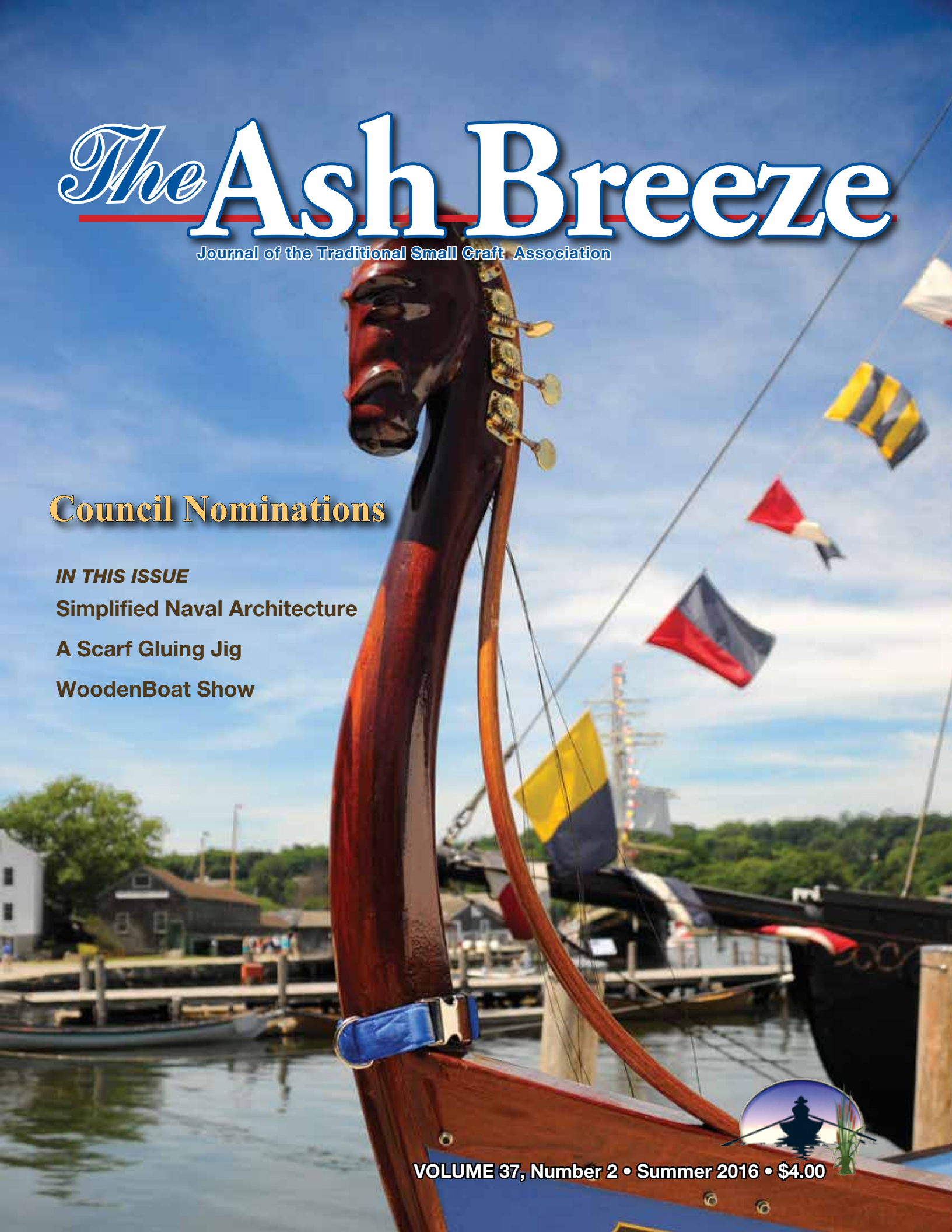

The Ash Breeze

Journal of the Traditional Small Craft Association

Council Nominations

IN THIS ISSUE

Simplified Naval Architecture

A Scarf Gluing Jig

WoodenBoat Show

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The Ash Breeze

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Volume 37, Number 2

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The Traditional Small Craft Association, Inc. is a nonprofit, tax-exempt educational organization that works to preserve and continue the living traditions, skills, lore, and legends surrounding working and pleasure watercraft with origins that predate the marine gasoline engine. We encourage the design, construction, and use of these boats, and we embrace contemporary variants and adaptations of traditional designs.

TSCA is an enjoyable yet practical link among users, designers, builders, restorers, historians, government, and maritime institutions.

TAB Layout Design: Karen Bowen
Cover © Bob Letourneau

President's Message: Ready, Set, Shoot!

Marty Loken, President

In the last edition of *The Ash Breeze* we announced plans for a 2017 TSCA large-format calendar featuring beautiful boating images, to be made available to members by this fall. Hoping that all of the photographs will be from readers of the magazine, we invited you to begin submitting some of your favorite digital images (in the highest available resolution) for possible use in the 2017 Small Boats Calendar.

Our first photo submission was from Steve Brookman of the Delaware River Chapter (who just moved to Maine, incidentally, shifting his membership to the Down East Chapter). Steve's image, shown here, was of his beautiful 16-foot Barto/Brady Melonseed, RIVUS, under sail during a 2015 messabout on Union Lake, New Jersey. The photo was taken by Rachel Cobb. (See www.weedyacres.com for more of Rachel's striking images.)

So, here we are at the start of another great summer of small-boat rowing, paddling, and sailing. No excuses now—please get out there with your friends and their cameras, and shoot the best images you can of your small boats and those of your TSCA buddies…and email 2017 Small Boats Calendar entries to me (Marty Loken) at Norseboater22@gmail.com

Once again, our final deadline for receipt of high-res JPEG images is September 15. Please be sure to include basic caption information: what, where, when, and who. We will acknowledge receipt of all entries, and let you know if we have any questions.

Calendar selections will be announced shortly after the September 15 deadline, and you'll be able to order the 2017 calendars by mid-October of this year, well before the holidays.

Thanks, in advance, for your photo submissions…and have a great summer of messing about in small boats!

Coming June 24–26, 2016

John Gardner Small Craft Workshop at the WoodenBoat Show

Once again Mystic Seaport is partnering with WoodenBoat and Traditional Small Craft Association to host the John Gardner Small Craft Workshop as part of the WoodenBoat Show. The Small Craft Workshop will be based on the Australia Beach where floats will be provided for our use. The Workshop will include TSCA member demonstrations, boats of all description, demonstrations of small boat skills, morning rows on Saturday and Sunday, and behind-the-scene, guided access to the Seaport Museum's boat storage area.

Workshop Activities

Mystic Seaport Boat House Livery: WoodenBoat has made the Boat House Livery available for you to try out a variety of rowing and sailing craft at no charge. The Boat House rental boats will be in operation during the Workshop at no charge during the weekend so feel free to experience any or all of their beautiful collection of rowing boats. The Boat House will operate independently from the Workshop with their own rules.

Use of Participant's Boats: Workshop boats will be located on the beach or the floats at Australia beach to be available for use by others at the boat owner's discretion. Participants will need to oversee the use of their boats. To be consistent with the rules of the adjacent boathouse, the wearing of PFDs when boating is encouraged so please bring PFDs for yourself and your crew.

