

Breezy

By KEN WILLARD

In this flight shot, Breezy still has Duranita lower wing in place. Plans show matching tips. Kick elevator, by Babcock escapement, featured.

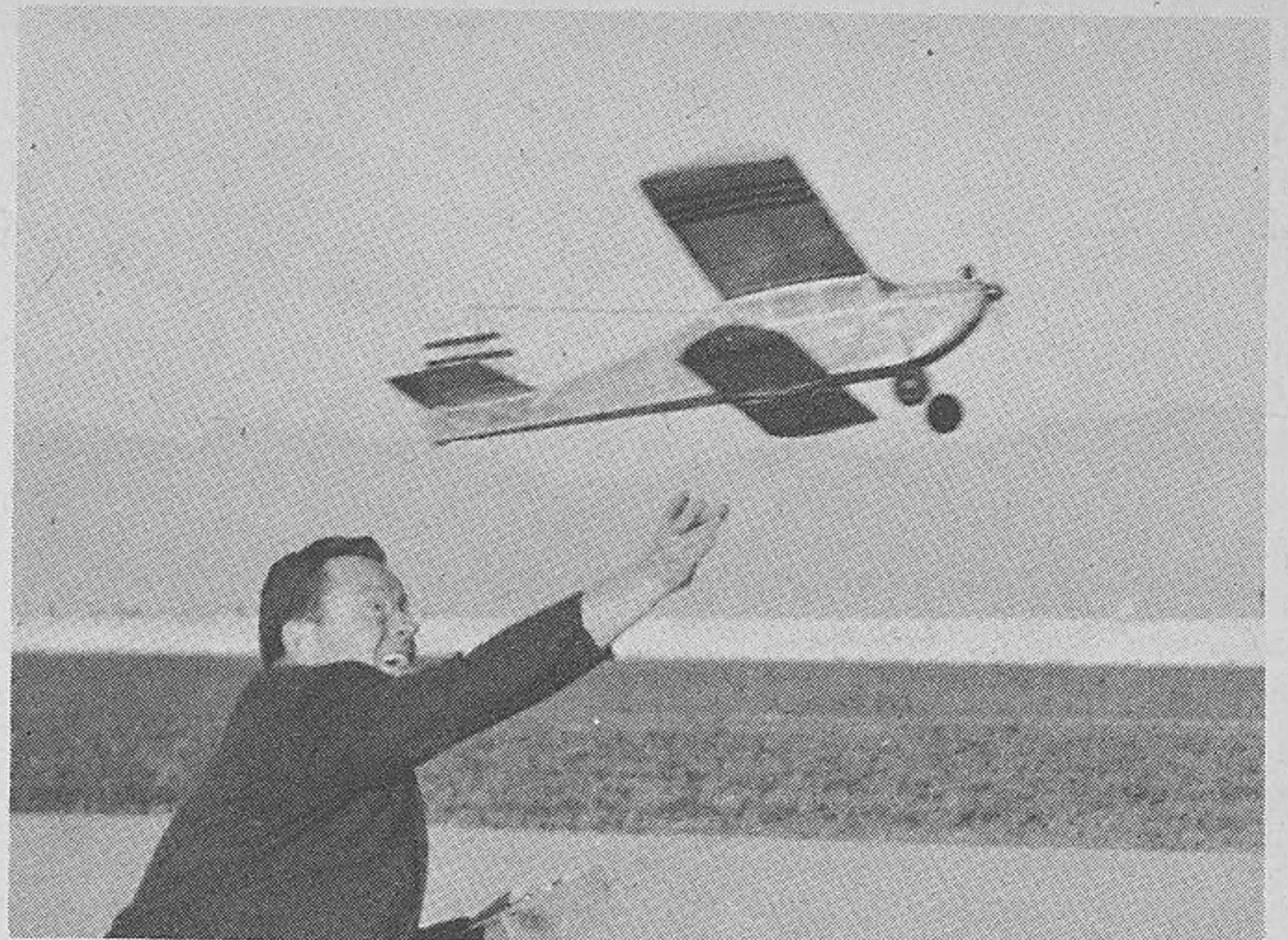
▶ Radio controlled models, for the most part, require pretty large open areas in order to be flown and maneuvered with any degree of safety. This is no particular drawback for those fellows who live in the smaller communities where a short drive puts them out in the country, but for the enthusiasts living in large cities, finding suitable flying areas gets to be quite a job. One notable exception to this is the City of Los Angeles, where the Department of Recreation and Parks is working closely with an Association of Hobbyists to provide not only an adequate area for radio jobs, but also for free flight and controlline flying as well.

