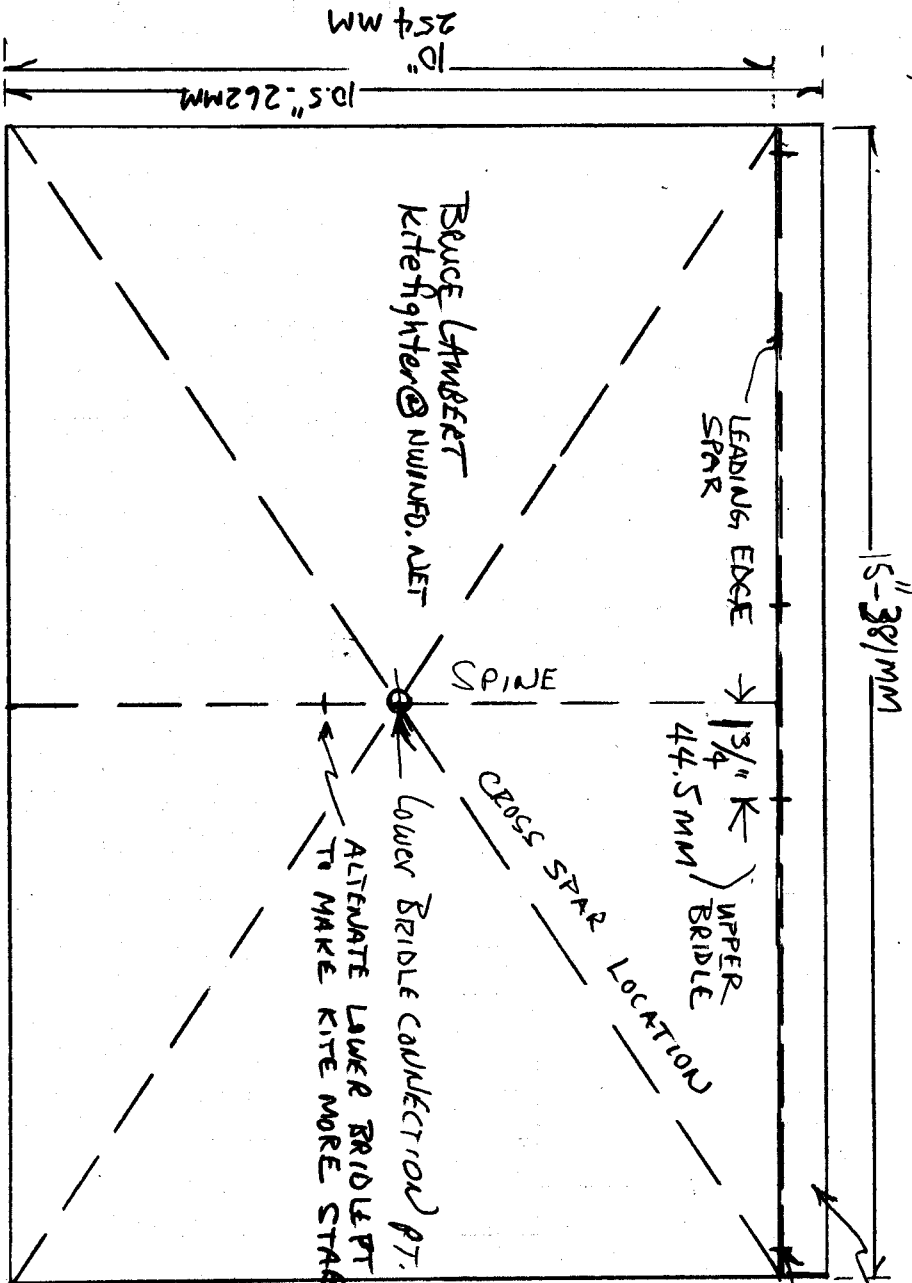


NORTH AMERICAN STYLE BUWA-10" X 15" - 254MM X 381MM



HEM FOR LEADING EDGE SPAR.

LOCATION OF TENSION LINE. ABOUT 1/2" - 13MM INWARD FROM LEADING EDGE CORNERS.

USE ALL 0.05" DIA. CF ROD FOR 4 - 8 MPH WINDS - USE 0.06" DIA CF RODS FOR LE SPAR & SPINE FOR HIGHER WINDS.

