



Aero Fox

by GEORGE and SCOTT McALEER

Type: Sport
Wing Span: 60 inches
Wing Area: 525 square inches
Weight: 5¾-6½ pounds
Wing Loading: 25.2-28.5
Channels: 6



AeroFox exhibits those qualities necessary in a more advanced design.

MY SON, SCOTT, now seventeen, learned to fly R/C four years ago. After two seasons with an underpowered basic trainer, which Scott learned to handle extremely well, and a season of a sport-scale Piper Tomahawk with totally unpredictable behavior, which he also learned to handle well despite its shortcomings, it became

obvious that if his flying was to advance, he'd need a fast, maneuverable, and stable advanced trainer.

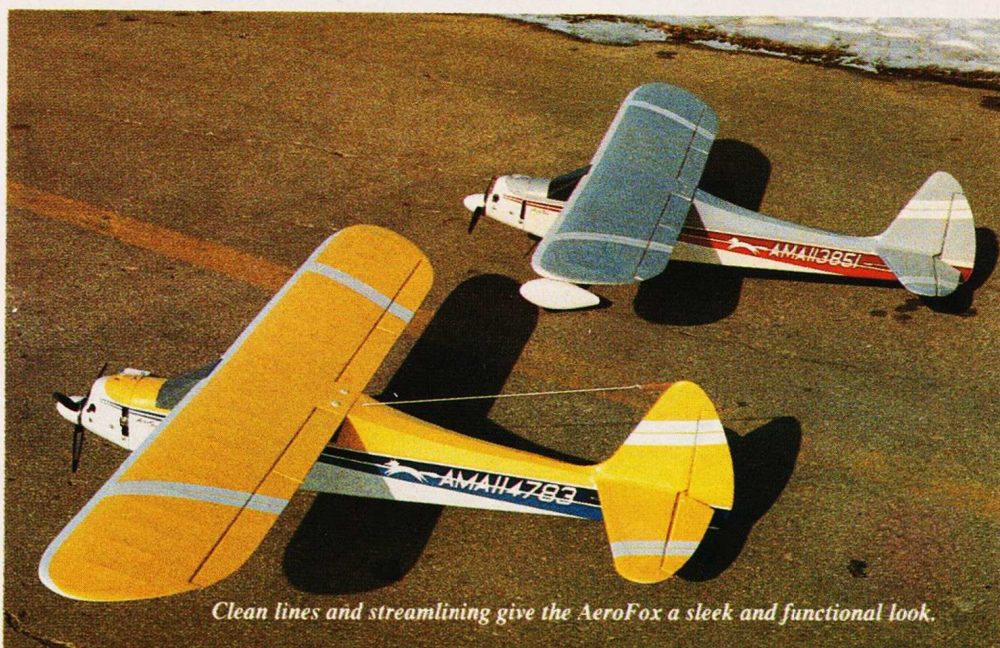
After deciding that none of the kits suited our needs, we chose to design our own advanced trainer, including all the features we considered desirable, including the sleekest lines we could think of.

Over a period of several weeks we

compiled a list of these desirable features: a high wing for stability, good maneuverability, adequate power, a tail-dragger with a wide tread, semi-symmetrical airfoil, washout, and flaps. To improve performance and esthetics we included in our design a low profile, low frontal area, wheel pants, a fully cowled upright-mounted engine, and slightly upturned wing tips. To mount the engine and to fully cowl it, to reduce drag and improve cooling, we lowered the thrust line until the engine would totally fit within the cross-section of the fuselage. The method of construction would include everything we'd learned up to that point.

We made sketches, refining the design each time until we liked what we had. We already had an OS 40 FSR engine, so the AeroFox was designed around that engine.

