Re-Volt-er

Clarence Haught

Model is covered with silkspan and finished with clear dope. Trim is Japanese tissue. One of the things you immediately appreciate about electric-powered models is the freedom from cleaning up oil film from typical glow engine operation—not to mention the gentleness to the ear.

YOU HEAR IT everywhere modelers gather—in small groups, at club meetings, and when flying. It's getting harder and harder to find a place to fly. Someone mentions Schoolyard Scale—½A engines in small models that can operate from ball fields and playgrounds. They're good, but even with mufflers installed someone may complain about the noise.

Some time ago I picked up an interesting paperback book, *The Silent Revolution,* by Bob Boucher of Astro Flight. It deals with electric-powered flight, something a lot of us thought about many years ago but couldn't do anything with due to the inadequate batteries then available. Today, with the readily rechargeable Ni-Cd power pack, electric flight is a viable alternative.

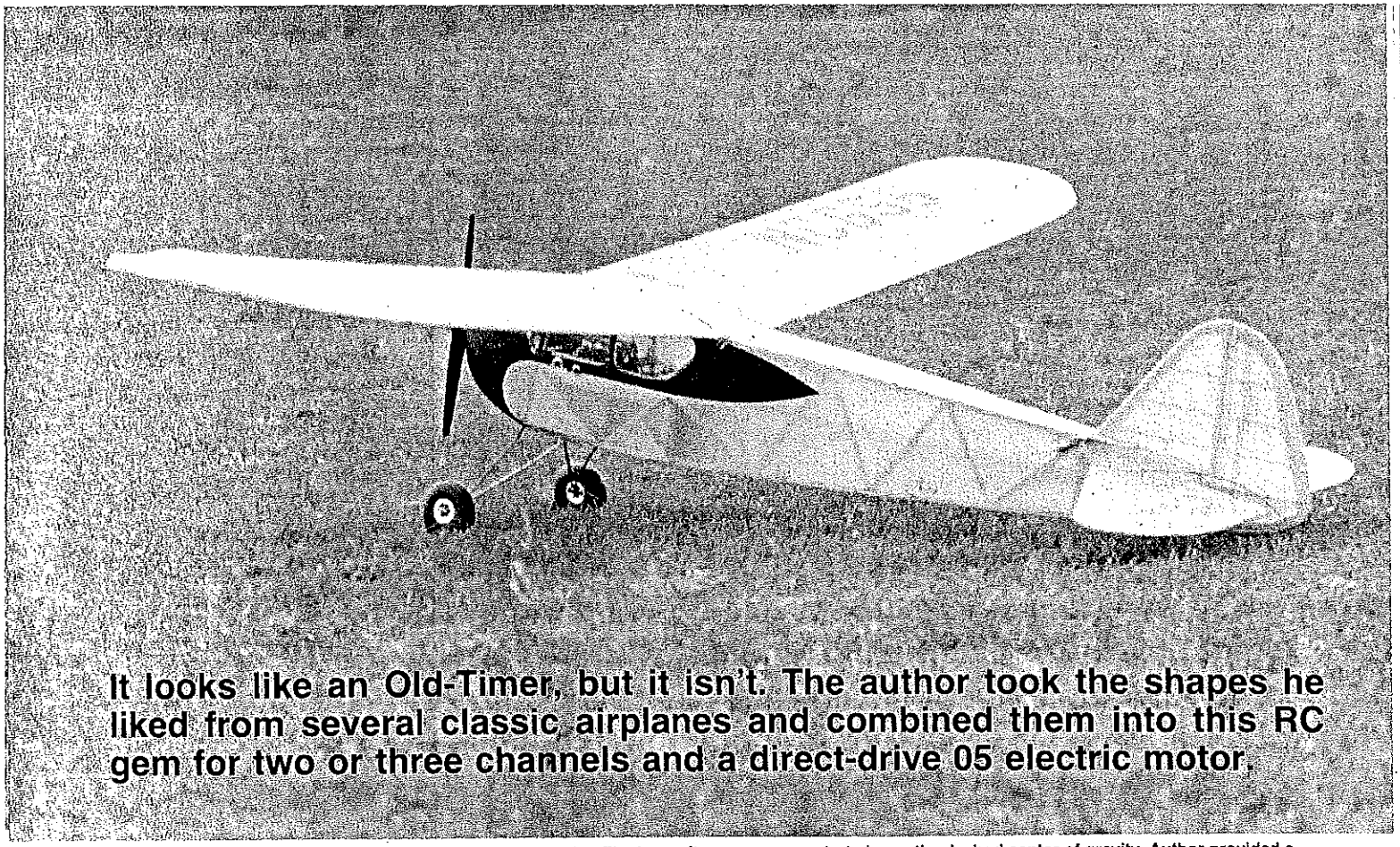
Author/Designer Clarence Haught is carrying everything he needs to put in a flight—the Re-Volt-er and RC transmitter. Charging the motor batteries takes only a few minutes. It's a great fun flier.

