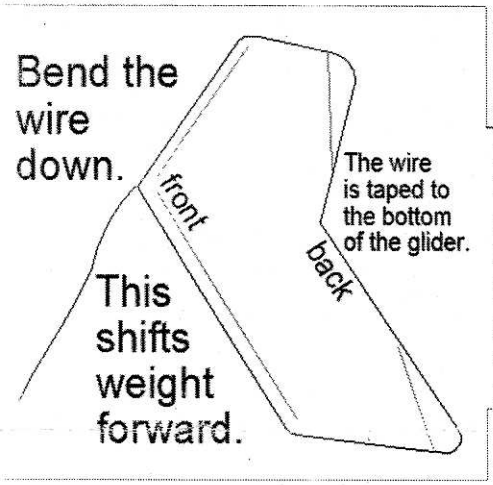
START HERE! Quick Instructions to Take You from Envelope to Flying

(See also: Video instructions are available at www.sciencetoymaker.org/airsurf*)*

Greetings Fellow Walkalong Glider Experimenter;

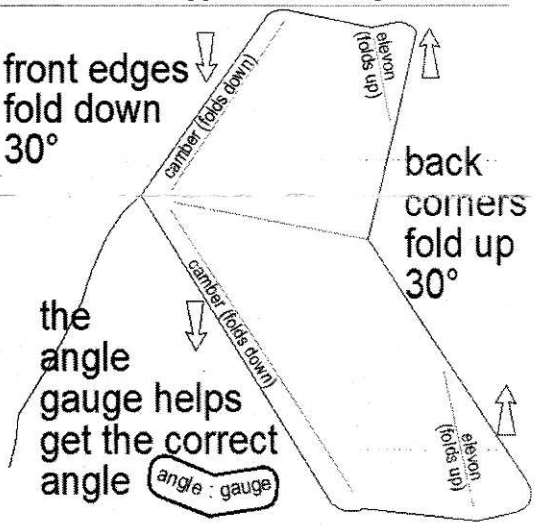
Please be very careful when you handle the thin, foam gliders. The foam is only about 5 times heavier than air, so it flies very slowly—good to learn with. But it is also extremely delicate.

The gliders have been flattened to fit in the envelope and you need to do some things before they will fly. Normally it would take 20 seconds and soon you will not need angle gauges to check the bends, but of course it will take longer the first time, going through and understanding the instructions.



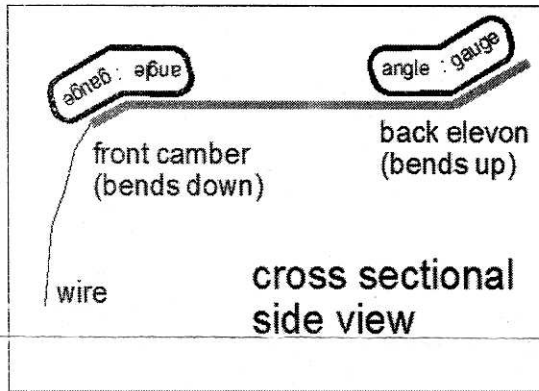
1. BEND THE WIRE DOWN:

Pull one of the gliders out of the protective cardboard. The copper wire weight and the tape holding it on are on the bottom of the glider. Bend the copper wire 90 degrees down. If you try to glide it now (hold it gently from the back, give a little push), it might glide ok. But it will gain more flight stability after the next step—especially resistance to diving.

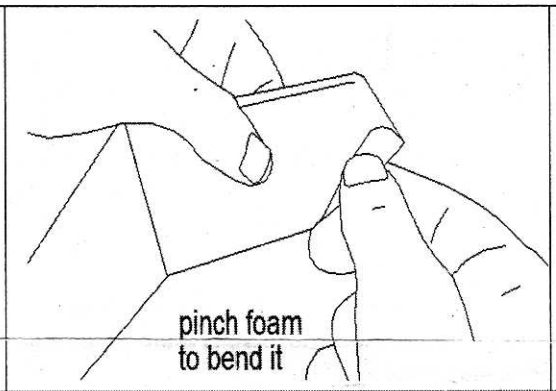


2. PUT THE FOLDS BACK IN THE FRONT AND BACK:

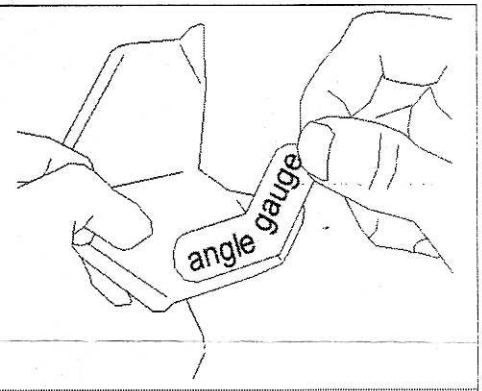
The front edges were bent down about 30 degrees (called camber) and the back corners were bent up about 30 degrees (called elevons). If you look at the foam closely, you can see where the folds were. Bend (by pinching at the fold) the back elevons UP a little again and the front camber DOWN a little again. The first time you do it, it's a good idea to use the angle gauge. Fiddle with it until it's the correct angle. Sometimes you have to pinch firmly because otherwise the foam just springs back.