Demonstrations and Workshops: Several workshops are planned on both land and water. Participants are encouraged to attend, suggest ideas and perhaps present topics, which may include rowing and feathering, sculling, rigging, reefing, anchoring, sail setting, knot tying, making hardware or outfitting for safety. The plan is to have these presentations take place on Friday at 3 p.m., Saturday at 11 a.m., 1 p.m. and 3 p.m. and Sunday at 11 a.m. and 1 p.m. Contact Bill Rutherford at smallcrafter@gmail.com with ideas or to volunteer.

Morning Row: Workshop attendees who wish to join the cruise down the Mystic River to Mason's Island or up river to Old Mystic (the direction depending on favorable wind and tide) should gather at Australia Beach at 8 a.m. on Saturday and/or Sunday. Efforts will be made to place participants who did not bring a boat a place on another attendee's boat or a JGTSCA dory.

Mystic Seaport Small Boat Collection Open House: The Museum's Small Boat Collection which is not normally open to the public will be open each day of the Show from 2:30 p.m. to 4:30 p.m. It is accessed through the loading dock doors in the rear of the Collections Building across from Latitude 41. TSCA will offer a guided tour of the Collection leaving from the TSCA Booth at Australia Beach at 3:30 p.m. both Saturday and Sunday afternoons. A few other small boats on display may be observed on the way across the Museum campus as opportunity presents.

Saturday Night Dinner: On Saturday night, join other WoodenBoat Show participants in the River Room at Latitude 41 for a dinner honoring John Harris of Chesapeake Light Craft. Tickets for the Tribute Dinner must be purchased in advance of the Show by calling the WoodenBoat Store at 800-273-7447.

Workshop Logistics

C**heck in:** Check in at the WoodenBoat Credentials Booth on Friday between noon and 5 p.m. and on Saturday between 7:30 a.m. and 10 a.m. It is located near the big anchor in the courtyard of the main entrance to Mystic Seaport. You will get a wristband that will give you access to the museum grounds for the weekend. Proceed to the TSCA booth at the Australia Beach (#12 on the map).

Load in and out of Boats: (Be sure to check in at the credentials booth first)

Car Top Vessels: You can drive onto the grounds of the Museum on Thursday 5–8 p.m., Friday from 6–9 a.m. and 6–8 p.m., Saturday from 7–9 a.m. and Sunday from 5–10 p.m. Access is through the Galley Restaurant Gate (just north of the main entrance to the Museum). Due to activity around the Show, the Shipyard gate will not be available.

Trailered Vessels: You can also load in at one of the Mystic town boat ramps. The most convenient is Isham Street, directly south of the Mystic Seaport shipyard. Please obey local regulations and do not park your trailer or vehicle on Isham Street.

Forklift Assistance: There will be a forklift in the Shipyard on Saturday morning 7:30–8:30 a.m. and Sunday afternoon 5–6 p.m. to assist with launching and hauling. Your boat can be lifted by slings from the forklift, Mystic Seaport will provide the slings.

Trailer Parking: Please park your trailers at the Mystic Middle School, 204 Mistuxet Ave, Stonington, CT 06378. Offsite Trailer Parking maps will be at the Credentials Booth. This is a very busy weekend for the Museum, so there can be no trailer parking allowed in Mystic Seaport parking

Sizing Marine Wire—Part 3
Fuses and Circuit Breakers

by Edward Scott, Bayside Marine Design

In Part 3 of this article, we are going to learn about marine circuit protection. Circuit protection on a boat is there to protect wires from overheating during an overload condition. While your wires should be sized for normal usage in regards to current flow and voltage tolerance, conditions can cause too much current to flow in a circuit causing the wire to overheat very quickly and potentially start a fire. When this occurs, circuit protection is what "opens" the circuit before the wire overheats. We will learn about overloaded circuits and the devices used to protect your wiring and devices from fire and damage.

Fuses and Circuit Breakers – Protectors of the Wire

By now you should be comfortable with marine wire and how to choose the sizes for your boat project. Your wires should be able to handle normal current as well as deliver close to 12V DC (within 3 or 10 percent) to your boat's equipment. But… what if something happens that causes too much current to flow through your carefully sized wires? This excessive current flow will likely cause a fire and/or may ruin an expensive piece of equipment. How do you prevent this from occurring? You use fuses and/or circuit breakers (circuit protection devices) in your circuits to sense the current flow and OPEN the circuit before fire and damage occurs.

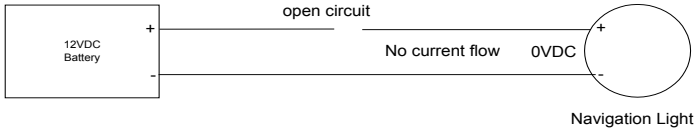
Abnormal Circuit Conditions

In Part 2 you have already been introduced to the normal electrical circuit. Before we start our discussion on circuit protection devices, we need to look at circuits that no longer function correctly. There are three basic abnormal circuit conditions that can affect the electrical circuit. The first is known as a SHORT circuit, the second is known as an OPEN circuit. These conditions mainly have to do with wire connections between the devices in a circuit such as the battery and a light or a switch. The third is a failure of a component in a circuit. For our purposes here, the component could be a wire or termination, light fixture, a piece of electronics, a switch, even the battery.

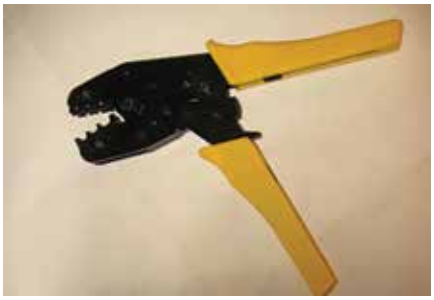
We will begin with discussing the OPEN CIRCUIT. Study and compare the normal circuit diagram with the open circuit diagram.

Normal Circuit

Open Circuit



This OPEN circuit diagram shows a break in the positive power lead. As mentioned above, the break can be a broken wire (positive or negative wire), bad terminations, or corrosion. This results in an OPEN CIRCUIT. With an open circuit, there is no way for current to flow from the battery to the device you're powering and also no voltage at the power terminals. This is not a fire causing scenario, but it can result in equipment not operating that you are depending on to safely operate your boat. How do these conditions occur? A physical break is usually caused by poorly routed wires that are in the way of people moving about or moving around with equipment. Many times nobody sees or feels the wire breaking when it happens. Another common cause is bad terminations due to using cheap crimp tools. Your terminations may look connected, but in fact may not be; they may work for a while then vibration opens the circuit right inside the wire terminal resulting in very intermittent operation or complete failure of the circuit. In addition, terminations can have CORROSION buildup; this creates a very high RESISTANCE connection, which is similar to an open circuit. Too much resistance will not let enough current flow and will reduce the voltage at the device power terminals, so the device fails to operate. Corrosion happens more often with poorly crimped terminals as well as using un-tinned wire. These two reasons alone are why it is imperative that you buy the best crimping tool for your marine terminations and to make sure you use only tinned marine wire.



The best type of crimpers for terminations.

The second abnormal circuit condition is the SHORT CIRCUIT. Study the "SHORT CIRCUIT" diagram. The diagram shows that the two power wires are connected

continued on page 18

CBMM Small Craft Rentals Begin May 28

More people will have the opportunity to get out on the water this summer with the Chesapeake Bay Maritime Museum's small craft rental program. The program launches this Memorial Day weekend, Saturday May 28, and continues weekends and select weekdays through August 28. Boats will be launched from the museum's floating docks, located near the Steamboat Building on CBMM's 18-acre waterfront campus. Participation is limited by the number of boats available, with reservations required.

