

KITES FOR CONNOISSEURS

ROEBUCK

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Kites for Connoisseurs is a collection of plans for kites designed by Andreas Ågren. These kites often have a unique technical twist. The plans can be found at <http://windman.se/kite-plans> and they may not be used for commercial purpose without written consent.

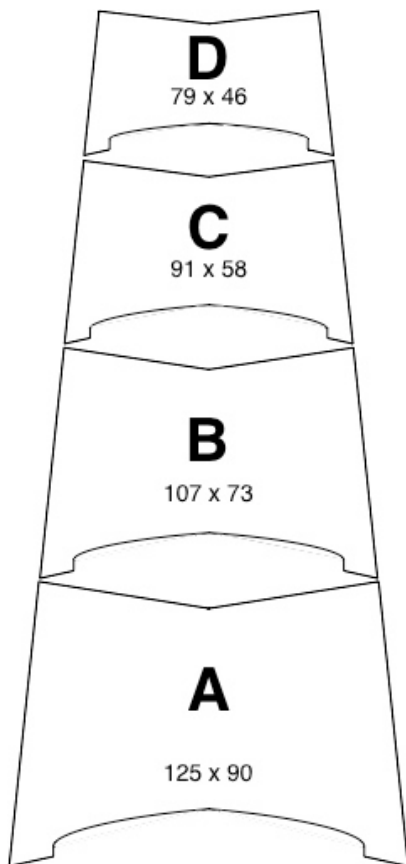


The **Roebuck** is a late development of the viking ship kite *Sverker* created in 1996. It uses the same technique with bowtie sails that give in-sail dihedrals and a semi 3D bow that works as a wind sock. The development consists simply of adding more sails.

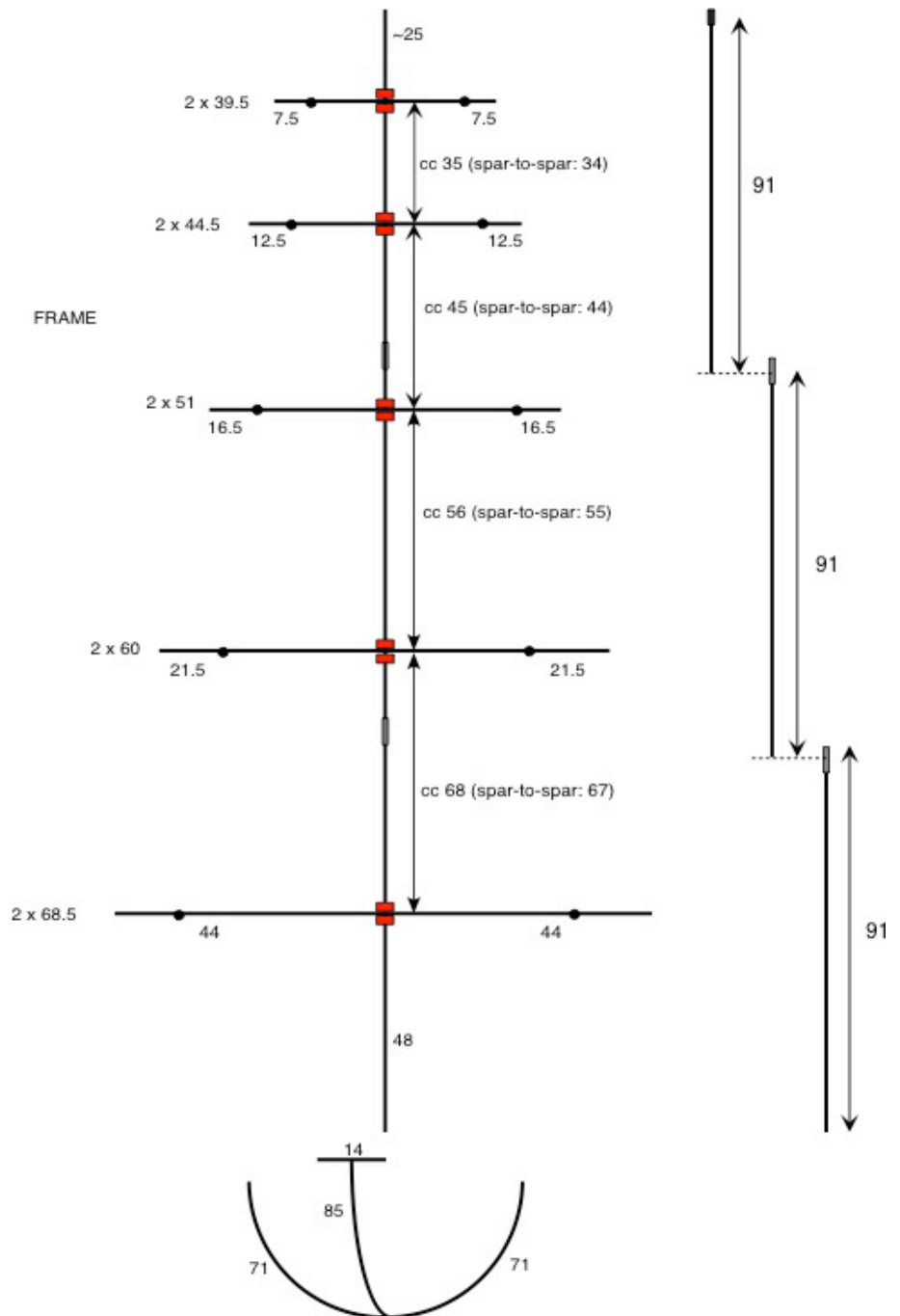
The inspiration came to me when I was flying a *Sverker* at Redcliffe kite festival 2017, wearing a bandana, and a bystander said “You look like a pirate; you should fly a pirate ship.” The first tallship I made had two sails, then came versions with three and four sails. However, the “Skull & Bones” is an optional decoration.

