TOP-20

by BRIAN PECKHAM

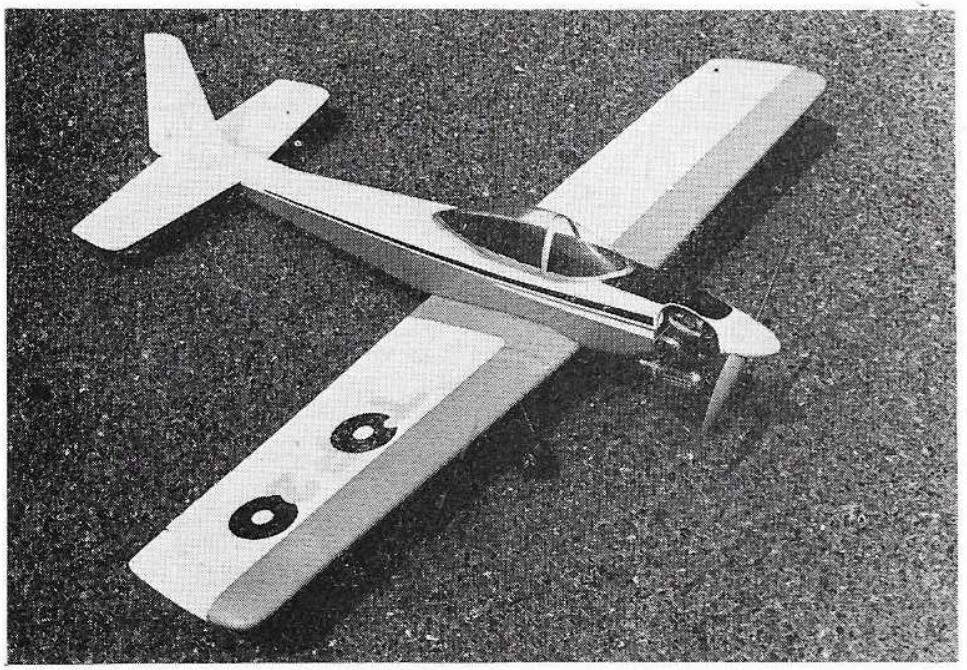
lively aerobatic model – 42" span for 4-functions

TOP TWENTY was designed at the outset as a Club-20 aerobatic model, which caused a lot of head scratching as to wing areas and weights—and, of course, motors. In this case, I based the design on the capabilities of the Veco 19 which I had been using previously in an r/c car, and which was therefore nicely run in.

The all-up weight that I had to aim at had to be under 3lb., giving the model a wing area of 300sq.in. or thereabouts for a reasonable loading. To avoid a sensitive beast, and to achieve a good smooth performance, a medium to long moment arm was used, with a 20% tailplane area.

With a small low-wing model, tip-stalling is always a possibility, so the tip section is 17% symmetrical—compared with the root section of 14% symmetrical, and to further help in this direction the ailerons are kept short of the tips, and of the strip variety rather than inset.

The final all-up weight came out at 2¾lb., giving a wing loading of 21oz./sq.ft. which seemed about right to me and has, in fact, produced a model that is nicely responsive and capable of the schedule—and can be flown in windy conditions without suffering too much.



If you can't read the name on *Top-20's* wing—take a look at the full-colour reproduction on page 52.

CONSTRUCTION

Wings

Cut the root and tip templates from $\frac{1}{16}$in. ply to the rib outline, with only the spar slots cut. Drill these for 6BA bolts where shown and clamp five blanks of $\frac{1}{16}$in. and two blanks of $\frac{3}{32}$in. between them. Carve and sand to shape, cut W1 and W9 to the templates. Having two sets of ribs, make additional cut-outs for the undercarriage beam and dihedral braces, and then add the $\frac{1}{16}$in. doublers to W1, W2 and W3, and the torque block to W1.

Assemble the wing panels over the lower spar, pinned to the building board, packing the trailing edges up with some $\frac{1}{4}$in.sq. and carefully checking the alignment. Next add the top spar, leading edge, and trailing edge, followed by the leading edge sheeting and trailing edge capping. When set, remove the structure from the board, add the u/c bearers and lower leading edge sheeting, followed by tip blocks and cap strips.

Join the panels with the ply braces after cutting out W1 to form the servo wall. (The dihedral is for

looks rather than stability so, if you prefer a flat wing, build it that way, by all means). Now add the centre section sheeting and tack-cement the ailerons ($\frac{3}{8}$x1in.) in place and carve and sand them to profile. Now mark off the exact length of the ailerons and tip and root portions in position, together with brass tube bearings, ensuring enough clearance for free movement. Now drill the aileron for its torque rod.