Bob's book answered a lot of my questions. Things about motor size, props to use, and weight considerations were all there. How long will the motor run? What about rapid charge? These and many more questions were put to rest during a pleasant evening's reading. I even learned that large models like an Old-Timer Powerhouse can be flown on electric by the use of a gear reduction unit, allowing the relatively high rpm of the electric motor to be utilized for driving a large diameter prop at a reasonable speed.

Keeping in mind that I wanted a small model for vacant lot flying I researched the charts in Bob's book and selected the Astro 05 motor (which approximates .05 glow engine power). The charts specified an all-up maximum weight of 32 ounces (wow!) and recommended a wing area of 250 to 350 sq. in. This will provide a wing loading of 13.2 to 18.5 oz. per sq. ft. That's not excessive with the larger wing area.

Anxious to join the "quiet revolution" I set about designing an appropriate model. Because of the weight involved and the small flying site to be used, I wanted a model that could carry the projected 32 oz. at a low air speed. An Old-Timer type of model would be ideal, and there were many designs in the 350 sq. in. area.

Even after extended research, I failed to find just the "right model" for me among the various Old-Timer designs. Since this model was intended for sport flying only, I thought I might just as well combine the best



It looks like an Old-Timer, but it isn't. The author took the shapes he liked from several classic airplanes and combined them into this RC gem for two or three channels and a direct-drive 05 electric motor.

Short nose works out well for obtaining the proper balance point. The heavy items are concentrated near the desired center of gravity. Author provided a dual-wire landing gear to take care of hard landings, but he found with the approx. 325 sq. in. wing that landings are smooth and easy.

features from more than one Old-Timer into something that pleased my eye. Thus the Re-Volt-er came into being as my contribution to the silent revolution. While not an actual Old-Timer, it does have Old-Timer flight characteristics. Being essentially an "interrupted Free Flight," but yet quite controllable, it will serve the beginner and expert alike as an enjoyable venture into a new realm of RC.

Any two- or three-channel radio is suitable. One with small servos and a 240 mAh battery pack is preferred. It is desirable to have a third servo to operate the motor switch, as this allows taking off from a standing start and switching off the power in flight if one wishes to thermal soar or land before the battery is exhausted.

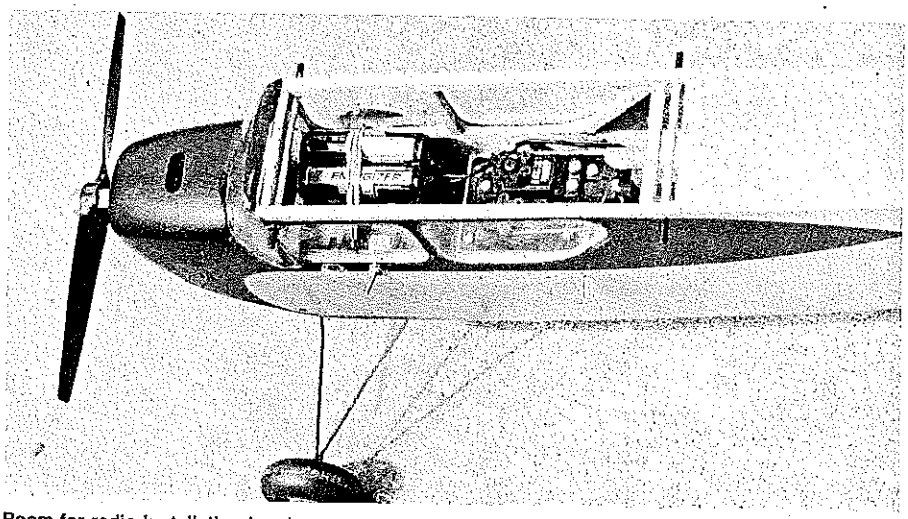
Astro strongly recommends a controllable switch to avoid motor damage in the event the motor is stopped by an obstacle. This can be an added function of one of the main servos—operable at full down elevator, etc. As the battery discharges in flight, the motor slows below the rpm necessary to maintain flight—so without a controllable on-off switch, all landings are made with the motor "idling." This tends to stretch the glide, so that's another good reason to have motor control.