The name *Roebuck* is derived from the name of the ship that was used by the Englishman **William Dampier** (“*Buccaneer, Explorer, Hydrographer and sometime captain of the ship ROEBUCK in the Royal Navy of King William the Third*”) when he pirated the seas in South East Asia and Oceania. By adding a Roman number to the name the number of sails is indicated, e.g. **Roebuck IV** is a tall ship kite with four sails.

Sails



Frame



Material for a four sail ship (approximation)

- White (light for sails) ripstop, 250 x 150 cm
- Brown (dark for bow) ripstop, 100 x 150 cm
- Black ripstop (skull & bones), 50 x 35 cm
- Carbon fibre tube 8 mm, 3 x 100 cm
- Carbon fibre tube 6 mm,
 - 1 x 150 cm
 - 2 x 125 cm
 - 2 x 100 cm
- Fibre glass rod 4mm, 1 x 150 cm
- Fibre glass rod 3 mm, 1 x 100 cm
- Cross connectors 8/8 mm, 5 pcs
- T connectors 6 mm, 2 pcs
- T connectors 3 mm, 1 pcs
- Split end caps 8 mm, 1 pcs
- T end caps 6 mm, 10 pcs or 20 cm of 6-7 mm plastic tube
- End caps 3 mm, 3 pcs
- Alu ferrules 8 mm, 2 pcs
- Alu ferrules 4 mm, 1 pcs
- Reinforced braided plastic tube 8 mm, 6 cm
- Bungee chord 1 – 2 mm thick, 30 cm
- Dacron 30 mm width, 300 cm
- Velcro 30 mm width, 30 cm
- Stoppers, 8 mm, 10 pcs

The ship kite can be made with four sails as well as with three or two using the same building description, just by omitting steps that are not applicable.

However, if making the ship kite with three or two sails there are two important things to observe:

- A. What sails (of the four) should be used.
 - For a three-sail ship use only sails B, C and D.
 - For a two-sail ship use only sails B and C.
- B. The smaller bow file labeled “2 - 3 sails” must be used.

Templates

The templates for as well the sails as for the bow (two different sizes) and the ‘Skull-n-Bone’ come in a zip package with two directories:

JPEG

- 4 sail template full height
- Bow template for 2-3 sails
- Bow template for 4 sails
- Skull-n-bones-35cm

PDF

- (1) 4 sail template full height
- (1) Bow template for 2-3 sails
- (1) Bow template for 4 sails
- (2) 4 sail template full height
- (2) Bow template for 2-3 sails
- (2) Bow template for 4 sails

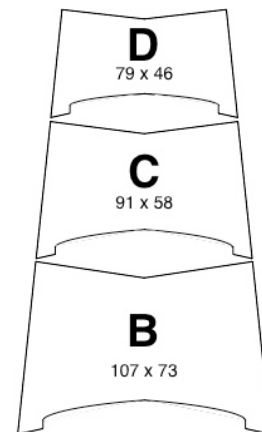
The JPEGs templates are in full size to be printed out on plotter.

The PDFs have the full size templates split in a number of pages, e.g. *4 sail template full height* comes at 7 x 11 pages! All have help lines to make the gluing-together process more easy.

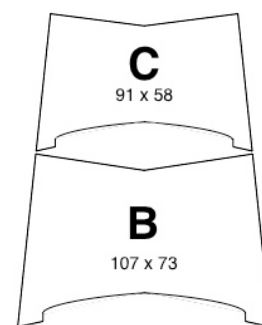
There are two versions of each PDF template, (1) and (2), and depending on operating system (I think) one might be more easy to print out than the other.

Main steps for making the Roebuck kite:

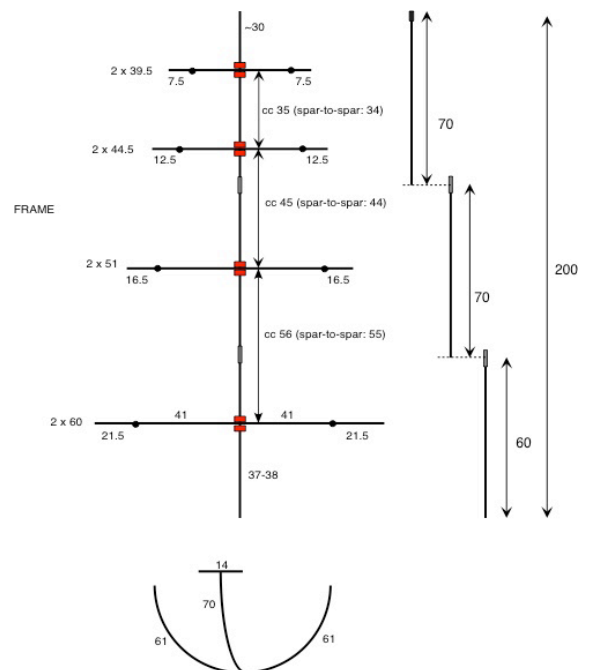
- A. Cutting out and making the sails.
- C. Prepare the yardstick sleeves with reinforcement and velcro.
- D. Sew the yardstick sleeves onto the sail.
- E. Cut out and sew the bow.
- F. Make the frame for the sail.
- G. Make the frame for the bow, including support strings
- H. Make the bridle.



For a three-sail ship use sails B, C and D



For a two-sail ship use sails B and C



Frame dimensions for three sail ship. For two sail ship just omit the top yard stick and shorten the top mast piece as much as is required.

