

Curtiss-Wright Junior

Scale model of a great light plane of long ago is ideal subject for 1/2A radio flying on rudder only.

ROBERT H. HAWKINS

IN the late twenties and early thirties, the real romance of flying came from sitting in the breeze of an open-cockpit plane. One of those planes was the Curtiss-Wright Junior, a pusher airplane that was offered in two versions—first as a 40-hp landplane and second as a 60-hp amphibian. The landplane design lends itself well to becoming a sport-flying R/C ship of today. Let's look at the features which make it suitable for R/C flying:

1) Two open cockpits; the front one to house the receiver and batteries and the rear one as the location for the magnetic actuator. 2) A high-wing design with sufficient dihedral to provide good, inherent stability. 3) A pusher-mounted engine which eliminates propeller breakage even in rough fields. 4) An upswept fuselage in the nose area and a landing-gear position that combine to prevent nosing over upon landing. 5) The receiver and battery box are well protected in the front cockpit. There's practically no chance of getting oil or fuel near them with the engine in its high, rear-mounted location. 6) And, besides, it's different from the usual R/C plane. It looks like a real airplane (at least to those of us old enough to have attended some of the pre-war Nationals meets).

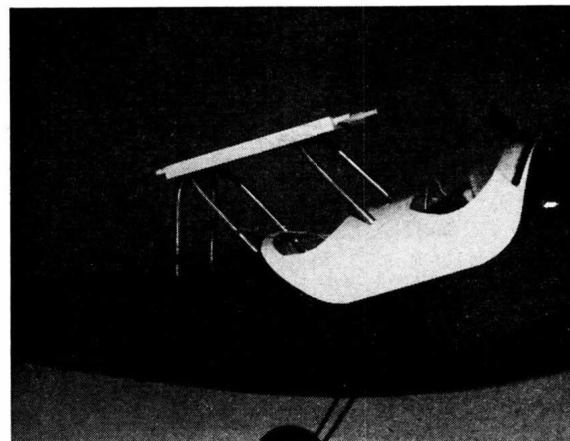
One of the frustrating things that modelers sometimes find with some magazine or kit plans is the "let's leave it up to the

builder" attitude regarding location and choice of accessories. Most of us would like to know what actuator, battery box, wheels, etc. the original builder used. We are listing the manufacturer of items we used in constructing this plane. Of course, many substitutions can be made.

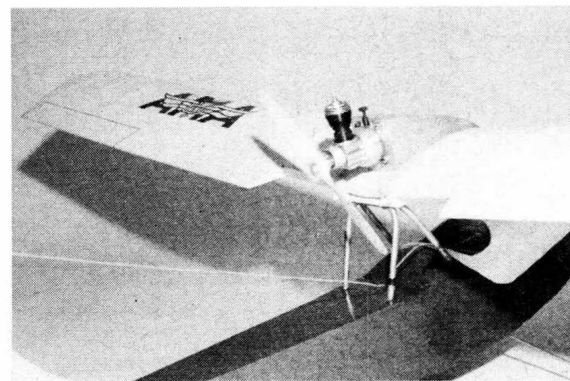
1) Engine used on prototype: Cox "Babe Bee"; 2) Displacement range: .049-.051; 3) R/C equipment used on prototype: F & M "Vanguard" receiver, F & M "GG-1" transmitter and Adams single magnetic actuator; 4) Types of alternate equipment: Any single channel equipment using escapement, magnetic actuators, or servos.

Much of the construction of this plane is straightforward and needs little explanation. Other items require some detailed explanation to make assembly as easy as possible. Let's start with the wing. The leading edge is made from 1/2 x 1/2" pre-cut L. E. stock and notched 3/32" deep by 1/16" wide for each rib, except where noted. Notching can be done quite easily, using an X-acto saw at each edge of the notches and then breaking out the center piece with a single-edge razor blade. Trailing edges are notched in the same manner. The wing spars are 1/8 x 1/4 and 1/8 x 1/2 Sig spruce. Wing ribs can be cut from medium 1/16 thick balsa, but use R/C balsa for the ribs at the center dihedral joint and at the locations for mounting the engine nacelle.

