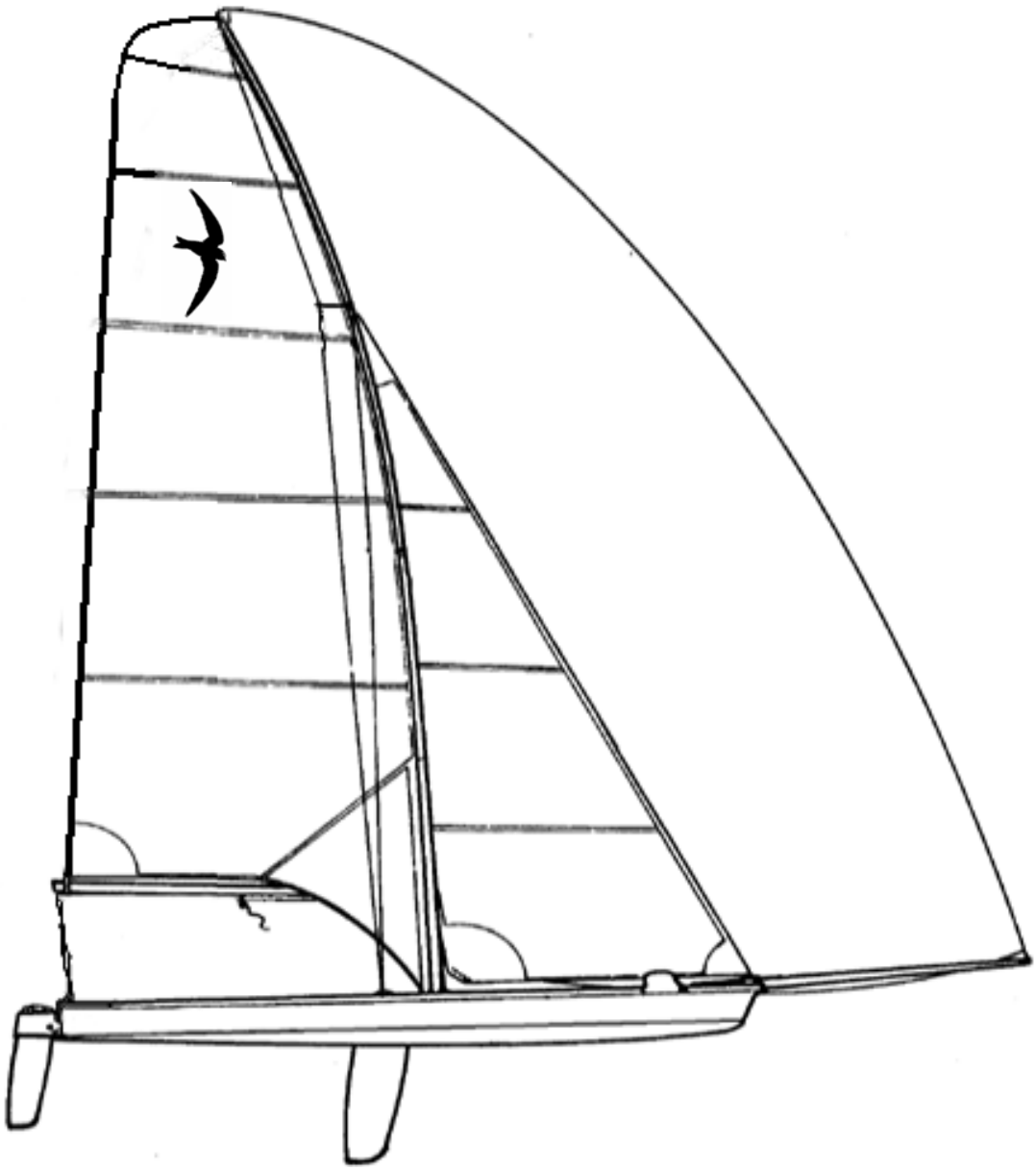
Rigging guide for the Swift Solo Volume 2



Thanks to Greg Ryan for the drawing

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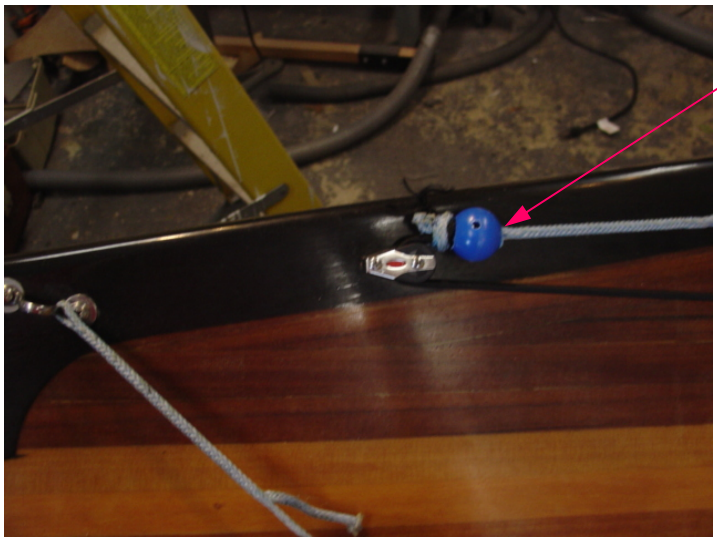
Righting line system

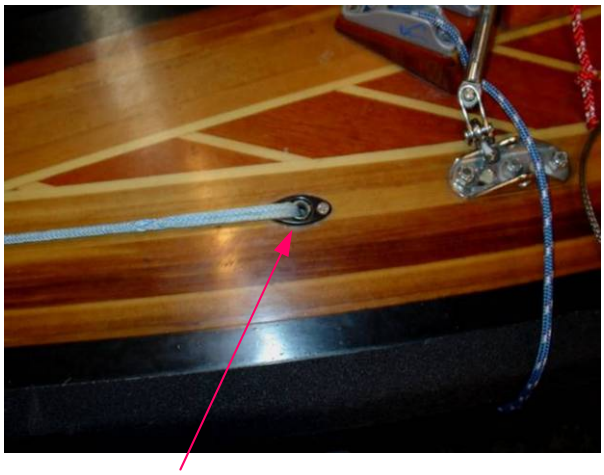


This blue ball stops the righting line at the thru-deck fitting. A ball under the flare (next page) stop the line from coming out the other way and gives you something to grab when the boat is upside down.

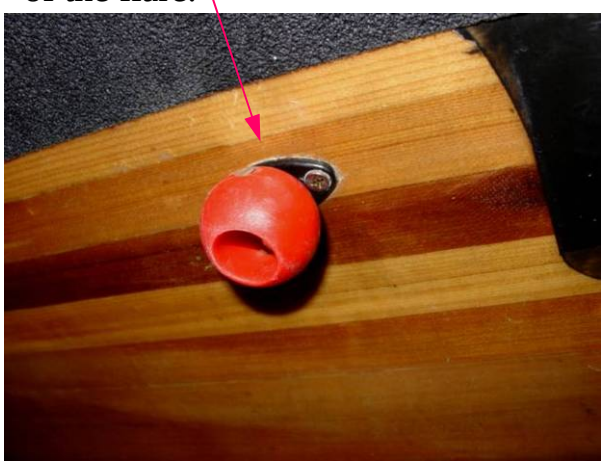
Thru-deck fitting is centered on chain plate blocking

This shock cord is headed to the end of the toe rail where it enters the rail channel

More righting line system



Each side requires two thru-deck fittings. The hole goes through the chain plate block and out the bottom of the flare.