Provisions are made in the design to allow cooling air for the motor and batteries in flight. Cooling is also an important factor during the charging cycle. Charging takes about 15 to 20 minutes, which allows you to relax between flights and free up frequencies for others to fly. Batteries must not be charged from car batteries while the engine is running. Automotive electrical systems operate at approximately 14 volts, and this is too high for the Astro charger (which is for 12V input). So much for charging while enroute to the field!

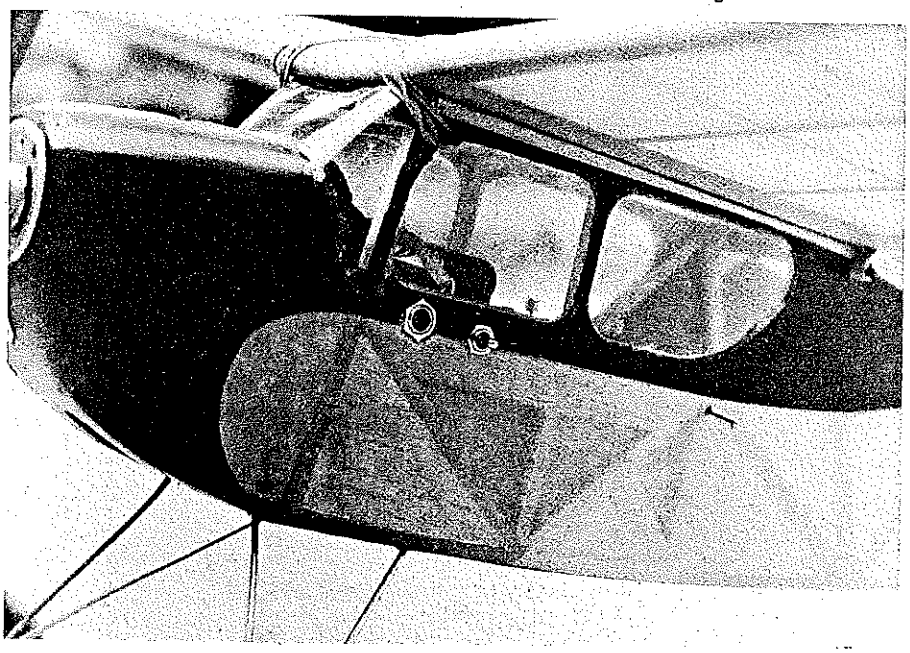
At first glance electric power may seem expensive. The cost of the motor, battery pack, and rapid charger does add up. But when you consider the current prices of glow fuel, the scales begin to even up. Not only do you not have to purchase expensive fuel, neither do you have to wipe the oil off the model at the end of the flying session!

Re-Volt-er turned out to weigh the maximum recommended 32 oz. Its 325 sq. in.

