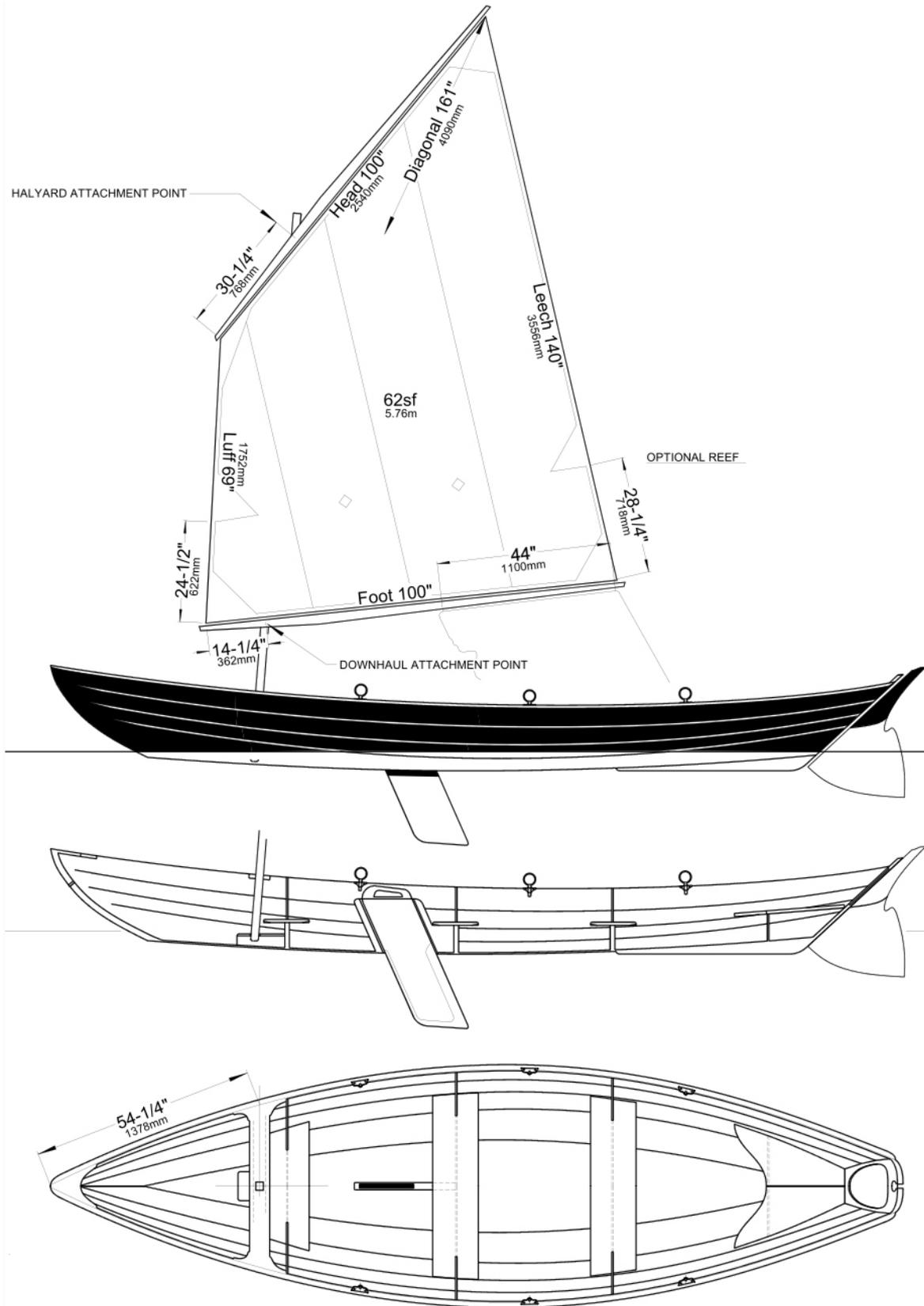


Appendix 2: A Balanced Lug Rig for the