# Teachings From An American Style Fighter Kite

When flying a fighter kite, one of my goals is **to adjust the kite so its flight characteristics match, as close as possible, the way I want the kite to fly.** Probably this is also one of your goals. So…how do we get there from here?

We carefully watch the kite because the kite is our only instructor.

Sometimes this isn't as easy as it sounds because we are not used to being that watchful. We may not be well trained at close observation. However, the fighter kite can help teach us this.

For example, if the kite is not spinning the way we want it to, we may think the issue is related to the bridle adjustments. But when we make those adjustments, the kite still acts as it did before the adjustment….or worse. What we thought was the issue wasn't an accurate assessment. We thought we were carefully observing the kite's behavior, but we missed something that could have told us the answer.

This article discusses things I've learned from the fighter kites themselves about making adjustments vs what to expect afterwards. First, please remember that adjusting or tuning a fighter kite is normal and is a required part of fighter kite flying. I know of no American style diamond shaped fighter kite that never needs adjusting. A fighter kite can not fly well without your input. Get used to changing the various adjustment points often; this is how you will get the kite to fly the way you want it to.

Learning to precisely adjust or tune a fighter kite only takes a little practice; it is not difficult and does not require any special tools or skills. In fact it is relatively easy and quick to do.

**When a kite is adjusted so it will consistently do the following 3 things, most fighter kite flyers would tell you the kite's adjustments are virtually perfect:**

1. The kite will fly in a straight path as long as you provide consistent strong tension on the flying line.

2. The kite will begin to spin or turn at the moment you reduce the flying line tension.

3. During a straight horizontal flight in either direction, the nose of the kite will turn upward, towards 12 o'clock, when you reduce the flying line tension.

You'll notice the primary issue in the 3 flying parameters above is the changes in flying line tension. A fighter kite is controlled by the application or absence of tension in the flying line and all degrees of tension in between. There is nothing else involved in the control of a fighter kite's flight.

## WHAT'S ADJUSTABLE?

When you're adjusting or tuning a fighter kite, you're modifying very few aspects of the kite. The major aspects you can't modify; they include the kite plan, the materials used in its construction and the building techniques; unless you are the kite maker and can make another kite using a different plan, materials, etc.

**What's discussed in this article are adjustments you can make to any diamond shaped American style fighter kite that will allow you to determine or modify important flight characteristics of the kite**.

## WHAT ADJUSTMENTS CAN YOU MAKE TO A FIGHTER KITE?

When a kite is finished being made, it is without any guidance from its flyer about how it should perform. Its guidance for how to perform comes from the flyer in the way of adjustments as discussed in this article. There are only 4 simple adjustments available on most American style fighter kites. The exceptions would include kites with more complex bridling than is typically used in competition caliber fighter kites.

Each of the kite adjustments discussed contributes in modifying an aspect of the kite's flight behavior. Although each of these adjustments is discussed individually, ALL of them must be evaluated in any kite you want optimum performance from.

A. **Static nose to tail balance**
B. **Spine shape**
C. **Dynamic right to left balance**
D. **Tow point location**

## A. STATIC NOSE TO TAIL or FORE/AFT BALANCE

The first thing is to determine its fore/aft balance point. The initial balance point of a fighter kite is created when the kite is made. The kite plan, materials and construction techniques determine the finished kite's balance point. However, after the kite is made you can add small amounts of weight, usually putty, to the backside of the spine to easily change the balance of the kite. Adding weight to a fighter kite to modify its balance is very commonly done and does not in any way indicate a kite was poorly made just because it requires added weight to balance it the way you want it balanced.

**How to find the fore/aft balance point.** Place the backside of the kite's spine on the tip of your finger or a pencil eraser; move the kite fore and aft, until it balances. Do this indoors or in no wind. Mark that point on the spine; that's the static fore/aft balance point.

OK, now that you located the fore and aft balance point, what value does it have?