Righting line is doubled and spliced every six inches to make a “ladder” that allows you to put your foot or hand through when you are righting the boat (on the bottom side of the boat)

Tiller system

5” of the inside end of the tiller is cut off at t 15 degree angle and then epoxied back on to form a upward 30 degree bend. The plastic tubing has shock cord run through it that is attached to wire ties about 18” in on the extensions. The tubing keeps the shock cord from pulling the tillers any further forward and the shock cord keeps the tillers from going too far aft. You’ll need to replace the shock cord about twice a season to keep the tillers where they belong. **Notice the inspection port in the background. It has a string that goes through the air chamber to the other port and to the drain bung so that you don’t lose them.**

It’s best to cut all of the rubber crap off the end of the tiller extensions and wrap the tillers nearly full length with either bicycle grip tape or shrink sleeve. When both tillers are dropped the friction causes a temporary autopilot that’s nice for functions like pushing the blades the rest of the way down after launching from the beach.

Trap system exit and shock cord

Shock cord enters sheave and toe rail tunnel where it turns aft

The bottom shock cord is the trapeze cord from this side and the top one is from the other side (it will go forward to the righting cord)

The cord continues aft where it goes through the block to the other side

Here it goes through the double block on the other side and goes forward where it enters the toes rail and goes the entire length to exit and become part of the righting line system

Shroud tensioning

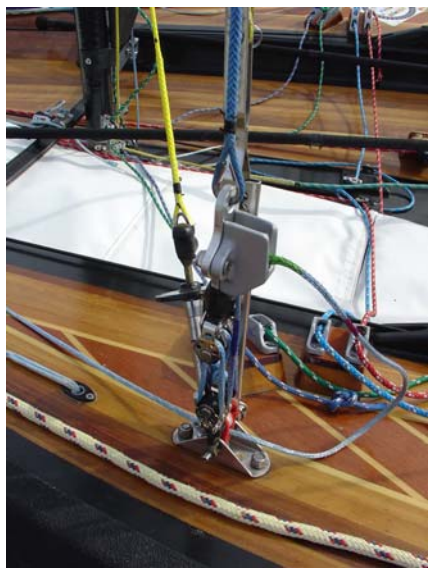
Notice that the primary shrouds have no on-the-water adjustment—only this lever

I've used a number of different shroud tensioning methods. The system that I'm currently using (on the left) uses levers for the primaries, levers and a "Sta-Master" for the caps, and modified Ronstan calibrated turnbuckles for the lowers. I modified the turnbuckle by making an aluminum (should be carbon) wheel that I epoxy on the square part that is intended for a wrench. I replace the swage stud with a toggle stud so that I have something to hold on to when adjusting. I then use an additional lever on the forestay. With this system I can not adjust the primaries under way but can adjust the uppers and lowers. I suspect that as competition heats up, it may be important to put the calibrated turnbuckles back on the primaries because it is that adjustment that changes compression bending in the lower mast (higher tension for heavier air).

Alternate forestay and cap shroud adjustment systems

These units are called PreCor. They work very well for the forestay and are lighter and cheaper than the lever of a calibrated turnbuckle. The upper unit makes a good terminal for the synthetic forestay material.

This cap shroud system uses a couple of triple blocks (one with a becket) and a clam cleat with a home made backing plate. The tail is led through a small kite block forward to the righting line shock cord to keep it out of the road. The line is marked with various colors of permanent marker to ensure that both shrouds are tensioned the same



Rigging you mast from scratch
spreaders

Start by shaping a piece of ¼" x 2" cedar into a aerodynamic shape (like your rudder). Drape a piece of 6" wide Mylar over it and use double stick tape (half on the cedar and half below it) to hold it down tight. Drape a piece of 6" peel ply over that and use the same taping method to hold it in place. Use 2 layers of 5" wide s-glass and cover with more peel ply and mylar. As soon as the epoxy is tack free, remove the top layer of mylar and peel ply and apply a strip of 2" uni carbon on each side (the rough surface left by the peel ply will allow it to stick even though the surface in vertical). Apply a third piece of carbon over the leading edge and allow it to drape down over each side. Cover with peel ply and mylar again and allow to cure until tack free again (plus one hour) before removing from the cedar.

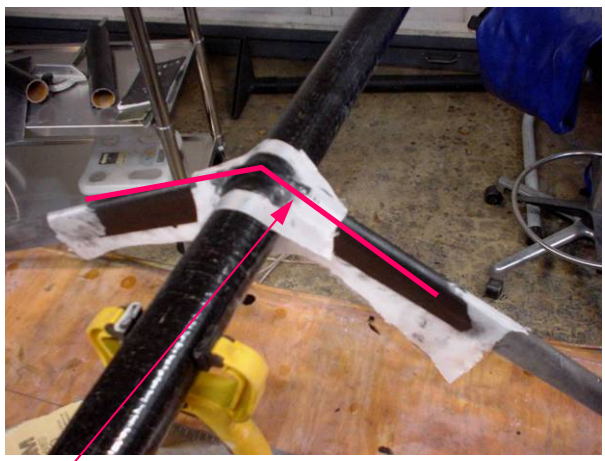
After, removing, cut to approximate length and cut the trailing edge so that the outer end is 1 inch wide while the end against the mast remains at 2 inches.

More on building spreaders

Use the belt to sand the trailing edge straight. Wrap the spreaders with tape to close the trailing edge tight and clamp the spreaders on the angle shown below. Mix some colloidal silica and liner fiber to a cream consistency and inject about a half of a WEST syringe full of the mixture into the high end of each spreader. After about 10 minutes remove the excess that has run out the lower end. This entire process needs to happen within a ten hour period to ensure a good bond.

After the spreaders have cured, fill and shape the tips and install the bushings (RWO R3034). Remove the tape and use a 2” spindle sander to shape the inner end to fit the mast. Since the spreaders need to be raked upward at about 7 degrees set the table on your sander accordingly

Installing the spreaders



Lay the carbon tape here

We now only use upper spreaders (just above the forestay), no lowers. The finished length of the spreaders should be 19” from the longest point on the leading edge.

Draw a straight line down the center of your work table (I hope it is at least 36” wide). Near one end use your square to draw a line perpendicular to the centerline. After vigorously sanding a 4” wide area on the mast for bonding, clean the sanded area with acetone.

Place the mast in clamps as shown centered on the table with the attachment point for the spreaders 2 3/8” below your perpendicular line. The upper ends of the spreaders will be on the line. The distance from the table top to the bottom of the mast track should be 5” (spreader sweep).

Fillet the spreaders in place and allow the fillet time to cure. Cut one piece of 2” carbon tape 14” long and another 8” long to use over the front of the mast onto each spreader. Cover with peel ply until cured.