Northeaster Dory



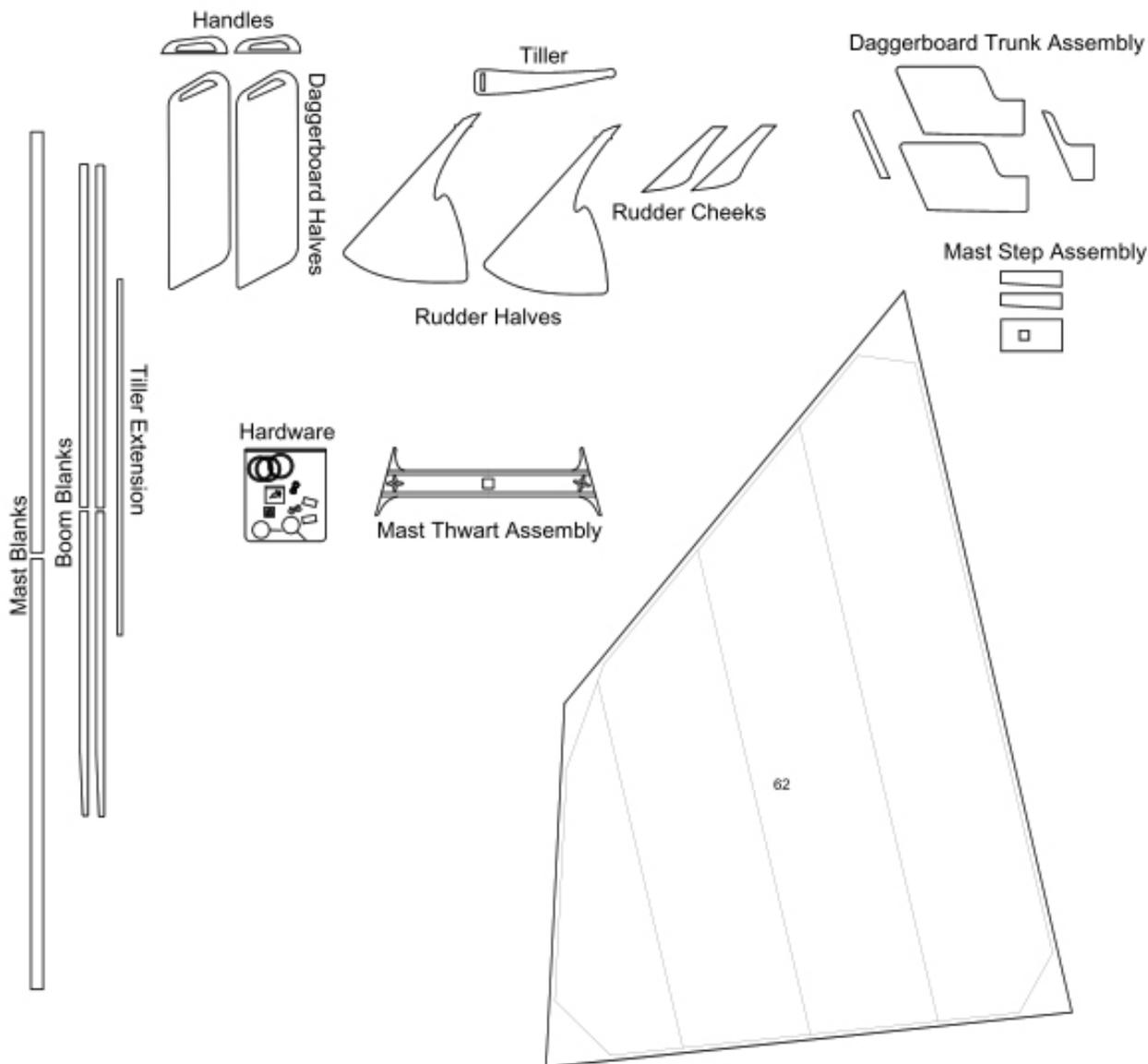
Northeaster Dory Lug Rig:

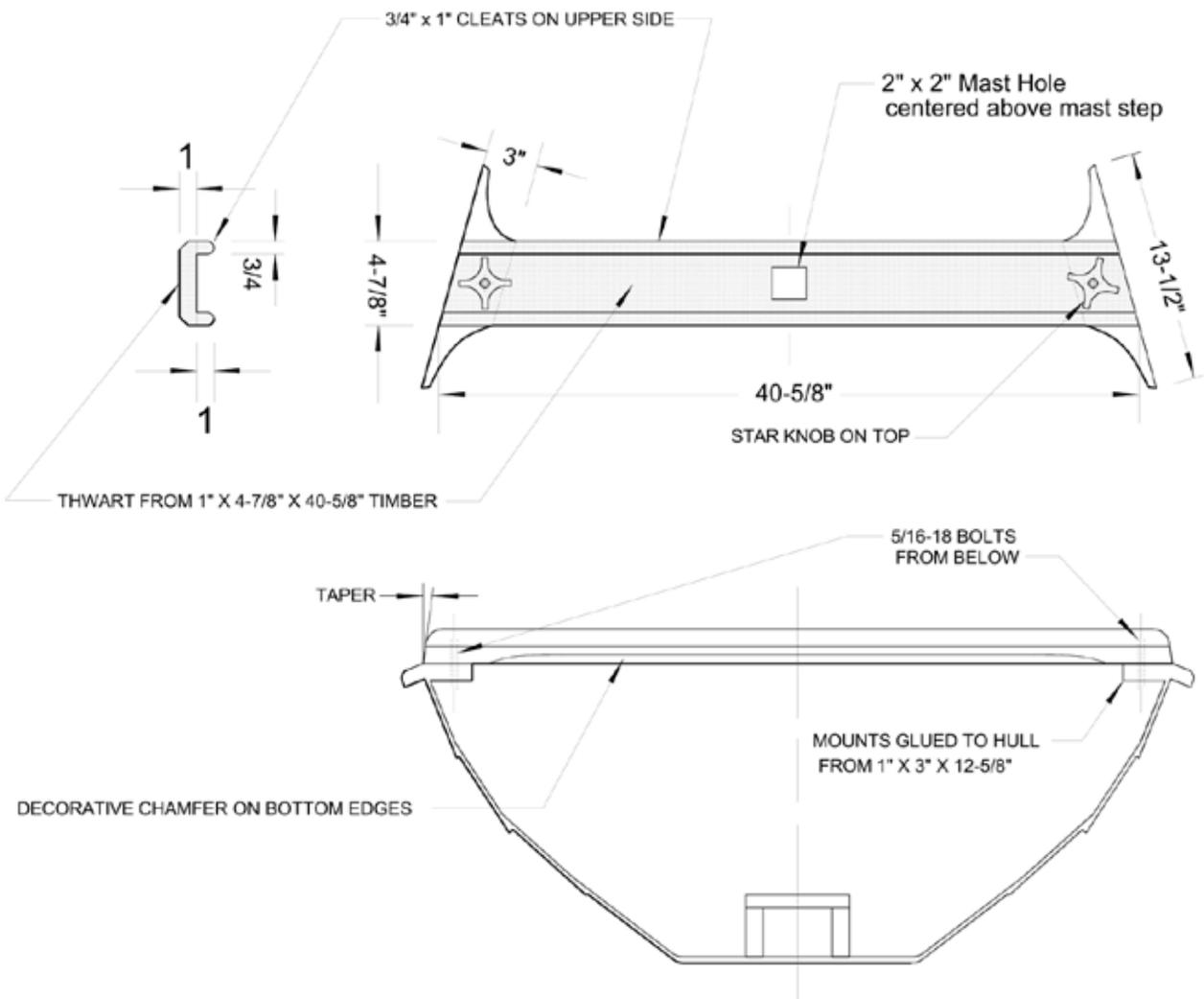
Spars, mast partner, and rigging for the lugger

A balanced lug rig is quicker to set up, easier to handle, and can be reefed or stowed more easily while out on the water. With a removable mast thwart (properly called a “mast partner”), it’s possible to quickly clear the Northeaster Dory for tandem rowing. The lugger will not be as fast as the sloop rig, but the easy setup and compact stowage will increase the boat’s versatility, especially in scenarios where you need to switch between rowing and sailing modes often.

Like the sloop rig, the Dory’s lug rig can be retrofitted to a rowing version much later. You can also switch between sloop and lug rigs---the mast step, daggerboard trunk, and rudder are identical in both versions. (The CLC display model can be switched between sloop and lug in a couple of minutes.)

Kit builders who opted for the lug rig will find these parts in the box. Plans builders will find dimensions for the thwart and spars in this appendix.





The mast thwart is made up of 1-inch (25mm) timber, and bolted to a pair of knees glued to the Dory's rails. Considerable effort went to giving the thwart handsome proportions, yet it's strong enough to manage the axial loads of the unstayed mast. Note the longitudinal placement on Page 153, which will guide both plan- and kit-builders in locating, fitting, and trimming the thwart to fit.

Here are the basic components of the mast thwart as supplied in the kit.

We use spanish cedar for these parts. Mahogany, spruce, pine, fir, cypress, or anything that's strong and takes epoxy well is suitable.

The big "star knobs" and 5/16-18 (7.9mm) stainless steel carriage bolts are available from CLC if you're working from plans.



Sturdy 1-inch (25mm) thick knees support the mast thwart. They fit tightly against Bulkhead 1.

The knee will need to be shaped a little to fit around the big fillet that secures Bulkhead 1 to the side planking.



Use a rasp or a sander to adjust the fit of the knees so they sit snugly against Bulkhead 1.



If you're retrofitting the lug rig to your Dory, you'll need to mask off very carefully where the knees are epoxied to the hull. Even if you're undertaking these steps prior to varnish work, a careful masking job still saves a lot of time!



Every trace of varnish must be sanded away if you're retrofitting. If you're working on a hull that just has an epoxy coating, you still must scuff up the mating surfaces for the strongest-possible bond.



Thicken epoxy with Cell-o-fill and brush a heavy coat onto the knees.



A few clamps hold the knee while the epoxy cures, for at least 24 hours.



Note the trouble we took with plastic and tape, to avoid dripping epoxy on the varnished interior of our showroom model.



A hole for the mast must be created in the thwart, measuring 2-1/2" (63.5mm) square.

Locate the center of the thwart, mark out the square hole in pencil, and drill pilot holes at each corner.



