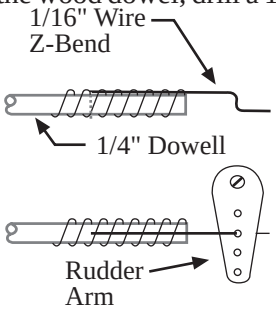
PUSHRODS

The rudder pushrod connects between the rudder servo and the tiller arm (use a model airplane steering arm). The pushrod must be very stiff, no deflection or flexing. The end connections to the servo arm and tiller arm can be made from 1/16" music wire with a “Z” bend. Or a model airplane clevis and threaded clevis wire. The good thing about the clevis is it’s adjustable, which makes adjusting the centering of the rudder easy.

Between the two ends is a stiff piece of material, the material can be a 1/4" wood dowel, carbon fiber tubing or aluminum arrow shaft.

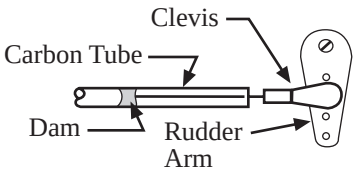
If you use the wood dowel, drill a 1/16" hole through



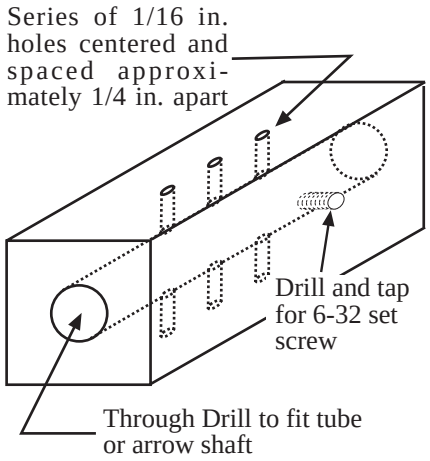
the dowel about 1" from the end. The “Z” bend or clevis should extend past the end of the dowel far enough so there is no binding, with full rudder throw. Cut the wire to length allowing for 1/4" right angle bend. Insert the 1/4" bend in the 1/16" hole in the dowel. Wrap the wire and dowel with string, then Zap it. Do both ends of dowel.

If you use the carbon fiber tube or arrow shaft, stuff a cotton dam down the tube about 1" from end. Make a small right angle bend at end of wire. Clean the end of the wire that will be in the tube, with sandpaper. Center wire in tube and layer in micro-balloons and Zap.

That’s it for the pushrod.

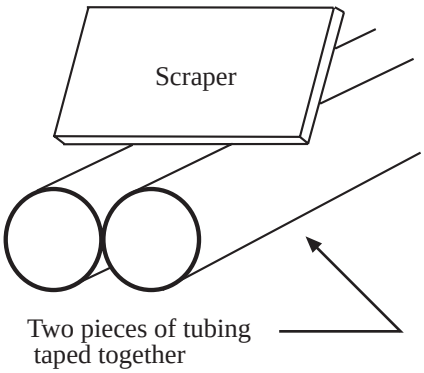


ARROWSHAFT DRILLING JIG



A through drilled piece of 3/4 inch square aluminum stock approximately two inches long makes a great jig for drilling arrow shafts and other tubing. Size the through hole to match the O.D. of the shaft. A 6-32 set screw lock everything in place for drilling. One person I know made one of these jigs from oak — minus the set screw, and it seems to work fine.

SCRIBING TUBING

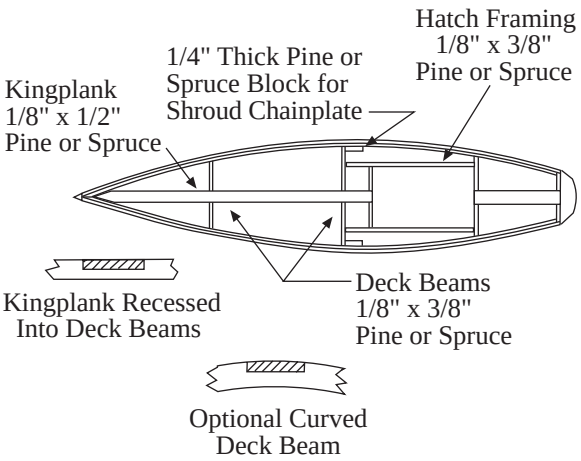


To scribe a straight line along a metal tube or aluminum arrow shaft, simply tape two identical pieces of tubing together and scribe the line with any handy piece of sheet metal with a straight edge. --Hal Robinson, Minuteman MYC, Massachusetts

DECKS AND HATCHES

SOFT DECK

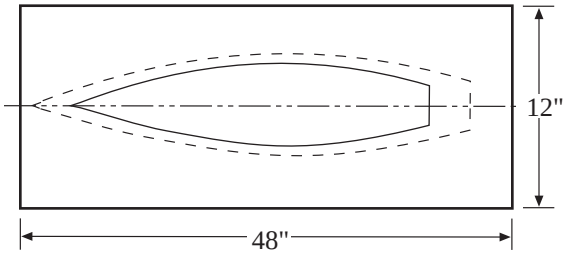
The “soft deck” covering material is “Solar-Tex, Monocoat, Micafilm” or other similar heat shrink type model aircraft covering material. “Micafilm” has a fabric weave to it, which gives it more strength than the other “film” type covering materials. Follow the instruction that come with the covering material. The edges of the material should be sealed with 1/4" wide auto stripping tape. Half the width of the tape on the fabric and half on the hull.



Deck beams can be flat which gives a flat deck, or curved so the deck is crowned. Deck beams should be located at the jib pivot, near the sheet exit guides and the mast.

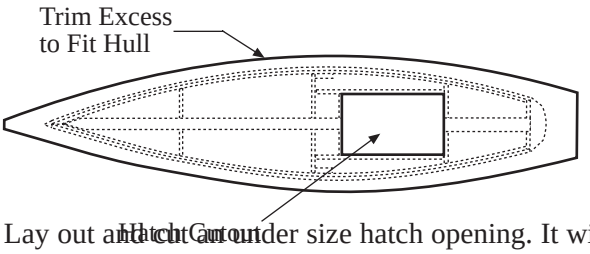
PLYWOOD DECK

The deck support arrangement for a plywood deck is the same as the “Soft Deck” arrangement. A flat deck is easier to cover with plywood than a curved deck. The deck is made from 1/32" thick aircraft plywood. It is available from the hobby shop in sheets of 12" x



48".

Place the hull on plywood, deck side down. Trace around deck edge with a pencil. Cut about 3/8" outside of pencil line. This excess will be trimmed later.



Lay out and cut an under size hatch opening. It will be trimmed and sanded to size later.

Carefully sand all hull surfaces that come in contact with under side of deck.

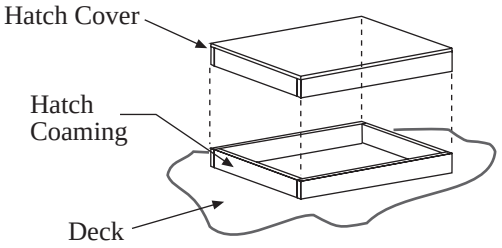
Apply epoxy to all hull surfaces that will come in contact with underside of deck. Place deck in position. Use strips of masking tape to hold deck in position. Use lots of tape! Small “C” clamps or clothes pins around the hatch opening

work well. Let epoxy cure, trim deck edge and hatch opening. Sand and finish.

HATCH COAMING AND COVER

The hatch coaming is made from 1/16" plywood strips. They are epoxied inside the hatch opening framing and should extend approximately 3/8" above deck.

The hatch cover is made from 1/32" plywood. It must

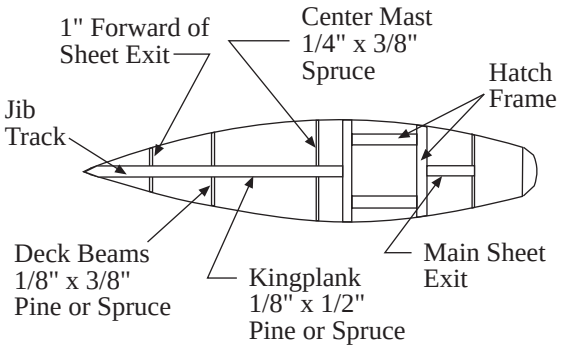


be a tight fit to prevent water from getting into the interior of hull.

