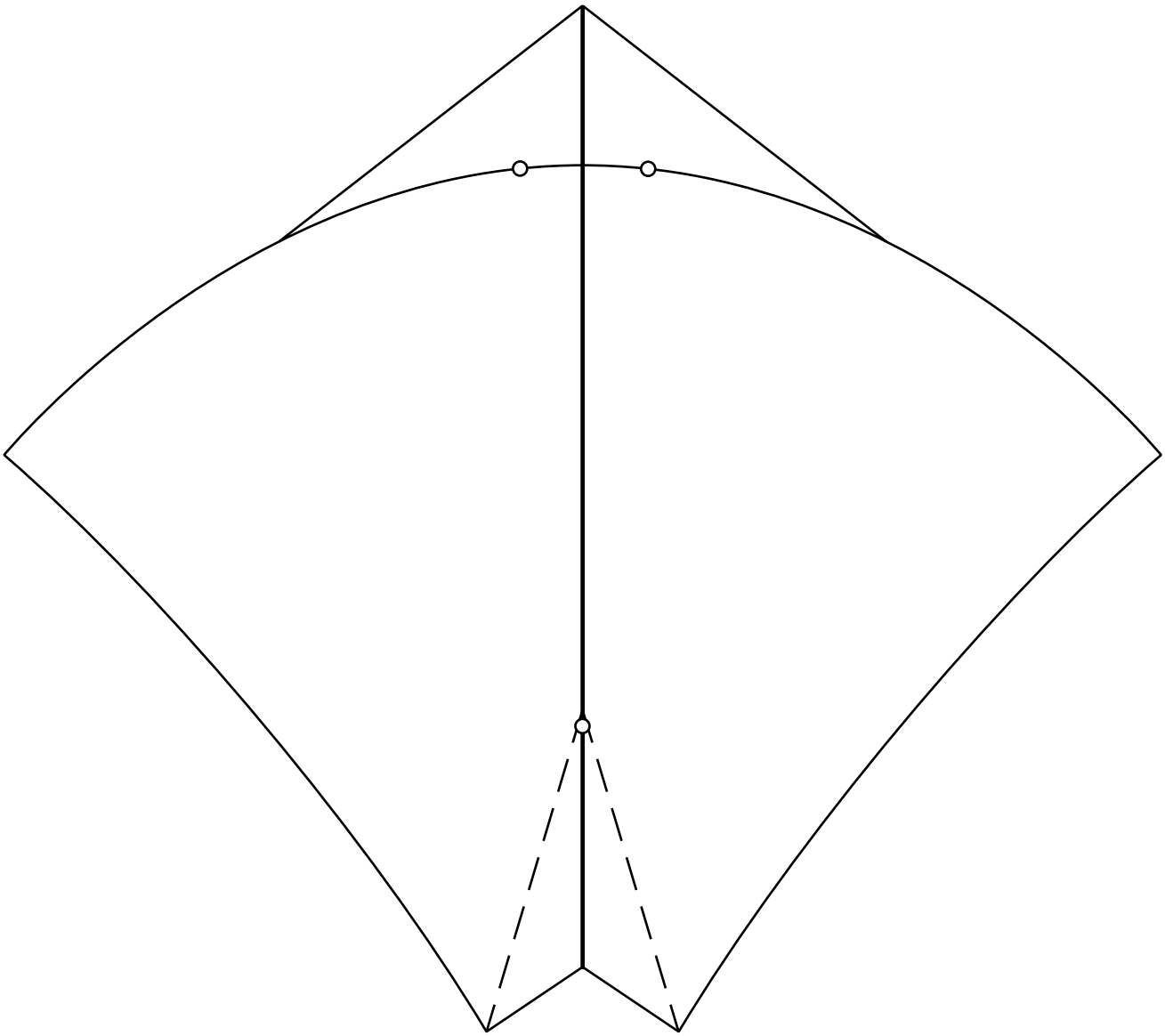
Firefly Fighter Kite



Materials and Tools List:

