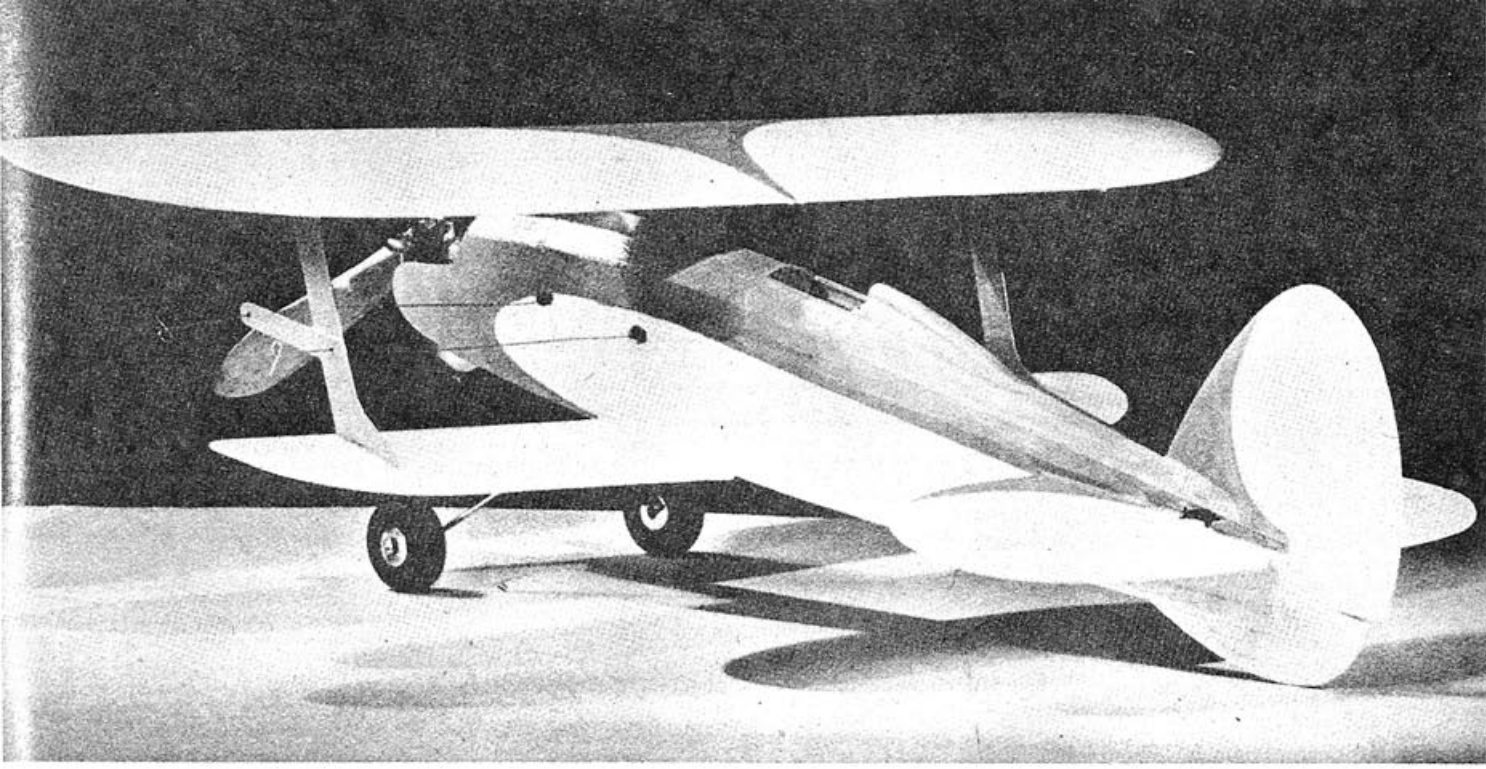


THE SMITH SPECIAL

Indoor sport or stunt flying is possible now with the new small engines. Try this tiny, trim semi-scale biplane

By S. CALHOUN SMITH

INDOORS or out this K&B-Infant-powered biplane is real flying fun. Oldtimers can trace the ancestry of the Special way back to the biplanes so popular with model builders during the '30s. How many of us wished then for a power plant such as the Infant to hang in the nose.

