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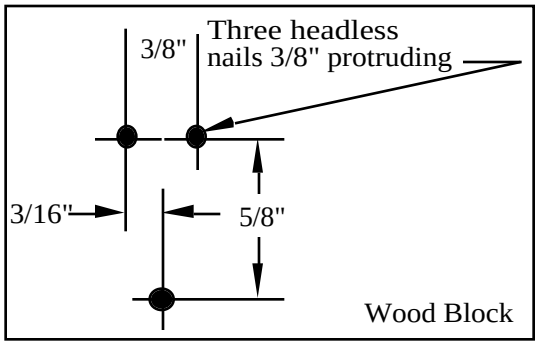
Flexi-wing Glider Plan...

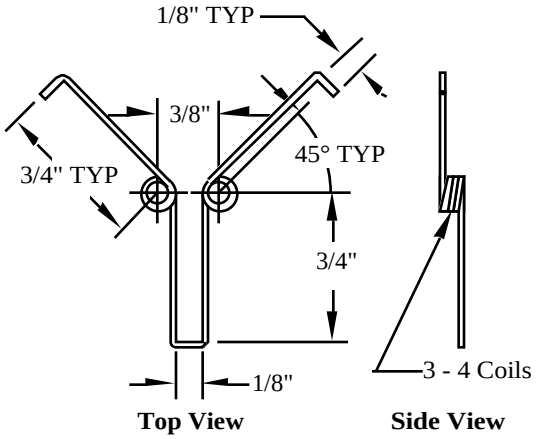
Although we've had several building sessions and discussions around this design, many members have not had a chance to attend these, so here's a detailed construction article dedicated to this popular model. The design was originally presented to us by Kevin Kuczek many years ago, and still remains essentially the same.

The required materials are few, easy to obtain, and inexpensive. For the model you'll need some 0.015 to 0.020" diameter piano wire, some thin plastic sheet (dry cleaner bag, thin garbage bag, or other similar material), and some heavy thread, kevlar line, multi-strand fishing line, and three 1/8" square spars 10" to 15" long (spruce, basswood, or maybe really heavy balsa), depending on the size glider you're building. You will also need a hobby knife, scissors, tape, thick cyanoacrylate glue (CA), contact cement, needle nose pliers, and a large board to work on.

Optionally, you can create a jig to assist in creating the actuating spring if you're all thumbs. To do this, sink three nails most if the way into a piece of wood as shown below, and cut the heads off so about 3/8" of each protrude.



Spring Forming Jig Detail

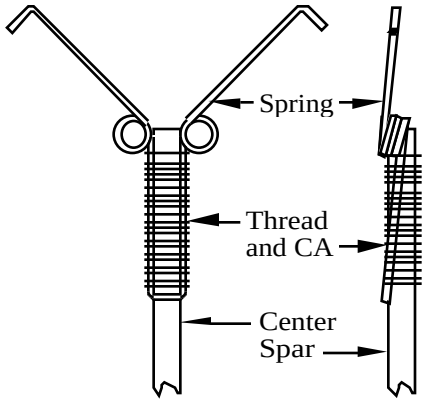


Actuating Spring Detail

The hardest and most critical part of the glider is the actuating spring, and the jig helps immensely. The actuating spring is made by bending and wrapping a piece of about 8" of piano wire around the posts to the form shown below. Three coils on each side should give sufficient tension to deploy the model.

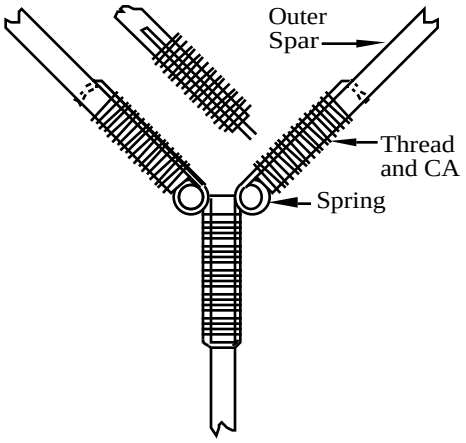
To cut the wire, hold it tightly at the cut point with the pliers, and bend back and forth until it breaks. Your first attempts may not come out right, but this is an ideal situation where your expertise will improve with practice!

The rest of the model is a piece of cake. Cut the three spars to the desired lengths. position one in the "U" shaped center of the spring as shown, wrap the joint with the thread neatly and tightly, cover with the CA, and let it dry.



