

CONSTRUCTION

Usually, wings require a lot of work, so they're a good place to start. Only the left wing plan is shown; the right wing is built over the same plan with the center section reversed.

The ribs are made of 1/16-inch sheet balsa. Place a card-stock template of the rib onto the balsa, and trace around the template with a felt-tipped pen. Do this 16 times so that you'll have a "printed" sheet from which to cut. Once you've cut the ribs, stack them, pin them together and "gang-sand" them to smooth out any high or low spots. Select four ribs, trim 1/16 inch off the top and bottom of each, and enlarge the spar notches; these are the center-section ribs.

You can buy spar stock,

to be used. The wing spar and the trailing edge should be cut out of firm stock, and the wood for the leading edge should be slightly softer. Cut the tip pieces out of soft, 1/8-inch sheet, and make sure that the grain on the tip pieces matches that on the plan.

Build-up the spar by using the plywood dihedral braces as guides, and make sure the wood isn't warped. Cover the plan with waxed paper, and pin the main spar into place on the plan. Allow the other

there might be in the length of the ribs and the plan. Pin the trailing edge into place and, starting with the two trimmed center ribs, glue the ribs into position. To install the center rib, position it at the proper angle to match the dihedral. One-sixteenth-inch sheet shims under the center ribs help to position the ribs properly so that the center-section sheeting is flush with the spar and the trailing edge when it's installed. When all the ribs are in position, add the leading edge. Build the other wing-half in the same way with the spar flat on the bench, and let the finished wing half extend past the bench.

Glue the tips to the two tip ribs. The tips slant upward and are flush with the top of the ribs. Use scrap spar material to build between the spar and the tips. Add the center-section sheeting; the sheet goes between the spars rather than over them. Sand the completed wing.

Like the wing, the stab and fin are built right over the plan. The rudder and the elevator are sliced out of soft 1/8-inch sheet. The elevator carry-through is a piece of 1/8-inch hardwood dowel. When the elevators are complete, join the mating sur-

faces, and sand all the out-lines.

FUSELAGE

The fuselage sides are cut out of medium 1/16-inch balsa sheet. Don't cut the wing saddle into the sides until after the doublers have been glued into place. The doublers are also 1/16-inch balsa; this time, hard stock is laid with the grain at a 45-degree angle to the side grain. When the doublers have been cemented into place, pin the two sides together, and sand them to the same outline with a sanding block and 100-grit sandpaper. While they're still pinned together, cut the wing saddle, and drill the 3/16-inch holes for the wing-holding dowels.

Separate the sides, and add the 1/16x1/8-inch uprights and longerons, the 1/8x1/4-inch servo-mounting rails and the small 1/32-inch plywood triplers in the firewall area. Cut out the firewall and the two cabin formers, and drill the firewall to match your engine. Start assembling the fuselage by gluing the two cabin formers into place on one of the fuselage sides. Use a right triangle to make sure that they're perpendicular to the fuselage side. When

they're dry, glue the other fuselage side to the formers, and make sure it's in perfect alignment with the first. Pull the tail together, and glue it; when it's dry, mount the tail to the fuselage. It's a good idea to use epoxy to hold the firewall in place.

Build-up and glue the landing-gear mount into place, just in front of the first cabin former. Sheet the bottom of the fuselage with 1/16-inch balsa with the grain running across the fuselage. At the tail, replace the balsa with 1/16-inch plywood for the tail-skid mount. Install the Nyrod guides, and complete the cross-grain sheeting. It's easier to sheet the cockpit area with strips of 1/16-inch stock rather than solid pieces. Sand the completed fuselage.

COVERING

The original was covered with Black Baron* transparent film, but any of the iron-on films will be fine—just follow the manufacturer's instructions. To hinge the surfaces, use the method with which you're most familiar.

Trim the covering away from the stab where it contacts the fuselage on the bottom and the rudder on the top. Epoxy the fin and rudder to the top of the stab; check the alignment with a square; then epoxy the stab to the fuselage. Trim the covering away, and epoxy the 3/16-inch wing-mounting dowels through the drilled holes. Epoxy the tail skid to the 1/16-inch plywood mount. Cover the headrest, and strip the covering from its location before gluing it in place. The windshield is cut from clear plastic sheet or from a plastic soda bottle.