The AeroFox was ready when the flying season opened in the spring of 1985. Even with his somewhat limited experience, Scott decided that he would

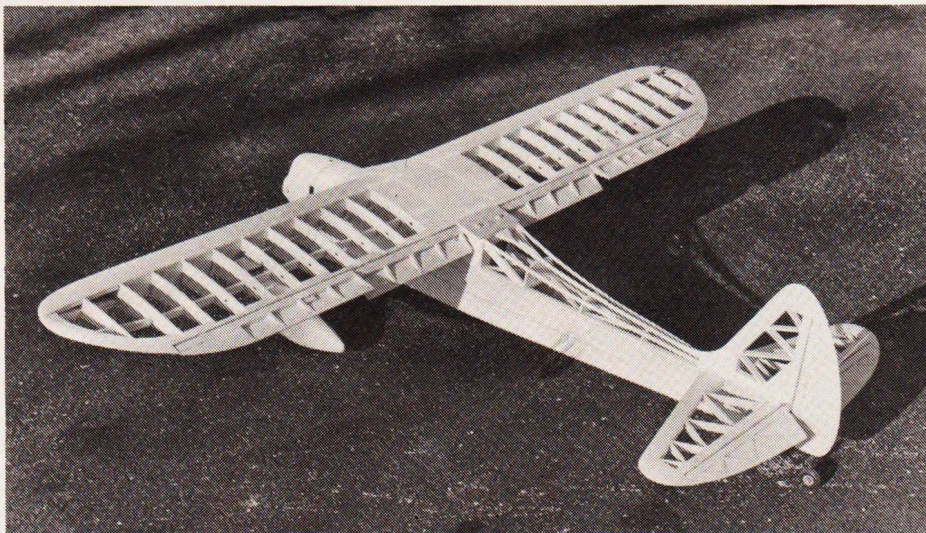


Clean lines and streamlining give the AeroFox a sleek and functional look.

test-fly it. After double-checking everything, alignment, trim, etc., and deciding it was as close to perfect as possible, we headed for the flying field. The first day was windy, so we made only two fast runs across the length of the field, lifting off

only about a foot and then setting down again. It lifted off in grass at quarter throttle, and seemed stable and flyable.

The next visit to the field, the AeroFox was fired up and lifted gracefully into the air. He climbed to a couple hundred feet



Proof that form follows function, this skeletal view reveals the secret.

then made the necessary slight adjustments to the trim. To our delight and amazement, the AeroFox flew superbly, as we'll fully explain later. The balance had worked out perfectly, and to this day the only modification necessary was to increase the aileron movement slightly. Otherwise, from the first day the AeroFox has performed admirably.

As mentioned before, the AeroFox was designed exclusively around an OS 40 FSR engine, and while the finished AeroFox weighs 6½ pounds, the 40 FSR propels it at an amazing speed and provides ample power for aerobatics. With one exception, a larger, or different engine may not fit within the close-fitting cowl. As the 1985 flying season drew to a close, the AeroFox had completed 70 successful flights, each averaging about 15 minutes. This adds up to 17½ hours flying time. The 12-ounce fuel tank will, depending on the type of flying, give between 20 and 30 minutes of flying.

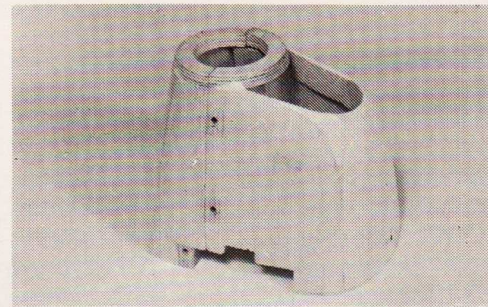
We have since built a second AeroFox, used primarily for the construction photos, and have reduced the weight slightly. We also have found that an OS 45 FSR and

FSR ABC are dimensionally the same as the 40 FSR. The new AeroFox uses the 45 FSR ABC, and with the 20% increase in power, and the lighter weight, the results should be interesting when the 1987 flying season arrives.

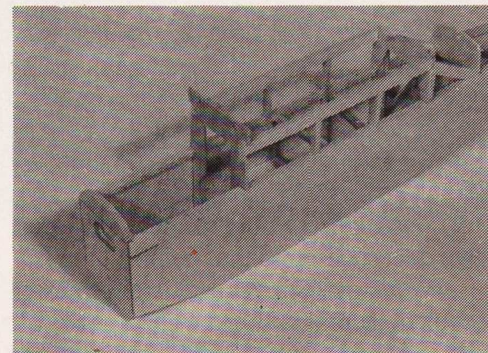
CONSTRUCTION. In general, the construction of the AeroFox is conventional. There may be a few areas that require some clarification, but, for the most part, there should be no problems.