However, everybody can't move to Los Angeles to fly radio controlled models, so another solution is required. This solution, naturally, is to design a radio job that can maneuver inside an area like a football field. And this is no small problem of design. Many things besides the airplane itself must be considered, such as noise tolerability, minimum danger to surrounding buildings in the event of malfunction, ability to get out of tight spots, etc. It's really a challenge to try and come up with the answer.

Certain decisions were obvious. The model should be Half-A powered to keep the noise level down. It should be light and small, so the danger of damage, both to the air-



Three of series of five test ships show in this picture. Light construction alone is not enough for small field because performance jumps.



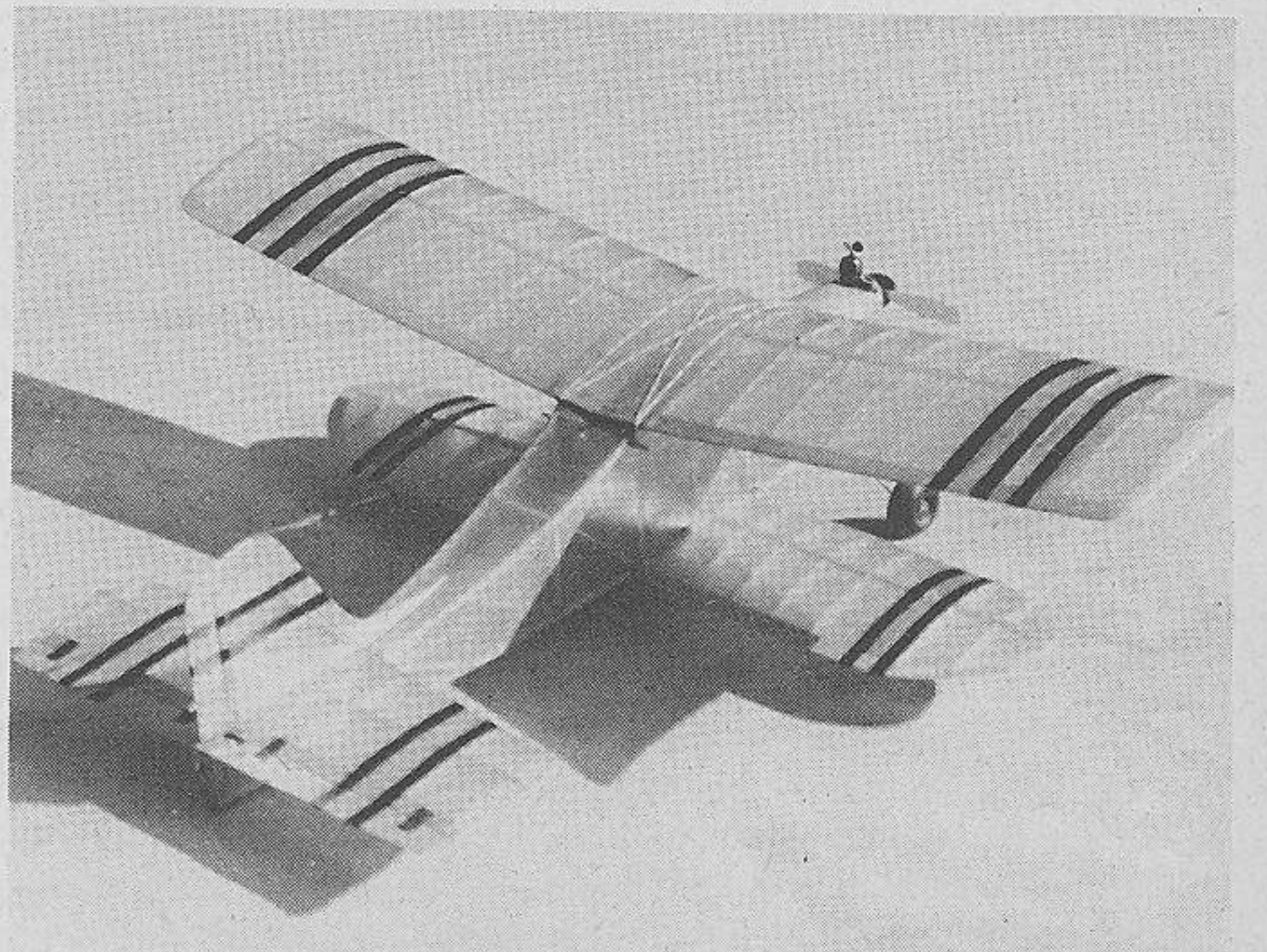
With hand-held transmitter in one hand, author tosses Breezy with other. Without lower wing, ship takes more area but is first rate competitor.