Rigging the mast (and parts list)

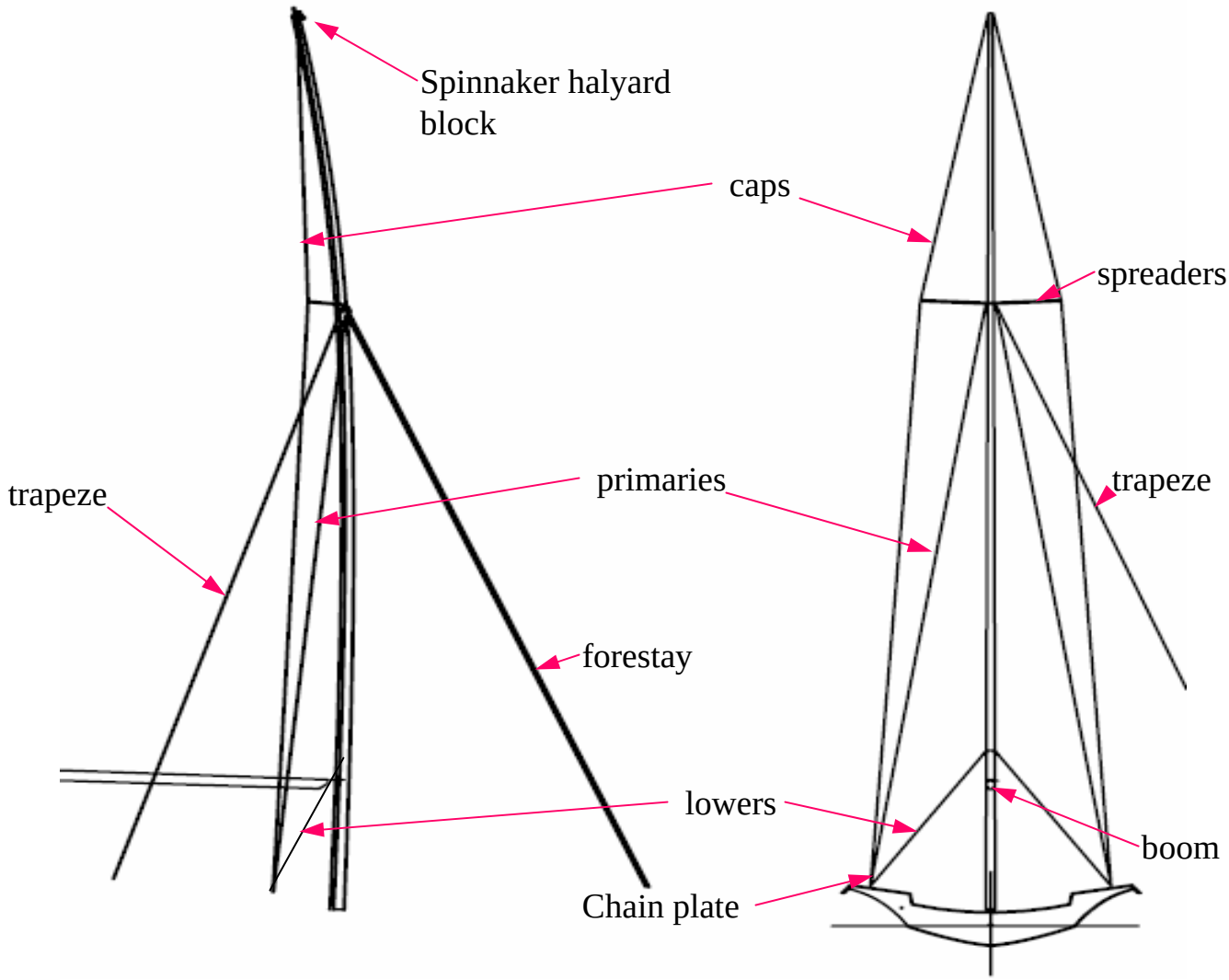
Parts list: Holt Allan 1 prefeeder HA824, 1 halyard rack HA345, 1 halyard sheave HA 15B, 3 T terminals HA6180 & 3 HA6195 backing plates

Ronstan 1 gooseneck RF2525, 6 mast tangs RF347, 2 pivoting lead block RF30174 , 1 vang block RF 20101 and an appropriate eye strap for mounting.

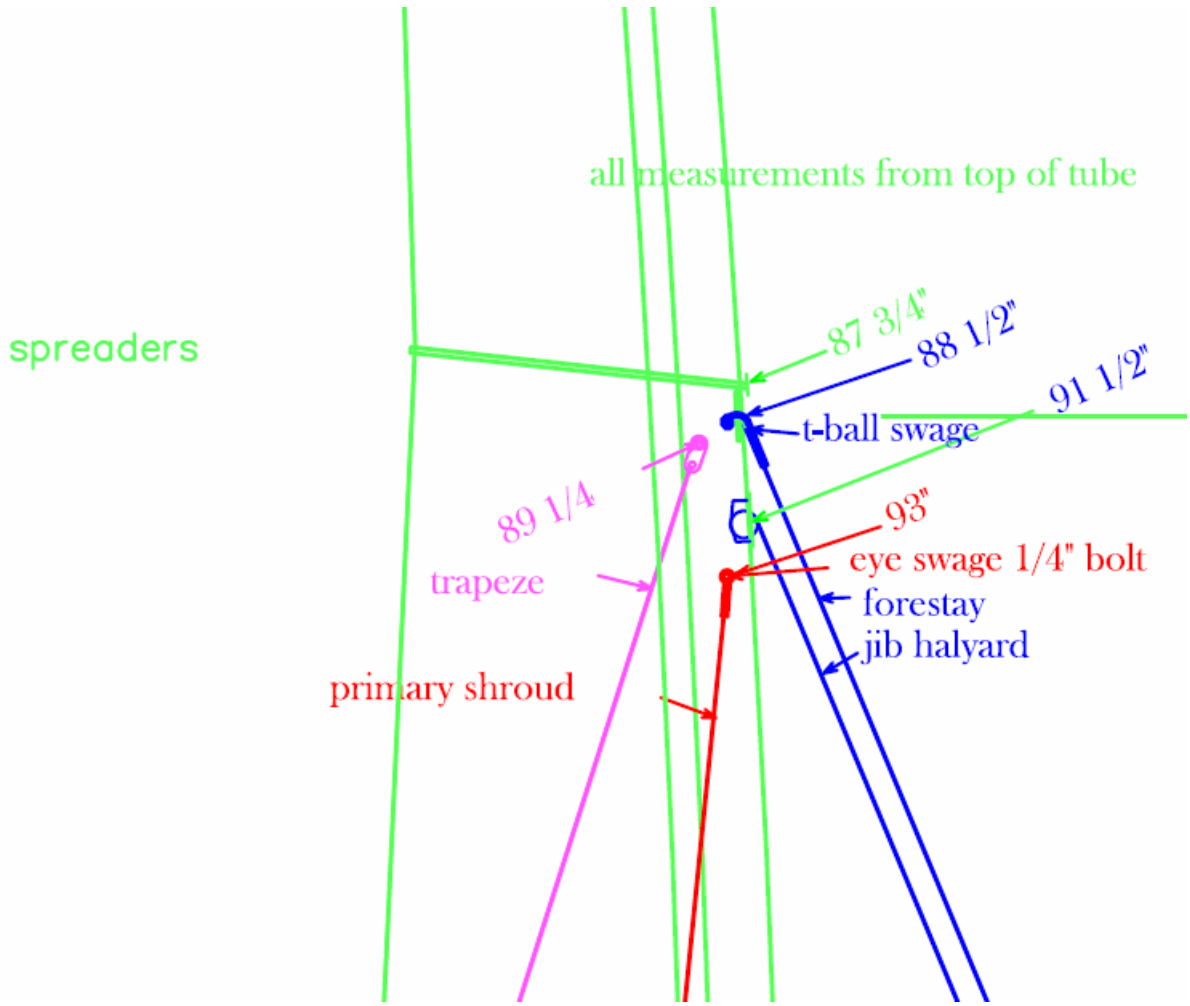
RWO 1 offset eye strap R2862, 4 Thru deck bushing for spreaders R3034