The fuselage sides are built right on the ¼-inch-thick balsa sides. The location of the ¼-inch-square balsa strips are shown in the small detail on the plan. Be sure to make one left-hand and one right-hand side. Add the ⅛-inch-thick plywood doubler to each side. Glue the two ⅛-inch-thick plywood bulkheads (#C and #F) in place first. The sides are parallel between #C and #F. Complete the construction between #C and #F, and add an extra ¼-inch-square balsa cross-piece at the top at #E. This will help hold the sides parallel when the tail of the fuselage is glued together, and can be removed later when the fuselage is completed.

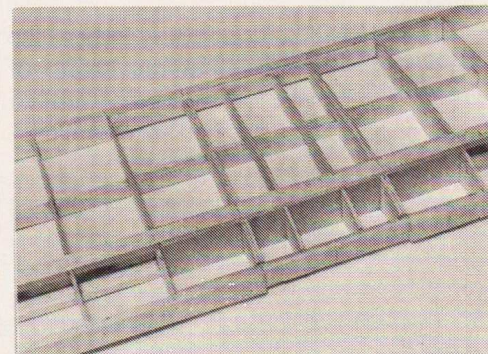
From #G the sides are straight all the



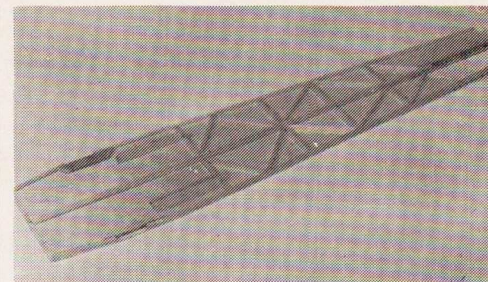
Cowl is built up from balsa and ply.



Fuselage framework is simple and effective.



The wing center section shows plywood doublers.



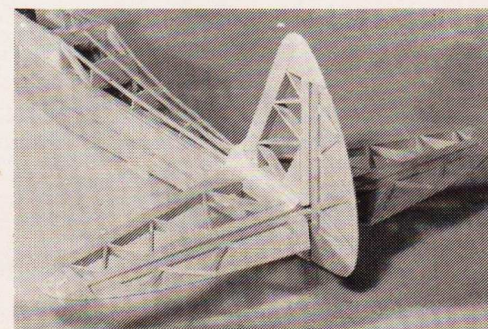
Build left and right fuselage sides the same.



The neatness of the design is seen in this nose shot.



Wing houses aileron and flap servos.



Tail group uses geodetic-type construction.

AEROFOX

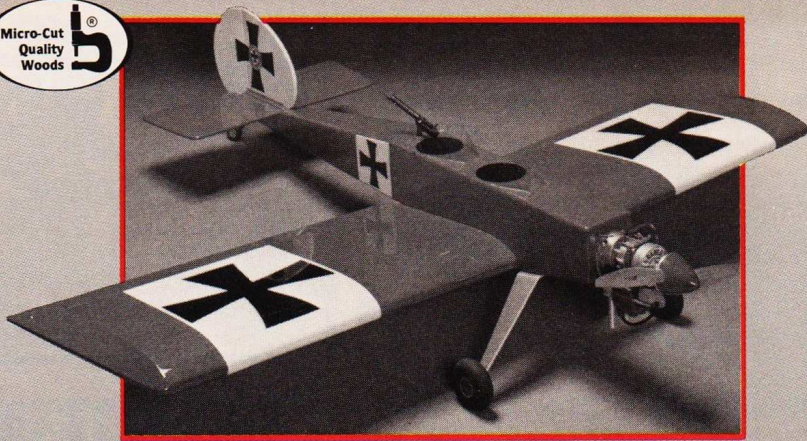
way to where they are joined at the tail. All the bending of the sides is between #F and #G. Clamp a short, straight board to each side to keep them straight while gluing, and until the remainder of the cross-pieces are glued in place. The diagonal bracing at the top of the fuselage is a must to keep the tail rigid. The formers at #G, #H, and #J, and the $\frac{1}{8} \times \frac{1}{4}$ -inch stringers are added after the tail surfaces are glued in place.

If the $\frac{1}{16}$ -inch plywood doublers were glued accurately, the firewall (#A) will fit squarely. The oval opening in the firewall is optional, and is part of a system to make the fuel tank more easily removed. A $\frac{1}{8}$ -inch-thick plywood plate is screwed to the rear of the firewall behind the oval opening, and the fuel lines connect to straight fittings mounted on the plate. Remove the screws and the plate, and the lines and tank come right out. The $\frac{1}{4} \times \frac{3}{4}$ -inch pieces are glued to the doublers as a support and a stop for the fuel tank.