The location of the fore and aft balance point helps determine the way your kite spins. If you want your kite to enter a spin very quickly after you reduce the flying line tension, you will want the fore and aft balance point located not more than 0.5" (13 mm) toward the nose from the point where the spine and a line drawn from wingtip to wingtip intersect.

The spin of a kite with the balance point located in this range will tend to have a spin that looks more like a rotation of the kite around the center of the kite rather than a small circle or loop.

***NOTE**: The location of the static balance point is NOT the only adjustment necessary to determine or develop a kite's spin.*

The closer the balance point is to the wingtip/spine intersection the tighter spin or rotation the kite will have and the quicker the spin will be. The tighter or more centered a rotation the spin becomes, the faster the kite can change directions.

If you want your kite to spin more slowly and/or in loops or small circles instead of rotating around its center, you'll want the balance point to be about 3/4" (16mm) to 1-1/2" (38.1mm) toward the nose from the wingtip/spine intersection. With the balance point more forward, the kite will not turn or spin as readily when you reduce the flying line tension. When it does spin, it will create small loops or circles.

With the balance point closer to the nose, the kite may also have a tendency to glide between line pulls. For example, when you pull and release the flying line, the kite will not stop as suddenly; it will continue flying for a slightly longer period. Gliding like this can be a beneficial characteristic especially for indoor flying.

If the balance point is toward the tail from the intersection of the spine and wingtip line, the kite will center its spin near the lower bridle connection point. The kite's spin will appear centered near the tail of the kite.

Each of the different spin styles has its advantages depending on your flying style and flying goals. Most line-touch competition flyers prefer their kite's spin centered close to the center of the kite. The reason is a rotation or very tight spin is the fastest way, shortest path, for the kite to change its direction. In competitions, this can be very important.

**When you add weight to the kite**, add about a pea sized amount of putty then check the balance. If it needs more to move the balance point to where you want it, add a small amount more, etc. Once the balance point is located where you want it, fly the kite and check its spinning characteristics. You may want to readjust the location of the balance point to achieve the performance you want.

## B. ADJUSTING THE SPINE SHAPE

The first step in adjusting or bending a fighter kite spine is to carefully look at the spine of the kite to determine if it has a bend and if so, how much. Holding the kite so you can sight down the spine from the nose, if the spine is correctly adjusted or bent, you should be able to see a slight rocker shaped bend in the spine. The bend should push out toward the front face of the kite.

If the spine doesn't have a bend, or has a virtually non-existent one, you may need to create or increase the bend. The bend in the spine significantly contributes to the kite's spin or lack of spin. The greater the amount of bend in the spine, the easier and quicker the kite will spin. If the kite has little or no bend in the spine, the kite will have very little tendency to turn or spin when the flying line tension is reduced.

There is another affect of spine bend; the greater the amount of bend, the slower the forward speed of the kite will be. For example, in adjusting a kite for line touch competition the amount of spine bend should be the least possible amount to provide the spin you want, but not so

much as to slow the kite's forward speed. Balancing the kite's speed vs its spin is a matter of personal preference, there is not correct or 'right' way.

A couple of frequently asked questions are "How much bend should a spine have? And "Where along the spine's length should the bend be located?"

With the kite lying with its front face on a flat surface such as a table, press down on the backside of the spine near the lower bridle connection point. This should make the lower or tail portion of the kite's spine be flat on the table. With the tail portion of the spine flat on the table, measure the distance from the NOSE of the spine to the table's surface.

It should measure between 1" (25mm) and 2" (50mm). This measurement is telling you the relative amount of bend in the spine. The amount of spine bend you need is partially dependant on your flying preferences.

When flying the kite, if you find the kite spins perfectly for you, then leave the bend as is, if it doesn't spin quickly enough, increase the bend slightly. Each time you increase the bend in the spine, increase it just a small amount; then fly the kite. Each time you fly the kite after adjusting the spine bend you will know by the change in the kite's characteristics if the increase was sufficient to make the kite spin to your liking. Continue increasing the bend, little by little until the spinning characteristic is as you want it.

