few months have been humid and the boat has returned to normal. However, the finishing process has been delayed by several months.

Despite the setbacks that I have encountered, it appears that boats constructed in this fashion are going to be long-lived and useful to their owners. They require little more maintenance than any finely finished craft, and the annual sand and varnish is pure therapy for tinkering types like us anyway.

When not messing about in his workshop, Wayne Redditt shares his expertise in boatbuilding, repair and restoration with the senior students of Georgian College's Marine Technology-Recreation course. Subsequent columns will discuss construction methods, restoration techniques, modern repair materials and other topics for builders and tinkerers of boats. Inquiries directed towards this column are welcome. Send your comments or questions via mail, fax or e-mail, attention ShopTalk.

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ELECTRONICS

Storing Electrical Power - Part 1

Storing electrical power for later use means getting the greatest possible output while engine-driven charging sources are in use, then tapping your stored electricity until it's time to generate again. This first of a two-part series looks at battery selection, ratings, reliability, performance and efficiency.

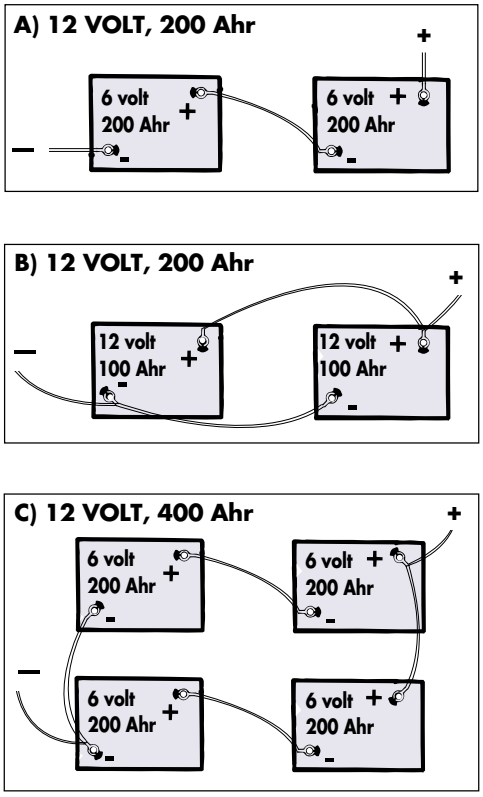
By Kevin Jeffrey

Batteries have traditionally been high on the list of nautical gear that boaters love to hate — they are bulky and heavy, can be a safety hazard, and seem to let you down when you need them most.

The cause of dead or malfunctioning batteries is either in the batteries themselves or in the way the batteries are charged and discharged. Cheap batteries don't give the service or dependability of high-quality models and poor charging techniques and negligent monitoring can quickly turn a great set of batteries into nothing more than expensive ballast. Understanding their operation and the differences between models, as well as proper charging techniques, may give you a whole new appreciation of your batteries.

There are three types of lead-acid batteries appropriate for onboard use, each designed and constructed for a specific task and categorized by their ability to deliver current and hold up to repeated discharge. The difference between them is the thickness and number of the positive and negative plates, the strength of the lead alloy in the plates and the type of electrolyte used, either liquid or gel.

FIGURE 1



A) Two 6-volt, 200 ampere-hour (Ahr) batteries connected in series to make a 12-volt, 200-Ahr bank. When batteries are connected in series (positive post of one battery connected to the negative post of another battery) the voltage doubles while the ampere-hour capacity remains the same.

B) Two 12-volt, 100-Ahr batteries connected in parallel to make one 12-volt, 200-Ahr bank. When batteries are connect in parallel (positive to positive, negative to negative), the ampere-hour capacity doubles while the voltage remains the same.

C) Four 6-volt, 200-Ahr batteries connected in series-parallel to make one 12-volt, 400-Ahr bank. Electrical components are first connected in series to double the voltage, then connected in parallel to double the capacity.

Starting-Lighting-Ignition (SLI) starting batteries have a great number of thin positive and negative plates that create a large total surface area capable of producing high-cranking power for the few seconds it takes to start an engine. These batteries can't maintain high discharge for very long and have a relatively high self-discharge rate. SLI batteries should always be isolated from the house bank through a battery isolator, a battery link or combiner, or a manual battery switch. Deep discharging will greatly shorten SLI battery life, since the plates aren't thick enough to handle it.

Deep-cycle batteries have the ability to withstand repeated deep discharge without harm, have lower self-discharge rates and are used to supply typical house loads. The plates in a true deep-cycle battery are thick and heavy, trading surface area for strength and starting power for reserve capacity. They often come in 6-volt configurations for easy transport and longer life, and can be connected in series or series-parallel to achieve the desired system voltage. Deep-cycle batteries can also be used for engine starting, if you have enough total capacity (several hundred ampere-hours or more).

It may be tempting to buy inexpensive 6-volt deep-cycle batteries, which have only a three-year life expectancy (less in the tropics), but you'll be better off in the long run with high-quality models such as the

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new Surrette Red line of batteries (marketed as Rolls in the U.S.). These batteries cost more initially but easily last eight to 15 years in normal service. Surrette batteries have heavy-duty plates that are individually wrapped with a protective envelope to eliminate short-circuiting and cell damage due to sediment buildup or faulty or misaligned plate separators. Other unique features of Surrette's new batteries are the large electrolyte reservoir over the plates and the virtually indestructible structural foam-and-polyethylene outer case.

Between the SLI and true deep-cycle batteries is the hybrid deep-cycle with plates of medium thickness and either gel or absorbed electrolyte (see below). Commonly used as house batteries, they also have cranking power for engine starting, can be moderately discharged repeatedly without harm, have a relatively low self-discharge rate and come in 6- and 12-volt configurations. Because of the moderate plate thickness these batteries typically don't have the service life of good-quality deep-cycle models. Immobilized-electrolyte batteries are also more sensitive to voltage, which means that your charge controls must be properly set and provide temperature compensation to make sure the voltage stays within acceptable limits.

The electrolyte in a lead-acid battery is the material surrounding the internal lead plates that allow them to chemically store or release electrical energy. The electrolyte in most lead-acid batteries is a sulfuric-acid solution in liquid form. Distilled water must be added to liquid-electrolyte batteries periodically to replace losses that normally occur during performance charging. They must also be periodically equalized — charged at a higher voltage under controlled conditions — to prevent sulfation deposits from decreasing battery capacity.

Batteries that are permanently sealed with the electrolyte immobilized are increasingly popular with boat owners. There are two basic types of sealed batteries: absorbed electrolyte and gelled electrolyte. (Note: these high-quality hybrid deep-cycle batteries should not be confused with inexpensive "no-maintenance" SLI batteries.)

In an absorbed-electrolyte battery, the electrolyte is contained in thick, felt-like glass-fiber mats that are compressed between the plates. During construction, some of the electrolyte is also absorbed by the battery plates. The mats serve as receptacles for the electrolyte as well as plate separators. Compressing the plates and mats together lowers the internal resistance of the battery and allows for higher charge and discharge rates. These batteries are best suited for power systems with light electrical loads.

FIGURE 2

The following chart shows typical battery sizes and ampere-hour (Ahr) capacities.

Battery Type	Typical Size	Typical Ampere-hour (Ahr) Capacity
Group 24, 12V	11" x 7" x 9"	85-90
Group 27, 12V	12" x 7" x 10"	100-105
4D, 12V	21" x 8.5" x 10"	160-180
8D, 12V	21" x 11" x 10"	220-250

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ELECTRONICS

In gel batteries, the electrolyte is contained in gel form. Gel batteries are hybrid deep-cycle batteries with high performance characteristics, allowing them to be used in power systems with heavier electrical loads. They typically don't have the service life of true deep-cycle batteries.

Battery Ratings

Batteries are rated according to their construction and how they perform, allowing boaters to make an intelligent selection according to their needs. The various ratings are: voltage, marine cranking amps, reserve capacity, and size and ampere hours.

Voltage Batteries are composed of a series of 2-volt cells. Individual batteries for marine use are typically available in 6- or 12-volt models. They can be connected together in series, in parallel or in series-parallel **(Figure 1)** to create the desired system voltage and capacity.

Marine Cranking Amps (MCA) This rating tells the current that a battery at 0°C (32°F) can deliver for 30 seconds while maintaining a minimum cell voltage of 1.2 volts. Gasoline engines require about 1 MCA per cubic inch of displacement, diesel engines about 2 MCA per cubic inch.

Reserve Capacity This refers to the number of minutes that a fully charged battery at 26.6°C (80°F) can be discharged at 25 amperes while maintaining a minimum cell voltage of 1.75 volts. Reserve capacity can also be expressed for other rates of discharge such as 5, 10 or 15 amperes. The higher the rate of discharge, the lower the total reserve capacity rating.

Size and Ampere-hour Rating Marine batteries are most often marketed according to their case size and corresponding ampere-hour capacity **(Figure 2)**. Ampere-hour (Ahr) capacity is an energy rating similar to reserve capacity. It refers to the amperes a battery can supply at 26.6°C (80°F) in a specific period of time, while maintaining a minimum cell voltage of 1.75 volts. Many battery manufacturers use a 20-hour rate. In this case, a 100 Ahr battery could supply 5 amperes for 20 hours. When comparing batteries, it's essential to make sure they use the same hour rate.

Capacity, Discharge & More

Here are a few rules about battery performance.

Ampere-hours and Energy The rating of ampere-hours is really an indicator of the amount of usable electrical energy the battery can provide. Remember that volts x amperes = power and power x time = energy. This means that ampere-hours x battery voltage = watt-hours, a true measurement of electrical energy. A 6-volt battery rated at 100 ampere-hours has half the total available energy than a 12-volt battery with the same rating.

Usable Battery Capacity The rated ampere-hour or reserve capacity of a battery is quite different from the amount of energy you can actually store and retrieve on a daily basis. Deep-cycle battery life can be greatly extended if you discharge to only about half of its rated capacity, or 50% charged. Frequent deeper discharges will shorten battery life dramatically. And because of the low rate of current a battery will accept during the final charging stages, it's likely that with an engine-driven charging source you'll most often charge the battery to only about 90% of its rated capacity. In effect you have about 40% of the total battery-rated capacity at your disposal as usable electrical energy. (The relatively constant output from solar panels and wind- and water-powered generators easily completes the final stages of charging, making that extra 10% of battery capacity available.) For long battery life, it's important to periodically bring the battery to a full state of charge.

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Lighten up

Upgrade your boat's interior lighting so that it's functional, flexible and decorative. Here's how.

Whether your boat has a one- or multi-cabin layout, a lighting design must be functional to enable you to work efficiently and read without eyestrain. It should define access and potential danger areas and provide general background illumination. Equally important is the decorative element, which can add to the charm and warmth of the cabin.

The ideal lighting plan for cabin interiors includes a mixture of general lighting, overhead lights (called downlighting), local light sources (called spot lighting or task lighting), floor or table lighting and colored lights. A plan like this is flexible, since you can turn on the overhead lights for casual use, then add spotlights to read or work.

Cabin lighting can be easily updated simply by buying new shades, replacing lights with conventional fixtures or adding new ones. Installing new lights is easily incorporated into most lighting schemes. All you need is a basic wiring kit and some working knowledge of your boat's DC system. (If in doubt, consult the "Wiring Handbook" in the WINTER '95 issue for reference.)

Planning your Lighting

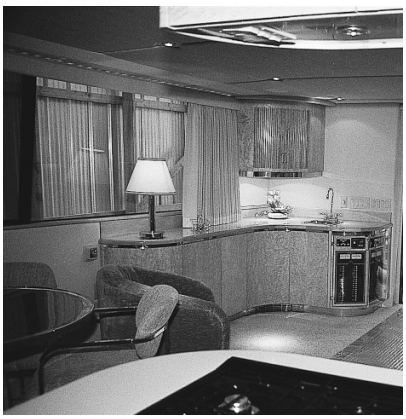
The main cabin or saloon is often the place where you are looking for a more warm and inviting atmosphere. The accent should be on versatility, creating areas of light where they are needed most.

A basic lighting plan in the saloon includes recessed overhead lights on the ceiling, concealed lighting under wall storage or bookshelves, spotlights over a table or mounted on a bulkhead, cupboard and cabinet lights, and downlights. (TIP: To make better use of lighting in the cabin, use bright colors in your decor and upholstery.)

