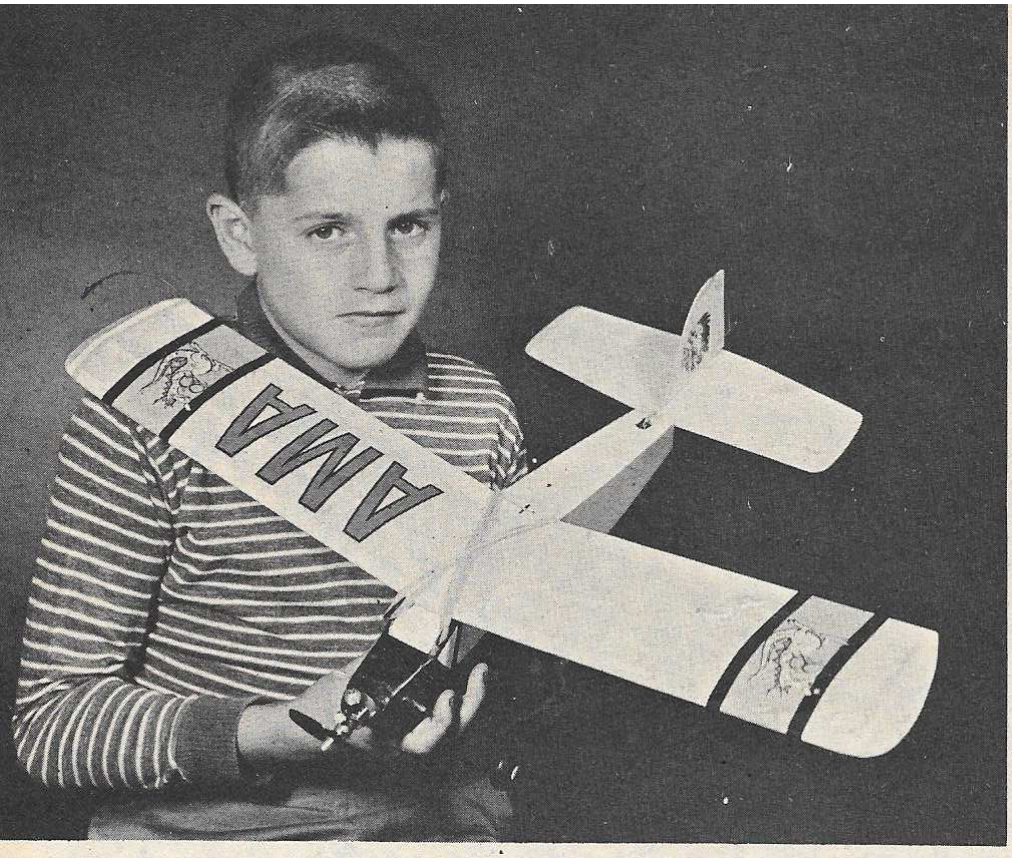
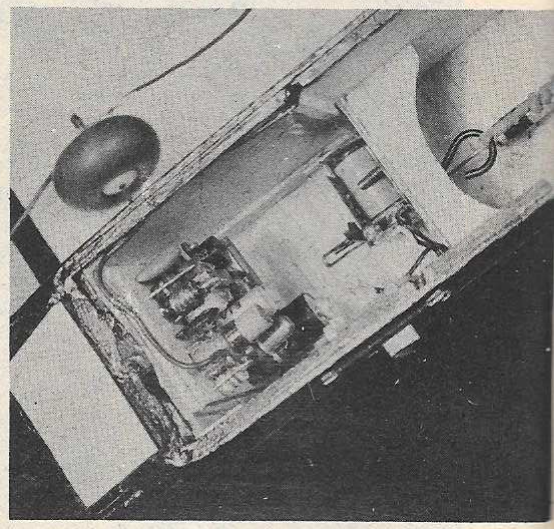


by BILL WINTER

The photographer used his youngster to demonstrate just how small our Lightning Bug really is.

