THE SICKLE FOR FAI COMBAT

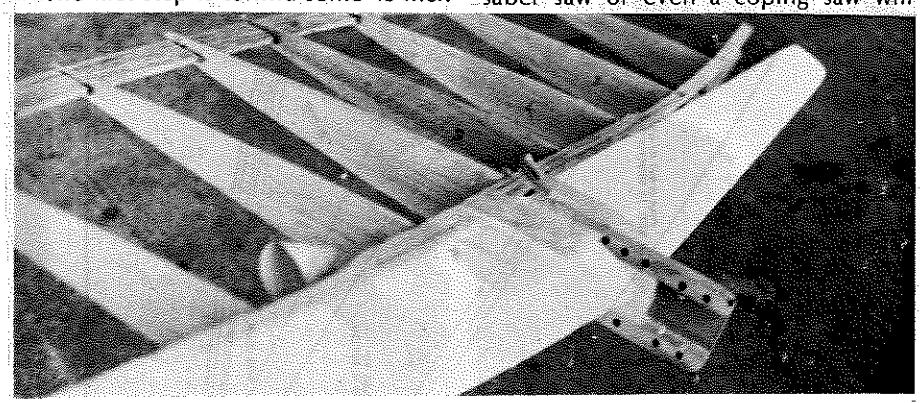
By STEVE FAUBLE . . . Laminated balsa spars and trailing edge, plus hot-wire cut foam forward section, make this FAI Combat ship a standout . . . in looks and performance.

• Combat flyers are you listening out there? If you're not flying F.A.I. combat you are missing out on what I feel is the most innovative and outright fun event going. The planes fly extremely well, and if you run a Fox .15 BB it is much less expensive than A.M.A-style combat. The international rules, if used at the local level at all, are confusing and hard to keep in mind, but even this can be a lesson in mental concentration.

In this article on my latest design, the Sickle 3, I will try to get your enthusiasm going for F.A.I. The plane has 450 sq. in. of area, and should weigh about 14 oz. with a Fox. This combination will give you a low enough wing loading for a truly spectacular turning plane. The semi-eliptical planform seems to handle the turbulant Texas winds (our constant companion) much better than a straight taper wing. The curved leading edge also seemed to be more crash resistent than a straight or tapered wing. I don't know if the reason is that the tips don't hit the ground in a crash or if it is that the built-in stresses tend to counteract the forces of the sudden stop. I will show you how to make these with very little extra effort, and at a lower cost than using ordinary spar stock. If you are still reading this you must be interested, so let's get ready to make some planes.

The first step is to find some 48 inch long wood. I would recommend Balsa USA, in Marinette, Wisconsin as a source. With the exception of their 1/16 thick wood, all of the wood I have purchased form them has been of very good quality at a super price. Using long wood as I do in this design, you will need to use an aluminum straight-edge to true one edge. The next step will be determined by the number of planes you are going to produce. If you want to make a single copy to try out the design, make a template for both the spars and the trailing edge out of artist's matt board or a very heavy cardboard. Then, using strip wood of the correct size and length, laminate two sets of spars and one trailing edge. I use Tightbond thinned 10% with water as my laminating glue. You have to wait for this to dry thoroughly, about 24 hours, but it has excellent strength and is not expensive.

If you are building three to six planes at a time (almost all serious competitors build at least this many in a single run), you will need to proceed to plan "B." Buy an 8 ft. length of 2x6 at your local lumber store. If you don't tell them what it is for, you won't get laughed at. Trace the outline of the spar curve on a four-foot piece and the trailing edge on the other. Now cut out these forms. A band saw will make short work of this, but a saber saw or even a coping saw will work.



Basic structure is curved, laminated spars and trailing edge, with hot-wire cut foam leading edges, shown here partially glued and taped in place.