Built over the years in CBMM's boatyard through the Apprentice for a Day program, the fleet of boats includes small wooden sailing skiffs, single and tandem kayaks, and rowboats that are perfect for singles, couples, or families. For participants wishing to sail but without basic sailing experience, CBMM is also offering private sailing lessons.

"We're a museum that brings people closer to the Chesapeake Bay, so getting people out on the water for a first-hand experience is absolutely central to our mission," said CBMM President Kristen Greenaway. "Come join us this summer and you too can mess about in boats that you'll find nowhere else."

The small craft boat rental program began in 2015 through the generous seed money support of donors to the Jim Greenaway Memorial Fund. The fund is named after CBMM President Kristen Greenaway's late father, an avid sailor, furniture manufacturer and boat builder, who passed away in January 2015.

The program will be operating on weekends beginning May 28 and continuing through June 19, and will expand to include Wednesdays through Sundays on June 22 through August 28. Hourly and daily rental reservations can be made from 10 a.m. to 4 p.m., with all boats returning to the museum's docks no later than 5 p.m.

"You can take one of our boats out for as little as one hour to an entire day," said CBMM Boatyard Program Manager Jennifer Kuhn. "For our guests it's a unique chance to play around on the Miles River in a handcrafted wooden vessel."

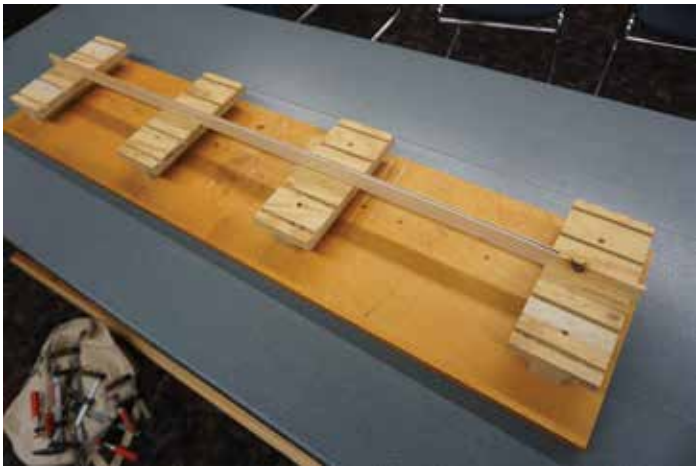
Private sailing lessons include up to four participants per session and are available to each participant at $50 per hour, or $300 per person for a full-day lesson from 10-4 p.m. Five days advanced registration is required for sailing lessons.

Boat renters must be 16 years of age or older, with minors accompanied by an adult, unless a boater safety certificate is presented. All participants must be physically able to get in and out of a small boat without assistance. Life jackets will be provided. In the event of small craft warnings or inclement weather, the programs will be cancelled. Daily and hourly rates vary per vessel, with discounts to CBMM members; advanced reservations are required by contacting Allison Speight at aspeight@cbmm.org or 410-745-4941.

A Scarf Gluing Jig

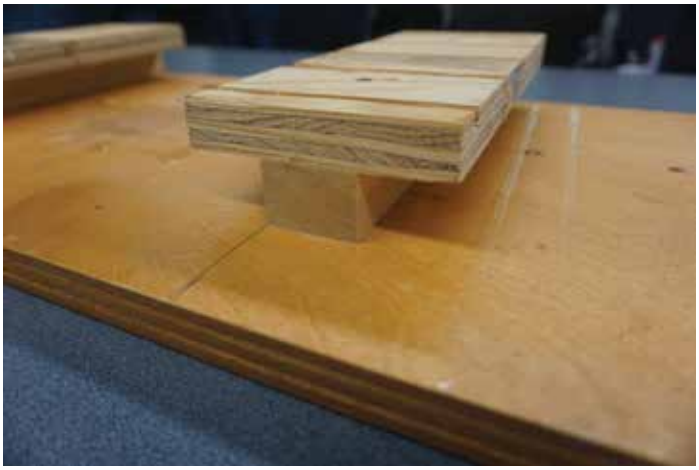
by Ed Neal

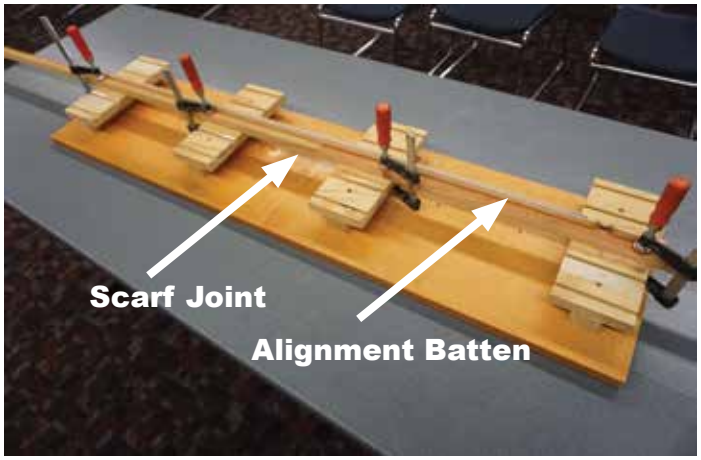
Boatbuilders are often gluing two short sticks to make a longer one. Chines, sheer clamps, gunwales, and toe rails often need to be longer than the purchased stock. A glued scarf joint is the common solution. But how can the scarf be quickly glued to get accurate, straight lengths? How can the joint be clamped so the angled pieces don't slide around on the glue?



A simple jig makes gluing scarfs a quick and accurate process. This jig uses a removable batten held in a dado groove to align the length of the two pieces. Riser platforms enable the sticks to be easily clamped. The open area around the scarf enables easy positioning of clamps and allows clean up of squeezed out glue.

To build the jig, make a base from a flat piece of ¾" plywood about 1' x 4'. Rip a 2x4 to make four riser blocks 1¼" x 1½" x 12". Increase the 1¼" dimension if necessary to accommodate the head ends of the clamps you intend to use. Screw the risers into the plywood base using a square to accurately set them parallel to each other. Position the two inner risers 12" apart in the middle of the base. The outer risers are positioned three inches in from the outer edges of the base.





Make the gluing platforms from a piece of ¾" plywood 16" x 12" and route five ¼ dados about ¼" deep, taking care they are cut parallel.

Rip four ¼" battens 1¼" x 4' from the 2x4 stock. Check that they fit snuggly in the plywood panel's dado grooves.

Rip the grooved plywood panel to create four 4" x 12" platforms. Center one platform atop an outside riser and accurately secure it with screws. Position a batten in the groove and continue to mount the remaining three platforms atop the risers using the batten to accurately position them in alignment.

To use the jig, insert a batten into one of the jig's dado grooves. Snug one stick of the scarf against the batten with the scarf cut end in the space between the inner platforms. Clamp the stick to the platforms. Apply glue to both scarf ends and align the joint. Snug the second stick against the batten and clamp it to the platforms. Clamp the scarf joint.

Clean up the squeezed out glue. Wax the batten or use a piece of clear packaging tape on the batten to prevent it sticking to the joint.

More than one scarf can glued at the same time. Simply position another batten in a dado and glue up a second scarf.

Simple, quick, and no more foul language at gluing time. The jig stores away easily along a wall. Just remember to keep the battens with the jig so it's ready to go for the next job.