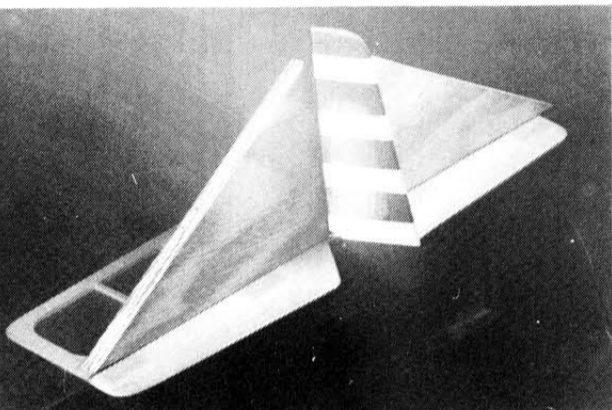
Attach the engine to the firewall with wood screws, but before you screw it to the firewall, harden the screw holes with thin CA, and paint the firewall with a coat of epoxy. Bend the landing-gear legs, and mount the 2-inch wheels with wheel collars. Anchor the gear legs in the gear mount with brackets and small wood screws.

The Bee-tween was designed to use a 500mAh flight pack and standard servos, so there's enough room to move things around. Connect the elevator and rudder to the servos with Nyrods and clevises, and check to see that everything reacts properly to the transmitter controls. After a range check, the Bee-tween is ready to fly.

pitch does the job quite well. On any type of smooth surface, takeoffs are nice and straight with little rudder correction required.

Once in the air, trim it for level flight. The control response is positive and solid, like that of a much larger airplane, and its performance will surprise you. Like all rudder airplanes, rolls aren't as smooth as those done with aileron airplanes, but they are rolls! Inverted flight is smooth and easy, and outside loops are almost as tight as inside loops. Control is positive, both under power and in a glide. You can expect about 4 minutes of flight time with the Black Widow and Golden Bee and a slightly longer time with the Dragonfly and Texaco engines. It's a great airplane!

*Here are the addresses of the companies mentioned in this article: Cox Hobbies, 1350 W. Ricon St., Corona, CA 91720. Black Baron; distributed by Coverite, 420 Babylon Rd., Horsham, PA 19044.



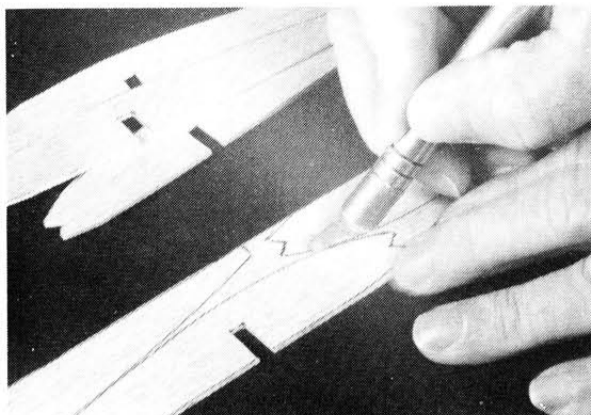
Half-inch plywood right angles are used to hold the fin vertical to the stab while they're being joined, before they're mounted on the fuselage.

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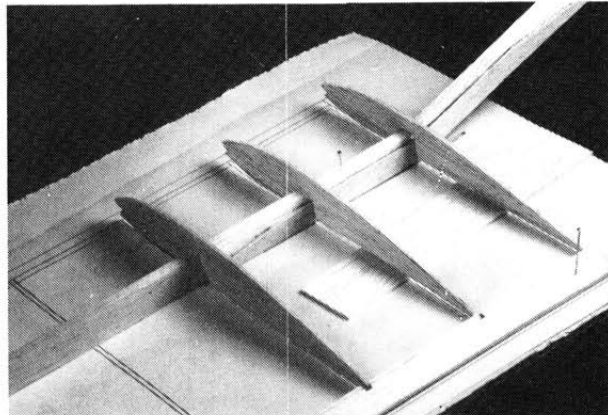
but to ensure uniformity, it's better to use one piece of sheet wood that you strip with a straightedge, a razor knife, or a balsa stripper. Your choice of wood depends on how it's

half of the spar to stick out from the building board. Attach some ribs to the spar, and use them to position the trailing edge so that it will match any slight difference

