



# SK821 Manual

SK821 can be as complicated or as simple as you make it. Manual is for folks seeking answers to questions or a field guide.

1. Assemble front tube and boom
2. tension outhaul
3. tension tip wands
4. insert and tension battens
5. adjust camber/rig
6. GO SAILING



## I. Assemble Front Tube and Boom

Insert the center tube within the luff tube of the sail. The snap pin should be visible.

Insert one side of center tube and then the other.

Insert tip wands. The plastic end of the tip wand goes in to the luff tube of the sail to engage the center tube. The tip wands and center tube assembled together are the front tube or spar.

Place the tensioners on to the tip wands.

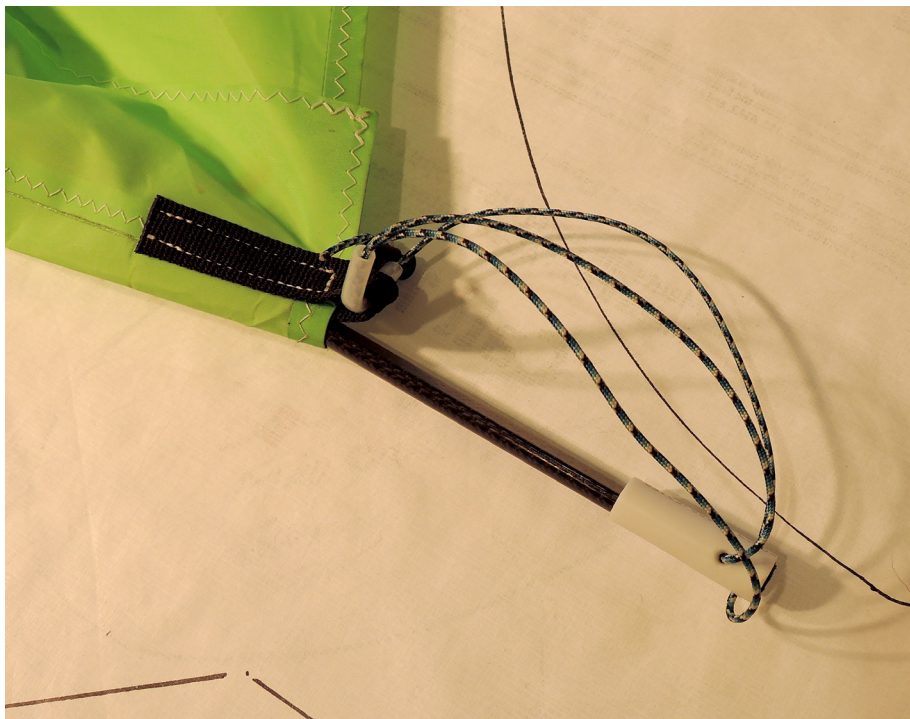
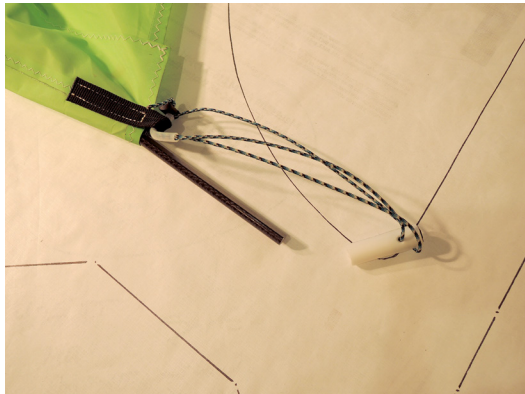
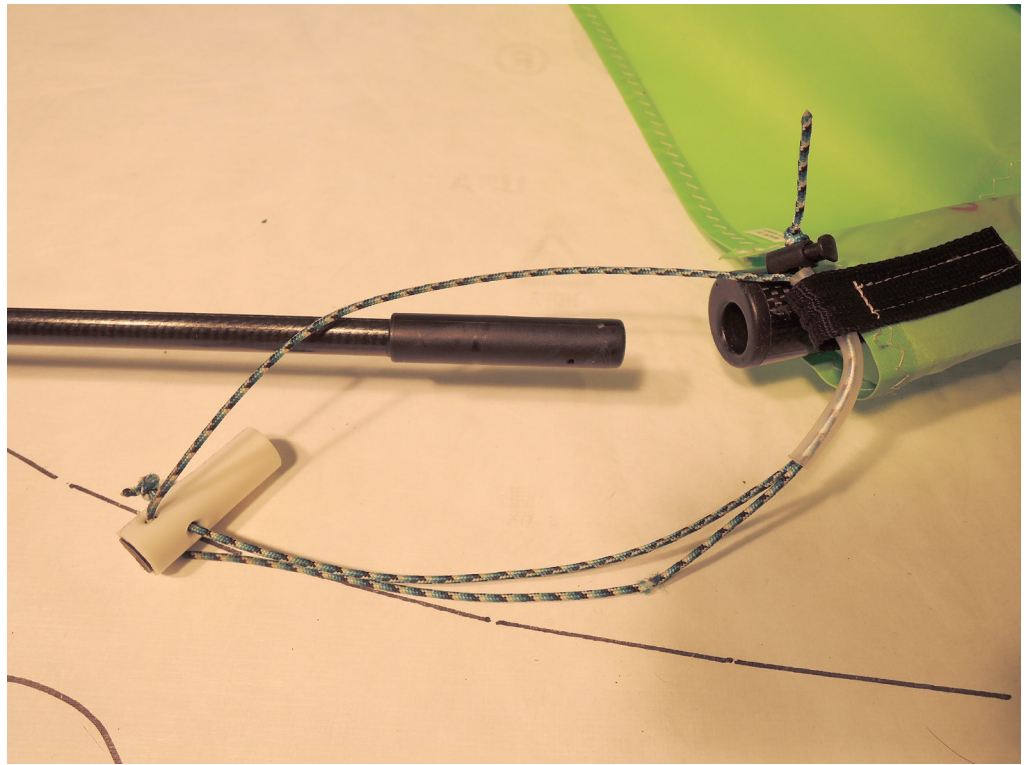