Place a small sheet of plastic wrap (Saran Wrap or similar) over hatch coaming and build hatch cover frame around coaming. Glue a sheet of 1/32" plywood on frame. Trim and sand.

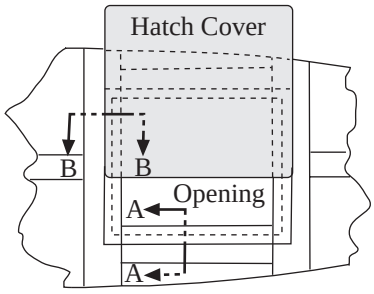
MORE SOFT DECK

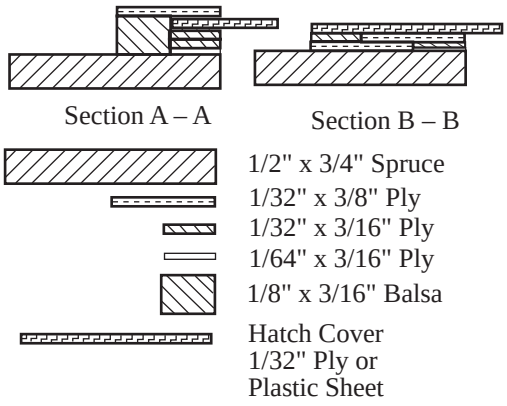
The actual positions of the jib track, jib sheet exit guide, mast step, hatch, and main exit guide is determined by the design of the hull, fin, sail plan, and sail control unit. Place the deck beams across the hull from gunwale to gunwale, under areas of the kingplank that will be subject to compression or strain.



SLIDING HATCH

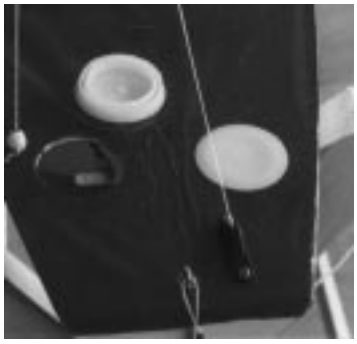
This hatch cover slides out from the side of the hull and has tongue and groove rails for sealing.





MILK BOTTLE CAPS

Milk bottle caps make great hatches in places where you don't need constant access. The frame is made by cutting a hole in 1/16" plywood with a 1-3/8" hole saw. It's a good idea to seal the hatch with petroleum jelly.

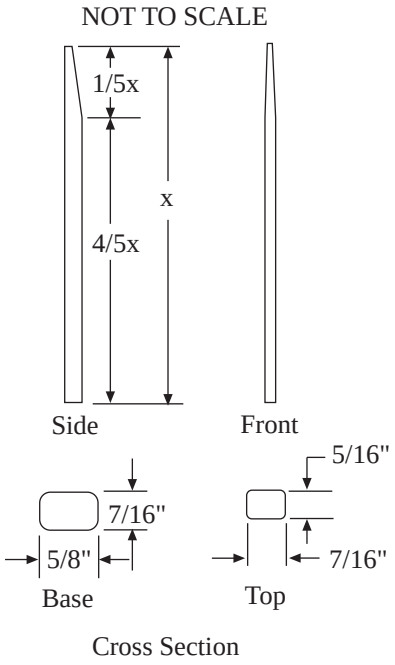


MASTS

Mast blanks are available from several suppliers or you can make your own.
Masts can be made from:
• Carbon fiber mast blanks.
• Carbon fiber fishing pole blanks.
• Carbon fiber cross country ski poles.
• Fiber glass fishing pole blanks.
• Aluminum (extruded) blanks.
• Aluminum tubing (1/2" dia. thin wall)
• Wood: Spruce, Pine (molding), Etc.

A wooden mast is the least expensive. It works well for a short rig.

Taper the front and sides with a plane (small block plane) and sand to approximate dimensions shown in the cross section drawing.

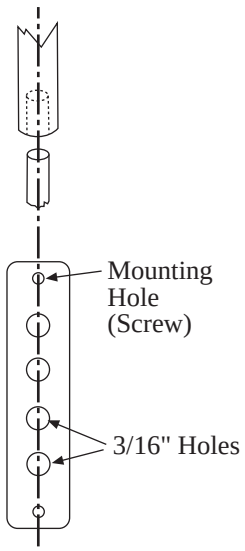


Cross Section

Finish with resin or varnish. Drill a 3/16" hole in base of mast. If you are using a hollow mast, epoxy a short dowel plug in mast base. Drill hole in base of plug.

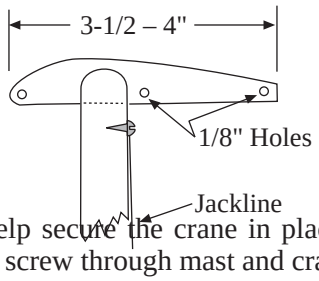
Epoxy a short length of 3/16" dowel in hole. Leave approximately 1/8" exposed. The exposed dowel will mate with mast mounting plate on deck. An alternate method would use a short length of 1/8" dia. stainless rod, with correct size hole.

Mast deck plate can be made of 1/8" thick plywood, aluminum, plastic or any hard material.



The masthead crane is made from 1/16" thick sheet aluminum, brass or fiberglass.

Cut a slot in top of mast to receive crane. Epoxy in

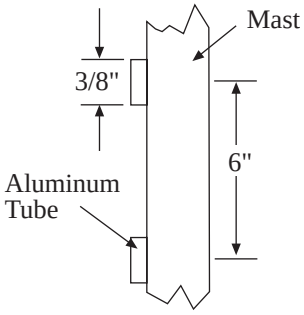


place. To help secure the crane in place, epoxy a steel pin or screw through mast and crane.

There are several methods for attaching the luff of the mainsail to the mast. Two are shown, jackline and mast loop.

Jackline method:

Short sections of 1/16" I.D. aluminum tubing will be epoxied along back side (trailing edge) of mast at 6" intervals. Determine number of tube sections required. Cut tubing with small file or razor saw. Debur edges.



Thread tubes on a length of line (heavy fish line). Stretch line along trailing edge of mast. Secure ends of line with masking tape.

Wrap masking tape around line and mast between tubes.

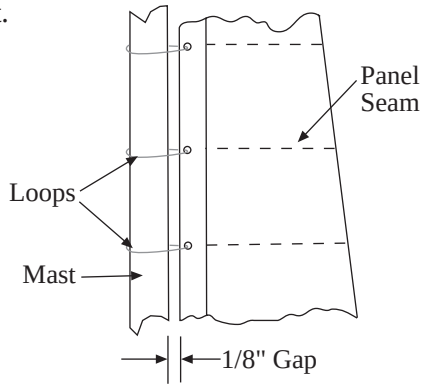
Epoxy (or Zap and micro-balloons) tubes to mast. Allow epoxy to cure.

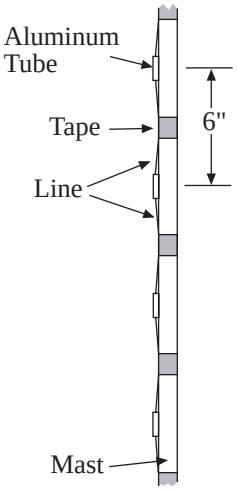
Remove tape and line. Stretch a jackline through tubes. Use stainless steel wire or plastic coated braided stainless steel leader material (available at fishing tackle shops). Use small sheet metal screws to anchor jackline ends. A drop of epoxy placed in screw hole will keep screw from working out.

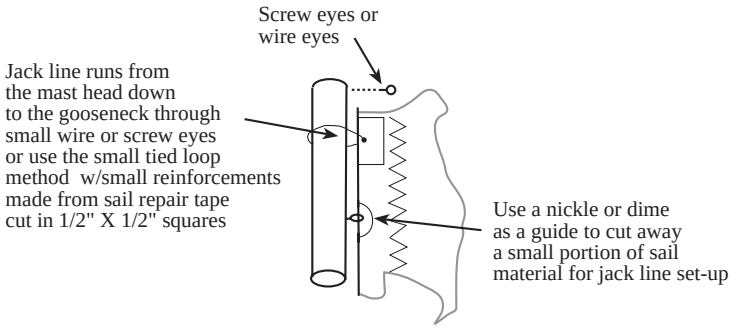
Mast loop method:

Loosely tie the mail luff to the mast, using light weight line.