Harken 1 upright lead for mast base H108HL

From Vanguard 1 49er mashead crane

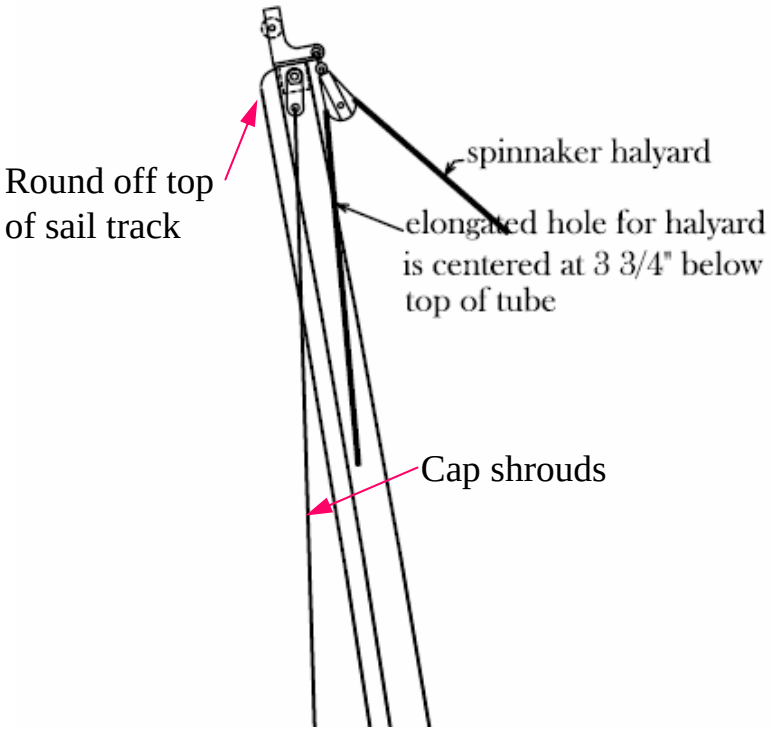


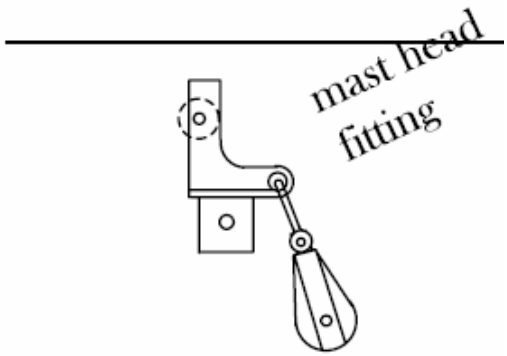
The spreader and forestay area



Mast tip and masthead crane

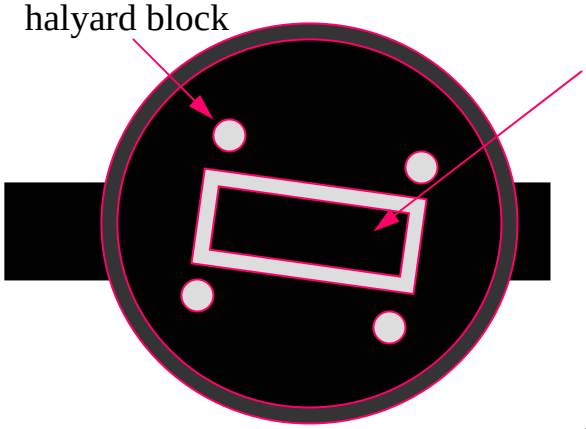
When you drill the hole for the spinnaker halyard to enter the mast us a 5/16” drill. After penetrating the mast raise the drill motor toward the top to elongate the hole and to taper the edges in the direction that the halyard will be headed. Use a rat tail file to remove any sharp edges on the elongated hole





Mast base

Tee nut holes for spin halyard block



Spinnaker halyard block

The spinnaker halyard block is set 10 degrees off of center with the front toward the starboard side. It's hard to tell from the picture below but the halyard exit hole is offset to the left half of the tenon.

The bottom of the mast base is made of pieces left over from making the mainsheet cleat base. It consists of 2 pieces—the first being the size of the outside of the sleeve and the second the size of the inside diameter. Bond the larger one to the bottom of the sleeve and bond the smaller one both to the first and to the inside of the sleeve (as an insert)

Make the sleeve part of the mast base by wrapping a 60" long piece of s-glass 6" wide (you will have enough to make 2 mast bases) around a 2 ¼" aluminum mandrel. A couple of wraps before the last wrap, put in a piece of 6" by 17" carbon—making sure that you cover it with a full wrap of s-glass.

More on the mast base

The tenon is made of the correct number of layers of the scrap left from the mainsheet cleat base. You'll need your mast step available to determine both the width and the shape of the tenon. Leave it a bit too long and too deep until after you have bonded it to the base. Use wood screws to hold it in place while bonding and to provide extra strength. Remember, the mast rests on the bottom of the tenon and not the sides of the mast step.

The tee nuts (actually "weld nuts") have to have one side of the flanges ground flush with the barrel in order to fit against the tenon. Notice that the tenon has some rocker in the bottom and that the hole is a bit elongated to allow for different amount of mast rake. The heel of the tenon has to be radiused so that the mast can be laid horizontal in the boat for rigging.

After you run the spinnaker halyard through the base block, you can either use screws or pop rivets to hold it in place (I prefer pop rivets).

You may need to wrap the bottom of the mast with a layer or two of glass to build it up to fit snug in the base.

Trapeze system

This system is a bit of a change from the ordinary. Because of some finger issues, I use a three part system instead of the standard two part system (50% more purchase). A tennis ball is cut in half and a 1" stopper ball is used immediately below it and on top of the trapeze cleat. An eye splice with a long tail is used (you can see the end sticking out just above the ball in the picture below). In heavy air I lower the entire system by lengthening the eye.

If you want to use the three part system, you'll have to make this bail. A Harken micro block with a becket is bolted to the Ronstan bail after the standard block is removed. The adjustment line starts with a figure eight knot, goes through the becket, then through the bullet block on the bottom of the trap cleat, back down through the block on the bail, and then up through the sheave on the trap cleat and through the cleat itself

A better trapeze system

(for those with good hands)

This is the system that nearly everybody should use (I use it whenever my hands work correctly). Notice the small bullet block attached to the shock cord. With this system you will automatically hook up with the cleat facing you.

Jib halyard

The jib halyard is fairly simple. Use an eye splice in the lower end (and on the tail). A short line is run from the offset eyestrap (skiff knot) through the bottom of the snap hook and down to a bullet block. The line in the bullet block goes through the floppies at the base of the mast and outward to the wing clam cleats.