BRUCE'S EASY TO MAKE BUKA

Bruce Lambert kitefighter@nwinfo.net

This is a quick and easy technique for making a buka. If you are relatively new to fighter kite making and have all the tools and materials at hand, it should take less than 2 hours to make this high performance buka.

First, for those of you not familiar with a buka, it is a rectangular shaped traditional Japanese fighter kite. These traditional bukas are typically 3'x5'....very large kites. And as is traditional with most Japanese kites it is made with bamboo and paper. It is flown with its long side as the leading edge of the kite.

The North American version of the buka is much smaller. . One of the most common sizes of North American bukas is 10"/254mm x 15"/381mm. Bukas are competitive, highly maneuverable, precise, fast, predictable and a fun fighter kite to fly.

Being a simple rectangle, a buka appears easy to make and it is. However it is quite time consuming. This article shows an easy and quite quick technique for making a high performance buka.

I suggest reading the article through a couple of times to become familiar with the flow of the process before you begin making the buka. This should cut your building time and also minimize frustrations.

This article shows making a 10"/254mm x 15"/381mm sized buka.

ADHESIVE BACKED PLASTIC PHOTO MOUNTING CORNERS

The key to this building technique is the use of self adhesive plastic photo mounting corners. These are available at any craft department or craft store that sells scrapbook making materials and are inexpensive.



The self adhesive plastic photo mounting corners are available in a few colors and clear. They come on a roll of about 250, depending on the brand. I have used several brands and they all work fine.

SIZES OF NORTH AMERICAN STYLE BUKAS

North American style bukas can be any size rectangle. However they are typically in a 3 to 2 ratio. The long side is 3 units long and the short side is 2 units long. This is just a general guide.....variations of this ratio also produce great flying bukas. The table below shows examples of proven North American style buka dimensions.

Wind Range	Height	Width	LE spar dia.	Diagonal spar dia.	Spine dia.
2-6 mph	11" 279mm	17.5" 445mm	.05" 1.27mm	.05" 1.27mm	.05" 1.27mm
5-10 mph	10" 254mm	15" 381mm	.05" 1.27mm	.05" 1.27mm	.05"/1.27mm or .06"/1.52mm
7-15mph	9-3/4" 248mm	14.25" 362mm	.06" 1.52mm	.05" 1.27mm	.06" 1.52mm

SKIN MATERIAL

In the photos I used black Orcon for the skin of the buka, however, any lightweight plastic film, polyfilm gift wrap, ripstop or Icarex will work just as well. I used Orcon because I have it and it shows up pretty well in the photos.

SPARS

All the spars in the kite for this article are made of 0.05"/1.27mm diameter carbon fiber rod.

The lengths of each of the spars for the kite in the article are:

Leading edge spar 14-7/8"/377.8mm

Spine 9-3/4"/249.2mm

Cross spars 17-13/16"/452.4mm

Cut your spars slightly longer than the dimensions and sand or cut them to fit when the time comes. This is because the precise dimension of your kite skin and the location of the self adhesive photo corners may be slightly different from mine. This will make a slight difference in the exact dimensions of the spars as you'll see as you read further. The kite will perform perfectly within a 1/4"/6.3mm dimension range. So don't worry about it if yours is slightly different in final dimensions from the one in this article.

BRIDLE AND TENSION LINE

You will need about 4'/100mm of 15#-20# test low stretch line to make the bridle. For making the tension line you will need about 4'/100mm of a stronger low stretch line, about 20#-30# test.

When bukas are made, they are flat. When they are flown, they must be bowed. Shortening the adjustable tension line on the back of the kite creates the bow or bend in the leading edge spar. Without a bend in the leading edge spar, the kite will not fly.

GLUE

CA glue or super glue and contact cement are the glues used to make this buka. You will only need a few drops of super glue to secure the knots of the bridle and the tension line. The contact cement is only used to secure the hem encasing the leading edge spar.

TOOLS & OTHER MATERIALS YOU'LL NEED:

- ✓ Flat smooth work surface
- ✓ Hobby knife with new blade or new single edged razor blade
- ✓ Scissors
- ✓ Ruler - 18"/460mm or longer, preferably metal
- ✓ Large eyed needle
- ✓ A pen that will write on the skin material you are using
- ✓ Several toothpicks
- ✓ Tape that will bond well to the material you are using for the skin. Packing tape, Orcon tape, filament tape and Icarex tape are some that work well on many skin materials.
- ✓ OPTIONAL – One piece of 1"/25mm long small diameter tubing. This can be heat shrink tubing or vinyl. The inside diameter should be slightly larger than the diameter of the leading edge spar.