At every horizontal sail panel seam, make a small hole in the luff about 1/8" from the leading edge (if sail material is Mylar melt a hole with a small round tip soldering iron, the melted material acts like a grommet. If sail material is fabric you need a grommet to reinforce the hole.). Tie the sail to the mast with loops of line through the luff hole and around the mast, leaving a 1/8" gap between the luff and the mast.





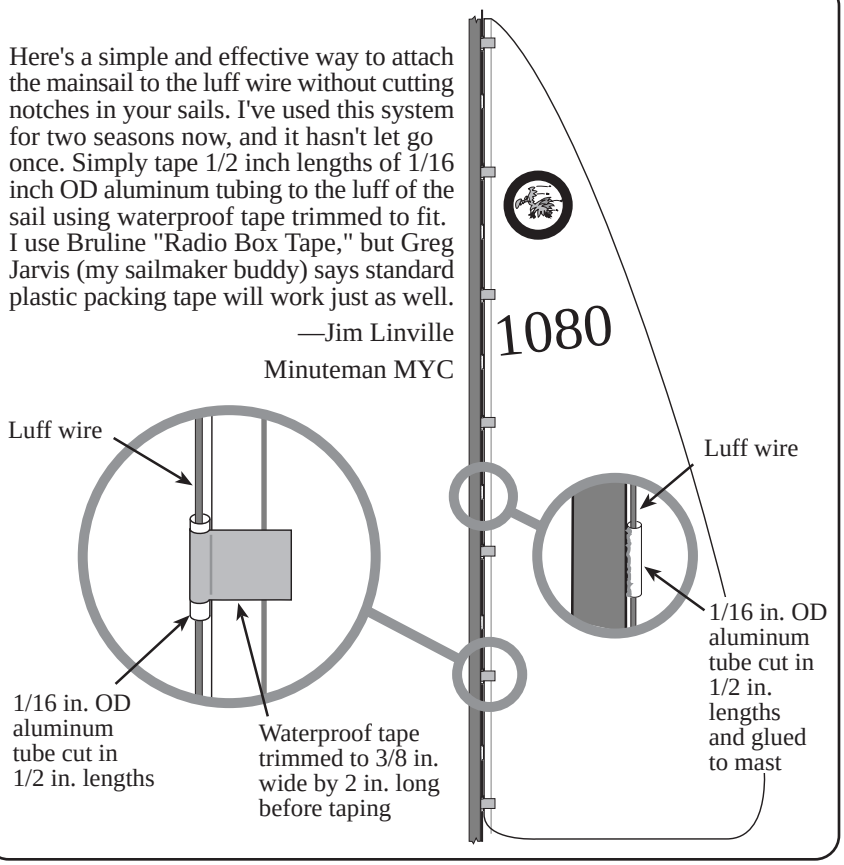


Two different ways to attach the main sail to the mast.

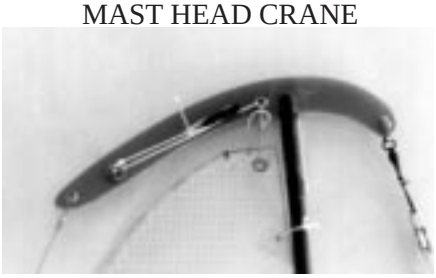
Here's a simple and effective way to attach the mainsail to the luff wire without cutting notches in your sails. I've used this system for two seasons now, and it hasn't let go once. Simply tape 1/2 inch lengths of 1/16 inch OD aluminum tubing to the luff of the sail using waterproof tape trimmed to fit. I use Bruline "Radio Box Tape," but Greg Jarvis (my sailmaker buddy) says standard plastic packing tape will work just as well.

—Jim Linville

Minuteman MYC

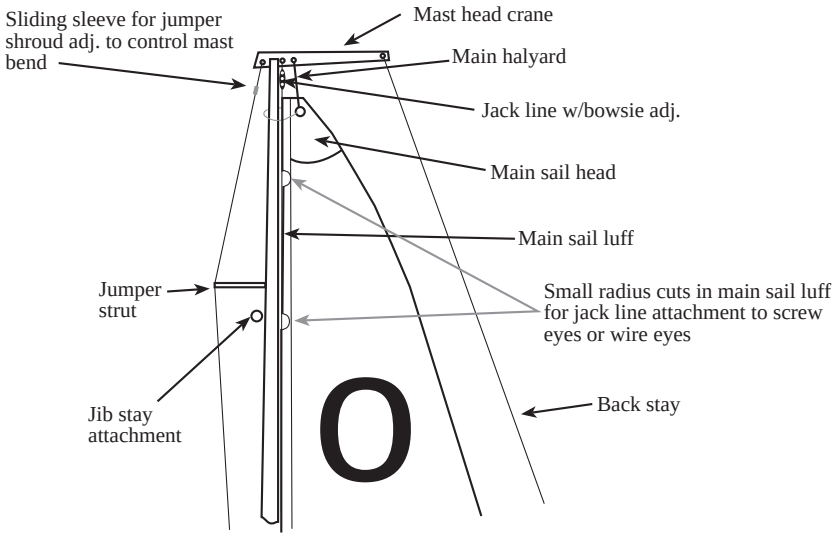


MAST HEAD CRANE

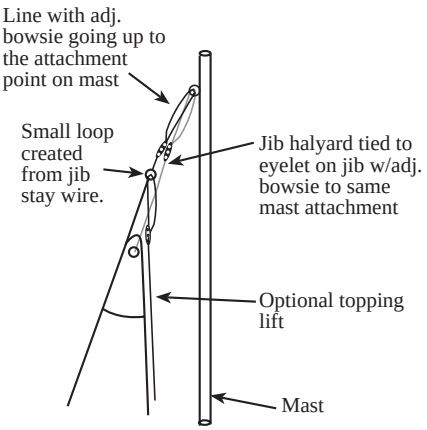


This arrangement uses an up haul on the mast head crane instead of a down haul on the gooseneck to control the main sail luff tension.