Materials:

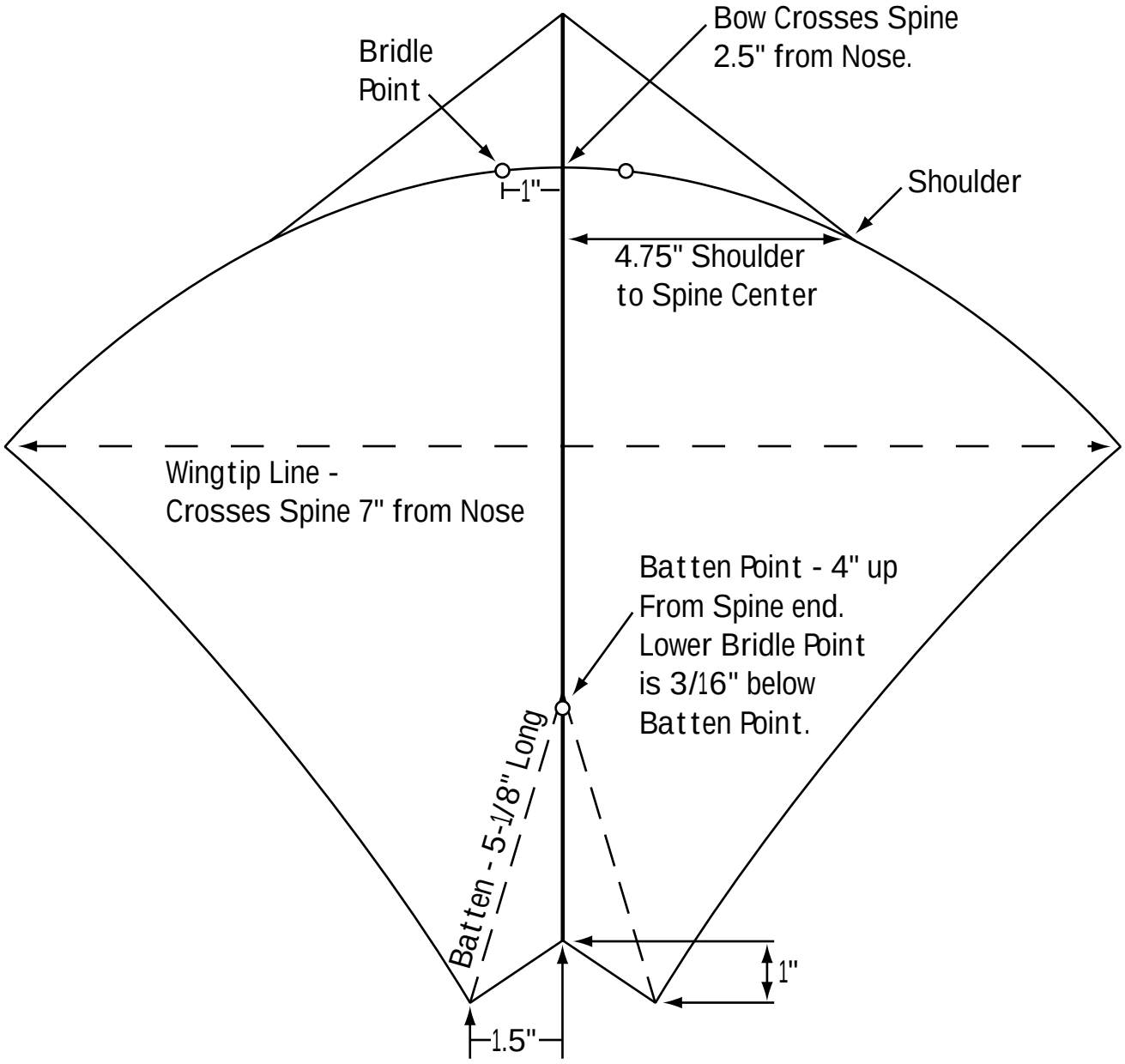
1. Sheet of Clearphane or Mylar
2. Bamboo Stick for Spine
3. .05 Carbon Fiber Rod, 24" long
4. .03 Carbon Fiber Rod, Approx 12"
5. Contact Cement
6. Clear Packaging Tape, 2" wide
7. Bridling Line
8. Clear Nail Polish
9. Gel Formula Super Glue
10. (2) 3-Ring Binder Page Reinforcements
11. (optional) Mylar strips to stiffen leading edges at nose