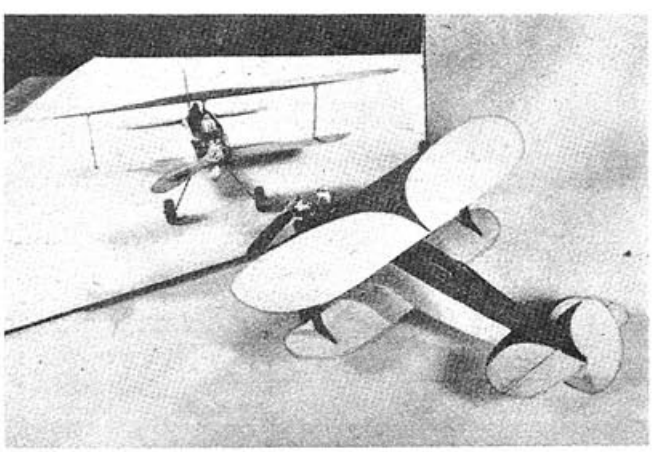
The Special was designed as a one-evening project and should prove simple enough for the young builder. The Infant pulls the model along at a good clip. Initial flights were made in a two-car garage with about 9 feet of thread out. We had to give that up when we wandered from the center of the circle and banged the ship against the walls. Outdoors we flew on 15 feet of line and the Special handled well. Because of its light weight (3 oz.), calm air is almost a "must" for flying, although the more experienced flyer can make good flights in a wind—but you'll be a busy boy, believe us.

Two types of wings are shown in the plans, stunt and sport. The first test model was built with the regular lifting sport wing and performed loops and eights easily. We managed a few inverted laps, but this is not recommended for beginners. If you wish to build a true stunt job, use the symmetrical airfoil stunt wing and a stunt fuel tank such as the Darwin Pee-Wee.

Interested? If so, grab a couple of sheets of 1/16" x 3" and two strips of 1/16" square. The rest of the odds and ends such as wire and plywood should be down in the bottom of the scrap box. Plans are drawn exactly half scale, so if you can't wait for the Air Trails Full Size Plans simply double everything shown.

Construction can be started with the fuselage. Cut out the sides and formers from 1/16" sheet balsa. The formers themselves have parallel sides and simple half circles on the top.

● The Smith Special looks itself over in the mirror before going out to fly. Full size plans available from Air Trails Plan Department.



The Smith Special

Remember to punch out holes for the push rod travel in the formers. The firewall is cut from 1/16" plywood. A ¼" x ⅜" pine brace is cemented to the rear of the firewall. This block acts as a seat for the wood screws that hold the engine in place, and squares up the sides when assembling.

The fuselage can be built "in-the-hand," laying it over the top view as work progresses to check alignment. Begin by cementing the sides to the firewall and brace. Pin in place, check alignment from side and top, then add former 4. These two formers should be aligned carefully before proceeding. Next add formers 2 and 3 and the bellcrank mount. Formers 5, 6 and 7 can then be added in that order; use plenty of cement at the rear where the sides come together.

While the basic fuselage structure is drying, cut out the pylon, head rest, rudder and sub-rudder. The pylon is specified as 1/32" plywood but if this is unobtainable, hard 1/16" sheet balsa may be substituted. The grain should run vertically. Ditto for the wing struts but more of that later. Cut out the wing and landing mount from 1/16" plywood. Bend the landing gear to shape and fasten to the mount with thread stitching and several coats of cement.

The stabilizer and elevators should be cut out and assembled at this point. The plans are self-explanatory. The control horn is made of 1/32" brass, ⅛" wide. Bend a right angle in the strip so that the hole is ¼" below the elevator spar. Wrap the other end of the strip down snug against the spar with thread. Cover with two coats of cement.

The rest of the control system can be assembled and fitted into the fuselage next and the stabilizer cemented permanently in place. Control-line leads can be .010" wire with a simple loop in end through the bellcrank. Elevator travel should be about ¼" up and down, more for the stunt version.