Build-up the cabin area between #C and #F, and cut out the curvature of the wing. The balsa windshield is added after the final fitting of the wing.

The elevator and rudder push rods, and the landing gear are installed before planking the underside of the fuselage. If you use the C.B. Associates tail wheel as I did, glue the $\frac{1}{8}$ -inch plywood plate to the underside of the tail section. Be sure to drill the mounting holes and attach blind nuts on the back side before gluing it in place.

As for the tail, the fin and stabilizer are built on the plan. The $\frac{1}{2}$ -inch thickness may seem excessive, but when the Aero-Fox is completed it will look just right. The $\frac{1}{2}$ -inch-square spar is sanded to a slight taper, top and bottom. The leading edge is tapered and radiused, producing a pleasing, symmetrical airfoil. The rudder and elevators have a $\frac{1}{2}$ -inch-square balsa forward edge, with a $\frac{1}{8}$ -inch-thick balsa sheet glued to it and centrally located. The $\frac{1}{8} \times \frac{1}{4}$ -inch diagonal ribbing is glued to both sides, and because of the airfoil, they will be flush and smooth when sanded. Fit the hinges before any of the tail surfaces are sanded, so it will be easier



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to locate the center.

Glue the stabilizer and fin to the fuselage, making sure that they are properly aligned, square and level. There is a third hinge added at the bottom, between the fuselage and the rudder. Quarter-inch triangular stock is used as a fillet between the fin and stabilizer. This also strengthens them. Now add the formers and stringers to the top of the fuselage. The remainder of the fillet is built-up from scrap balsa and sanded carefully.

The wings are built separately right on the plan. The forward lower spar rests on the plan, while the rear spar should be blocked up $\frac{1}{16}$ inch. The trailing edge of the common ribs (#3) should be blocked up $\frac{1}{4}$ inch. Rib #4 should be glued in place before the tip, laminated from $\frac{1}{4}$ -inch balsa, is glued in place. Remember, and this applies to rib #4 as well as the rest of the ribs to the tip, align them even with the top surface of the outer ribs, as from rib #4 to the tip, while the top surface is straight; the bottom surface curves up. Use a straightedge laid across three or four of the #3 ribs as a guide, making sure the tip ribs are all in line front and rear. The tip is blocked-up in its proper position, $\frac{7}{16}$ inch up at the leading edge, $\frac{5}{16}$ inch up at the trailing edge of rib #4, and $\frac{13}{16}$ inch at the tip. See the wing details for the method of extending the spars.

When the two wing halves are completed, pin them in their proper location on the plan, with the proper dihedral, and construct the center section. Add only the $\frac{1}{16}$ -inch balsa sheeting on the bottom of the center section and the $\frac{1}{16}$ -inch plywood trailing edge, so that the wing can be fitted to the fuselage. When the wing is properly located on the fuselage, using the two $\frac{1}{4}$ -inch-diameter holes in the plywood bulkhead (#F) as a guide, drill through the leading edge of the center section for the $\frac{1}{4}$ -inch dowel-locating pins. These are added to the wing and securely glued into place. Now the remainder of the $\frac{1}{16}$ -inch sheeting can be added and the wing completed. The balsa windshield can be added to the fuselage.

The ailerons and flaps are constructed from $\frac{1}{8}$ -inch balsa sheet with a $\frac{1}{2}$ -inch-square forward edge and $\frac{1}{4}$ -inch-thick ribs. When completed, sand as shown on the plan. The tips of the ailerons must also be curved upwards to match the tips of the wings.

I used a $\frac{1}{16}$ -inch-thick aluminum plate for mounting the wheel pants; $\frac{1}{16}$ -inch plywood will probably work just as well.

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It is held to the landing gear by the axle, and to keep it from twisting, drill and tap for a #2-56 machine screw as shown on the plan. The Sig Citabria wheel pants come in two pieces, and can be assembled by clamping them together, and as Sig recommends, painting the seam with lacquer thinner. Epoxy the 1/8-inch-thick plywood plate to the inside of the pants for mounting. Position the wheel pants and drill through the aluminum and plywood plates. Add the blind nuts.