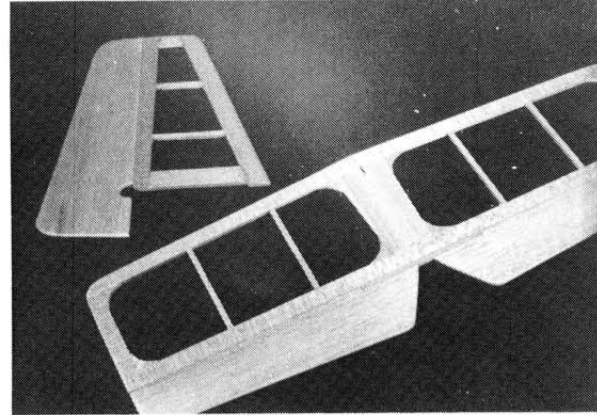
complete, join the mating sur-



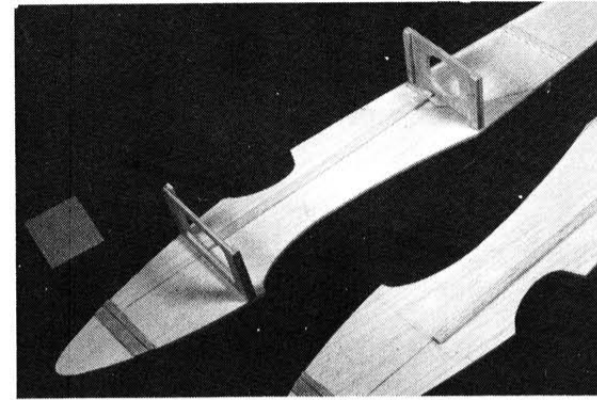
With a rib template and a fiber-tipped pen, you can make a "printed" sheet by tracing all 16 wing ribs on a sheet of 1/16x3x36-inch balsa.



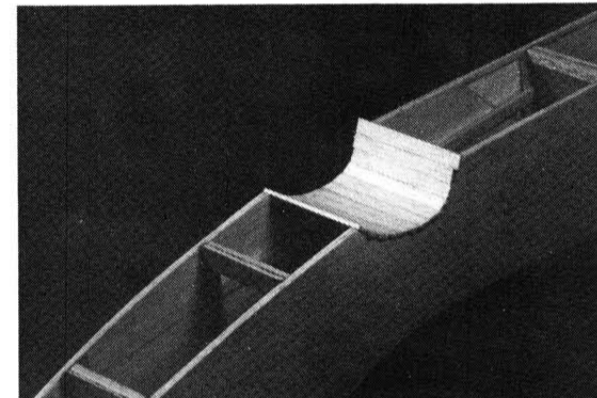
The main spar is built-up using the dihedral braces as guides; then each wing panel is built right over the plan. This method almost guarantees a straight wing.



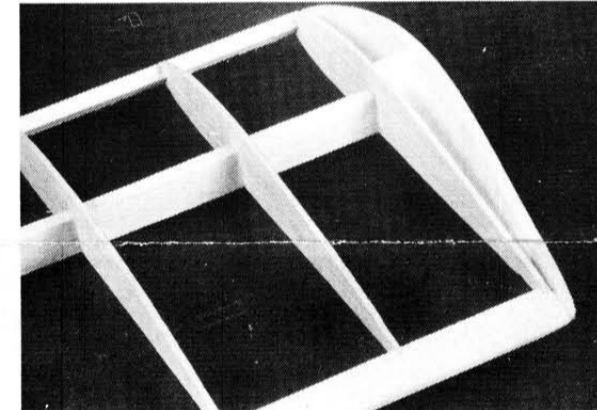
For a more solid joint, notch the stab's leading edge at the center to receive the fin's extended leading edge. After the tail surfaces have been covered and hinged, join them before you glue them to the fuselage.



The two cabin formers are glued to one fuselage side; the other fuselage side is then glued over the first. When you install the firewall, take care to ensure a true thrust line.



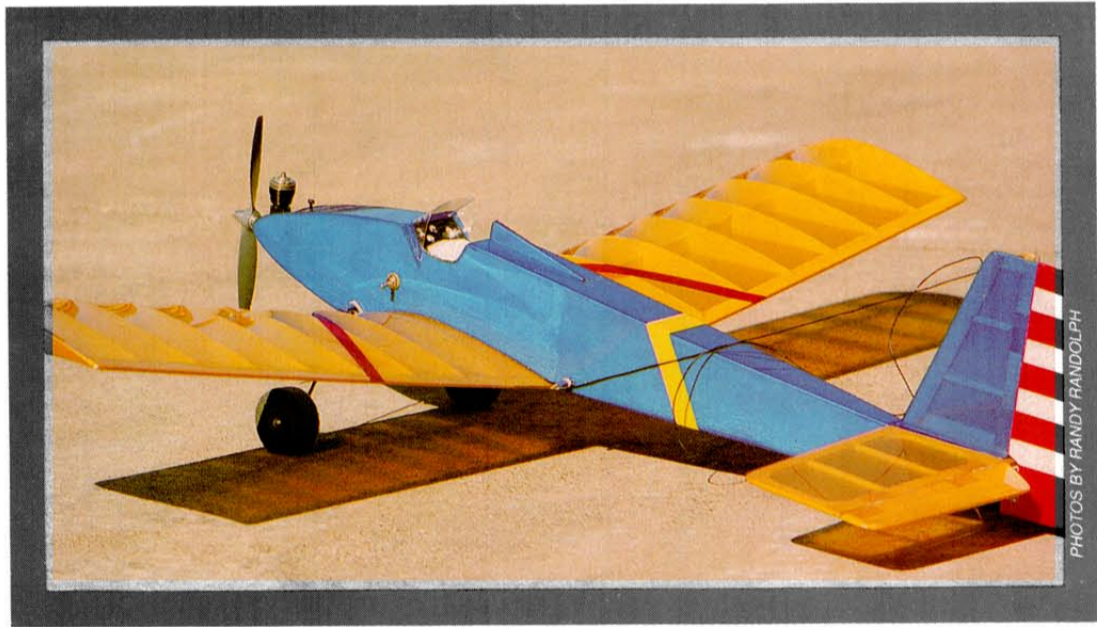
When you sheet the cockpit, it's much easier to use strips, instead of sheet, to fit its concave shape. When the cockpit sheet is complete, sand it flush with the fuselage sides, and add the remaining top and bottom sheets.