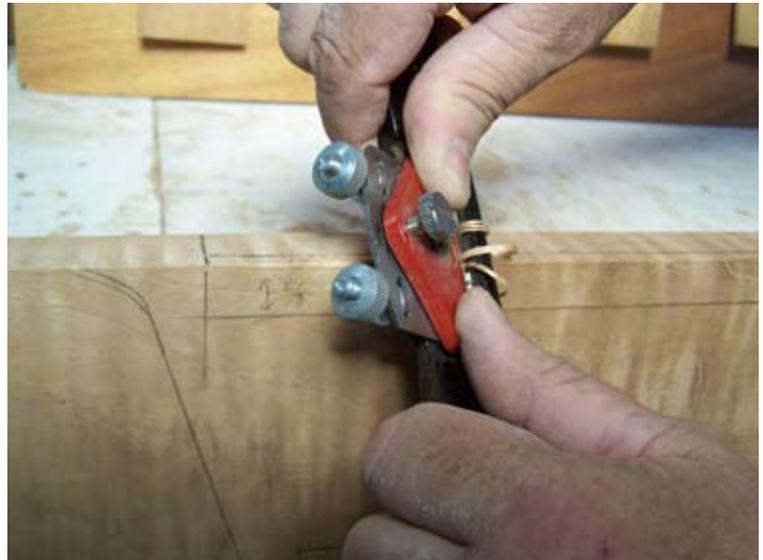
Use a saber saw with a sharp bit to cut the hole.



A chisel cleans up the rough edges left by the typical saber saw.



Adding a chamfer to the lower edges of the thwart greatly enhances its appearance. Remember the chamfers back on Page 77? Same idea. Use a spokeshave to create a chamfer about 3/4" (18mm) wide.



Here's the thwart, lower edges chamfered, ready for additional reinforcement.



3/4" x 1" (18mm x 25mm) rails are glued to the upper edges of the thwart, for lots of extra strength without much extra weight.

We make the rails a bit long to start with.



Thickened epoxy is applied to the mating surfaces....



....and the rails are clamped on.



Double-check and triple-check against the boat that your thwart is the right length and that the angles are correct, then trim the thwart assembly to length.



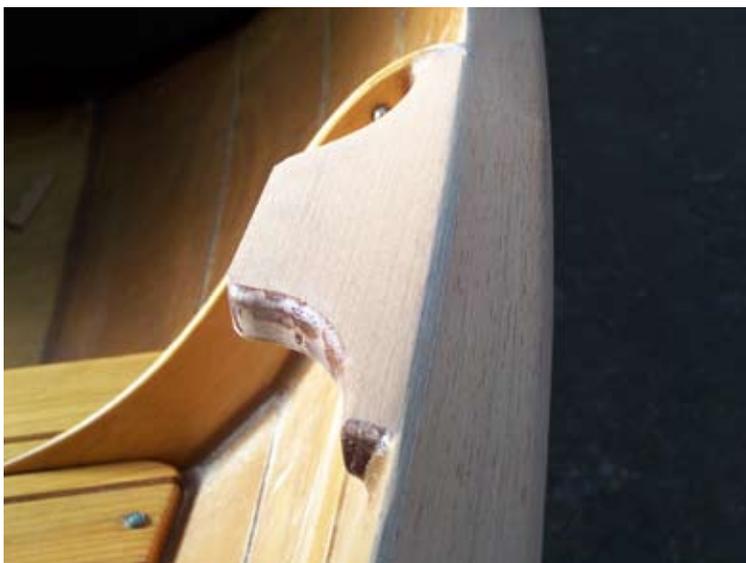
We rounded the ends of the stringers, using an epoxy filler can as a pattern.



For extra strength, we recommend that a “peanut butter consistency” epoxy fillet be added to the underside of the thwart knees.



Here's the finished thwart knee, sanded smooth.



A single sturdy bolt on either side holds the thwart. After one more check on the thwart's location, drill a 1/2" (12mm) hole through thwart and knee.



We will use the "drill-fill-drill" scheme to make sure these holes are strong and the bolts don't wear on the wood.

Place a bit of tape on the underside of the thwart, then flip it over and fill the hole with thickened epoxy.



The thwart knees get the same treatment: a bit of tape on the underside, then a solid fill of thickened epoxy.



When the epoxy-filled holes have cured, sand them smooth.



Now re-drill with a 5/16" (7.9mm) hole, ready for the bolt.



A test-fit. Knees and thwart are now ready for several coats of epoxy and varnish.

Note the stock mast step, with the mast in place. The mast step for the lug-rigged dory is identical to the one detailed beginning on Page 112.



