



BLÄCKJACK

By LARRY SARGENT . . . Here's a state-of-the-art glider designed to be competitive on only a moderately high throw, by means of a superior glide. Its contest record is impressive, including a first at the '79 Nats.

• Outdoor Hand Launched Glider has too long been regarded as a pure strength event, and as such, has always attracted fliers in their youth. Later, they often turn to less physical events. However, cranking up a 16-strand rubber motor or running around the field with a 164-foot towline is hardly sedentary. Every free flight event presents its own unique demands, and all free flight models need to be chased.

Why, then, is HLG so often the realm of youth?

Well, not because we outgrow them. Any beginner can readily testify that hand launched gliders are not toys; they can be tricky and frustrating, just as any other free flight. Many are the would-be modelers whose first shot at free flight was HLG (perhaps because these models looked the simplest), and who are now happily back at their stamp collections.

The fact is, many modelers quit flying HLG because of severe and often permanent physical damage to their throwing arms. The list is long and the names on it might surprise you. If being competitive at HLG can do this to grown men, what will it do to kids, whose muscles and bones are still growing? Ask any little league coach how careful young pitchers should be and you'll see my point.

A couple of years ago, I was enjoying the wide open spaces of Taft (when you live in L.A., it can be a treat to merely see the horizon) and was preparing my 18-inch glider for the contest. When I saw Greg Sussex and Bob Boyer warming up I felt like turning around and going home. I couldn't believe the altitude they were getting! Try as I might, My rollout would be 20 feet below theirs. Finally, straining every muscle, doing my best imitation of an arthritic gorilla, I hung on an instant too long, and planted it in the dry Taft soil.

That sort of thing can ruin your whole day. But it did get me to thinking. Both Bob and Greg are younger, taller, and

probably stronger than I am. Without six months of weight lifting (and maybe an arm transplant), I would never throw as high as they did.

Therefore, why not design a glider for only a moderately high throw? It would have a larger wing span, higher aspect ratio, and lower wing loading to make the most out of the lower, lighter lift. The result was the Blackjack, a contest model that can do well on a consistent 80% throw.

Of course, my 80% may be different than yours. All I can say is that my arm never aches, I don't lift weights, throw tennis balls, nor fly more than every other week. Also, I am 33 years old.

If this depressing description fits you, or you're just tired of hearing your arm snap, perhaps Blackjack is just the thing for you!

WOOD

In order to be competitive, Blackjack must be able to make about the same dead air time as the popular 18-inch gliders. They may go up higher, but Blackjack comes down lower. This means Blackjack must be built light. If you can't find the right wood, wait until you can. Remember Sargent's Law of Counterproductive Balsa Selection: *NO amount of sanding nor accuracy of shape can compensate for starting off with the wrong wood.*

CONSTRUCTION

This is the most important part, so take your time. Use a piece 1/4 x 4 x 36. Weigh it. Then get your trusty calculator and figure out it's density per cu. ft. For the wing you want to find a piece that is 4-5.5 lb. density. C-grain balsa isn't really necessary, but it helps. You can also glue pieces of 1/4x1 and 1/4x3 together to make your wing. If you do, use a glue that can be sanded.

Cut the outline of the wing and mark the exact center where the middle dihedral break will be. Next, stick pins edgewise into the leading and trailing edges at the center to check the balance.

It's not too soon to consider which way the glide turn is to be: left, if you're right handed; right, if you're a southpaw. I am right handed, so all my directions will be for right handed trim. Just reverse the directions if you're left handed. Anyway, the *left* wing should be slightly heavier than the right wing. Check this before the wing is formed. If it falls to the right side, turn the wing over. It may be perfectly balanced; if so, worry about it later.

Soak a piece of 3/32 sq. spruce in hot water for 15 minutes and Hot Stuff it to the leading edge of the wing blank. Note that the wing outline is not symmetrical; the leading edge is swept back more, as you can see from the plans.

First sand the washout into the underside of the tip, as shown on the plans. No more than 1/32 of an inch. Next, sand in the taper on top from the outboard dihedral break to the wing tip. It should be about 1/16 inch thick at the tip. Then draw the high point line with a felt-tipped pen and start removing material to form the back part of the airfoil. Take your time and check your progress with a straightedge. Don't get too eager, you can't put wood back on! Some guys use a razor blade for this job. Not having stainless steel fingers, I prefer to use an abrader. They can be purchased at a hardware store and are great for roughing out wings. When you finish, there will be a sizable pile of balsa dust. Scoop some up before it blows away and save it for later.