Depending on the area, about four fluorescent lights, evenly distributed and mounted athwartships, provides adequate general lighting. Where headroom is tight, use flush-mounted lights or shallow strip lights. Recessed pot lights or spotlights can be used as either general or task lighting. These are mounted overhead or against bulkheads. Incandescent bulbs are commonly used, but you'll get a whiter, more brilliant light by using low-voltage halogen bulbs. Wall lamps with shades are most often used more for decoration than general illumination. They can serve the same purpose as downlighting, but with a warmer look and feeling.

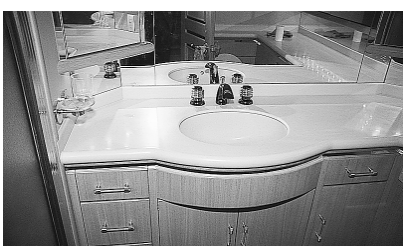
Concealed lighting works well in the saloon. Strip lights placed high will bounce light off the ceiling into the cabin, and fluorescent fixtures hidden behind valances can illuminate shelves. Rope lights mounted against the cabin sides can provide additional accent. For safety at night, use foot lights or rope lights to illuminate companionway stairs and the cabin floor.

A dimmer switch controlling the light intensity of one or more lights saves electricity and the added cost of extra fixtures. You can use the cabin as a bright workspace or dim the lights for night use or watching TV, all using the same set of switched



Lighting can provide general background illumination or create an inviting atmosphere.

A door-activated switch operates a small light to illuminate a dark cabinet or cupboard (available from Rekord Marine, CDN$22).



Head lighting: Decorative strip lights and light fixtures concealed behind a valance so they won't get wet.

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lights. Dimmers are either integral with a light or mounted on a panel. There also are "intelligent" dimmers that allow a number of lights to be set at separate brightness levels, all from one central control.

Lights should be on separate circuits, so that you can create a cozy dining area, for example, without having to illuminate the rest of the cabin. Switches should be easily accessible, with one placed near the companionway steps. Installing three-way switching lets you control saloon lights from the forepeak, the companionway or the aft cabin.

Sleeping areas require reading lights positioned over each berth. Two individually controlled lights in the aft cabin or vee-berth forward can let your partner sleep undisturbed while you read. For general lighting, use wall lights or downlights in the ceiling, but install two-way switching so that you can control them from the bed.

Spot lighting is the wisest choice for the nav station. Small, bright, multi-directional spotlights supply a concentrated beam of light to illuminate the working areas. Lights must be located in front of the navigator to avoid throwing a shadow across the chart table. Night vision is a concern when planning lighting in the nav station; install a light with a red or green lens for night use.

Lighting in the galley should include at least one general light and downlights over the sink, stove and countertops. Multi-directional spotlights recessed in the ceiling let you move the beam around as required. As in the nav station, the light source must be placed in front of the cook. In addition to spotlights, illuminate countertops with strip lights placed under an overhead cabinet and hidden from view by baffles along the front edges. Lights mounted inside large cupboards save searching with a flashlight.

Fixtures in the head must be located where they won't get wet. Rigid strip lights with halogen bulbs hidden behind valances, concealed lights directed onto the sink, recessed pot lights in the ceiling or flexible rope lights bent around vanities are ideal fixtures. Wall-mounted lamps should have plastic shades, which won't rust.

In the engine room, adjustable spotlights can illuminate a particular area, placing light exactly where it's required. Overhead bulbs should have wire cages to prevent breakage.

WIRED FOR LIGHT

Adding courtesy lights and recessed pot lights gives this production boat a more practical and flexible lighting scheme.

By Capt. Daniel J. Gingras

There's nothing more frustrating than returning to your boat after a wonderful dinner ashore, climbing aboard in the dark and stumbling down the companionway steps. I finally tired of trying to find the nav station light switch and decided to install a set of courtesy lights that would gently illuminate the cabin sole and operate whether the main battery switch was turned on or not.

My first task was to find a suitable location for the switch. I chose a spot just below the companionway opening, a place I could easily find in the dark once I removed the companionway boards. The area in question was to the right of a small opening used to store the winch handles and where the fuel gauge is located.

I began by selecting a couple of molded, modern-looking sealed marine switches. Although the switches were located inside the boat, I felt that rain might splash on them, so I chose waterproof switches.

Drilling the hole was easy, and I used a small keyhole saw to enlarge the hole to the square dimensions of the switch. To be honest, I actually cut the hole too large, and ended up having to use the modular bracket that is sold to fit two switches in one hole. Next time, I'll measure twice and cut once.

Installing the Switch

Once the holes for the switch were cut, I used 14/2 Ancor marine-grade cable (14-gauge, two-conductor insulated cable) to connect to a small fuse block located just below the companionway stairs in the engine com-

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CABIN UPGRADES

Lighten up

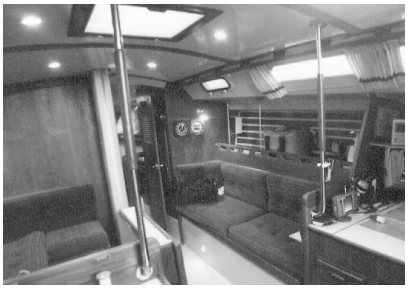

Figure 1

Installing courtesy lights under the berths and recessed halogen lights in the cabin ceiling connected to a dimmer switch, provides a lighting scheme that's functional and decorative.

partment. Fusing the circuit is critical to protect it from overloads and short-circuits — potential fire hazards. Marine-grade wire is worth the expense, as normal stranded-copper wire will tend to corrode after a few seasons making it impossible to crimp and get a good connection.

The switches have spade connectors so I chose the matching crimp connectors, using Ancor heat-sealed, adhesive-filled crimp connectors and my US$100 ratchet crimper to ensure a good crimp. A single-pole, single-throw switch works well, and if you're ambitious, you can install an illuminated switch.

Installing the Courtesy Lights

I chose small, 5.7cm (2-1/4") flush-mounted utility lights (Perko part #1044DP-2W) with the lens opening facing downwards. These make excellent courtesy lights and come in black or white. I choose white lights for the cabin, and black ones for under each companionway step. These have incandescent bulbs that draw only 3 watts each, so there's minimal power drain. If you're really concerned about power usage, you could substitute a couple of high-intensity, light-emitting diodes (LEDs), dropping the current drain to under 1 amp for about six of them. The LEDs are not as bright as utility lights, but they are a little easier on your eyes when you're at sea.

Figure 2

Utility lights mounted from above illuminate the steps for safe entry.

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The lights are mounted just below the berths in a 4.4cm (1-3/4") hole, cut with a holesaw. Make sure you have sufficient clearance behind the lights for wiring and fasteners before cutting. Mount the lights with #6 x 3/8" round or flat-head screws. There are four mounting holes per light and a faceplate snaps over to hide them, making a very neat installation **(Figure 1)**.

I then mounted the three step lights **(Figure 2)** and connected them to the second switch, which I installed to cover my mistake in cutting the switch hole. Wiring the step lights was exactly like wiring the courtesy lights.

Variations on the Installation

My original intention was to use the companionway lights only when I came aboard Lionheart, but with usage, I've found that a better setup is to have a switch in the forward cabin, so that when I get up in the middle of the night I'll have some low-level lighting that won't disturb anyone else onboard. My next project will be to change the current switching system to a three-way installation **(Figure 3)**. I'll have to change the switches from SPST (single-pole, single-throw switch with one input wire) to SPDT (single-pole, double-throw) to allow the lights to be operated from either end of the boat, and add a 12-volt feed to the forward cabin, but that shouldn't be difficult. The only difference is that I'll need to upgrade to a 14/3 boat cable (14 gauge, three-conductor cable) between the switches.

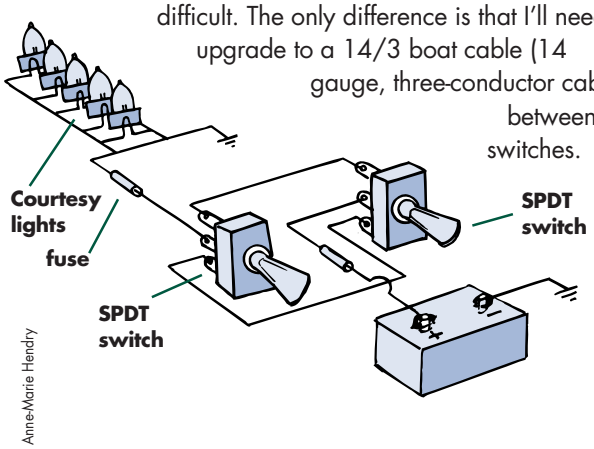

Figure 3

Two switches used to control the same light from either of two locations.

Overhead Lights

Last winter, I decided to replace the deckhead in the main cabin, which was warped and water-stained. This also allowed me to install overhead lights. I purchased five recessed lights with halogen bulbs that were designed to mount under cabinets, so I felt they would work with the 2.54cm (1") clearance behind the overhead panels. Concerned about the amount of heat given off by halogens, I conducted a test by putting a sheet of paper over a light, leaving it on for 12 hours. There was absolutely no discoloration of the paper, which remained cool to the touch.

These lights, however, were extremely bright so I added a 10-amp dimmer switch to control the five lights rated at 2 amps each. In actuality, the lights consume only 8 amps at full brightness, according to my Heart Link 2000R. The lights are all wired in parallel (positive to positive, negative to negative), and connected to the dimmer switch **(Figure 4)**.

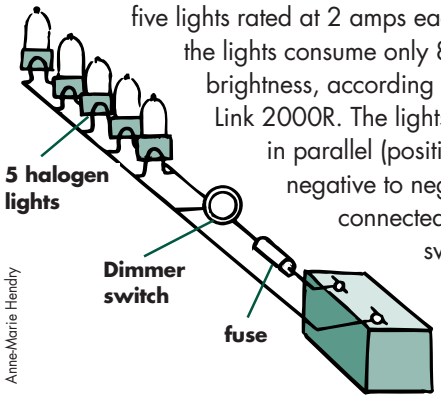

Figure 4

Spotlight wiring with dimmer switch.

Capt. Daniel Gingras specializes in computers and is CIO of Watts Industries. He teaches boating and celestial navigation Power Squadron courses and sails Lionheart, an O'Day 39, from Portsmouth, New Hampshire.

Stoking the Home Fires Below

For fall, winter or early spring cruising, or just messing about below deck in the off-season, a cabin heater is a good investment in your personal comfort and your boat.

Unless you cruise in tropical waters, the warm-weather boating season is much too short. A cabin heater can extend your boating season when the temperature turns cold, take the chill off a cool summer's morning, dry out wet clothes after a cruise in the rain and altogether improve onboard comfort.

There are many heating systems to select from — the one you choose largely depends on your personal preference, the onboard fuel supply, cabin layout and your budget.

How much heat you'll need is also important. Most heaters are rated in BTUs, which usually represents a unit's maximum output in ideal conditions. Plan on five BTUs for every cubic foot of usable cabin space for casual use; 20 BTUs per cubic foot if you are an ardent frostbiter or living aboard in the winter. To estimate the cabin area, multiply the beam times the headroom times the cabin length, then subtract the amount of space taken for lockers and cabinets. More BTUs are better — you can always turn the heat down. Having a system continually running at full blast increases maintenance intervals and may require premature repairs.

Portable electric heaters from Caframo and others offer instant heat — just plug them into a power source. Look for models with a thermostat control, multispeed fan and overheat protection. Marine models constructed of stainless steel or aluminum will last longer than heaters approved only for household use. Operating on AC power limits their use to dockside hookup or running off a generator. Liquid-fueled space heaters put out lots of heat but must be used only with plenty of ventilation and only occasionally because of the risk of carbon-monoxide poisoning.

For convenience and around-the-clock warmth, an Espar or Webasto built-in, forced-air furnace can't be beat. These diesel-fired heating systems have a 12-volt starter and blowers, and thermostat control for even ducted heating to the cabin, head and staterooms.