Main halyard

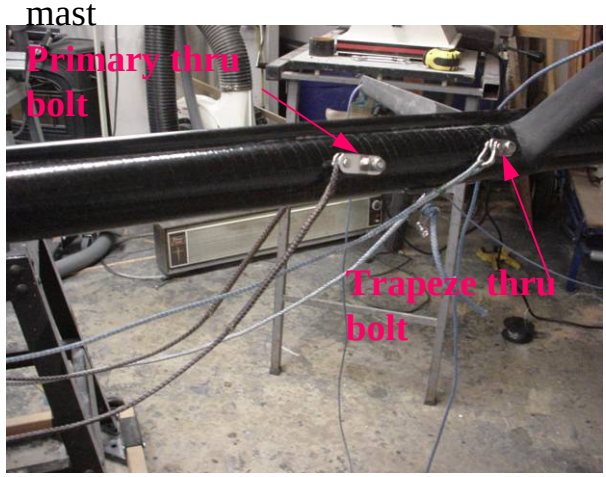
OK, OK, it's a fake picture spliced together to give you the idea of the elongated hole and the relative position of the halyard rack. The Lightning rope halyard end has an eye splice with a long loop (about 2 1/2"). You'll have to learn to do a 3-strand eye splice in the halyard tail to splice it to the long loop on the halyard (a knot will not got through the hole).

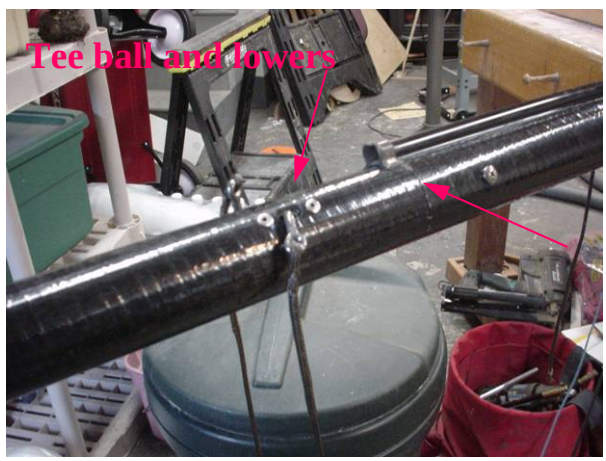
Mast rigging

Below you see the mast head crane. Notice that the spinnaker halyard exits the mast about 6 inches below the top of the mast tube. Also notice that the bolt that holds the crane in place is the bolt for the uppers. The shackle bolt on the spin halyard block will need to be taped over with rigging tape before sailing

If you look closely at the picture on the right you can see the joint in the mast. You will notice that the bolt rope "feeder" is on the lower section while the entire sail track is on the upper section. The two pop rivets that hold the feeder in place also help secure the internal aluminum ferule.

You should make a sleeve for the primary thru-bolt by wrapping several wraps of s-glass around a ¼" tube. The mast hole is then drilled to the sleeve size (say 10 to 12mm) and the sleeve epoxied in place and cut flush on both ends. This will provide a larger bearing surface for the primary bolt (1/4") to keep it from elongating the hole in the mast



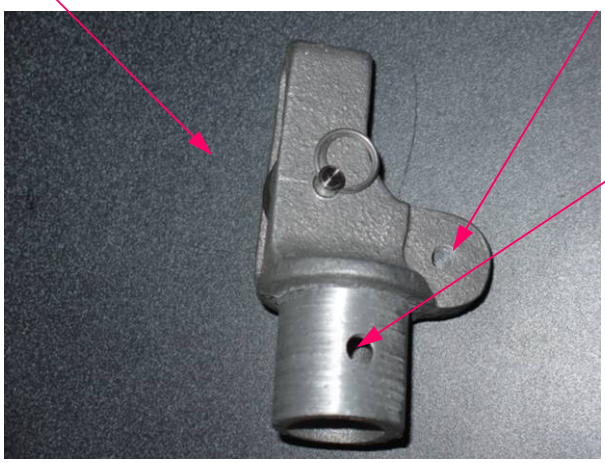


More on mast rigging

Masthead crane

The main halyard sheave

The hole for the shackle that holds the spinnaker halyard block

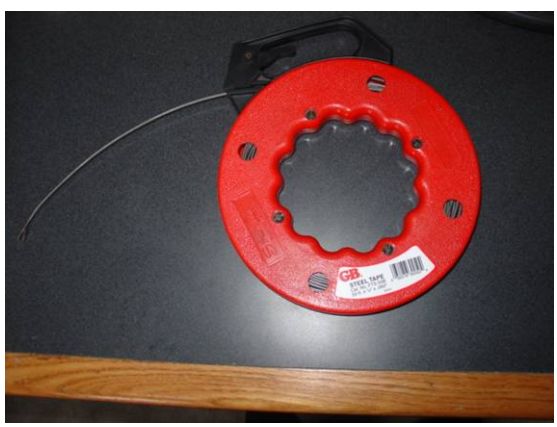


The hole for the bolt that fastens the unit to the mast and attaches the cap shrouds

Use 1/8” lightening rope for the main and jib halyards and for the core of the spinnaker halyard. Also use lightening rope for the cap shrouds. The primaries and lowers should be either stainless 1 x 19 1/8” or 1/8” PBO. The PBO is more expensive and doesn’t last as long but you won’t have to pay to have ends swaged on it. Use eye splices for all terminals but whip the upper splices and leave a tail on the lower terminals

Use a “fish tape” (shown below) to pull your halyards through the mast. Start with the main halyard. After you have it through the exit hole pull it tight and tie it off so that it stays tight. Next, do the same thing with the spinnaker halyard.

The jib halyard will need to be pulled up past the halyard block. A piece of wire with the end bent like a fish hook is then used to pull it through the sheave.



5/28/2004

Forestay, shrouds and other stuff

Cut your 1/8” PBO 198” long to start with. Use a 6” insert in the top splice (t-ball fitting) and whip it when complete. Measure down 178 ½” and make mark. This will be the bottom of the eye for now. Insert the splicing tool 8” above this mark and come out 1 ½ “ above it. Pull the end through to make a adjustable eye splice. This forestay will be adjustable to allow you to use either a turnbuckle or a lever. Be sure to tie an overhand knot in the loose tail so it doesn’t slip through during transport.

This end of the forestay should be tucked inside and whipped with whipping twine

Sometimes I use this lever with a twisted shackle and sometimes a calibrated turnbuckle for the bottom of the forestay (haven’t decided which is better). By using this loose ended splice I can change the length to suit either

5/28/2004

Shrouds

Lower shrouds:

Cut two pieces of 1/8” PBO 60 inches long. Splice a t-ball fitting into one end of each piece with the tail tucked inside 6 inches. As always, whip the non-adjustable end. Make a mark 42 inches from the top of the t-ball. That mark will temporarily be the bottom of the of the adjustable eye splice. Make another mark 1 ½” above and another 6” above that to insert you wand. Bring your wand out of the center at the 1 ½” marks and pull the end through to make the adjustable eye. Those eyes will attach to the turnbuckles.