Center tube inserted within luff tube of sail. Snap pin is up.



**Tip wand inserted to center tube within the luff tube of the sail.** Illustration shows the socket end of the center tube exposed by bunching the sail.

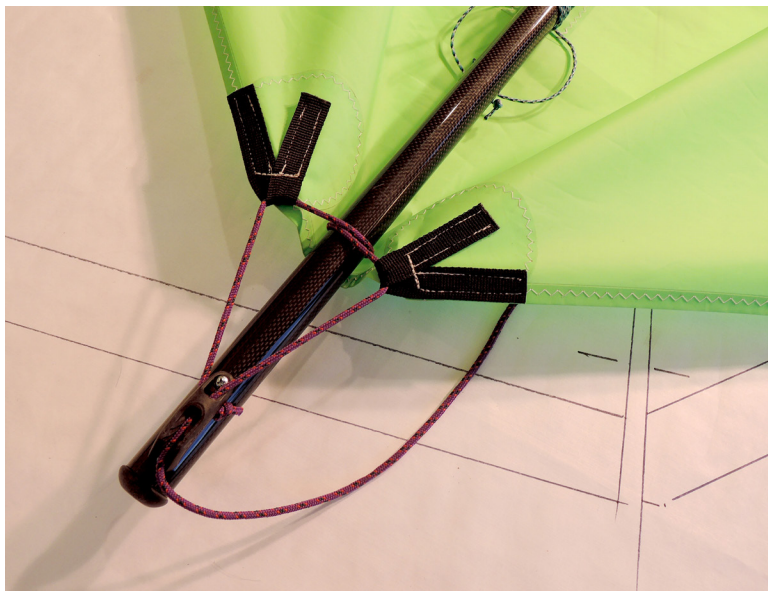
Once rigged, the tip wand remains within the luff tube. Insert the tip wand by feel.



