CHAPTER FIVE: TUNING

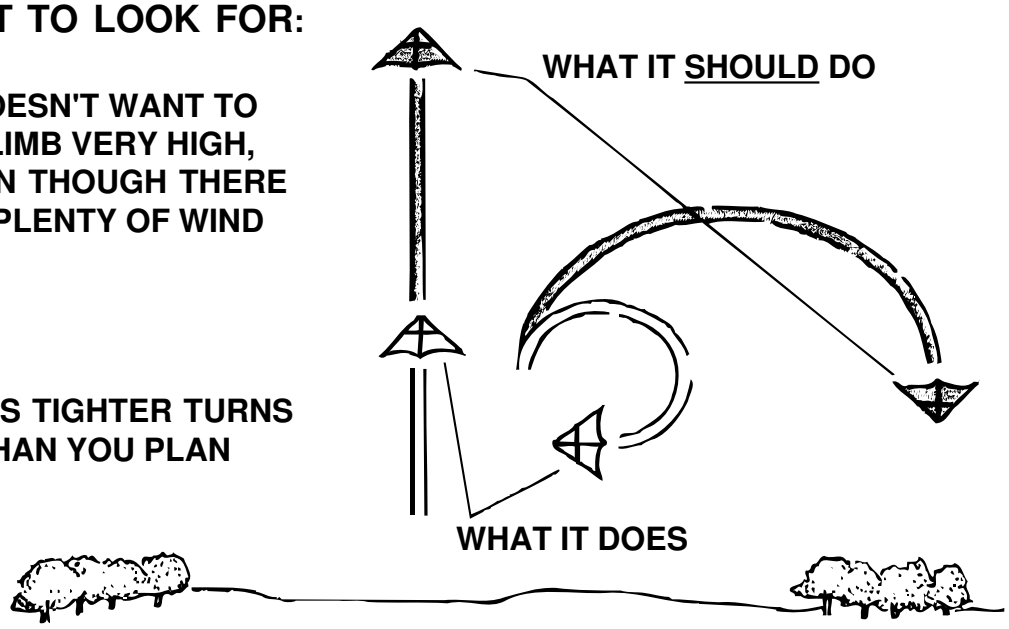
The best musician sounds terrible on an instrument that's out of tune. Just as a properly tuned instrument gives good sound and great pleasure, a properly tuned stunt kite will delight you with its ability.

The main reasons we tune kites is to adjust for wind conditions, to correct errors, and to maximize performance. In stronger or lighter winds, a kite can be tuned to increase speed, reduce pull, or simply stay in the air.The process is simple if you know what to look for and what to do. So here's --

WHAT TO LOOK FOR:

DOESN'T WANT TO CLIMB VERY HIGH, EVEN THOUGH THERE IS PLENTY OF WIND

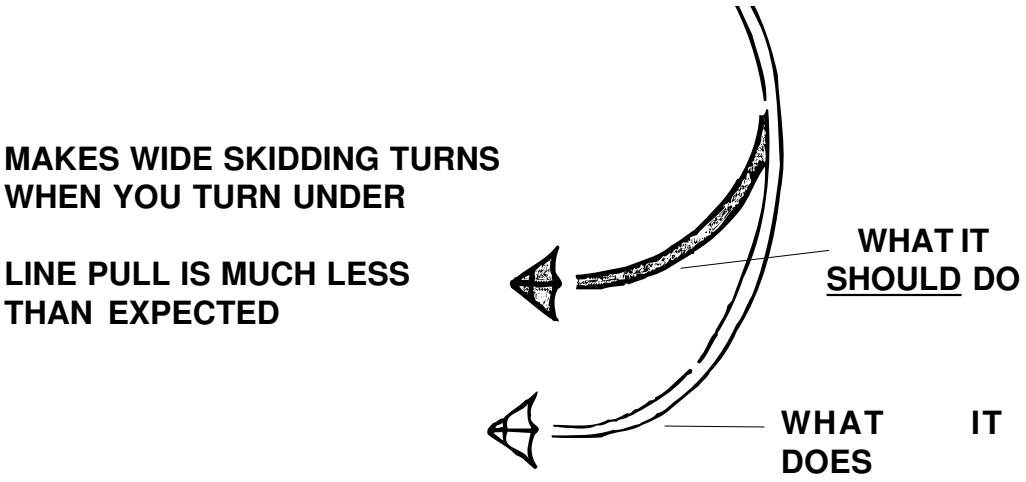
MAKES TIGHTER TURNS THAN YOU PLAN



A kite needs tuning when it won't climb well. In any reasonable wind, say 7 MPH, it should climb up to at least a 45 degree angle. The other symptom that goes with "lack of climb" is "turns too tight". The kite will execute very tight turns, and will feel like it's "yanking" itself around, rather that flying smoothly through a turn.