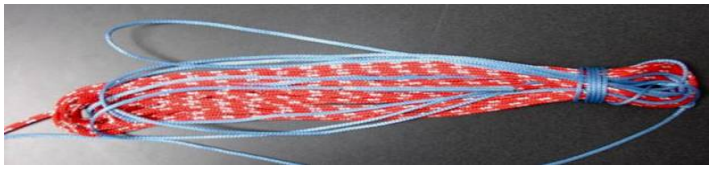
Primary shrouds:

Cut two pieces of 1/8” PBO 176 inches long. Make a non adjustable eye on one end with a 6” tuck. Measure 158 ½ inches down and make a mark. Make another mark 1 ½” above and another 6” above that to insert you wand. Bring your wand out of the center at the 1 ½” marks and pull the end through to make the adjustable eye.

Cap shrouds:

Cut two pieces of 1/8” lightning rope 265 inches long. Make a small nonadjustable eye on one end with a 6” tuck. Measure 247 inches down and make a mark. Make another mark 1 ½” above and another 6” above that to insert you wand. Bring your wand out of the center at the 1 ½” marks and pull the end through to make the adjustable eye.

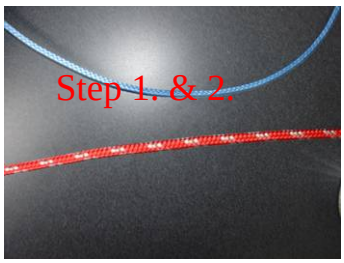
Making a tapered spinnaker halyard

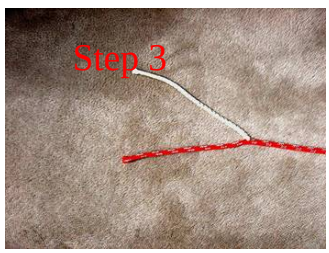


1. Start by purchasing 40’ of ¼”Sampson yacht braid to use as the halyard cover. Roll it up yourself using the coiling method shown on the right.

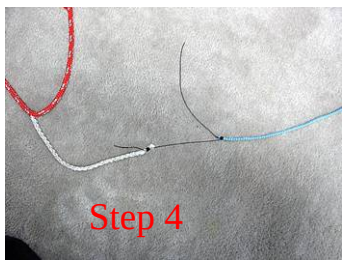
2. Cut a 65’ piece of 1/8 lightning rope. Using a Magic Marker, make a mark 24’4” and another 25’ from one end on the lightning rope. Be careful to keep both of these lines un-twisted.

Never, ever, coil your spinnaker halyard using the typical circular method. It is guaranteed to cause “line assholes” when you douse your kite.



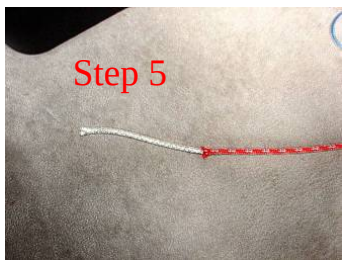


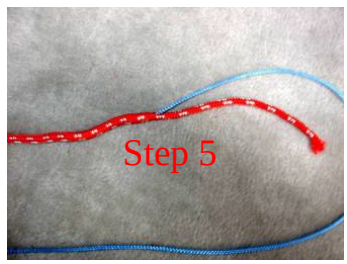
3. Using a needle, pull the core out of the Yacht Braid 8” from one end.



4. Use whipping twine to tie the core end and the lightning rope together. This is the end of the lightning rope that is 40’ from the marks.

5. Go to the other end and pull the core out of the Yacht Braid and start “milking the cover toward the lightning rope after working the lightning rope inside the Yacht Braid cover

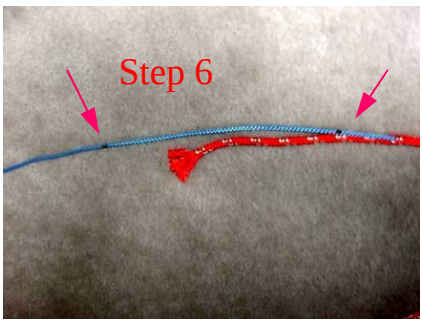


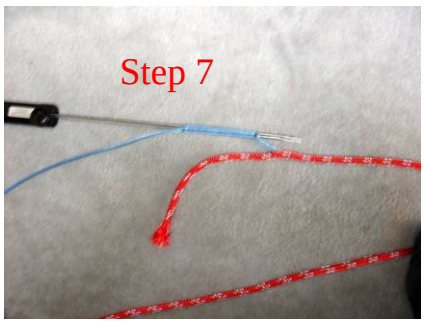


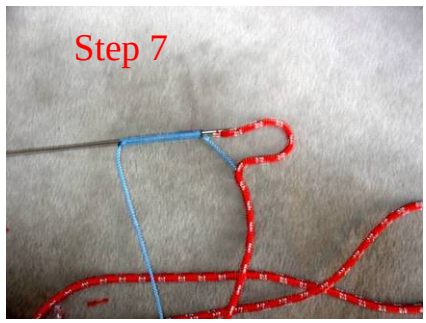
Spinnaker halyard (cont.)

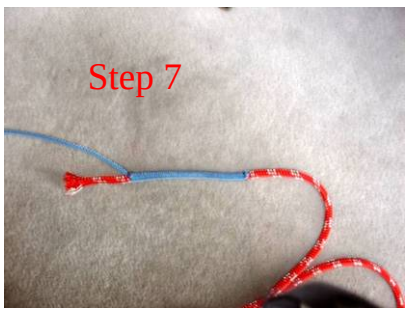
6. Continue to milk the cover on to the lightning rope until your marks approach the cover (the knot splice on other end will be roughly even with the end of the cover at this time)

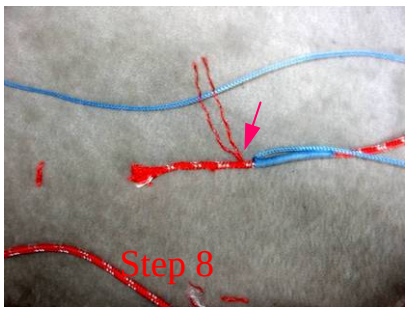
7. Insert the splicing wand into the lightning rope for the full length of the marks and pull the cover through.

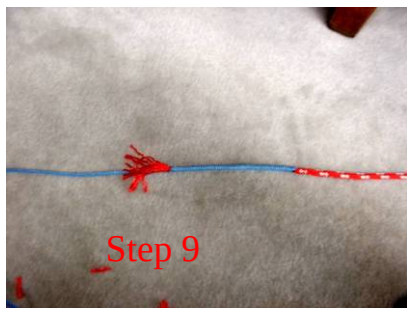












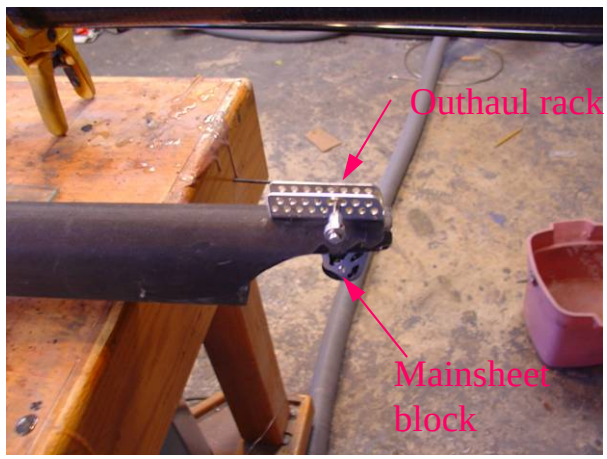
8. Pull the cover through hard to milk the lightning rope back against the cover. Pull about 25% of the strands bout of the cover and cut them off flush with the lightning rope. Move up an inch and repeat. Move up another inch and cut off half of the remaining strands.