The bend should begin at the nose of the kite and extend toward the tail of the spine about 6"-7" (152.4 – 177.8mm). However, the bend should not extend far enough toward the tail of the kite to reach the point where the wingtip line intersects the spine.

**Just as important as having the correct location and amount of bend in the spine is having the tail portion of the spine absolutely straight.** Beginning at the point where the wingtip line intersects the spine and extending to the very tail, the spine should be straight; absolutely straight.

**Tips on Bending a Bamboo Spine**

To create a bend or increase the bend in a bamboo spine place the kite with its front face against your stomach. Then gently press on the backside of the bamboo spine, pushing it into your stomach while at the same time gently pushing the nose of the kite's spine away from your body.

Press on the backside of the spine at several points, one at a time, pressing the spine into your stomach a little. Begin at a point about 2" (50.8mm) toward the tail from the nose, continue pressing on the spine at about every 1" (25.4mm) and continue to about 5" (127mm) below the point where the bow and spine cross. This entire portion of the spine should have a gentle rocker shaped bend.

The combination of the pressure of your fingers pressing on the back of the spine and the heat from your body is sufficient to gently bend the bamboo spine. At each point where you press on the spine, hold it against the warmth of your body for a few seconds before pressing at a different point. Don't push the nose of the spine more than about 1"-2" (25.4 – 50.8mm) away from your body; otherwise you increase the risk of breaking the bamboo.

**CAUTION: Bamboo can be broken by pressing too hard at any one point. Don't try to bend the bamboo sharply, it may break or weaken.** ***The ideal spine bend is a very gradual curve.***

**Tips on Reducing the Bend in a Bamboo Spine**
If the spine is bent too severely for your preference of flying, here's how you can reduce the bend. You can also use this technique for straightening the tail portion of the spine.

Place the kite against your body with the backside of the kite facing your stomach. Gently press on the front face of the kite's spine, pushing it VERY, VERY gently into your stomach. Press on it in several places, one at a time, along the portion of spine where you want less bend. At each point where you press on the spine, hold it against the warmth of your body for a few seconds before pressing at a different point.

When trying to straighten the bamboo, it is possible to break the bamboo if you put too much pressure at any one spot along the spine……use caution and be gentle.

**Bending Carbon Fiber Spines**
If your kite has a spine made of carbon fiber rod or flat stock, there is usually a tension line or mechanism that creates the curve or rocker shape in the carbon fiber spine. Adjust the tension mechanism so the spine has a gentle rocker shape from the nose to a point about 5" (127mm) below the point where the spine and bow cross.

If you are trying to adjust the spine for line touch competition, then, If the tensioning device creates a bend that extends toward the tail past the wingtip line/spine intersection, you may want to relocate the tensioning device terminations so the bend is created only in the portion of the spine that is toward the nose from the wingtip line/spine intersection.

**C. RIGHT TO LEFT BALANCE**
Most American style fighter kites are naturally ' balanced', right to left, when they are made by the kite maker. This is due mainly to the use of relatively uniform synthetic materials. However, if for example, a kite builder was sloppy with the use of tape by using significantly more tape on one side of the kite compared with the other side, the kite may be slightly out of balance; slightly heavier on one side than the other.

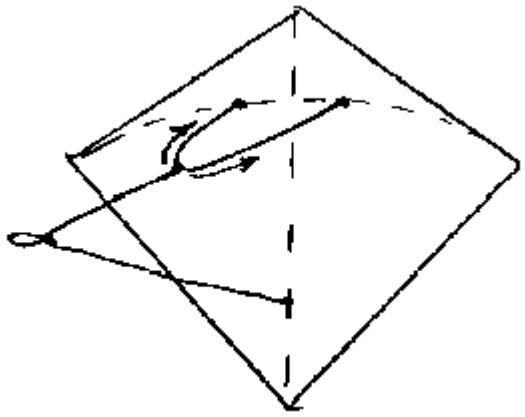
I don't bother checking the static right to left balance of my kites. Instead of statically balancing the kite right to left, I ***dynamically*** balance the kite using the right/left bridle adjustment.