*Tip wand tensioner placed over the end of the tip wand.*

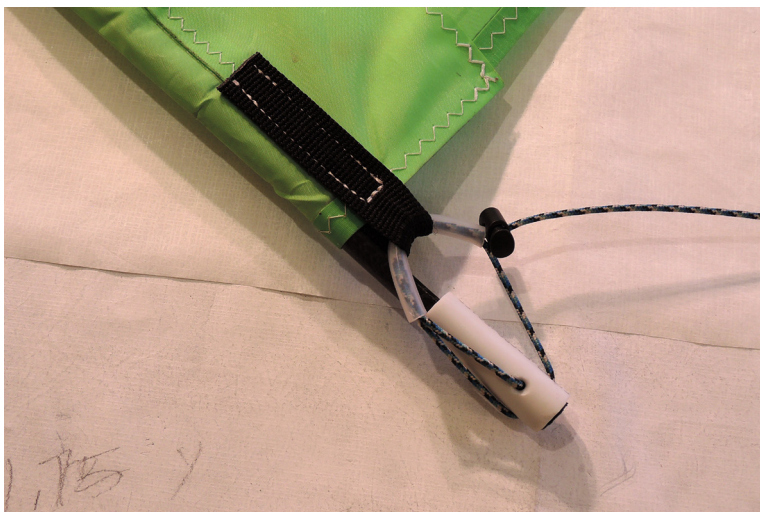


Tip wands inserted to center tube.  
Outhaul rigged and tensioned.  
Boom is assembled and rigged to  
center tube retained by snap pin.



## 2. Tension the outhaul

Outhaul is rigged through soft eye,  
around boom and through opposite  
soft eye then back to cleat.



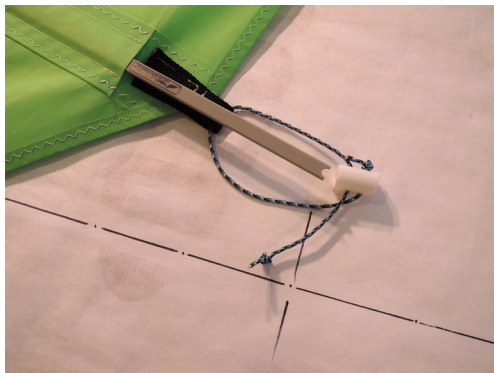
## 3. Tension the tip wands

Tipwands are tensioned after the  
outhaul.

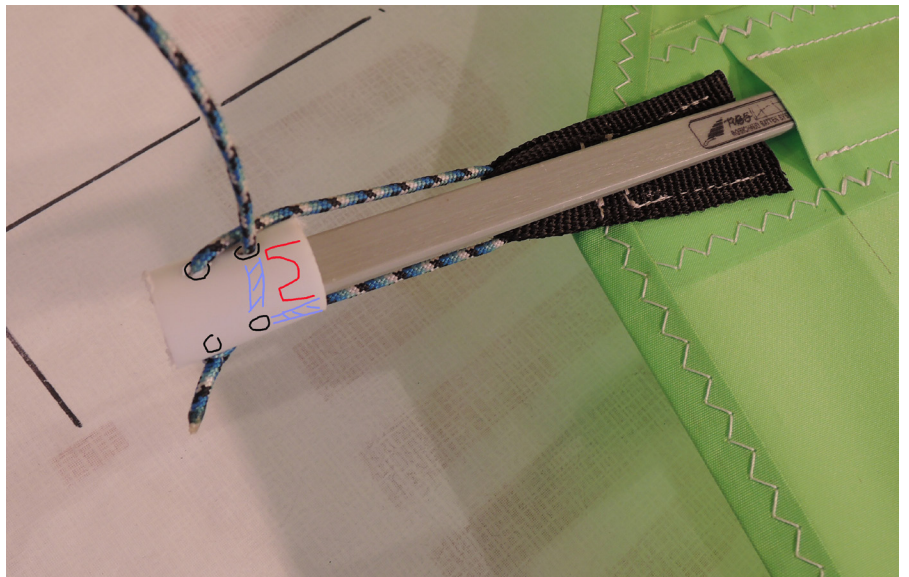




Outhaul and tip wands tensioned makes installing battens easier.



Batten tensioner and notched batten end



Batten tensioner self cams to batten. To release: twist and pull.