Tools:

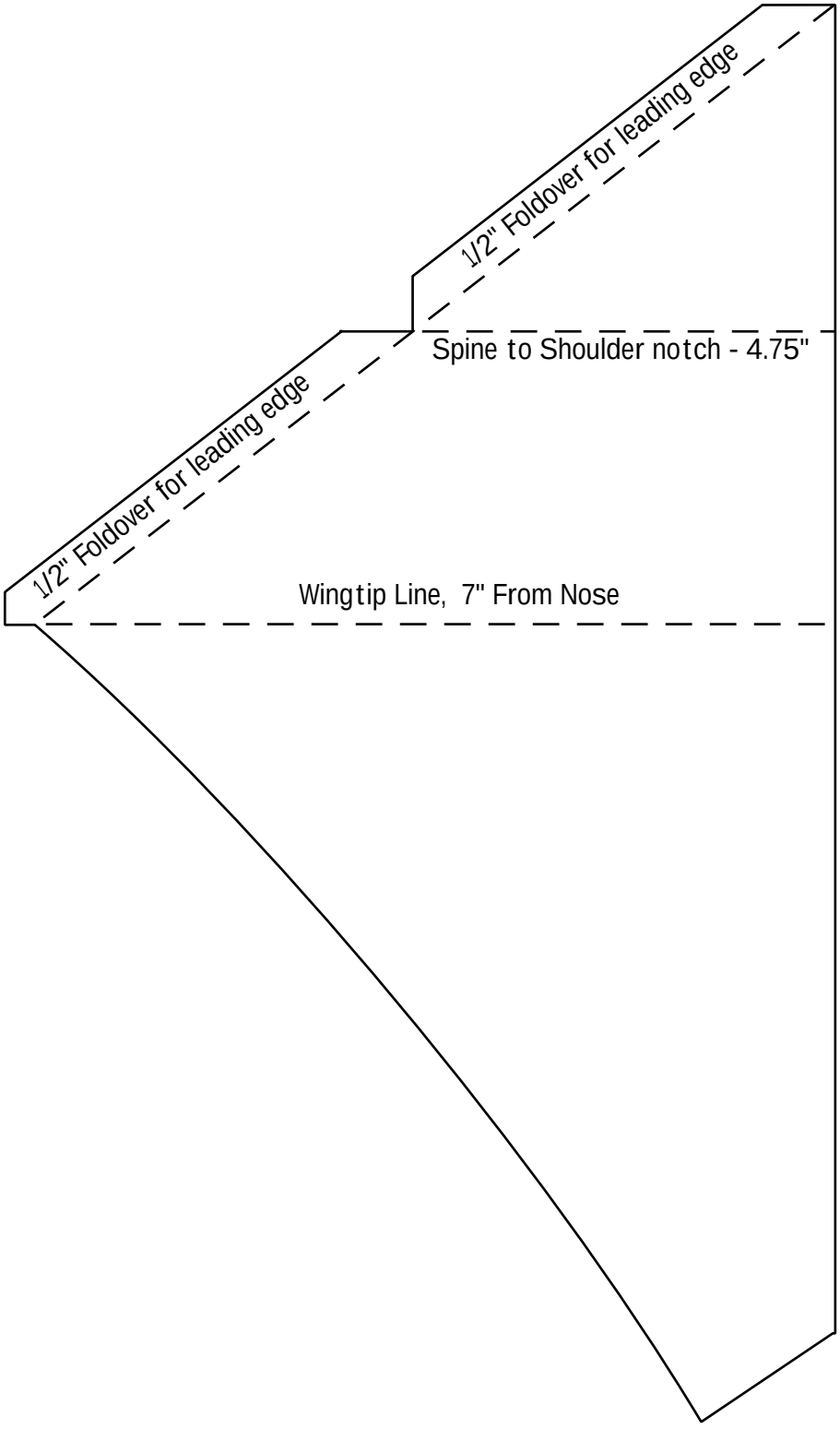
1. Ruler - at least 18" Long
2. Cutting Mat
3. Six Small Weights (I use very small jars filled with pennies)
4. X-acto Knife
5. Scissors
6. Wire Clipper
7. Bow Setter (explained later)
8. Soldering Pencil
9. Fine Pen for marking sail, & white for marking bow
10. Sewing Seam Gauge
11. Makeup sponges or other glue spreaders.
12. Needle for threading bridle.
13. Fine Sandpaper (used to make sure batten lengths are even)