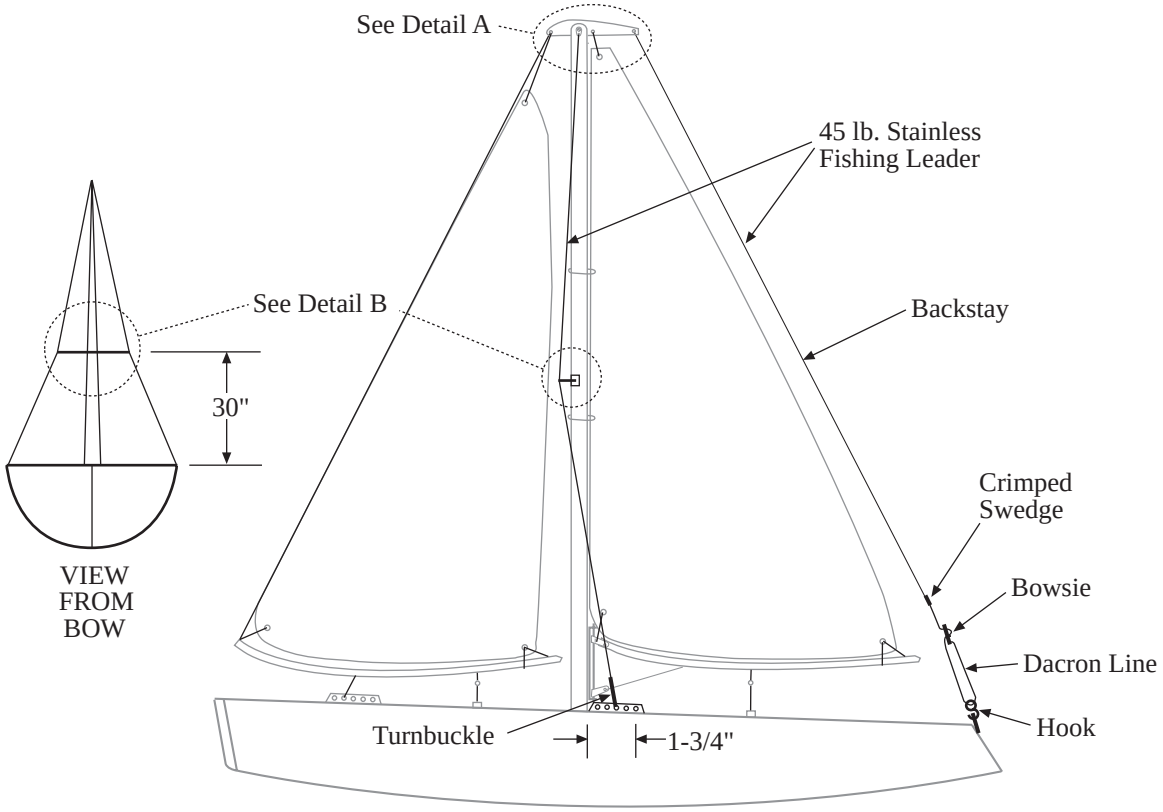
RUNNING RIGGING

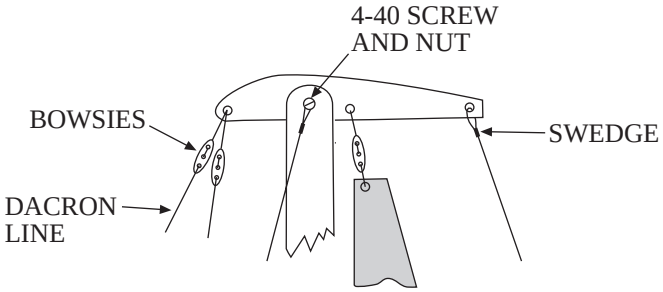


Mast head rigging of a typical fractional rig

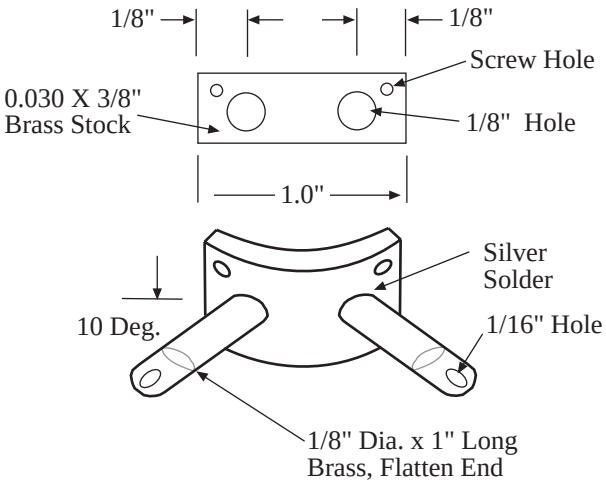


Attaching the jib to the mast on a fractional rig..





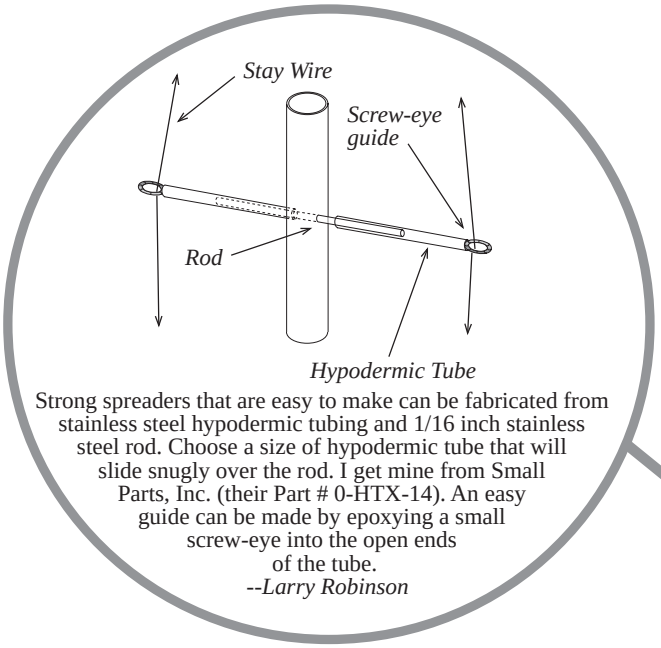
DETAIL A



DETAIL B

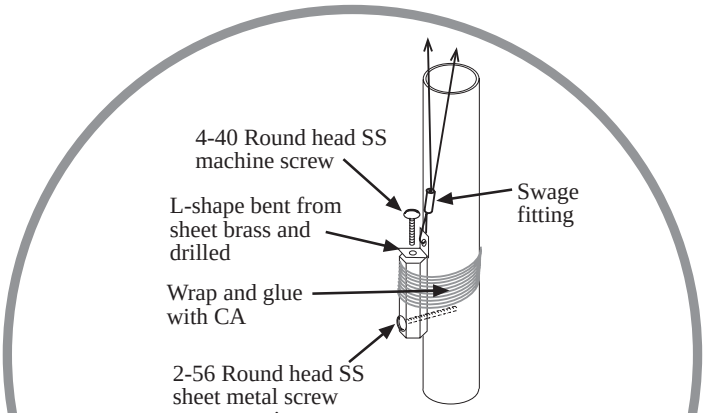
MAKING A MASK FROM A CARBON FIBER KITE SPAR

By Jim Linville



Strong spreaders that are easy to make can be fabricated from stainless steel hypodermic tubing and 1/16 inch stainless steel rod. Choose a size of hypodermic tube that will slide snugly over the rod. I get mine from Small Parts, Inc. (their Part # 0-HTX-14). An easy guide can be made by epoxying a small screw-eye into the open ends of the tube.

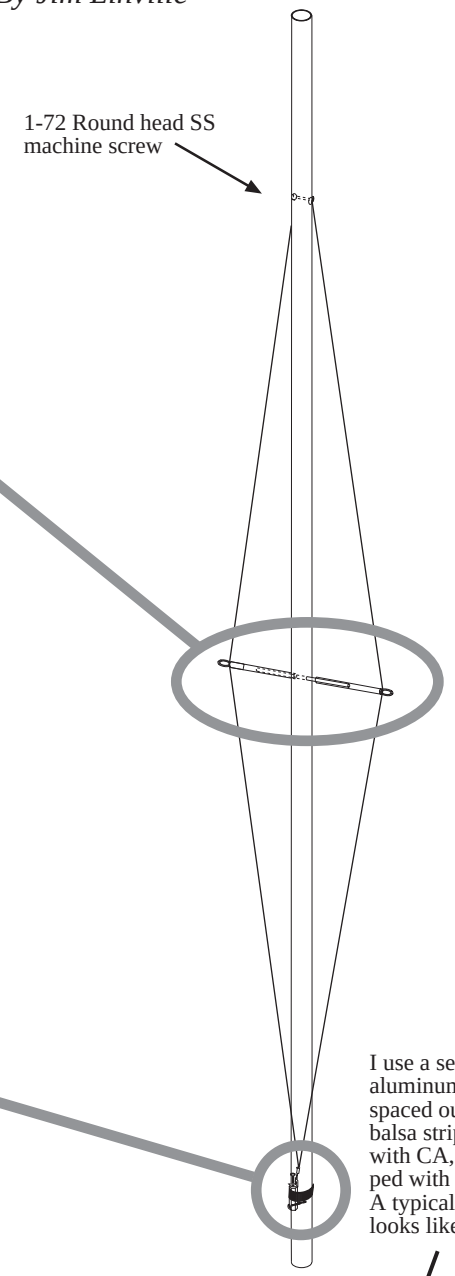
--Larry Robinson

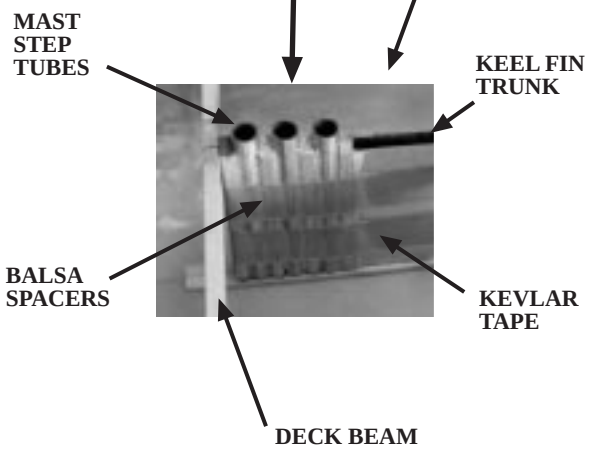


FOR ALUMINUM AND CARBON MASTS

This is the little turnbuckle I use to tension jack and/or diamond stays. The turnbuckle body is a 4-40 aluminum standoff from Small Parts. Inc. Their part number is O-S4-12. Install the stay wires, tighten them, and sight down the mast to make it is straight before locking everything in place by crimping the swage fitting.