For flying in small areas, this .049-powered biplane will do figure eights within a 150-foot circle. Development of unique ship well worth reading.

plane and to whatever it might hit, would be minimized. It should be able to turn very sharply to stay out of trouble when close to the ground. It should have reliable radio.

The first design I tried was a functional monoplane with a slab sided fuselage, just barely large enough to accommodate the Babcock BCR-3 receiver. It was, and still is, an amazing little machine, quite capable of holding its own in any competition flying—but it turned out to be too hot to qualify for the small field requirement. It is very easy to fly, but it takes up a lot of space as it maneuvers. Although it weighs 2 lb., the McCoy .049 Diesel or the new McCoy .049 glow engine gives it unbelievably good performance.

The performance of the first design was sufficiently encouraging, it appeared worth while to make another, only this time going all out for light weight and high lift in hopes of slowing the job down a little. So another monoplane was built, but the more complicated Warren truss type of built-up fuselage was used for lightness, and the NACA 6512 airfoil, which has undercamber, was used on the wing. By careful selection of wood the weight of the model was kept to 26 oz. (12 of which comprised the radio and battery weight). Again the results were encouraging, but still not satisfactory. This job could turn sharper and (Continued on page 46)



This was lightweight monoplane before lower wing was added. Finalized Breezy next. Only the hottest Half-A's; otherwise, bigger engine.

"No officers but Jim Bowers, Sr., a sort of secretary," Red explains. "No regular meeting time or place but get together about once a month. No business, either, but do cover things like Wakefield eliminations. Strictly bull sessions about best rubber, gears or no, long moment arm versus short. The works. Be sure to include the CBB on your list. The best darn club in the world."

▶ Best located club in the country according to Ken Barbier, Jr., is the AV Airs. The AV stands for Antelope Valley. That's in California, takes in Lancaster, Palmdale, Rosamond, Pearlblossom, the Rosamond and El Mirage dry lakes and Edwards Air Force Base. The big aircraft companies thereabouts have assembly and test facilities at Palmdale, where, with few exceptions, older club members work. Started in January, the club has 41 members, has run a hand-launched glider contest, with a free flight club deal coming

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up. Just to get the swing of things. New members welcome. Meetings every Monday, 7 p.m. Palmdale School, 38334 N. Tenth St., East. Big interests are free flight, RC and some ukie... And how's this for a name? Klobber Klub. Harry Jones, Publicity Chairman, RFD 1, Gaitherburg, Md., describes an inter-club 500 lap stock race. This we'd like to hear more about. Sounds real hectic!

▶ Every time an RC field box picture gets into print, modelers want to know where this thing has been all along, how to get it, etc. So, for the umpty umph time, the RC field box is made by old timer Jack Billings, Broadfield Air-Models, Cutler Drive, Ashland, Mass. The thing stands almost waist high, has folding legs, compartments and detachable U-shaped brackets to hold the ship ready-to-fly on the field. Billings, incidentally, also makes a big variety of shaped leading and trailing edges with unique span-wise slots to take gussets.

