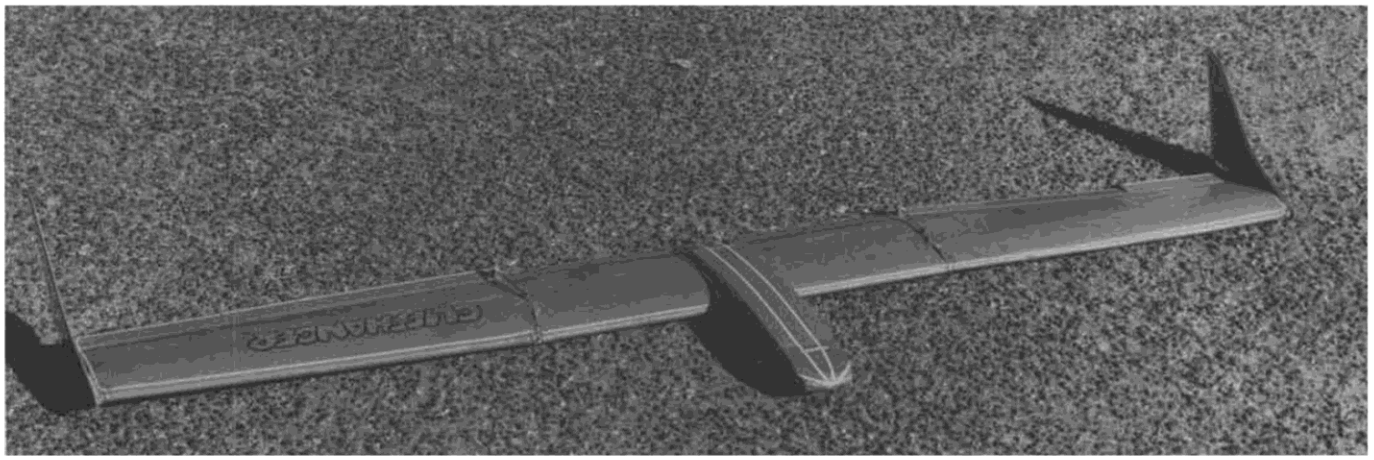


The Cliffhanger is just the thing for a simple, inexpensive slope glider. The model had been flown quite a bit when this photo was taken, hence the dings. Guess you could say the model has really been through the Renger . . . er, *ringer* (hope you're in the mood for bad jokes!).

CLIFFHANGER

By LARRY RENGER . . . Yes, our "Half-A Scene" columnist also flies gliders! The Cliffhanger is a quick-building aerobatic flying wing that uses Ace foam wing panels. Right at home in 40 mph winds.

• Once upon a time in the happy little kingdom of **Model Builder**, there lived a couple of lovely young flying wings. Also in this kingdom there was a young (more or less, I'm told) lad who saw them and fell madly in love. Sad to say, he was under a dark spell by the wicked witch called "Lazy", and was unable to reach his desire.

One bright day while sitting at his building board, our hero (?!) came across the fixings needed to overcome the dreaded "Lazy" spell. Chanting "ACEEXPANDEDBEADFOAMMOLDED-WINGS" under his breath, he mixed a grisly potion of Parts A & B of a magic 5-minute elixer bought at great cost from the land of Hobbypoxy. At it hammer and tongs, wrapping with cloths of bright plastic and adding mysterious electronic black boxes, he had his creation finished in a nonce.

This particular nonce happened to be in the middle of a dark and gloomy night, but the wings shown with a luster, the pinstriping was in place, even a name was proudly emblazoned on one wing! Lo and Behold! It was the "Cliff-hanger", all ready to fly. Now our lazy lout had a sexy flying wing all his very own.

There was one hang-up, a nagging fear that the new model would just flop helplessly end for end when it was thrown over the edge of the local cliff. Fortunately, there is an old trick for checking model stability developed by, of all people, the model rocketeers. A thirty-foot piece of 1/2A dacron control line was tied around the fuselage and run through a small hole drilled 1-1/2 inches from the leading edge in one wing tip fin.