You can check your kite's adjustment by holding the bridle clips in your hands with the kite over your head. If the bridle is too low, the kite will not want to lift; too high and the kite will want to float on top of the wind. Find a happy medium.

Here's another indication that your stunter needs tuning:



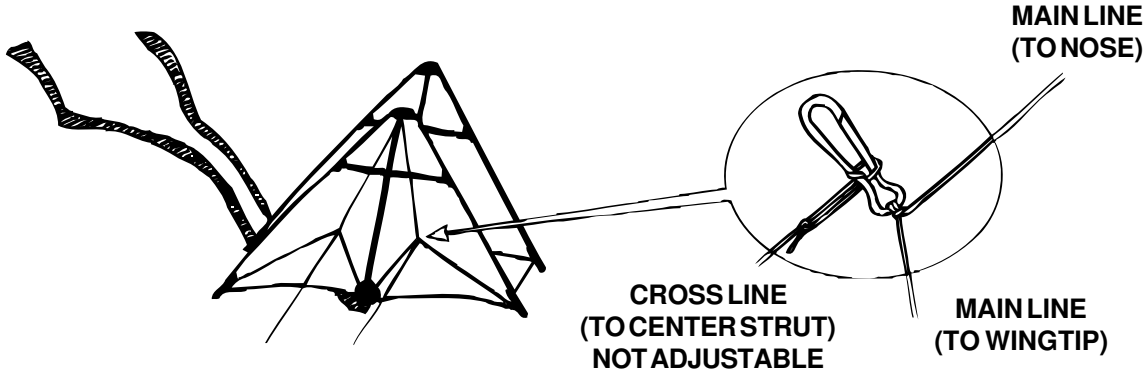
When the kite makes "down" turns wider than planned, when even the most careful control seems like too much, when the line pull goes away completely and the kite seems on the verge of falling out of the sky — TUNE IT.

Some kites naturally make noise when they fly. Others are usually silent. The noise (or lack of it) is a valuable indicator of a stunt kite's tuning. Over time, you should learn how to "read" kite noise. We'll talk more about this later.

So now that we've talked about what to look for, let's talk about --

WHAT TO DO

ADJUSTING CLIPS — Adjusting bridle clips will take a little explaining.



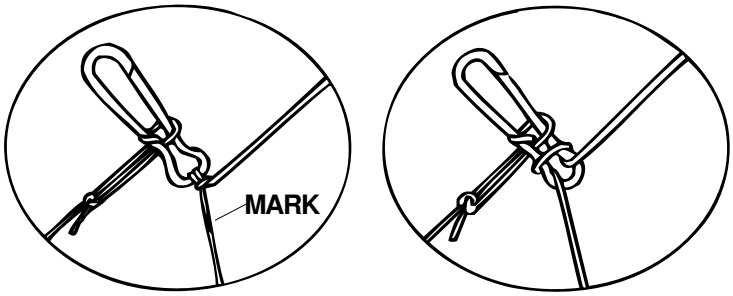
Stunt kites with bridles use "clips" to attach the flyline. On Diamond Wing stunters, each clip is attached to a single Main Bridle Line. On Delta Wing kites, the clips have two lines attached (besides the flyline) -- the Main Line, which is longer, and the Cross Line. The Cross Line (sometimes called the "Static Line") is not adjustable. With either kind of kite, adjusting the clips consists only of sliding them up or down the Main Line.

