

call it Delta, maybe

kite design with plastic sheeting and bamboo

Material List:

- Husky plastic sheeting (3.5 MIL), enough for a 9' x 4'7" kite, plus two tails at 10' x 5" each
- Tyvek tape
- 4 bamboo culms, approx diameters: 2 @ 1/4", 1 @ 1/2", 1 @ 3/4"
- rubber bands
- paper clips
- mason line #18
- split rings, 0.47"
- spray paint (optional, but this increases visibility to pilots)

Assembly Tools:

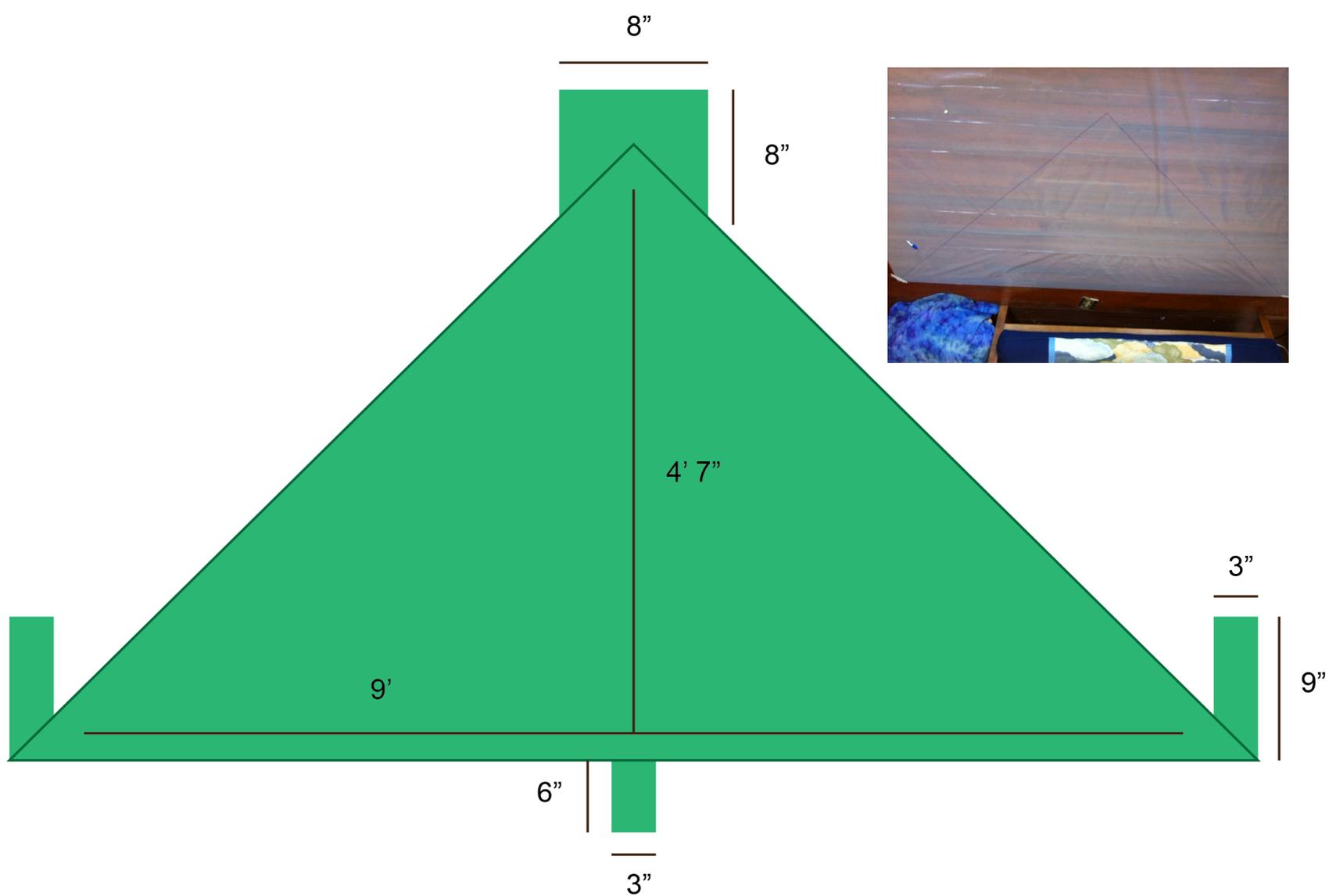
- single hole puncher
- scissors
- measuring tape
- Sharpie