CUTTING OUT THE SKIN



Measure a rectangle 10.5"/266.7mm x 15"/381mm on your skin material. This dimension includes a ½"/12.7mm hem along the leading edge that will encase the leading edge spar.

Cut out the skin.

Now draw a parallel line ½"/12.7mm from our long edge. This line indicates the actual leading edge of the kite. This line will be the location of the leading edge spar.

Now draw a line from the trailing edge corners to the opposite corners created by the intersection of the leading edge line you drew and the edge of the skin. These cross lines are the locations of the cross spars.

Then measure along the leading edge line 7.5"/190.5mm from the edge and make a mark. Do the same along the trailing edge. Connect the marks to form the vertical spine line.

ATTACHING THE ADHESIVE BACKED PHOTO MOUNTING CORNERS



Use a toothpick to remove a photo corner from the package. This prevents your fingers from reducing the bonding power of the adhesive. Place a photo corner at the location of each corner of the finished kite. Note the location of the photo corners at the leading edge; they are on the corner created by the leading edge line

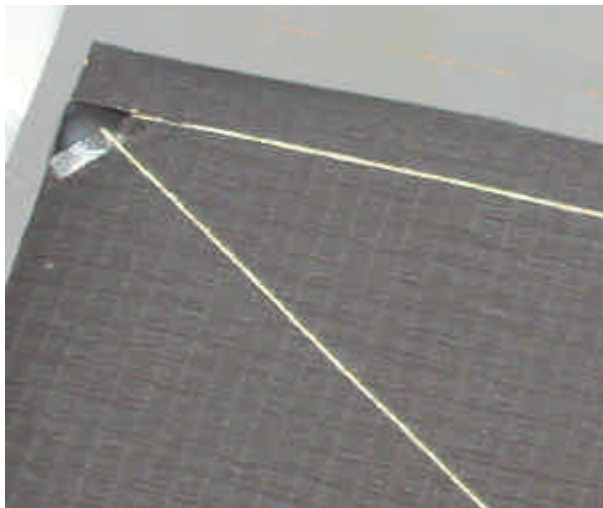
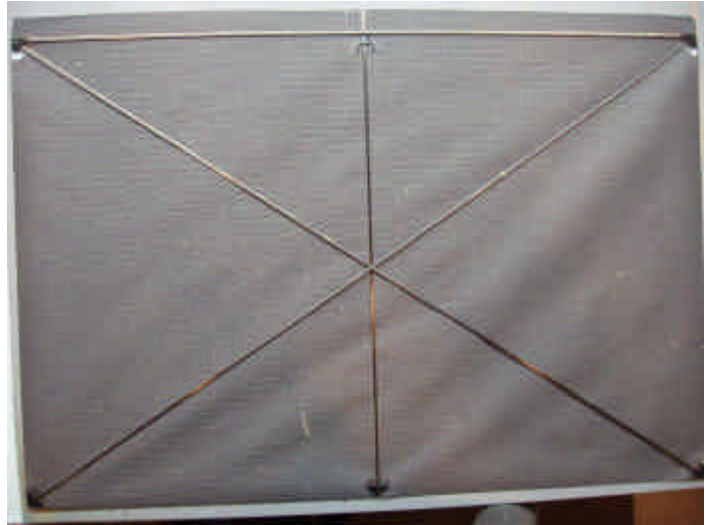
and the edge of the kite.

Also place one at each end of the spine line, unless you are going to use a piece of tubing for the connection of the leading edge spar to the spine, (this option will be discussed a little later). If you use tubing, then you will place a photo corner only at the trailing edge end of the spine.

INSTALLING THE SPARS

Once you have the photo corners attached to the kite skin, it is time to fit and install the spars into the photo corner pockets. I use a toothpick to help open the photo corner enough to easily insert the end of a spar.

Insert the leading edge spar first. If it is too long, cut and/or sand it to the length so it will fit. When fitting the spars into the corners, be sure the ends are pressed firmly into the corners. When installed, none of the spars should cause wrinkles to form in the kite skin. If you have wrinkles it probably indicates you have one or more of the spars just slightly too long.