Firefly

Wingspan: 18"
Spine Length: 15"



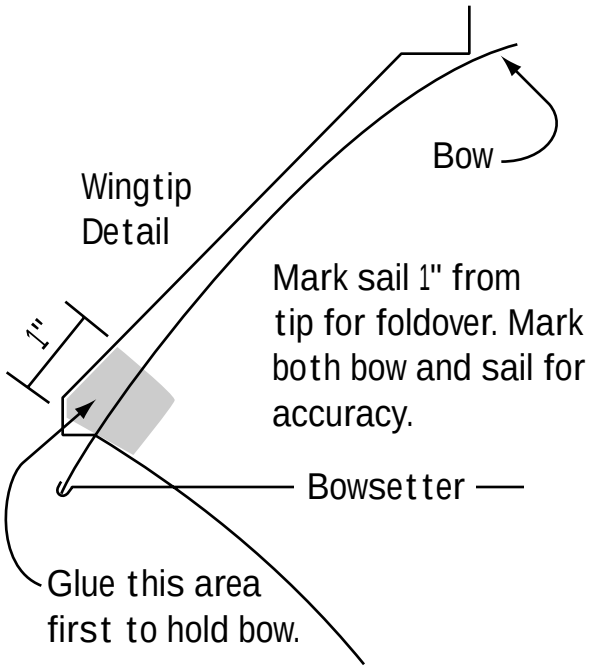
Detail of Half-Pattern Template for cutting out the sail



This Template detail, along with the measurements on the previous page, will aid you in making a template out of posterboard for use in cutting sails. I use half patterns in order to get better symmetry from my sails.

Construction

1. Spray water on your work surface and lay out your sail. Use a business card to smooth out the sail. Wipe up any excess water. Measure and mark the point on the sail where the bow will cross it. Mark the center of the bow. Place the bow in the bowsetter, finding the natural curve of the carbon. Adjust the bowsetter so that the bow reaches the wingtip points, and the center marks on the bow and sail align. Mark where the bow leaves the wingtip, and 1" up from there, also marking the sail to assure proper placement of the bow on the sail. (See detail below)



2. Mark a spot on the sail 1" up from the tip on both sides. Spread cement thinly on both sail and bow on this 1" length. place the bow down on the proper spot, using weights to hold it in place above the cemented wingtip. Use an Xacto knife to cut the sail from the mark out to the sail tab edge. Fold that 1" tab over the bow and burnish it down. Wait for the glue to dry. (10-15 Minutes)

3. Thinly spread cement along the centerline of the sail, ignoring the spot where the spine lays. Thinly coat the face of the spine with cement, and carefully place the spine on the sail, underneath the bow, along the centerline. Be careful - you only get one chance! Use weights to hold down the spine until the glue dries. (10 Minutes)

4. Options for leading edge from shoulder to nose: A.) Crease the leading edge tab (above the shoulder notch) and glue down to the sail. (under the bow at the lower end.) Be careful when you crease this tab, since the end at the shoulder notch will want to tear into the sail. B.) Use stiffeners, mylar or carbon. Crease the leading edge tab, and Coat this tab thinly with cement and carefully fold it over the stiffener. (under the bow at the lower end.) C.) Carefully place tape over the tab, over the spot where the fold will be. be careful to measure the width of the tape carefully. Cut along a straight edge from nose to notch through the tape, leaving half the tape on the leading edge as a reinforcement. Use special care when working around the notch. Avoid tearing the sail, since it will be weaker at that point.