*this does not include the flying line, reel, and materials for the camera rig

Kite Terminology

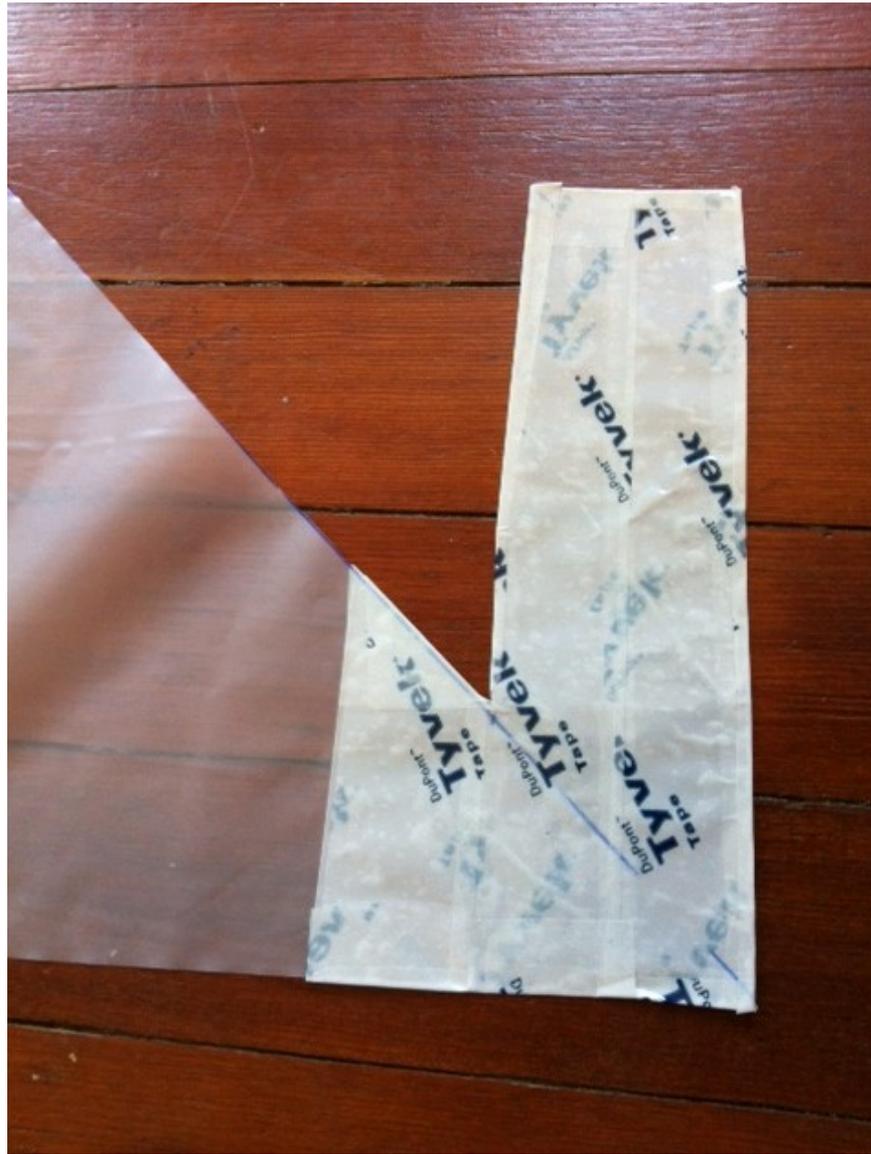
- **Spar**- stick, dowel, bamboo, etc. that makes up the frame of the kite
- **Culm (bamboo)**- stem
- **Leading Edges**- the edges connecting the trailing edge to the nose of the kite
- **Trailing Edge**- the bottom, longest edge of the kite
- **Bridle**- arrangement of string by which the flying line is attached to the kite
- **Keel**- material, usually triangular, that hangs down along the vertical spar on the ground-facing side of the kite, in which the bridle is usually attached