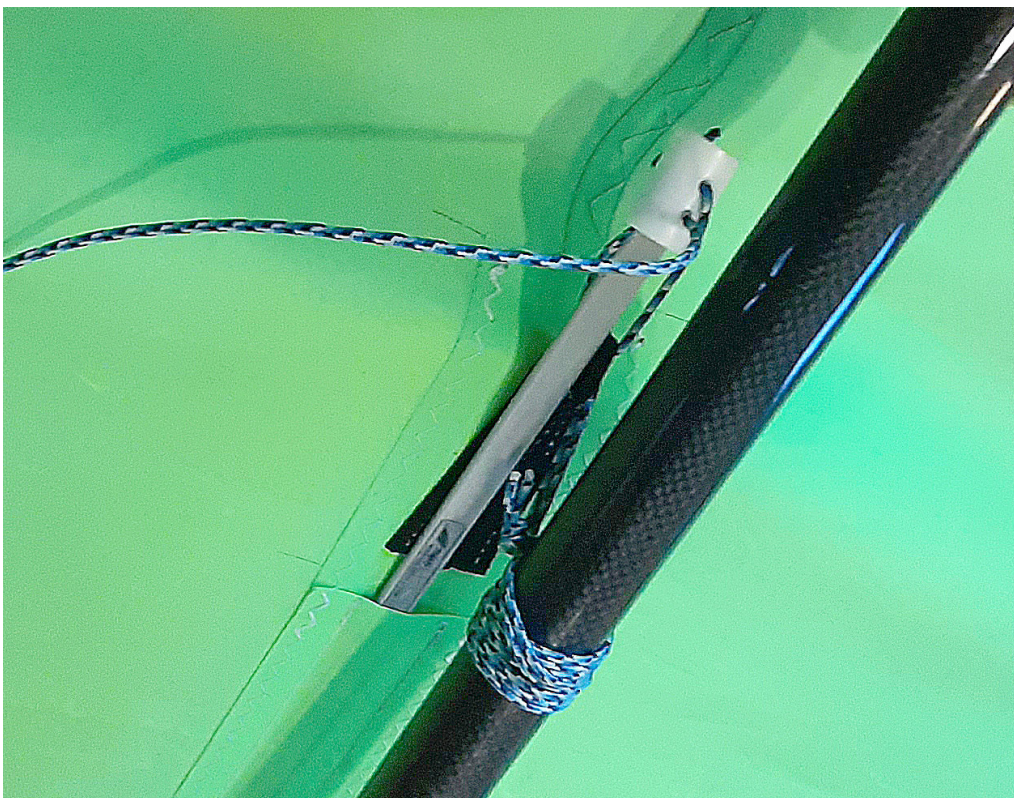


*Rig camber inducer through the same softeye as the center batten tensioner.*



*Place the camber inducer loop over the batten. Place the center batten tensioner within the notch of the batten where it will also retain the camber inducer.*









**Camber inducer** is a choke wrap to the boom which can be slid forward or back to compress the center batten against the tack adjustment. Compressing the loop works against the outhaul. To compress the center batten, release the outhaul. More or less tip wand tension allows more or less center batten to project past the center tube. The tack adjustment tensions the sail as well as the end of the center batten which changes the shape of the camber induced by the batten.

SK 821 will work without the camber inducer. However it is easier to get a full camber by using the camber inducer and the tack adjuster. For best results, especially in light air, the camber inducer and the tack adjustment must be played along with tip wand tension.

SK821 can be rigged full for light air performance or flat for heavy air survival.



