RAIN CROW 2

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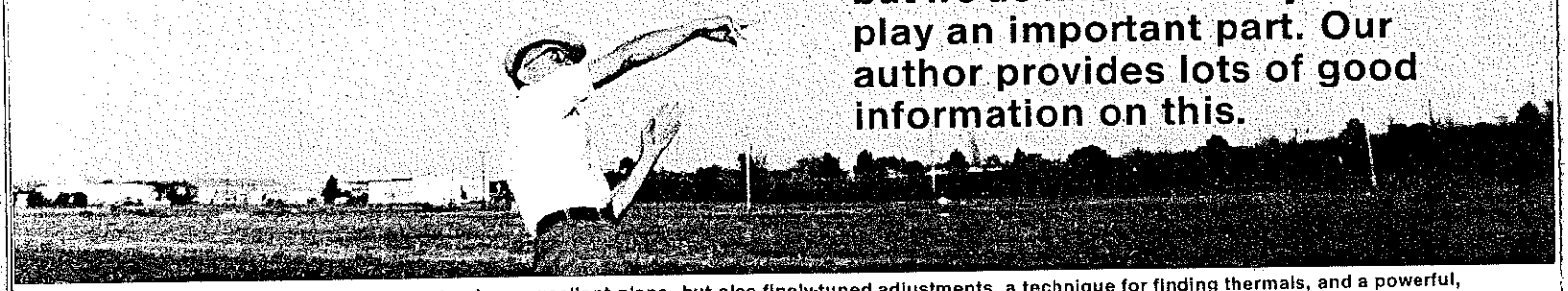
Reid A. Hull

What makes one HL Glider better than another? It's hard to say, but we do know that adjustments play an important part. Our author provides lots of good information on this.



Superior HL Glider flying takes not only an excellent plane, but also finely-tuned adjustments, a technique for finding thermals, and a powerful, controlled launch. This picture shows the Rain Crow II banked to the left—indicating that it wasn't thrown to the right of the oncoming breeze.

THIS DESIGN is probably the best-gliding HLG you've seen in quite a spell—that is if overheard comments mean anything. When thrown to altitude, it subsequently displays a very smooth transition to the glide, a combination resulting in continuing contest success by those flying the Rain Crow II design. This is a refinement of the Rain Crow I which appeared in the August 1975 *MA*.

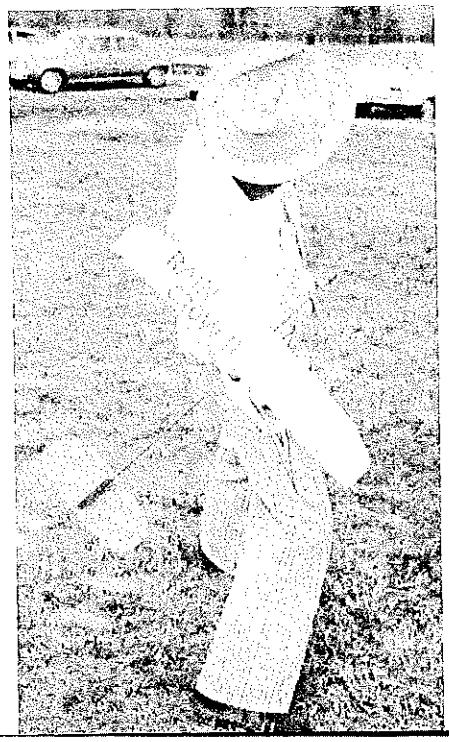
If memory serves correctly, Rain Crow II has won nine out of 10 club contests held over the past two years prior to submission of this article for publication. HL Glider fliers in the Brainbusters Club now fly this design. A significant feat of this plane in the hands of Paul Altenhoff was the winning of the HL Glider event of the 1981 Eastern States Championships.

Various hardware has been picked up with the Rain Crow II at different contests —with one trophy having been won in a light rain. It figures, I reckon!

Construction. Select medium-grade balsa that is maybe a bit on the light side of average for the wing and tail; choose quarter-grain (stiff) balsa for the tail. When making your selection of balsa, you should also be sure that it is straight-grained and has no mushy areas.

For the fuselage, if a little judicious splicing is done, you need only a 3/16 x ½-in. strip of straight-grained spruce 30 in. long. In this case, use slow-setting epoxy to secure the splices.

If not available, the 1/20 balsa can be sanded down easily from 1/16 with a sanding block. Actually some so-called 1/16 sheet is nearer 1/20 if measured. Let's mention here that a sanding block need be nothing more than a wood block about 3 in. wide and 4 in. long with a piece of sandpaper wrapped tightly around it.



Reid Hull begins the wind-up for another powerful throw. HL Gliders provide the most fun for minimum investment in time/money of all FF modeling. Pictures by Gene Hartmangruber.