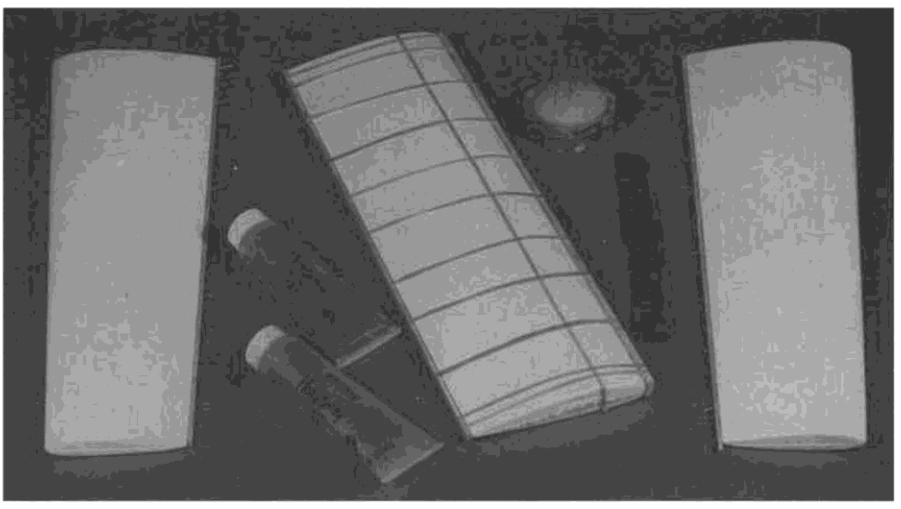
Thus it came to pass that around the witching hour last July 4th, I sneaked out into the middle of the street in front of my house and did a "swing test" to check balance and control settings on the prototype Cliffhanger. Sure enough, there were trim adjustments required, but due to the safe control possible with a tether, there wasn't a scratch on the model even though I was flying it over asphalt. It's just a good thing that the neighbors are understanding about that weirdo on the block playing with his model airplanes in the dead of night.

First flights were not quite so smooth as I hoped, but not disastrous. I had trimmed for a very flat, fast glide on the tether. Experience now indicates that a bit more "float" is in order. More on this later.

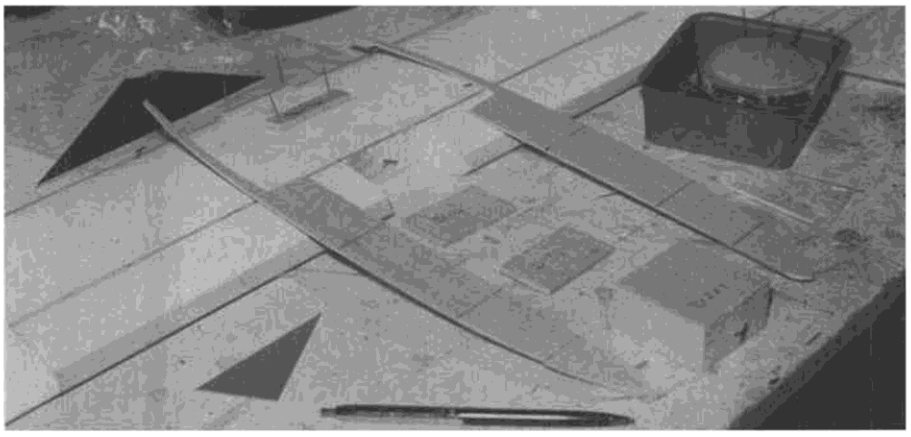
About the time I was getting Cliff-hanger flying right, it folded in the middle during a tight turn. OOPS! Back to the drawing board for design of a completely new center section. Tip fins were also enlarged in the process. New construction was quick, as I grafted the new parts onto the old tips . . . "Lazy" strikes again! This time there were no special flight problems. The changes worked just fine and Cliffhanger is now a good flying model.

So what is the end result? Well, Cliffhanger won't thermal, that's for sure; it's purely a slope machine. But it is fast and smooth, turns on a dime, handles high winds with ease, and is nice and compact. For sport aerobatics, or speed on the slope, Cliffhanger is a hot trip. The highest wind yet tried with Cliffhanger was a steady 40 mph. This was over a sheer 300-foot cliff, so lift was no problem. I finally had to fly straight into a bush to get down. Loops and rolls were duck soup that day.

The separate ailerons and elevator and this particular mode of construction yield a really easy-to-build airplane. It's both rugged and repairable. The materials are simple and inexpensive. In the air, this model looks clean and purposeful. Longitudinal trim is smooth, due to the almost symmetrical wing section. As you might expect, it does require careful CG placement, but since that is already



Gluing the leading edges, trailing edges, and spar to the foam wing panels. Note that only the center section gets a spar and leading edge; the tips get trailing edges only.



Wing and nose block pinned to building board, ready to start fuselage assembly. Cut-out in wing is for aileron servo. Foam aft of spar is cut out later for elevator servo.

established, you should have no problem with your own Cliffhanger.

Cliffhanger has successfully been flown under power. A simple flat panel of 1/8 plywood was epoxied upright to the rear face of the nose block, and a Tee Dee .020 was fastened to it by a couple of No. 2 sheet metal screws. All-up weight was 17 ounces, but it flew well and could even be looped! It would be better to make a socket into which the engine mount could slide for easy removal and installation, if you want this alternative.