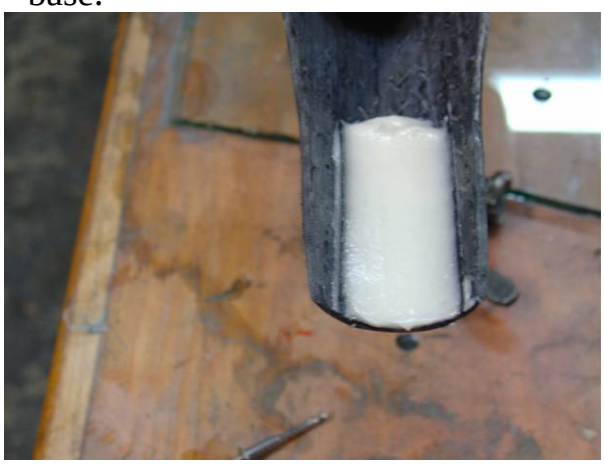
9. Milk the lightning rope back toward the end of the cover and trim the remaining strands flush.

10. Milk the lightning rope over the ends and whip at the arrow and you have a beautifully tapered halyard that will go through sheaves easily

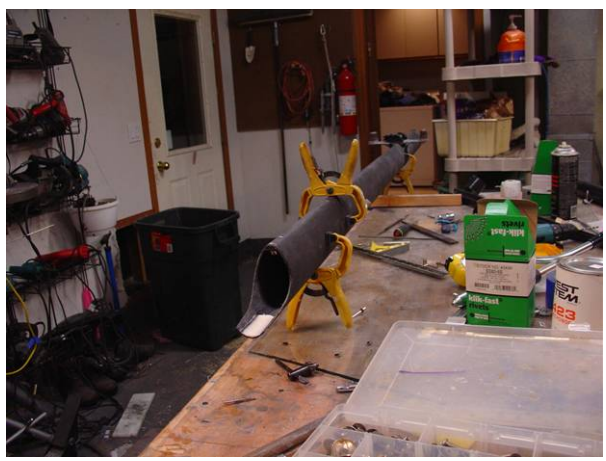
Rigging the boom from scratch

Before you can install the outhaul rack and the end-boom mainsheet block, you'll need to cut the end of the boom in the approximate radius shown. After cutting, build the inside up with colloidal silica and linen fiber for strength and to provide a flat surface for the block base.





These yellow clamps come in handy for working on the boom as well.

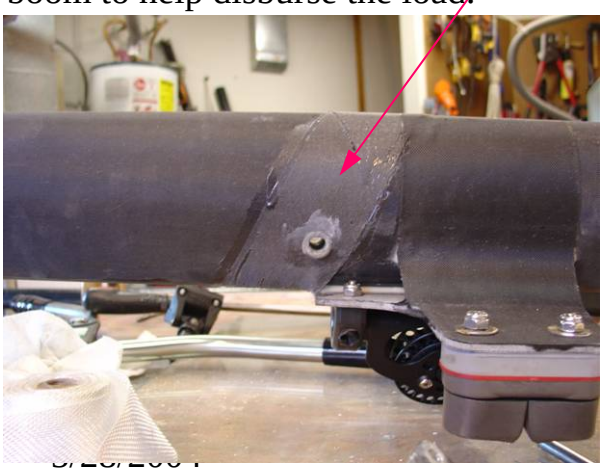


The boom length should be 91" overall if you use the recommended gooseneck (92 ½" from back of mast) and 88" to the center hole of the outhaul rack (89 ¼" from back of mast

More on the boom

Before installing the gooseneck tube, you'll need to cut the front of the boom on a 45 degree angle but leave about 1 inch of vertical on the end. Install the inner mainsheet thru-boom block at this time as well

Another tube is used for the vang thru-pin. You can see that I used a piece of 2" carbon tape around the boom to help disburse the load.