KITE PATTERN



Trace a 9' x 4'7" kite (the dimensions of the ITW Levitation Delta), including the extra the pockets. This should be cut out as one continuous piece. It's easiest to trace out the main body, and then the pockets. Cut out 2 tails at 10' x 5" each while you have scissors in your hands.

POCKETS



Tape both sides of the corner pockets with Tyvek tape, going slightly past the width of the pocket.

POCKETS



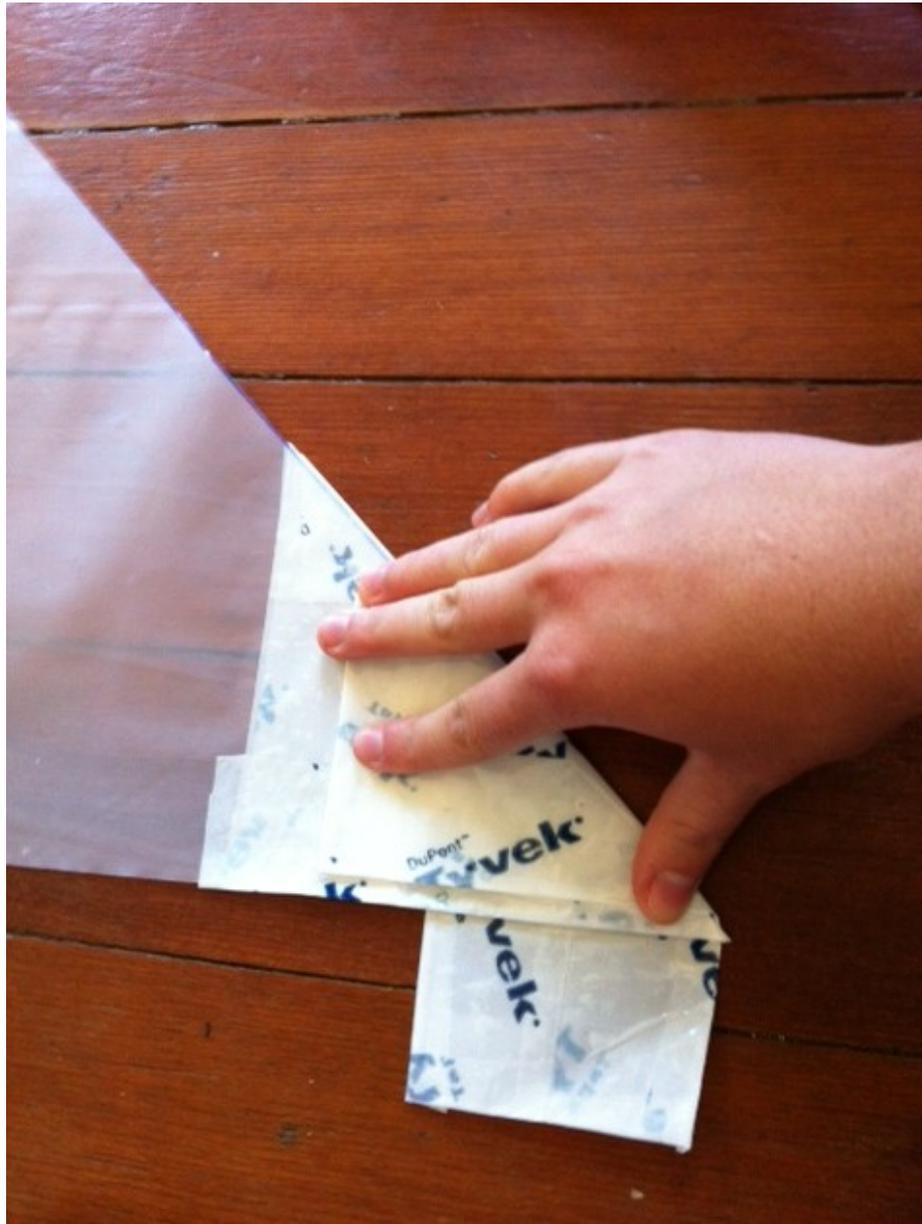
Fold the pocket material down towards the trailing edge and then towards the center of the kite, creasing down the edge.