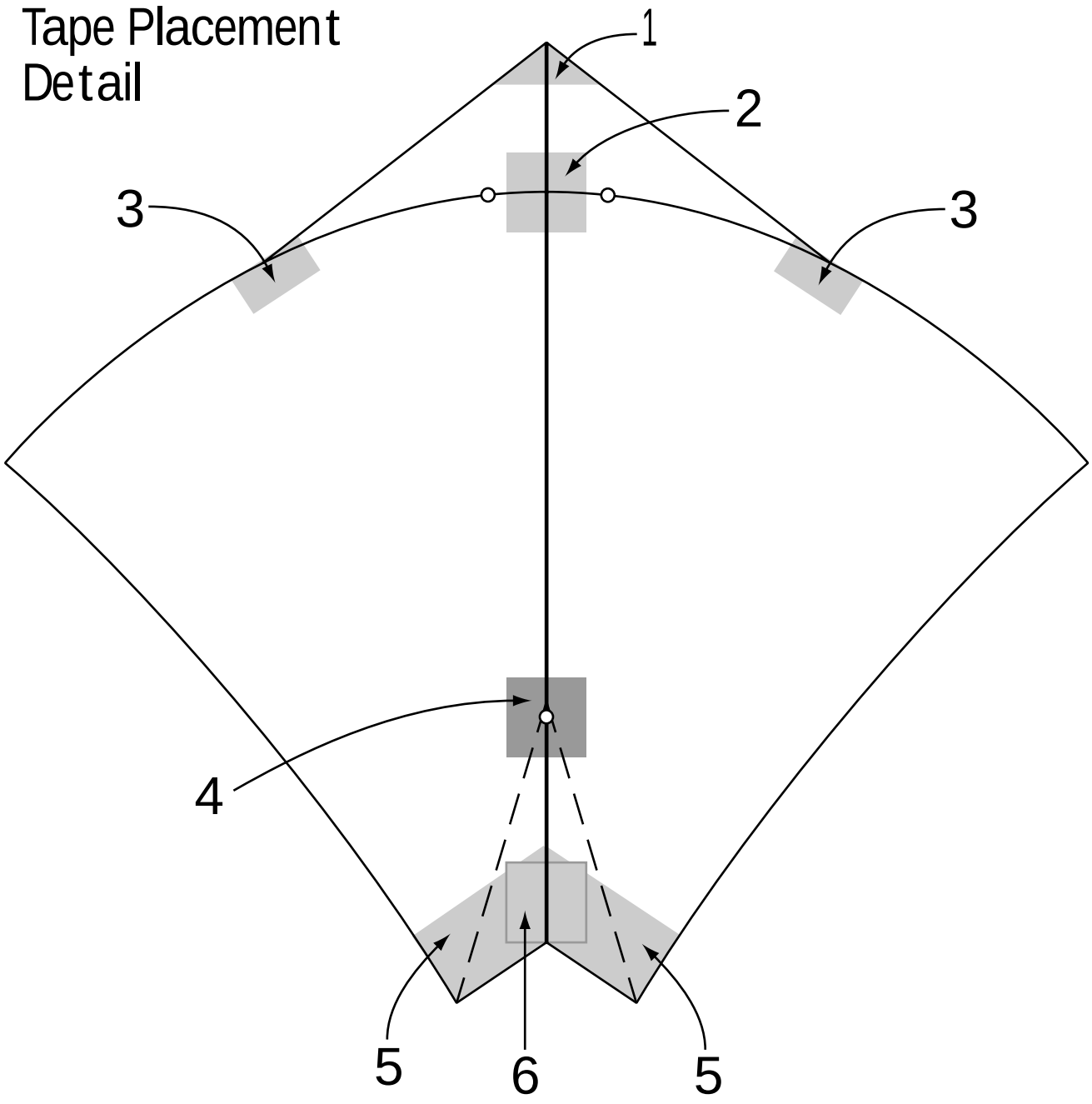
5. Cut two pieces of packaging tape, 1" square. Carefully fold one over the spine where it crosses under the bow. (#2 on tape detail) This is very difficult to do! Measure and mark the spine 4" from the bottom end, and again 3/16" below that mark. The top mark is where the battens will end on each side of the spine. The mark below it is the lower bridle point. Fold the other piece of tape over both of these marks - centering them on the tape. (#4 on tape detail)