Making the sails

2. Cut out the sail parts using templates. In this description the parts are called "A", "B", "C" and "D" from bottom to top.
3. Hem the sides and the curved cut-out in the bottom of each sail with a 5 mm hem.
4. Optional: Cut out the skull-n-bones and sew it onto the top sail (C or D).
5. Cut a 30 mm slit in the exact centre in the top of each sail.



6. Cut out a 50+50 x 20 mm gap for the cross connector at the top of all sails. Note that the slit made in the previous step still remains with 10 mm.
7. Draw guide lines with a pencil 10 mm below the cut-out for future use (step 25 b).



8. On the back side of all sails except the bottom sail: draw with a pencil a line 30 mm from the lower edge as a guide for next step.



9. Starting from the bottom sail, put the top edge of the sail A on top of the lower edge of the sail B with a 30 mm overlap aligning with the pencil line made at previous step. The corner of the upper sail (which now is under the bottom sail) should be exactly at the edge of the bottom sail.

(Seen from the front side the upper sail is always on top of the lower level.)



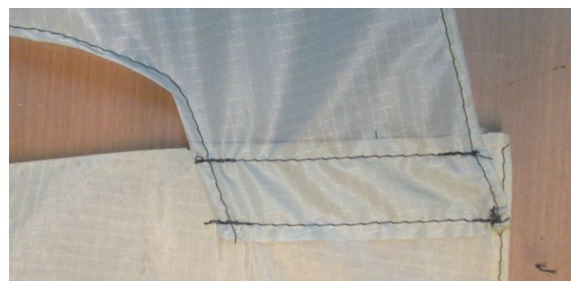
The corner of the upper sail encircled.

10. Sew the upper seam and then the lower.

Please note: in this description black thread has been used strictly for pedagogical reasons.



Backside view.



Frontside view.

11. Repeat for the other edge of the sail.



12. Repeat steps 9 to 11 for the rest of the sails.
13. Prepare 8 pcs of dacron 30 x 30 mm as reinforcement for the bridle points for the yard sticks between sails A/B, B/C and C/D and top of sail D.
14. Sew these reinforcement dacron pieces on the backside of the sails. The distance from the outer side of the dacron to the edge of the sail:
- For sails A/B 20 cm from the edge.
 - For sails B/C 15 cm from the edge.
 - For sails C/D 11 cm from the edge.
 - For top of sail D 6 cm from the edge.



Example: sails B/C 15 cm from the edge.

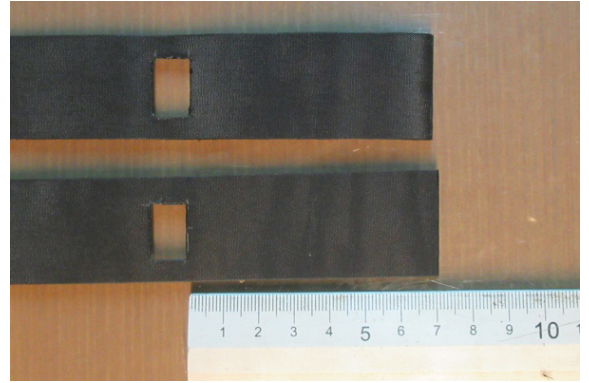
Prepare yardstick sleeves with dacron reinforcement and velcro.

15. Prepare the brown strips for the yard stick sleeves:

Cut 5 strips of brown ripstop: 30 mm width and lengths 148, 128, 112, 100 and 90 cm.

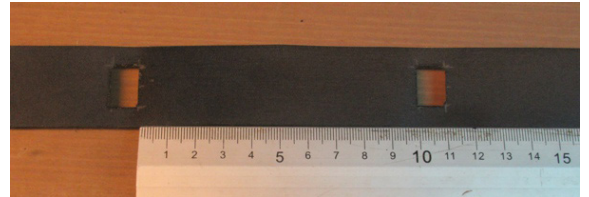
The number inside [brackets] below is for when a three sails or two sails ship is made.

16. Prepare dacron reinforcement for the longest, 148 [128] cm, which is in the bottom.
 - a. Cut a dacron piece 148 [128] x 3 cm.
 - b. 7 cm from each end cut out a hole 10 x 15 mm.



Both ends of bottom dacron reinforcement with the cut-outs.

- c. Mark the middle of the dacron strip. From the middle and 50 mm in each direction cut out holes 10 x 15 mm.



Centimeter 5 is the middle.

- d. Sew the 148 [128] cm dacron piece onto the 148 [128] cm brown ripstop piece.
 - e. Cut out openings for the T connector in the lower edge: 24 [14] cm from the end of the brown ripstop/dacron piece cut out a 80 x 10 mm hole along the edge, at both sides. (This should not be hot cut!)

After making the cut-out, reinforce the edge seams that have been cut on both sides (encircled in red in the picture).



24 cm for four sails ship.

14 cm for three and two sails ship.

17. Prepare dacron reinforcement for the remaining four brown ripstop pieces: 8 pcs of 120 x 30 mm.

18. Sew these dacron reinforcement at both ends of each of the remaining 4 brown ripstop strips.



Both ends of one brown ripstop piece.

19. Prepare four pieces of 100 x 30 mm dacron.

20. For all the four brown ripstop strips and the dacron pieces mark the exact middle with a sharp crease and sew the 100 x 30 mm dacron reinforcements there on the same side of the ripstop as the previous dacron reinforcements at the ends.



21. From a 30 mm Velcro strip cut 10 pieces of 20 mm.

Sew the Velcro onto the dacron in both ends of all 5 brown strips:

22. Sew the 'soft' part (the loops) at the very end of each brown strip.
23. Sew the 'hard' part (the hooks) just inside the cut out on the longest strip and 7 cm from the edge on the others. Note! The 'hard' part should only be sewn with two seams along the side, see encircled with red! No seam across, since the spar will go under the 'hard' part.