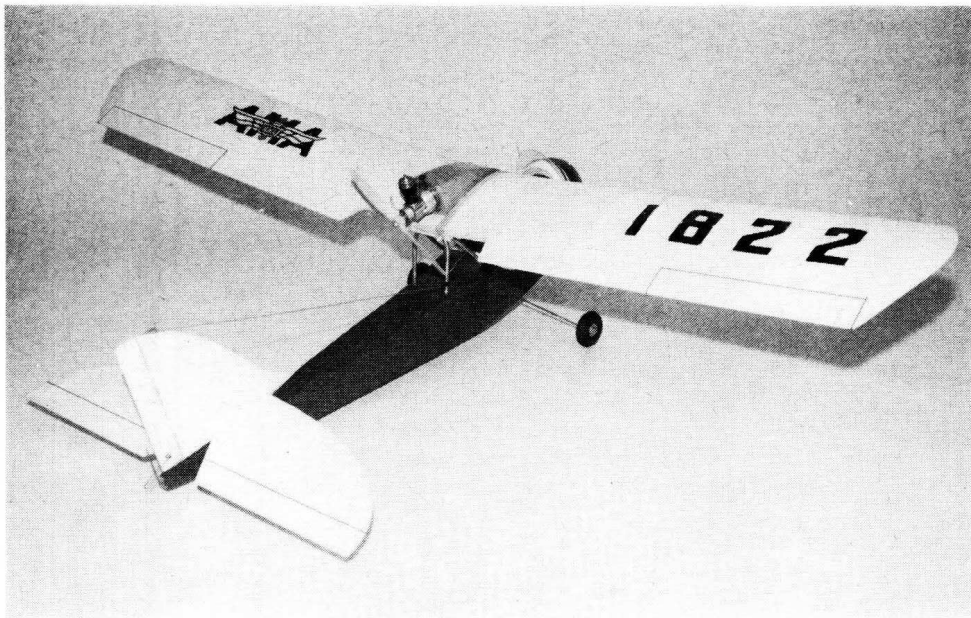
Build the wing, except for the ribs adjacent to the engine nacelle, and trim the leading edge, trailing edge and spars for proper dihedral angle. Assemble the dihedral joint, cementing all dihedral braces in place. Now, with the bottom of each wing-tip rib raised 2 1/8 above the workbench surface, install the nacelle ribs with the engine nacelle sides in a vertical position. Cement the 1/8 plywood firewall in place after installing four 3-48 blind mounting nuts on the rear surface and put on the 1/16 hard R/C balsa pieces on the top of the



Wing platform is attached to aluminum cabane struts with 2-56 machine screws. Upswept nose is handy for grass-field landings.



With pusher engine, antenna must be fastened to lower, right-hand, rear cabane strut. Clockwise engine starter spring.



Large wing and stabilizer provide good stability and fairly slow flying speed. High mounted thrust-line with a low center of drag gives excellent wind penetration.

nacelle. When this assembly is dry, plank the upper and lower surface of the center-section of the wing with medium hard $\frac{1}{16}$ balsa. Add soft balsa wingtip blocks and sand to shape.