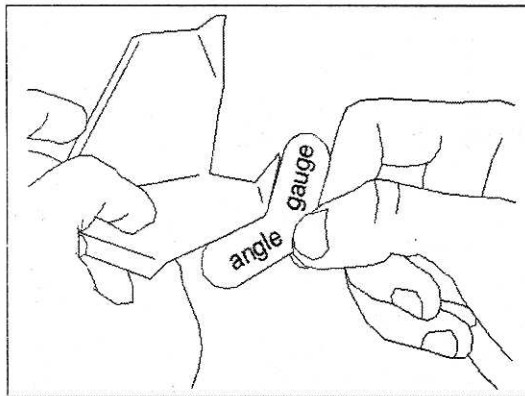
The front bends down; the back up. The gauge helps get the correct angles.



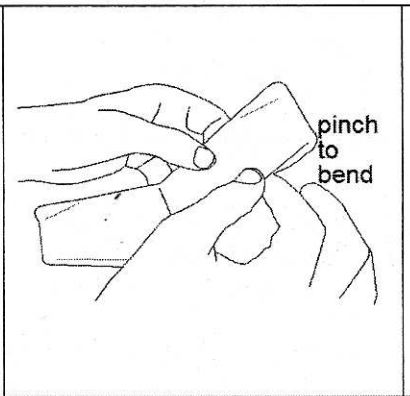
Pinch the foam to bend it. If you bend it too much, just flatten a little.



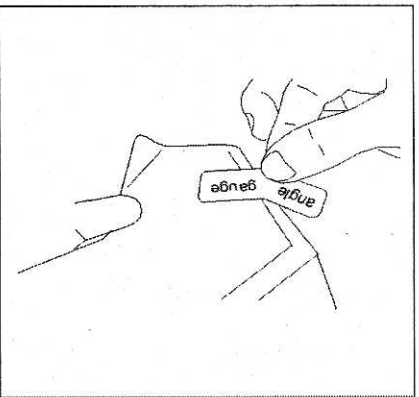
You can use the gauge on top to get the 30 ° bend…



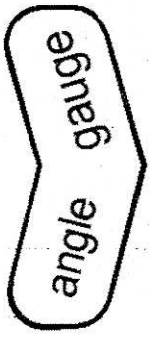
…or the bottom; or both. Soon, you will not need the gauge.



Bend the front edge (camber)…



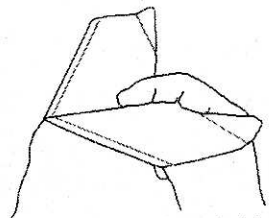
…and gauge it.



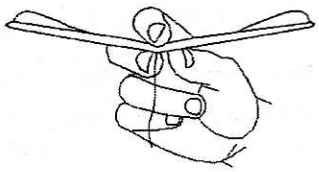
You can cut this out

(Continued from other side)

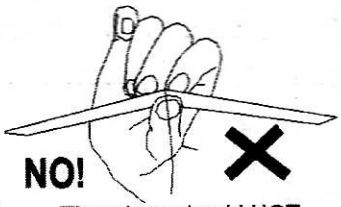
3. TEST GLIDE AND ADJUST FRONT WIRE: Now you need dead-calm air. Hold the glider from the back. It's best to have just one finger on top, two fingers on the bottom, so the glider has a VERY SLIGHT bend in the middle—less angle than the other bends. This is called "dihedral". Remember, the upward sweep of the wings is very slight, but the wings should never slope down.



Hold GENTLY from behind, with one finger on top...



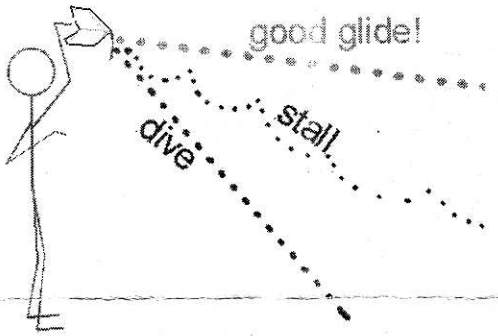
...so the wings slant upward slightly (called "dihedral").



The wings should NOT slant down.