Rigged tack adjuster



**Unfold**



**Assemble front tube: insert tip wands. Rig boom**



**Tension outhaul, tension tip wands, insert tension battens, adjust camber**



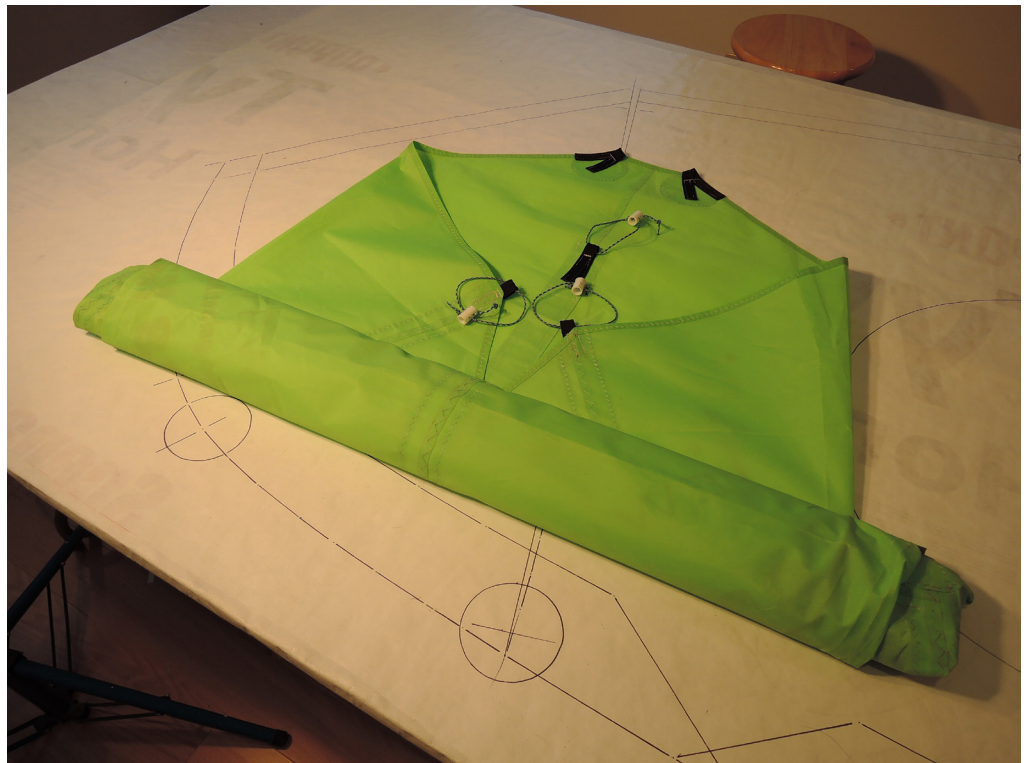


A large, bright green kite is laid out on a white surface. The kite has a delta shape with a central spine and two long, thin struts. The words "KITEWING" and "SK 821" are printed in black on the kite's surface. The kite is positioned diagonally across the frame. In the background, there is a wooden table with various tools and materials, including a roll of tape and a bucket. The overall scene appears to be a workshop or a studio.