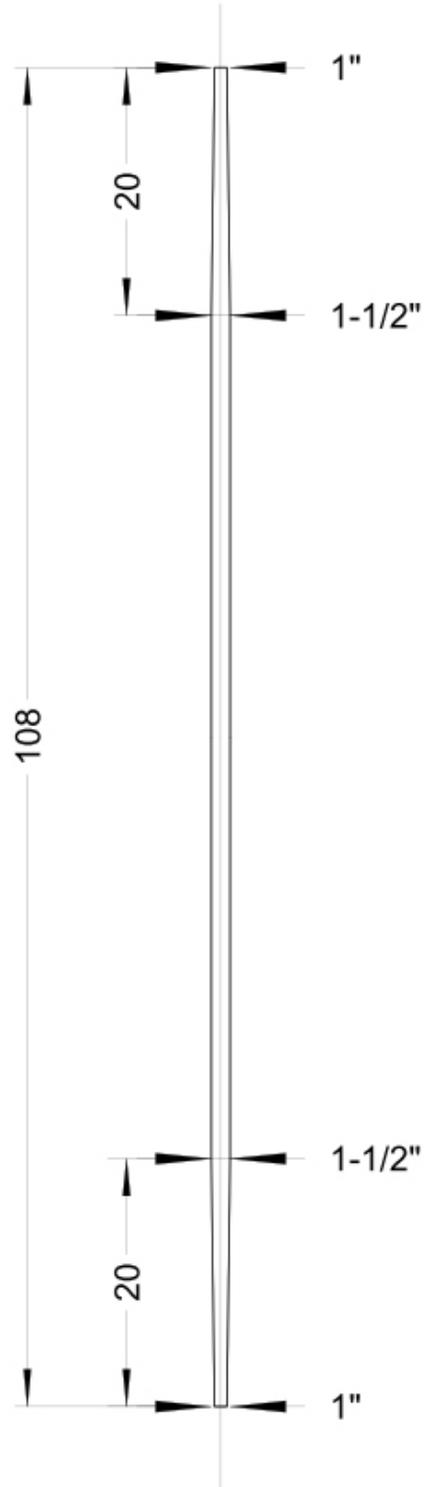
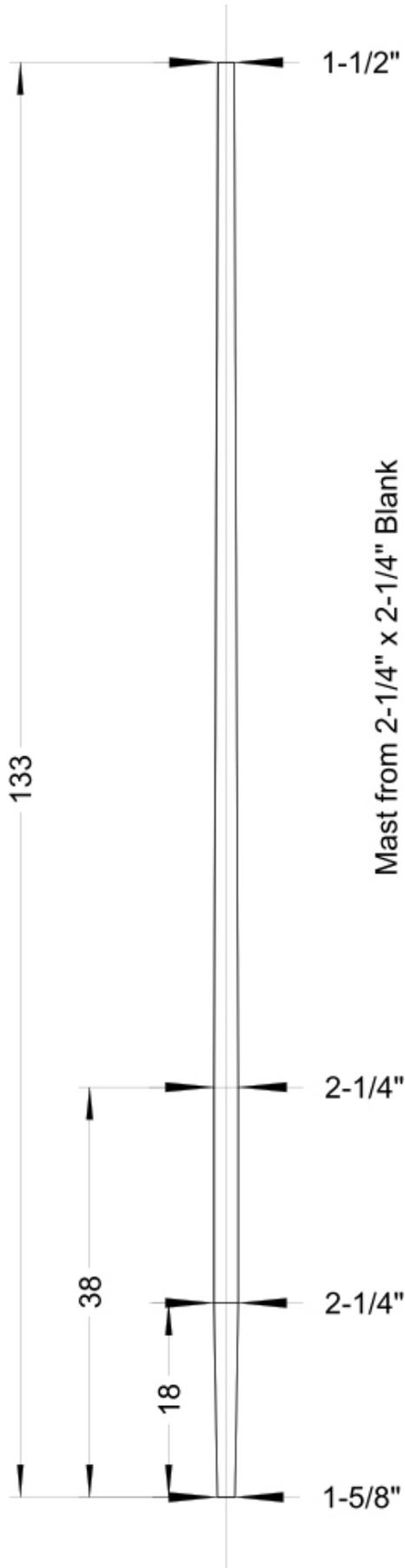
This builder chose to make the mast hole a bit bigger, and to add a leather surround to protect the mast. This is elegant, though certainly not required.



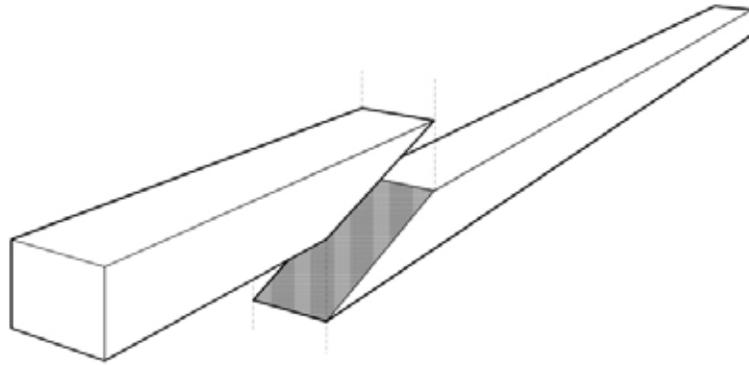
Building the Mast, boom, and yard

Kit builders have mast “blanks” ready to assemble and shape. Scratch-builders will need to collect up some clear spruce, pine, or fir, and laminate and scarf it into “blanks.” The spar-building discussion that begins on Page 123 of the manual is helpful here. The lugger’s spars differ only in detail.