Espar furnaces feature a computer-controlled main panel and automatic shutdown when voltage drops (won't drain batteries) or when fuel is low. These units operate on minimal power. The D3LC model for boats around 10.8m (36') in length, consumes 9 amps for two seconds


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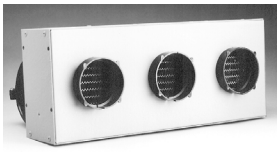
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***1** Caframo 9200 portable electric heater; **2** Espar D3LC, shown installed in a cockpit locker; **3** Webasto Air Top 3500 furnace; **4** Heater Craft Acu-Heat 300-H water-to-air furnace; **5** Sigmar 100 bulkhead-mounted diesel "fireplace"; **6** Dickinson Newport diesel heater; **7** Force 10 Slimline propane heater; **8** Origo 5100 alcohol space heater; **9** solid-fuel Luke stove.*

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Cabin Upgrades

Stoking the Home Fires Below

the smokehead. To overcome this problem, Sigmar heaters have an optional balanced draft system that blows air into the air intake at the bottom of the heater. There's also a kit that allows ducting into another cabin or the head.

Force 10's Slimline propane heater makes good sense if you already have a propane stove. Fuel consumption is high, so you may need to increase tank capacity if planning more than occasional use.

Solid-fuel heaters from Paul E. Luke and Dickinson resemble miniaturized fireplaces and provide a very dry heat. These make excellent heaters for boats without a fuel source, but you'll need a spare compartment to be converted to a firebox.

Installing a radiant heater is straightforward. As a guideline, follow the instructions given for "Installing a Wood Stove" on page 21, omitting step 11, and refer to the owner's manual for the correct fuel tank assembly and hookup. Heaters must be level, so place shims under the base if necessary. For safety, install a fuel shut-off valve in the fuel line close to the heater. A propane installation is not difficult — but it's wise to have the system inspected by a certified gas installer before operating.

A water-to-air heating system is probably the best choice for powerboats and an option for motorsailers. Dickinson, Heater Craft and Thermex offer systems that operate similar to a car heater, using hot water generated by an engine's cooling system or a hot-water heater to generate forced-air heat.

Heater Craft's Acu-Heat series has 12- and 24-volt models for small runabouts, skiboats or large cruisers to heat the cabin or cockpit, or to be used as a defroster. Compact and lightweight (less than 5kg/11lb), these units draw up to 8 amps on high or as little as 3.9 amps on low. Kit prices range from US$291 to US$456 and include all necessary hardware, hoses and electrical components. Installation is not difficult. The heater unit is typically mounted under the helm, in a stairwell or a storage area. Water hoses attach to the engine — one to the cooling system on the intake manifold and the other to the water pump housing — then are routed to the heating unit. After installing the air vents, attaching the vent hose, mounting the switch and wiring it to a power source, the heater is ready for a test run.

Before operating any heater, be certain it's installed correctly and make sure you fully comprehend all operating procedures.

Insulation plays a factor in the heating capabilities of a heater and most boats are poorly insulated, particularly fiberglass or metal boats that tend to sweat, increasing condensation as temperatures fluctuate. Adding several inches of composite cork or foam-backed insulation will dramatically increase the efficiency of any heater.

Installing a Wood Stove

By Ryc Rienks

A solid-fuel stove allows a variety of fuels, including coal (anthracite is best), charcoal, wood scraps, waste paper or compressed sawdust logs. (Don't burn driftwood from ocean waters; the salt in the wood will cause your stove to rot out quickly.)

These heaters need at least 9.1m (36") of stovepipe above the heater and a portion of that distance can be above the deck. My stove used 7.6cm (3") pipe, available in blued steel or, for more money, stainless

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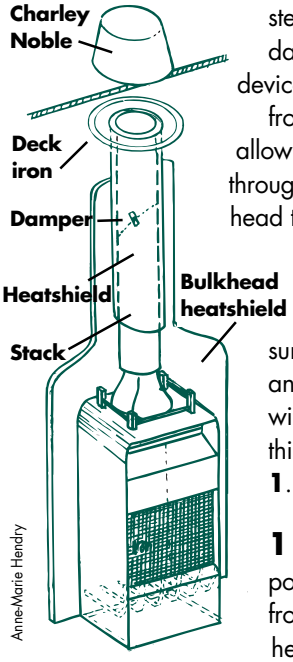

Figure 1

steel. Other components include: a damper; a deck iron, a metal device that protects the deckhead from the hot stove pipe while allowing the exhaust gasses to pass through; a Charley Noble or smoke-head to let the smoke out and keep the rain from getting in; and heat-shields for the stove and stovepipe to protect adjacent surfaces from direct radiant heat and people from direct contact with the hot pipe. To see how all this fits together, refer to **Figure 1**.

1 Set the stove, less the pipe, in position, about 15cm (6") away from flammable surfaces. Radiant heaters need 9.1m (36") of stovepipe above the heater and bends of up to 45° are allowed. Mark the mounting bolt hole locations on the floor or bulkhead.

2 Using a plumb bob, place a mark on the overhead that allows the weight to hang in the center of the stovepipe opening. Check the ceiling for obstructions, such as light fixtures, wiring or nearby windows. Topside, look for grab rails, sail handling gear or anything else that would interfere with the stovepipe. (Ed: Plan on about eight hours to decide where to drill the hole, then four to six hours to complete the installation!)

3 Drill a small pilot hole through the deck at your mark, being careful to drill at the same angle as the string met the overhead.

4 Check the vertical angle relative to the top of the deck. If the deck isn't square to the pilot hole, you'll need to mount a wedge-shaped teak pad to allow the deck iron to sit flat.

5 Measure the outside diameter of the portion of the deck iron that passes through the deck. Scribe this diameter on the top of the house using the pilot hole as your center and add 3mm (1/8").

6 Cut out the hole using a jigsaw with a narrow blade. Coat the cut edge with epoxy to prevent moisture from penetrating the laminate (optional).

7 Drop the deck iron into the hole and check the distance from the top of the stove to the shoulder on the deck iron.

8 Transfer this dimension to the pipe and cut it to length. File the cut end to remove the sharp edges, then assemble the pipe.

9 Place the stove in position, lining up the mounting holes, and dry-fit the stovepipe, setting the deck iron on top. Adjust the placement of the stove and chimney assembly as

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Brand	Contact #	Type	Heat Source	BTUs	Price	Vented	Installation
Caframo	T (519) 534-1080 F (519) 534-1088	Convection	Electricity	1,695-5,083	[1]CDN$70/US$74	No	Portable
Dickinson	T (604) 525-6444 F (604) 525-6417	Radiant Water-to-air Radiant	Diesel, kerosene Engine Solid fuel	6,500-16,250 12,000-24,000 3,000-8,000	[1] CDN$752-$943 [2] CDN$205-$323 [1] CDN$390/US$370	Yes No Yes	Bulkhead, floor Fixed Bulkhead
Espar	T (905) 670-0960 F (905) 670-0728	Forced-air	Diesel, kerosene	3,400-16,400	[4] CDN$1,400-$2,670 [4] US$1,230-$2,400	Yes	Ducted
Force 10	T (604) 522-0233 F (604) 522-9608	Radiant	Diesel, kerosene, propane	4,000-12,000	[1] CDN$525-$950 [1] US$415-$745	Yes	Bulkhead
Heater Craft	T (208) 777-9466 F (208) 773-9716	Water-to-air	Engine	40,000 max.	[3] US$291-$456	No	Ducted
Luke	T (207) 633-4971 F (207) 633-3388	Radiant	Solid fuel	NA	[1] US$1,200-$1,500	Yes	Bulkhead
Sigmar	T (604) 945-4107 F (604) 945-3597	Radiant	Diesel, kerosene	5,000-18,000	[1] CDN$789-$1,114	Yes	Bulkhead, floor
Thermex	T (203) 322-9310 F (203) 329-9374	Water-to-air	Engine	11,000-19,800	[2] CDN$277-$695 [2] US$198-$498	No	Ducted
Webasto	T (810) 545-8770 F (810) 545-8773	Forced-air	Diesel	5,100-18,000	[3] US$2,500-$3,522	Yes	Ducted

[1] Stovepipe, stove fittings, smokehead and deck fittings are extra.
[2] Air vents, vent hose, water and coolant hoses are extra.
[3] Kit price includes all materials needed for installation.
[4] Price for heating unit only.

necessary so everything is vertical and fits together correctly.

10 When you are satisfied with the fit, mark the permanent location for the stove mounting bolts.

11 Drill a guide hole for the damper, about 60cm (24") above the top of the stove. Push the handle through to lightly mark the opposite side of the pipe, then drill from the outside and push the handle point in so the ragged edge is turned inside. Once the damper assembly is in place, cut off the pointed end.

12 Move everything aside and insulate contact surfaces with a heat-resistant insulation, leaving an inch or more of air space, covered with heat reflector plates made of stainless steel or ceramic tile.

13 Drill the stove mounting holes and bolt the stove in place. Set the stovepipe in place, then go topside and bolt down the deck iron sealed with a polyurethane adhesive.

14 The other consideration is the height above the deck of the Charley Noble. I placed mine on a section of pipe about 30cm (12") above the deck. Put at least two screws through each joint above the deck. The Charley Noble is pricey and will sink like a rock if it goes overboard.

15 Returning below decks, bolt on the heatshields and you are ready to light up the stove.

16 To circulate warm air around the cabin, mount a small 12-volt fan on the deckhead near the stack, aimed at a 45° angle towards the cabin.

A former musician, custom knife maker and teacher, Ryc Rienks and his wife Penny are currently en

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SAILBOAT RIGGING

TILLER-TO-WHEEL CONVERSION

A wheel-steered boat really is much easier to drive without sacrificing the "feel" at the helm. Here's how to select, install and maintain a steering system.

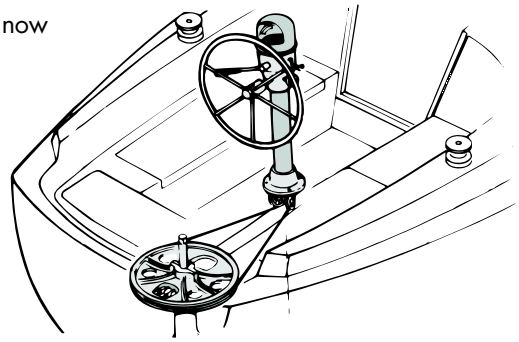
By Kim Weeks

Tools & Materials

Drill
Assorted drill bits including 1/16" and 9/16"
Jigsaw
Hacksaw
Socket or box wrenches
Screwdrivers
Cable cutters
Polysulfide sealant
19mm (3/4") plywood
38mm (1-1/2") mahogany wood blocks
Fiberglass cloth and epoxy resin
#30 Motor oil
Teflon grease

A pedestal steering system is well suited to boats with mid-ship and aft cockpits with inboard or transom-hung rudders. The benefits of wheel steering are many: more cockpit room, a perfect location for mounting a compass or instruments, and a place or two to hold your drinks. Add a foldaway cockpit table to extend your galley area and now you've really streamlined the appearance and function of the cockpit.

The first step in a tiller-to-wheel conversion is to consult with the steering manufacturer and/or your boatyard for advice, such as the type of steering system to use and the location of the wheel. The manufacturer has likely already encountered someone who's undertaken this project and can make specific recommendations to you. Edson, for example, has more than 2,200 installation drawings for stock boats available free of charge. If you're building a custom boat, Edson will send you a complete proposal and steering data for a nominal fee if provided with construction drawings. Plan on spending eight to 10 hours on homework before beginning the installation.



Edson Corporation

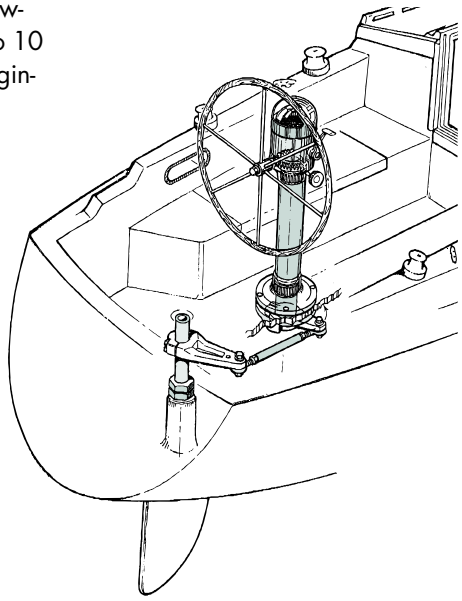
Figure 1

A mid-position steerer installation using a radial drive wheel and pull-pull conduit. The cables lead directly from the pedestal idler to the drive wheel mounted on the rudderpost.

Types of Steering Systems

Because there are several different types of steering systems, we've highlighted a couple of the more popular wire and geared systems here. To be sure you're considering the right system for your boat, again, contact the manufacturer or the boat's builder.