A small, wedge-shaped piece of 3/16-inch balsa braces the wing tip at the spar. The top of the tip should match the top of the airfoil.

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CONSTRUCTION



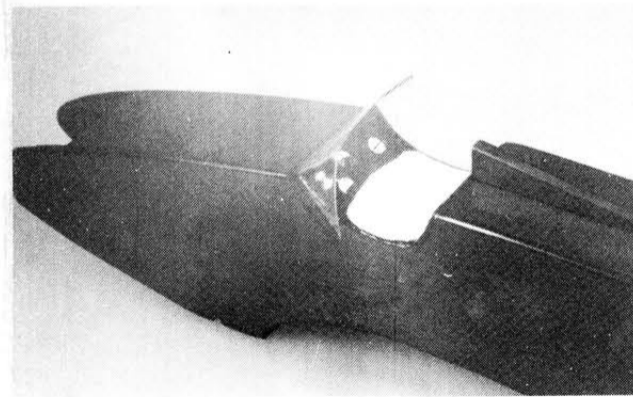
PHOTOS BY RANDY RANDOLPH

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1/2A sport low-winger with a big-plane feel

ALMOST EVERY MODELER has at least one Cox* engine: the Golden Bee, Black Widow, Texaco, Dragonfly, or QRC. In fact, so many have been sold that almost everyone in the country could have one! As a gateway to the R/C experience, they're about the least expensive, most easily obtained and installed power sources that can be found. The "Bee-tween" was designed as a low-cost, easy project that's suitable for these ubiquitous Cox engines. It could very well serve as a first plane for someone who wants to get into the sport of R/C flying. Its low-wing configuration is a little more glamorous than the common high-wing trainer, yet it retains the stable flight characteristics of a trainer.

Because the airplane resembles those that were popular during the "Golden Age" of aviation, I chose a color scheme that fits that period. The blue fuselage, the yellow wings and the Golden Bee powerplant prompted friend Tom Anderson to provide the name.

by R A N D Y R A N D O L P H



White MonoKote forms the cockpit and instrument faces. I used a Sharpie pen to draw the instrument dials.

Before installing the radio, assemble the airplane and check the balance point. Put the battery pack in just behind the firewall, and move the servos around until the airplane balances at the point indicated on the plans. Install the radio to maintain this bal-

FLYING

Since most flying fields are rough and weedy, the Bee-tween is flown a lot with hand-launches. Actually, very little "throw" is necessary to get it on its way; a wings-level, nose-on-the-horizon baseball

MATERIALS

- 4 - 1/16x3x36-inch balsa pieces (wing ribs, fuselage sides, sheeting)
- 2 - 1/8x1/16x36-inch balsa pieces (fuselage, longerons, uprights)
- 1 - 1/8x3x12-inch balsa (rudder, elevator and wing tips)
- 1 - 1/8x3/8x36-inch balsa (fin and stab outline)
- 1 - 1/8x1/2x12-inch balsa (stab and fin ribs)
- 2 - 3/16x1/2x36-inch balsa (wing spar and trailing edge)
- 1 - 3/16x3/16x36-inch balsa (wing leading edges)

MISCELLANEOUS

- 1 - 1/2x11/4x3/16 plywood
- 1 - 1x12x1/8-inch plywood
- 1/2x4x1/32-inch plywood
- 24x3/32-inch music wire
- 6x1/16-inch music wire
- 6x3/16-inch hardwood dowel
- landing-gear clips
- control horns
- clevises
- Nyrods
- covering material
- glue

SPECIFICATIONS

- Type: 1/2A sport
- Wingspan: 37 inches
- Length: 22 1/4 inches
- Weight: 16 ounces (with .049 engine)
- Wing Area: 250 square inches
- Wing Loading: 9.23 ounces per square foot
- Power Req'd: .020 to .049 2-stroke
- No. of Channels Req'd: 2 (rudder and elevator; throttle optional)

COMMENTS: The Bee-tween is designed to be flown with a .020 to a .049-size engine. The name arose because it looks like an aircraft that would have been built between WW I and WW II. Despite its low-wing design, the Bee-tween is stable, and it has the same flight characteristics as a high-wing trainer. It feels like a much larger model, and it has positive control that's great for beginners.

bee-tween