The cowling is built-up from 1/2-inch-thick balsa, and 1/2-inch triangular stock to reinforce the corners. I inlaid small pine blocks where the mounting screws are located to keep the screws from crushing the balsa. The nose is 1/4-inch plywood and turned to the proper diameters, cut in half and glued to the cowling. A lot of careful sanding is required. The lower section mounts to a bracket made of 1/16-inch aluminum and screwed to the bottom of the motor mount. Both sections mount to the firewall with small easily made aluminum angles. The upper section will require some cutting away on the inside to clear the top of the cylinder, the cowling fits so close.

Both of our AeroFoxes are covered with silkspan. The first AeroFox received 10 coats of clear dope, two coats of polyurethane primer, three coats of gloss-white polyurethane enamel, and then whatever grey trim was needed. All of this added about a pound to its weight, bringing the total up to 6 1/2 pounds.

Our second AeroFox got only five coats of clear dope, one coat of gray automotive primer, three coats of automotive acrylic lacquer and what trim was needed. This resulted in a lighter finished aircraft, just under 6 pounds. A plastic film-covering should be lighter still.

The attractive color scheme of the AeroFox was designed by Scott.

FLYING. The AeroFox is a model with exceptional flight characteristics. On take-off roll, AeroFox, unlike most tail-draggers, can be kept going straight down the runway with only a few gentle corrections of the rudder. Even when trading half throttle for about 10° flaps, AeroFox will gracefully rise from the pavement and climb out. The wheel pants are not a problem on a grass field as long as it's fairly smooth.

There is no better time to appreciate the lines of an AeroFox than when it's in the air, although it may appear to be doing 200 mph just sitting on the flight line. At full throttle its aerodynamics

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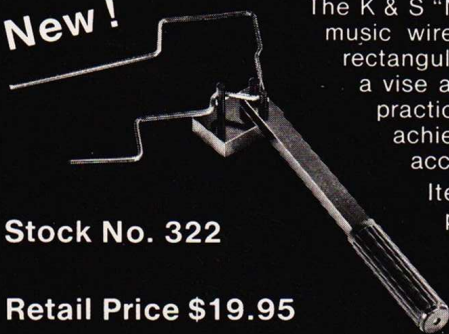
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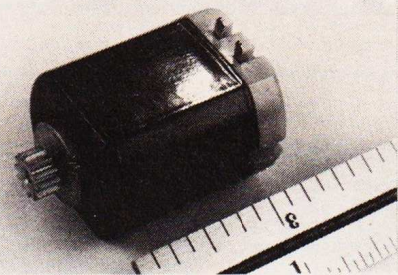
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AEROFOX

(Continued from page 96)

really take over by allowing the model to reach an incredible speed for the size of the engine and weight of the model. At quarter throttle and half flaps, it will motor around like any basic trainer.

It has also proven its aerobatic abilities by cleanly flying through any of the basic or more complex maneuvers, not to mention a few accidental maneuvers that have yet to be named. Sustained inverted flight can easily be achieved with only slight retrimming, and inverted spins are as easy to get out of as letting go of the sticks or applying opposite rudder, whichever you prefer. Although its vertical climb is limited, there is ample thrust to reach a hammer-head or any similar maneuver.

On a windless day, landings may be a little on the quick side and AeroFox may require a little more room to set down, but full flaps and a full-stall landing will limit ground-roll to as little as 30 feet. (Due to the effectiveness of full flaps when landing, it is important to maintain a very controlled, nose-down attitude, using the elevators to control airspeed rather than the throttle.) Even when it's moderately breezy or gusty, AeroFox will penetrate well, and calmly deal with any crosswind landings.

In short, AeroFox is the trainer that takes you from the trainer to?...

The suppliers of the principal components mentioned in this article follow.

World Engines, 8960 Rossash Ave., Cincinnati, OH 45236

For engine mount (No. 200-065): Kraft Systems, Inc., 450 W. California Ave., Vista, CA 92083.

For landing gear (No. L-3): Great Planes Model Mfg. Co., P.O. Box 721, Urbana, IL 61801.

For wheel pants: Citabria, Sig Mfg. Co., Montezuma, IA 50171.

For tailwheel assembly (No. 5510 reg.): C.B. Associates, Inc., 21658 Cloud Way, Hayward, CA 94545.

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