Wire steering systems, including radial drive, quadrant and pull-pull conduit, are ideal for most production boats with raked or vertical rudderposts **(Figure 1)**. Wire systems are economical, easily adjusted and maintained at sea, and ideal for boats where there may be some obstructions, such as tanks between the steering system and the rudder post, or even an obstruction as large as a bunk or



Edson Corporation

Figure 2

Edson's CD-i (Compact Drive Integrated) system uses a simple, direct linkage from the wheel to an inboard- (shown) or transom-mounted rudder.

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SAILBOAT RIGGING

lazarette. These systems can withstand severe steering strains and shock, and replacement parts are readily available.

Figure 3

An aft-mounted rack-and-pinion steerer for inboard rudders mounts the wheel close to the rudderpost and takes up less than one-third of the cockpit space of a tiller. The teak-decked housing covers the steering gear and provides a seat for the helmsman.

Typical direct-drive geared systems are easily installed and provide a closer direct linkage to the rudder — there's really no compromise when converting from tiller steering to a geared pedestal steering system in terms of the feel at the helm. Steering sensitivity is enhanced because of the gear ratio and direct link from wheel to rudder (i.e., there is no cable involved, as in wire steering). There are several types of geared systems, such as rack-and-pinion, worm gear and Edson's new CD-i **(Figure 2)**. (Worm gear systems have no feedback.) Geared systems are easily maintained and are extremely strong and durable since they're made of bronze and stainless steel.

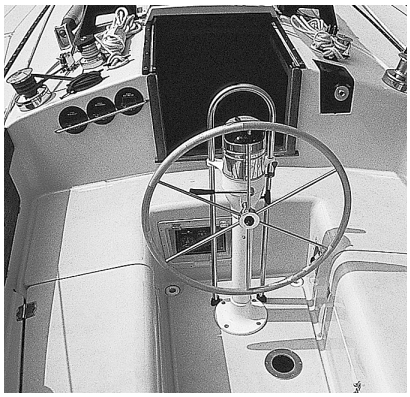
Wheel Location

There are three basic cockpit locations for the wheel: aft, mid-cockpit and forward.

Offering a classic look, the wheel aft places the steering gear directly over the rudder post, such as with rack-and-pinion or worm gear steering mechanisms **(Figure 3)**. This location is typically seen on catboats, schooners, ketches or Friendship sloops. An alternative is to mount the wheel aft on a pedestal. This offers an efficient layout for racing sailboats since the helmsman (or helmswoman) can clearly see the entire length of the boat. Make sure to check the height of the primary helmsman and the space between the back of the cockpit and the back of the pedestal. You don't want heads banging into backstays and too-little leg room. Also, make sure that the instruments will be clearly visible to all who need them.

In a mid-cockpit installation **(Figure 1)**, the helmsman sits where he or she can see more of the sails since (s)he'll be at a beamier spot on the boat and thus sitting farther out. The backstay and lack of space behind the pedestal cease to be concerns; however, winch and cleat location is important since the crew and helmsman may need access to the same area in the cockpit. A cockpit table can usually be added also.

Ideal for shorthanded situations, the forward steerer installation **(Figure 4)** gives the helmsman some weather protection from the dodger and easy access to the



Edson Corporation

Figure 4

Ideal for shorthanded situations, the forward steerer installation gives the helmsman easy access to the sheets, winches, instruments and the cabin below

sheets, winches, instruments and the cabin below. This location keeps all cockpit activity aft of the helm. However, a pedestal guard is a necessity. If the boat rolls when a crewmember is exiting the cabin, a pedestal guard offers them a secure handhold, other than the wheel, instrument pod or compass; it also eliminates entanglement of sheets in the wheel.

The best place to mount the wheel is right where you'd be seated (or standing) when using the tiller, since your boat was likely designed for you to be there anyway. A minimum distance of 45cm (18") is recommended from the wheel rim to the aft edge of the cockpit sole.

After you've decided where you think the wheel will go, take the time

TIPS WHEEL RESTRAINT

When the boat is unattended, always secure the wheel with a line or the pedestal brake. A free-wheeling system may cause damage to the rudder stops.

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SAILBOAT RIGGING

to build a model wheel and pedestal: a 2" x 4" shaft made from a broomstick handle, and a cardboard or plywood cutout of the wheel will do the job. Move your model around the cockpit, placing it in the locations mentioned above. Can you access the instrument data? Does it interfere with the mainsheet or genoa winches? Are the engine controls within close reach? Will gas lines or tanks be obstructed? Is there enough room under the cockpit floor to mount sheaves, sheave brackets and radial drive or quadrant? Check out each location and take as many notes as you can — you'll be surprised at what works and what doesn't in terms of wheel location and your specific needs.

The Bottom Line

A typical radial drive system costs from CDN$1,700 to CDN$2,200 (US$1,200 to US$1,500) for the basic system, which includes a wheel brake. Geared systems range from CDN$1,200 to CDN$3,750 (US$800 to US$2,500) depending on the system. Add-ons and accessories increase the cost, but can make your new pedestal steerer more useful.

Installation varies from simple to complicated, depending on the type of boat and steerer. Installing a steerer on a boat with an outboard rudder is straightforward and takes about one day. Boats with inboard rudders are more complex — the installation involves routing the pedestal control cables, mounting the quadrant onto the rudderpost, installing a stuffing box, custom machining or fiberglass work.

While this type of installation may certainly be accomplished by a skilled do-it-yourselfer, practical experience plays a key role in the expediency and efficiency of an installation. The cost for a professional installation will vary by boatyard and/or installer, as well as by the boat. Once the yard or installer has taken a look at your boat and spoken with the manufacturer, a firm estimate can easily be provided.

General Installation Considerations

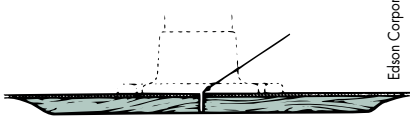
The installation information below provides some general guidelines concerning the installation process. Because each boat is different, we've highlighted installation procedures for the most common type of pedestal steerers. Refer to the instructions included with your steering system for complete installation details.

Wire Steering Installation

A typical chain-and-wire pedestal steering system includes the following items: pedestal, steering wheel, chain-and-wire rope assembly, pedestal idler or conduit bracket, radial drive wheel or quadrant, sheaves, two wire take-up eyes, pedestal mounting bolts, wire rope clamps and, if necessary, a stuffing box.

Once you've received your new pedestal steerer, lay out all the equipment and familiarize yourself with the system by arranging the parts as closely as possible to the order of assembly. Read through all the installation instructions included in your kit. You'll save yourself a lot of time and aggravation if you read them and get your questions answered now.

Carefully place the pedestal in its intended place and ensure it meets all your objectives. Once the pedestal location has been finalized, drill a pilot hole at the center of the four pedestal bolt holes using the



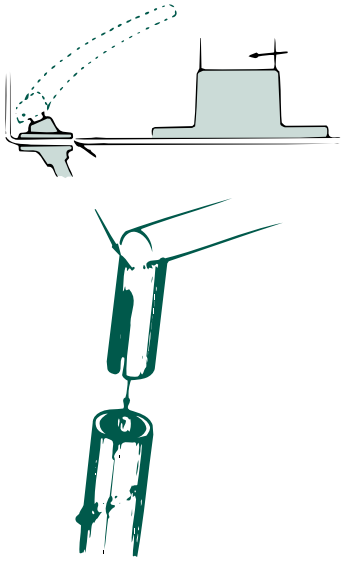
Edson Corporation

Figure 5

On many boats, the cockpit floor will require reinforcing with a 61cm (2') square of 19mm (3/4") plywood at the pedestal.

TIPS — BACKUP STEERING

A wheel steering system should have a provision for emergency steering. A good, easy way is to leave the existing rudderhead in place and attach the original tiller when you need backup steering. The original tiller may need to be shortened to allow the arm to swing past the new pedestal. Another option is to modify the top of the rudderpost: the tiller attaches to either round tubing or square stock that slides over the rudderpost and is thru-bolted. You and your crew should be as familiar with rigging the emergency tiller as with man-overboard drills — it's a safety exercise that should be practiced frequently.



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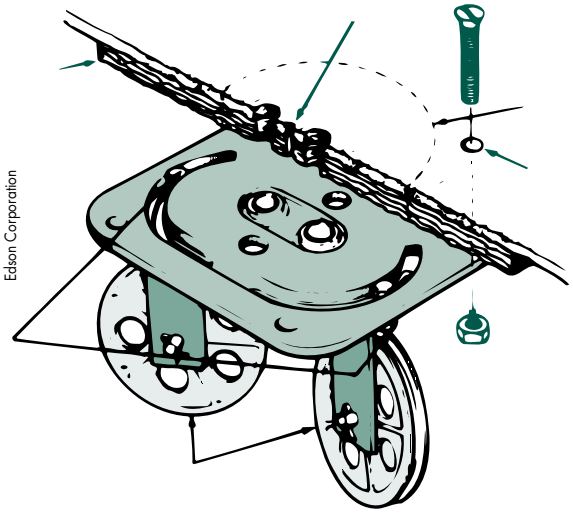


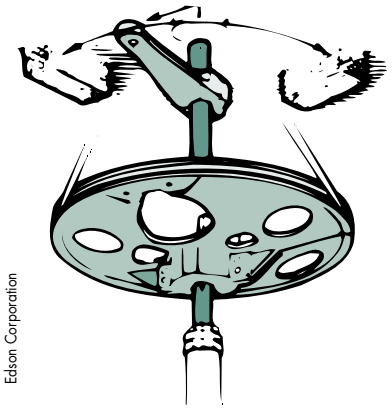
Edson Corporation

Figure 6

To mount the idler, drill four 14mm (9/16") holes through the cockpit floor using the pilot hole for alignment, cut a 12.7cm (5") diameter opening in the center and bolt the idler to the floor.

supplied template. This hole will mark the pedestal location under the cockpit floor. The pedestal should be supported or reinforced. To do this, simply install a piece of 19mm (3/4") plywood under the cockpit floor **(Figure 5)** with epoxy glue.

If your boat's rudder is equipped with a stuffing box, the pedestal steerer may be installed with the boat in the water. If the rudderpost enters through a fiberglass tube from the hull to the cockpit sole, a portion of the tube must be removed to expose the rudderpost for the installation of the quadrant or radial drive wheel. Where to cut is determined by the location of the quadrant or drive wheel, and the size of the idler sheaves. To make sure no water enters the boat through this tube, a stuffing box should be installed on the rudderpost. To do this, the boat will have to be hauled out and the rudder dropped. Now you install the idler **(Figure 6)**. With the pedestal bolts, secure the idler in position beneath the pedestal and temporarily adjust the angle of the



Edson Corporation

Figure 7

The ideal rudder stop mounting uses a tiller arm to keep the stops independent of the steering system.

EDSON MARKS 138 YEARS

Jacob Edson founded Edson International in 1859 in Boston, Massachusetts, to manufacture and sell his diaphragm pumps and marine products. The company quickly became synonymous with the words "Yankee Ingenuity" when, in 1875, Edson's Boom Buffer reduced the shock of gybing — and became standard equipment on all Gloucester fishing boats. In 1890, Edson pumps were put to use in the increasingly industrialized New England to pump sewage.

The turn of the century brought about an increased popularity of pleasure boating and thus steering systems. Systems were designed for both the recreational and racing markets, such as the America's Cup. During World War I, all Liberty ships used Edson emergency steering and pump systems. With the 1960s came the introduction of lightweight materials, such as aluminum and composites, to the manufacturing process. These materials were incorporated into the product line to match the needs of the new era of fiberglass boats for reduced weight and increased strength. Today, Edson continues to be recognized for its quality, value and innovation in its extensive range of marine steering systems and accessories, boat davits, radar towers, and marine and industrial pumps for both sail and powerboats.

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MAINTENANCE

On a new boat, inspect the steering system at least once a year. It's a good idea to prepare a maintenance log, noting the component, type of lubricant, frequency of service, description of work (i.e. "Inspect," "Adjust," "Lubricate" or "Replace") and date. Here's a brief look at the key maintenance areas.

Wire systems

1 Check the condition and tension of the wire and oil it lightly. Place five tissues (i.e. Kleenex) in the palm of your hand, squirt #30-weight motor oil (or similar) on the tissues then slide them along the wire. Any broken or hooked strands will snag on the tissue, and the wire must be replaced. Replace the wire after 5 years and, if in good condition, keep it onboard as a spare.