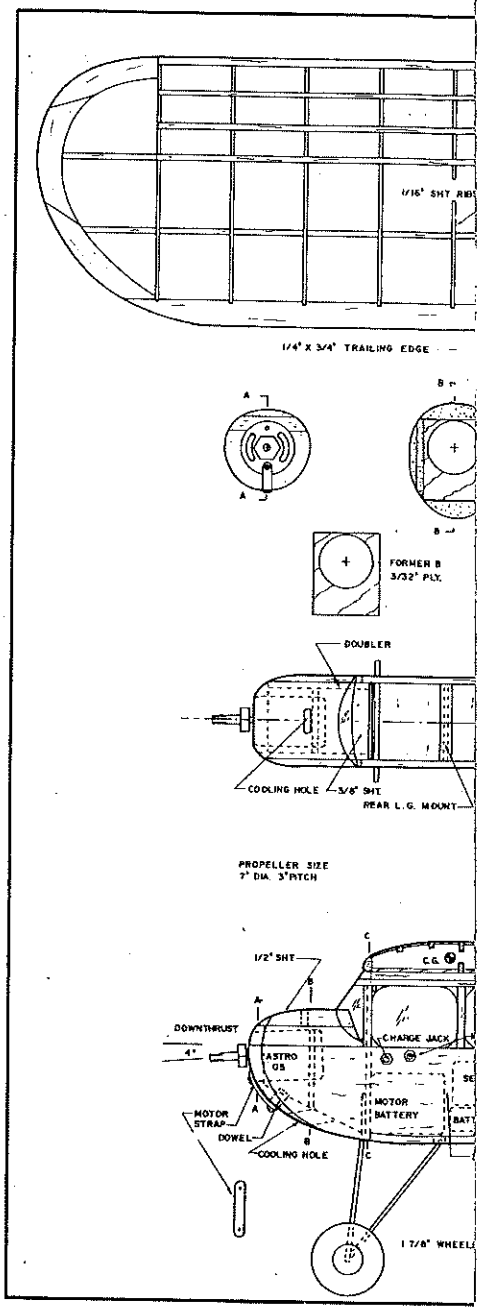
The model is flown on a 7-3 prop, but props from 6-4 to 7-4 work okay. An RC-controlled on-off switch is a virtual necessity to prevent the possibility of motor damage (and for soaring).

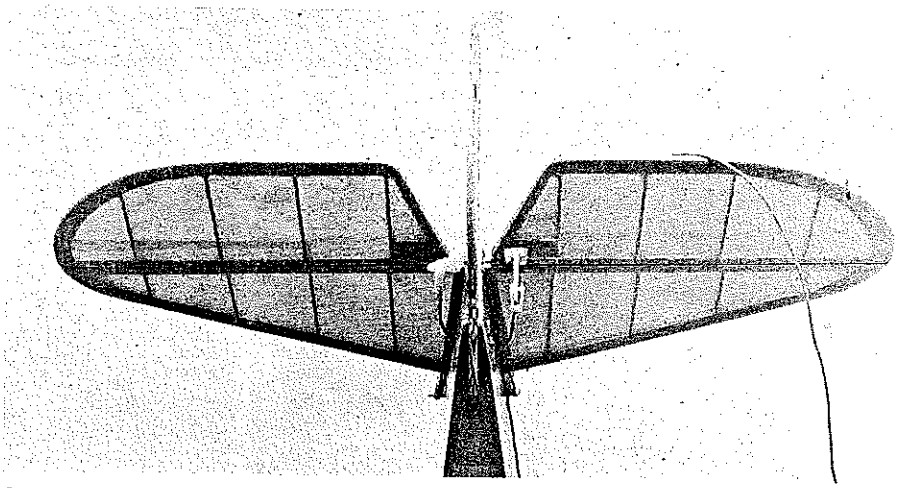


Room for radio installation is adequate, though snug with the motor batteries. Locate the servos to achieve the correct fore-aft balance. Slot in top of cowl is exit for motor cooling air.



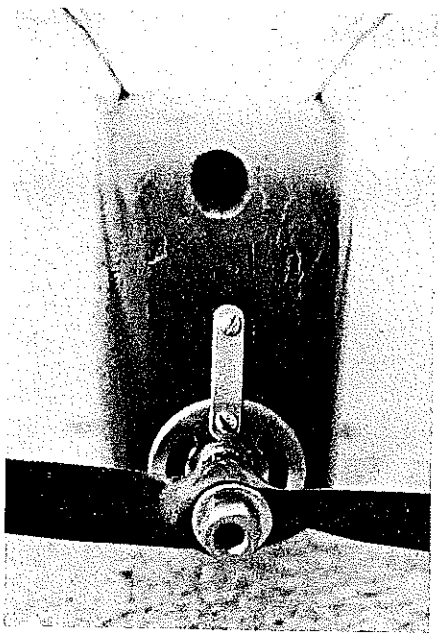
Front fitting under the side window is a charging jack. Behind that is a manual on-off motor switch. The wire beneath the rear side window is for the radio on-off switch. Box fuselage is conventional.