POCKETS



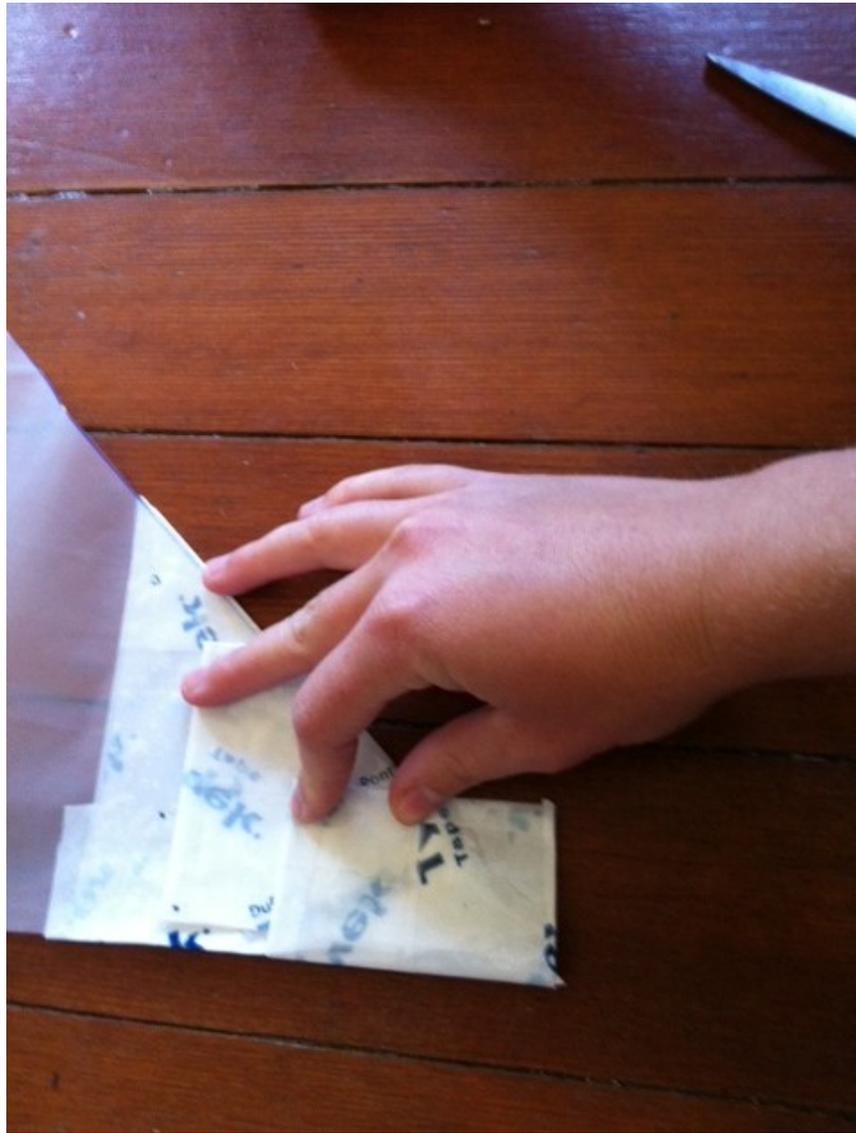
Fold the pocket material away from the kite, making the crease at the 3" width of the material.

