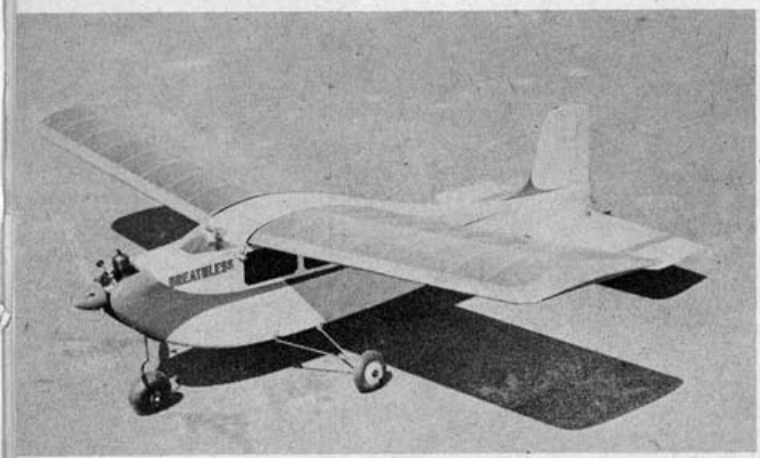
Bubble canopy and pilot add realism without a weakening windshield, permit high thrust line. Main gear made from music wire or aluminum.

BREATHLESS

by KEN WILLARD



Wing is simple and robust—nothing squeaky here. Very stable, ship will recover from any attitude, hands off. Handy thing to remember.

For small flying sites, this Half-A powered RC, is simple, strong, and highly maneuverable. And it is superb for a beginner.

Though flown with both Babcock BCR-10 and Deltron, latter installation shown here. The plywood tray fits into fuselage horizontally.

► The objective was a rugged, reliable RC model, suitable for sport or contest flying, powered by Half-A glow or diesel motor, and as simple as possible to construct. All of the flight proven aerodynamic design factors were listed and the design was laid out. All of the crash-proven structural strength features were incorporated into the detail construction of the model. The result was a sheet-balsa fuselage and tail, silk covered, and a conventional built-up wing, silk covered, all held together with the finest shock absorbing fasteners yet devised—rubber bands. Bracing is distributed so the model will withstand hard landings easily, and only requires minor repair even after a crash due to malfunction (which might be mechanical, electrical, extraneous or human). The model will recover from any flight attitude and assume normal level flight just by neutralizing the controls.

Construction

The plans show the wood sizes. For a Half-A, medium hard balsa, except where plywood is specified, has ample strength, especially after the framework is silk covered.

Cut out the two fuselage sides from 1/16 x 5 sheet, cement the longitudinal and upright braces in place, and let dry. Note the downthrust provided for firewall mounted engine, as well as right thrust, accomplished by proper placement of the firewall braces on the two sides.

When putting the sides together, cement the tail block and escapement bulkhead in place first. This helps to obtain proper alinement. Next, pull the sides together and cement the cross braces in place where the leading edge of the wing is positioned, making sure that the sides are pulled in equally. Finally, do the same at the firewall, and this will give you the proper alinement to give right thrust.

Install the escapement and torque rods at this time, since it is easier to get inside the fuselage before the top and bottom sheeting is added. (*Continued on page* 40)

Breathless

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Also cement the dowels for the wing, landing gear and tail mounting in place.

Now you can add the reinforcing "skin doublers" to the sides, forward of the firewall, put in the landing gear braces, and cement the reinforcing gussets in place where the wing and forward access hatch are located. Finally, cover the top and bottom with 1/16" sheet balsa, except immediately behind the firewall on the bottom, where ¼" flat is used, since this part takes a beating.

The main landing gear may be made from .050" hard aluminum, or from spring steel wire, whichever you prefer. One-eight inch wire is used for the nose gear.

The wing is conventional, built in one piece using 36" lengths of balsa for the leading edge, spar and trailing edge, and 1/16" sheet for the ribs. Add the wing tip blocks, cut the wing in two at the center and cement the two halves back together with the proper dihedral (5½°) established by the dihedral center braces. Cover the center section with 1/16" sheet, sand, and the wing is ready for covering. If you want a slightly slower model, increase the span from 38" to 46". No other changes are necessary.