"UP" or "FORWARD" or "LIGHTER" means TOWARDS THE NOSE
"DOWN" or "BACK" or "HEAVIER" means TOWARDS THE BASE

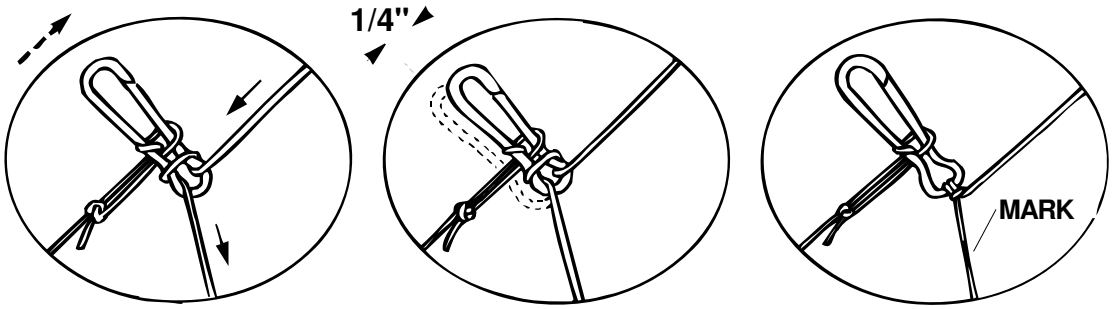
The arrangement of Cross Lines and Main Lines may vary on different types of Delta Wing kites. On some, the Cross Line goes to the center strut, on others, it runs to the wing. The principles of tuning remain the same, however. Clips adjustments are made up and down the longer line which we call the Main Line.

Notice that the Main Line has a mark on it. The mark is for reference, to let you know where the clips are on the line. The mark itself is not a “magic” location; it’s just there to show you where the clips are in relation to the mark. Read your factory instruction sheet to see what the manufacturer recommends about general clip settings.

Let's take a look at how to move a clip FORWARD or toward the nose.



First, loosen the knot by pushing it up the clip.

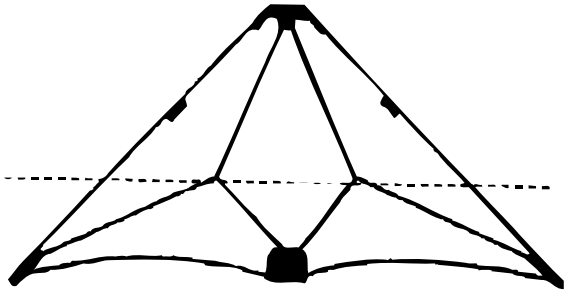


Then slide the clip up the line. Make all your adjustments small. Tighten the knot by pulling it back down on the clip again. Notice that the clip is now a quarter of an inch farther forward on the Main Line, as shown by the position of the mark.

Foil stunters don't have bridles or clips. Adjustments are made by changing the "tether point" (the point at which the flyline attaches to the spar). Usually, a "stopper ring" will prevent the line from sliding beyond the identified tether point.

If the end cells on the kite do not inflate or flap during flight, the sail is stretched too tight and the tether point needs to be moved in (toward the spar's center). Moving the tether point in will also reduce lift, and in some cases, a foil's speed.

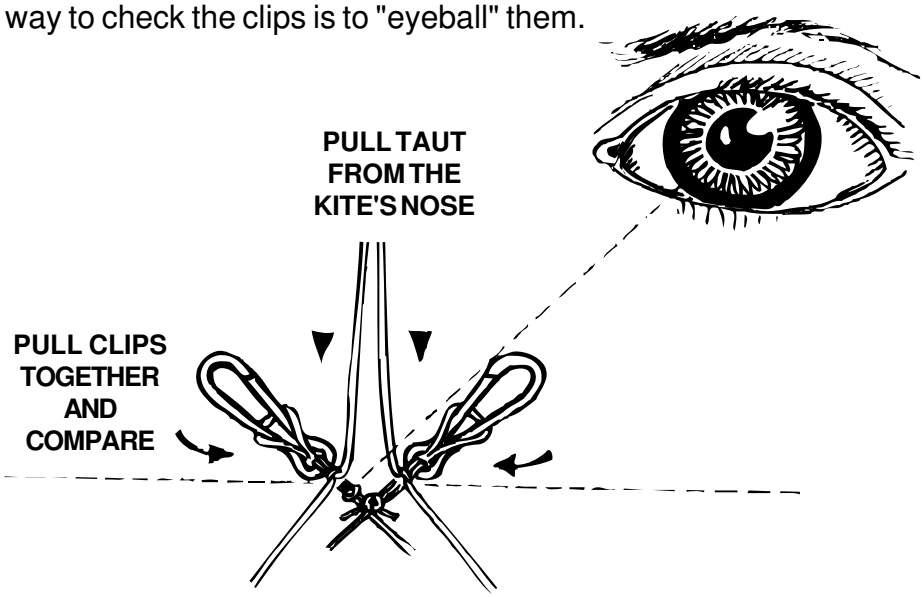
A quarter of an inch is plenty, which means that the clips will always be in the immediate vicinity of the mark on the Main Line. The whole range of adjustment, from farthest forward to farthest back, is usually less than ONE INCH, although depending on your kite and the wind conditions, it can change much more. Adjust a little at a time, and fly the kite between adjustments to see what happens.