Working down the wing to a respectable airfoil contour will test your patience the most, but this task can be reduced considerably by making use of a smaller block plane to shave the wing blank down near its final contour. Since both outboard panels of the wing have twist (washout) actually cut in them, it is advisable to mark the trailing edge (T.E.) location where twist exists so the mark can be used for reference in cutting from both top and bottom of the wing blank in the area of twist.

Shave the wing blank down to the approximate airfoil shape, leaving about 1/64 in. still to be sanded off. (See the drawing for airfoils to be approximated.) Next, sand the wing blank contour down with medium-grade sandpaper until you can no longer distinguish any of the shave marks. (Our idea of medium-grade sandpaper is that with grit about the size of table salt.) The use of a sanding block here will cut off the high areas left by shaving, and it also tends to give a more uniform surface. Next, with fine-grit paper, sand the wing until no scratches remain from the previous sanding.

Finally, using extra-fine paper, sand the wing contour until no scratches whatsoever are discernible.

Employ these same sanding procedures for the tail surfaces.

When the spruce fuselage is laid out, the outline is carved with a sharp knife or a jigsaw. As suggested before, the fuselage blank may be built up from 3/16 x ½ stock to get the required depth. Trim the blank until the sections on the drawing are truly representative of your finished fuselage, and then sand it until no scratch marks remain.

At this point you are cautioned to make certain that the fuselage wing and tail mounting surfaces permit precisely parallel mounting of the wing lower surface and the horizontal tail; anything else will not permit proper wing and tail alignment.

With the fuselage finished, turn your attention to the wing with a view towards cutting and cementing the dihedral joints. The outboard joints should be carefully cut and beveled so the correct outboard panel dihedral angle can be achieved together with a snug-fitting cement joint.

As for the cement to use, Ambroid is my preference of those available as it is waterproof and doesn't get brittle in a few months. Whatever your cement choice is, you need to apply a primer coat where the end grain is to be joined.

Having primed the end grain, go ahead and cement the outboard dihedral joints—being sure that the beveled ends are precisely mated so the outboard panels don't end up having more or less twist than initially cut into them. Straight pins can be used to secure this joint while the cement dries.

Follow the same procedure when joining the right wing to the left at the center. Be careful, again, to get the butt ends accurately bevel-cut so they can be precisely mated while simultaneously taking on the correct dihedral angle.

Now that the wing and tail have been sanded to shape, apply one coat of sanding sealer to all the balsa surfaces. Once the sealer has thoroughly dried, take a piece of extra-fine sandpaper and sand all the stiffened wood fuzz and bumps. Continue to sand until all surfaces become quite smooth.

High-speed camera shutter catches the author in mid-throw. Overhand launches that are steep and about 30° to right of wind are best.

Finally, apply two coats of quite thin clear dope to all balsa and spruce surfaces (except just one coat within ½ in. of the wing trailing edge—so as to reduce the possibility of eventual warping as the dope ages. If you wish, you can mix in about 20% color dope with the clear for these two last coats; this will add a little color to your glider.

The wing and tail are now cemented on the fuselage, and a finger rest of spruce put on the bottom of the wing next to the fuselage. Incidentally, whatever type of cement is used should be applied sparingly when cementing the horizontal tail on the fuselage. Any large cement fillet here will eventually shrink and warp the tail surfaces.

No dethermalizing scheme is shown. Several different types have been described in previous publications. Probably the best one is the small aluminum panel which, having been released from the side of the fuselage by a burning fuse, swings outward and thence aft, coming to rest against the wing leading edge. This panel may be cut from a soft drink can, about ¾ in. wide and 2 in. long, and is hinged at its rear end near the wing leading edge. (You'll find it necessary to cant the hinge line a bit to get the panel to come in contact with the wing when released.)

I should note, before leaving the construction phase, that others have had quite a bit of success with a modification of the Rain Crow II wherein they shorten that slender tail boom a little more than an inch. It makes the glider a bit more rugged, no doubt.

Flying. Add clay to the nose until the C.G. (balance point) on the fuselage falls where the drawing shows it. Launch from about shoulder height. Grip the fuselage between the thumb and second finger with the end of the forefinger against the finger rest cemented under the wing.

Thrust the glider forward in a slightly downward direction a little harder than if you were tossing a ping-pong ball across the living room. The glider should then glide forward for about 60 feet without stalling. If it does stall, add more weight to the nose.

If it is necessary to launch much harder than the toss indicated to achieve a 60-ft. glide, the glider will probably dive when launched to altitude. In this case, too much weight probably has been added to the nose. Also, if a marked right or left turn becomes apparent in the glide, deflect the rudder enough to overcome it (or else reposition the rudder, since it no doubt is misaligned.)