Applying Simplified Naval Architecture Principles to Designing Traditional Boats: Preliminary Design: Creating the Lines Drawing

by David and Rosemary Wyman

This is the third article in a series describing how to design a traditional small boat using the basic principles of naval architecture, which have been simplified to make the design process relatively easy to understand and use. In this article I will begin the Preliminary Design by creating a Lines Drawing that defines the hull shape. In the next, I will use a Lines Drawing to calculate the important hydrostatic characteristics to see how she will float. This includes where her waterline will be, how much water she will displace at that waterline, and how much additional buoyancy is provided if the waterline is raised one inch. Hydrostatic calculations will allow me to calculate her initial stability and determine if she will float upright. Hydrostatic calculations will also include the prismatic coefficient and the location of the longitudinal center of buoyancy, important indicators as to how she will move through the water to perform in a seaworthy fashion as desired.

The hull shape of any boat can be shown in a Lines Drawing. A Lines Drawing is made up of three two-dimensional drawings:

- The Profile Plan: looks at the boat from the side. In it both the waterlines and station lines are the straight lines of the matrix; the sheer, keel, bow, and stern show the shape of the boat as seen from the side.
- The Half Breadth Plan: looks at the hull from above with the station lines and centerline drawn as straight lines of the matrix; the chine and sheer lines are curved. If this was not a simple hard chine hull, curved water lines would also be shown in this plan.
- The Body Plan: shows the waterlines and the centerline drawn as straight lines of the matrix. The Body Plan shows the boat viewed from the bow on the right side of the centerline and viewed from the stern on the left side of the centerline.

These three drawings taken together define the shape of the boat. Only one side of the boat is shown in the Lines Drawing because both port and starboard sides are identical.

Figure 1 is a Lines Drawing for *Rosie*. Figure 1 will be used for illustrative purposes throughout this article to help you follow the step-by-step process below. For simplicity, this Lines Drawing shows a hard chine hull because that type of hull requires only sheer, chine, and keel lines be drawn on both the Profile and Half Breadth Plans. (Later, the chine will be radiused to make it a rounded bottom.) The section lines (shown in red) are numbered 0 through 8 on both the Profile and Half Breath Plan. The Body Plan shows the cross-sectional shape of the hull at each section, by using the points at each station from the sheer, chine, and keel lines measured from the Profile and Half Breadth Plans at each station. The shape of the lines will be adjusted to get fair curves (i.e. smooth curves with no humps in them) and a shape that is visually appealing. These curves can be drawn with a flexible wooden batten. The location of the points in all three views must agree with each other.

Here are the steps I use in drawing a Lines Drawing.

1. To start, select a piece of paper on which to draw. I like to use graph paper with ¼" squares, and I find using 11"x17" paper works well. It is large enough for me to be able to see the details but of a size that is readily copied on many copy machines.

2. In order to begin drawing, you will need a straight edge, a ruler (architect's scale is best), a batten for drawing curves, a pencil, and, most important, an eraser.

3. Next, a *scale* for the drawing needs to be chosen. For the 12' LWL Skiff in Figure 1, I have chosen a scale of 1 inch = 1 foot, which means the drawing will be 1/12th life size. Using graph paper with ¼" squares means that each square equals 3 inches.

4. Next draw the *matrix of straight lines,* which I have shown in red in Figure 1 to differentiate them from the hull lines.

5. Now the number of *stations* to be used must be determined. I chose to use 8 stations because eight stations is the minimum number that will adequately show the shape of the hull and provide enough cross sections to perform the hydrostatic calculations. Since the load waterline length (LWL) is 12 feet long, the station spacing (also referred to as the common interval) will be 12'/8 = 1.5'.

6. To begin drawing the matrix on which the hull shape will be drawn, draw the *baseline* (BL) for the Profile Plan.

7. Next on the Profile Plan at a distance of the intended draft of the boat, draw the *LWL* parallel to the BL (as shown in Figure 1).

8. Still working on the Profile Plan, draw the *station* lines 0 through 8 with a scale spacing of 1.5' between them perpendicular to the base line, as shown on Figure 1.

9. Moving on to the Half Breadth Plan, draw a *centerline* (CL) and then, perpendicular to it, draw the station lines 0 thorough 8 as shown on Figure 1.

10. Finally, on the Body Plan, draw the *centerline* and then, perpendicular to it, the *baseline* and the *load water line* as shown on Figure 1.

11. Now, taking measurements from the Concept Design for *Rosie*, I drew the sheer line onto both the Profile Plan and the Half Breadth Plan.

12. Also based on the Concept Design, I drew the shape of the bow, stern, and keel onto the Profile Plan.

13. From the Profile Plan, measure the height of the sheer above the base line at each station and mark it on the Body Plan. Then from the Half Breadth Plan, measure the half beam (centerline to sheer line) of each station and mark it on the Body Plan. I now have a point on the Body Plan for the sheer at each station. The easiest way to transfer these measurements from one plan to another is to use a strip of paper and mark the distances on the strip of paper and then mark it on the Body Plan. This is more accurate than using the scale (ruler). The reason why we transfer measurements from one plan to another is because we are drawing a three dimensional object using three views and each point on the hull must agree in all three plans. In other words, for example, the height of the sheer above the baseline must be the same on both the Profile Plan and the Body Plan.

14. Now, from the Concept Design, measure the angle of flare of the side. This can be done with a protractor or by measuring the beam at the chine and the sheer. Draw the side with its flare through the sheer point of the widest section (midships section) on both sides of the centerline on the Body Plan.

15. Next on the Body Plan, draw lines down parallel to the line from step 14 through each of the station's sheer point. This makes the sides of the hull part of a cylindrical surface which is also known as a *developable surface.* By making the sides a developable surface, it makes it easy to plank with plywood. For plywood planking, the hull shapes must be either part of a cylinder or a cone because plywood will only bend easily in one direction.

16. On the Profile Plan, draw a chine line and then transfer this height above the baseline to each of the stations on the Body Plan.