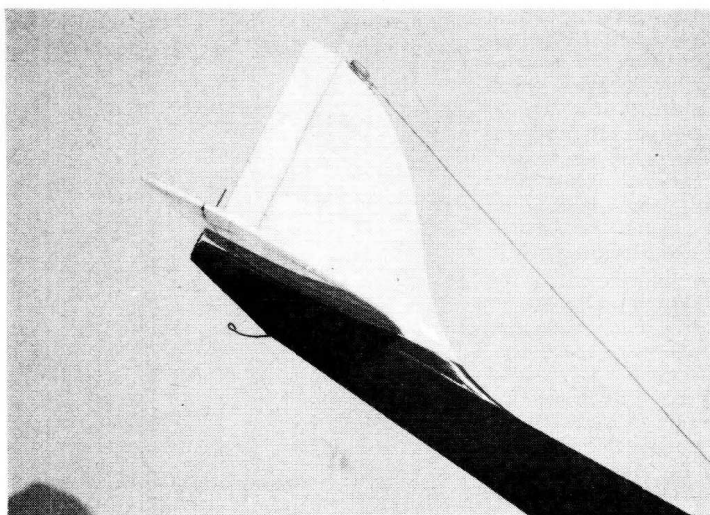
Next, build the stabilizer and fin. The construction used is similar to that used by Earl Stahl on many of his well-remembered rubber-powered designs of the late thirties and early forties. It's simple and provides an easy way to get a streamlined section for both the stabilizer and fin. Use soft $\frac{1}{8}$ square strips on top and bottom of the completed framework and sand them to the shape shown in the typical cross section. The only caution here is to use *hard* balsa for the spar in the main framework of the stabilizer and a *hard* balsa rear spar in the fin. The hinges for the movable rudder fasten to the rear spar of the fin, so strength and rigidity are needed. After the two assemblies are completed and sanded, cover them with wet Silkspan. Give them two coats of clear butyrate dope and assemble the fin into the $\frac{3}{8}$ wide slot in the upper surface of the stabilizer. Trim the paper from between the two center ribs of the stabilizer to form these slots, top and bottom. As mentioned, the fin fits into the top and the $\frac{3}{8}$ thick hard balsa stabilizer and fin mount fits into the bottom.

Begin the fuselage by cutting the sides and doublers from "B"-grained, medium-hard $\frac{1}{16}$ balsa. Glue the doublers in place, with white glue, being sure that you make one right-handed side and one left-handed side. Install the magnetic actuator mount "C" at the position and angle shown. The angle causes the centerline of the actuator to be parallel to the path of the torque rod. At the same time you install the magnetic actuator mount, also cement in place the tail-block wedge with the bearing for the torque rod. Next, install the remaining bulkheads between the escapement mount and the tail. Put the bottom and top $\frac{1}{16}$ balsa sheets on the tail section of the fuselage before attempting to pull the front fuselage pieces together. When the rear section of the fuselage is assembled including the stab and fin mount and completely dry, cement the shaped balsa noseblock in place on one side. After it dries, bend the two fuselage sides uniformly and cement the noseblock to the other side. Wrapping the entire nose with 10-12 loops of $\frac{1}{4}$ Pirelli rubber or large #64 rubber bands holds this assembly properly in place until the cement is absolutely dry. Let it stand overnight to be sure. All cement joints should be pre-cemented and allowed to dry before assembly of parts is attempted in

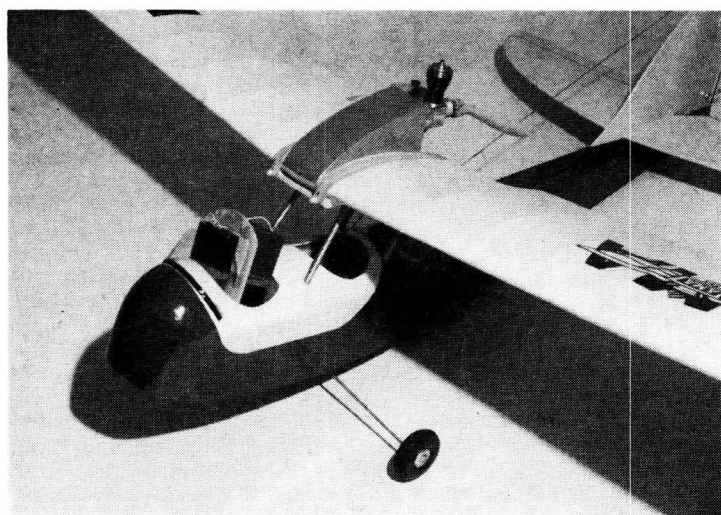
the fuselage. The $\frac{3}{16}$ thick 5-ply plywood landing gear mount is next to be assembled. Fasten the $\frac{3}{32}$ diameter steel wire landing gear onto the plywood mount with "J" bolts *before* cementing the mount inside the fuselage. Install the magnetic actuator and the torque rod at this time. Be sure to do it at this stage of construction; otherwise, you will not be able later to reach the actuator mounting screws because the cabane strut mounts and $\frac{3}{16}$ plywood landing gear mount will be in the way of a screwdriver when they are installed later.