Sew yard stick sleeveless onto sail.

24. Sew the brown ripstop strips onto the sail. Start with the bottom one that has the cut-outs.

Put the strip with the velcro facing up and then put the sail part on top of it with the front side of the sail facing down to the strip. The corner of the sail should be just inside the velcro piece. Note! Sew only two seams, alongside.

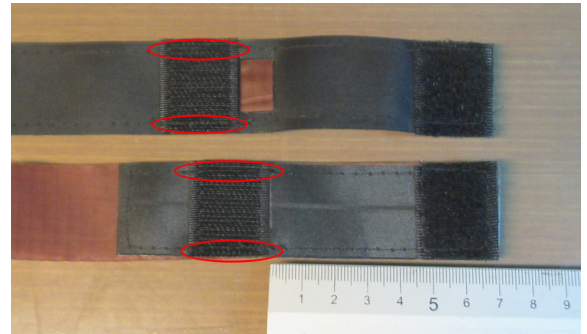
25. The rest of the brown ripstop strips are to be sewn on the upper edge of the sails. For all these it is the same rule: Velcro and dacron facing up and front side of sail facing down on top of the strip.

It is best to start the sewing from the middle of the sail:

- Fold the ripstop strip in half and make a sharp crease in the middle of the dacron.
- Align this crease with the slit in the middle of the cut-out and the strip with the guide line drawn at step 6.
- Starting from the slit in the cut-out sew the first seam, aligning the strip with the drawn pencil line.
- When the cut-out is passed align the upper (right) edge of strip with the upper edge of the sail.

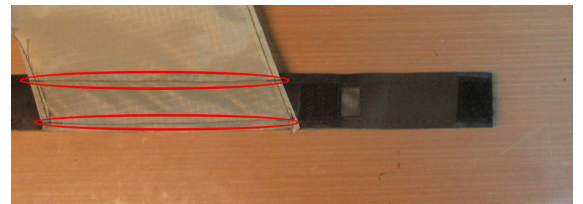
- e. Sew the upper seam starting from the dacron.

- f. Sew the seams for the other side in the the same manner, starting from the middle.

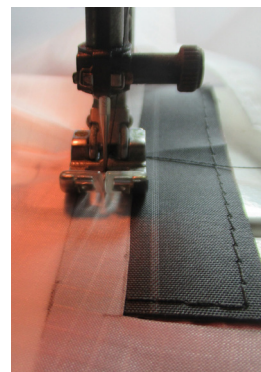


Velcro with 'hard' part to the left and 'soft' part to the right.

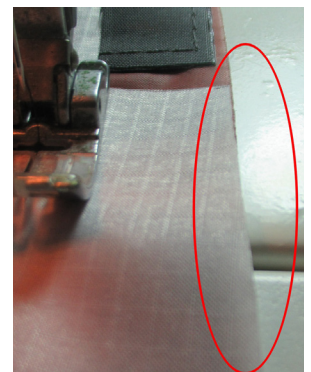
Only paralel seams on 'hard' part.



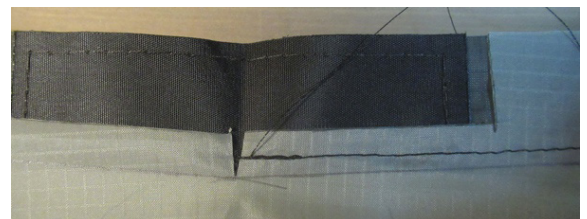
Backside of sail facing up. Only two parallell seams.



c) Align strip with pencil line.



d) Align strip with ripstop edge.



Making the Bow

The bow on the Roebuck kite is semi 3D and protruding from the mast. The top of the bow is held in place by bridle.

26. Cut out the the bow parts using templates 2 of each (facing each other).

Be sure to use the templates that are designated for the number of sails you have made.



27. Join A with B, then B with C and finally C with D for one side. Start the seam from the bottom edge on each part, corner to corner. The sides of the pieces curve differently so be attentive when sewing.

The templates are made for a double seam and always fold the material towards the larger piece for the second seam.



28. Repeat for the other side.
29. Check that both sides are symmetrical.
30. Hem the outer edge of D.



31. Both sides of the bow complete.



32. Join the two sides together with a seam 5 mm from the edge of the material in the corner. The seam should then continue to run 15 mm from the edge after the first cut-out.



33. Add a second seam 5 mm from the edge to create a sleeve for the bow sprit.



Second seam at bottom.



Second seam at top.

34. Sew a 70 x 30 cm piece of dacron as reinforcement at the bottom middle (at the cut out).



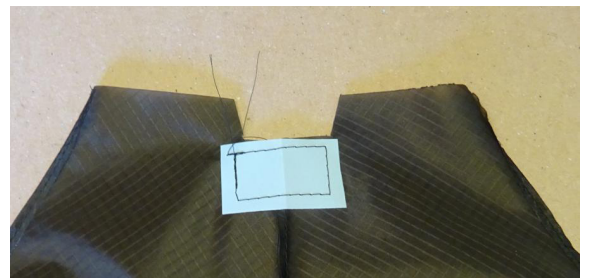
35. Cut two pcs of 100 kg string for loops in the sleeves ends; length 15 cm.
36. Fixate boths end of the each string on each side as a loop.



37. Fold the entire bottom edge 15mm to create a sleeve for the bow contour spar.
38. Sew a sleeve along this fold and include the loop in each end for the tension string.



39. Sew a 50 x 30 mm piece of dacron as reinforcement at the top middle (at the cut out).



40. Fold down the flaps above the dacron piece and sew a 15 mm pocket along the the top.



41. Close one end of the pocket completely with a seam.



42. Close the other end only halfway with a seam (to allow insertion of spar with an end cap). Sew the seam slanted as the picture shows.