▶ We've got headaches? You've got headaches? Consider McCoy's. The design displacement of their new .36 is .345, not .354, as the literature on the motor tells the world. Doesn't make much difference? Well, the new AMA rules limit maximum displacement in the combat event to .350! The McCoy .36 is eligible. Please note, you contest directors and modelers. Somebody goofed! ... When Len Kincaid moved from Philly to Santa Ana, Calif., he found the new church had large basement work benches and the fixings—none of it being used. So Len got together with the Youth Director and within three months they had a group of 30 young boys and a troop of Scouts active in church model plane work. Building on Wednesday nights and Sunday afternoons. There's a gym for indoor meets. Hobby dealers back the club all the way with nice merchandise and trophies. Kids from 8 to 18—we're all kids! So many curious parents came out that both mothers and fathers attend building nights. Says Len, "I would like to see some good, fighting leaders try this in other localities. I'm sure it would pay off." Amen. END

Breezy

(Continued from page 14)

glide slower, but with the lighter weight it would really dig out under power. It seems incredible, but I actually had to plug the McCoy Diesel down in order to reduce the performance!

There were two possible avenues still open; I could make the model just a little bigger, without increasing the wood sizes in cross-section, and thus come up with a lighter wing loading and heavier power loading; or I could try a biplane design, which I knew would be capable of sharp turns.

As luck would have it, I had a couple of spare panels in my scrap box, left over from an earlier biplane free flight design, the old Duranita. They weren't really designed to fit the job I was flying, but I rigged up a temporary mounting arrangement, covered the panels with silk, stuck the panels in place, and went out to try the idea.

The model hadn't been in the air half a minute before I knew that I was on the right track. For the first couple of flights I took it easy on the button until I got some altitude, but from then on I threw caution to the winds and just had fun. We have a 150 ft. circle which has been leveled off for ROG flights (and landings for those that can hit it), and with a little practice I have been able to do figure eights inside that circle. It is also possible to circle the model up to altitude, wring her out, and then, when the engine quits, circle down almost inside the 150 ft. circle except for straightening out the last turn in order to make a final straight-in glide for the landing.

The addition of the lower wing increased the weight by a couple of ounces, and also necessitated a little more fin area. There seemed to be plenty of excess power, so it now looked as if one more model, designed as a biplane to begin with, would prove to be the final answer. However, by this time, I was just a little tired of building new jobs, so I did the designing and turned the building job over to my good friend Bill Glick. He came up with one of the slickest models you ever saw, except that it was just large and heavy enough to be marginal as a Half-A job, and we finally had to go to a larger engine. Also, when we did that, the model was no longer a truly small field job. It did serve two purposes, though: Bill has a real nice biplane for sport and contest flying, and I found out that the practical weight limit for Half-A biplane jobs is about 28 oz., even though the monoplane performs well at 2 lb.

And thus I arrived at the final design for Breezy, the small field specialist, which permits, as added attraction, that you remove the lower wing, slip a light balsa fairing in the wing cradle, and fly the job as a monoplane.

The name Breezy came naturally: the model is not intended to penetrate a strong wind, but it flies well in a breeze. It uses a Babcock Radio Engineering receiver (BRE) and is easy to build and fly (EZY), which all adds up to BREEZY.

For those of you who are pretty hep to the radio side, and feel that you can set up a really reliable lightweight receiver of the modified Lorenz type, you can lighten the model by about 4 oz. and get it to fly in an even smaller area, but you'd better be sure of that radio. A friend of mine, Brett Page, who works in the laboratories at Hughes Aircraft Co., makes up a sweet little two-tuber that weighs only 1 oz. and with a Babcock 1.0-2.0 relay, a couple of 22-1/2 volt hearing aid cells, two pencil cells for the A supply and one pencil for the Babcock escapement, we were able to cut down the radio weight by 6 oz. With this equipment installed, Breezy flies around like a control-line job.

The BCR-3 receiver, using the lightweight battery complement shown in the plans, incorporates a slight modification in the circuit by connecting the C-plus to the A-plus. Otherwise, it is standard. A word of caution—check your A batteries often, and don't let them get below 1.25 volts if you go in for long flights.