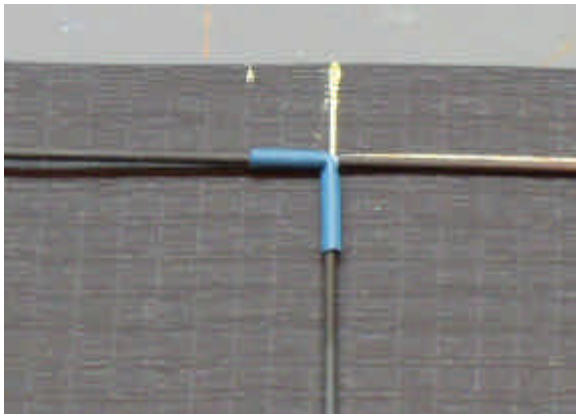


Into the photo corners at the leading edge corners, you will be placing the ends of both the leading edge spar and a cross spar.



In the photo above showing all spars installed into the photo corner pockets you'll notice the point where the spine meets the leading edge spar, there is a photo corner. This is where the leading edge end of the spine is inserted.

There is an optional method that is slightly more secure at holding the spine and leading edge in alignment; it uses a small piece of tubing. You puncture one wall of the tubing with a needle at about the 1/2 length mark of the tubing. Then insert one end of the leading edge spar into one end of the tubing and have the spar exit through the puncture you made with the needle.



Decide which method you want to use, both work well, but using tubing as described is slightly more durable.

FINDING THE 'NATURAL' CARBON FIBER BEND

After all the spars are installed into the photo corner pockets, pick up the kite and hold it by the leading edge corners. While holding the leading edge corners, one in one hand one in the other hand, gently compress the leading edge spar so it begins to bend. When this happens, the cross spars will also begin to bend slightly.

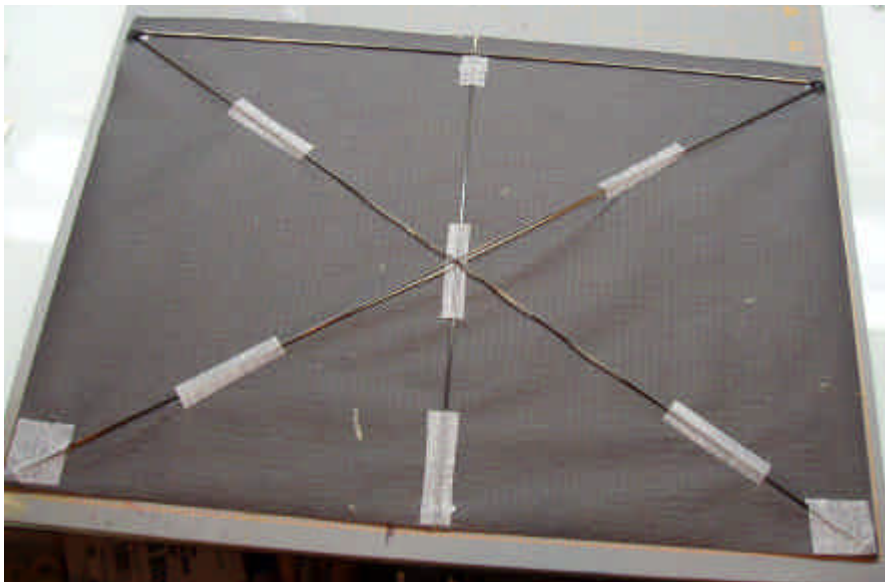
As the spars bend, they will automatically rotate to their 'natural' bending position. This is how you want the carbon fiber spars oriented. Once you have positioned the spars in this way, carefully lay the kite back onto your work surface and begin taping the spars in place.

SECURING THE SPARS TO THE KITE SKIN

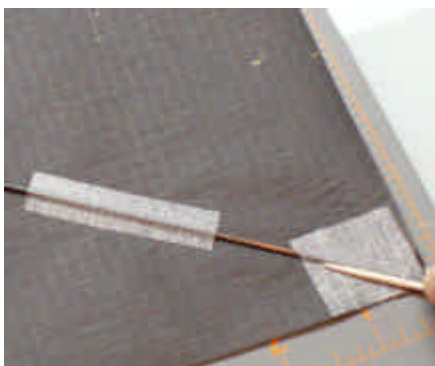
After you have the spars oriented correctly, cut 7 pieces of tape, each about 2"/50mm long and about 1/2"/12.7mm wide and 2 pieces of tape about 1"/25.4mm square.