Citizenship's LT-3 Relayless rcv'r escapement combination ideally suited for light weight planes.



LIGHTNING BUG

Compact cars and — now we have the compact model plane. Since the advent of the Cox .010 engine planes are smaller and add to this combination the lightweight relayless receivers and we have 7¼ ounce R/C planes.

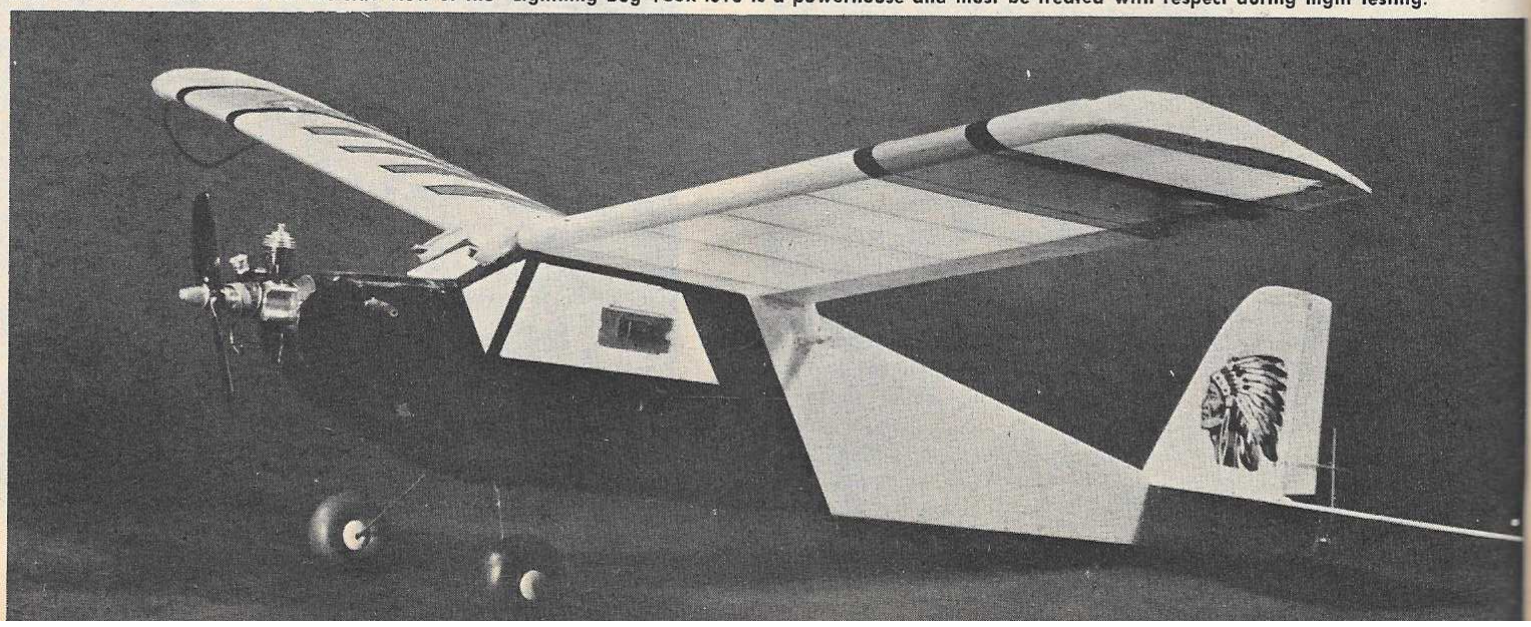
► The first RC job we flew—designed by the writer, built by MAN'S editor and chased on a 50-50 basis by the both of us, was an Ohlsson 60-powered behemoth that weighed a ton. Lightning Bug, the 40th RC, spans 26 inches and is powered by the new .010. It weighs less than the batteries did in that big job 13 years ago—not half as much as did the Good Brothers receiver with its batteries.

Wing loading is 9 2/3 ounces per square foot, power loading 725 ounces per cubic inch displacement, gross weight 7¼ ounces. Keep in mind when building yours that every extra ounce means another 100 ounces power loading!