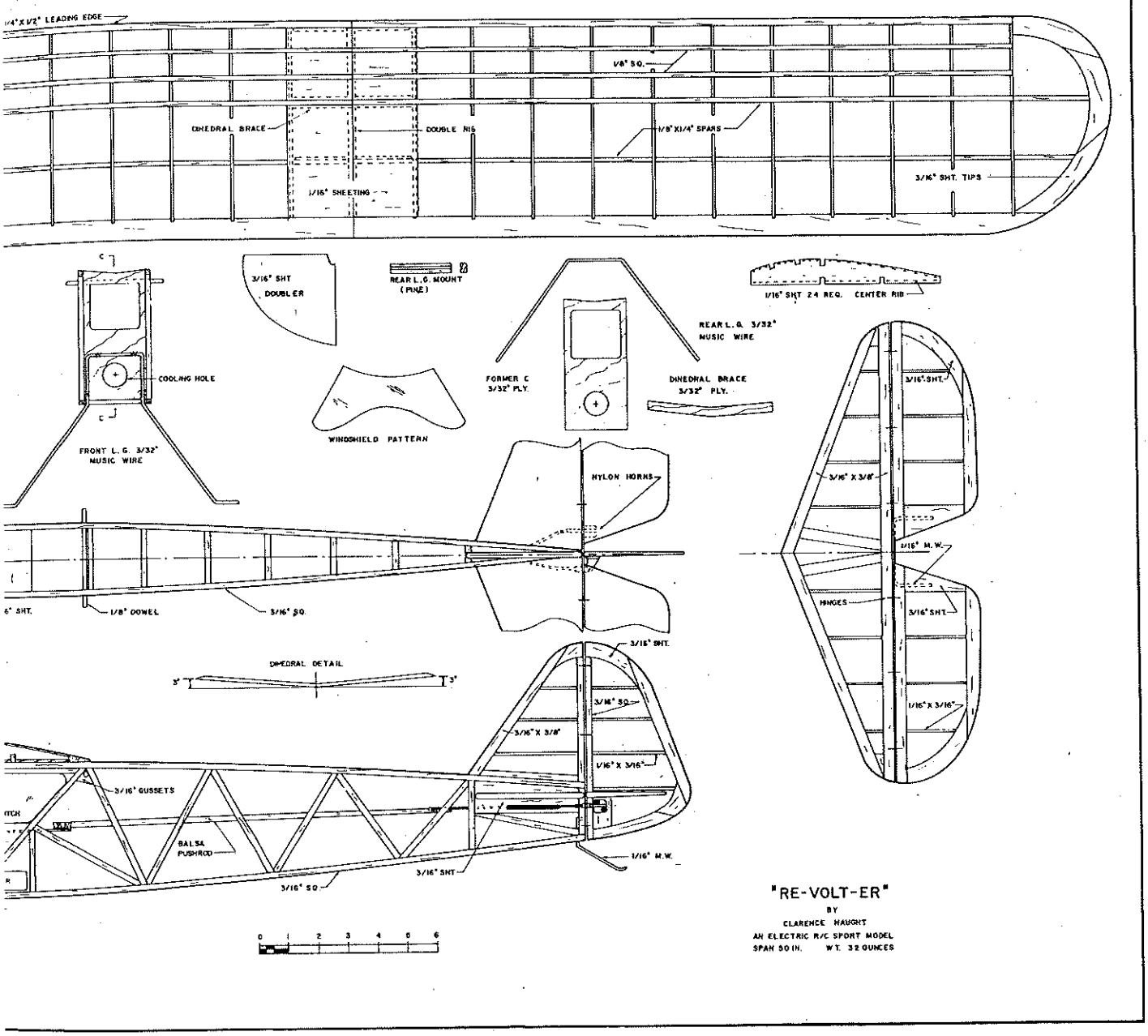


Standard control used—nylon horns and clevises threaded to wire ends of balsa pushrods. Tail surfaces of original were held on with rubberbands, but author says permanent mounting is better.