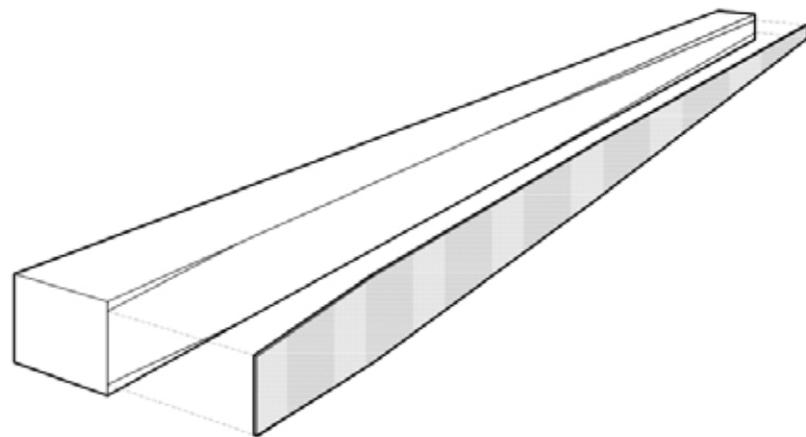
In the Northeaster Dory, the lug rig’s boom (lower horizontal spar) and yard (upper horizontal spar) are identical in every respect.



Step 1 - Use scarf joints as necessary to assemble the mast blank. Use lots of thickened epoxy!

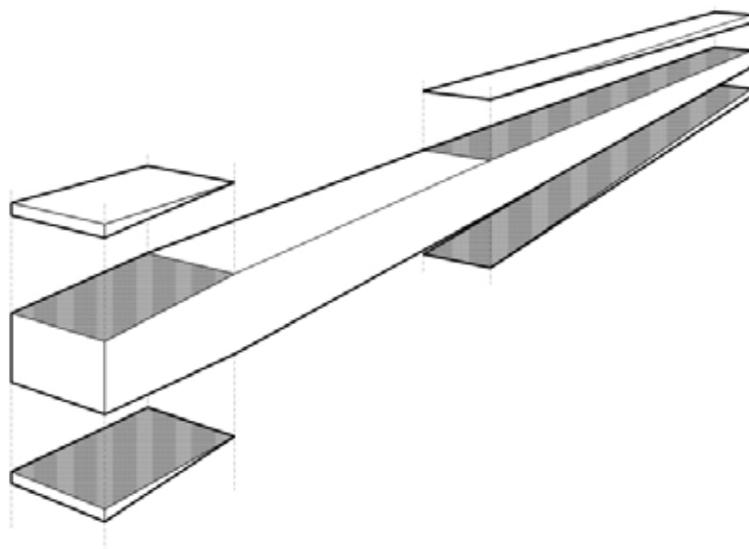


Step 2 - Trace the pattern onto one side of the square-sectioned blank (or lay out the dimensions shown on Page 165).

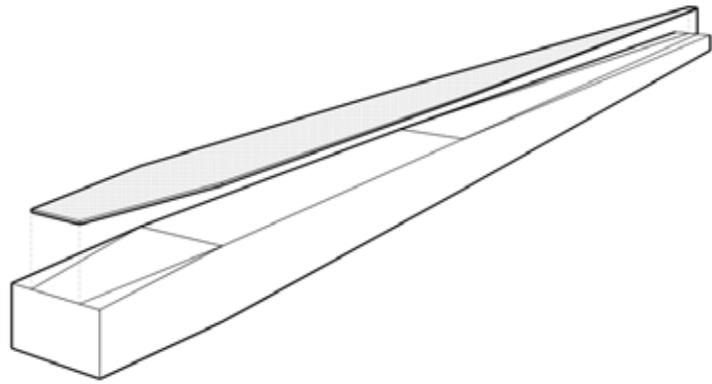


Unlike the sloop, the lugger's mast is tapered on all four sides, not just three sides. So a single pattern works on all four sides.

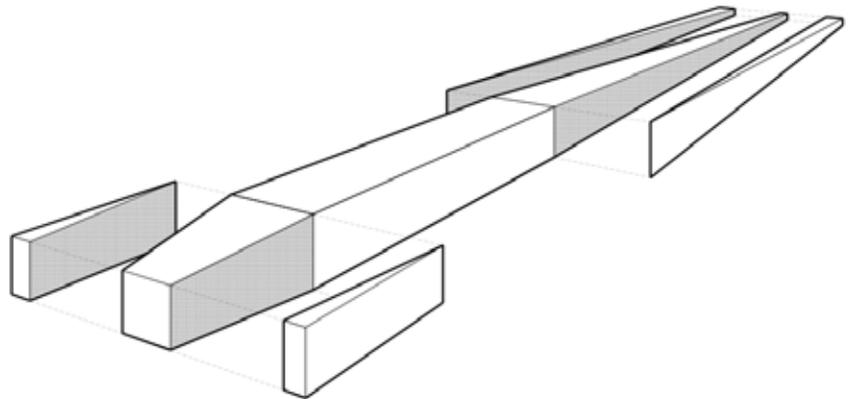
Step 3 - Trim to the lines. The best tool is a circular saw (see Page 167) or a bandsaw.