Whenever you adjust, be sure to adjust both clips the same amount. The best way is to position one where you want it, then move the other one to match it. When you're done, both clips must be the same distance from the nose of the kite.

If the clips are different distances from the nose, the kite will require more tension on one line than the other to fly straight. It will also turn tighter in one direction than the other. The kite will act sort of like a car with its front end out of alignment.

The easiest way to check the clips is to "eyeball" them.



Pull the clips down so that the parts of the Main Line leading from the clips to the nose are taut. Then look at the knots to see if they're even. Eyeball accuracy is generally close enough.

And that's all there is to adjusting clips. Actually doing it should only take about thirty seconds.

> *If your bridle clips seem to be slipping, rub a bit of beeswax on the line and make sure your knot is cinched tight. Don't use candle wax. It doesn't work. Get real beeswax from a hardware store ... or from a bee hive.*

Now for the reasons why you adjust.

When you adjust the clips, you are changing the kite's angle of attack. The angle of attack is the angle at which the kite meets the wind.

Just as, when sailing a sailboat, you must pull the sail in when it's too loose and let it out when it's too tight, you should adjust your kite to the best angle for the current conditions. Kites are adjusted to a reasonable position at the factory, but you can improve it with a little practice.

Adjustment is also a matter of personal taste. Within a certain range, the kite will fly. How it flies depends on where within that range it is adjusted. Some flyers like tight turns, others like their kite to float around the sky. Most like a mix of both. It's up to you. So please....

DON'T BE AFRAID TO EXPERIMENT ! !

The full range of adjustments will best be found through "trial until error". So adjust the kite a little forward. Then fly it. Then adjust forward some more and fly again. Keep doing that until you're sure you've gone too far. Then do the same with adjusting to the rear. That way you will know what the kite does through its whole range, and will be better able to decide what you like. And if your kite isn't adjusted to suit you, you'll know what to do about it.

I tell everyone, "Experiment. You'll learn more and learn it better." Lee (Sedgwick) would have never invented "solo" and "quad" if he hadn't experimented. And don't be discouraged by things that don't work! That's what experimentation is all about.

Be especially careful about comments from people who think they know the only "right" way to fly. If no one ever tried anything new, Paul Garber would still be flying box kites.

Al Hargus III
Chicago, Illinois

Finally, let's talk about When to adjust.

In general, WHEN THE WIND GETS STRONGER, you'll need to move the clips BACK. This increases performance, allows sharper turns, and provides more sensitive control, while decreasing the lift of the kite. More wind will be needed to fly out to the sides.

WHEN THE WIND GETS LIGHTER, you'll need to move the clips FORWARD. This provides more lift and improves light wind handling. The kite will make wider turns, climb higher, and fly farther to the sides of the wind, but control will be less sensitive.

We call moving the clips back "setting heavier", because it's for "heavier" wind, and moving the clips forward "setting lighter".