carries it well at 14.2 oz. per sq. ft. I fly my model on a 7-in. diameter, 3-in. pitch prop (an FAI size), but props from 6-4 to 7-4 work okay. Flight speed is slow and realistic, and the model is quite maneuverable.



Note cooling holes in front of the Astro 05 motor and how it is retained by a metal strap. Lower screw goes into hardwood insert in the balsa nose piece. Lower hole channels cooling air to the motor's battery pack.



The model will R.O.G. (rise off ground) on a smooth surface, but is best hand-launched over a grass field. At 32 oz. it's not a real floater on landing, but it still lands gracefully. It's nice to fly just by switching on the

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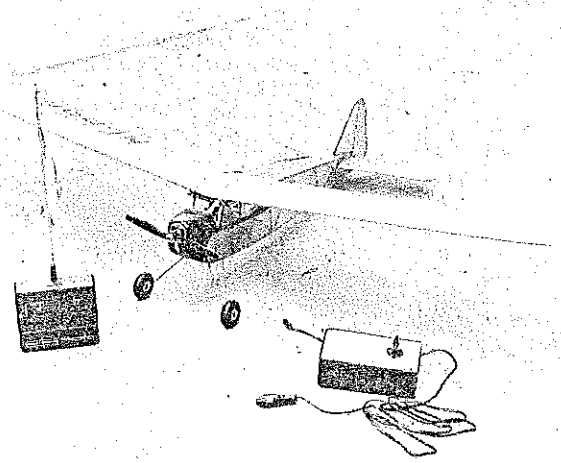
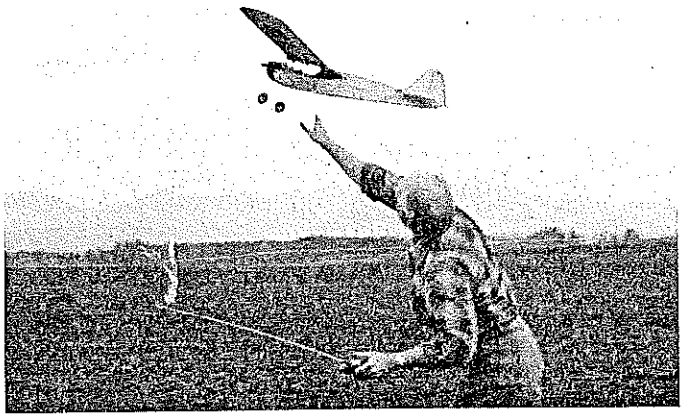


Fly the whole day with what you see in this picture (plus your auto for an energy source). The charger plugs into the cigarette lighter socket. Timer regulates amount of charge; switch gives high or low charging rate.



Clarence Haught hand-launches over grass for a calm evening test hop. Basically a FF design, there's plenty of time to get to the controls before the ship goes astray. Takes off with ease from a smooth surface. Gets about 4-5 min. power run before gradually going to idle for landing.

for trailering and storage.

Once the second prototype has been pronounced a success, the unusually well-drawn plans will be offered for sale as a set for $100. They will include at least 15 sheets of 24 in. by 36 in., a construction manual, and photographs of particularly critical items. Information is available from: Fishercraft, Inc., 4356 Narrows Rd., Perry, Ohio 44081. The phone number is (216) 259-4412.

Re-Volt-er/Haught

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radio and power. No fuss, no muss!

Wing. I prefer to begin construction here. All ribs are the same except the three center ribs which are trimmed 1/16 in. on the top and bottom to allow for center section sheeting. I suggest making two card-stock rib templates and stacking the 1/16 sheet rib stock between the templates; secure with pins, and carve and sand all ribs to shape at once. Cut spar notches with a razor saw while the ribs are still pinned together. Cut wing-tip pieces from 3/16 sheet, and glue them together. Cut notches in the ¼ × ¼ trailing edge pieces for ribs.