Place a piece of tape on the cross spars at two places. In addition, at the bottom or trailing edge corners apply a piece of tape that is about 1"/25.4mm square to each cross spar. These tape squares will cover the photo corner. You can see in the photos where the tape is to be applied.

The spine is taped at both ends and in the center. The tape at both ends covers the photo corners.



Burnish all the tape well so it is bonded well around the spars and also onto the kite skin. I use a toothpick to assist in the burnishing.

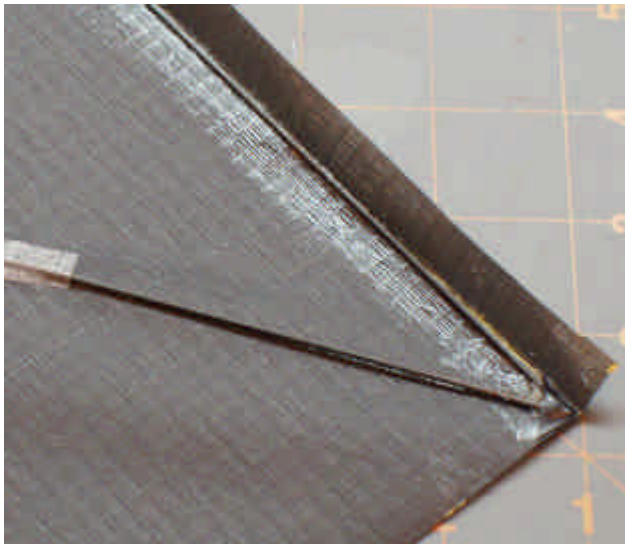


BONDING THE LEADING EDGE SPAR TO THE SKIN

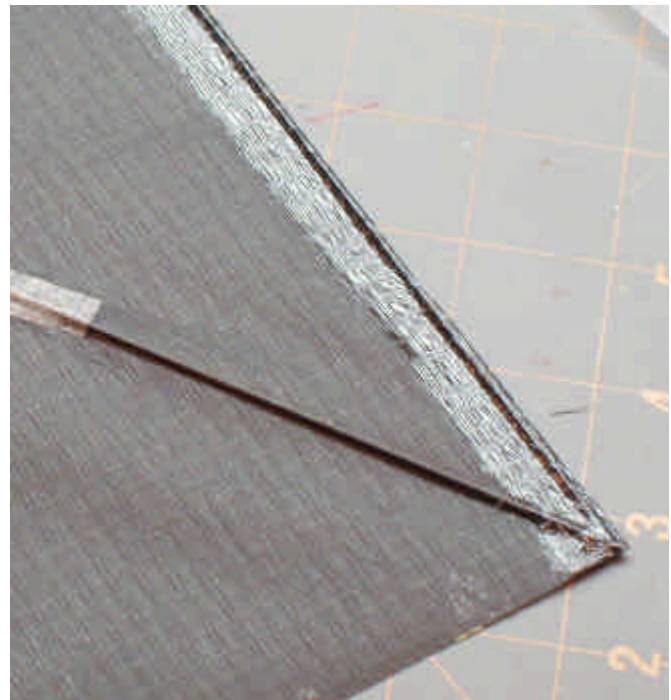


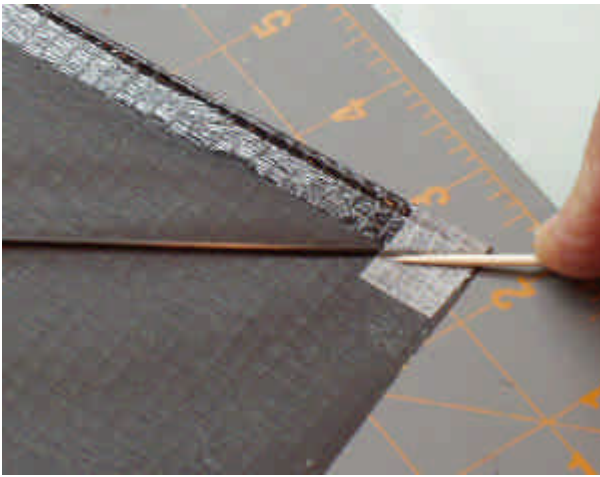
The leading edge hem is what secures the skin to the leading edge spar. The hem will be glued to the spar, using contact cement or a glue that bonds well to the skin material you are using.