Now the cabane struts are installed. These are formed from $\frac{3}{16}$ diameter uncoated aluminum welding rod. A Handi-Bender wire-bender was used to form all angles. Grind or file flats on the ends of the struts where they fasten to the $\frac{1}{4} \times \frac{1}{2}$ basswood blocks. Also grind flat surfaces at the proper angles at the top center where the wing platform is to be fastened. Drill each strut as shown on the drawing after the flat surfaces are filed on them. Counterbore the basswood strips so the 3-48 nuts will be slightly below the surface when tightened. Screw the aluminum struts to the basswood strips with 3-48 $\frac{1}{2}$ " round-head machine screws. Clip off the protruding threaded portion of the machine screws and grind flush with the surface of the basswood blocks. Retighten and fill the counterbores with epoxy cement. Pre-cement the proper locations inside the fuselage and the outside surface of each cabane strut block. Cement the cabane strut blocks in place, being certain that the three struts meet in a longitudinal straight line which is 3 degrees positive with respect to the upper surface of the stab and fin mount. Check it this way: With the fuselage resting on the landing gear wire, block up the rear of the fuselage until the stab and fin mount are 3 degrees negative. Then, use a carpenter's level to determine zero for the line joining the three cabane struts. When the struts are properly aligned, let them dry in place overnight. Mount the $\frac{1}{8}$ plywood wing mount to the top of the struts using 2-56 $\times \frac{3}{8}$ round-head machine screws. Since the method of attaching the wing rubber bands allows a knock-off arrangement, this wing mount can quite easily absorb the shocks of hard landings.

Build two rails to hold the receiver mounting board. These should be of very hard balsa or even basswood, because they must withstand the entire forward force generated by the receiver and batteries in the event of a hard landing. The rails taper toward the bottom of the fuselage and should be carefully fitted to the sides of