Typically, an American style fighter kite has a 3-point bridle. With a 3-point bridle, there are 2 bridle connection points on the bow that form a yoke across the spine.

When adjusting the bridle to balance the right/left aspect of the kite's flight, you are dynamically balancing the kite right to left. Dynamic balance takes into account not only the slight differences in weight on the right vs. the left side of the kite, but also compensates for small differences in the way the kite's materials act in flight on the right vs. left side of the kite.

The dynamic balance is adjusted by positioning the lower bridle leg's larkshead knot along the upper bridle yoke. **The kite is dynamically balanced right to left** when you apply strong tension to the flying line and the kite flies or 'tracks' straight.

**NOTE:** *The upper bridle loop or yoke is a relatively short line with each end of the line attached to the bow. The upper bridle yoke is on the front face of the kite and it crosses the spine. A larkshead knot connects the lower bridle leg to the upper bridle yoke.*



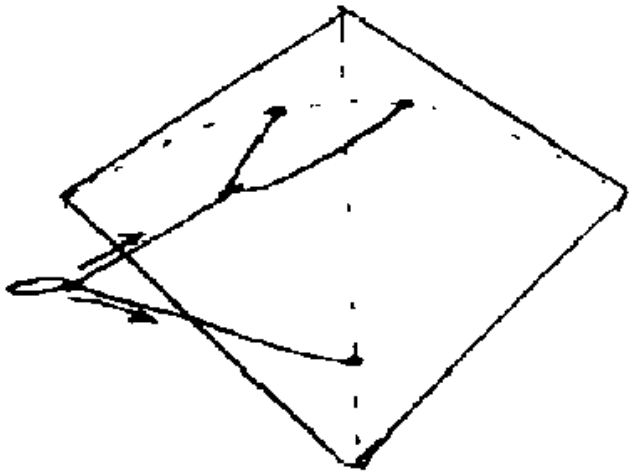
You adjust for it by moving the lower bridle leg's larkshead knot along the upper bridle yoke until the kite flies straight when strong tension is applied to the flying line. When the right/left bridle adjustment is correctly positioned, the kite won't have any tendency to veer or constantly turn to one side or the other!

**An example of what to do about adjusting the right/left bridle connection**
If your kite is turning, spinning or veering consistently to the right, you would move the lower bridle leg's larkshead knot to the left along the upper bridle yoke. If the kite is veering to the left, you would move the larkshead knot to the right along the upper bridle yoke.

This is an extremely sensitive adjustment. I suggest moving the larkshead knot 1/64" (0.39mm) or less and fly the kite to see if it is flying straight. If not, then move it again about 1/64" (0.39mm) and fly again. Repeat this until the kite is flying straight.

***REFERENCE:*** *Right and left are referred to as you are facing the front of the kite; the same as if you were flying the kite.*

**D. TOW POINT LOCATION**
A good starting point for positioning the tow connection loop is created by what is called 'table tuning' a kite. It's done in no wind, usually indoors. Use a tabletop, floor or flat surface for a reference when table tuning a kite.



Position the tow connection loop at a point along the lower bridle leg that allows the kite to hang at a slight angle, nose up/tail down.

The tow connection loop is in a position that will virtually assure you the kite will fly when the kite hangs with its tail touching the tabletop and the nose is about 1.5"-3" (38 – 75mm) above the tabletop. Use the table tuning location of the tow connection loop as your starting position when first flying your kite. You should expect to make adjustments to the tow connection loop's position during your flying sessions. This is normal.

When you're flying the kite, here's what to expect when moving the tow connection loop from its table tuning position.