--Jim Linville





I use ProSpar PS-19-352 carbon fiber kite spars for US1M masts. The PS-19-352 is a tick under 3/8 inches in diameter, and a 65 inch mast weighs in at slightly less than 2 oz. They're available from almost any serious kite store.

The PS-19-352 only comes in 53.5 inch lengths, so they have to be spliced. I find that the Dave Brown 1/4 inch fiberglass push rods from Tower Hobbies fit nicely and make great splices. You can also buy splicing pieces from the spar manufacturer. I like the Dave Brown push rods because they can be used as reinforcing sleeves to help control mast bend.

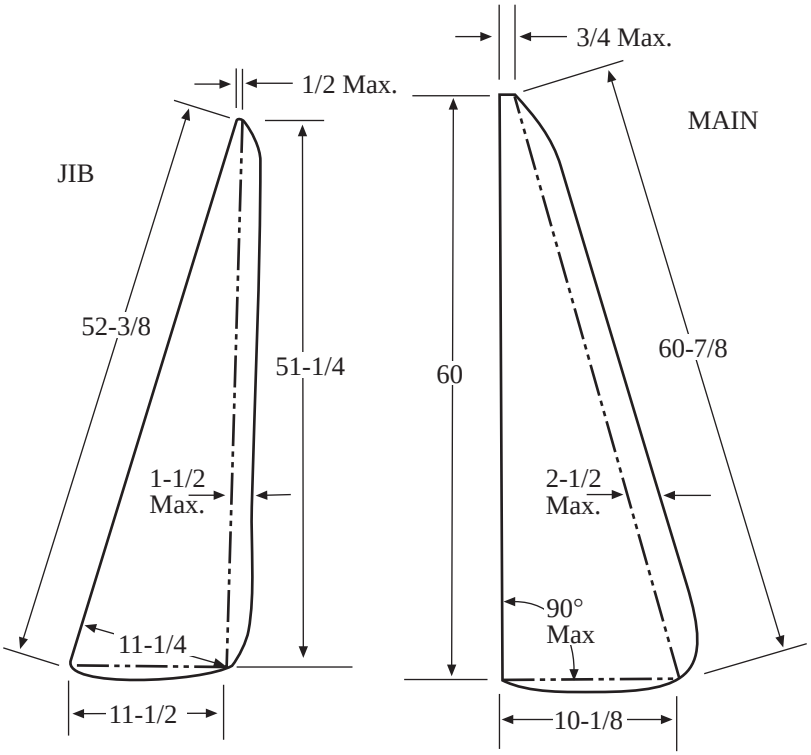
While they're surprisingly stiff for a 2-ounce spar, they still need side stays, but a long diamond stay will also work if you just have to keep the mast free standing. I do, and I use a diamond stay that stretches approximately 80 percent of the mast length.

7/16 inch K & B aluminum tubing makes great mast stepping tubes.

SAILS

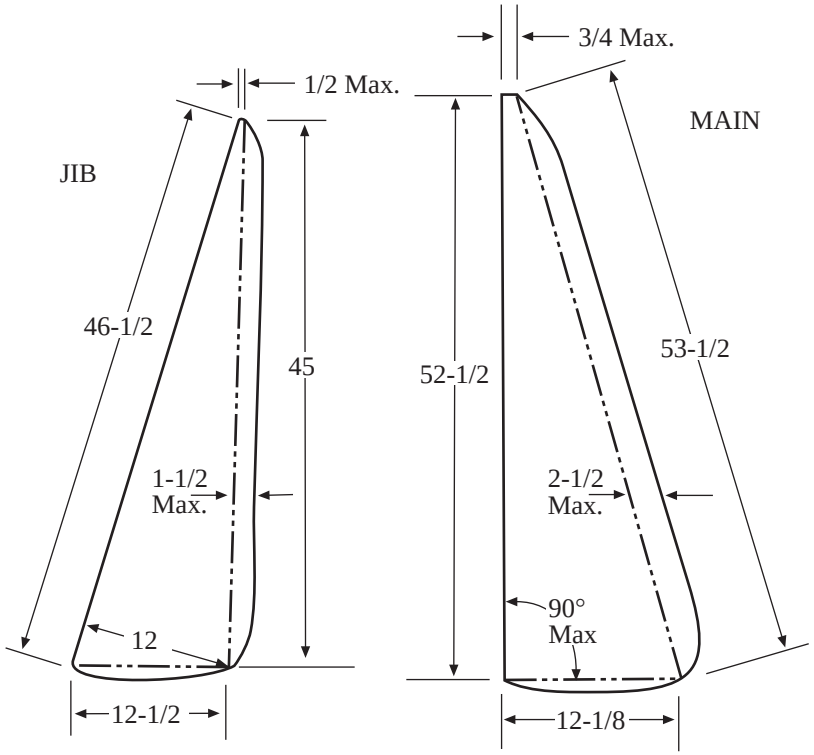
60" LUFF FOR WINDS BELOW 5 MPH
(All dimensions in inches)

Sail Area
Main = 303.75
Jib = 294.60
Total = 598.35



52" LUFF FOR WINDS ABOVE 5 MPH
(All dimensions in inches)

Sail Area
Main = 318.28
Jib = 279.00
Total = 597.28



MAST SUPPORTS

The method used to attach the keel to the hull, the size of the radio board, and the type of sail control are the major factors that determine the type of mast support that can be used on a U.S. One Meter.

Masts can be stepped on the deck and supported with shrouds. Or stepped through the deck in a tube, with this arrangement they may not have shrouds.

Options for supporting deck-stepped masts include:

- Full height fin trunks which can provide bracing between the keelson and the king plank as well as a strong method for keel attachment.
- Extra thick deck beams which can be used with fractional height fin trunk so there is clearance under the deck for rotation of a sail winch arm.
- Separate mast support piece between the keelson and the king plank for use with bolt-on keels.

Through deck stepped masts include:

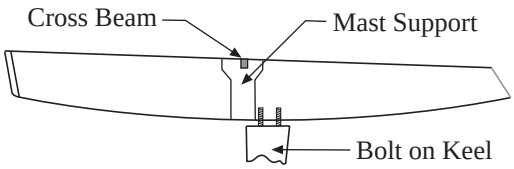
- Stiff carbon fiber masts can be used with or without shrouds. Without shrouds, these masts are stepped through the deck to the keelson via a mast tube. The mast tube has an inside diameter that closely matches the outside diameter of the mast butt. Shims can be placed in the tube (around the mast) to adjust the rake or lean of the rig. A tube is usually made of glass reinforced plastic, and is glued in place upon the keelson and to the deck support so that water does not leak into the hull. Remember a mast stepped in this manner can not be moved fore and aft. To balance the boat, the tube may have to be moved or the proportion of the areas of the main and jib may have to be changed.

Here's an example of Hal Robinson's mast suppoer installed in a hull. Details on the next page.

MAST SUPPORT FOR BOATS WITH BOLT ON KEEL

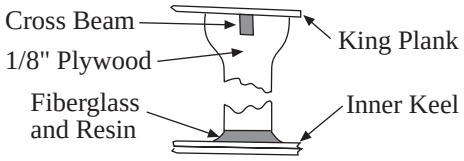
The mast support is made from 1/8" thick aircraft plywood. Shape is determined by radio board installation.

Install sturdy (3/16" x 1/4" pine) cross beam at the mast location.



Cut and fit mast support between king plank and inner keel

Epoxy at king plank, fiberglass and resin at inner keel.



BOOMS

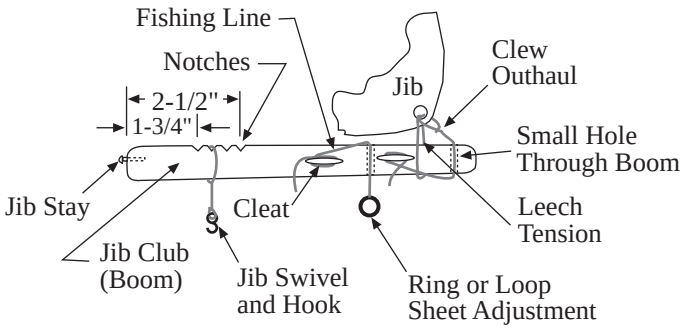
Booms should be stiff and light weight. Weight is important factor, particularly the jib boom. The jib boom rotates around a forestay which is far from being vertical. As the boom rotates outward the tip of the boom has to lift upward. The heaver the boom the more wind force required to swing the boom out. The main boom rotates around a vertical mast and does not have the lifting problem. They can be any shape, so long as they meet the class rule.