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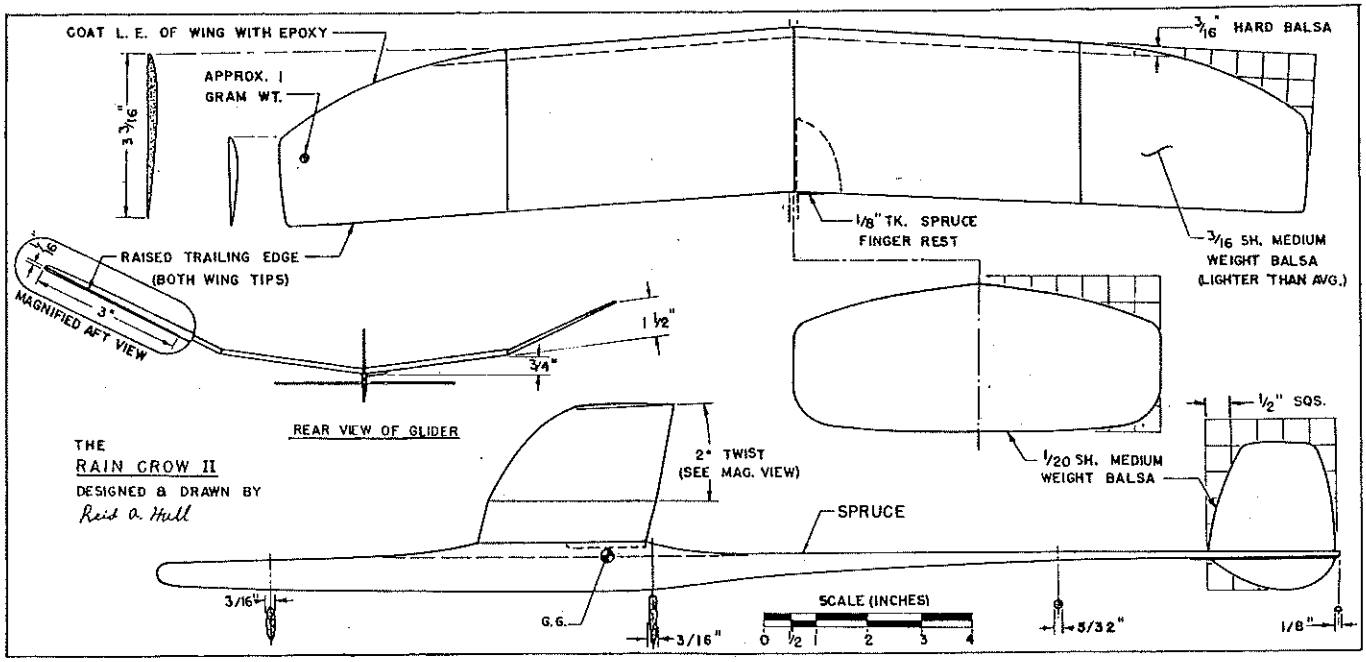

Full-Size Plans Available . . . See Page 172

Bellanca, cont.

U.S. Navy as a JE-1. The manufacturing rights to this final version were sold to Northern Industries, Ltd., of Edmonton, Alberta, Canada, after World War II. That firm produced a limited number of the Senior Skyrocket (as Model 31-55A) in the early postwar years. The last gasp came in 1950 when the design was considered for entry in the U.S. Army competition for liaison airplanes (which was won by the DeHavilland Beaver, to become the L-20).

Although the Bellanca was Lindbergh's first choice to be "The Spirit of St. Louis," fate decreed that it would be, by two weeks, the second airplane to fly the Atlantic Ocean nonstop. However, Bellanca was first across the Pacific Ocean nonstop, as the Columbia and its progeny became the world's premier long-distance planes. The Pacific flight was made by Clyde Pangborn and Hugh Herndon, Jr., in Miss Veedol (Wasp C-1, NR 796W, serial No. 3004). There had already been six previous unsuccessful attempts by others before they lifted off, on October 3, 1931, from Samishiro Beach, 280 miles north of Tokyo. They landed 41 hours and 13 minutes later, after a flight of 4,558 miles, at Wanatchee, WA to win the $25,000 prize offered by the Tokyo *Ashahi* newspaper for the first nonstop crossing. Earlier in 1931, on July 28-30, Russell Boardman and John Polando set a new long-distance record in the Cape Cod (Wright J6-9, NR 761W, serial No. 3001). They flew from New York to Istanbul, Turkey, in 49 hours and 20 minutes, a distance of 5,012 miles. Transatlantic flights had almost become commonplace. By 1931, there had been 14 successful nonstop crossings. In this spirit, when Otto Hillig and Holger Hoiriis flew from Newfoundland to Krefeldt, Germany, in June of 1931, they said they just wanted to visit their homelands for "some pig knuckles, sauerkraut, and beer." Their plane was called the Liberty (Wright J6-9, NR 797W, Bellanca serial No. 3003). Among other long-distance Bellancas were the Leonardo da Vinci, the American Nurse, the Pathfinder, the Lithuanica, and the Warsaw.