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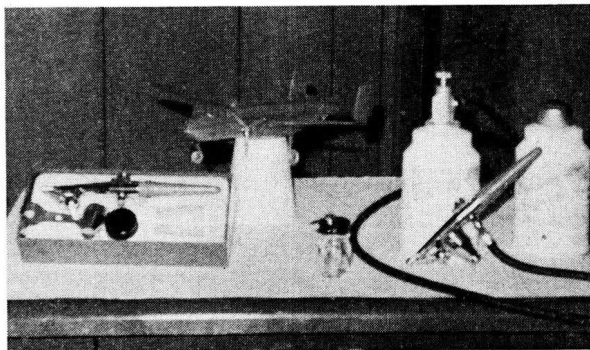
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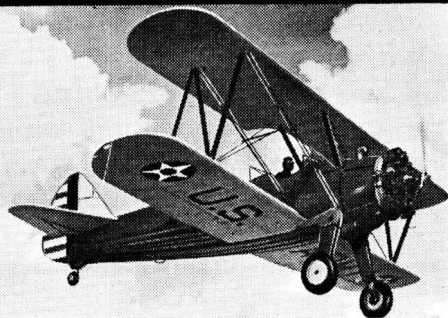
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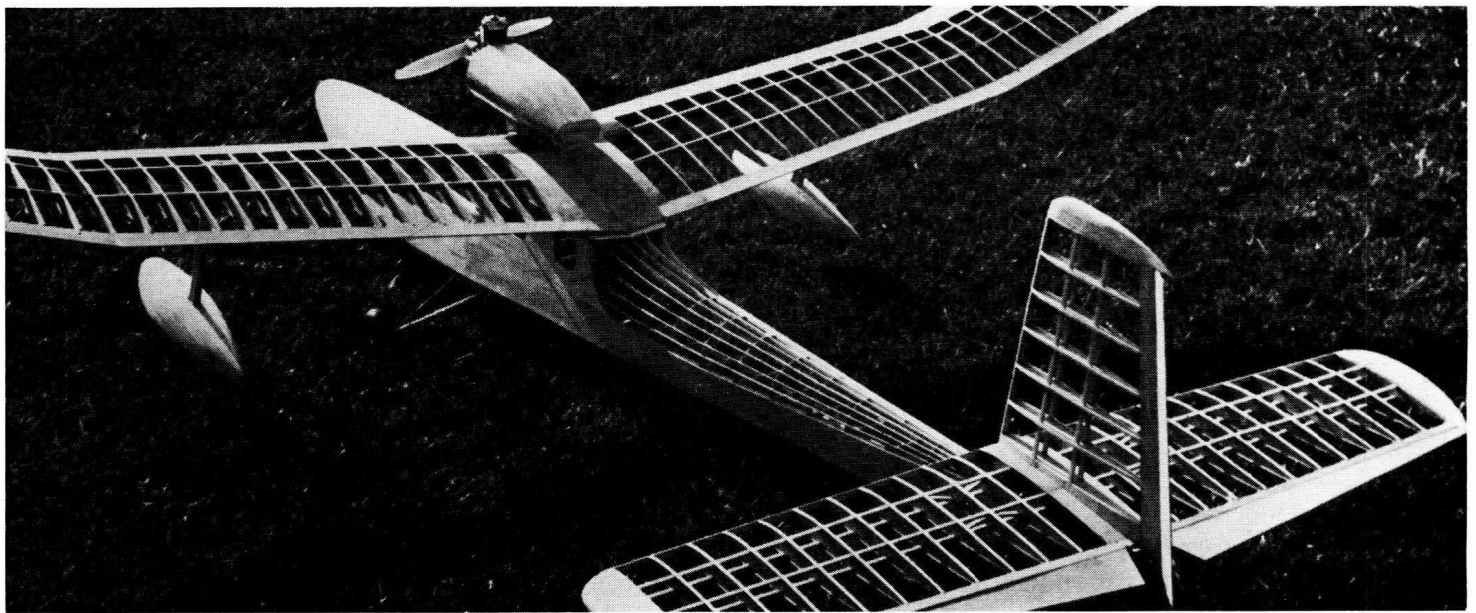
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the fuselage. It is best to have the 1/8 plywood receiver mounting board in place in the rail slots when the rails are positioned in the fuselage. This will then assure that the mounting board can be easily slid in or out of the fuselage.

Wire up the switch, battery box and receiver socket before applying 1/16 hard R/C balsa between the bottom sides of the fuselage. Check the complete radio installation before these sheet-balsa, fill-in sheets are cemented into place. Note the grain



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direction. Then, apply a second layer of $\frac{1}{16}$ R/C balsa from the rear fuselage bottom piece all the way to the front of the nose block. Note that the grain should be crosswise to the centerline of the fuselage. Because the rear cockpit is surrounded by cabane struts, it is necessary to plank the area from former “I” back to former “J,” using $\frac{1}{16} \times \frac{3}{16}$ hard balsa strips.

Fit short pieces around the metal cabane struts. After these are cemented in place and sanded, the cut-out for the cockpit can be made — do half of it from each side. Lots of the sandpapering around the rear cockpit and between the cabane struts can be done with an emery board (small sandpaper nail file). The sheet for the front cockpit can be cut from a single piece of $\frac{1}{16} \times 4$ ” balsa and bent over the formers. Be sure to center the cockpit cutout on the fuselage.

Cover the wing and fuselage with Silkspan and install the stabilizer and fin. Apply three coats of clear butyrate dope to all surfaces and sand with very fine wet or dry sandpaper. The original model has a Miami Blue fuselage and Diana Cream wing, stabilizer and fin. The engine nacelle on the full-size plane was the fuel tank and is painted silver on the model to resemble the sheet metal tank. Be sure the windshield stands up straight enough that the battery box clears it, when the plywood mount is slid upward out of the front cockpit. The original full-size plane only had a windshield on the front cockpit, none on the rear one. After three coats of colored dope, apply license number decals and trim tape outlines on the ailerons and elevator and then spray on a final coat of Aerogloss fuel proofer.