POCKETS



Fold the pocket material under the kite and crease.

POCKETS



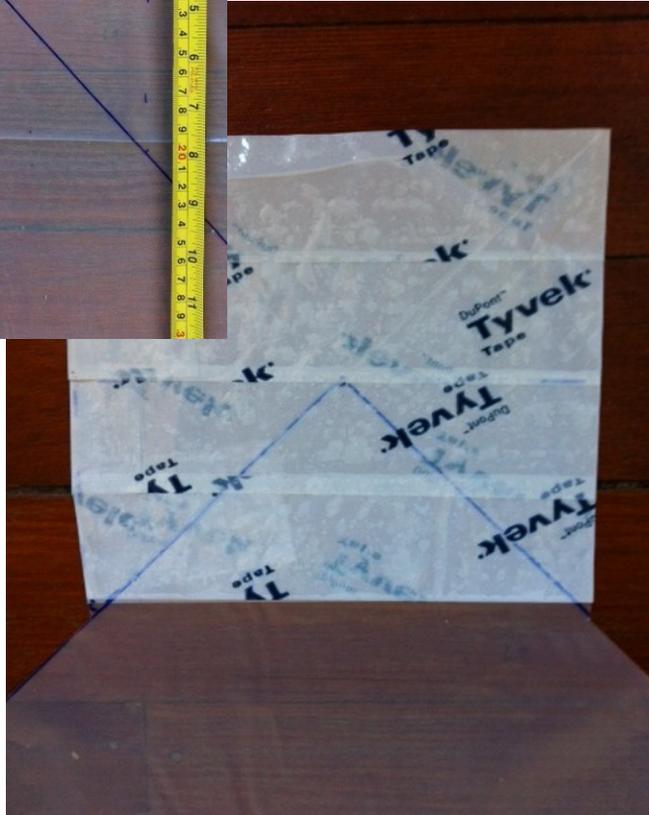
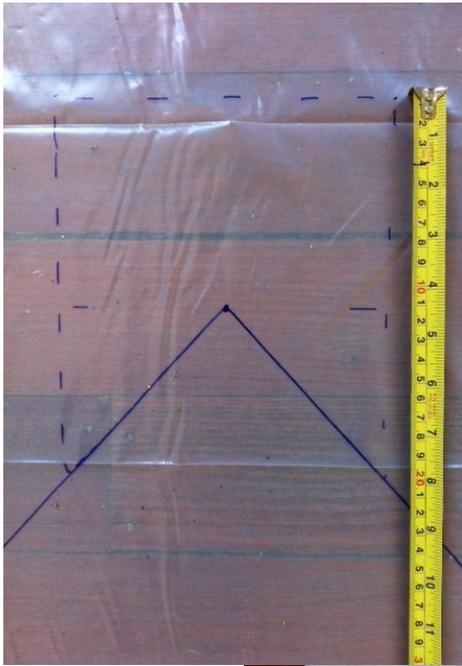
Finally, crease the pocket up over the corner, and tuck any extra material under the kite again. Crease down the edges one final time, and tape down the pocket with Tyvek tape.

POCKETS



Your corner pocket is complete! Repeat instructions for the other corner pocket.

POCKETS



For the nose pocket, cover both sides in Tyvek tape. Fold, crease, and tape in a similar manner as the corner pockets.