2 Oil the chain with #30-weight motor oil.

3 Maintain the steering wire tension. When you feel a bit of play in the steering, it's time for an inspection. Adjust by tightening the take-up eyes on the quadrant or drive wheel. With the wheel locked in place (tie off or use the pedestal brake), you should not be able to move the quadrant or drive wheel by hand.

4 After adjusting the cables, rotate the wheel slowly from stop to stop. If it doesn't turn smoothly, the chain and sprocket require servicing.

5 Grease pull-pull cables monthly with Teflon grease.

Geared systems

6 Check frequently for any wear on the parts and lubricate all bearings, gears and linkages well with lithium or other heavy-duty machine-grade grease. Once or twice a season, check that all connections and linkages are secure.

7 Inspect the universal joints for play and, if necessary, repack with grease to prevent wear and corrosion.

8 Check for play in the worm gear or between the pinion and gear. Do this with the rudder centered and held rigid.

All Systems

9 No matter what kind of steering system you have, annually inspect and lubricate with Teflon grease the pedestal shaft bearing and other moving parts.

10 Regularly check all screws, nuts, bolts, clevis or cotter pins that are part of the steering system or pedestal accessories for tightness and wear.

11 Check that all sheaves are securely bolted and well oiled.

12 Check that there is no movement between the quadrant and the rudderpost.

13 Set aside a day and inspect the system while under full load. If you see anything bend, hear anything creak or note any other indication that there's a problem, you've got the rest of the day to try to sort it out.

14 Inspect the condition of the emergency tiller and make sure it fits the rudderhead and operates properly.

15 Check the rudderpost tube for any signs of separation from the hull.

16 At each haulout, carefully inspect the rudderpost bearings for wear or cracking.

17 Check the stuffing box for leaks.

idler sheaves. The idler and sheaves must be securely bolted to wooden supports bonded to the hull or cockpit floor with fiberglass cloth and epoxy resin.

Next, the quadrant or drive wheel is installed in two halves on the rudderpost at the appropriate height. The chain-and-wire assembly is led across the sprocket in the pedestal, down through the cockpit floor and around the idler and/or sheaves, then around the quadrant or drive wheel. To align the idler and the quadrant or radial drive wheel, you'll need to raise or lower the quadrant or drive wheel on the rudderpost as well as adjust the angle of the idler sheaves. Cable tension is then adjusted using two wire take-up eyes.

A steerer using a quadrant or radial drive must incorporate rudder stops. These stops will pick up any load the rudder may place on the system when the rudder is hardover. They must be installed to prevent the rudder from hitting the hull or the roller chain adapters and damaging the sprocket. It must be located so that the stop on the radial drive squarely hits the other stops. Edson supplies a reinforced rubber piece that will greatly reduce shock load. Always take care to tighten the brake when not in use to prevent

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freewheeling (likewise, don't reverse at speed and let go of the wheel). The rudder could slam against the stops, which might cause damage to the rudder or steerer. Blocks of wood should be glassed in place and must hit squarely and as low as possible on the stop. **Figure 7** shows an example of an ideal arrangement.

Geared System Installations

Geared steering systems are installed much the same way, except instead of connecting the steering mechanism to the rudderpost with chain, wire and sheaves, the connection is either a direct link of the steering gear to the rudderpost or through a tiller arm/drag link arrangement **(Figure 2).** Pedestal placement planning should also be carefully carried out and the same stuffing box guidelines for wire steering also apply.

When designing a steerer that uses an aft-mounted rack-and-pinion or worm gear system, ensure that the helmsman's seat will cover and protect the steering gear as well as allow easy access for inspection and maintenance **(Figure 3)**.

Accessories

With your new pedestal steering in place, maximize its use. How about a leather wheel cover? You'll be able to grip the wheel tightly, no matter how wet and salty it becomes. A binnacle compass, instrument pods and a radar display housing can position your electronics where you need them most — close to the helmsman. A teak table and drink holders can make your new pedestal even more enjoyable. Pedestal-mounted engine controls allow you to stand during docking maneuvers. Accessories are not only designed to enhance your boating, but to offer greater flexibility in layout for a clean and efficient cockpit.

Edson Corporation

The optional compass pedestal offers a secure handhold and makes it easy to add instruments, a teak cockpit table, drinkholders or a storage box.

Kim Weeks handles public relations for Edson International.

Suppliers

Edson Corporation, 146 Duchaine Blvd., New Bedford, MA 02745-1292; Tel: (508) 995-9711, Fax: (508) 995-5021.

Whitlock Marine Steering Co. In Canada: Transat Marine, 240 Bayview Dr., Unit 6, Barrie, ON L4N 4Y8; Tel/Fax: (705) 721-0143; In the U.S.: PYI, Box 536, Edmonds, WA 98020; Tel: (425) 670-8915, Fax: (425) 670-8918.

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ENGINE TROUBLESHOOTING

MODIFYING RAW-WATER COOLING SYSTEMS

A four-way engine coolant recirculation system that incorporates engine winterizing and flushing, a hot-water source for bathing or washing, optional fresh-water cooling, an emergency bilge pump and more — in one easy-to-install system.

Story and photos by Robert Hess

Raw-water-cooled marine engines are cooled by water drawn in through a seacock in the bottom of the hull, circulated through a V-drive water jacket (if fitted), water pump, engine block and cylinder head water jackets, exhaust manifold water jacket, exhaust pipe manifold (if fitted), and then into a marine muffler or water mixer or the downstream side of an exhaust pipe gooseneck. It's then ejected along with the exhaust gas at the rear of the boat through a hull fitting located at the waterline.

Although most engine water jacket castings are fitted with frost plugs, which are supposed to pop out under the pressure of water expanding as it turns to ice, the plugs are notoriously unreliable. Even when they do work, it may take a major disassembly of engine components to replace them. Most other cooling system components are not usually fitted with frost plugs (water pumps, for example) and are destroyed if water left in them freezes.

Normal Flushing Procedures

The traditional way to winterize this type of cooling system and prevent damage from freezing is to drain the water from the system by removing coolant hoses, loosen drain plugs and open petcocks (if fitted) at the lowest point of each cooling system component.

As raw-water-cooled engines age, the threads of drain plugs, which have repeatedly heated and cooled, begin to seize becoming increasingly difficult to remove. While being removed, they may break off or come loose only after cracking the adjacent assembly. As well, many engine components are difficult to drain completely, either because of the angle at which they are mounted, insufficient drain plugs, or poor access to all drain plugs because of non-standard parts installed during the marine conversion (i.e. marine manifolds). Petcocks do not drain completely, even when they are fully opened and sometimes become clogged with debris brought in with the raw water or scale from engine block water jacket corrosion. Freezing damage may be evident when the boat is put back into service or not noticed until years later.

The alternative to completely draining the cooling system is charging it with a liquid antifreeze solution. This is not only much easier and faster, but allows the boat to be put back into service at a moment's notice. A simple way to charge the system is to simply remove the cooling system water intake hose from the intake seacock, put it in a container of anti-freeze and run the engine until the anti-freeze container is empty. Unfortunately with raw-water-cooled engines, this process dumps the excess antifreeze out the engine exhaust pipe and pollutes the body of water in which the boat is moored (antifreeze depletes the oxygen in the water, which kills fish), leaving the owner liable to pollution charges. It also doesn't allow the antifreeze to circulate until the engine reaches operating temperature and the thermostat opens, which may prevent antifreeze from flowing to the upper sections of the

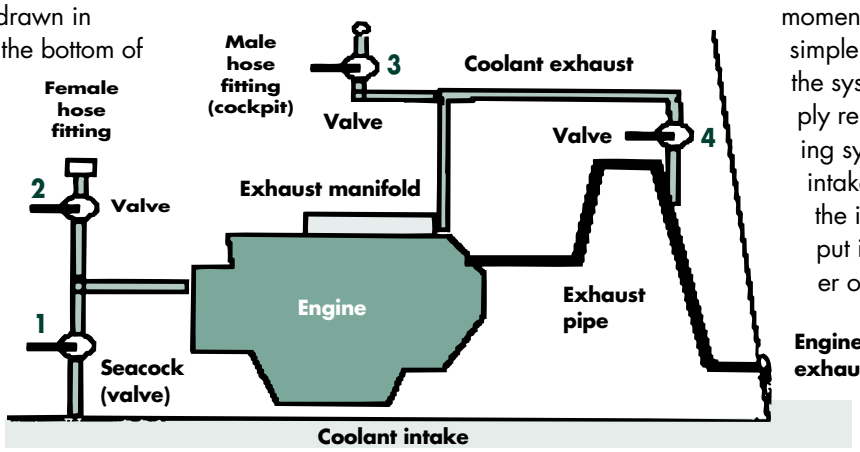

Figure 1

Adding one extra valve to both the intake and exhaust converts a typical raw-water cooling system into a multi-use one. Installation requires three ball valves, two T-fittings, one male and female garden hose connection, hose clamps and short lengths of garden hose.

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block and cylinder head water jacket around the thermostat, so that freezing damage still occurs.

A Better System

I designed this modified cooling recirculation system for my 7.5m (25') Hughes sailboat equipped with a 20-kW (30-hp) Atomic-4 model UJVD gasoline engine. It's a multi-use system that's easily adapted to most inboard engines.

With this system, you can:

- Winterize the engine by charging it with antifreeze without removing hoses or parts, circulate the antifreeze until the thermostat opens to ensure the whole system is protected and prevent the release of antifreeze into the surrounding water.
- Quickly bring the engine to operating temperature to check the thermostat temperature setting. The ability to raise the engine temperature quickly is also handy when the specifications for engine idle adjustment, valve adjustment or head torque call for it to be done at operating temperature.
- Have a convenient source of warm water while underway when it's not convenient to light the stove (i.e. heavy weather).
- Run warm water into a sailboat cockpit, creating a great bathtub (by plugging the cockpit drains).
- Run the engine while using an internal source of cooling water, such as the freshwater tank, so that the engine cooling system can be isolated from extremely silted or polluted water when powering off a mud bank or passing through an oil spill.
- Attach an external marine water hose to the cooling system intake to allow flushing of the cooling system with fresh water after operating in salt water.
- Deploy a pressurized fire or wash hose while underway.
- Draw water from the bilge to act as an emergency auxiliary bilge pump.
- Back-flush the engine to remove scale and dirt, simply by connecting the flushing line to the cooling system exit and running the flushing fluid backwards through the engine — the engine should be shut off and the water pump impeller and thermostat removed while this is done.
- Run the engine when the boat is out of the water, allowing for testing of the cooling system with all hoses in place before the boat is launched. The system can be quickly pressurized and tested using an automotive radiator tester (fitted with a pipe fitting adapter).
- Check that cooling water is available at the thru-hull water intake before starting the engine.
- Quickly clear any blockage in the seacock without removing hoses.

Coolant Intake Modification

The intake configuration incorporates a T-fitting in the cooling system attached to the valved intake seacock (**Figure 2**). The straight branch leads to a second ball valve and a female garden hose fitting.

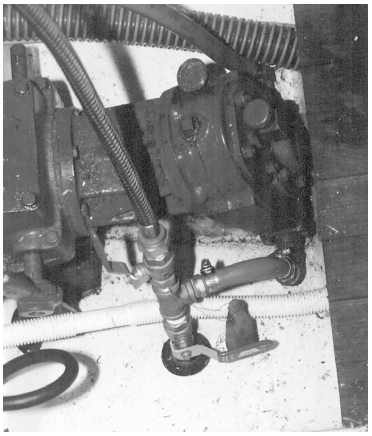

Figure 2

Coolant intake valve configuration shows the connections for the T-fitting, ball valve and garden hose.

The 90° branch leads to the engine water pump and cooling system.

This configuration allows the selection of the source of engine coolant intake, either from the intake seacock or from whatever is linked to the garden hose, such as antifreeze, bilge water, marina water or water tank. Both valves may be closed when the system is sealed for storage.

The T-fitting, ball valve and female garden hose fitting must be the same diameter as the intake line hose.

Coolant Exhaust Modification

The exhaust configuration incorporates a T-fitting in the cooling system just before the water is mixed with the engine exhaust (**Figure 3**). The straight branch leads to a ball valve (shown in photo) and then back into the cooling system at the muffler or water mixer or exhaust pipe. The 90° branch (not visible in photo) leads to a ball valve with a male garden hose fitting or a garden hose tap, which combines a gate valve and male garden hose fitting, mounted in the cockpit (**Figure 4 top**). The T-fitting, two ball valves and male garden hose fitting match the diameter of the coolant exhaust line.