Step 4 - Flip the blank 90 degrees and trace the same pattern again.



Step 5 - Four more big cuts, and you have a mast tapered on four sides.



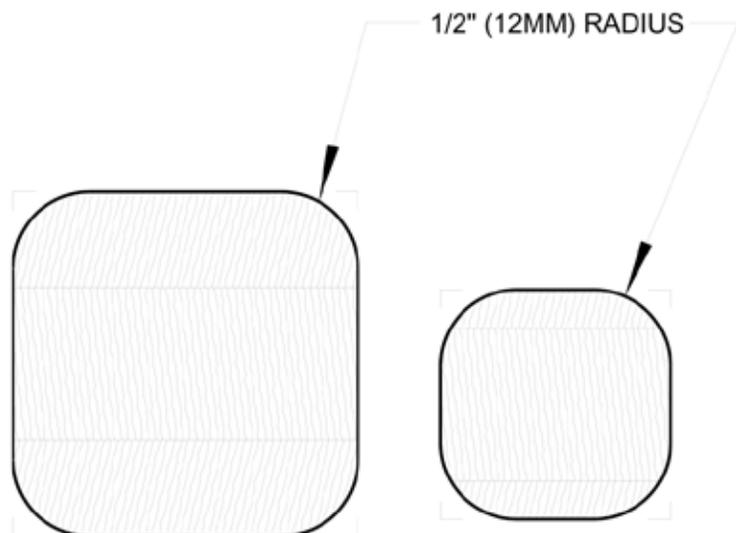
A circular saw with a sharp, thin blade offers great control and tends to cut “plumb” and straight.



Use a sharp plane to clean up all four sides of the mast. A beltsander is good for the final smoothing steps.



The square-sectioned mast is ugly and heavy with sharp corners. We used a router with a 1/2-inch round-over bit to knock the corners off. This looks great, and saves a lot of weight where it matters the most---up in the air.



With a big router bit, you need to take several passes, cutting a little more each time, or you risk splitting the mast.

You can create these round-overs with a block plane and sander if you don't have a router.

The boom and yard are just straight sticks, 1-1/2" (38mm) square, with the last 20" (500mm) tapered down to 1" (25mm) square.



The halyard goes through a 1/2" (12mm) hole centered an inch down from the top of the mast.

The correct way to drill a hole through wood like this is to first create a pilot hole, then drill from either side, meeting in the middle. Otherwise, you might create a grisly "tear-out" when the big bit emerges on the other side.



The halyard needs to run smoothly through the hole. We used a router and a round-over bit to "flare" the hole neatly. Thus treated, there is almost no friction on the halyard.



The boom and yard need 5/16" (8mm) holes at each end, centered about 1" (25mm) from the end of each spar.

Here, we've clamped the spar to a piece of scrap, to avoid "tear-out" on the back-side.



A big countersink bit works to “flare” these smaller holes.



The finished hole, with a neat “flare” to prevent friction on lashings.



We hung the three spars and the mast thwart from the ceiling in our tall shop to apply varnish.

We recommend 3-4 coats of a marine-grade varnish for an attractive and durable finish.

We don't epoxy-coat the spars, though this WILL make them even more durable. Epoxy-coating sticks like these is hard work and adds many hours. We DID epoxy-coat our mast thwart first, however.



When the varnishing is complete, the spars are ready to rig.

A pair of cleats are centered on the mast 28" (710mm) above the butt end.



Use #8 x 1-1/2" (38mm) screws to fasten the cleats to the mast.



The cleats are positioned on the port and starboard faces of the mast.

The hole at the top of the mast for the halyard should be oriented side-to-side, in other words, with the openings on the same faces as the two cleats.



Find a clean space to lay out your sail, which will be permanently laced to the boom and yard.

We used 1/8" (3mm) line for these lashings.

Start by lashing the sail to the holes at the ends of the boom and yard. We'll call these lashings "outhauls."



The outhauls are a double loop of line, like this.



Tie a square knot in the outhaul.



To prevent the square knot from working loose, add simple overhand “stopper knots” as shown here.

The sail should be stretched very tightly by the outhauls at all four corners.

Exactly HOW tight the outhauls should be for best sail performance is a matter of practice and experience. If you’re unsure, it’s better to have the outhauls too tight than too loose.



Each grommet on the head and foot of the sail is lashed around the spar. We used two loops each. These lashings should be tight enough to bring the sail in solid contact with the spar, but not so tight that the tension of the sail can’t be adjusted with the outhauls.



We were lucky to have the showroom floor available laying out and lacing on our lug sail.