Drill the torque block to take the 10g undercarriage leg wire, and finally hinge the ailerons with your favourite hinges . . . or leave this until after covering—whichever you prefer.

Tail unit

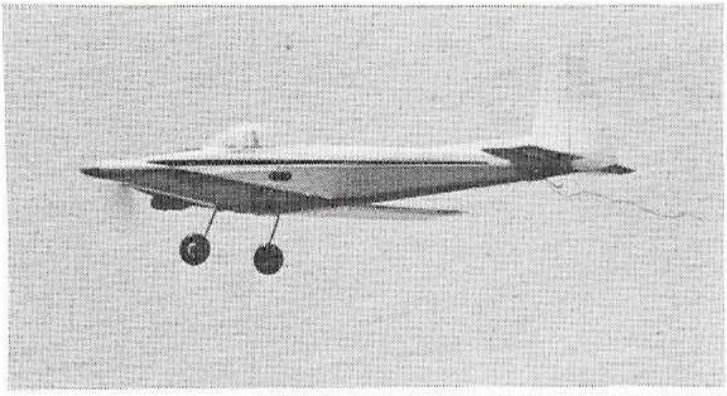
Cut the fin, rudder, tailplane and elevator from a medium-soft grade of $\frac{1}{4}$in. sheet, and add the tips from a hard grade of $\frac{1}{4}$x$\frac{1}{2}$in. The elevators are joined with a 14g wire joiner as shown on the plan.

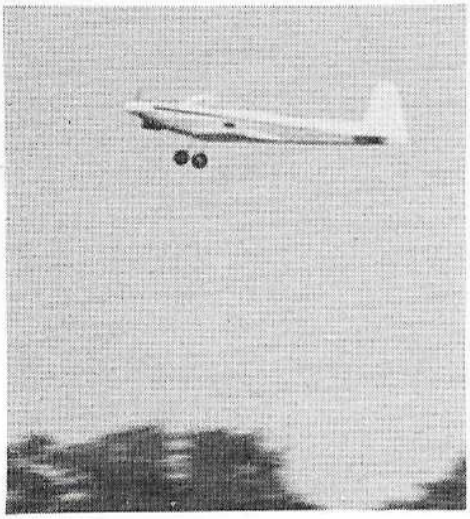
Fuselage

Make up the fuselage sides from $\frac{1}{8}$in. medium sheet, and add the $\frac{1}{32}$in. ply doublers, using contact adhesive. Next add the $\frac{3}{8}$in. triangular strip and $\frac{3}{16}$in.sq. reinforcing.

Cut the formers from $\frac{1}{8}$in. ply, making cut-outs to suit the tank you are using, and drill for the throttle cable. Bolt the engine mount to former F2. (Incidentally, try using Gaboon plywood. This is very light and plenty strong enough for the purpose, and just as durable as marine ply if well fuel-proofed).

Assemble the fuselage sides with F3 and F4, followed by F2, F1 and then pull in the tail-end, leaving a





Left: the actual size of the model is shown up when held by designer Brian Peckham, who is of fairly normal proportions! He flew the model around for us, and put it through its paces, when we were very impressed by its general grooviness—and willingness to "de-groove" to perform manoeuvres at will!

¼in. gap for the fin, packing this for the moment with scrap. Now add the ½in. top and bottom sheeting and ¼in. rear decking (note taper). Mark and cut the slots for the fin and tailplane, then plane and sand the whole thing to the sections shown.

Fit the ¼in. ply wing mounting bracket, complete with blind nut; and finally make cut-outs in the engine bay to accommodate the particular engine/silencer combination to be used.

Assemble the tailplane and fin to the fuselage, aligning these carefully with the wing, then fit the ⅛in. balsa strake or dorsal fin. Bend up the skid from 16g wire, bind it to some scrap ¼in.sq. balsa and assemble into a slot cut in the underside of the fuselage. Finally cut the canopy to the shape required from a standard 12in. Micro-Mold bubble canopy and assemble in place—not forgetting to paint the inside woodwork before using any adhesive—and, of course, a pilot if you wish.

Finishing

I believe that, for speed and lightness, a film covering is to be preferred, and I used this. Check the wings for warps, whichever method of covering you use. I did—and there was one! The wing does tend to flex a little, you see, until it is completed.

Installation

The disposition of the radio equipment as shown on the plan seems to put the weight in the right place, although some experimentation may be required to achieve the indicated c.g. position.