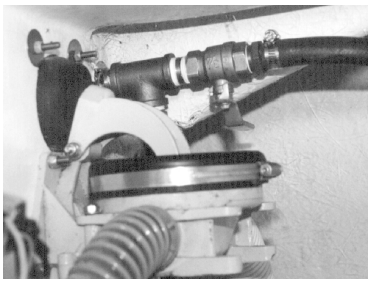

Figure 3

This photo shows the T-fitting connected to the cockpit tap (left) and a black hose leading to the engine exhaust.

This configuration allows the

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Figure 4

Engine coolant is diverted to a cockpit-mounted tap and attached to a garden hose when hot water is needed for bathing or washing (top), or to charge the cooling system with antifreeze (bottom).

selection of the destination of engine coolant — either to the engine exhaust muffler or water mixer or exhaust pipe — to the cockpit-mounted tap or to both simultaneously. The tap can be opened at any time while the exhaust pipe valve is open, but should only be used for short periods when the exhaust pipe valve is closed in order to ensure the exhaust pipe and/or muffler does not overheat because no water is flowing through it. Both valves may be closed when the system is sealed for storage.

Robert Hess has a background in automotive and marine mechanics and in 1994 he restored Water Music, a 7.5m (25′) Hughes that he cruises on the coastal waters of Canada's West Coast. In an upcoming issue, he'll provide step-by-step instructions to rebuild an inboard engine.

VALVE CONFIGURATION OPTIONS

This chart shows the many different ways to use this modified raw-water cooling system. The numbers of the four valves are keyed to their location in **Figure 1**.

[1]Intake Seacock	[2]Intake Hose Fitting Valve	[3]Exhaust Cockpit Valve	[4]Exhaust Muffler Valve	Mode
Closed	Closed	Closed	Closed	System shut down and sealed.
Open	Closed	Closed	Open	Normal operating condition.
Open	Closed	Open	Open	External warm water to cockpit tap & exhaust pipe. Warm water while underway. Cockpit bathtub. Auxiliary fire and/or wash hose (low pressure).
Open	Closed	Open	Closed	External warm water to cockpit tap. Auxiliary fire and/or wash hose (high pressure). NOTE: Use this mode only for short periods to avoid overheating the muffler and/or exhaust pipe.
Closed	Open	Closed	Open	Use internal water supply (not recirculated). Emergency bilge pump. Internal water supply when passing through silted or polluted water.
Closed	Open	Closed	Open	Recirculate internal water supply. Recirculate antifreeze. Heat engine quickly. Test engine out of water.
Open	Open	Closed	Open	Check cooling water Present at intake Clear Seacock obstruction

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DIY PROJECTS

Shop Tested

FLOWER(POT) POWER FOR HEAT

By Ryc Rienks

This idea came up while discussing with friends the use of a propane cooking stove as a source of heat on boats that lack a cabin heater. Simply firing up the stove produced little change in heat and only increased the condensation buildup (water vapor is a natural by-product of propane combustion). So how do you convert an open stove flame into a more efficient heat source?

What is needed is a way to create radiant heat with minimal equipment that can be easily stowed away when not in use. My suggestion was to invert an unfired red clay flowerpot over a stove burner. This will capture the heat and radiate it into the surrounding spaces. I have successfully used this trick in a small travel trailer, managing to take the morning chill off while making coffee on the other burner. The addition of spring clamps or rails could hold the flower pot in place against the boat's motion — don't try this until you have a way to secure the pot in place as it will get quite hot.

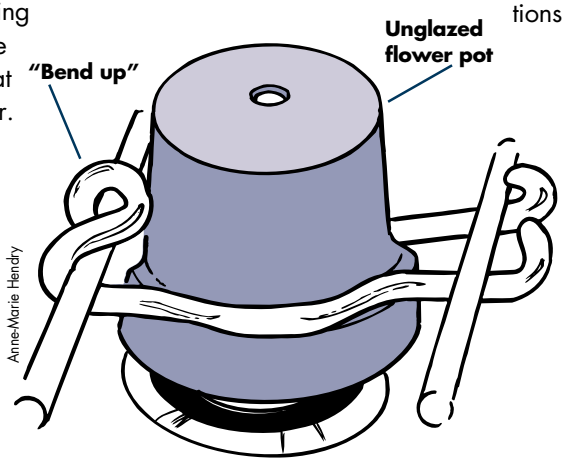

Figure 1

Flowerpot heater needs a clamp of some sort for safekeeping.A tank constructed of plywood and "waterproofed" with multiple coats of epoxy resin. Baffles prevent the contents from surging in the tank and scallop-shaped cutouts in the corners vent each compartment.

For materials, all you'll need is a clay pot of larger diameter than the burner and a length of wire. A coat hanger will do the job, but it quickly rusts. A better choice is brass brazing rod, 2mm (3/32") in diameter, available from a welder's supply house or some hardware stores. Refer to **Figure 1** for directions on bending the wire. Note that the section marked, "Bend up," will exert a down force on the rim of the pot, keeping it in place, while allowing it to be easily removed when cool.

The most important thing to remember is that you must provide adequate ventilation — the open flame will quickly deplete the oxygen supply. To really make this safer, install a smoke head, such as a Charley Noble, and rig a length of flex conduit as a temporary smoke stack. This will carry the moisture and combustion by-products outside. Conduit fittings will connect the pot and flex pipe together. Most, if not all, vented propane stoves and heaters use 2.54cm- (1"-) diameter stainless-steel pipe, so the deck fitting should be compatible with your flowerpot heater. Adding a couple of small battery-operated fans will help circulate the heated air around the cabin.

A former musician, custom knife maker and teacher, Ryc Rienks lives with his wife aboard Mai Tardis II, a Cascade 36 in Seattle, Wash.

Share a boat-tested project with other DIY readers. If we publish it, we'll send you $25 to $150 depending on the published length.

LOCKING OARS

This simple harness helps protect your oars from "walking" away and secures the oars when towing the dinghy.

To make it, drill a 9mm (3/8")

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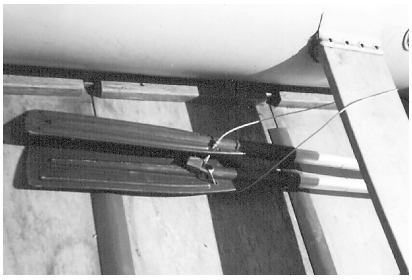


Figure 2

This harness keeps your oars with the dinghy.

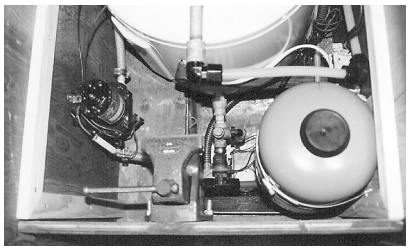
hole in each blade near the stock; the holes don't significantly affect the blade strength. Fabricate a 1.8m (6') or longer length of 3mm (1/8") stainless-steel cable or use PVC lifeline wire. Make a 7.6cm (3") loop in the ends and secure each with a Nicopress sleeve fitting. Thread the cable around the seat, through the holes in the blades (**Figure 2**) and lock using a marine-grade padlock with a shackle made of hardened boron alloy. *Kevin Dean,* Via Sophia*, North Vancouver, B.C.*

STOWABLE WORKSHOP

Often when working on my boat, I need a third hand. This comes in the form of a vice, but where to permanently mount or stow the vice has always been a problem.

One solution is to mount the vice on the inside of a locker cover. I mounted my vice on the front sliding board that conceals the compartment housing the water heater and pressure system (**Figure 3**). Rubber sound insulation on the outside of the board doubles as a protective pad when it's placed on a countertop. There are two bolt options to fasten the vice: one is for working and the other for storage. Four rubber feet (not shown) fit into the sink or stove top opening to keep the board from moving.

Another solution for powerboats is to mount the vice on the bottom of the hinged engine hatch cover. When opened, it turns the engine room into a great workshop for on-board maintenance. *Bill Macklin, Stratford, Ont.*



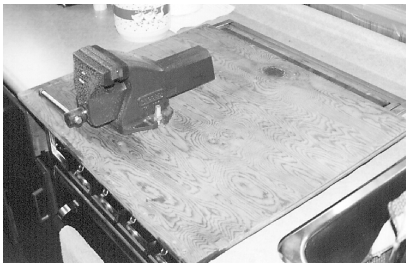


Figure 3

(Top) Vice mounted to board in locker; (bottom) vice in working position on stove top.

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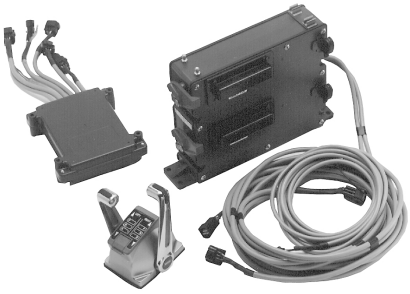
POWERBOAT RIGGING

TAKE CONTROL, ELECTRONICALLY

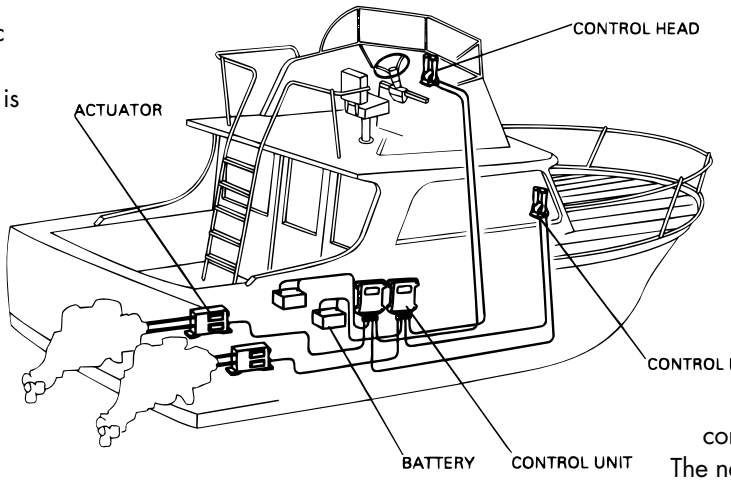


The Morse KE-4 electronic control is easily retrofitted onto any gas or diesel engine.

After you've installed an automatic synchronizer (see "Powerboat Rigging," 1997-#2), the next step is to replace linkage, push-pull cables, hydraulic or pneumatic controls with an electronic engine control. With such a system, electronics and computers control the engine to deliver precise throttle control and smooth shifting.

Electronic control systems are available from Glendinning Marine Products and from Morse Controls, which just launched the KE-4. Easily adapted to fit all diesel or gas engines, the KE-4 can operate up to three stations.

It comes with a control head, a 12- or 24-volt control module, actuator (big black box in the photo), all wiring harnesses and mounting fasteners. Add two Morse 33C cables of the appropriate length, an optional circuit breaker and alarm buzzer, and this completes the list of components for a single-engine boat with one helm station. Boats with twin engines and dual stations need two control heads, modules and actuators, and four of everything else. An optional mechanical control head and cables allow manual operation of the actuator in case of a power failure.



Installation of the components is simple: For a single-engine boat, mount the control head on a flat surface in a convenient location at the helm; install the control unit in a dry location within 2m (7') of the actuator, which is located farther aft, in line with the engine. Wiring is also simple with preassembled wire harnesses — just insert the plug-in connectors into their corresponding sockets. Routing the harnesses under the deck or through the gunwales could be challenging and will have to be planned well in advance. Connect the two Morse cables to the engine's shift and throttle connections and to the actuator, and the installation is half-complete.

The next phase is more complicated and time-consuming, and involves adjusting the control unit and actuator to match the engine setup. Both units have preset factory default settings that may, depending on the engine, save some time.

The cost of the complete KE-4 package for a single engine, including the extra engine cables, averages US$2,218. Add US$2,033 for twin-engine boats plus US$753 for dual stations, which totals US$5,004. The mechanical control and cables are extra.

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WINTERIZING

OFF-SEASON STORAGE FRAME

This strong and effective cradle system allows easy access to your boat or engine for servicing in the off-season. And it's a cinch to build.