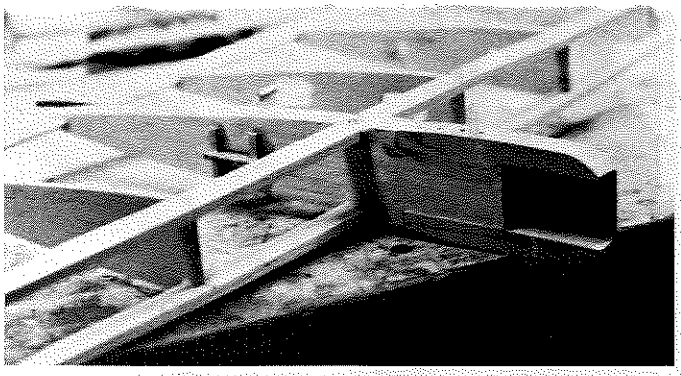
Lay out the sheet with your squared edges aligned carefully and liberally coat each sheet with Tightbond until all are stacked one on top of the other. Now lay the stack on the two-inch wide form and put heavy weights on top until the balsa conforms to the plastic covered form. I use lead weights, but almost anything really heavy will work. Put clothes pins, or clamps all around the edges to hold all the layers together and make up bellcrank assemblies, or cut ribs, or something for 24 hours before disturbing the laminates.

After everything is dry, make one trimming pass on a table saw, then set the spacing 1/8 inch for the trailing edge and 3/16 for the spars, and slice off, baloney style, a supply of parts.

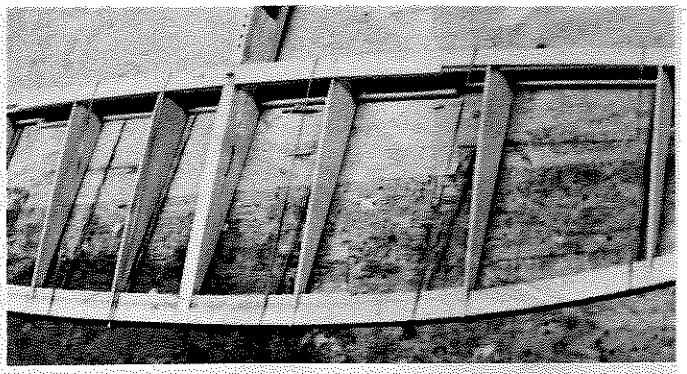
If you don't have access to a table-saw, a servicable alternate can be made for $30.00 by getting a cheap power hand saw and a piece of 1/2 or 3/4 inch thick plywood. Cut a slot in the plywood and using flat-head screws, bolt the saw to the bottom of the plywood. This will leave the blade sticking out of the top. A piece of wood or angle iron can be clamped to the plywood for a fence. This will work quite well and is all I used for years. As with any power tool be extremely careful when using this. It would be real hard to fly combat with no fingers.

The stabilizer is two layers of 1/16 plywood with either polypropylene or nylon hinge material epoxied in the middle of the sandwich. Use lots of 15-minute epoxy and "C" clamps to hold everything in place till cured. The real key here is lots of pressure to insure good contact along the full width. The elevator is two sheets of 3/32 balsa. Both of these pieces of wood should be 8-10 lb. wood. The hinges are again epoxied into this sandwich, using epoxy and clothespins.

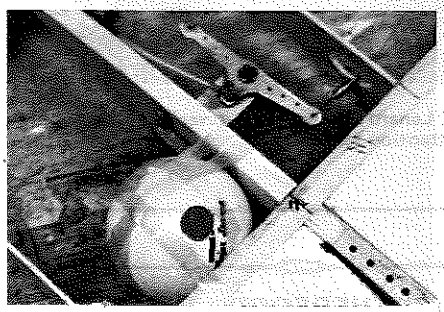
Make the motormount as shown on the plans. Note the shape of the bell-crank platform and also the small scrap



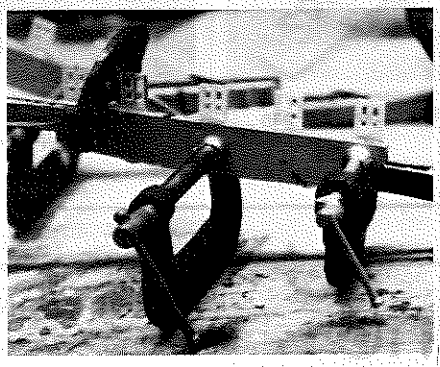
Close-up of construction details. Structure pieces kept to a minimum to save weight. Note firm bellcrank mount lock to center rib.



Basic frame, with rubber bands holding everything in place for gluing. Keep it simple for mass production.



Plastic baseball is pacifier compartment, installed with nylon reinforced strapping tape.



Stabilizer sandwich. Two pieces of ply, with hinges and epoxy in between!

Bellcrank hardware a mixture of R/C and C/L materials.

ply load spreaders. In order to pull this assembly out, the whole center rib must disintegrate. Use epoxy for both of these assemblies.