Protect the plan with kitchen wrap before pinning down the leading and trailing edges. Add wing tips. Locate the lower spars with the aid of a couple of ribs to ensure proper spacing. Glue center bottom sheeting in place. Install all ribs except the center one.

When glue has dried, remove the wing from the plan, and sand butt ends for the proper dihedral angle. Block up each tip 3 in., and join the wing panels together. Add the dihedral braces as indicated on the plan. Trim the center rib to fit, and glue it in place. When dry, add the top spars and the top center section sheeting. Sand the wing structure to its final shape.

The stabilizer, elevators, rudder, and fin are simply glued together from the specified sizes of strip wood and sheet for the tips. Sand to shape, and join the elevators with 1/16-in. music wire.

Fuselage. Begin by building two identical sides. I suggest that you build the first side by pinning the parts in such a manner that a sheet of kitchen wrap can be pulled down over the pins to allow the second side to be built right over the first—with the kitchen wrap preventing them from sticking together. When dry, remove from the building board, and add sheet balsa nose doublers (being sure to make a right and a left side).

Cut out plywood formers, and install the front landing gear legs to the appropriate former. The gear may be retained by J-bolts or by binding with soft wire and epoxying the wraps.

Set the fuselage sides upside down on the workbench so they are resting on the wing platform. Join the fuselage sides using the plywood formers and the bottom 3/16-in. sheeting to ensure alignment. A little 5-min. epoxy or cyanoacrylate glue will speed up the process. When dry, pull the rear fuselage sides together, and join them at the rudder post. Add all the other cross braces and the rear landing gear mount.

Cut out the nose block with motor mount hole, and fit the block to the fuselage and motor to provide four degrees of downthrust. Install the top and bottom nose blocks, and sand them to shape. Cut cooling holes in the top and bottom, and install the hardwood dowel motor strap anchor.

Install the window and wing dowel gussets. Fit the wing mount dowels, but don't install them until the model is covered. Add the upper windshield block, fitting it to the wing dihedral angle.

Give the fuselage a final sanding. Install the rear landing gear wire. Glue the wire into the grooved block with epoxy, and reinforce it with a bit of cloth. Bind and solder the landing gear wires at the axle junction. Shape and install the tail skid.

Temporarily install your favorite hinges in the tail surfaces. Trial-fit the tail surfaces to the fuselage. Don't assemble them permanently at this time.

Install the motor, battery pack, charging jack, and switch. The battery pack must lay down to allow cooling air to pass through the hole in the cabin former and through the open center of the battery pack.

Install the radio gear, control horns, and pushrods. I used ¼ sq. balsa pushrods with wire ends as shown on plans. This system is lightweight and is not affected by temperature changes.

Covering and finishing. Disassemble the model, and remove all equipment in preparation for covering. Use your favorite covering material, keeping in mind that weight is an important factor. I prefer traditional dope-and-tissue finishes. One must use very little pigmented dope, as it adds weight fast.

I covered mine with dyed silkspan. The procedure is simple. The basic structure was given two coats of clear dope where the silkspan was to be adhered, with a light sanding between coats. Prepare dye by dissolving in a pan of warm water. I used Rit brand clothing dye. Cut GM silkspan to size, and immerse it in the dye solution. Agitate until the silkspan has the desired depth of color. Remove from the dye, and blot the wet silkspan between layers of newspaper.

Lay the still-moist silkspan on the structure, and smooth out the wrinkles. Lift edges, and apply clear dope to stick the silkspan down. Trim with a razor blade, and allow it to dry. Apply two coats of clear dope, and sand very lightly with 400 or 600-grit paper.

Cut desired trim, numbers, strips, etc., from colored Japanese tissue. Apply with dope thinner brushed through the trim tissue. Apply three more coats of clear dope for a durable lightweight finish.

Fit the windows, windshield, and wing mounting dowels. Glue the tail surfaces permanently in place. Mount wheels. Install motor, batteries, radio gear, and check for proper operation.