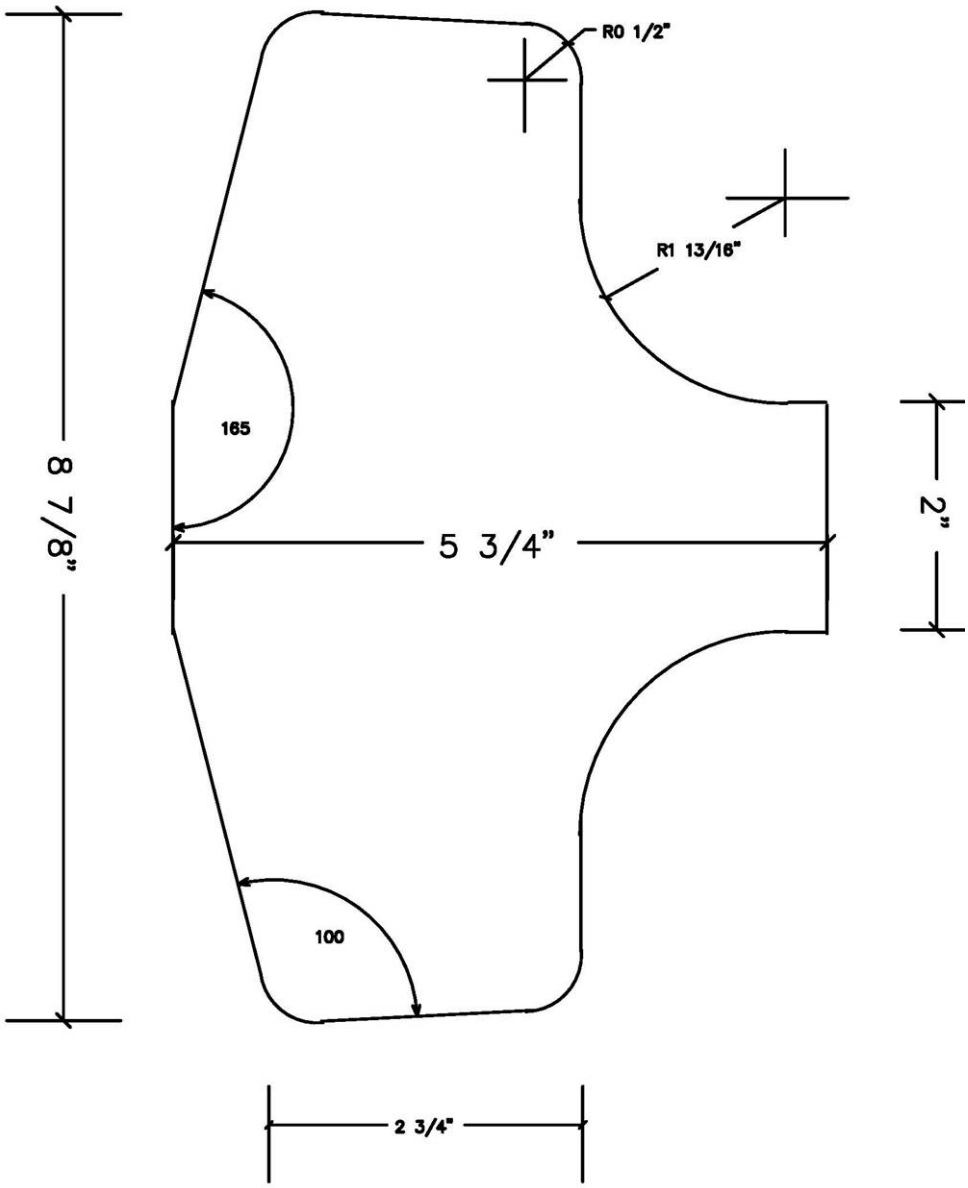


For the female part of the gooseneck, wind a bit of s-glass and carbon to make a tube about ½ inch in diameter and 4 inches long. Fill the inside with colloidal silica and linen and drill it out to the proper diameter after it sets. Embed the tube in the same mixture leaving the tube hanging over the end about ¼". After curing, cut it off flush.

The mainsheet cleat platform (not to scale)

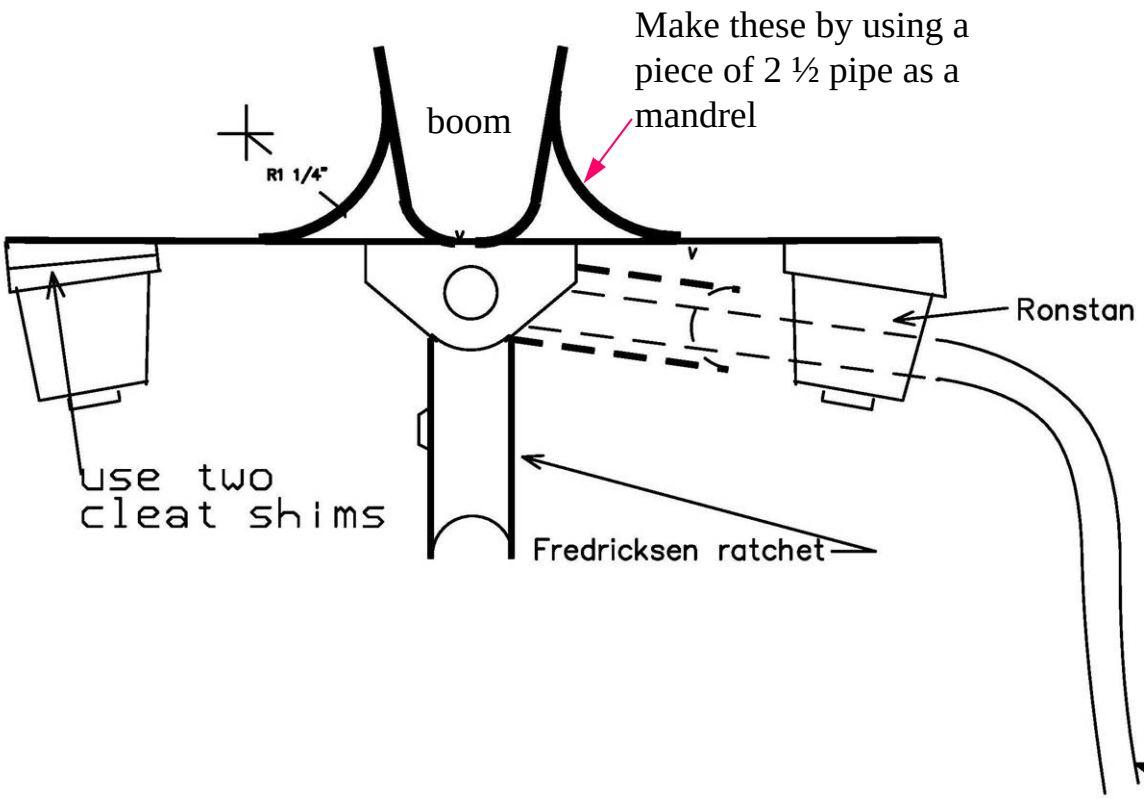
When laying-up the material for this platform, make a sheet 12” x 12”. You will use the balance of the material the mast base and base tenon. This platform should be made of glass layers in the following order:

1. One layer of 6oz s-glass
2. One layer of uni carbon running from cleat to cleat
3. Eight layers of 6 oz s-glass
4. One layer of uni carbon running from cleat to cleat
5. One layer of 6oz s-glass

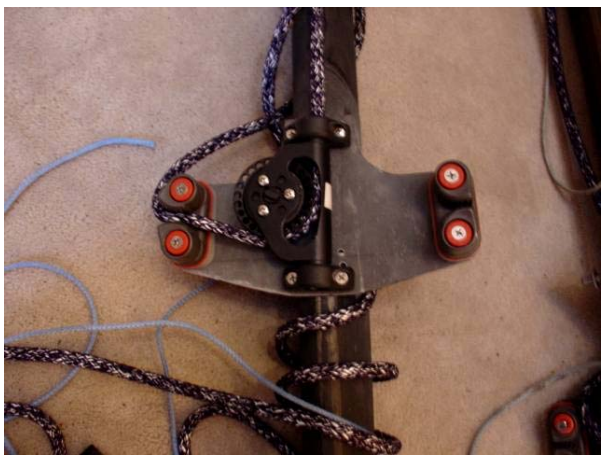


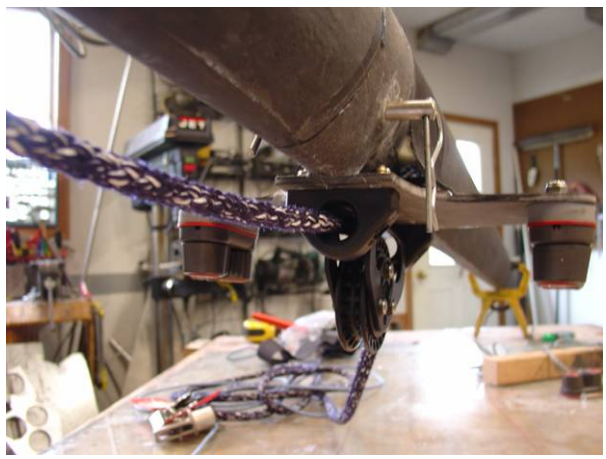
End view of mainsheet cleat

Be sure to sand the surface of the boom well were the plate and the quarter rounds bond to it. A couple of stainless rivets should be used to secure the plate to the boom for bonding and for additional strength



The mainsheet cleats and platform





The mainsheet comes from the cleats forward to this block where it enters the boom

Notice how the vang arm has a cutout for the mainsheet to pass through on its' way forward.

Final boom fittings

After the gooseneck tube bedding has cured, put a bolt through the inner end (past the end of the shaft) with a nut on it. Insert the gooseneck and after making sure that it is rotated to the correct setting, drill a 3/16” hole through the entire works and insert a quick pin. The hole thru the shaft should be elongated a bit to allow for a very small amount of rotation.

Boat cover pictures

The Swift Solo transom needs to be covered as well as the deck. The cover has a hole for the rudder box and is supported by the boom at the gooseneck and 2 feet forward of the transom.