Mark the positions of all the ribs on both the inboard and outboard spars and trailing edge (you did mark the centerline and inboard section of the laminates, didn't you). Using a large number of rubber bands, assemble spars, ribs, and trailing edge (use no glue), and sighting along the trailing edge from the rear, get rid of as many warps as possible. You can change the tension on the rubber bands by tightening one side of the rubber band by sliding it over the spars. Make sure all ribs are parallel and perpendicular. When all this is done, hit all joints with Hot Stuff and you are about half-way to a straight plane. Twenty seconds later go back over each and every joint with Tightbond and set aside to dry. Install the controls after the Tightbond has dried.

I have recently started using R/C nylon pushrod material instead of music wire to try to eliminate some weight. This change has also given me much smoother control action.

Now get ready to cut the foam leading edge. There have been any number of articles on hot-wire foam cutting and *R/C Modeler* has an excellent book available, so I won't say anything more. The leading edge is cut as a straight taper and the rear of the foam is notched for the spars on the table saw. Using Tightbond and masking tape, install the foam leading edge on both sides. As soon a you have done this and before the glue starts to dry, again sighting across the trailing edge, take out any warps that have appeared. After the glue dries the structure becomes quite rigid.

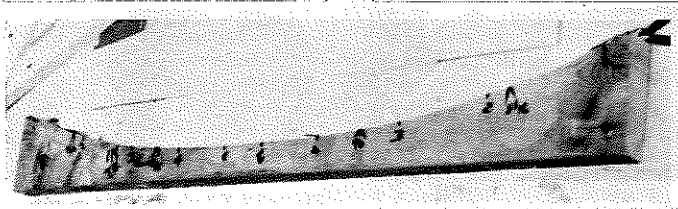
Install either a pacifier compartment (I use some neat plastic baseballs that I found at K-Mart) or a piece of tubing for a bladder. I have found that ordinary 3/8 inch wide strapping tape, holding the ball to both the spars and the center rib will keep the tank in place if any of the structure is left at all. Install tips with bracing and run a strip of the strapping tape down the leading edge to help prevent string kills. Cover with your favorite low temperature film.

Make the boom out of either 3/8 balsa with 1/64 plywood epoxied on both sides, or 3/16 basswood. Using either a large nail or center punch, punch holes through the covering into the center rib approximately 1/8 inch deep. Force epoxy into these holes and apply it to the inside of the boom and install. The holes are required in order to really lock this joint together, so don't leave this step out. Install the stabilizer and elevator assembly at this time. I cut lightening holes in my elevators and cover with silk or tissue and dope for additional split resistance. Make sure the stabilizer is square with the wing, or you will never get that particular plane to fly right. If any of you RC'ers got this far, keep the construction details in mind for your next design.

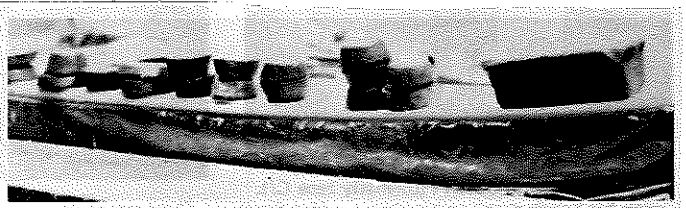
Some of the people who helped inspire this design were Vernon Hunt of England and Jean Fraisse of France, who's designs started me thinking about a curved trailing edge. Jordan Segal and Jeff Johnson, who steered me onto foam leading edges. From Editor Bill Northrop I borrowed the idea of slicing off composite assemblies into individual pieces, and Al Denison, my flying buddy, who kept telling me that I should try something really radical until I did. I also want to thank Duke Fox for remembering the combat flyer with a pair of really fine motors at a reasonable price.

Well, that's it. I hope you will give F.A.I. combat a try and get in on all the fun. To keep up on all the latest trick stuff and get a fine newsletter, join the M.A.C.A. Contact Jordan Segal at 8314 W. Oak, Niles, IL 60648, and send $9.00 for a one-year membership.

Hunter's prayer: "I hope all my kills are clean and quick."



One of two laminating molds, cut from a piece of 2 x 6 lumber. When you build combat models, think production line!



Spars for six "Sickles" in the laminating mold. Use plenty of weights to hold shape while glue cures.