Put on the wing with rubberbands, and

check the model for alignment. Support the model at the indicated center of gravity. If it does not balance properly, shift equipment or add ballast if necessary.

Pick a nice calm evening and join the "quiet revolution." You'll find the Re-Volter's flight characteristics to be slow and gentle. If you get into trouble, the model will recover on its own—given enough altitude—if you release the control sticks. It even makes acceptable landings unassisted if there is adequate room.

Run silent, run high!

FF Duration/Meuser

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the goals. Nit-picking, perhaps, but rules (however bad) have a way of becoming cast in concrete and, therefore, awfully hard to change. (Send SASE for three-page list.) I lay this long trip on you merely to illustrate that good rules are difficult to design—and I probably have found only a fraction of the loopholes.

However, the basic structure of the event seems to have a lot of merit. It will be interesting to see what comes of it.

Unlim-Mulvi, again. In the January issue, I discussed this annual event, held in Taft over the Memorial Day weekend at the U.S. FF Champs, mentioning that Loren Williams and his co-conspirators were hot after Bob White's tail-feathers, him being the perennial winner of this crazy event. I promised I'd have more details on the Team Williams approach soon, but "soon" takes a while around here. (I call your attention to the rules for the event, published in my October 1982 column.) Crazy event? . . . One flight, at dawn, for maximum duration of flight. Pure Free Flight at its best; they don't come no crazier.

So here's a three-view. I've crammed all the detail I could onto the few square inches available, but it leaves a lot untold.

Be warned that this machine is not for the timid or the weak. It was designed for one purpose; to take the Oakland Cloud Dusters perpetual trophy away from Bob White. For contest-after-contest Mulvihill events, this is *not* the machine, although if all the wood sizes were increased to the next larger commercially-available sizes, and wood of stout heart were used for critical members such as spars and longerons, the design would be at least as good as many others for such purposes. For example, the fuselage, weighing a mere 10 grams uncovered, must cope with the pent-up emotions of some seven times its own weight of impetuous, unpredictable Pirelli rubber having a potential energy capable of lifting itself to a height of upwards of 3,200 feet.

At present, Team Williams consists of Loren Williams himself, Andy Faykun, Dick Siefried, Mike Mulligan, Mik Mikelson, and of all things, ex-Indoor World Champ Bud Romak. Total weight for these models, using tissue covering peddled by Oldtimer Models, will be 70 grams or less. Motors consisting of 20 to 22 strands of 1/8-inch Pirelli (or the equivalent) and without a lot of slack, will weigh less than 70 grams, favoring a low sinking speed resulting from minimum overall weight. Props? The three-view carefully avoids the issue; it is up for grabs, with everyone doing his own thing at present (Larabee, Schwartzbach, whatever).

Book reviews, regurgitated. In my February column, I talked about Bob Stalick's book of airfoils and stated that two bucks for coordinates of *45* airfoils was the biggest boggin in town. A reader from California's northernmost county, Oregon (close to the California-Seattle boundary) wrote to inform me that I was about 60 short; in fact the book contains *105* airfoils, which makes it an even betta boggin. A mere $2.50, including postage, gets it to you. Write to Stalick, 5066 Picadilly Circle, Albany, OR 97321.

Making an inexpensive weighing scale. You start with a two-bit wooden yardstick, a couple of coat hangers, paper clips, and snap-top plastic containers. Twenty minutes later you end up with a scale the equal of those costing upwards of 50 bucks. Not bad! A fringe benefit is that it doesn't take up any workbench space; the flip side is that the ol' lady might not appreciate a screw eye in the dining room ceiling. The generic name for such things (as if you cared) is "steelyard," independent of the material from which it is made. (One made of wood is *not* properly termed a "woodyard.") The following material is from an article by Bob Dittmer, which appeared in *SAM Speaks*.

"How many times have you wished that you had a scale that you could use to weigh that new gas job? Here are plans for a simple, easy-to-make beam balance that is as accurate as you could ask for.

"The materials required are: one yardstick; buckshot as required; coat hanger; large paper clip; two snap-top plastic containers (1-in. dia. × 2-in. long and 2-in. dia. × 2-in.