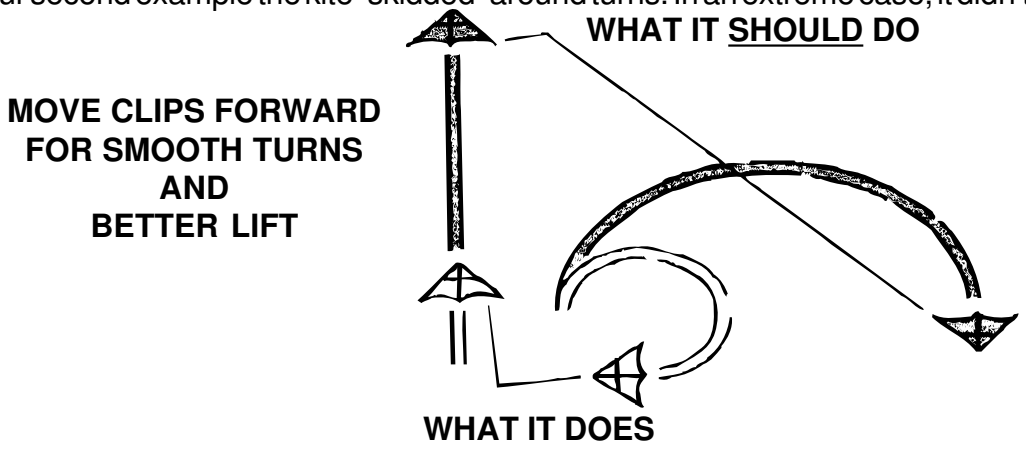
Remember our first tuning example of "What to Look For"? The kite "jerked" itself

If you want to fly in real heavy winds and not put a lot of stress on the kite or yourself, move the clips FORWARD. This allows you to even fly multiple kites in a strong breeze. Your turns won't be as tight, but you also won't have as much pull. Sometimes you don't want to go "skiing" down the field.

Sue Taft
Erie, Pennsylvania

around turns. The kite didn't climb well and may have been difficult to get off the ground at all. This set of symptoms is an indication that the clips are TOO FAR BACK and need to be MOVED FORWARD.

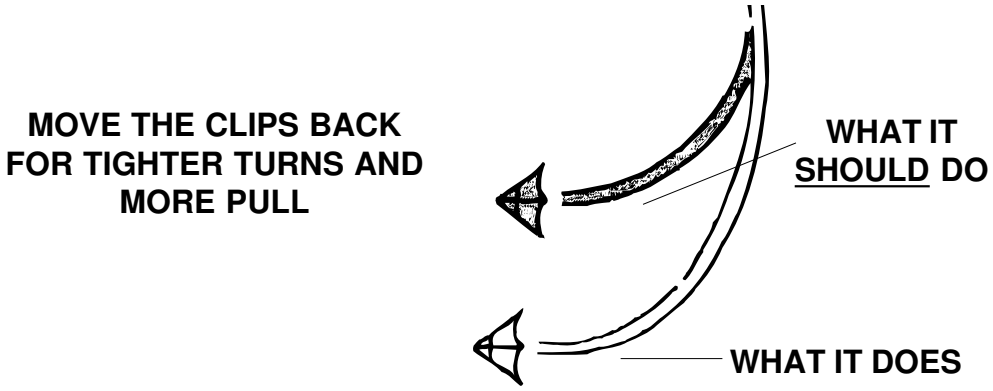
In our second example the kite "skidded" around turns. In an extreme case, it didn't even



Adjusting the length of bridle lines on Delta Wing stunters will also effect their performance. Shorter bridles pull toward the center of the kite; longer bridles pull toward the flyer. If the wings of your kite have a tendency to "flap" or "bounce" in high winds, try lengthening the bridle lines.

complete the turn without falling out of the sky. These symptoms indicate that the clips are TOO FAR FORWARD and need to be MOVED BACK.

ABOUT NOISE



Earlier, we promised to talk about noise as an indicator for tuning. Notice that, when the kite flies, it tends to make more noise when it's flying faster. You can use this noise to get an accurate picture of how well the clips are adjusted.

Moving clips forward increases the speed of the kite and the amount of noise. Moving clips back decreases speed and therefore, volume.

Pay attention to the noise your kite makes, and adjust accordingly. You'll find it an easy, accurate method for getting good performance without a lot of hassle.

SPECIAL TUNING FOR STACKS

Sometimes, noise can frighten or intimidate people. Never fly too close to roads, sidewalks, on unsuspecting bystanders. It's not that you might hit someone. Just scaring them can hurt the sport.

WISKERS or STAND-OUTS

"Wiskers" are thin pieces of solid fiberglass which are installed between the lower cross strut and the base of the sail. They are used primarily to keep the sail tight and prevent collapse or "luffing" at the edge of the wind. Because they hold the kite open, they are also called "stand-outs".