17. Then transfer the heights of the keel above the baseline to the Body Plan for each station.

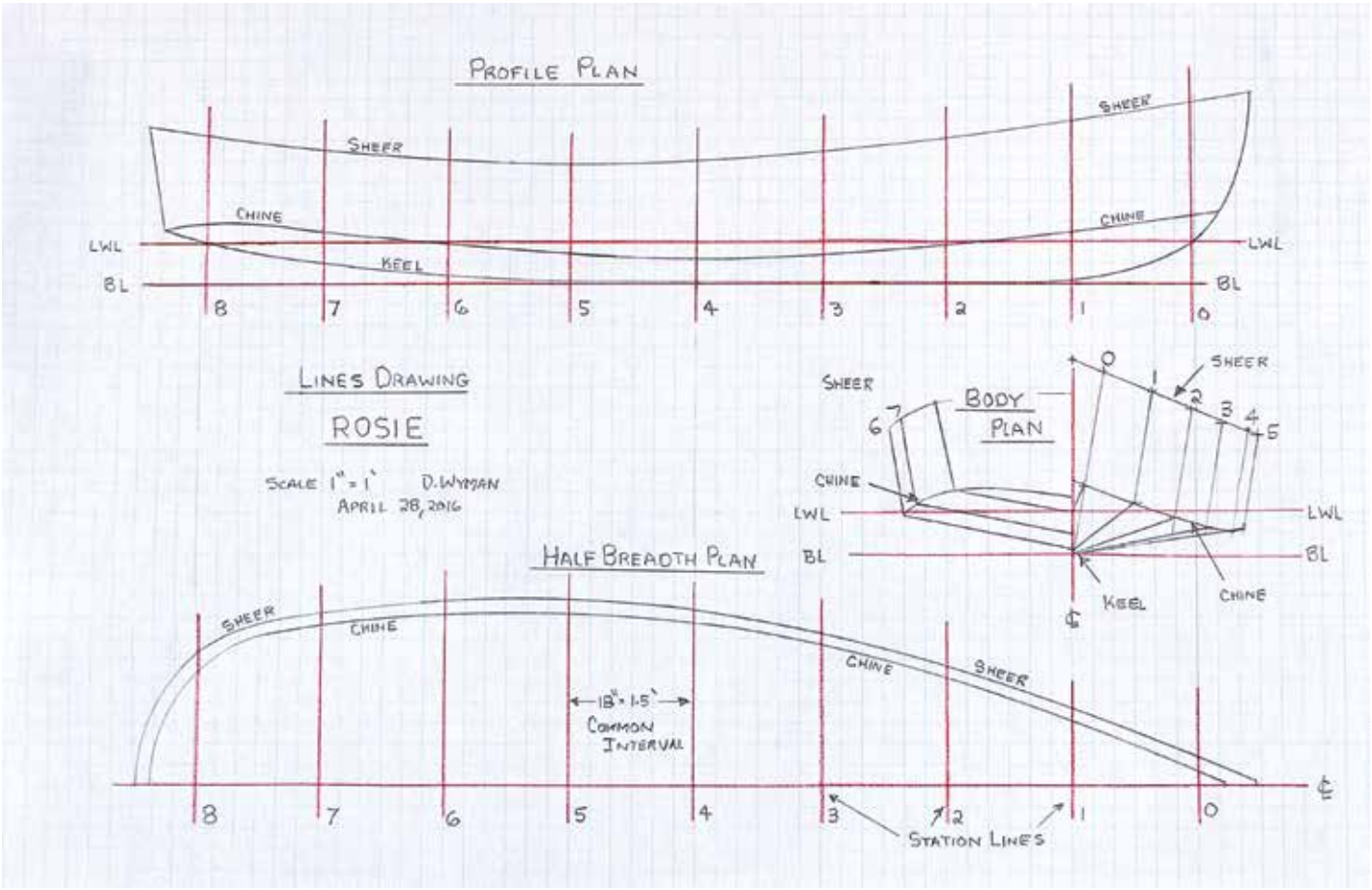
18. On the Body Plan, draw the bottom of the hull from the mark on the chine to the mark on the keel.

19. From the Body Plan, transfer the half breadths of the chine for each station onto the Half Breadth plan. Then draw the chine through these points on the Half Breadth Plan.

Now you have the beginnings of a Lines Drawing. It may be necessary to refine the various points to get the hull shape that you want and to ensure that all points on each of the three drawings are in agreement with each other.

In the next article, I will make use of the Lines Drawing, taking measurements of the waterline half beam and half area of the sections, to calculate the hydrostatics.

Figure 1



John Gardner Grant

In 1999, TSCA created the John Gardner Grant program to support projects for which sufficient funding would otherwise be unavailable. Eligible projects are those which research, document, preserve, and replicate traditional small craft, associated skills (including their construction and uses) and the skills of those who built and used them. Youth involvement is encouraged.

Proposals for projects ranging from $200 to $2000 are invited for consideration. Grants are awarded competitively and reviewed semiannually by the John Gardner Memorial Fund Committee of TSCA, typically in May and October. The source of funding is the John Gardner Memorial Endowment Fund. Funding availability is determined annually.

Eligible applicants include anyone who can demonstrate serious interest in, and knowledge of, traditional small craft. Affiliation with a museum or academic organization is not required. Projects must have tangible, enduring results that are published, exhibited, or otherwise made available to the interested public. **Projects must be reported in *The Ash Breeze*.**

Program details, applications, and additional information:
www.tsca.net/JohnGardnerGrant.html

"To preserve, continue, and expand the achievements, vision and goals of John Gardner by enriching and disseminating our traditional small craft heritage."

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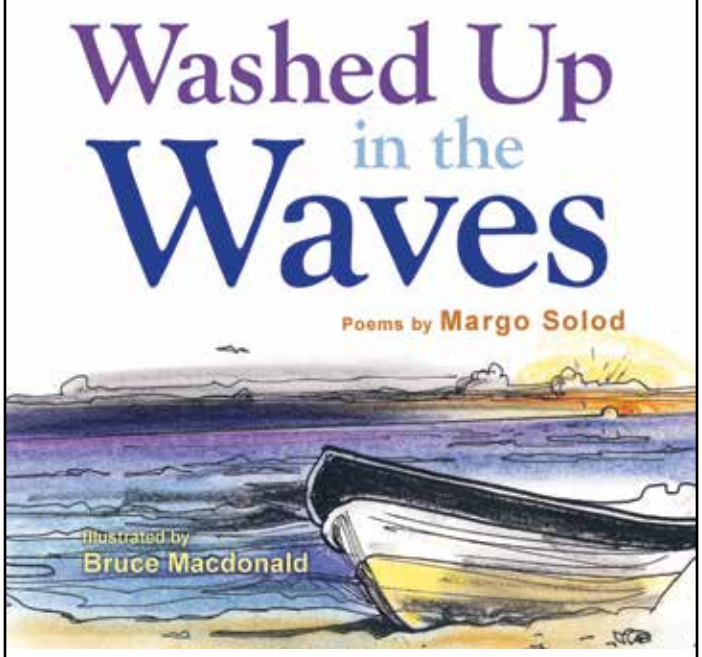
Watch Log Canoe Races aboard *Winnie Estelle* This Summer

The Chesapeake Bay Maritime Museum in St. Michaels, Maryland, is offering the opportunity to view Chesapeake Bay sailing log canoe races along the Miles River while aboard its 1920 buyboat, *Winnie Estelle.* The two-hour scenic cruises depart from CBMM at 9:30 a.m. and 1:30 p.m. on Sunday, June 26 and again on Saturday, July 30 and September 17. Regular drop-in cruises aboard *Winnie Estelle* are otherwise offered at the museum Fridays through Mondays, May 22 through October.

These iconic Chesapeake Bay sailing log canoes only race along the Chester, Miles, and Tred Avon Rivers on Maryland's Eastern Shore. With long masts and large sails, these boats keep upright as they accelerate to speeds of 10 knots or more, with crew members climbing to the ends of 15-foot boards placed perpendicular to the boat itself.

These two-hour special cruises aboard *Winnie Estelle* offer scenic views and photo opportunities, along with commentary from CBMM's docents and crew. The cost is $25 for CBMM members or $35 for non-members, with space limited and advanced registration made with Allison Speight at aspeight@cbmm.org or 410-745-4941.



What would a clam say?

As you walk the sandy beaches and gaze out to sea, do you ever wonder what the inhabitants of the coastal community might have to say about themselves? The clams and crabs, the birds and star fish, the flounder, the shark, and the whale-what might they say to an inquisitive child?

This book is a classic poetic response to just those questions. Lyrical and funny, poet/author Margo Solod first wrote the collection of seaside poetry for her nephew and now shares them with a world full of young exploratory beach dwellers. To help young imaginations soar, illustrator Bruce Macdonald created pen and pastel artwork of the sea creatures for each poem.