POCKETS



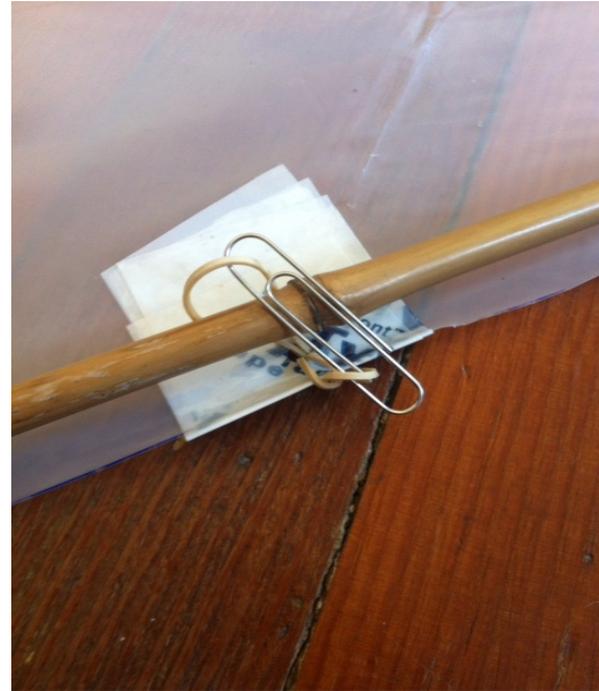
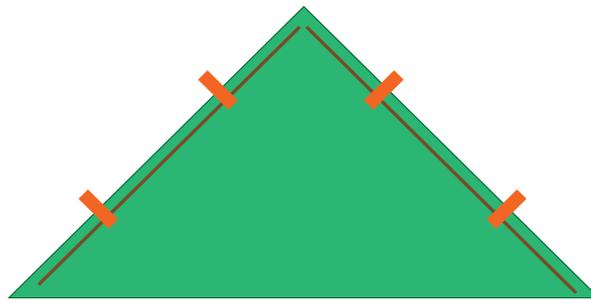
For the pocket on the trailing edge, I followed Mathew Lippincott's [instructional video on taping tyvek pockets](#). I used the technique to reinforce the corners with the square Tyvek pieces on all the pockets.

SPARS



Insert the bamboo culms into the pockets, the thicker 3/4" culm for the vertical spar and the thinner 1/4" culms for the leading edge spars. I had to bend the bamboo slightly to get them into the pockets, which is helpful for keeping the kite taut in the end. Thicker ends of the culms should be in the trailing edge pockets.

SPARS



To strengthen the connection between the kite and leading spars, I taped 2 pieces of Tyvek tape 1" in at each "third" section of each spar. See diagram at the top. Punch a hole (using a hole punch or other clean cutting device is key to prevent tearing) and loop a rubber band through itself. Loop both ends of the rubber band through a paper clip to secure. I found that the tension between the bamboo and plastic during flight keeps the paper clip fairly secure.