There is nothing really sensational about an .01 RC. No freak, this one is built like any other RC. Proportions are normal and materials generously strong. At 7¼ ounces this model is 4¼ ounces heavier than the designer's free flight for the same engine, suggesting that weight cannot be reduced easily—there just isn't enough wood in the craft to permit any important saving. The radio is a Citizen-Ship LT "3" with the matching SN escapement that came in the same box.

Lightning Bug may be bigger than some .02 bombs, but it has roughly half the area of Ken Willard's .01 which, we hear, has about 200 squares. Recalling much that has been published about .02's, doctored escapements, and so on, for extreme lightness thought so necessary, one may wonder. The .01, half as (*Continued on page* 54)

Slide switch looks enormous in this side view of the "Lightning Bug". Cox .010 is a powerhouse and must be treated with respect during flight testing.



Lightning Bug

(*Continued from page* 16)

big as the .02, definitely does not require doctoring anything in order to fly.

By careful building and material selection, the .01 can be pared to under seven ounces, but it climbs at 7¼. The thing to watch is extra weight. It is not necessary to use mush wood, but you must avoid the hard stuff. Construction does not require an expert hand, but good wood selection is a vital matter. Go easy on the colored dope—a little trim, maybe, but none at all on the tail. Painted all over, the model probably will be too heavy.

Fuselage: Outline the pair of sides on 1/16" sheet balsa, marking off the bulkheads and station positions. After cutting out the sides cement the nose doublers in place with the grain vertical. Place one side flat on the bench and cement to it bulkheads #3 and #5 and the top-of-cabin stiffener for the same side. Quick-drying cement is OK on a small model like this and will hasten construction.

Cement the second side and cabin stiffener to the same two bulkheads. Check alignment before the cement is dry, after which the work can be handled for in-the-air building.

Crease the sides—on the inside—at bulkhead #3, then angle them in at the nose to the width of the 3/32" thick ply firewall. Before installation the firewall is drilled for the 2-56 machine screw mounting bolts. Tighten the nuts—without the engine—and cement them with two coats of high-grade cement to the rear of the firewall. Cement strips of 3/32" sheet around and between the nuts to prevent them loosening later. When a mounting nut of this type comes loose it usually is because of heavy pressure on the screw driver as the machine screw engages the nut—the nut simply is pried away from the wood.

It is imperative that escapement, push-rod, and the 1/32" wire yokes be installed now; they cannot be fitted later. The sides can be pulled in at the rudder post, but go no farther until the gizzards are in place, including the receiver and wiring. Some wiring will have to be loose-ended for the time being.

Wires from the receiver to the batteries pass through a hole near the bottom of the front cabin bulkhead. The escapement mounts on 1/16" ply with a 1/8" sheet balsa brace along the top edge of the ply, behind the ply, cut away to allow hook access.

Our receiver was not removable, but a light-weight slide can be arranged if desired. Note the 1/32" ply insert in the rudder post, and the smallest size modeling bushings that are press-fitted into this insert, and into the escapement mounting plywood, to serve as torque rod bearings.

The receiver is contact cemented to a rectangular piece of thin foam cut from a Dr. Scholl inner-sole. This material is about one-eight inch thick. Do not pull off the heavy material which is on one side of the foam as it comes. This harder side can be contact cemented to the bulkhead, the receiver being attached to the rubber after it is in place.

Note: Due to possible bad effects from the action of the contact cement upon the open underside of the chassis with all its printed circuitry and soldering points, give the bottom of the receiver three coats of modeling cement, and allow to dry hard before using the contact cement.

Before completing the nose, bend to shape and install the .045 music wire landing gear. Lightweight Trexler air-wheels are specified. The gear is retained by cementing it to the front of the bulkhead, then sandwiching it with 1/16" sheet as shown. Piece B, the battery compartment floor, glues to the top of the sandwich.

The nose construction is self-evident; however, select the desired tank—ours was a small Perfect Wedge, feed line placed at the bottom.