The fin rudder, stab and elevators are made from 1/16" and 3/32" sheet respectively, covered with silk. The fin is permanently cemented to the fuselage, and the stab is removable. Experience has shown that this eliminates a lot of repair work when the stab hits a weed or a rock on landing.

Plenty of room is available for mounting any of the commonly available receivers—Deltron, Aerotrol, Citizen-Ship, Babcock, etc. If the Babcock BCR-3 is used, the weight may go up to the point where .074 engine is required (an .09 could be used but it would make a mighty hot performer!). The new Babcock BCR-10 is ideal for this size model.

Mounting is very simple. Make a completely self contained receiver unit, including batteries, on a piece of 3/32 plywood, 2" x 6½", and hold the entire unit in place with two wood screws. Since there aré so many small receivers available, no detail is shown other than the approximate location. The photos show the Deltron; the new Babcock BCR-10 also was used.

Slight wing washout is not absolutely essential, but it improves the flight characteristics. Make sure both panels have the same amount. Warping is easily done over a gas or electric range; hold the wing with one hand under it, closer to the heating unit. The wing will not catch fire if it is not subjected to heat higher than your hand can stand. Twist the wing while it is warm; then have an assistant (probably your wife, sister, or girl friend) pour cold water on it and the wing will "set" with the desired amount of twist. The doped silk has the necessary strength to hold the new alinement.

The rudder and elevator should both have about 15° travel for the first flight. This assures quick and positive control. Later you can adjust the travel to suit your own control taste.

Check your fin alinement, wind up the escapement, start the motor, check your radio operation *with the engine running*, and you're ready for your first flight. Hand launch into the wind, correct any turn with the rudder until you gain altitude, then feel out the control. After you are familiar with the response of the model, take-offs, flying and langings, get to be "old hat" and you'll be stunting before the first day's flying is over. And the performance of this little job will really leave you "Breathless'."

Finishing

The entire model is covered with silk. This adds a lot of strength, and if you lightly sand the silk with ultra fine sandpaper between coats of dope, a fine finish results.

Adjusting and Flying

This model is not critical. It will fly even though the C.G. is not exactly where it should be. However, for peak performance the C.G. should be properly located, and this is easily done by moving the radio unit around until the desired balance is achieved.

Not much need be said about the Babcock BCR-8 465 mc equipment. If you install it according to the manufacturer's instructions there appears to be no inbetween point. If either works or it doesn't. If it works you have no problem. If it doesn't work and you are sure you have installed it properly, check all of your connections to make sure they are sound, and check your batteries and make sure they are delivered rated voltage.

The new Babcock Magic Carpet receiver is a good unit for this model. It is easy to install and easy to tune. I flew Breathless with one of the early models of the Magic Carpet and found the range to be more than ample.

The Deltron receiver is a very neat little package which lends itself to shock mounting in a very small space. The manufacturer's recommended voltage for safe operation is 1.3 volts for the filament, and 42 volts for the B supply. In the case of the filament volts, this should be with the radio turned on. In the case of the B supply, it should be 42 volts with the receiver turned on and the transmitter turned on with the button pressed down. My own experience shows that these are very conservative, and if you maintain this battery supply you are not likely to have any trouble with the Deltron equipment.

Rip Van Winkles?

(*Continued from page* 12)

a few scientifically minded designers with aerodynamic know how, gave the answer: speed and weight. These made the difference. Air reactions on wing, tail, surfaces, side areas in turns, the momentum to climb and centrifugal pull of the airplane's mass in turns, all increased in proportion to the *square* of the plane speed. Instead of flying at eight or ten miles per hour like rubber models, gas buggies hit speeds four or five times faster. As a result, the force of air and weight reactions increase from *16* to 25 times. Any defect in design for stability was magnified proportionally. When side areas were not carefully arranged to center the resulting forces at the center of gravity or slightly to the rear, when dihedral and fin area were not carefully proportioned, or when the line of thrust was not properly located relative to drag and center of weight, spiral dives, spins, rolls, stalls and other unwanted gyrations were the inevitable results.

Like true scientific detectives, fans set out to solve the mystery of stable gas model design. Pet theories of individual designers found dynamic expression in hundreds of grotesque aerodynamic and structural combinations.

Fat bodied planes, thin stick-planes, planes with long or short noses, big tails, high wings, low wings, with various degrees of dihedral, engines high, low or intermediate all contended with perform-

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