The frames

The sail frame

43. Prepare the carbon tubes (for three and two sail ships check the dimensions on page 3):
 - a. 3 pcs of 8 mm 91 cm
 - b. 2 pcs 6 x 68.5 cm (cut 69 and adjust if needed.)
 - c. 2 pcs 6 x 60 cm
 - d. 2 pcs 6 x 51 cm
 - e. 2 pcs 6 x 44.5 cm
 - f. 2 pcs 6 x 39.5 cm
44. Glue a ferrule on one end of two of the 8 mm 91 cm mast spars.
45. Glue a split endnock on the end of the third 8 mm 91 cm mast spar.
46. Make step-downs for the cross connectors: The mast/spine is 8 mm and if the cross connector has the same diameter for the cross spar this has to be stepped down to 6 mm:

Put a drop of glue on one end of a spare 8 mm tube and insert it in the cross opening. Cut off what is protruding.

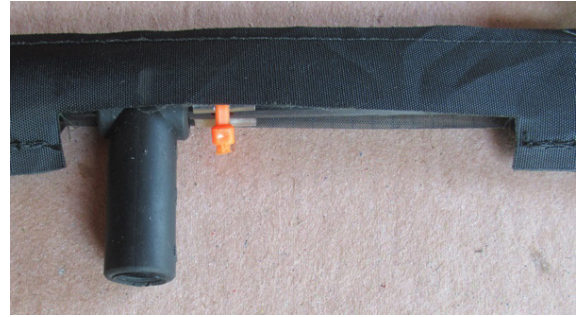
Do the same for all other cross openings.

47. Slide 1 cross connector onto a 91 cm mast part with a ferrule.
48. Slide 2 cross connectors onto each of the other two 91 cm mast parts.
49. Glue endcaps onto all cross spar ends. The endcaps can be either "T end caps" or a 2 cm piece of a 6 mm plastic tube with a 5 mm hole punched in the middle.
50. Lay out the sail on the floor, back side up. Join the mast parts and place the mast on the back side of the sail.
51. Position the cross spars on the mast according (approximately) to the measurements on the frame drawing.
52. Insert the two 69 cm spars in the bottom sleeves of sail A:
 - into the cut-out before the velcro.
 - slide on a 6 mm T connector in the cut-out at the edge.
 - out of the sleeve through the cut-out before the cross connector in the centre.



Centre with cross connector and spar end.

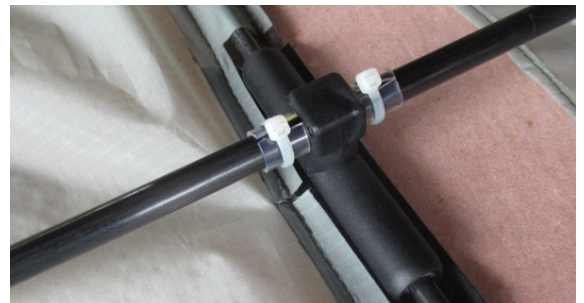
53. At the cutout in the bottom edge of the strip: Make a mark 44 [41] cm from the mast and position the T connector there. Put a stopper just on the outside of the T connector.



54. Insert the rest of the cross spars under the velcro strip at the end and into their sleeves. Adjust the length of the spars so the velcro pocket can close nicely.



55. When all cross spars are in place adjust the distance between the cross spars according to the frame drawing and lock the cross connectors with stoppers.

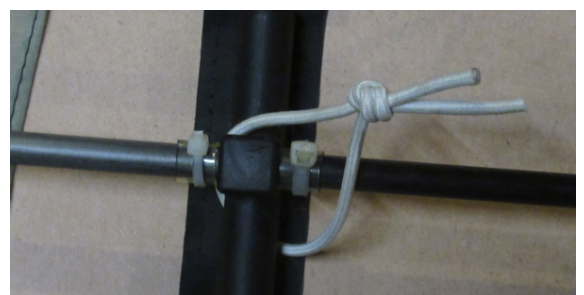
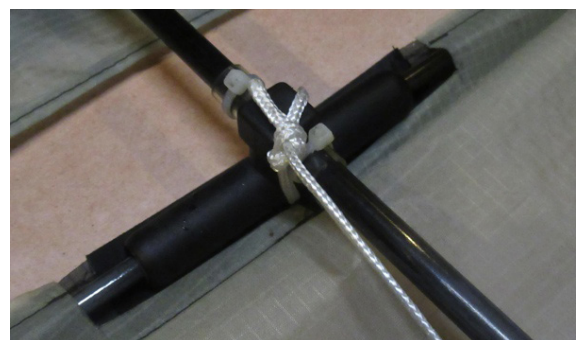


Mast and locked cross connector viewed from side.

56. There are two sail segments where the mast is divided. To prevent the mast parts from gliding apart while in the air the segments must be secured.

Make a string-and-bungee loop over a segment with a ferrule:

- Cut a 90 cm piece of thicker string and tie one end around the mast and the connector on one side of the ferrule.
- Cut a 25 cm piece of bungee chord and tie a loop around the mast and the connector on the other side of the ferrule.

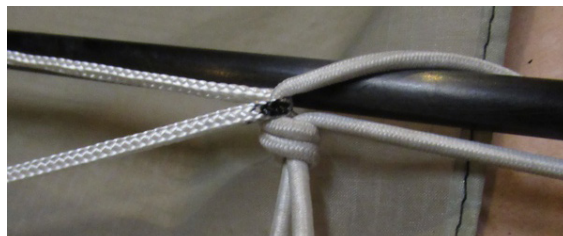


- c. Pull the thicker string through the loop (under the knot on the loop). Stretch the string and bungee ...