Wiskers improve general performance by increasing the size of the usable wind window and allowing you to fly in lighter winds. They also help with self launches when the kite is laid out flat on it's back and allow some pretty fancy ground maneuvers.

Because stand-outs are not attached permanently to the kite, they're real easy to lose. They are connected to kites in so many ways that its difficult to tell you how to hang onto them the best.

The best advice is to make some extras just in case.

The potential for tuning problems increases dramatically when you start flying multiple kites or "stacks". That makes it a good idea to check your tuning before you launch on any particular day, and to recheck after every landing or crash.

Generally, stacks are flown on a higher bridle settting. Here are few other things to watch for:

First, **Straighten Train Lines**. The lines should run straight between wings without wrapping around wingtips. Wrapped wingtips are very common, and sometimes difficult to spot. In the air, wrapped wingtips will make your kite lean to the side or lean back. Make a habit of including an inspection of your wingtip lines in your Preflight Checklist. Check them every time you launch. If you're flying, and notice your kites leaning, land and check the wingtip lines again.

Second, **Measure Train Lines**. In order to fly together, each wing must be at exactly the same angle to the wind. You know that bridle settings on the lead kite determine its angle of attack. Train lines determine the angles on all the other kites.

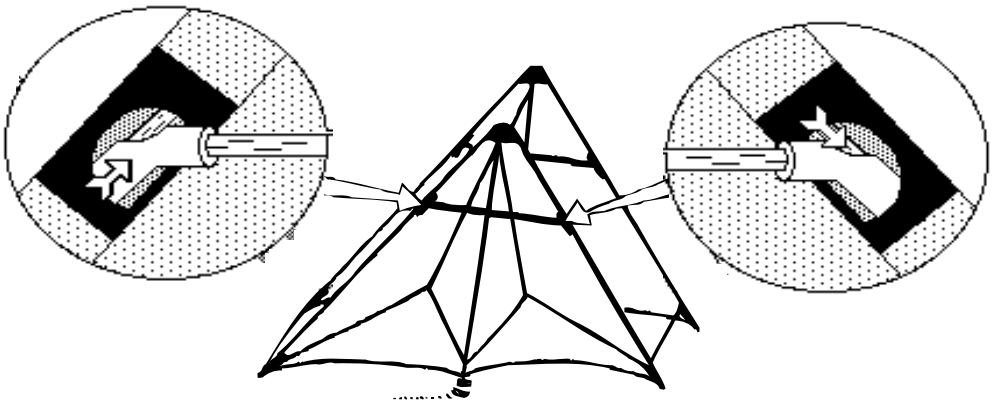
Lines stretch. Knots slip. Sometimes, the factory gets sloppy and includes train lines of unequal length. In any case, measuring the lines to make certain they are all equal will improve performance. Also check to be certain that the lines are attached at proper points to each kite.

It's rare for these lines to move during a flying session, so they shouldn't need to be checked before every flight.

Third, **Adjust Bridle Clips**. In general, the more kites your stack has, the less often you'll need to adjust the clips for changes in the wind strength. If the average wind strength shifts significantly during a flying session, you'll see your kite's performance change, and will want to move the clips.

Finally, **Check Vinyl Connections**. This is important. Does your kite have a flexible structure held together by vinyl connectors holding the cross struts in place? After a crash, the frame parts may have moved in relation to one another. In other words, the cross struts may not be in the same place or may have even popped loose.

A quick check of the kite will usually turn up any damage.



"Popped" struts at the vinyl connectors are a particular problem in kites where the sails have stretched or lost their sizing. Wingspans can be adjusted by moving the connectors. Pushing the vinyl toward the kite's nose makes the wingspan wider. Pushing the connectors back makes the wingspan narrower.

In strong winds, loose tubes will have a tendency to adjust "themselves". Make sure they get back where they belong.

The design of some stunt kites puts more tension or stress on the lower train line than on others. This stress can build up in a stack, stretching train lines and eventually, decreasing the angle of attack on the last kites in the train. The result is "slurring" where the last kites lag behind in a maneuver.

Using train line material with minimum stretch is important. However, if your stack does start to "slur", try shortening the length of the lower train line on the last kite. You can even make field adjustments by using a larkshead knot to insert a short piece of dowel or a stick in the line and "take in" some of its length.