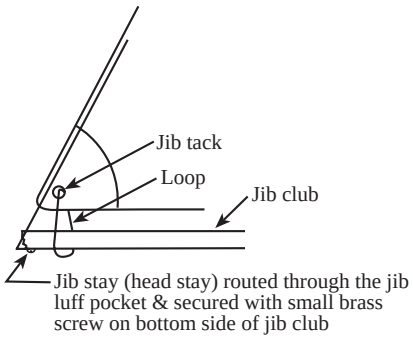
Booms are made from the following materials:

- Carbon fiber tubing (arrow shaft).
- Aluminum tubing (arrow shaft).
- Carbon fiber/foam composite flat stock.
- Wood.

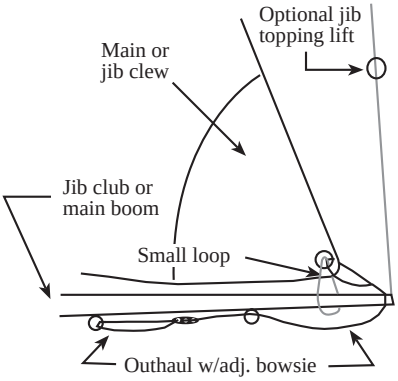
The drawing above right is a wood jib boom.

The hardware and rigging is a general arrangement. You may need to change some of it too fit your needs.

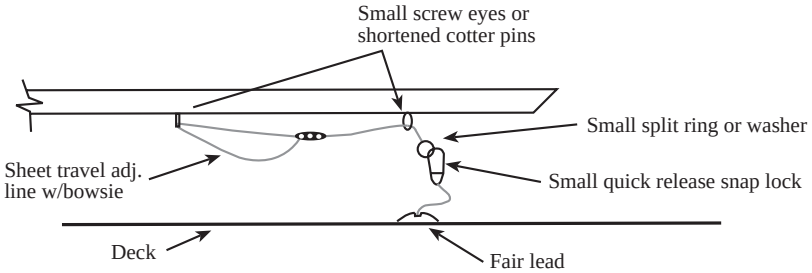




Rigging the tack end of a jib club.

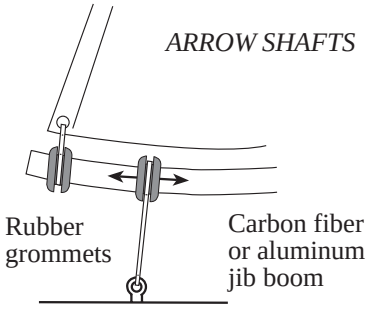


Rigging the clew of a typical main boom or jib club.

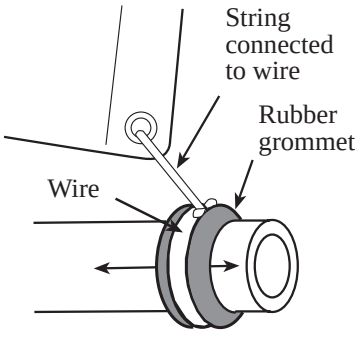


Sheet adjustment rigging for a typical main boom or jib club.

ARROW SHAFTS



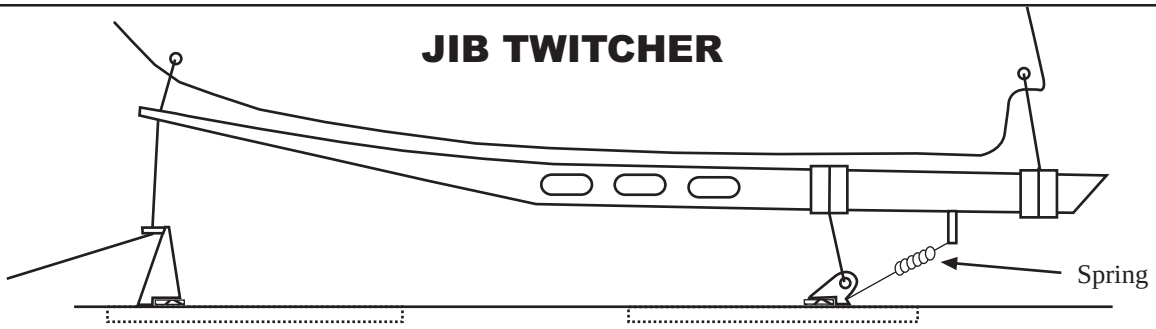
JIB SWIVEL



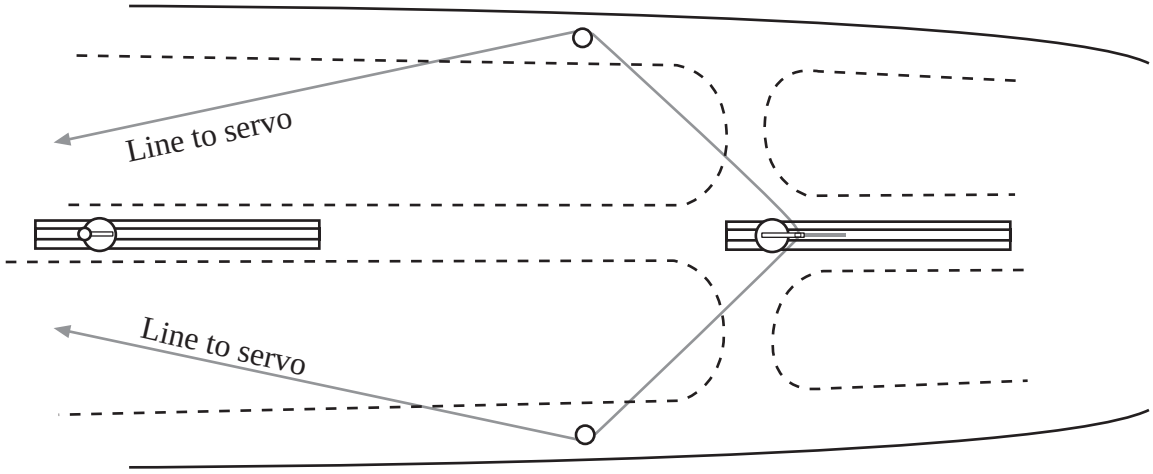
OUTHAUL

Small aluminum arrow shafts or carbon fiber tubes make excellent booms for US One Meters. Most sporting goods stores carry aluminum arrow shafts, and carbon fiber tubes are available from hobby shops and kite stores. You can get the rubber grommets at Radio Shack. *— Dave Acree, Mesa MYC, Arizona*

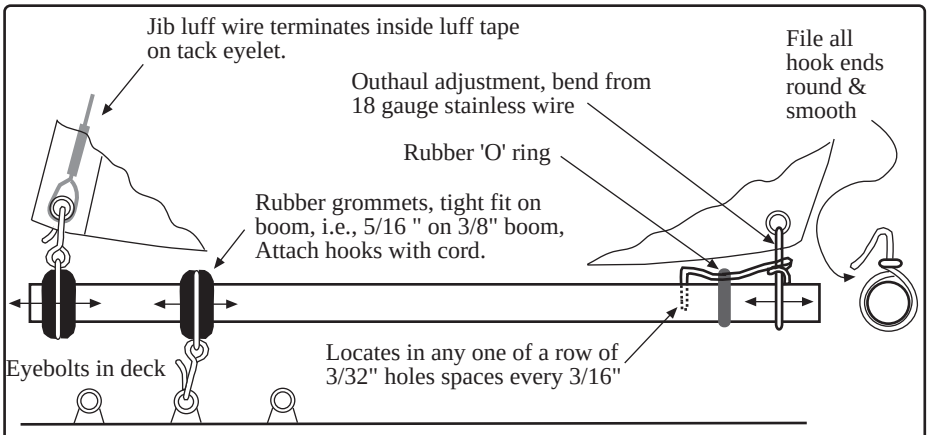
JIB TWITCHER



Jib boom is tapered (cut) and angled upwards behind the swivel point to help it move more easily in light winds and to avoid the boom end hitting the water on a reach. Make all fittings on this boom aft of the swivel point as light as possible. A counter weight can be fitted to the forward end of the boom.