Now to assemble all these parts to the fuselage. First comes the pylon, then the head rest. Add the wing and gear mount, use cement liberally here. Next add the sub-rudder and fin. Check alignment of these by sighting at the fuselage from the rear end. Cement the rudder in place with the amount of offset indicated. This about completes the fuselage except for the 1/16" square stringers which may be added later after the fuel tank is fitted in place.

The sport wing can be cut out of 1/16" sheet and sanded smooth. The trailing edge is tapered slightly to about 1/32" thick. Cut out the ribs and prepare the wing surface before cementing in place. This type of wing can be neatly built by using the following procedure: Paint the top of the wing lightly with water from the leading edge to about ⅔ of the way to the trailing edge. Working quickly, give the bottom surface one coat of thin dope, covering the same space chordwise as the top surface. The dope will shrink and curl the sheet, and the water will allow the sheet to bend in the right places. Cement the ribs in place and hold with pins pushed in diagonally. When the water, dope and cement are dry the wing will

be set in the proper curve. Check to see that no warps develop while drying. Any warps can be twisted out and held that way while the sheet is drying.

Repeat the operation for the two lower wing panels. These are simpler because of their size.

If you are building the stunt wing, cut out all the ribs and lay out the leading and trailing edge over your plans. The leading edge should be blocked up with ⅛" scrap blocks, the trailing edge with 3/16" sheet. The ribs can then be cemented in place with ample clearance above the plans. Tips are soft ½" square or sheet balsa carved to streamline shape. Lower wings for stunt version are 1/16" sheet sanded to symmetrical section as indicated on the plans.

Now comes the only tricky part—assembly of the wings to the fuselage. Cut out the wing struts, leave a little extra on the bottom in case a little "fudging" is in order. Lay the fuselage down on your work board with the landing gear hanging over one edge. Lay a scrap of ⅛" sheet under the gear mount so that the fuselage will be resting level. Now pin the fuselage down to the board through the sides and the sub-rudder. Slide the wing down onto the pylon and check for equal elevation of the wing tips and 0° incidence. Cut scrap strips to support wing tips equally above the board. The wing can now be cemented in place and the tip supports pinned to the wing and the board. Let dry a bit before proceeding.

Cut a slot through the lower wing surface to receive the lower ends of the I-struts. Slide the struts through the slots and lay the lower wings in place on the fuselage mount. Check the dihedral angle holding the struts in place against the top wing ribs. Now is the time to insure proper alignment so shave or beef-up accordingly. When everything is lined up, the lower wings and struts can be cemented in place. Now go eat your supper and let the thing dry thoroughly.

Well, nearly finished. Add the line guide to the left I-strut, drill for lines and run leads through and bend a simple loop in the ends. Fit the stunt tank in place with the feed pipe level with the needle-valve of the engine. Now add the 1/16" square stringers and 1/16" sheet around the cockpit.

Use lightweight Silkspan for covering the fuselage top and bottom. Paper can be added to fuselage sides and wing leading edges for extra strength, but we do not recommend doing so because of the added weight.

One coat of filler, or sealer, one coat of colored dope, and one coat of hot fuel-proofer completes the job. A fancy finish is passed by for the sake of weight reduction.

The Infant engine is held in place with two wood-screws 5/16" long. Side thrust, if necessary, may be added by placing a washer behind the engine mounting flange on the left side.

Because the fuel line in the Infant tank is on the left (inside of circle) side, we found it necessary to rig a Rube Goldberg fuel line from a length of ⅛" O.D. copper tubing going into the right (outside of circle) side of the tank. This enabled the engine to practically run the tank dry in flight. Of course if the stunt tank is used, the regular Infant tank will not be used. But don't cut that mounting stud off—you may use the regular tank on some free-flight job.

And finally, props: we used a hand-carved type as recommended by K&B. We also experimented with slightly more pitch, but the difference in performance didn't warrant the trouble. Best success was achieved with the Air-O single blader. Although primarily intended for free flight, the fly-wheel action developed by the added lead weight made the engine start easier and turn more rpm.

The Special can be flown on from 10 to 15 feet of No. 20 cotton thread or silk and nylon of smaller size.

If the builder so desires, all wood sizes given as 1/16" sheet can be made of 1/20" sheet if available and a considerable saving in weight will result. Although performance is good now, a bit less weight should really make your Special jump.