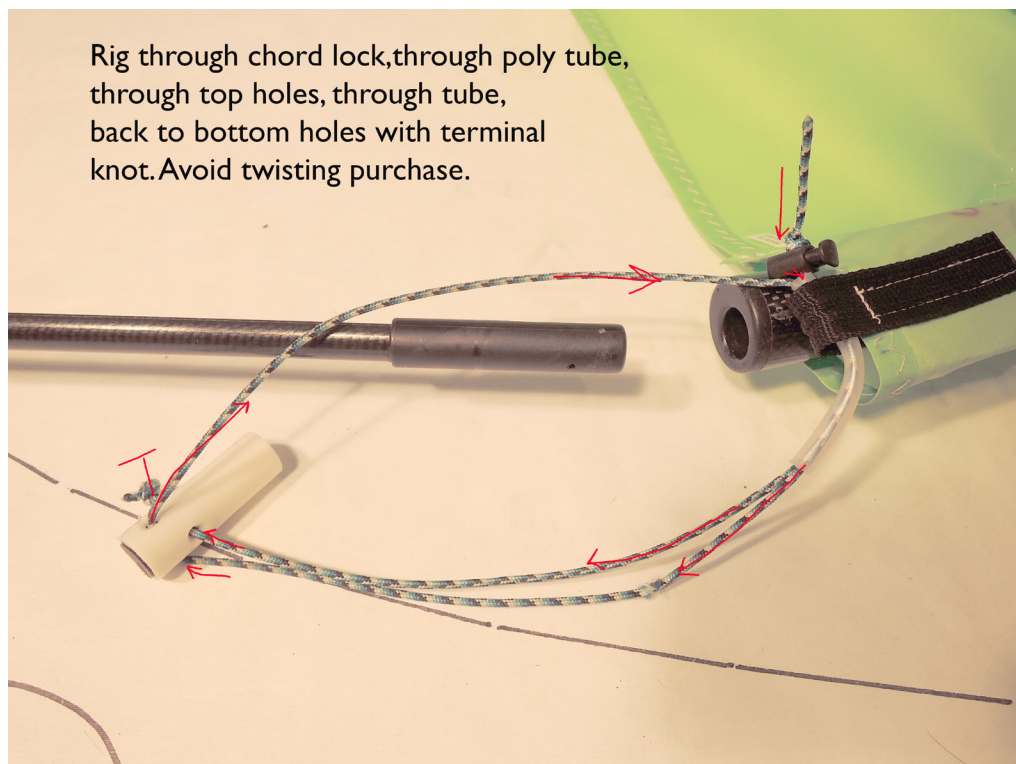


**Fold and roll. Rolled sail captures parts. Stow in bag.**

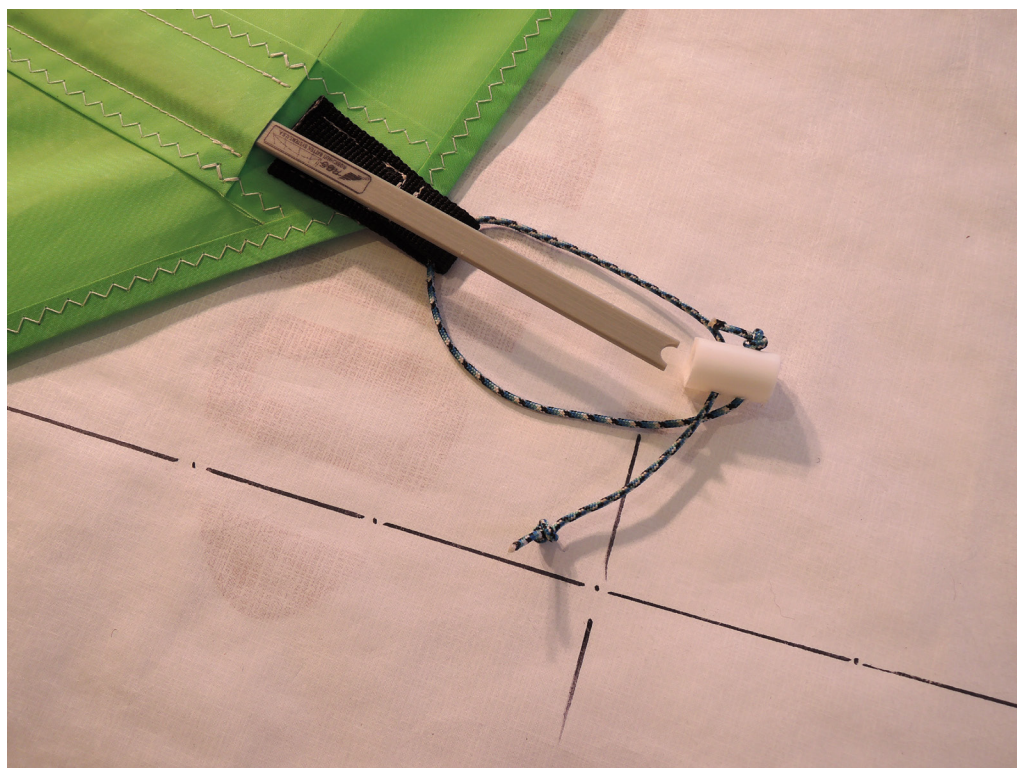




Tip tensioner is rigged with approximately 40 inches of 1.7 to 2mm chord as shown. The poly tube protects the web soft eye. If you choose to rig without the tube you may saw the web eye with the chord.



Batten tensioner is rigged from 20 inch 1.7 to 2mm chord as shown.







## Notes:

*Always hold the sail down wind.*

*To tack or gybe it is easiest to pass the rig overhead or behind.*

*Sailing is easiest with the trailing hand on the boom, the leading hand on the front tube below the boom.*

*Skate sails work the best on clean ice. Slower surfaces require more wind and expertise. The SK82 I works very well with light nordic ski or skate gear.*

*Read the warning label printed on the sail.*



## Rig Camber Inducer

*Camber inducer is a 42 inch 1.7 to 2 mm chord with an overhand knot to secure both ends in a loop. The running end of the loop is wrapped around the boom x4 and passed through the knot end of the loop through the soft eye to the batten. To tighten the choke on the boom pull and wind the running end.*

*Use the camber inducer to force the center batten to bend.*





Camber inducer is forced ahead, tack tensioner forces the leading edge of the batten around the center tube. Draft is a bit deeper, further forward and the rig is stiffer. There is less slack in the fabric of the sail.



Camber inducer is forced ahead, tack tensioner is loose, allowing the front of the batten to project past the center tube. Draft is a bit flatter and away from leading edge. Rig is looser. There is slack in the sail.

## Tuning Camber Inducer

Sliding the camber inducer forward to the front of the boom compresses the batten. Tack tension compresses the leading edge of the batten forcing it to bend around the center tube. The camber of the center batten can be adjusted from full to flat.