CONSTRUCTION

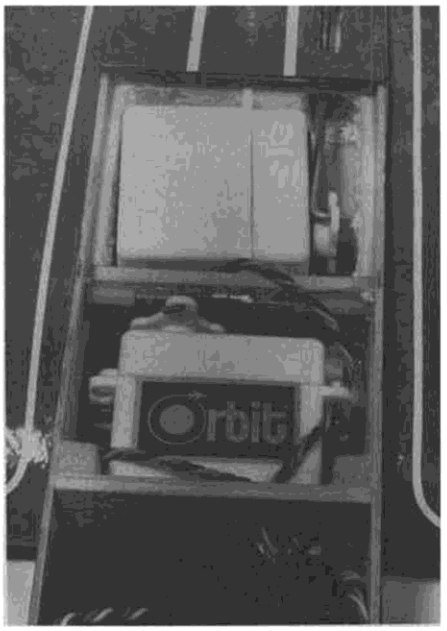
After gathering the required materials, cut the straight Ace wing section at the spar line, then at the leading and trailing edges. Make a single cut for the spar, and take up the 1/8-inch excess chord by extra trimming at the trailing edge cut. Epoxy the spruce strips to the spar core, then epoxy the five center panel pieces together. Both tip panels only get trailing edges epoxied on. Carve the center section leading edge to shape.

Next, sand both ends of each wing panel as shown on the plans. Note that the 2° for the tip fins is equal to a 5/8-inch forward sweep over the 18-inch wing tip panels when setting up for sanding. Sand all panels inverted, then epoxy them together, still inverted, so that the top of the wing will be straight. If you wish, a bit of dihedral could be added to each tip panel, say, up to 1/2 inch each. My prototypes flew well even with a droopy wing after repairs.

Make the fuselage cutout in the center panel, then pin the panel right side up over the plans with the trailing edge blocked up 1/4 inch. Pin the nose block over the plans, then epoxy the fuselage sides to the wing and nose block. Epoxy the formers, spacers, and hatch retainer strips in place. When the epoxy has set, unpin the model and epoxy the fuselage bottom on. The panel runs from nose to trailing edge. Note that you should not yet have cut out foam aft of the spar! Carve the nose block to shape.

Now you can cut in the pocket for your elevator servo aft of the spar, set the servo in and cut a channel for your

Dr. Jekyll and Mr. Hyde . . . whoops, no, it's just the two personalities of Larry Renger, Cliffhanger designer and MB "Half-A Scene" columnist. Didn't know he could get so violent, huh?



Servos are mounted with servo tape. Plywood radio hatch snaps in place.

pushrod underneath the spacer and hatch retainer strip. Inset the cable guide tubes into the top surface. Then add glass fiber package strapping tape to top and bottom wing surfaces from fuselage to tip at the spar location. Epoxy the tip fins in place. Cut the 6-inch strips of 1/4 x 1-inch trailing edge stock to fit, and epoxy in place against trailing edge and tip fin. The rear edge should be up about 3/16 inch from a line drawn from the bottom rear surface of the airfoil.

Cut the ailerons and elevator from 1/4 x 1 trailing edge stock. Cut and fit the hatch panel and epoxy the balsa tabs under each end. Sand all wood parts such as the nose block, vertical fins, and control surfaces, and also eliminate any mismatch in the foam panels. Sand the panels gently with 400 grit sandpaper wrapped over a long piece of wood to remove the little molding bumps.

Hinge the control surfaces in place with full-length Econokote hinges. Cover and decorate your airplane.

Install the radio. Check your CG position and move whatever you must for balance, or add small amounts of ballast as required. Set up your control surfaces with about 1/8-inch up and down throw.

The bottom aileron surface should have a slight break upwards, and the elevator should be parallel to the bottom surface of the wing.

How about that; ready to fly already! If you are the nervous type, try swing testing your model. Tie the line on around the nose, then run it through a small hole in one wing tip. Neutralize your transmitter controls, turn everything on, then turn the receiver off and transmitter off so that your servos are locked in their neutral position. Swing your model around to see how it flies. Little by little, on successive tests, adjust the three control surfaces until your

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Cliffhanger . . . *Continued from page 52*

glider seems to be floating by itself out at the end of the line. It should fly at or above your hand level, and show an altitude change with inceased swinging speed.

When you are satisfied with the trim in tethered flight, recheck that the ailerons are set equal to each other and above the elevator. This set-up gives you a washout effect which reduces tip stalling. Once you have done all this, there is nothing left but to charge the batteries, do a range check, and then throw Cliffhanger off a cliff. •