Halyard and downhaul attachment points are shown on Page 153. The measurements are from the center of the grommet in the corner of the sail.



Halyard and downhaul are 1/4" (6mm) low-stretch line. Here's the knot we used, a clove-hitch around the spar followed by two half-hitches.

See Page 153 for the exact attachment points of the halyard and downhaul. Where these are attached really matters for sail balance!



Use a hot-knife to cut off all of the excess lashing line, right up against the stopper knots.



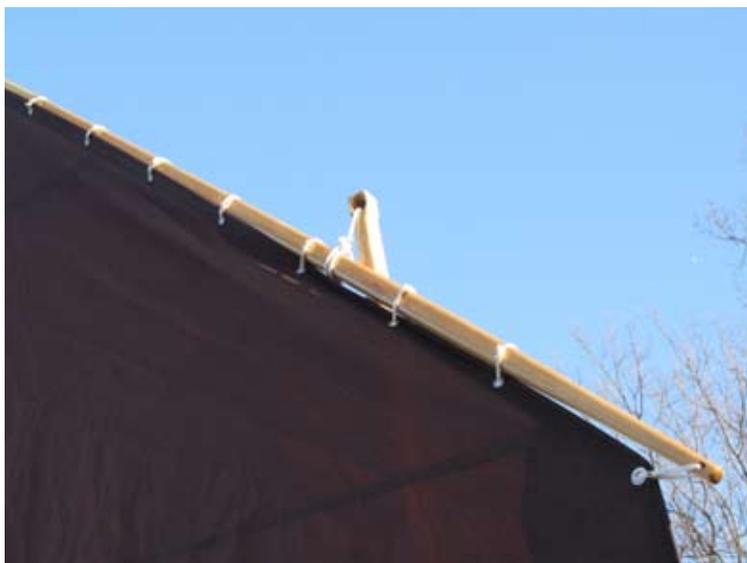
The finished and rigged Northeaster Dory.



The finished mast thwart.



A view of the halyard in action. You should hoist the sail first with the halyard, then take up on the downhaul.



Here's the downhaul, which not only helps tension the sail in the vertical dimension, but also holds the boom in the correct orientation. Again, the exact amount of tension is an artform, but should default to being very tight.



The halyard and downhaul will stretch while sailing. Expect to have to tighten them up from time to time.

The main sheet is rigged to a bridle. The oarlocks at the rear rowing station are perfectly placed for the bridle; we just passed a length of 1/4" (6mm) line into each oarlock and tied a knot.



In the middle of the bridle, create a loop and an overhand knot.

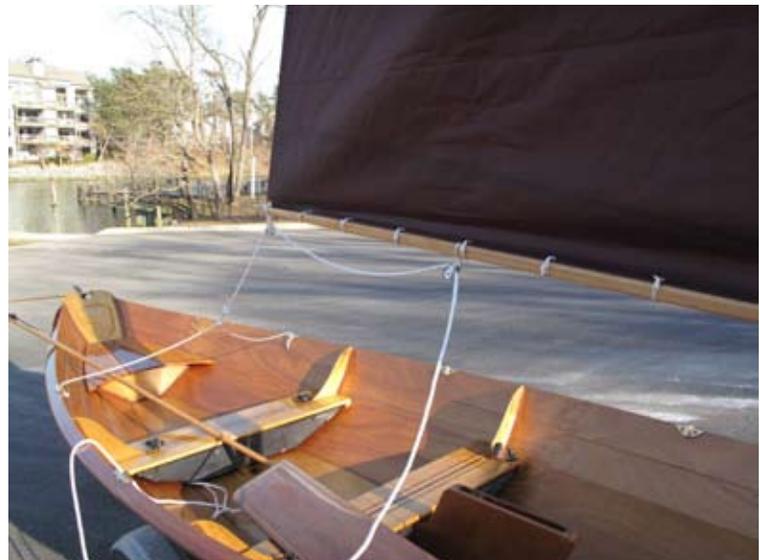
The mainsheet is 3/8" (9mm) line, fastened to the loop in the bridle with a "sheet bend."



The mainsheet is rove through two single blocks lashed to the boom. Use 1/8" (3mm) line to lash the blocks to the boom.

The two blocks are positioned at the aft end of the boom and about 44" (1100mm) forward of that.

The running end of the sheet goes to your hand. We do not recommend a cleat for the mainsheet, though some builders might add another block on the floor or thwart. Just be sure the block isn't in the way of rowing!



Whether you're fitting the lug or sloop rigs, you should plan on a leisurely driveway rigging session, allowing you to sort everything out, get the line lengths correct, and in general understand how it works. There's nothing worse than trying to get all of the rigging done the first time at the launch ramp, while everyone's standing around awaiting the christening. At CLC, we literally "sail" the boats on all points in the parking lot, shifting the trailer around as needed, so that there are no surprises when we get to the water.



The lug rig handles great on all points of sail. Have fun!