When you get the airfoil shaped, switch to 220 sandpaper, and finish up with 600. Apply two coats of sanding sealer.

Now, stick the pins back in the center and check the balance again. It should fall *gently* to the left side. If it doesn't, use *paint* to correct it. You need black paint under the wings for visibility in the air (I use spray enamel) and bright colors on top for easy spotting on the ground (I use day-glow). If the left wing still needs weight, then put paint on the left side only. If not, apply paint to both wing tips evenly.

Finally, cut the wing at the dihedral breaks and bevel the edges for a good fit. Prop up the wing tips and tack the wing tip dihedral with one drop of Hot Stuff on the leading and trailing edges. If you didn't get the bevel just right and you have a small crack, take some of the balsa dust you saved, rub it into the crack, and apply some more Hot Stuff. Check the center balance again, and set the wing aside.

The fuselage is made from 3/16 spruce. When you cut it out, take particular care with the cut that will hold the stab. It *must* be exactly parallel to the top of the fuselage on which the wing will be mounted. Round off the edges as shown, sand, and give it one coat of sealer.

Now let's mount the wing. In my desk drawer I have a stack of HLG plans going back several years. All of them call for "O-O" incidence. In my opinion, all of them are terribly misleading. This has

got to be the best-kept secret of HLG flying. *You must have incidence.* It is helpful in the rollout, and also helps to avoid the straight up/straight down flight patterns of all beginners. I prefer to build in the incidence under the leading edge of the wing. Cut out a very small piece of 1/32 sheet balsa and Hot Stuff it on top of the fuselage where the very tip of the leading edge will rest. If you are a beginner, leave it at 1/32; if you are experienced, sand it down to about 1/50. Now stick pins down through the leading edge and trailing edge, simulating how the wing will set on the fuselage. Adjust it in your hands until it looks straight, then tack it front and back with one drop of Hot Stuff each. Due to the incidence block, there will be a gap under the center section of the wing. Fill it with balsa dust and hit it with Hot Stuff, and cover with fillets of Titebond.

Tail sections should be "C" grain (speckled stuff) of between 5 and 6 lb., 1/16 sheet. Note that the stab airfoil is asymmetrical in the areas shown; a normal airfoil on the left side and an inverted airfoil on the right side (or the other way around for left handers). Avoid making either of these curves too abrupt. No feather edges. The whole stab should be on the thick side, with the contrary curves blending into one another. The fin is symmetrical with a small trim tab at the rear bottom.

Run inside the house, throw open refrigerator, grab a can of beer and chug-a-lug it. Ignore your wife's glare and run back to the shop with the empty can. The aluminum beer can stock is perfect for the trim tab. Slit the back of the fin and epoxy in place. Use Ambroid or Testor's cement on the tail sections to avoid warps and make replacement easy.

A pop-up stab dethermalizer is unquestionably the best way to bring a model down. But is it the most reliable way to put a HLG up? I don't think so. When such a small model leaves your hand at 45+ mph, the slightest irregularity, especially in the tail surfaces, can cause it to go really squirrely. Even crash. Furthermore, we've gone to a lot of trouble to get the alignment of the flying surfaces just right. I'm not going to ask you now to make some of the surfaces movable. If they work, leave 'em alone!

Blackjack uses a swinging weight DT. When the fuse burns through the rub-

ber band, the weight releases and swings from the rear part of the fuselage, causing the model to stall, spin, and vibrate; sort of an airborne impression of a Saint Vitus dance. It looks silly, but it works. The usual problem with this type of DT is that the weight swings on the way down, crashing into the tail section, denting the wing, sometimes swinging over the wing, enabling the model to fly off again. . . . I solved this by using a piece of .020 piano wire and a pin stop, as shown on the plans. It protects the tail section and dampens the swinging motion considerably.

The fuse holder is made by soldering a small strip of .012 tin sheet to a 3/8-inch long piece of 1/4-inch O.D. brass tubing. Epoxy in place.

The finger block must be custom fitted to your own hand.

The nose weight is filed down from a larger piece of sheet lead. Sig makes these, six to a package; they even have the hole already cut. Attach the weight with a rubber band and keep filing until the model balances as shown on the plans. Now you're ready to fly.