By Judy and Ken Rogers

Materials

Stern Support
4.2m (14') 2x10
3.9m (13') 2x4
5.1m (17') 2x8

Bow Support
9.6m (32') 2x4

*Nails**
1/2 lb 3" galvanized common
1/2 lb 2-1/4" galvanized common
**Bolts are optional and recommended for heavier boats.*

Exterior paint

Supplies given will make a storage cradle for a 7.8m (26') powerboat with an 2.4m (8') beam and weight of 2,016kg (4,480lb). The boat's beam and finished height of the bow support will determine the amount of lumber and nails (or bolts) required. Use either fir, pine or pressure-treated lumber.

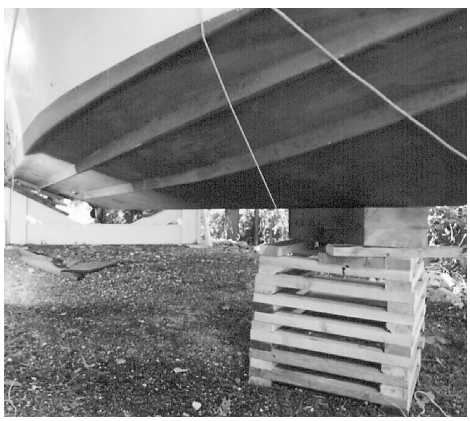
With the approach of colder winds and rain (or snow in more wintry climes), many boaters move on to warmer interests. If your boat isn't stored on a trailer, you'll need to arrange for safe storage after haulout.

Two winters ago we left our 7.8m (26') Campion Toba in the water (Porpoise Bay, near Sechelt, B.C.) and managed a couple of winter trips without experiencing any severe wind or snow storms, even when docked. The winters aren't normally very severe on the West Coast, but last winter we decided to haulout our boat and were in need of a safe, strong structure for winter storage.

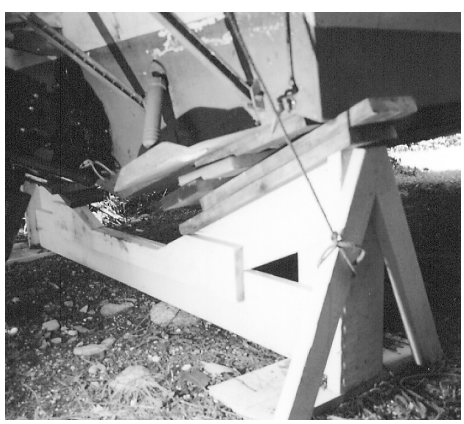
We didn't feel comfortable using discarded 45-gallon fuel drums. Although we've seen them in backyards with boats balanced on top, we didn't feel the barrels meet safety or structural support standards. We also wanted to keep the storage frame light enough to be quickly moved and set up in position, which saves money when you're paying to have your boat hauled out.

The storage frame we designed is quick to build, easy to move and strong. It survived last winter's abnormal weather, which included severe rain and windstorms that knocked down a number of trees in our neighborhood, a couple of snowstorms that brought .9m (3') of heavy snow followed by sudden driving rain that collapsed boathouses and sunk boats, and two earthquakes (only about 4.5 on the Richter scale).

The cost for haulout and setting up the boat on our storage system was CDN$107. It would have cost another CDN$30 or more for the extra set-up time with a less efficient



Bow view: Box frame is simple to build and fully portable.



Stern view: Support gives sufficient clearance to service the outdrive and trim tabs.

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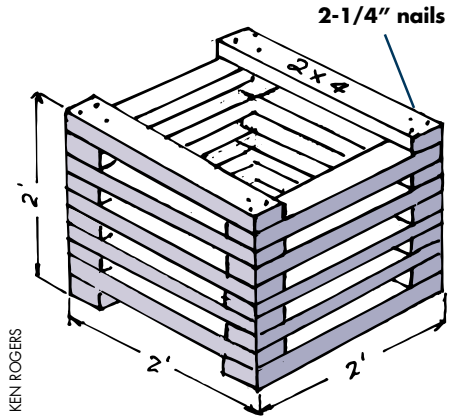

KEN ROGERS

system. In short, you could save the cost of your investment in the lumber required in the first use.

With easy access to the boat for winterizing last fall, we checked for and fixed any leaks that sprung in window frames over the winter and recoated the bottom. By spring, our boat was ready for that much anticipated relaunch.

Construction Details

If you want the storage system to last for more than a couple of years, you could build it out of pressure-treated wood. We didn't, using instead fir No. 2 or better grade. We just gave it a good coat of exterior paint. Where fir is not available, pine could be used. Knots should be small and if you experience splitting when nailing, pre-drill the nail holes, especially on the ends of structural members.

Our Campion weighs about 2,016kg (4,480lb). For fasteners, we used galvanized nails for the extra holding power and resistance to rust. For heavier boats, owners should consider using 6mm to 9mm (1/4" to 3/8") bolts backed up with washers for extra holding power. Everyone tells us we overbuild things, but that's okay — they seem to last longer.

To support the bow, we built a box frame of 2x4s (**Figure 1**). This is done by simply cutting lengths of 2x4 to 61cm (24") long, then nailing them alternately on the flat to a height of 61cm (2'). Make sure each layer of two adjacent pieces is squared before nailing. It took two people only about 20 minutes to solidly nail these together after the 2x4s were cut to size. The finished height varies according to the hull design, adding a few extra inches to elevate the bow.

The measurements of the stern support also vary according to the type of power your boat has. You'll want sufficient clearance to service the outdrive or prop shaft and rudder, as well as the trim tabs, transducers, etc.

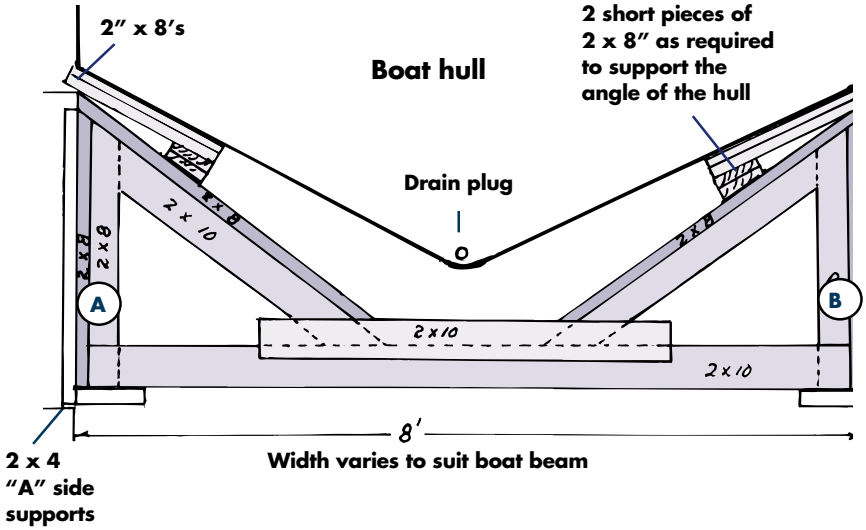

Figure 2 - Stern Support

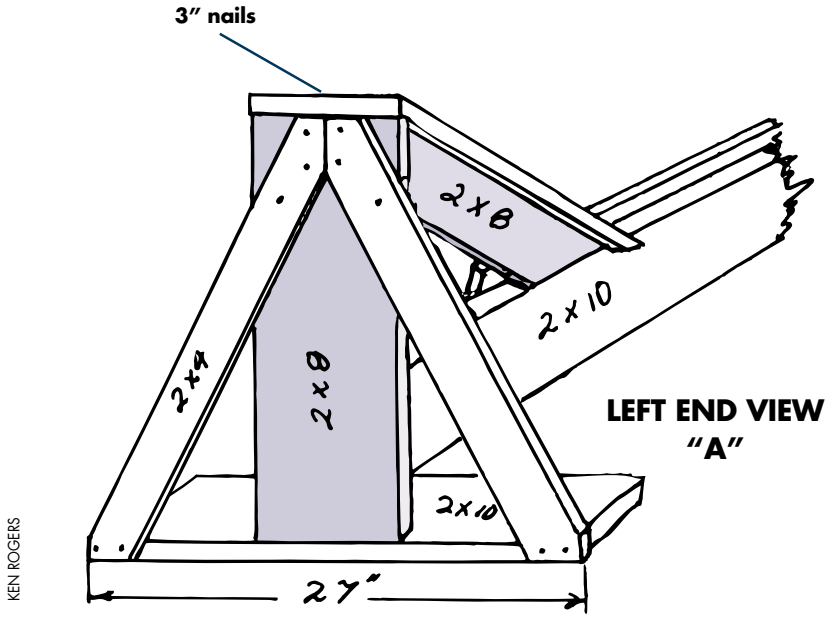

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Figure 3 - Stern Support End View

Assembly and Construction

To construct the stern support, nail the two vertical supports first, shown as A and B in **Figure 2**. Set them on a level surface, the distance apart equal to your boat's beam. The other lengths and angle cuts are easy to measure directly from the supports. Refer to **Figures 2** and **3** for additional assembly details.

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Set Up

The boat should sit in the stern support so the deck is level. A 15cm to 25cm (6" to 10") bow-high position really is useful for draining out water tanks and the bilge through the transom drain plug hole, and allows water to run off the boat cover and deck area.

Ken and Judy Rogers purchased Sweet Dreams, a Campion Toba, in '95, then proceeded to debug, rewire, upgrade and do the myriad fix-up tasks inherent in owning a 20-year-old boat, while still finding the time to cruise the Sunshine Coast with son Daniel. Both hold management positions in British Columbia's school system.

A LEG UP

A portable and stowable hull support system for powerboats and sailboats "standing" on the mud or stored "on the hard."

Story and photos by Janis Priedkalns

There may come a time when you have to move your boat to a new storage location or have it hauled for bottom work in places far away from your boat's cradle. Usually, the yard will rent you several tripods chained together or, in the worst case, shore up your boat with lumber supports wedged under the hull. As a last resort, you may wish to have your cradle shipped to the haul-out location at a cost probably exceeding the tripod rental cost.

Tripods and wooden supports are not ideal methods of supporting powerboats or sailboats upright if you want unobstructed access to the hull. Should a support be removed accidentally, you risk injury to anyone working under or near the boat, or the possibility that the boat will tip over — which could also be catastrophic. (Of course, twin keels eliminate this problem and there's obviously no problem if you have a catamaran or trimaran.)

When we moved our Corbin 39 to a new location, our old cradle did not meet the requirements of the yacht club or the new environmental bylaws which require that cradles must be collapsible to a height of less than 1m (3'3"). This happened during spring launch, so we put the purchase of a replacement cradle on hold.

During the sailing season, we discussed various cradle options with fellow boaters. In all cases, we came up against the problem of the support pads: Where do you keep them after the boat is launched? Then there's the periodic maintenance needed to prevent the pads and cradle from rusting. Positioning a standard metal cradle can also be time-consuming — getting it set up with all pads in place and then aligning it to meet the boat; checking that the boat's sitting correctly and that all pads are adjusted without causing any pressure points on the hull; and so on. And should you decide to relocate, you'll need to hire a cradle-moving company, which takes a chunk out of the budget.

Portable "legs" keep the boat upright in mud, sand or on land, allowing clear access to the hull for cleaning or painting.

Eventually we decided on a "leg" support system popular in Europe. Many European yachts are berthed in tidal waters and, in order to keep them upright at low tide, support struts or legs are attached to the hull, both port and starboard. These are long enough to support the boat as the keel settles in the sand, mud or hard bottom. Some of these systems are permanently attached, while others are removable.

Made by The Yacht Leg Company in Middlesex, UK, our system has now been in use on our Corbin for several seasons and has shown versatility in both haulout and launching. At haulout, the boat is lowered to a few inches off the ground at the desired location. Short 2"x6" planks are placed under the keel to keep it off the ground and then the boat is lowered completely. While the slings continue to support the boat, two preassembled legs are locked into fittings permanently mounted on the hull. The length of the legs, which have an adjustment span of 61cm (24"), is then fine-tuned to support the boat upright. An adjustable handle acts as a load indicator and helps determine when adequate pressure has been applied to each leg. You now have full access to the hull for scrubbing or painting. The only drawback is during long-term storage since the yard cannot easily move the boat by forklift should the need arise.