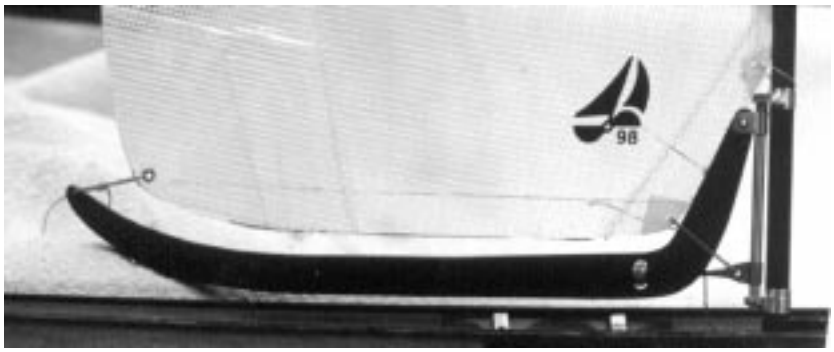
JIB TWITCHER
A servo operates the line which is attached to the bottom end of a spring located forward of the pivot point. As the line moves, the spring centerpoint is moved to one side or the other, forcing the jib boom to move with it, and "goosewinging" the jib. Easy to rig, overdeck mounted, and easy to adjust.

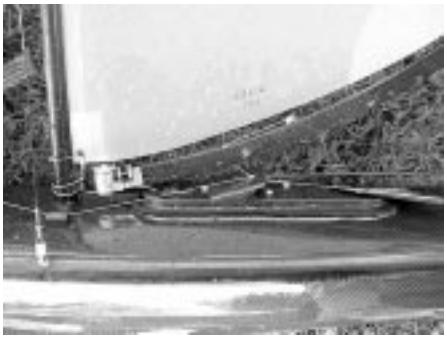


Jib boom made from an aluminum arrow shaft or a carbon fiber tube. All fittings slide to suit various jib foot lengths. The grommets are available from Radio Shack. Reproduced from the March, 1989 issue of *Model Yachting News* by permission of the editor.

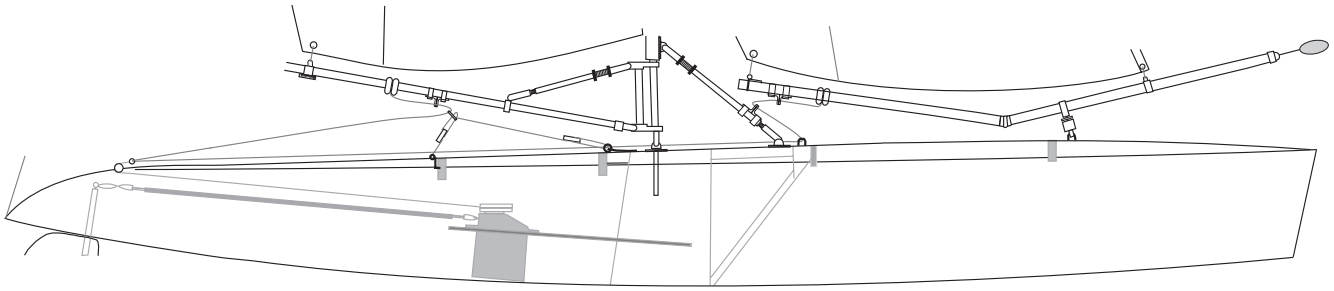
ARROW SHAFT BOOM

This is the end of one of Hal Robinson's booms. Hal makes them from aluminum arrow shafts that he heats with a torch until the aluminum begins to change color. He then lets them cool slowly to room temperature before bending curves to match the foot of his sails. After bending, the shaft is flattened between two boards in a vice. Hal says he has to overbend the curve because some of it will come out during the flattening procedure. Note the neat use of a cotter pin as a strap eye.



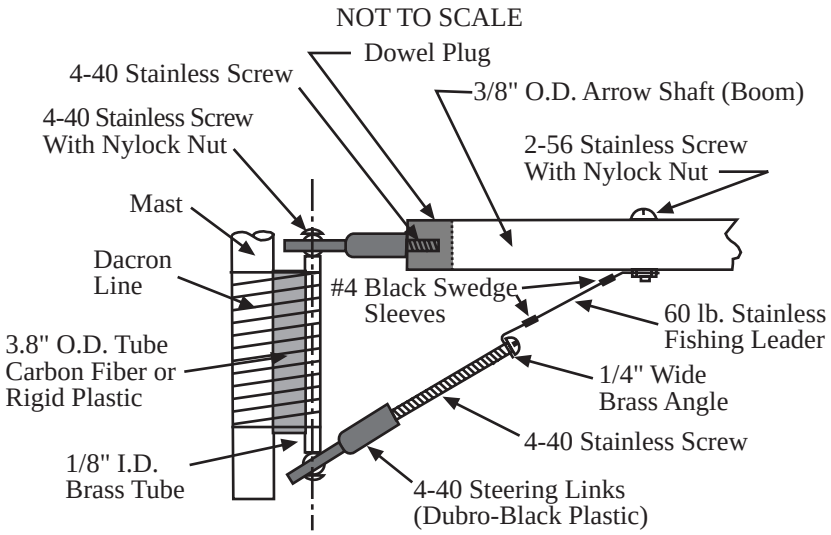


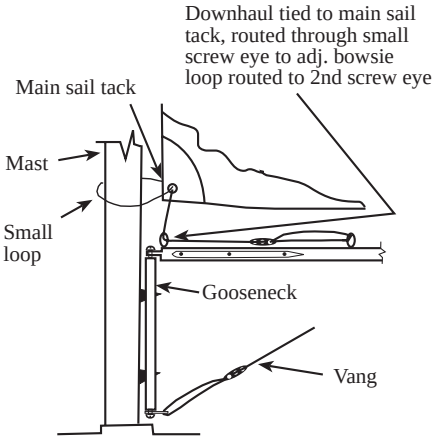
Here are a couple of innovative gooseneck/ main boom designs. Top is Hal Robinson's "Dog Sled" boom. Its intent is to get the foot of the sail as close to the deck as possible in order to reduce "wing tip drag." Bottom is Swede Johnson's "Offset" boom. Its purpose is to help control sail shape by acting much like a vang while the boom is sheeted in tight and then forcing "belly" into the sail when the boom is sheeted out.



This spiffy "conventional" rig is adapted froma drawing in the September 1989 issue of Model Yachying News*, and is reproduced here with permission of the editor.*

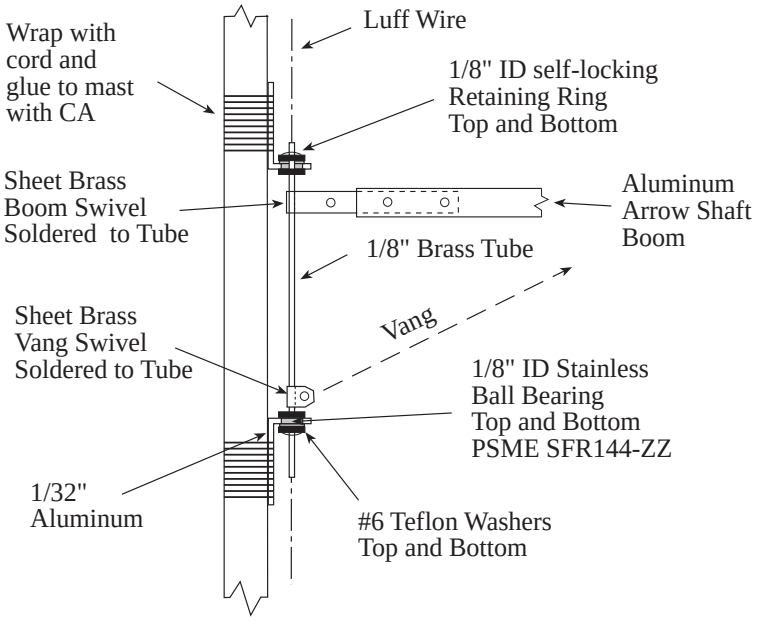
FITTINGS





Rigging a downhaul and gooseneck

GOOSENECKS



Ball Bearing Gooseneck

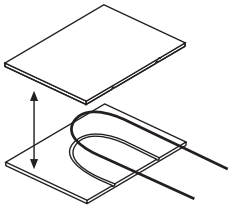
This is a ball bearing gooseneck for Solings One Meters and US One Meters. It lets the boom run out in the lightest of winds, and it's relatively easy to build. Just bend a 90° angle into a couple of aluminum pieces and drill 1/4" holes for the bearings. All of the parts are available from Precision Scale Model Engineering in Milford, MA (508) 478-3148.