TRIMMING

Get up early and drive to where there is grass for 200 yards in any direction and no trees. Also no dogs. They love to chase things that are thrown, and bring you back the biggest piece in their teeth. Finding the right place on a clam day is important.

A gentle, straight toss, into the wind, with the wings level, should result in a left hand glide to the ground. I adjust the glide circle to be on the large side, about 75-100 feet across. Add or subtract weight until the glide is smooth.

For a full launch, two angles must be kept in mind. The first is elevation: the angle of the nose above the horizon. The second is bank: the angle of the wings relative to the horizon. To begin, the elevation should be about 25° and the bank about 35°. Hold the model as if you were throwing it at arms length, nose up and banked right (if you're right handed) at approximately those angles. Hold it and look at it. Try to freeze that picture in your head. That's how it should look at the instant of release. When you think you've got the picture, go ahead and throw it with at least 50% power.

The model should leave your hand in a right bank and climb in a right turn until it runs out of energy, then at the top of the climb, circle left to the ground. The necessary trim for these two turns, the right climb and the left glide, is already built into your model. The right climbing turn, of about 270° from launch to rollout, is done by throwing it with a right bank, and at high speed the asymmetrical stab contributes to this right turn. When the model slows down, the stab tilt and the heavier left wing cause the plane to circle left. Thus, these two turns are accomplished by different means, at different speeds. If you're *sure* the launching angles are correct and the model still dorks, you may need more right turn. Bend the very bottom of the trim tab over right just a little and try it again. To adjust the glide circle, twist the fuselage with heat, to change the stab tilt. Gradually increase power, but *never* at the cost of missing those two launch angles. With time, you may find that your model likes slightly different launch angles. Each of my Blackjacks vary in this respect, but never very far from the angles given.

CONTEST FLYING

Once you develop a good, reasonably high, and very consistent throw, you're ready to concentrate on what really wins

contests: thermals. No other free flight event requires thermals as much as HLG. The others need only "light lift" or "air without a downer" to max. The very best Mulvihill rubber ships can do 10 minutes or more (double their 5-minute max) in dead air. But no one, not King Kong nor the Hulk, can possibly max in HLG without help from the air.

On the subject of thermals, at the '79 Nats, I was singularly lucky. I happened to drive the 4000-mile round trip in the company of non other than the original George Perryman. George has been going to these things for so long that they probably would cancel the Nats if he didn't show up. To say the least, he always does well. In fact, in 41 years, he has never walked away from a contest without a trophy! You may chalk this up to merely four decades of experience, but that isn't true. George has a secret ritual, which few mortals (*and certainly no Yankees!*) have ever seen. You've heard of Indian rain dances? Well, George does a *thermal dance*, complete with buffalo hide loin cloth. I realize this may be hard to believe, but I felt it my duty to reveal this secret to my fellow modelers.

On contest day I like to get there early, do some exercises, and make a few practice throws before I have to go through the hassle of lighting fuses. I used to wait until 10:00 a.m. before lighting fuses, but of the 14 Blackjacks I've built in the last year, 7 have "slipped the surly bonds of earth" never to be seen again. Now I start lighting fuses at 8:00 a.m.!

When I've maxed once or twice deliberately, I go sign up and start flying official. Oftentimes, your toughest competitors will turn out to be your greatest benefactors. Two days before the HLG event at the '79 Nats, I was practicing my throw when a huge boomer grabbed my best glider and pulled it up and then out over the Nebraska plains. It soon became a dot, even in my binoculars.

"Can you see it?" asked Stan Stoy, well known designer, record holder, and as of the night before, Indoor HLG winner.

"Yeah," I answered, "but I'm afraid to take my eyes off it."

I finally did lower the binoculars, ready to write off the model, but Stan was no longer there. He'd taken off on foot across the prairie to bring my model back. He did, too.

"I didn't want the competition eliminated before the contest," he said.

Two days later, when I needed only one more max to win, Bob Boyer, a Nats winner himself, kindly offered to "find good air" with his model, before I launched mine for that last critical flight. Sportsmanship and kindness such as this is the most valuable thing in free flight.

HLG is a great event. The models build quickly and you don't need the Great Gobi Desert as a flying field.

The Blackjack has been a good model to me. Perhaps it can do as much for you. If you try it, I'd like to hear from you. ●