The hem covers and is glued onto the skin, the leading edge spar the spine photo corner and the leading edge photo corners. Apply contact cement to those mentioned surfaces and let it dry.



Once the glue is dry, fold the hem around the leading edge spar and onto the back side of the kite skin and burnish well.



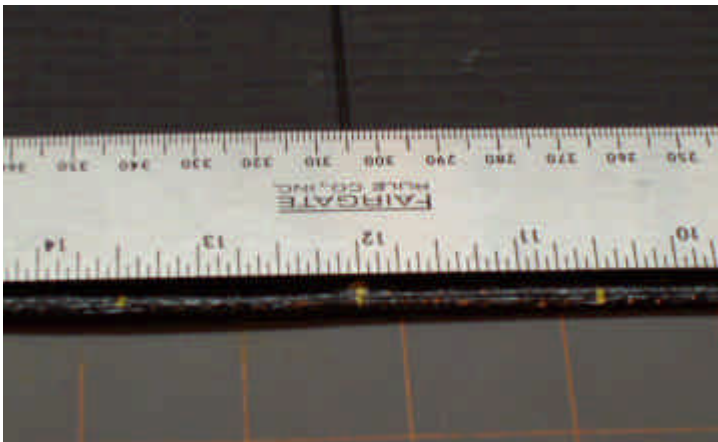


After the hem is glued down, apply a piece of tape to each of the corners of the leading edge. Burnish them well. The tape is applied to the back of the kite and is wrapped around the leading edge spar and onto the front face of the kite.

You want the corners to be strong. This is where much of the abuse and damage occurs on a buka, especially when they crash. Another place is at the junction of the spine and leading edge spar, so put a piece of tape there also. This piece of tape should also overlap from the back to the front of the kite.

LOCATING THE CONNECTION POINTS FOR THE UPPER BRIDLE YOKE

Place a ruler along the leading edge and make a mark on the leading edge that is 1.5"/38.1mm from the center of the spine. Make the mark on both sides of the spine. These marks are the location of where you will tie the ends of the upper bridle yoke onto the leading edge spar.



Thread a large eyed needle with about 12"/305mm of bridle line. Begin at one of the bridle marks you made on the leading edge and from the back side of the kite poke the needle thru the kite skin just below the leading edge spar. Pull the line through so there remains enough line to tie a secure knot. Then poke the needle from the front of the kite through the kite skin at the mark on the other side of the spine.

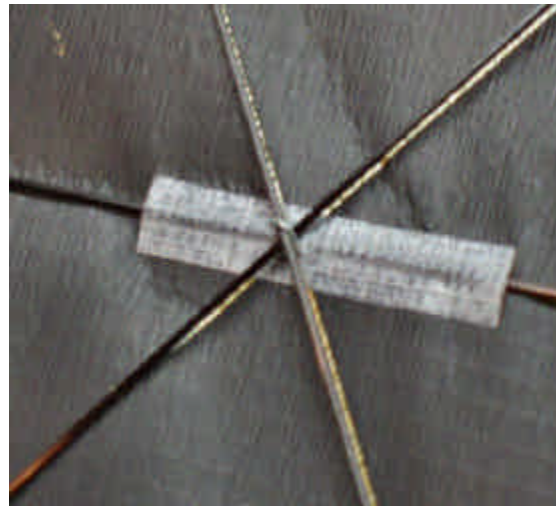
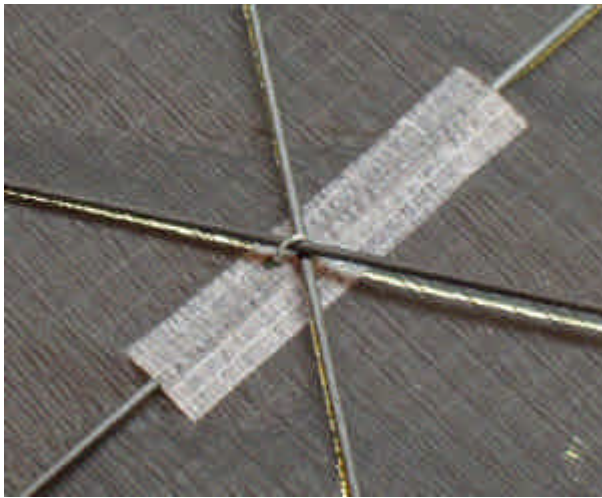
Tie each end of the upper bridle yoke line around the leading edge spar. There will be a loop or yoke created on the front of the kite with the line. Then place a drop of CA or super glue on each of the knots to secure the upper bridle yoke to the leading edge spar.