**Moving the tow connection loop toward the nose of the kite causes the kite to:**

(a) have less pull on your flying line,
(b) fly slightly faster,
(c) spin or turn in wider circles,
(d) be less willing to fly straight or 'track' for long distances,
(e) be more willing to circle, curve or spin,
(f) be less stable.

**Moving the tow connection toward the tail of the kite from the initial starting position:**

(a) reduces the willingness of the kite to spin,
(b) when the kite does spin, the kite will spin in a tighter circle,
(c) causes the kite to pull harder on your flying line,
(d) causes the kite to fly slightly slower,
(e) enhances the kite's ability to fly or 'track' straight,
(f) makes the kite more stable.

However, when the tow connection is moved too close to the tail of the kite, the kite will not fly forward; the kite may just hover, or may even try to fly with the tail pointing up instead of the nose!

If the tow connection loop is at an extreme position near the nose of the kite, the kite will act as though it is being deflected by the wind and will fly in large curves or circles and likely will crash often. It won't fly straight no matter how hard you try.

A position somewhere between the extremes is what normally works best. This adjustment is sensitive. Each time you adjust the tow connection loop, move it about 1/8"- 1/4" (3.17 – 6.35mm). After moving the tow connection loop, fly the kite and notice the affect. Continue adjusting until the kite is flying to your liking.

**If you are at the flying field and don't have a 'no wind' condition available to 'table tune' the kite to find a good starting location for the tow connection point, here's an option:**
Move the tow connection loop to a point on the lower bridle leg where the kite flies very slowly forward. To find this point, fly the kite, then move the tow connection loop about ½" (12.7mm) toward the tail and fly the kite again. Repeat this until you have the kite flying forward, but very slowly, the kite will be almost stalled when in this condition. This means the tow connection loop is closer to the tail of the kite than you would want for normal flying.

Once you have the kite slowly flying forward, fly the kite to see if it flies in a straight path or if it veers or turns to one side or the other. If it is flying straight, you don't need to make any adjustment on the upper bridle and you can skip the next step. If the kite is veering to one side, your next step is to adjust the right-left dynamic balance of the kite as described above.

When you have the kite flying or tracking straight, the last step in the bridle adjustment is to move the tow connection loop toward the nose of the kite. Move it about 1/4" (6.35mm), fly the kite and see if it flies as you want. If not, move the tow connection loop another 1/4" (6.35mm) and fly it again. Repeat this until the kite's flying as you want it to.

## …AND A BIT MORE…

### NOSE TO TAIL BALANCE, SPINE SHAPE AND TOW POINT LOCATION INTERACTION

Although these three adjustments are independently made, they all interact with each other during flight. It's because of the constant interaction that makes it important to evaluate all 3 adjustments every time you feel any 1 adjustment is needed.

### CORRECTLY ADJUSTING THE KITE IS LIKE 'TAMING' IT

The importance of having a correctly adjusted fighter kite can not be over emphasized. Precise adjusting or 'tuning' makes an amazing difference in a fighter kite's flight characteristics! When correctly adjusted, the kite is totally in your control, it's predictable and you have confidence when flying it. Making the adjustments is like programming the kite to make predictable responses to the wind and to your flying line manipulations. Without correct adjustments, a flyer may blame the kite for its uncontrolled and erratic performance.

However, here's an important **Fighter Kite Truth**: ***A fighter kite NEVER makes mistakes in flight and it NEVER lies to the flyer!*** This may seem like an odd statement. But, what often happens is the flyer expects the kite to behave in a specific manner. However, the flyer may not have correctly adjusted the kite to allow it to behave in that expected way, or the flyer did not manipulate the flying line in a way to allow the kite to perform as expected. In these situations some flyers blame the kite. Remember that the kite is your **teacher**, so pay close attention to what it is telling you.

### The Wind Conditions

Because a fighter kite's adjustments are partially related to the wind conditions, each time you fly a specific kite, you may need to make minor adjustments to it. This is true even though your kite was perfectly adjusted the previous time you flew it. Differences in wind speed between the two flying sessions are what cause this to occur.

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