BRIDLE



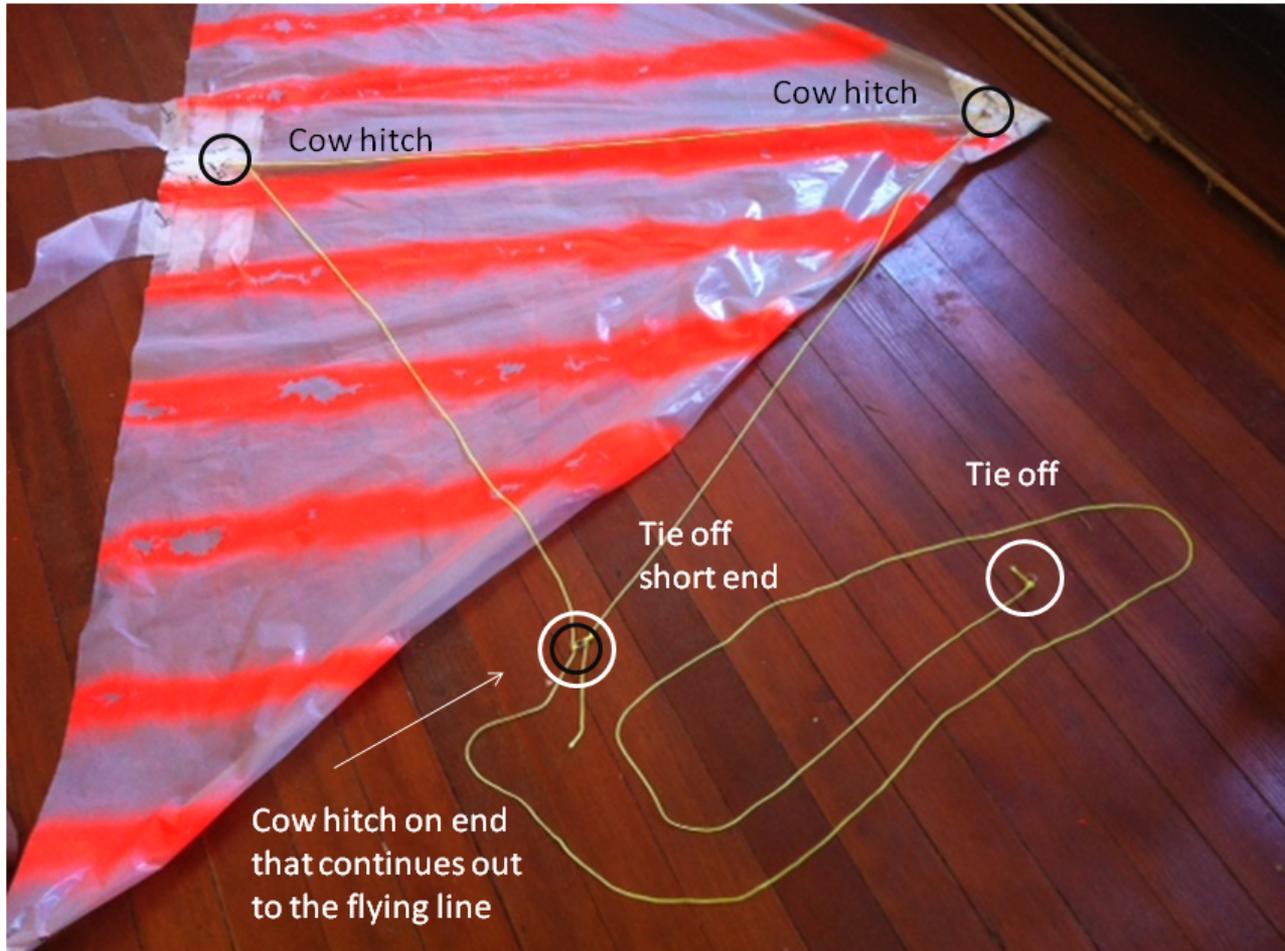
I used a simple bridle that attaches to the vertical spar without a keel. Punch two holes through the Tyvek taped pockets (not through the entire pocket, just the kite part of the pocket- see picture), one at the nose of the kite and one at the trailing edge. Thread a 12" piece of mason twine through a split ring under the kite, and then up through the punched hole. Double the string and tie it off. Do this for both ends.