The antenna on the plane is fastened from the top of the fin to the bottom of the right-handed rear cabane strut. A pair of wire hooks have a very small rubber band

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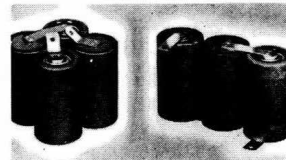
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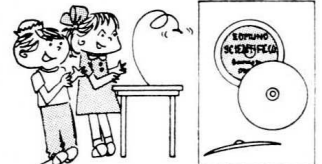
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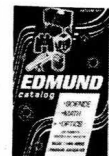
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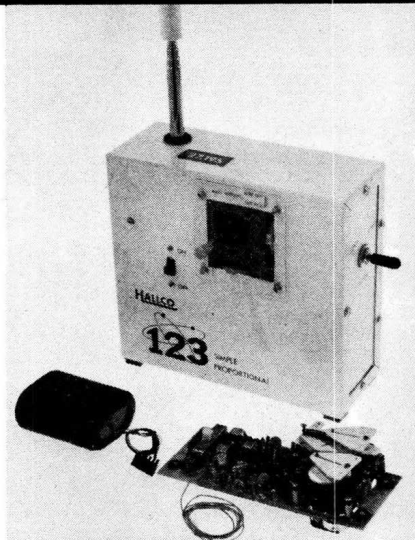
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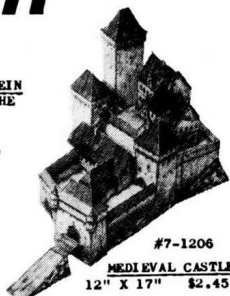
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between them to provide tension on the antenna wire which is anchored to the cabane strut with a 1/8 wide strip of Scotch Electrical Tape, No. 33. From the cabane strut forward, the antenna is looped loosely around the rear cockpit R.H. edge and attaches to a small Fahnestock clip mounted at the front of the cockpit on former "I."

By mounting the receiver on the receiver board with only rubber bands and padding it with a 1 1/2 x 2 1/4 piece of 1/2 thick foam rubber, the receiver is almost instantly removable for use in other planes. A five-connector socket (called a "plug socket" at radio supply stores) is mounted on a 1/8 plywood strip at the rear of the front cockpit. By pulling out the plug and disconnecting the receiver antenna wire from the Fahnestock clip in the rear cockpit, the receiver is completely free from the plane. On the front side of the receiver board is mounted the plastic battery box that holds two penceils. It, too, is held in place with rubber bands.

The Cox Babe Bee engine shown is equipped with a Cox #338 spring starter. This left-hand spring starter turns the engine in a clockwise direction, so a right-handed propeller can be used and still provide thrust in the rearward direction. Thus, the engine can be started without manually flipping the propeller and possibly misaligning the wing with the fuselage centerline. Keys are used to maintain alignment of the wing on the wing mount.

With two penceils in the battery box, the plane should balance longitudinally as shown. Add lead-weight to either the front cockpit floor or the rear of the fuselage until balance is correct, if it doesn't check correctly the first time. Total weight of the original model with all items as listed in the parts list is 20 1/2 ounces.

We aren't sure yet just how aerobatic this plane may be. As far as smooth, gentle, slow-speed flying, it's a great model for the Sunday afternoon sport flyer.

This is a slow-flying plane that is quite realistic with its slow, easy takeoff and gentle climb to altitude. There is sufficient dihedral that you get gentle turns without any diving tendencies unless you "hold" the turn continuously for about 270 degrees. It has a ballooning recovery from a spiral dive and doesn't gain too much speed because of the inherent drag of the design. In summary, it's an easy-to-fly plane — good for beginners in R/C scale.

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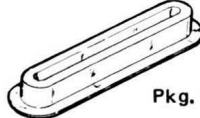
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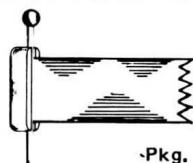


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