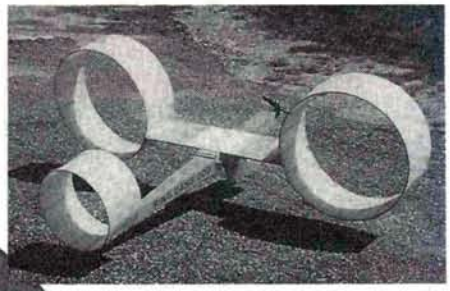
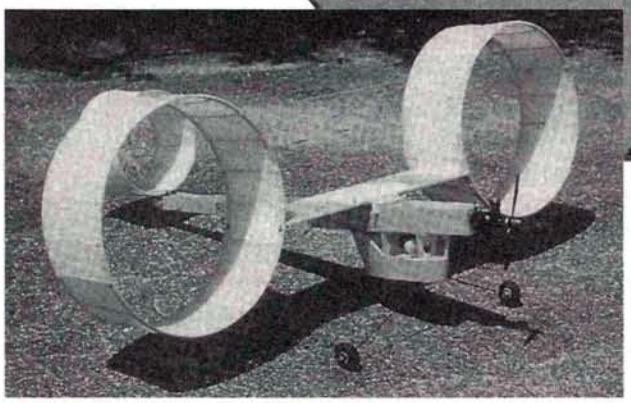
by ROY L. CLOUGH JR.

MODEL AIRPLANE NEWS
CONSTRUCTION

Ringer

What's all the "hoop" -la about?





IT LOOKS LIKE the courtship dance of a pair of lampshades, or like a time traveler from a future that has outrun our ideas of common sense, but the "Ringer" is a novel design that has its roots firmly planted in one of the oldest notions of how to build a flying machine.

Aircraft with annular airfoils (or lifting drums) instead of conventional wings have been theorized, proposed and actually built since around the turn of the century. Early-bird Danish pioneer Ellehammer tried to fly one. (He had better luck at a later date with a more conventional design.) Louis Bleriot actually did fly a somewhat diluted version—a flattened oval annular-wing tow glider on floats. Ellehammer's full-scale machine wasn't a success, but the method of control he proposed—"slewing" a lifting drum—worked well on this model.

Ringer gets noticed. My fellow members of the Winnipesaukee Radio Controllers quit flying their own stuff and gathered around when I fired it up. Their rapt attention as it maneuvered around the sky and their round of applause when it landed made the whole project worthwhile. Of course, there were a few remarks I could have done without, such as, "It's good to minimize wingtip losses, but this is ridiculous!" and "Oleg Cassini is going to be very annoyed by what you've done with his lampshades."

Seriously, though, Ringer *is* extremely stable. It handles well under power and has a decent glide. Towed around by a Cox* Black Widow, it's an eye-catching performer and if you feel burdened by a reputation for excessive sanity, Ringer will get you off the hook.

This isn't my first annular wing. In a previous incarnation, I built a free-flight annular wing for *Popular Mechanics* (see "Hoopskirt"—April, 1963). It flew well with a Cox .02 reed-valve engine. Judging by the mail I received, it was a popular item, but I did get a few squawks that the circular wing spars were a nuisance to make. Well, Ringer's spars aren't difficult; they come "prefabbed." They're made of wooden embroidery hoops, which are available in most craft shops.

Just about every model I design has at least one key ingredient I'm proud of. For Ringer, it's the smooth, responsive control system. It even lowers the model's tail to increase the wing angle of attack for takeoff! Scratch-builders might want to give further consideration to the control linkage, which could be used to work the "cruciform" tail of a scale Santos-Dumont "Demoiselle," or designed into gimballing tail feathers for your latest original. You could even try an annular drum instead of the usual tail surfaces on something conventional. For soaring gliders, it could be used to operate a V-tail without a complex linkage or mixer function.

CONSTRUCTION

A good point I discovered: the more radical the model, the more conservative the construction. Ringer has a sheet-balsa fuselage covered with iron-on film. Build the cabin/landing-gear unit separately. Cabin sheathing is manila file-folder material; it's easier to work around curves than sheet balsa, and it takes iron-on coverings very well. "Major Pong," my faithful test pilot, was ensconced behind the acetate windows of the original. If you prefer, it's simpler to cover the entire cabin with folder stock and indicate the windows in a contrasting color.

• **Wing.** The four annular wing spars are made of two, 14-inch-diameter embroidery hoops. One of each pair is solid and requires only rounding on one edge. The other hoop is open-ended and joined with a screw clamp. Remove the clamp by carefully drilling out the rivets. (Don't discard the screw clamps; they make great stabilizer adjusters for larger planes.)

Squeeze the open hoop down to the same diameter as the solid one. Make a diagonal cut through the overlap with a razor saw. Line up the diagonal cuts, and epoxy or CA and thread-wrap the joint.

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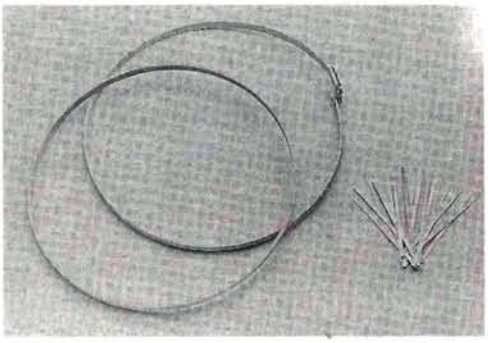
SPECIFICATIONS

Model name: Ringer
Designer: Roy L. Clough Jr.
Type: annular-wing sport flier
Length: 39 in.
Weight: 28 oz.
Span between hoops: 44 in.
Engine size: .049
No. of channels req'd: 2 (elevator, rudder)
Prop: 6x3
Airfoil: annular

Comments: circular wing spars made of 14-inch-diameter embroidery hoops provide strength and structural integrity to this unusual, though stable, model. Its smooth, responsive control system even lowers the model's tail to increase the wing's angle of attack for takeoff. Ringer will prove to be the steadiest plane you've ever flown.