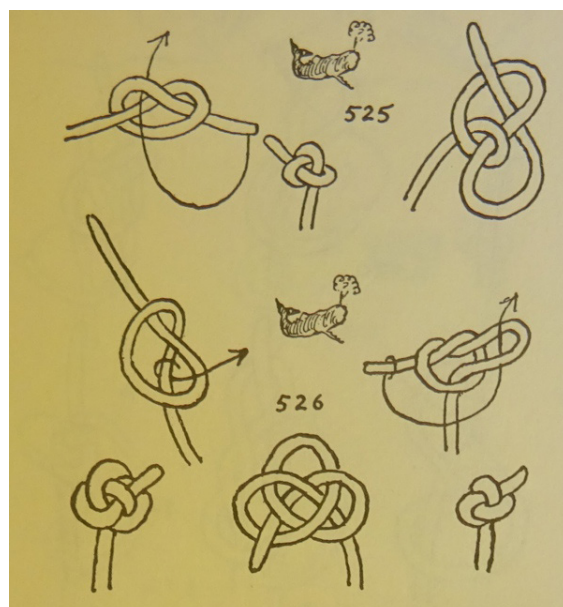
Stretch the bungee.

- d. ...and make a mark on the string just under the knot.



Make a mark on the string at the bungee knot.

- e. Tie an Oysterman's Stopper (or any other reliable stopper knot) at the mark.



- f. Trim the excess line after the stop knot leaving a strap for locking and releasing.



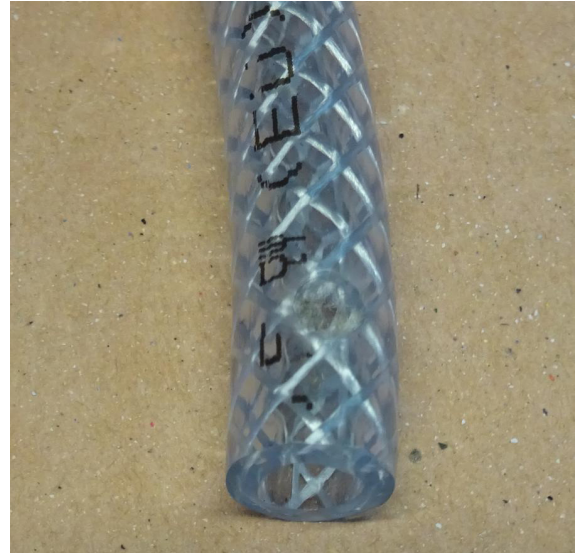
- g. Repeat for the second ferrule segment.



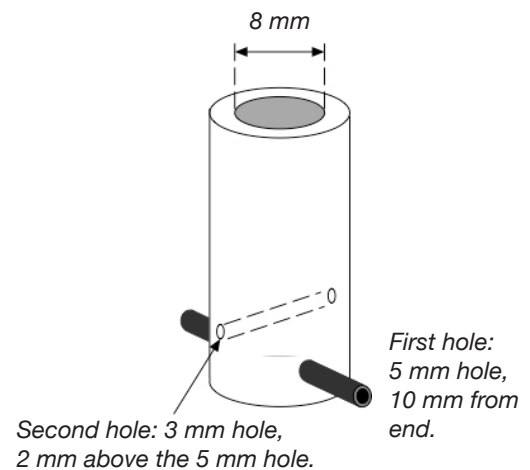
Second segment secured with string and bungee.

Bow frame

57. Prepare the fibre glass rods and plastic tube
- 2 pcs of 4 mm fibre glass rod 71 cm
 - 1 pcs of 3 mm fibre glass rod 85 cm
 - 1 pcs of 3 mm fibre glass rod 14 cm
 - 1 pcs of 6 cm reinforced plastic 8 mm diameter
58. Punch a 5 mm hole in the plastic tube 10 mm from one end.



59. Punch a 3 mm hole in right angle to the above hole: 2 mm above that hole.



60. Make a division in the centre of the 4 mm ferrule if there is not one already.



61. Insert the ferrule into the 5 mm hole in the plastic tube.



62. Insert the 14 cm long 3 mm fibre glass rod into the pocket at the top of the bow. At the centre insert it through a 3 mm T connector and put end caps in both ends and insert the rod fully in the pocket.



63. Insert the 85 cm 3 mm rod in the sleeve in the centre of the bow and insert the top of it in the T connector.

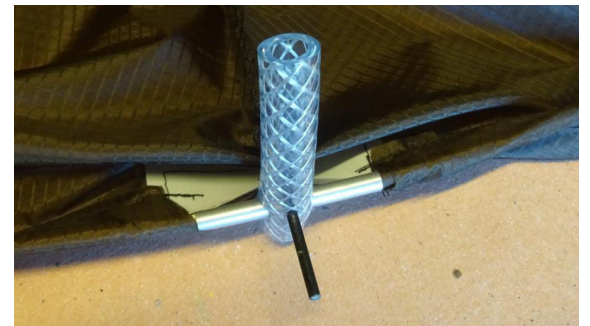
64. Cut off the bottom of a 3 mm end cap and slide it onto the other end of the long 3 mm rod c:a 4 cm as stopper.