So much for the background story on the development of this model. Let's get on with the construction. In this regard, one thing is very important to remember; weight can be controlled by careful wood selection, and the lighter you make your model, the smaller the area you will be able to maneuver in.

I have mentioned that Breezy is easy to build. That is, of course, a relative statement, because no radio job is "easy" to build, but some are easier than others, and Breezy falls into this class. It follows the simple, classic, Warren truss pattern in the fuselage, and conventional wing and tail construction. Only a moderate amount of detail construction is shown, because most of you will probably make modifications anyway to suit your own taste. Just don't modify the layout! That is, unless you want to change the flight characteristics to suit your own purpose. If you do, be careful of one thing, particularly if you decrease the angular difference between the main wing and stab settings: watch out for right turns under power if you have your right thrust setting arranged for straight flight cruising, because as the speed picks up in the right turn, the right thrust pulls the nose down, and it can be dangerous.

It isn't bad if you're flying Breezy as a biplane, but if you have removed the lower wing, it can be disastrous if the speed builds up too far. True, you can eliminate this by

taking out some of the right thrust, but then you're faced with the necessity for constant correction of a wide left turn at cruising speed. We'll talk about flying technique a bit later on.

For fuselage construction, follow the conventional procedure. Make two sides, using 3/16 in. square hard balsa for the longerons, 3/16 in. medium hard sheet for the shaped pieces around the lower wing and forward to the nose block, and the various sizes as shown on the plans for the diagonals and upright members. Add the gusset plates at the joints where reinforcing is required, and shape those at the windows as shown.

Join the two sides together with the plywood formers at the landing gear station and the upper wing trailing edge station, then pinch the tail together, cementing it firmly after making sure that you have equal curvature in both sides. Next press the nose sections in until they fit the width of the former which backs up the nose block, and cement. You'll have to use some means of holding the sides in until they dry. I used cross braces at the top and bottom and wrapped rubber bands around the nose until dry.

After you have the two sides together, don't put in the rest of the cross-bracing until you've made up the torque rods, mounted the escapement, installed the torque rods and checked out the operation. This is the time to make sure it works without binding anywhere. Also, have the leads soldered on the escapement. Now you can complete the cross-bracing. No diagonals are necessary in the top and bottom of the fuselage; the silk covering provides all the necessary strength.

The base plate at the nose is carved to shape out of 1/2 in. balsa. It should be medium hard stock, since it gets scraped occasionally on landing. The nose block should be carved out of hard balsa, then hollowed out for lightness, and also to provide access to the mounting bolts for the engine.

The engine cowl is carved out of a balsa block, but it doesn't have to withstand any heavy shock, so use light balsa. Hollow it out so you can lay a Jim Walker balloon tank on the engine bearer back of the engine and then cover it with the engine cowl, which is held in place by a rubber band when the model is flying. The landing gear arrangement is very simple, yet provides a very serviceable gear for light models. Note that the gear is shaped to fit in a slot across the bottom of the fuselage and is held in place by rubber bands wound around the mounting dowel. The dowel serves the triple purpose of providing: (1) a forward bearing surface for the radio base plate, (2) a retaining member to restrain vertical movement of the radio base plate, since the B batteries slide in between the dowel and the plywood former, and (3) the landing gear mounting as well.

Wings and tail surfaces are held in place by rubber bands fitted over 1/8 in. dowels, which shouldn't be mounted until the rest of the fuselage is completed and the two sides have been covered with silk, since this procedure simplifies the covering of the sides. This also applies to the dowel for the landing gear.

Two 1/8 in. dowel rods are also run from the sides of the fuselage at the leading edge of the wing down to the center of the top of the plywood former at the landing gear station. This makes a good strong windshield area, which has proved its worth in a couple of crashes which occurred during the testing program. The "cradle" for the lower wing is formed by cementing 1/16 in. sheet across the fuselage, grain running crosswise.