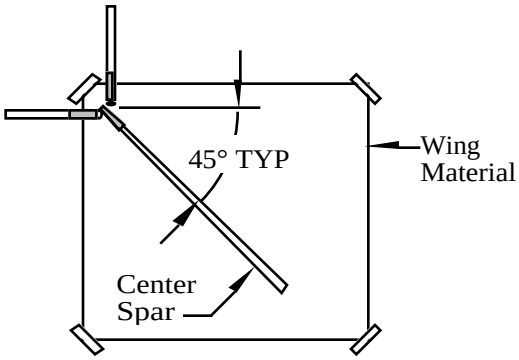
Center Spar Attachment Detail

The outer spars are attached in a similar manner with on exception: the small prong on each end of the spring must be pressed into the spar along its centerline (a small hole could be drilled to facilitate this step). This will prevent the spar form rotating around the spring after assembly. Once all three spars are attached, you should have an assembly in the shape of a "Y" as shown (if not, start over!).



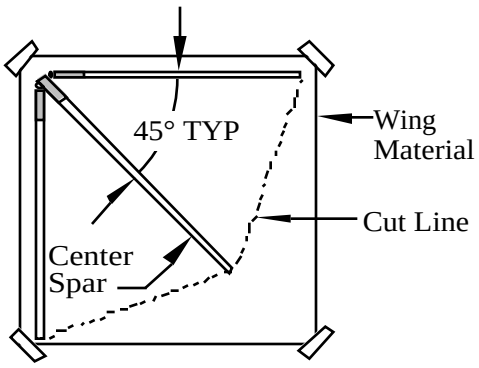
Outer Spar Attachment Detail

At this point, you're almost done. Tape the plastic wing material to the board, tightly to remove all wrinkles. Run a light bead of contact cement along the bottom of the center spar, attach it to the plastic as shown, and let it dry.



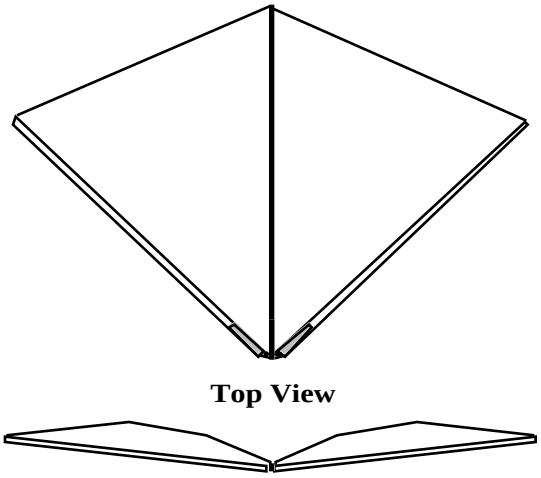
Wing / Center Spar Attachment

Run a bead of contact cement to the bottom of each outer spar, fold them back as shown, and press them onto the plastic sheet. There should be considerable tension produced by the spring to keep the plastic tight when deployed. You may need to tape or weight the spars until the glue dries.



Wing / Outer Spar Attachment

Once the glue has dried, trim the plastic around the model. Any small overlap can be attached to the spars with contact cement. This completes the glider assembly.



Finished Flexi-wing Glider

The glider can be trimmed by hand tossing it in very calm weather, and it should have a long, flat glide. There should be a small dihedral between each wing to keep it level. Adjustments can be made by carefully bending the spring at the nose joint. If the model dives, either add a small amount of weight to the tail, or carefully warp the center spar upward slightly. If the glider stalls (which is somewhat unlikely), add weight to the nose.

To fly the glider, fold the outer spars inward along the center spar, and wrap the wings around the spars to hold them in place. The model should unfold quickly and smoothly when it is released.

The glider is flown inside a long thin rocket with a body diameter just slightly larger than the glider's folded phase, usually a BT-5 tube. Use plenty of wadding to protect the glider, as they are susceptible to ejection gasses.

Use this design as a basis for further experimentation! You might want to build several at a time, since they can be lost easily. Visibility is a problem for duration events, to you might want to investigate ideas to improve this aspect. This design also has a difficult time pulling out of a dive, and finding a way to lower the center of gravity would help to correct this problem.

The 45 degree angle between the center and outer spars in not a set value; Kevin uses a 50 degree angle, although this is a little more difficult to lay out. Only a lot of test flights will determine which configurations perform the best in competition!

If you have any problems in building the model, contact one of our experienced members for assistance. Hopefully, you'll have a great time flying these gliders and improving on this enduring, yet simple design!