The stabilizer (moving control drum) front and rear spars are made by razor-sawing the solid hoop into two rings.

I had this great idea to make the wing ribs of the original model by gluing wooden coffee stirrers to both sides of the wing spars and inserting small balsa blocks to bulge them into symmetrical sections. It worked; if you have a lot of time to waste, you can build them this way, too. A much better way is to cut out 36 symmetrical 1/8-inch-sheet-balsa ribs for the wing drums and six flat-bottom ribs for the bridge. The tail drum's flat section requires 12, 3/16-square-inch balsa ribs. Sand the ends down to spar thickness.



The four annular wing spars are made from 14-inch-diameter embroidery hoops. See article on the technique for joining the ends of the hoop. The coffee stirrers can be used as ribs, but the procedure for installing them takes a considerable amount of time.

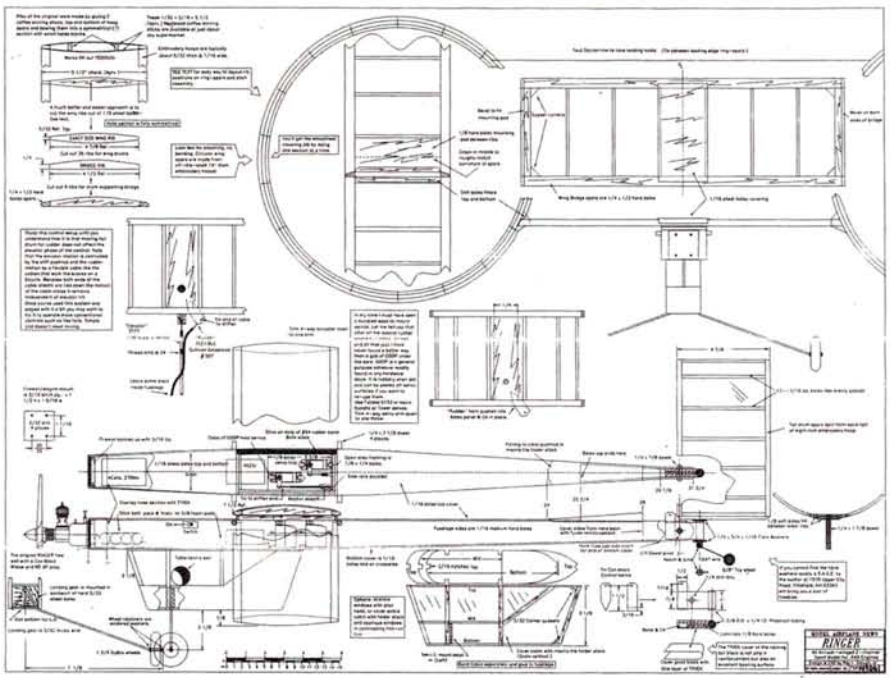
Wing assembly starts with matching two wing ring spars by sliding them around until they are even with each other. They probably won't be absolutely, perfectly circular—no sweat. A little out-of-round won't hurt anything if both spars are in line on the leading and trailing edges. (To keep track of alignment, make "witness marks" in red on both spars.) The easy way to determine rib positions is to lay out a 14-inch-diameter circle on a piece of cardboard and divide it into 18 sections. Cover it with a sheet of wax paper, lay the hoops over it, and pencil in the rib positions. Start with three ribs 120 degrees apart stuck on with fast-drying CA. Lay the other hoop spar atop the end of these ribs (centered and held in place with books, fuel cans, or whatever is handy), and tack it into place with more fast-drying CA. After you get to this point, the rest is easy. Add the remaining ribs in opposing pairs, and true up the drum structure as you go. The wing drums are identical. The tail drum, with its 12, 3/16-square-inch rib struts, is assembled in a similar fashion.

When all the drum frames have been assembled, glue in the 1/8-inch, sheet-balsa mounting inserts. Note that these are cracked midway to conform to the curvature of the spars. Then make up the "bridge" wing. Trial-fit the lifting drums, but cover the three pieces separately before joining them. I covered all flight surfaces with silkspan, one bay at a time—a very smooth surface and only slightly tedious to do. I "water-shrunk" the material and finished it with clear dope. You could also use any light covering such as Litespan* or Micafilm*. Assembly of the wing unit should be clear from the plans. Do not omit the string between the top of the wing drums; it takes landing loads off the joints between the wing drums and the bridge.

• **Controls.** Study the simple control hookup and, before you start, understand how and why it works. I tried several versions before I figured out how to achieve the elevator motion without disturbing the rudder setting and vice versa. The answer turned out to be simple: the elevator is actuated by a solid pushrod, and the rudder is worked by a flexible, sheathed cable in the same way as a bicycle brake. Sullivan* Gold-N-Rod works fine. It's very important to have plenty of slack between the two tied-down ends of the sheath. One end of the sheath is bound and CA'd to the tail end of the elevator pushrod; the other end is solidly glued to the servo bulkhead. Tin 1 inch of both ends of the cable to stiffen them so they can be formed into Z-bends. The hardwood dowel pivots must operate smoothly without binding or wobbling appreciably.

I hand-launched the original for its first flights, but a rolling takeoff is more impressive. Balanced at the right spot and with true surfaces, Ringer will prove to be the steadiest plane you've ever flown.

** Addresses are listed alphabetically in the Index of Manufacturers on page 138.*



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