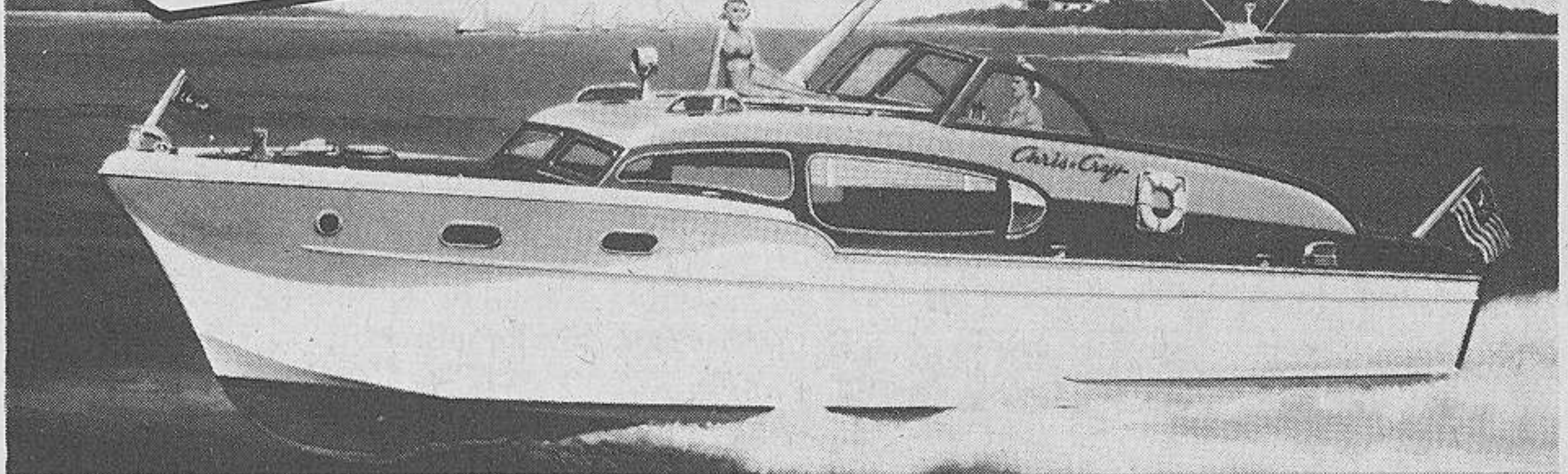
The wings are very simple. Build them in one piece right on the plans. Then cut the upper wing in two at the center line, trim the center of the leading edge, trailing edge and spars to fit the 5-1/2° dihedral, cement reinforcing hardwood or plywood gussets in place,

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to establish the dihedral, then cover the center section with 1/16 in. sheet. The lower wing is all one piece, with the center section covered with 1/16 in. sheet to minimize holes which may be occasioned by rough landings. Be sure to trim down the three center ribs of the lower wing 1/16 in. at the top so the wing fits snugly, with the 1/16 in. sheet on top of the wing fitting up against the 1/16 in. sheet in the wing cradle.

For stab and fin, too, the construction is straightforward. In fact, if you're the lazy type, you can use 1/8 in. sheet balsa, medium light grade, and make a couple of lightening holes, rather than make the built-up tail. The weight difference is negligible in this case, but I felt that since the rest of the model was built up, the tail should be, too, just to maintain the uniformity of construction. The elevators and rudder are cut from 1/16 in. sheet and attached to the stab and fin with cloth hinges.

You may want to set up your own favorite method of mounting the radio. The removable base plate arrangement which is shown on the plans was designed for quick interchangeability, since I was developing a model and figured that I might have to install the radio in several different versions before reaching the final design. As it turned out, this mounting arrangement is also very serviceable. The B batteries are taped to the base on the under side, then they slide in the opening between the landing gear mounting dowel and the bottom cross-piece of the plywood former; thus the forward edge of the radio base plate butts up against the landing gear mounting dowel, and this fixes the forward end of the radio base plate in place. The rear end of the plate is held in place by a wood screw which is inserted into a 1/4 in. basswood cross-piece which is cemented into position as shown on the plans. For the BRC-3 receiver, the C and A batteries are mounted as shown, and all connections are soldered. Some of you will shudder at this, because of the weakening of the batteries which results from the soldered connections, but as far as I am concerned, I'd rather solder the connections and have the shorter battery life, because it eliminates two other liabilities: the additional weight of battery boxes together with the possibility of poor contacts in the boxes causing a loss of control just when you need it most. However, this is a matter of choice, and if you want to vary the radio mounting, go ahead; just be sure you don't move the CG too far from the spot that it is shown on the plans.