After installing all uprights, cross pieces and bulkheads, cover the top and bottom of the fuselage with 1/32" sheet balsa, grain across-ship. The completed fuselage is well sanded, taking the material down

to 1/20 inch—you'll have to estimate. It is not covered. Four coats of clear dope provide protection. Sand after each of the first two coats. The fuselage is quite strong.

Tail: The 1/16"-thick tail surfaces are easily made. The edging of the thickness material, preferably a harder grade balsa, prevents warping and retards nicking of the wood. After smooth sanding the finished surfaces, give them three coats of well plasticized dope.

Mix about two dozen drops of castor oil in two ounces of clear dope. Untreated dope will warp the sheet balsa. The stabilizer cements in place and the fin on top of the stabilizer, with shaped pieces of 3/32" sheet on either side for support (see detail on stabilizer).

Cloth hinges seem awkward on such a small rudder and fin, but can be used. However, we used short pieces of 1/16" outside diameter tubing (as shown in the detail) with straight pins running through them. On the top hinges the pin points down; on the bottom hinges, up; the heads are cut off and both pins bent over and the ends cemented. The pins can be cut short.

Wings: Shaped leading and trailing edges are used as they come from the hobby shop. They are of more than ample size so look for medium-hard triangle stock, and rather soft leading edge material. Note that the spar notches are located aft an additional one-eight inch on the righthand panel, permitting a handy overlap at the center line for joining at the required dihedral angle.

The frame is assembled by pinning down the edges, then inserting the ribs and tips. When the cement is dry, cutting the wing in half at the center. The butt ends of the edges then are beveled for dihedral. To do this elevate each panel two inches at the tip from the surface of the bench in such manner that the wing centerline is flush with the edge of the bench, with just enough material projecting beyond the edge to allow block-sanding with the bench as a guide.

Join the panels by pinning one panel flat, then elevating the other four inches at the tip. Double-glue the edge joints. Finally, drop in the spars, filling in the joiner point as shown in the detail. The excess material is trimmed off after the cement has dried. The finished frame is carefully sanded before wet-covering with Silkspan or similar material.

Silk is not necessary; the paper does not crack even with rough handling. We thinned the dope 10% and, since it was hobby shop dope with a plasticizing element present, did not add castor oil. If you feel plasticizing necessary, mix about half as much castor oil into the clear dope as was required for the tail, and use the plasticized dope for the last two of the four coats given.

Flying: Nothing special need be said about flying instructions. Merely correct any warps and be certain of the alignment of the surfaces, particularly the vertical tail. Some down- and right-thrust may be required; the amounts appear on the plan. For right-thrust slide a standard ¼" modeling washer over the mounting screw behind the left side of the radial engine mount.

Our only difficulty came with swamping of the receiver when close to the transmitter, as when picking up the model for launching with the transmitter, turned on, in the other hand. This swamping can cause the SN escapement to change position unnoticed so that the incorrect control intelligence may be given. With a compound escapement this would not be so bad, since right is always the next control position, going from neutral. Of course, someone can launch the model for you if this difficulty is encountered.

The Citizen-Ship three-volt relayless receiver was as easy to operate as turning on a light. To tune, read voltage at the escapement. A two-pin socket (or alligator clips) and an old voltmeter for handy field use, will expedite operations, especially when your hands are busy with the tuning.

Since pencell-sized batteries are required in this small airplane, beware of any brand that utilizes a double-bottom. While suitable for their design-purpose—not model airplanes, they are most unreliable for RC work. We used energizer type cells.

The two-battery pack, lightly taped, carries through receiver impact to the nose in a dive-in. The batteries, therefore, should be a snug fit. A couple of pieces of foam rubber also will prevent sidewise movement of the batteries within their compartment. Avoid heavy switches; in selecting a slide switch, use one which makes a knife-type contact. The contact action can be observed through the open end of the switch. The mounting tabs and lever can be cut short if desired.

And don't worry about the engine—it's a powerhouse.