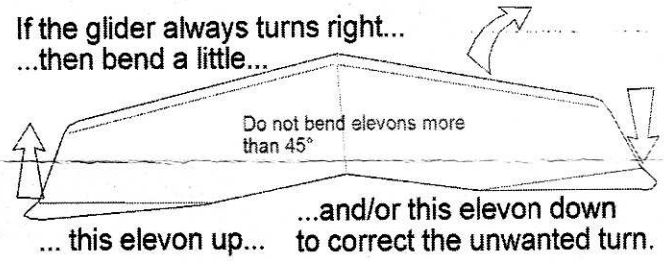
Too much dihedral

Tilt the front of the glider down a little (that helps it go straight) and give it a gentle push. Does it glide well?

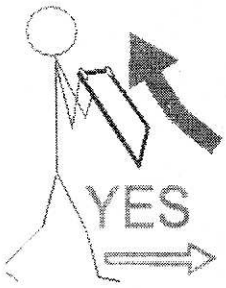


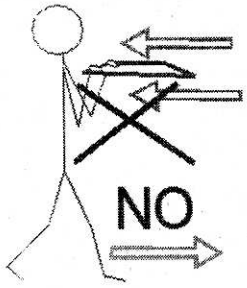
If the glider stalls a lot, dipping in peaks and valleys, bend the wire forward more. This moves the "center of gravity" or "CG" (balance point) forward more and reduces stalling. A little stalling is ok. On the other hand, if the glider dives, then bend the wires toward the back.

If the glider always turns by itself when gliding, you can adjust it to fly straight. By bending UP the back flap on one side, the glider will turn more in that direction. So will bending the OPPOSITE side back flap DOWN a little. Do not bend a back flap up more than 45 degrees because it will start to act like a brake and the glider will not fly well.

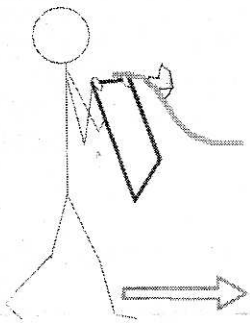


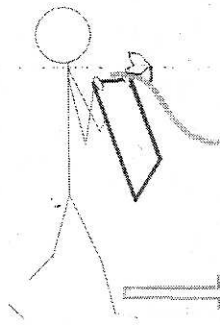
4. FLY THE GLIDER: The best way to learn to fly the glider is to have someone who knows how to walk beside you. You both hold onto the board. The other person controls it at first; you gain the feel for it. After a few steps of flying, they let go. When you crash it, they show you what went wrong. Of course, for pioneers who start walkalong gliding in new parts of the world, there is no one to show you. At sciencetoymaker.org you can see videos about starting to fly. I think using only written instructions with illustrations might be the most difficult way to learn to fly, but here are the common things to remember.



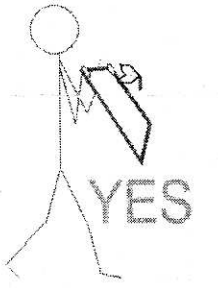


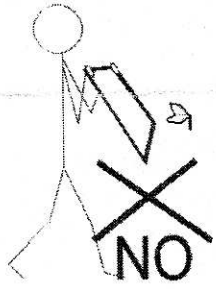
A large board (like a pizza box) is easier to start with to deflect the air upward. Remember to keep the board slanted as you walk through the air. If the board is horizontal, it just slices through the air, but many people unconsciously flatten the board. The air wave must be smooth and steady. No swishing!





Keep the glider even with the top of the board. If the glider is low on the board, then it will dive. If the glider is too high above the board, then it will be difficult to control.

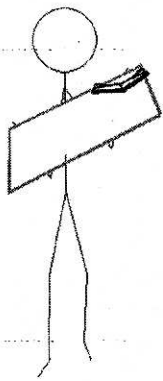




Another reason the glider goes down instead of up (very common for beginners), is if the glider is a little too far ahead of the board.

Visualize that the glider is riding (surfing) on a wave of air (the curvy thing in the picture above). If the upward air is only hitting the back of the glider (because the glider is ahead of the air wave), then the back will be tipped up and the front will slant down—and the glider will dive. But if you keep the board a little closer to the glider, the upward air lifts the glider more evenly (picture on right). The glider might blow over the top of the board. That is good; you are close—good practice! The glider should always be close to blowing over the top—but not quite.

The way to gain altitude is keep the top of the board so close to the glider that it could blow over the top, but raise the board up before it can go over.



Remember that you tell the glider where to turn, not vise versa. To turn the glider, push the corner of the board toward the corner of the glider as if you are going to touch it. Banking (tilting) the board helps. Most turning problems are a result of the glider being too high above the board or not getting the board close enough. Experiment to see what works.

Hands-only flight is the most difficult kind of flying because there is barely enough air being deflected upward. Also, you have to keep your hands exactly in the right place relative to the board—there is no wiggle room. Hand flight works best if you move the wire forward so much that there is no stalling at all. You can spread your fingers a little bit. The correct position is to try to touch the bottom, back edge of the glider with the tips of your fingers. If you get too far ahead, then the glider will bump up and stall. If you get too far behind, then the glider will dive. You can also fly with one or both arms held out horizontally.