BRIDLE



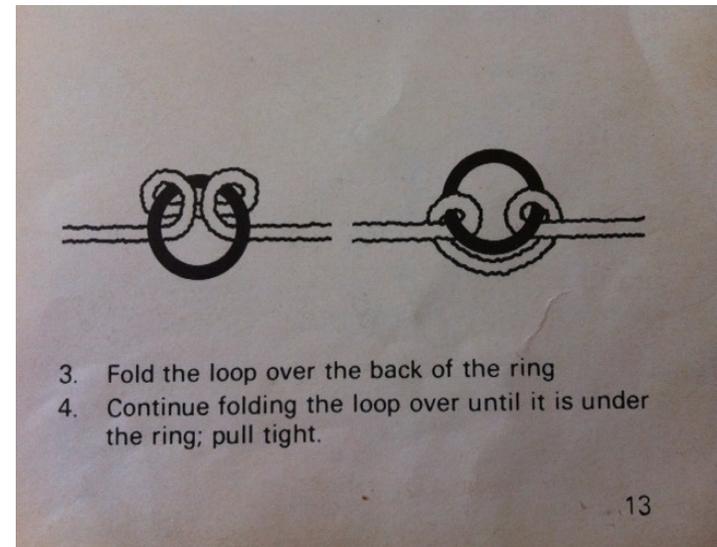
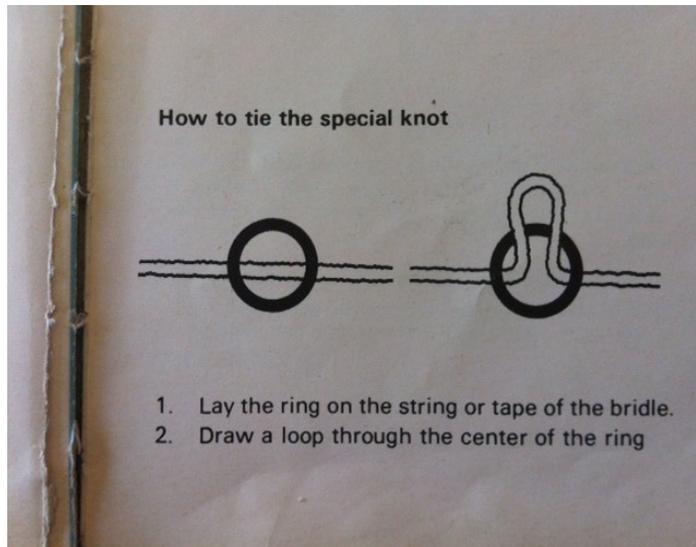
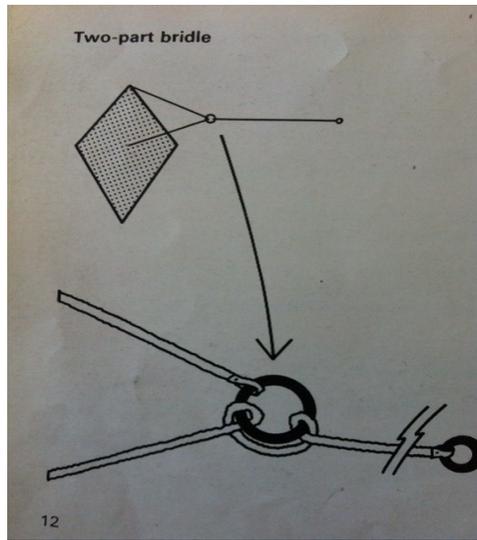
There should now be two tied off loops, looped through split rings on the opposite side of the kite, one at the nose and one at the trailing edge. When you flip the kite over, you should see the two split rings, and a bit of the mason line poking through.

BRIDLE



Flip the kite over so that the spar side is facing down. Cut a piece of mason twine about 20' long and lay it down so that the middle of the line is along the vertical spar. Cow hitch knots (instructions on next slide) are used at three points on the bridle, the other two are just tied off (best knot to use TBD, but a good site [HERE](#).) Each point encircled above has a split ring.

BRIDLE



These are instructions on how to make the cow hitch knot, borrowed from "Fun with Kites" by John and Kate Dyson, Angus & Robertson Ltd, 1976. The cow hitch knot makes it easy to adjust the bridle (calm winds= kite in a more vertical position, strong winds= kite nose nearer to horizontal position).

TAILS



I flew the kite once without tails, and then once with tails. There was significantly less diving with the tails, so I would recommend adding these guys. Tape down tails on either side of the vertical spar. Tape on both sides of the kite for reinforcement.

FLIGHT ASSEMBLY



When you are ready to fly, attach the horizontal bamboo culm (1/2") to the leading spars and vertical spar. I used the rubber band paper clip technique explained previously, and it worked fine, but there is probably a better way to do this. Finally, attach a split ring to the end of your flying line, so that when you assemble/disassemble, you can easily attach the flying line split ring to and from the bridle line split ring.

FLIGHT



The inaugural flight took place in Boonville, CA. I spray painted colored lines on the kite to make it more visible to any passing aircraft.