6. Place two weights on the bow on either side of the spine to hold it down. Spread cement thinly on the rest of the lower tab and the bow it folds over. Once both sides are coated, go to the first side and make 6-8 cuts from the bow outward. Fold these tabs carefully over the bow and burnish them down.

7. When the glue on both sides is drying (10-15 minutes) cut two battens out of .03 carbon, 5-1/8" long. find the natural bend, and put that side down, thinly coating it with glue. Place the battens on the sail between the swallotail ends and the upper mark on the spine. It should lay on top of the tape at the top end of the batten. (#4 on tape detail) Cut another 1" square piece of tape and place it over the other tape, trapping the batten ends between two layers of tape. Burnish the tape down.

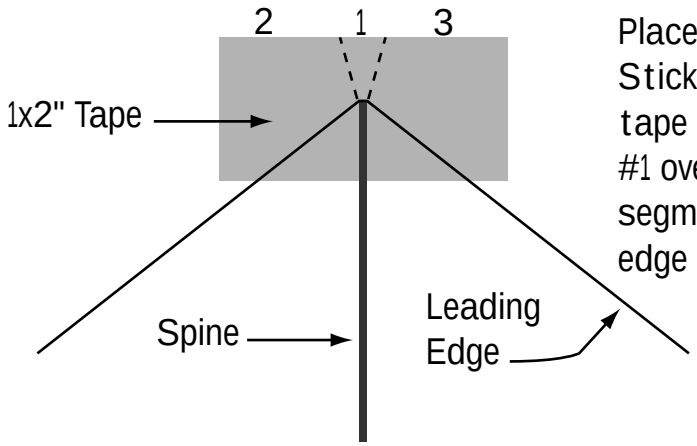
8. Cut two 1" x 2" pieces of packaging tape, and place them along the inverted "V" area of the swallotail. (See #5 on tape detail.) This should fold over the batten at one end and the spine base at the other. They will overlap slightly. Place a 1" square piece of tape over the spine end to trap this down. (#6 on tape detail)

9. Cut two 1" square pieces of tape. place them under the shoulder sticky side up, and press down. Fold the other half over, burnishing it over the sail and bow at the shoulder point. (#3 on tape detail) This protects against the sail tearing at this critical point.



10. Place a 1" x 2" piece of tape halfway under the nose, sticky side up. (See tape detail #1, above) Cut through the tape on either side of the spine and fold it over the top of the spine. Wrap the other two ends over the leading edge and spine and burnish it down. (see special detail below)

Folding Tape at the Nose of the Kite



Place tape halfway under nose, Sticky side up. Make cuts in the tape at dotted line. Fold segment #1 over the spine. Then fold segments #2 & #3 over the leading edge of the kite and the spine.