Whether read to a child or read by a child, the poems and pictures portray the sea creatures' stories, not deep like the ocean, just teaching in a humorously gentle way about the moon and the tides retreating to reveal a trove of ocean dwellers-where they live, what they might do, and what they might eat. It's all uncommonly tasteful, in language children love.

Harbour Books

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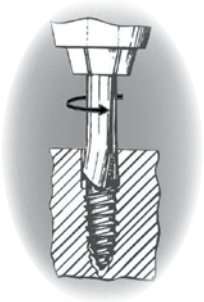

Remove broken screws and other fasteners. Hollow tool uses the stub as a guide.

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Calendar of Events

Pocket Yacht Palooza & Palooza Crooza
Jun. 11–15
Port Townsend, WA

Classic Boat Show and Small Craft Festival
Jun. 18, 2016
Michigan Maritime Museum, South Haven, Michigan

Les Cheneaux RAID
Jun. 24–25, 2016
Great Lakes Boat Building School, Cedarville, MI

WoodenBoat Show
Jun. 24–26, 2016
Mystic, CT

Antique & Classic Boat Festival
Aug. 20–21, 2016
Brewer Hawthorne Cove Marina, 10 White St., Salem, MA

Port Aransas plyWooden Boat Festival
Oct. 8–10, 2016
Port Aransas, TX

MyState Australian Wooden Boat Festival
Feb. 10–13, 2017
Hobart, Tasmania, Australia

Members of the Down East TSCA toured Richard Stanley's Custom Boat Shop on Mount Desert Island, Maine, on a chilly spring morning. Richard Stanley, standing in the middle behind a small rowing boat that he is in the process of totally rebuilding, carries on his father's tradition of crafting high-quality wooden boats.

Photo credit: Rosemary Wyman

The Chesapeake Bay Maritime Museum is offering a workshop to teach the basics of carving a nameboard on Saturday, July 9, with all participants taking home their individual carved pieces. The program takes place in the museum's boatshop from 9:00 a.m. to 4:00 p.m. Participation is limited, with advanced registration needed by contacting aspeight@cbmm.org or 410-745-4941.

2nd Annual Les Cheneaux RAID

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A sail, paddle, and oar adventure.

June 24–25, 2016

This is a leisure pursuit (hosted at the Great Lakes Boat Building School in Cedarville, MI), involving a fleet of small boats capable of being rowed, paddled, and sailed exploring a coastline or inland waterway; often with some competitive element.

LC RAID Registration: $25, includes tour of school, lunch, and T-shirt (register early and reserve a shirt). Sizes XS-XXL

Send payment to: Les Cheneaux Row, Inc.
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Cedarville, MI 49719

Contact Les Cheneaux Row:
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(906) 484-1252 or (906) 484-2217

Second Annual Port Aransas plyWooden Boat Festival

October 16–18, 2015

Make plans to attend the Second Annual Port Aransas plyWooden Boat Festival on October 16–18, 2015. Last year's festival attracted 92 wooden boats gathered at beautiful Port Aransas, Texas. This year's festival will be even bigger and better. We are planning informative talks by Jim Michalak, John Welsford, David Nichols, and Howard Rice, among others. We will have another family boatbuilding event where folks can build a row boat or canoe. A SCAMP will be under construction at the Farley Boat Works. New this year will be the Lighthouse Mini Cruise on the morning of the last day. Take a four mile round trip row, sail, motor or paddle to the historic Lydia Ann Lighthouse for a tour.

Check out
www.portaransasplywoodenboatfestival.org
for more info.

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TSCA Council Nominations

David Fitch

David retired from banking/insurance after a 28-year career, then purchased Sears Hometown Stores in Temple and Gatesville, Texas. After 18 years, he retired again. With the Sears organization, he served a five-year term in the Sears Dealer Council representing 60 independent stores in the state of Texas.

He transformed from a hobby in woodworking to an obsession with boat building. In the past year and a half, he has built a 5x10 Skiff designed by Sam Devlin, a Wood Duck 10 Hybrid designed by Nick Schade, a Chester Yawl designed and sold by Chesapeake Light Craft, and a Spindrift 10 designed by Graham Byrnes of B&B Yacht Designs.

David, now 70, is building a new home and shop in Beaufort, South Carolina, and wants to teach wooden boat building.

Carol Jones

Carol has been secretary of the Delaware River Chapter since January 2013. She made six trans-Atlantic trips with her late husband (Tom Firth Jones) in small cruising multi-hulls that he designed and built. Today, Carol enjoys kayaking, day sailing a small garvey, and stand-up-paddle-boarding.

Carol lives in Tuchahoe, New Jersey, and volunteers at TSCA tables and exhibits at Mystic and the New Jersey Woodworkers Show. She wants to work with the national organization in hopes of encouraging interest in the small traditional boats she has personally enjoyed so much.

Steve Brookman

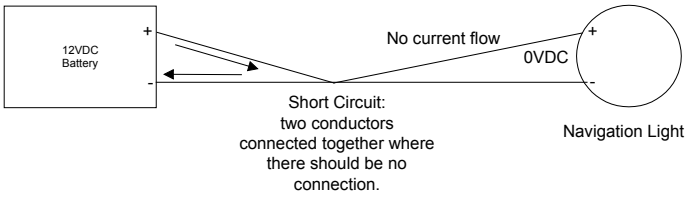
Steve grew up in Connecticut and attended the U.S. Naval Academy, in Annapolis, Maryland. After leaving active duty, he purchased a 32' sloop in St. Croix, USVI, and lived aboard for almost two years. He got the Jimmy Buffet lifestyle over with early in life! Returning to the mainland, he began a commercial aviation career. Steve acquired a 26' "Herreshoff-ish" cutter and sailed it single-handed from Maine to Florida, in 1987, where he found an affordable house with a dock in Ft. Myers, and lived for the next 18 years. Then in 2006 the family moved to western New Jersey where Steve began building small boats, discovered the TSCA and joined the Delaware River TSCA. He has built a Peace Canoe, a 19' Ohio Sharpie, and a 16' Melonseed. He also wrote for the Mainsheet newsletter.

In preparation for retirement this summer, the Brookmans purchased a boat building barn with an old farm house in Blue Hill, Maine. Steve has transferred his membership to the Down East TSCA. In addition to working on the old house and building the next boat, he plans to be involved in the local community, especially on the boating side, volunteer at the local marine museums and contribute to the local and national TSCA.

Marine Wire

continued from page 4

together; when you activate the system, the battery current goes from the positive connection of the battery back to the negative battery connection through the connection point, no current flows through the device.