When launching, the procedure

Continued on page 34

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FALL LAY-UP

Steps to better off-season storage

Regardless of whether winter puts you in a deep freeze or brings more moderate temperatures, if your boat is not going to be used for a few months, you need to protect it from the elements. We've compiled this checklist to help you organize your end-of-season maintenance chores. (For more detailed information, refer to our FALL '95 and FALL '96 issues.)

Before Haulout

❒ Fill fuel tanks and add stabilizer or fungicide. Or leave as empty as possible and add a water absorber.
❒ Before the last pumpout, add Shock Treat or similar product to descale head and hoses.
❒ Winterize head and holding tank according to owner's manuals.
❒ Winterize fresh-water system: a) add non-toxic antifreeze. Turn on one tap at a time until antifreeze-colored water flows out, then turn off. Repeat with each tap; 2) or drain fresh-water system: Open all taps and let tank run dry, then disconnect water lines at fresh-water pump.
❒ Disconnect all water lines at the lowest points or blow water out of the system using compressed air.
❒ Winterize air conditioner, refrigerator, ice machine, deck washdown and any other water-using equipment.
❒ Drain shower sump and hot-water heater.
❒ Strip the interior — remove all perishables, personal items, all paper products. Remove any bottles or jars that can freeze.
❒ Remove cushions and mattress or tip on side if left onboard.
❒ Remove electronics and store in a warm, dry place.
❒ Remove antennas and couplers, then spray exposed cable ends with a protective lubricant and wrap with electrical tape.
❒ Scrub the interior and dry thoroughly. Spray a mildewcide in drawers, cabinets, galley, sinks, head and shower areas.
❒ Remove cockpit and flybridge covers, clean with a mild detergent and store in a dry place.
❒ Check condition of cradle.
❒ Designate a storage place ashore for all your boat gear.

After Haulout

❒ Power wash bottom. Wash hull and deck. Be sure cockpit scuppers drain freely.
❒ Remove growth off shafts, struts, outdrives and trim tabs.
❒ Thoroughly check hull for damage or blisters and inspect all external fittings.
❒ Winterize engine and cooling system.
❒ Winterize generator cooling system.
❒ Remove all fresh- and seawater pump impellers so they don't take a set.
❒ Clean refrigerator or ice box using warm water and baking soda.
❒ Clean bilges, then pump dry.
❒ Wash lines — place in pillowcases in a washing machine with cold water and a little detergent or soak large lines in a tub.
❒ Top up batteries, fully charge and disconnect if leaving on the boat.
❒ Check electrical connections for corrosion and spray with a moisture-displacing lubricant.
❒ Empty cockpit lockers. Clean and spray with a mildewcide.
❒ Supply fresh air — leave hatches and ports open a crack, disconnect all hoses and open seacocks, slightly open oven and refrigerator doors (or ice box lid), leave open all cabin and locker doors and lift up floorboards to air the bilge.
❒ Place packets of silica gel inside lockers and cabinets.
❒ Apply a coat or two of varnish or oil to brightwork.
❒ Remove anything you want to work on at home.
❒ Make a checklist of things to do before spring.

Optional

❒ Cover boat, leaving ends open for ventilation.
❒ Wax hull and deck (except non-skid). Buff now as some waxes harden if left on and are difficult to remove.
❒ Apply a coat of metal polish to stanchions and all deck hardware.
❒ Jack up trailer and securely block the frame.
❒ Check fire extinguishers.
❒ Inspect and lubricate seacocks, steering systems and all other moving parts.
❒ Hand-wash sails in warm water using a mild detergent, let dry thoroughly and store in a cool, dry place.
❒ Cover mast end and engine vents to prevent unwanted nesting pests.
❒ Leave bottom hull cleaning for spring — algae and scum are often easier to remove if left over the winter to die and dry out.

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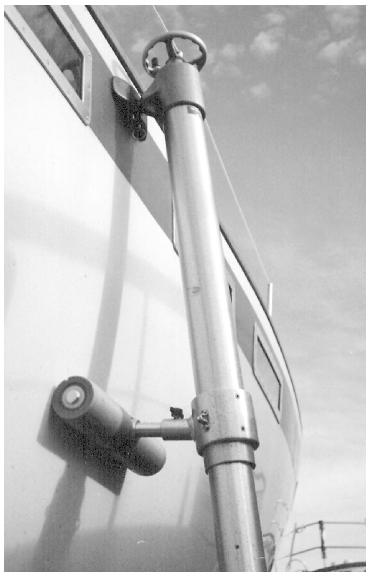
is reversed. The crane slings take the weight of the boat and the legs are unlocked, removed and then later dismantled for stowage on board, in the dock box or elsewhere. The legs disassemble into 1m-long (3'3") sections. We stow our legs in a cockpit seat locker and still have room to spare.

For boaters in tidal waters, there are some added benefits to keeping



the legs on board. Should you happen to ground on a falling tide and be unable to kedge off, there's no need to panic — simply assemble your legs, clip and lock them in position, adjust the length to suit your situation and wait in a comfortable upright position for the return tide. To ensure the legs remain in a vertical position, I attach fore and aft guy lines to the foot pads and tie them off to a cleat on deck. When you need to scrub the boat or paint the bottom, beach the boat at high tide (don't do this during spring tides!) and attach the legs. Wait until the keel rests firmly on the bottom, adjust the legs to keep the boat upright and then tie off the fore and aft lines to keep the legs vertical. Since the boat is upright, both sides of the bottom can be done on the same tide, an improvement over the traditional method of having to careen the boat first on one side and then the other over two tides!

An upright boat also makes for a drier, more-comfortable stay on board while you're waiting for the return tide. When the boat refloats just untie the guy lines and detach and stow the legs and you're finished.

How strong is the system? Our Yacht Legs are made of heavy-walled

(Left) The "leg" sits snugly against the hull at a 7° angle on the Corbin 39. (Top) Closeup of the upper leg assembly shows the key and split ring locking mechanism and adjustable wheel for fine tuning.

aircraft-grade aluminum tubing and stainless-steel fittings. The hull fitting is a strong casting with two 15cm (5/8") stainless-steel threaded rods locked into the casting that bolts through the hull with wooden backing plates on the inside. Sealant is not required as the manufacturer supplies gasket material that's used between the casting and the hull.

The legs do not need to be placed amidships; if your boat has a tendency to tip forward when resting on its keel, they can be installed forward of the midships position. A template gauge is provided to determine the correct angle of the legs. In my case that was 7°. After several measurements, the padded T-bar spacer rod was cut to size and tested for the required angle. We installed our legs while the boat was in the water, but the final leg-length adjustment was done during haulout.

Will this system work on your boat? That depends on the type of keel you have, the way it attaches to the boat and whether or not it can take the full weight of the boat with the mast in place. Units are available for boats with a maximum weight of 3 tons up to 25 tons. This system has been successfully installed on a C&C 44 fin keel and Jeanneau 32 at my club, in addition to my Corbin.

Janis Priedkalns spends his summers cruising the Great Lakes in* Simmerdim*, a Corbin 39 he built from a kit. He manages an electronics service business based in Markham, Ont.

Buying Info

To find out if your boat can be fitted wih Yacht Legs, contact the manufacturer directly. (The Yacht Leg Company, Duttons Farm, Bangors Rd. S., Iver Heath, Bucks SL0 0AY; Tel: UK+44(0) 1753-655145, Fax: UK+44(0) 1753-630517.) Legs are built on a semi-custom basis; in order to receive a price quotation and installation advice, you'll need to supply a photograph or scale drawing of your hull with full details about the boat's construction and displacement. Yacht Legs are sold in pairs with all the necessary parts and fittings to complete the installation. Prices in pounds range from £295 for legs that expand to 1.37m (4'6") to £625 for 2.9m-long (9'6") legs.

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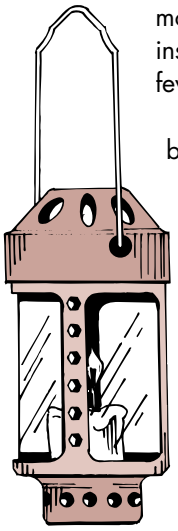
Good Boatkeeping

By David & Zora Aiken

Cockpit Glow Lights



A gimbaled oil lamp (the bulkhead-mounted type with a canister base and glass chimney) can be lifted from its bracket and taken outside to provide soft lighting in the cockpit. The weighted base will keep the light upright in normal circumstances, but if you're in a rolly anchorage, secure the base to prevent spilled oil or a splintered chimney.

A camper's candle lantern also offers good light for cockpit parties. The smallest one (just a few inches high) will hardly interfere with star-watching or skyline-gazing.

Traveling Lights

Boat interiors are noted for their abundance of oddly shaped spaces, many of which are either hidden or heavily shadowed. For the occasional need to lighten up such spaces, permanent wiring is unnecessary. Keep a small, battery-operated portable fluorescent light handy. Use one of the flexible-handled lights to reach around curves and into corners. For engine work and other chores that require two hands, try using a head lamp, such as the Pelican VersaBrite (see review in "Dockside," 1997-#2 issue).

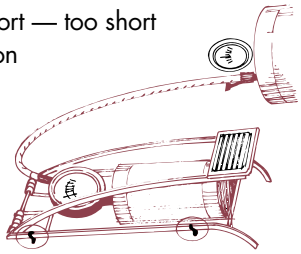
Heat Helpers

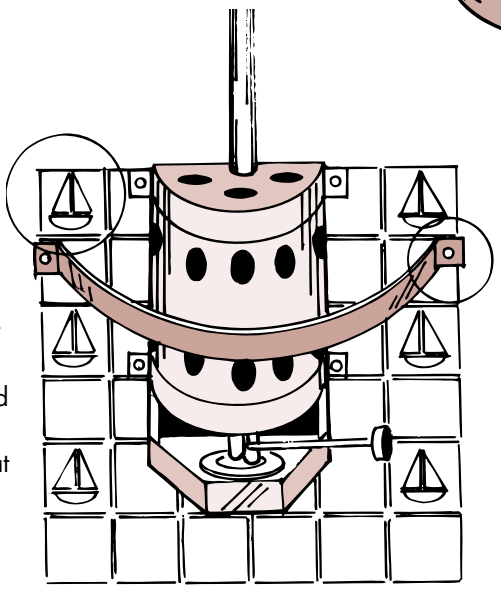
Regardless of how your bulkhead-mounted cabin heater is fueled, the installation can be improved with a few add-ons.

Put ceramic tile on the bulkhead behind the heater. It adds a safety factor, retains some heat and can even look good. Break up some tiles and rearrange them into whatever design appeals to you. Fill in all the spaces between the tile pieces with grout.

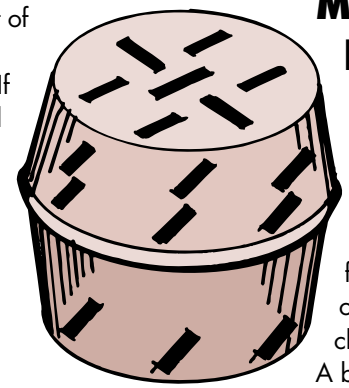
You can prevent singed fingers and elbows by adding a narrow safety shield in front of the heater. Attach a bendable metal band about 5cm (2") in front of the heater. Curve the band to match the shape of the heater. If you've added tile and must drill into it to attach the band, use a masonry bit to avoid unnecessary cursing.

If your heater is fueled by kerosene, you can pressurize the tank by using either a hand pump or foot pump (the kind used for bicycle tires). The foot pump is small and easy to use, but its air hose is short — too short for tanks on boats. Attaching the foot pump vertically against a bulkhead at whatever height is convenient to the tank, lets you pump it by hand. Keep a pressure-release tip handy. Better yet, put a couple of spares in a plastic bag and tape the bag to the back of the tank.





Movable Heat



If your boat doesn't have room for a fixed heater, a few options can help chase the chill. A basic wick-burning kerosene lamp (trawler style or hurricane lantern) gives heat as well as light. Or try a pressurized kerosene lamp — it throws a lot of heat. Place them as low as possible so you'll be able to feel the rising heat. For smaller boats, an alcohol-fueled small portable heater (i.e. the Origo Heat Pal) can serve double duty as a single-burner cookstove.

David and Zora Aiken are the authors of* Good Boatkeeping *and* Good Cruising *published by International Marine. The books are compilations of hundreds of practical boating tips acquired from nearly 22 years living afloat. The Aikens currently live aboard a 1963 10.5m (35') Chris-Craft sloop,* Atelier, *berthed in Mathews, Virginia.

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