11. If all cement on the wings is dry, remove the bowsetter and use the wire cutters to clip off the excess.

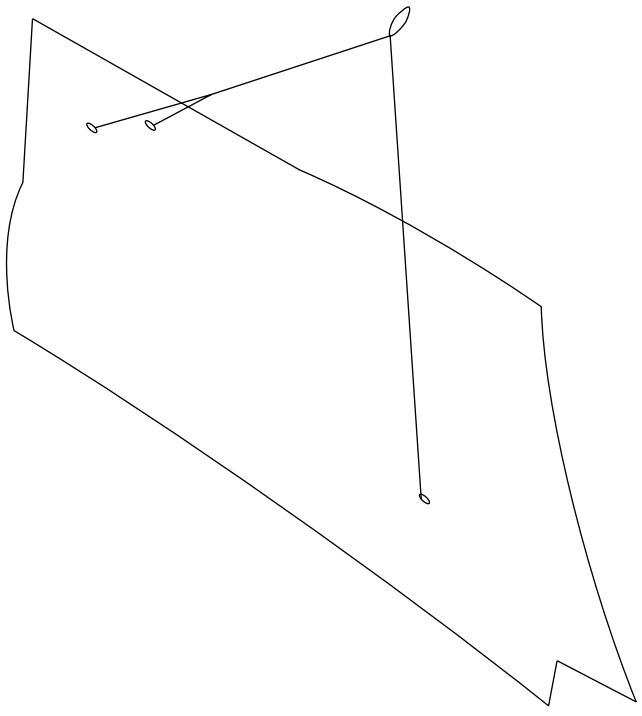
12. Carefully measure and mark 1" on the bow from either side of the spine. Place a looseleaf page reinforcement under each mark (centered as best you can) and press it down.

13. Use the soldering pencil to melt a hole, using the looseleaf reinforcement as a guide. Do not touch the bow with the hot soldering pencil, because it will weaken the bow and cause it to break.

14. Using the needle, poke two holes in the tape under the bow/spine cross point. One side should be above the bow and the other below it. Thread a short line through the holes, and tie the bow to the spine with a simple square knot. Coat the knot with clear fingernail polish to be sure it doesn't come undone. This is done to make sure that you can feel the bow tension as you release line.

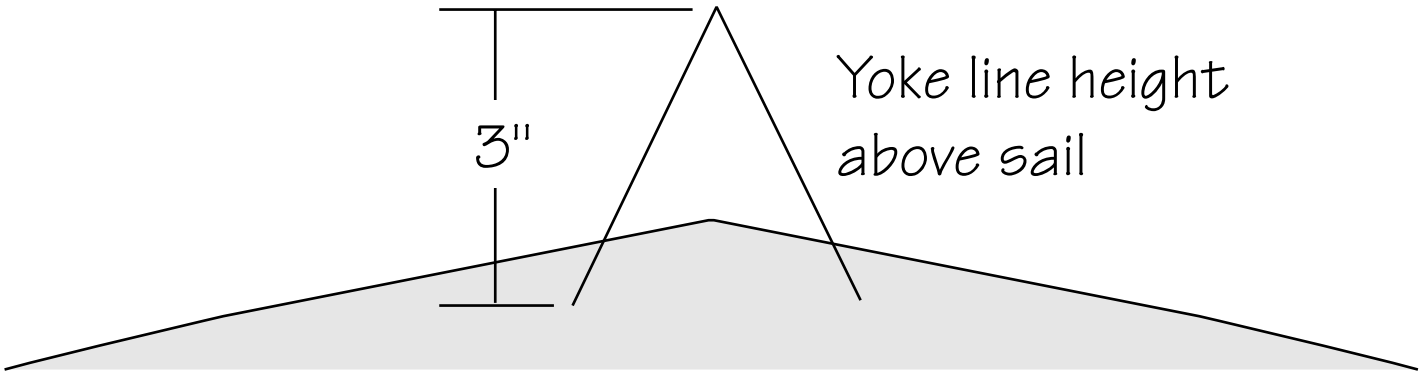
The Sail is now complete. Now to bridle the kite.

15. Start by preparing the yoke line. Tie one end of the yoke line to the bow at the mark you made on the bow earlier. Use Clear Nail Polish to set the knot. Use your Seam Gauge to make sure the center of the yoke line is 3" above the spine. Tie the other side and set the knot with the Nail Polish.