## Shape

*Relatively full draft forward wings generate power at slower speeds.*

*Flat draft aft shapes are for higher speeds with less drag.*

*Stiff rigs with tensioned surfaces which are less prone to distort or flap under sailing loads are more reactive or quicker to feel.*

*Find what works best for you.  
SK821 is very adjustable*

*Some folks believe that full draft forward hand held wing sails are easier to manipulate because they fly at broad attack angles. This makes the same full foils easier to control in shifty conditions. The compromise is drag.*



*Full camber for light air. Camber inducer is forced ahead and tack is tight.*



*Camber inducer is pulling the batten tensioner to the back of the boom. Tack is tensioned to jam the leading edge of the batten against the center tube with makes the rig stiffer. Camber is flat for higher speeds, more wind.*



# Sailing

Sailing skate sails should be unique for everyone. There are many ways to hold the rig. Folks can argue about what works best.

What has worked for us so far:

It is important to be able to point to the wind. Wind direction relative to the axis of the skate sail is what makes it work. If you can feel the wind on your face and know from which direction it is coming you will be able to sail.

The sail is a hand held wing sail. It is a relatively crude air foil compared to a double sided wing. However the best way to understand Skimbat skate sails including the SK821 is to treat them like a small hand held wing.

If you can fly a paper airplane you can handle a wing sail. Keep the rig flying and pulling and you can hitch a ride.

Sailing in your hiking boots is a good way to learn the hand held wing without complicating the experience with skates or skis.

Start by facing the wind. Turn left or right to put the wind over one shoulder or the other. Hold the rig by its leading edge over head. If there is enough wind the rig will start to fly.

Hold the boom in your trailing hand, or the hand which is down wind. Hold the leading edge of

the rig or the leading edge of the boom with your upwind hand.

Practice with the wing to be able to manipulate it over your head while you shift your grip.

When the wind is over your right hand shoulder you are on starboard tack. When the wind is over your left shoulder you are on port tack.

Practice pulling on the wing while you manipulate it from tack to tack.

You will be changing the direction you face, with the wind on your right cheek or the wind on your left cheek. Turn through the wind or in to the wind direction.

Do not allow the wing to pass between you and the wind. Imagine what this would feel like with skates or skis on your feet. You can get blown over.

You may back wind the rig which will invert it. It is best to keep the wind blowing on the inside curve or underside of the wing sail.

**The trick is to find the grip which allows you to relax with the rig ballanced within your grip.**

After your confidence is suitably inspired suggest using skates or skis to glide with wingsail in hand.

It should be obvious. You may not sail directly up wind or even efficiently directly down wind. While

you may blow down wind at wind speed, it is more efficient to take advantage of combined aparent wind to make the wing sail pull harder. The wind that you feel works best affecting the wing sail between 90 degrees and almost straight ahead.

SK821 can sail upwind and down wind at tight angles. Wind speeds determine how close to the true wind direction. In light air angles are fat. In heavy air angles can be very tight or close.

**Combined aparent wind:** the wind you feel. The true wind combines with forward motion. There cannot be combined aparent wind if you are standing still.

**Windward:** to the wind.

**Down wind:** away from the wind.

**Camber:** the shape of the wing, extent of the airfoil.

**Full foil:** deeper camber. Camber can be a percent or ratio of hight to length. It is also typical to note at what percent away from leading edge camber is thickest.

**Flat foil:** less camber.

Full draft forward camber works better in light air because you get lift at slow speeds. Flatter sections have less drag and require more wind speed to generate lift relative to same surface areas with more camber.



Shows starbord tack: the wind is the blue arrow. The purple arrow is the direction of combined aparent wind or the wind you feel.

Grip is two handed. Down wind hand on boom, upwind hand on the center tube below the boom. This is the safest "easy to control the wing" grip.

Red arrows would be the direction you might be gliding if you had skates on.



Shows port tack: colored arrows represent the same as starbord tack illustration. Grip is example of different style. Both hands are on the boom. Changing the orientation of the wing relative to the wind changes the feel of wing or how it is ballanced in your grip.





Some sail nomenclature:

*Tack* is the part of the sail which is tensioned at the front of the boom. Tensioning the SK821 tack compresses the center batten to influence camber.

*Clew* is the part of the sail tensioned by the outhaul. Tensioning the clew of the SK821 tightens leech as well as flattening camber

There are two tip tensioners, one at each tip of the sail. Tensioning tips pre loads the luff tube against the spar or center tube and tip wands making the rig stiffer and more reactive.