Control throws: rudder ⅝in. each way. Elevator: ⅜in. each way. Ailerons: ⅜in. up and ¼in. down. These settings give ample response, but

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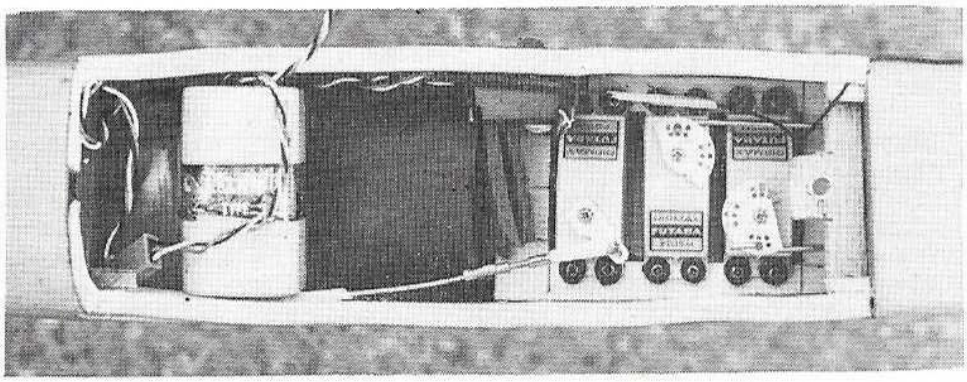
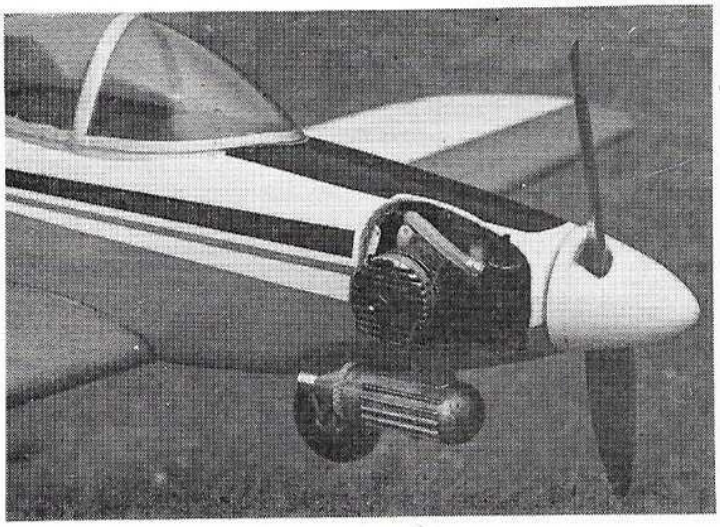
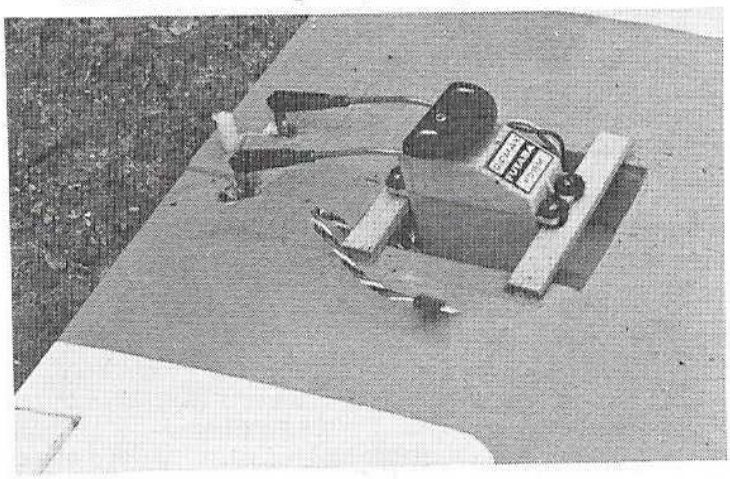




Three-abreast servos no trouble, though that nicad looks a little tight. Aileron servo is shown below, installed in wing-well.



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experiment if you would like an even snappier performance, *after* starting with those suggested.

Trimming and flying

With a small model like *Top*-20, it is important to check for warps and alignment, as every little bit of control surface trim needed to keep her flying straight is going to add more drag. However, with everything square and true, and the c.g. where shown, there should be no problems.

The takeoff run, with my Veco 19 and 8 x 6 prop is short and quite fast. Up-elevator is needed to hold the tail down for a few yards, letting the speed build up, and it will be found that rudder is quite adequate for ground control.

General response, in the air, is positive but gentle, and *Top*-20 will sail through all the manoeuvres required in the currently suggested schedule. As usual, a little down-trim is required for any prolonged inverted flight.

Landing is a pleasure. The model has a good glide, but not too floaty, so line her up and *Top*-20 will land herself, without any wing dropping. One final point; for the optimum performance, some experiments with different propeller sizes to suit your own engine can pay dividends. I tried a number before arriving at the 8 x 6 which I now use.

For the cost-conscious, *Top*-20 cost me about £13 to complete (*early summer*, 1977—*Ed.* and flies on a thimbleful of fuel . . . can't be bad!