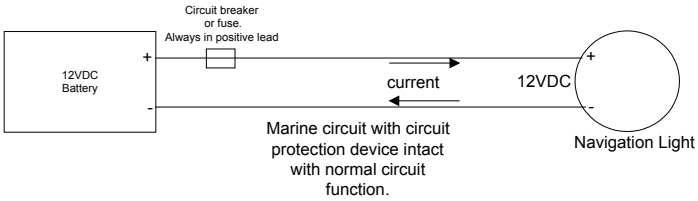
The current that does flow will be the maximum that the battery can deliver. This can easily be 500 amps or more from a single battery to thousands of amps if you have a large number of batteries feeding your boat's electrical system. This unwanted connection will instantly melt wire insulation, overheat everything in the wire's path, and start a fire. In addition, there is a good chance the battery(s) could explode. This connection of the positive wire to the negative wire of the battery is called a SHORT, or SHORTED CONNECTION. A short is nothing more than two wires that are connected together accidently that should not be connected together. A short can be between battery power wires or any other wires that get connected together when they SHOULD NOT be connected together. In a new installation, for example, wires can be connected to the wrong points such as mistakenly connecting a positive power wire to a ground connection. Another example is where two power wires (+ and -) routed right next to each other (as they normally are) and passing through a metal hole or other sharp edge that cuts the insulation and with some vibration (which all boats have) causes the two wires with insulation rubbed off to connect together. The effect is the same as an improper wiring connection. You will get excessive current, wire overheating, fire, and possible battery explosion. In a poorly installed system where terminations are physically uncovered, dropping a metal tool on the connections could cause a SHORT with the same high current effects. That is why terminations must always be protected by physical covers or in enclosures.

But why the excessive current flow in a shorted circuit? In some shorts, it is simply two wires inadvertently connected together through defective electronic components. This usually occurs inside of electronic devices, a place where you will not normally have access to, and this usually results in the device not working properly. However shorts in power wires, which are the common place for shorted connections in marine systems, the device is bypassed, the device no longer has two power connections; it is effectively out of the circuit (see the shorts diagram). What is left is a battery connected to itself with NO RESISTANCE other than the wire resistance itself. This wire resistance is extremely small allowing the maximum current from the battery to flow in the wires, which will certainly exceed the safe current carrying capability of the wire. By now you should know the effect of this condition. Shorts can also cause other problems not involving excessive current. A switch may operate more than one device for example. So be aware of strange operation of your controls and switches—there could be a short somewhere in all of the connections.

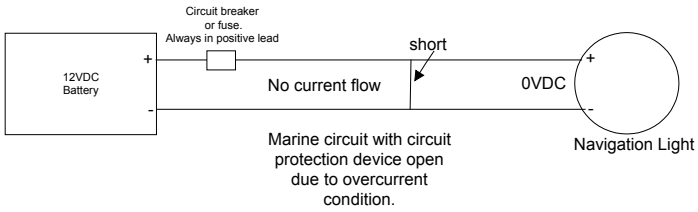
The third abnormal circuit condition is a failure in a device that is part of the circuit. This type of failure can cause the device (radio, relay, etc.) to draw much more current than normal, up to possibly a full shorted condition. And of course, an internal failure can also cause the device not to fully operate or not operate at all with no excessive current draw. While this is not as common as the other two abnormal circuit conditions (shorts and opens), it does occur. In addition, all electronic devices and many electrical devices have a fuse or circuit breaker mounted inside their housings that is supposed to isolate the device from the outside circuit power in case of internal failure, but these circuit protection devices do not always work.

Enter the Circuit Protection Device

Now that we have learned about circuit conditions that cause excessive current flow, how do we prevent this from happening? You add a circuit protection device to your circuit. This device can be in the form of a fuse or a circuit breaker. These devices come in different current ratings that will open the circuit when the current meets or exceeds the rating, thereby protecting your wires, your battery(s), your devices, and ultimately your boat. There is no protection for open circuits. When they happen, you have to troubleshoot the circuit and find the open, but there is no fire danger from an open. As a matter of fact, when a fuse or circuit breaker "blows" (opens up), it is actually creating an OPEN circuit so no more current can flow, making the circuit safe until it can be repaired.



As you can see in this diagram, the fuse is in line with the positive lead of your circuit. When this device opens up due to excessive current flow, the whole circuit is OPENED, meaning no current can flow thereby stopping any potential for fire and damage. All of this occurs in less than a second without any action on your part. Now you can identify the problem (troubleshoot), make the repair, replace the fuse, or reset the circuit breaker, and you are back in business again.



Marine circuit with circuit protection device open due to overcurrent condition.

Fuses or Circuit Breakers?

Now that we have seen where the circuit protection device fits in, what are they called? Most people have some idea about what a fuse or a circuit breaker is all about, but we will go over them here just to be sure. Fuses and circuit breakers are two very different devices with the same function, to break open an electrical circuit that's in a shorted condition. A fuse is a simple device that has a precisely designed "resistance wire" that melts away when the current flowing through it meets or exceeds the designed current value or CURRENT RATING. Once the fuse has opened, it is no longer re-usable and must be discarded. There are a few types of these fuses available to the marine electrician. We will cover these later.

Circuit breakers are more complex than fuses and are mechanical in nature and open by two methods. The first and most common type of breaker opens by sensing the current MAGNETICALLY. When the current flow through the breaker reaches its CURRENT RATING, the magnetism created by the current flow causes a switch like connection to open and interrupt the circuit. This open condition stays that way until you fix the problem and reset the circuit breaker switch by putting it back into its normal operating position. This means, of course, that the circuit breaker is re-usable. This is the type of breaker you should use in the boating environment. The other method of breaker operation is THERMAL. When current flows through the thermal breaker, it heats up and the wire mechanism distorts and pulls apart the current connection. Again, once you fix the problem, you move the breaker switch back to its operating position and you are back in operation. This is the breaker normally used for motor protection. We will cover the circuit breaker and its variants later.

Which Device is Better for the Job?

The question usually comes up as to which device is better for the job of circuit protection, the fuse or circuit breaker. They both do the job equally when it comes to protecting your circuits and your boat. The obvious advantage of breakers is that you do not need a box of spares to put your circuit back into operation once you repair the circuit defect. With fuses you need to keep spare fuses of every CURRENT RATING on your boat. With that said, you should still have a couple of breaker spares on board just in case, particularly if you are doing offshore cruising. Circuit breakers can fail. Circuit breakers and their holders/panels are far more expensive than their fuse cousins. Circuit breakers can be used as switches to turn various electrical devices on such as bilge pumps, deck lighting, and electronics. If these breakers are being used as SWITCHES, they must be rated as switches and not just circuit breakers. With fuses you can buy switch panels or fuse holders that have switches built in so the fuse panel acts like a breaker panel; of course the cost goes up, but it is still cheaper than breakers. For simple electrical systems needing only a few fuses, a simple FUSE HOLDER panel may be all you need, but make sure all of your electrical devices have their own power switch.

So, with some of these thoughts in mind, which device is better for the job? It depends on your boat complexity, your budget, and what type of cruising you are planning. Large boats with plenty of gear and maybe some long distance cruising, breakers would be my choice. There will be some areas fuses are still needed, but breakers are the main protection. Small boats, on the other hand, can use fuses even if you have to keep spares. Small boats usually don't have lots of gear and usually stay close to some sort of marina facilities. So the choice is yours. Look at your boat and your cruising profile then pick your circuit protection devices.

FUSES AND CIRCUIT BREAKERS

We will now look at some of the more common examples of the fuses and breakers available to the marine electrician/ boat builder. Those discussed here are not the only devices available, but they are the most common ones in use. We will start out by discussing the most important fuse specifications and some of the various fuses available. We will do the same for circuit breakers.

Fuses

Knowing fuses by what they look like is only part of the deal. You need to understand specifications first, then decide on the fuse style you want or need. Here are the most important specs with their explanations:

Current Rating: This specification tells you the current in amps that will open the fuse.

Voltage Rating: This specification tells you what the *maximum* voltage the fuse can operate in and be in spec. Marine fuses are usually rated for DC circuits only. The glass fuses are rated for AC and DC.