In addition to its successes in setting flight records for efficiency and long distances, Bellanca's design was a commercial success. Over 200 of the CH, J, Pacemaker, and Skyrocket series and their variants were produced by Bellanca Aircraft Corporation of New Castle, Delaware, in the decade from 1927 to 1937. Today, only five are left on the U.S. Civil Aircraft Register, but the Pacemakers and Skyrockets live on in the countless memories of those who knew and flew them.

Rain Crow/Hull

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After the glider is balanced and trimmed so that a long, smooth glide (with possibly an almost imaginary bit of left turn) has been observed we advance to the next stage of flight adjusting—that of launching to a modest altitude. To do this, bank the glider with the right wing tip about 6 in. lower than the left, and launch enough to the right of any oncoming breeze to prevent any violent stall when the launching speed tapers off. This should be at about half of your full-power launch. The glider should, in this instance, make about half of a full circle, gaining altitude all the way, and reach a height of about 20 ft. It should then slowly drop its nose and go on to a smooth glide circle.

You are cautioned to base your judgement on the performance you observe during several flights, since air currents may vary from flight to flight. Based on this sort of observance, if ever-tightening left glide circles seem to regularly occur, add a bit of right rudder.

If opening-up the glide circle to abot 100 ft. diameter by use of the rudder doesn't cure the tightening-up (and ultimately a diving tendency), it will be necessary to lower the leading edge (L.E.) of the horizontal tail a very small amount. Accomplish this by softening the tail's cement joint (about ½ in. from the L.E.) and inserting a cement-coated spruce wedge (no more than 1/32 in. at its thickest end). If Ambroid has been used to cement the tail to the fuselage, it can be softened with acetone (but if white glue has been used, it can only be softened with water, which will cause the tail to warp—a catastrophe). Of course, you can

cut the tail loose, but this will be difficult if the cement joint has really hardened.

Once satisfactory flight characteristics are obtained for 20-ft. launches, try harder ones with less bank. They should be steeper, too, approaching 45° inclination. Also, more of an overhand launch will work out better, and you'll find a respectable transition from the launch to the glide phase is still possible with a little more trimming.

If, in spite of launching to the right of an oncoming breeze rather than straight into it, you witness a violent stall or loop at the peak of the launch, add a bit of weight to the left wing tip and/or lower the T.E. of the horizontal tail about 1/64 in. by cementing a tiny wedge between it and the fuselage. In either case, a bit of corrective right rudder may be necessary to prevent a spiral dive, but it will need to be miniscule. Small rudder changes can be facilitated by dampening the T.E. area on the side opposite the direction the T.E. is to be deflected. Incidentally, your lips become very convenient when dampening tail surfaces becomes desirable.

When a fairly hard launch seems to be yielding a nearly flawless performance, go ahead and try your most vicious hard launch —trying for an almost purely overhead steep launch at about 30° to the right of any oncoming breeze. You will be nothing short of lucky if the first really hard launch yields a flawless flight.

A perfect flight takes a lot of practice and often some fine-trimming with rudder deflections so tiny as to be nearly invisible.

If following these as-hard-as-you-possibly-can launches the glider just seems to stall modestly, try bending the T.E. of the horizontal tail up a bit. This will cause the glider to keep to the right in a screaming Immelmann sort of launch, slipping to the right rather than stalling at the end.

I have found that a near-overhand launch yields the most consistency, which is one prime prerequisite when flying in competition.

Speaking of competition, it is nearly impossible to compete effectively and be any sort of threat if you can't put your glider into a thermal or balmy air on most every official flight. Learn to become aware of the presence of a thermal. One is almost certainly at hand if you note a tiny rise in temperature or a calm spell on a breezy day. (If you want to avoid thermals, you'll find boomers are mighty scarce when only two hours of daylight remain in the day.)

Well, happy thermal chasing, and keep 'em flyin'—Rain Crows, that is!

CL Speed/Hempel

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point. The class would be limited to one engine, the side-exhaust McCoy .60. It really was the only engine used for class D Speed during the late Forties, the Fifties, and the early Sixties. Also included is a photo of Harold deBolt attempting an FAI-rise-off-water speed record at the Plymouth Internats. Hal used a McCoy .60 for power.

"Keep up the good work."

Part of the Topping 100 instruction manual. Note the two engines shown here: Hornet .60 at top, Ohlsson .23 below. Other pictures showed how to fit almost any of the other popular engines of the day (1946) into it.

I would like to thank each person who took time to write concerning "Old Time Speed." Keep those cards and letters (and photographs) coming!

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