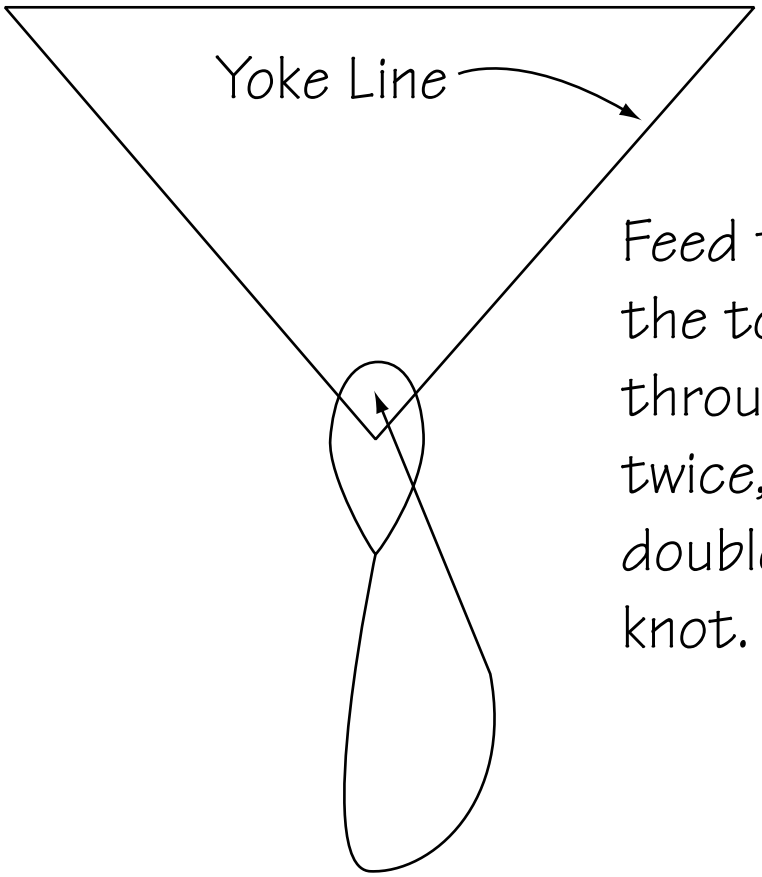


16. Use the Gel Formula Super Glue to glue the back of the yoke line to the bow. The three point bridle tends to put pressure on the yoke lines to slide towards the spine. The super glue prevents this.

17 Prepare a line about 3 feet long. Make a small overhand loop at the end of the line, and put some nail polish on the knot. This is the tow line.



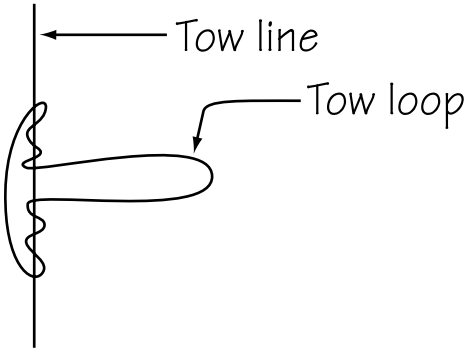
18. Place the loop in the tow line behind the yoke line, and feed the free end through the yoke line and the loop twice, making a double larkshead knot. This is a locking knot, which won't slip easily and allow the kite to lose it's tune. Sliding this knot controls the tendency of the kite to turn easily in both directions.



Feed the end of the tow line back through the loop twice, making a double larkshead knot.

19. Feed the free end through the sail at the lower bridle point you marked earlier. Pull the line tight. Then, taking the line from the point it goes through the sail, pull it carefully back through until it gets to the nose of the kite, and tie the line at the lower bridle point. Use super glue to hold the knot, and if you want, you can place some gel super glue on the back of the knot over the spine to keep the knots from pulling inwards towards the spine.

20. Make a tow loop, Wrap the tow loop twice around the line in a double larkshead knot. (See tow loop detail, below) Now you're ready to tune and launch your new firefly!



Wrap the Tow loop twice around the tow line in a double larkshead knot.