65. Insert the same 3 mm fibre glass rod into the 2 mm hole of the plastic tube with the stopper on the inside.

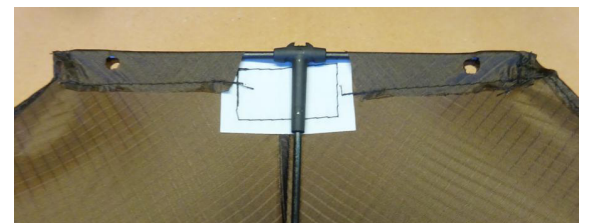


66. Insert the two 4 mm glass fibre rods in the bottom edge sleeves.

67. Insert the two 4 mm rods into the 4 mm ferrule while adjusting the 3 mm rod.



68. Punch or burn holes in the top pocket of the bow just inside the end caps.



69. Cut 2 pcs of thin string (20 – 30 kg) 30 cm long.

70. Tie the ends in the just created holes to create two loops.

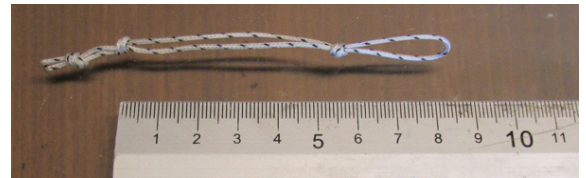


71. Cut a 30 cm m piece of same kind of string.
72. Fold it double and tie an overhand knot in the very end of this loop. Then tie a second overhand knot about 1 cm from the first knot. Tie a third overhand knot about 3 cm from the loop end. The distance between the strap and the end loop should be about 8 cm.
73. Cut two 60 cm long pieces of a much thicker string (~90 kg).
74. On each, tie a loop in one end and from the loop knot tie an overhand knot every 3 cm.

One knotted strap will be used for adjusting the length of the inner bow bridle string. The other knotted strap will be used for adjusting the length of the outer bow bridle string.

75. Tie the string made in step 71 and one of the knotted straps made in step 74 to the bow sprit loops made in step 66. Use a Prusik knot in both cases. Tighten the knots in the centre of the string.

76. The second knotted strap made in step 74 should be attached to the mast. The loop in the end (to the left) should simply be slid around the mast at the bottom of the sails, but in order for it to not disappear when packing it best to secure it to the same T connector as the bungee using a c:a 5 cm long string. The securing string should also run through the loop in order to also prevent this from disappearing when packing.



Loop with three knots for tuning distance between bow top and mast. The leftmost part is a strap to meke it easier to remove the loop when packing up.

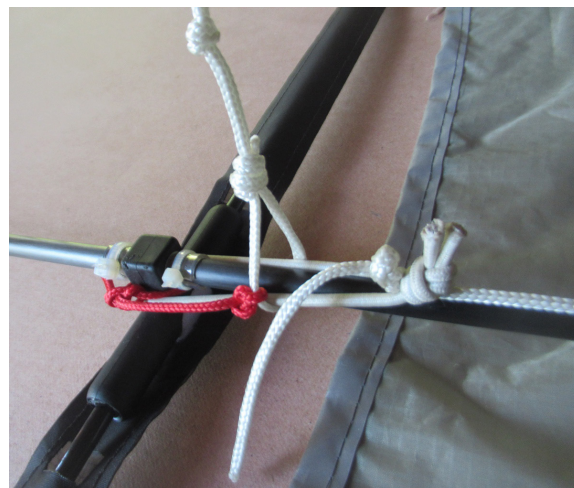


Knotted straps for tuning bow bridle strings.



5 cm securing string (red) hold knotted string and bungee in place. Bungee released for clarity reasons.

When the bungee strap is applied the bungee knot should go inside the loop of the knot strap.



Bungee inside knotted string loop.

77. Cut two pcs of thin string (20 – 30 kg) 110 cm long and tie to the loops at the bow.



78. On the same strings tie a loop so the loop ends ~79 cm from bow edge.

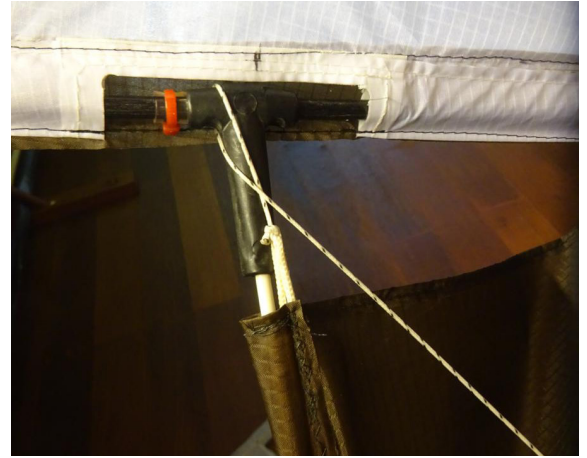
Attach the bow to the sail

79. Slide the plastic tube made in steps 58-61 onto the mast end.
80. Insert the 4 mm fibre glass rods into the T connectors on the cross spar.



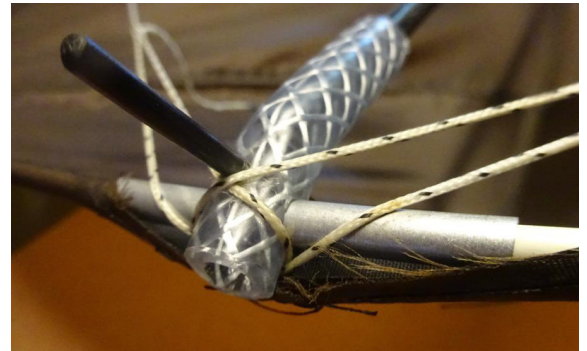
View from front.

81. For each side: pull the bow tension string from behind over the cross spar and on the outside of the T connector. Then under the 4 mm rod and behind the bow.



View from back.