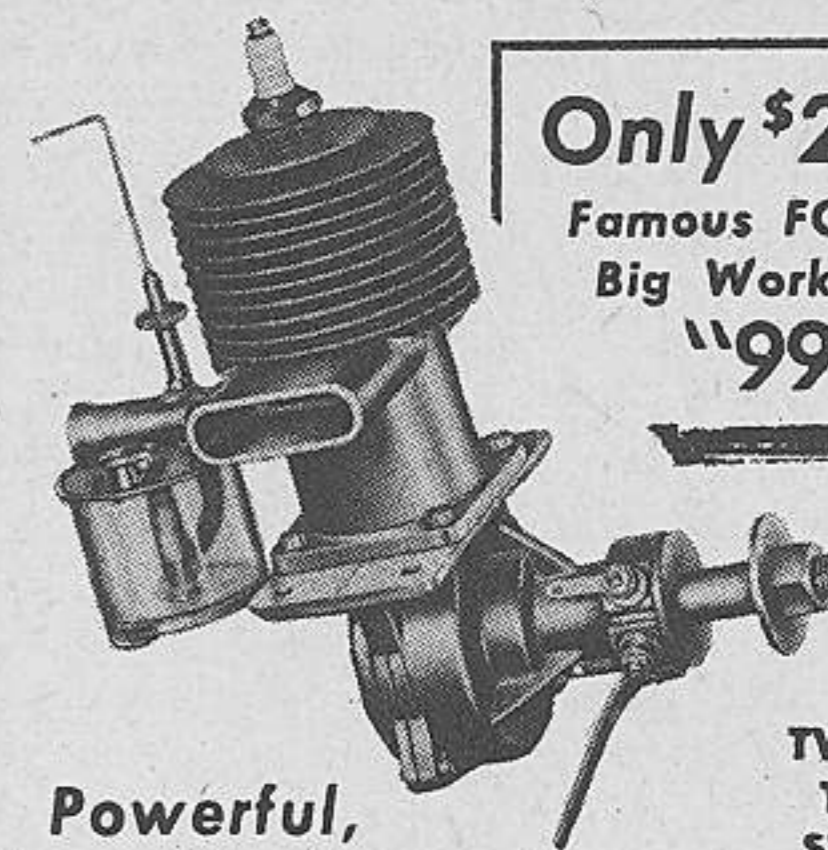
The entire model is covered with silk; paper isn't strong enough, and nylon is too heavy. To keep the weight at a minimum, I used colored silk and clear dope, but if you are one of those radio specialists who can set up a lightweight radio, colored dope can be used because of the weight saving thus accomplished. Just remember to keep the over-all weight under 28 oz., or you'll have to go to a larger engine and also a larger flying area.

Breezy is small enough and light enough to be hand-glided safely. Glide the model and make the usual corrections for noseheaviness or tailheaviness until you get a good, flat, sinking type of glide. Then you're ready for power flight.

The engine thrust line should be set so that, with the glide established as above, a steady climbing flight is achieved under power. Roughly about 5° of downthrust and 3° of right thrust will give you this type of flight. Slight variations will be necessary depending on your own individual model's characteristics, since no two models are identical. The engine mounting base is patterned to give about 3° of right thrust, and you can get the necessary downthrust by inserting some tapered hardwood blocks between the engine base and the beam mount.

First in importance, when flying, is setting up the rudder and elevator linkage to get the right amount of travel in the surfaces. This

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will vary, of course, if you use a Bonner or a Cameron escapement in place of the Babcock. In any event, you'll have to use a compound type of escapement in order to get the simple up-elevator movement from the third position on the compound. The schematic on the plans shows how it works. The Babcock compound escapement comes equipped with bearing holes for the torque rods, and crank arm followers already matched, which simplifies the mounting.