HOMEMADE "TURNING BLOCKS"

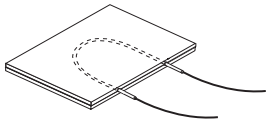
By Jim Linville, US One Meter Class Secretary

Here's a quick and easy way to make blocks for pennies. I feel they are as good, if not better than, the expensive imported ball bearing type. The teflon tubing comes from Small Parts, Inc. in Miami Lakes, FL and costs $2-3 for a 10 ft length. Their part number is SWTT-16.

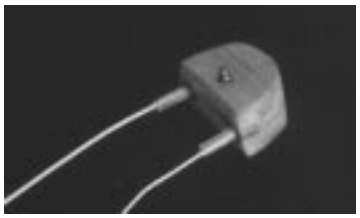
Bend a piece of wire or rod into the shape you need (coat hangers work nicely).



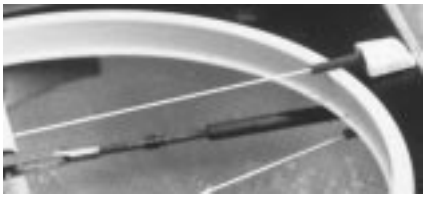
Place the wire shape between two pieces of 1/8 inch balsa and press together to form an indent in the balsa.



Line the indent with Teflon tubing and glue the two pieces of balsa together with slow CA.



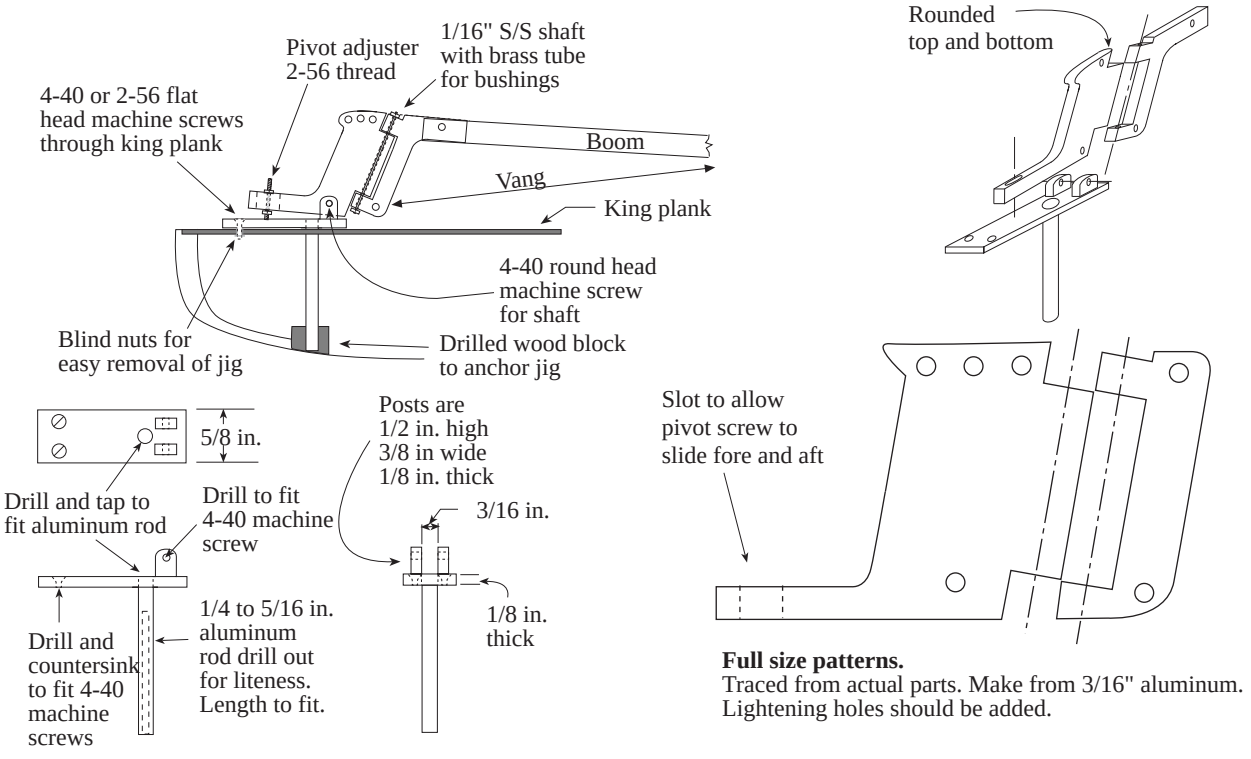
After trimming, the finished block will look something like this.



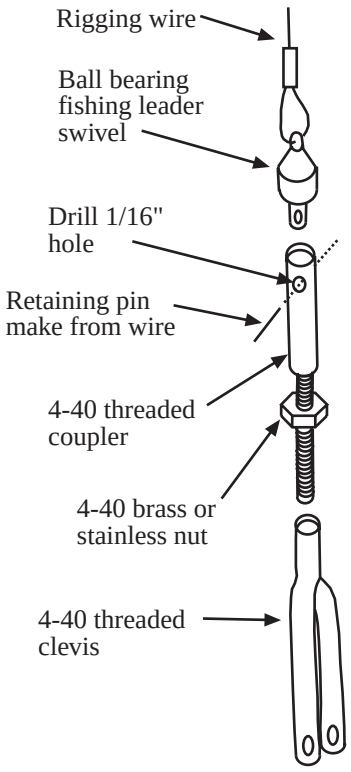
An example, here the block is being used for thru-deck sheeting on one of Hal Robinson's boats.

Manny's Radial Jib Fitting.

This is the radial jib fitting used by Manny Costa on three of his National Champion Stars and an EC 12. It could probably be lightened considerably for use on a One Meter. **To Set-up on boat.** With sails bent on, (1) swing boom to full out position and use vang to bring boom perpendicular to mast, and (2) adjust pivot adjuster screw to bring boom parallel to deck,

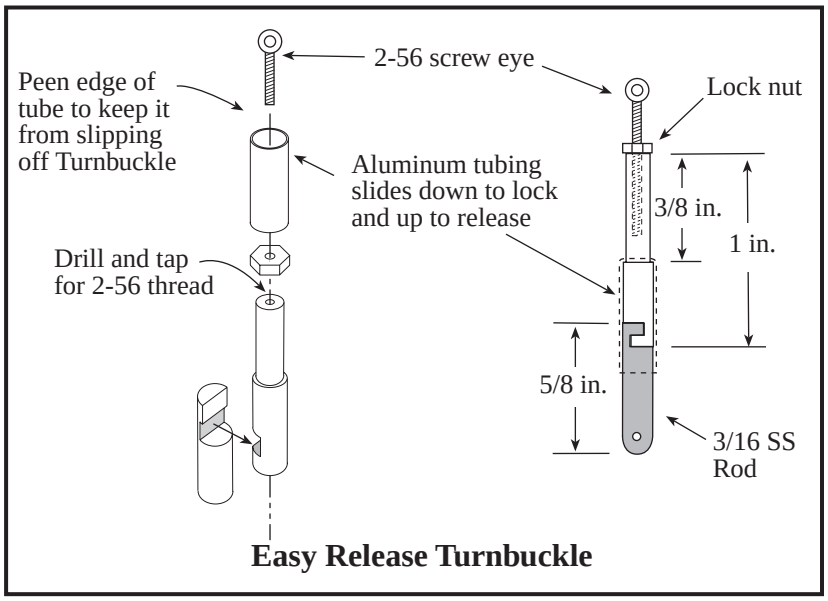


Full size patterns.
Traced from actual parts. Make from 3/16" aluminum. Lightening holes should be added.



Here's a simple turnbuckle from Art lent of Florida's Space Coast Model Sailing Club.

TURNBUCKLES



Easy Release Turnbuckle