82. Slip the loops over the protruding part of the plastic tube.

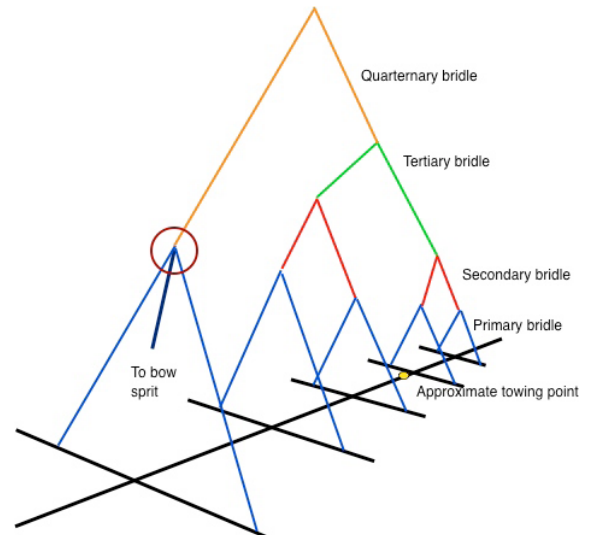


The bridle

A tallship has a complex bridle system with a lot of strings.

83. Punch or burn holes in bridle reinforcements, in the middle of them. (For the bottom yard sticks no holes are required: the bridle string will be tied around the T connectors.)
84. Cut 5 pcs of ~40 kg string for primary bridle in lengths 400 cm, 250 cm, 180 cm, 150 cm and 130 cm.
85. Tie the 400 cm long string around the mast and the T connector on both sides.
86. Tie the remaining other primary bridle strings around the spars/yard sticks through the bridle reinforcements.
87. For the two secondary bridles on the four top yard sticks cut 2 pcs of ~40 kg string in lengths 150 and 100 cm and tie to primary bridle pairs from bottom to top using Prusik knots in both ends.
88. For tertiary bridle cut one piece of 60 kg string in length 100 cm.
89. Tie the tertiary bridle to the two secondary bridles for the four top yard sticks using Prusik knots.
90. Cut a piece of 60 kg string with length 400 cm for the secondary/quarternary bridle of the bottom yard stick. (It is secondary at the bottom yard stick end but quarternary at the other end.)
91. Tie it with a Prusik knot on the primary bridle of the bottom yard stick.
92. Tie the other end with a Prusik knot on the tertiary bridle of the four top yard sticks.
93. Tie a towing point loop onto this bridle string with a Prusik knot.
94. Cut 1 pcs of 40 kg string with length 200 cm for the bow bridle string (the dark blue in the picture "To bow sprit").
95. Tie a loop with a strap in one end of this string. Tie the other end to the primary bridle knot for the bottom yard stick, encircled in the diagram above. Tie this a bit loose so it can be adjusted. The actual length of this line has to be adjusted at first flight: coarse adjustment at the bridle knot and fine tuning at the bow sprit.

The other end of the string, with the loop, will be tied to the tuning line at the bow sprit, see picture on next page.



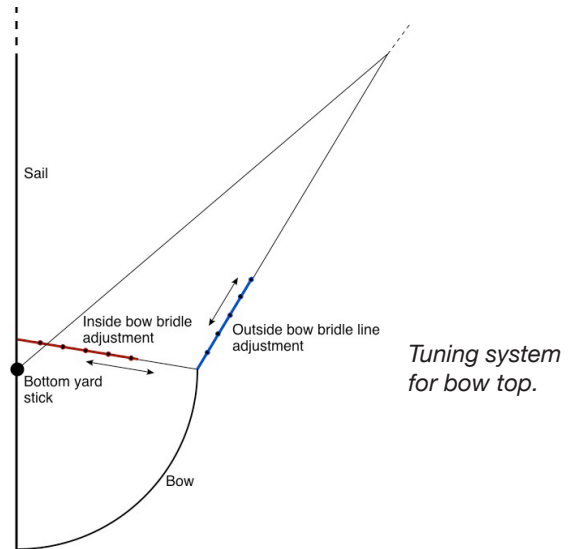
Bridle system for a Roebuck IV kite.



Holes through bridle reinforcement.

Tuning the bridle strings for the bow.

96. When flying, the bow must be in a correct position relatively the sails to function properly. The position can be tuned by using the inside bow knotted string and the outside bow knotted string (which leads to the bow sprit bridle string).



Tuning system for bow top.

The string made in step 94-95 coming here. Loop tied around the knotted string.



Tuning knotted string for bridle.

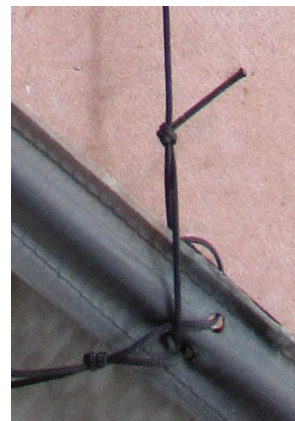
Start from knot in middle and then tune.

Tuning knotted string for bow distance to sail.

Start from knot in middle and then tune.

For mast top

97. Cut 2 pcs of the same 40 kg string; 70 cm long.
 98. Tie each of them through the top bridle hole, but only the lower hole. Tie with a loose loop so the yard stick spar can run freely inside.
 99. Bring the string to the split end nock at the mast top and make a mark.
 100. Tie a loop, so that when the loop is slipped over the split end nock at the mast top the strings are equally taut on both sides.
 101. Put a streamer on the mast top.



Tie only through the lower hole.



On tuning the bridle.

All tall ships have a lot of tackles and ropes. The corresponding for the Roebuck kite is the bridle system.

Tuning the bridle system is somewhat tedious to find the correct angle of attack, get all bridle parts equally taut and the spine of the kite straight. It is important that the bow is properly inflated, if not one side of the bow will collapse and the kite will lean to that side.

The Roebuck kite needs a breeze of at least 2.5 m/s.