Cut a second piece of bridle line about 24"/610mm long. This is the lower bridle line. At one end of the lower bridle line fold over about 6"/153mm and tie an overhand or figure eight knot to form a loop.

Secure the loop at the end of the line to the center of the upper bridle yoke using a larkshead knot.

Then thread your needle with the opposite end of the lower bridle line and poke the needle through the front face of the kite at the cross point of the spars in the center of the kite. Wrap the line



around the spars and poke the needle from the back of the kite through to the front. Place the needle's entrance and exit

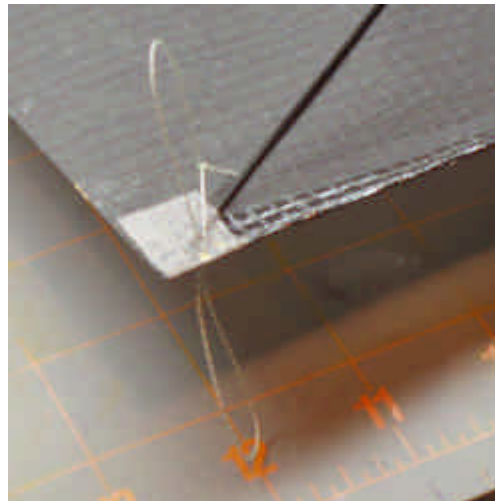
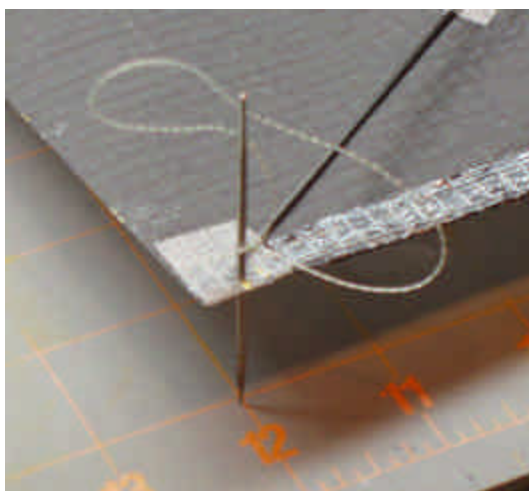
so when wrapped around the spars and tied, the lower bridle line will secure both cross spars to the spine.

Before tying the lower bridle line to the spine, pull the lower bridle line toward one of the leading edge corners. The length of the finished bridle should prevent the bridle from wrapping around the leading edge corners of the kite. After you've established the length of the bridle line, tie the loose end of the lower bridle line securely and apply a drop of CA or superglue to the knot to secure it to the spine.



Cut a third piece of bridle line about 6"/153mm, fold it in half and tie the loose ends together forming a loop. This is the tow point connection loop. It is where you connect your flying line to the bridle of the kite. Secure the loop to the lower bridle line using a larkshead knot.

MAKING THE TENSIONING LINE



Measure $\frac{1}{4}$ "/6.35mm from the leading edge corner and make a mark on the leading edge. Do the same on the opposite leading edge corner.

The tension line consists of 2 separate pieces of line. First, cut a piece of bridle line about 6"/153mm long, fold it in half and tie the ends together to form a loop. Thread the loop into the needle eye. Poke the needle through the corner tape, the kite skin and the photo corner at the mark you made at one of the leading edge corners. Create a larkshead knot with the two parts of the loop and pull tight. Place a drop of CA or super glue at the knot to secure it to the leading edge spar so it is on the back side of the kite.