The only way that I know of that will determine the right amount of elevator travel for your plane is to try various amounts of movement until you get enough to give you good elevator action without making the model zoom too much. This can be accomplished by varying the angle at which the follower sets when the crank arm engages it as the crank arm comes down from the second to the third position. I suggest you start with about 10° elevator travel and go from there as experience dictates.

As for the rudder travel, this is a matter of choice also. My own personal preference is for enough rudder travel that a short beep causes the model to go into a turn right away; thus, to make a complete circle, you "beep" the model around rather than hold the button down. This gives you the added advantage of a quick recovery and rapid entry into a turn in the opposite direction. It is true that this causes some "rocking" in the model, but for flying in confined areas you'll need the fast action. About 15° is what I use.

For really sharp turns, the technique is to hold the button down until the model gets well into the turn and the nose starts to drop, then feed in some up-elevator. For example, if you want a sharp right turn, give a single push on the transmitter button, hold it until the nose drops into the turn, then give two quick beeps and hold the second one; this holds the escapement on the third position which is up-elevator, and tightens the turn up very sharply, raising the nose at the same time. Similarly, if you want a sharp left turn, give two beeps, hold the second until the nose drops, then give a quick third beep and hold it. This procedure is very useful when you are gliding in for a landing and want to turn the model without losing too much altitude. Practice it while the model is high in the air, and after a while you'll be able to make approaches like a hot fighter coming in for a landing. You'll find that flaring out for a good landing takes some practice. If you give up-elevator command when the model is too high off the ground, it may stall out and drop in for a rough landing before you can correct it with another up-elevator action. In fact, if Breezy is coming in steadily after a good approach, sometimes the best technique is just to let her land by herself. END

Radio Control News

(Continued from page 24)

super-sensitivity of the Citizen-Ship 465 mc receiver is largely caused by the great difference between the quench frequency and the incoming signal. How can you achieve this condition? As was mentioned in previous columns, the primary way is to increase the values of the grid resistor and/or capacitor.

Values of 4.7 meg for the resistor and 120 mmf for the capacitor (5 per cent tolerance) gave definite improvement when checked with 37 different RK-61 tubes. Paul Runge of Ace Radio Control, Higginsville, Mo. ran checks based on this information and reports that he found 5.6 meg and 150 mmf to give improved results. Too large a value for these two components will make for excessive blocking action and the result will be improper operation.

Another cause of insensitivity of super-regen receivers, and one mentioned by Bob

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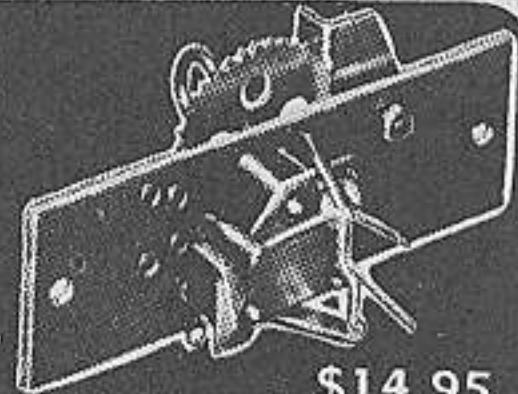
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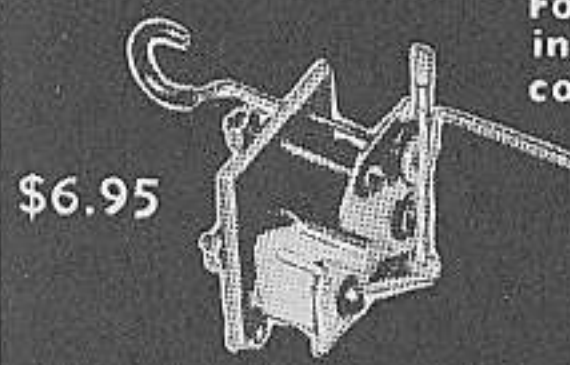
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