Ampere-Interrupt Current: This specification tells you how much current can flow through the fuse *even after the fuse is opened*. This is would be due to a catastrophic short where thousands of amps are flowing.

Time Delay: This is the time it takes a fuse to open from the time it senses the current rating to the time it actually opens. Fast blow is a description that means it opens instantaneously. Slow blow means there is a longer delay in opening. Slow blow fuses are what is needed for motor type circuit due to the large start-up current that is inherent in all motors.

A few remarks about the specs shown. The typical voltage rating for marine fuses is 32VDC. If you find a fuse with a higher rating feel free to use it. Glass fuses are rated for 250VDC or VAC. The Ampere-Interrupt Current spec is

Marine Wire

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often overlooked. The reason being is most boats only have a couple of batteries feeding the electrical system (not including starting battery). If there is a short, you may get up to the two cranking amps worth of current in your wiring where the short is. This could equal a little over a thousand amps. Pretty much all fuses can handle that. BUT… if you have three or more batteries connected in parallel, you are looking at over two thousand amps or much more, enough to weld with. When a short occurs, this current will JUMP the fuse and holder from one side to the other regardless of the fact that the wire melted. This means the current will continue to flow through your wiring and it WILL cause a fire and possible battery explosion. When you have that many batteries, make sure you are using fuses and holders that can withstand all of your battery current at one time!

The Common Fuse Types

Sea Fuse
Blue Sea Systems
Current Rating:
100 to 300 amps
Voltage: 32 VDC max

Class T Fuse
Current Rating:
110 to 400 amps
Voltage: 160 VDC max
Inherent time delay?

ANL Fuse
Current Rating:
35 to 750 amps
Voltage: 32 VDC max

**fuse color depends on ampage*
ATO, ATC Style Fuse (blade fuse) *Current Rating: 1 to 30 amps*
Voltage: 32 VDC max

Glass Fuse: AGL, AGC, MDL, AGU
Current Rating: 1/8 amp to 30 amps max
Voltage AC or DC
Up to 250 volts max

MAXI Fuse
(Same style as ATC-ATO except larger in size)
Current Rating: 30 to 80 amps
Voltage: 32 VDC max

A fuse type not shown here is the PIGTAIL fuse. This fuse is an inline glass or sometimes a blade fuse that is attached to electronics and other equipment. This fuse is part of the power wiring that sticks out of the equipment. You attach your distribution wire to this PIGTAIL to supply power to the equipment. Keep this in mind when working with pigtails… you could use this pigtail fuse to protect your power wire from the distribution panel to the pigtail, but it is not good practice in my opinion. Fuse your whole circuit at the panel and use the pigtail as backup. The pigtail wire is usually smaller in size than your wiring, so you need to protect the pigtail wire with a smaller fuse the equipment manufacturer calls for. The smaller fuse may also prevent catastrophic damage to a piece of equipment that has failed internally. Pigtail fuses will be in both breaker and fused protection systems. Some equipment will have a RESET ONLY type of breaker instead of a pigtail fuse. We will discuss the RESET ONLY breaker later.

Circuit Breakers

As with fuses, you need to understand breaker specifications in order to use breakers properly. There are many specifications for breakers but these are the important ones for marine electricians.

Current Rating: This specification tells you the current in amps that will open the breaker.

Voltage Rating: This specification tells you what the *maximum* voltage the breaker can operate in and be in spec. Breakers are usually rated for AC circuits only. Some breakers are rated for AC and DC.

Ampere-Interrupt Current: This specification tells you how much current can flow through the breaker *even after the breaker is opened*. This is would be due to a catastrophic short where thousands of amps are flowing.

Time Delay: This is the time it takes a breaker to open from the time it senses the current rating to the time it actually opens. Fast blow is a description that means it opens instantaneously. Slow blow means there is a longer delay in opening. Slow open breakers are what is needed for motor type circuit due to the large start-up current that is inherent in all motors.

Open and Close Cycles: If you are going to use the breaker as an operational switch, use a breaker with a large number of Open and close cycles. Consult manufacturer data to determine which model is best

Trip Free: This is important. All Marine circuit breakers must be of the trip-free type. This means the breaker cannot reset until the excess current is cleared. Older breakers that are not trip free will let you hold the circuit closed with excess current, which could start a fire and/or harm equipment.

A couple of remarks about breaker specs. The most important spec is the TRIP FREE spec. Every marine breaker must be a TRIP FREE breaker. Luckily, breakers made by marine manufacturers are TRIP FREE, and I believe all

breakers for the house and boat are TRIP FREE. But watch out, you may come across a few old breakers at a yard sale and may get them for pennies. Don't use them unless you know for sure they are of the TRIP FREE type. The second spec is the OPEN AND CLOSE CYCLES spec. Many times breakers are used like power switches, to turn equipment on and off. Breakers were originally never designed to be used as power switches. However, in the marine field, using them as switches is common enough that breaker manufacturers construct their breakers with enough strength to be able to be used as switches. But there are some that are really for breaker use only. Make sure you install the right breaker type for the job. Switch rated breakers are more expensive, but if you are not sure how you are going to use the breaker, INSTALL SWITCH RATED BREAKERS.

One last area that needs to be discussed, and this applies to fuses as well as circuit breakers. Circuit protection devices have current rating. As you know, this is the rating that tells you when the device will open. HOWEVER… there is a tolerance in this rating that is in the data sheet (usually) but not catalog pages. This tolerance can be as much as 10%. This means a 10 amp fuse could open between 9 or 11 amps. So do not run your circuit protection devices to their theoretical rating. Allow room for the tolerance. For example if your wire is good for 25 amps and you are loading that wire to 25 amps (which you shouldn't do), then choosing a circuit protection device is difficult. A 25 amp fuse may open at 28 amps which is risky, or it may open at 23 amps which makes it a nuisance because it is blowing out without a circuit defect. So… don't fully load your wires, and don't size your fuses for exact fuse ratings. Again, these statements apply equally to circuit breakers.

Some Common Breaker Examples

Reset-Only circuit breaker

Single and double pole circuit breakers These are used in AC and DC circuits

Typical current ratings: *5 amps to 300 amps AC or DC*
Voltage ratings: *DC around 42 to 50 VDC; AC around 120 VAC and up*
DC Thermal Breakers: *25 to 150 amps; 42 to 50 VDC*

All of the breakers above, except the RESET ONLY breaker, work similar as far as the user goes. The breakers open and you reset it when repairs are made, or you can open the circuit manually if you need to, like a power switch. However, the RESET ONLY breaker opens in an over current situation, and when repairs are made, you push the breaker button in and you are running again. BUT… you cannot open the circuit manually if you need to. You cannot grab the button and pull it out to open the circuit. These are used on many types of electrical equipment to protect the equipment more than your wiring and are mounted on or in the equipment. They shouldn't be used as power distribution breakers.

IN CONCLUSION

We have discussed circuit protection and the reasons for the need of these devices. We have also discussed some of the devices available to the marine electrician. In the last article of this 4-part article, we will discuss putting all of this wiring and circuit protection knowledge together to design a reliable, safe electrical installation for your boat. In PART 4 we will go further into fuse and breaker sizing and selection. After you have chosen your equipment to be installed, you will chose and size your wires, set-up your main power distribution panel, and then choose the right sized circuit protection devices to protect your system.

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