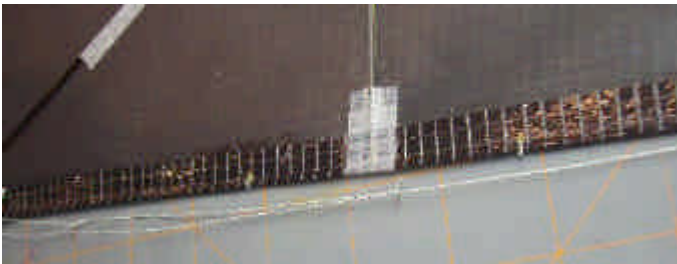


Cut another piece of line about 24"/609mm long, this is the second part of the tension line. Thread one end through the eye of the needle and poke the needle through the kite skin at the mark you made at opposite leading edge corner. Tie one end around the leading edge spar securely and place a drop of CA or super glue on the knot to secure the line to the leading edge spar.

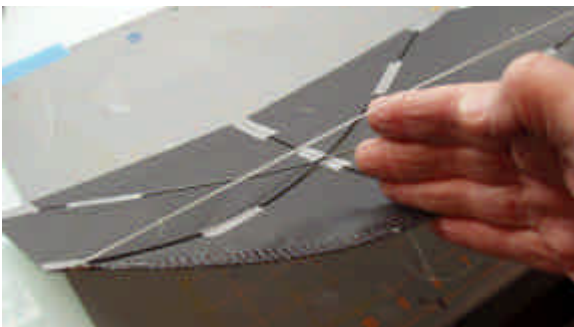


Feed the end of the line through the loop at the opposite leading edge corner and pull it snug. The tension line is on the back side of the kite.

About 5"/127mm from the end of the loop, tie a tautline hitch adjustable knot onto the second tension line. This will allow the tension line to be shortened and the loop will act as a pulley.



BEFORE YOU FLY YOUR NEW BUKA

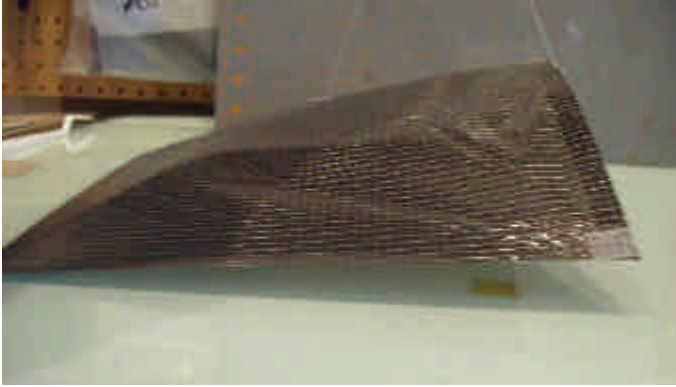


Before flying the buka, shorten the tension line which will create a bend or bow in the leading edge spar. The amount of bend you put into the leading edge spar will affect the way the kite flies. A very good average is to create enough of a bend so you can place 3 fingers stacked on top of each other between the leading edge spar and the tension line.

KNOT NOTE: If you are unfamiliar with knots, search Google for the specific name of the knots you want to learn.

The simplest and easiest knot for securing line to spars is the double half-hitch, other knots work great also, but this one is easy to tie. The other knots used in the bridle and tension line are the larkshead knot and the tautline hitch.

PRE-TUNING



A good way to find an average starting position bridle adjustments is to 'pre-tune' the bridle before you fly the kite. Here's how: position the lower bridle line's larkshead knot in the center of the upper bridle yoke. Then hang the kite by the tow connection loop above a flat surface, indoors. The leading edge spar should be tensioned as above so the leading edge has a '3-finger' bend in it. Slide the tow connection loop up or down along the lower bridle line until you position it at a point where the corners of the leading

edge of the kite are about 2"/51mm above the flat surface when the trailing edge of the kite is barely touching the flat surface. The kite will be hanging at an angle. This adjusts the bridle at a good starting point that allows the kite to fly well in 5-10mph winds.

After flying the buka, you will want to adjust the tow connection point location and the amount of leading edge spar bend to best accommodate the wind conditions and your flying style or what some flyers call their kite's 'sweet spot'. It may take a little experimenting to locate this 'sweet spot', but it will be worth it!

One aspect of bukas you should be aware of; they do not self launch after grounding. So when your buka lands on the ground, plan to walk out to retrieve it.

Of all fighter kites I've flown, buka's are one of the most interesting, exciting and fun fighter kites to fly! I hope you enjoy flying yours as much as I enjoy flying mine!

If after making and flying the buka you have questions about it, please don't hesitate to email me. I'm eager to assist, if I can. BukaBuka!

BigBukaGrins, Bruce kitefighter@nwinfo.net