

THE

BRIAN PECKHAM's 54 inch sport design for four function radio and .40 four strokes makes an excellent low wing trainer.

The idea of Poppet was to produce a semi-scale light aircraft capable of aerobatics with .40 four stroke power, but at the same time easy to fly and without any nasty habits.

With this in mind a thickish semi-symmetrical wing section was used with a blunt leading edge and a built up symmetrical section tail plane. To make the appearance different I decided on a 'T' tail, and a fully cowled motor, this I hope achieved the initial aims although, as they say, beauty is in the eye of the beholder!

As for the flying performance I got exactly what I designed for, in fact more. I am sure 'Poppet' would even make a good trainer for the novice except that the construction would be a little advanced for someone without any previous building experience.

I will give a run through of the construction highlighting all the naughty bits!

Wings

Cut an $\frac{1}{8}$ in. ply template for the ribs and cut out all the rib blanks from $\frac{3}{32}$ in., $\frac{1}{8}$ in. and $\frac{1}{16}$ in. sheet as noted and modify the ribs as necessary for the centre section W1, W2 and W3 etc., also slot four ribs for the bellcrank mounting plate.

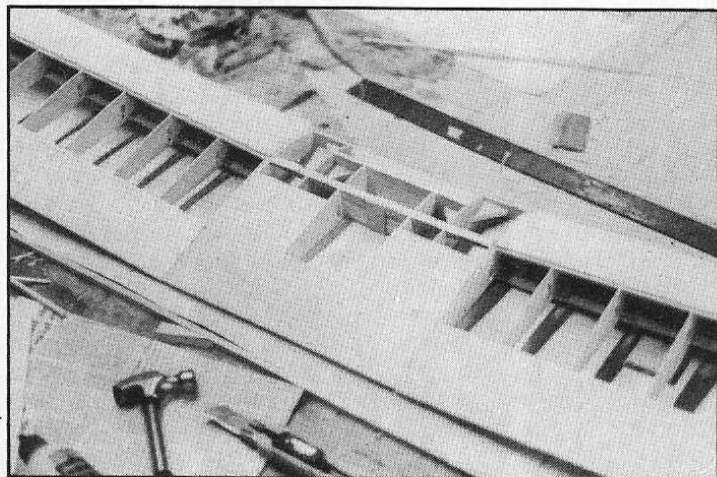
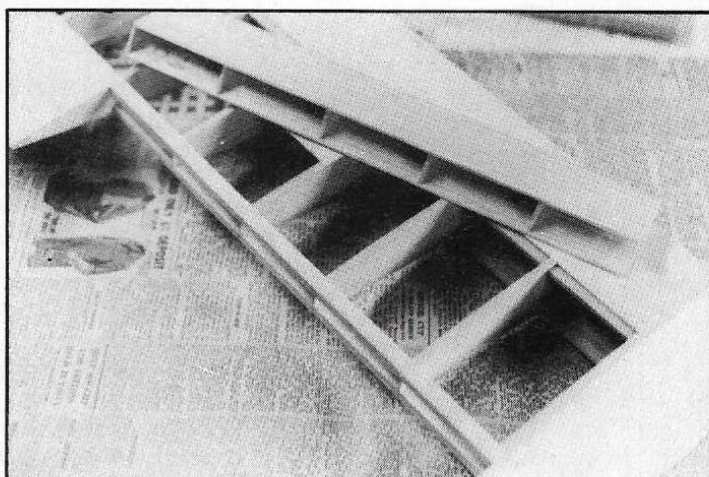
Assemble the two outer panels up to the dihedral break over the plan, pinning down the bottom main spar

The upper spars extend to the centre line, so pass through the centre section at an angle.

and packing up the ribs at the trailing edge with a strip of $\frac{1}{4}$ in. sq. Add the top main spar and rear top spar, angle the root rib as shown, leave the top

main spar long enough to reach the centre line. Add false leading edge and the leading edge and trailing edge sheeting, then fit the bellcrank plate.

After construction, the ailerons are cut out of the wing structure.



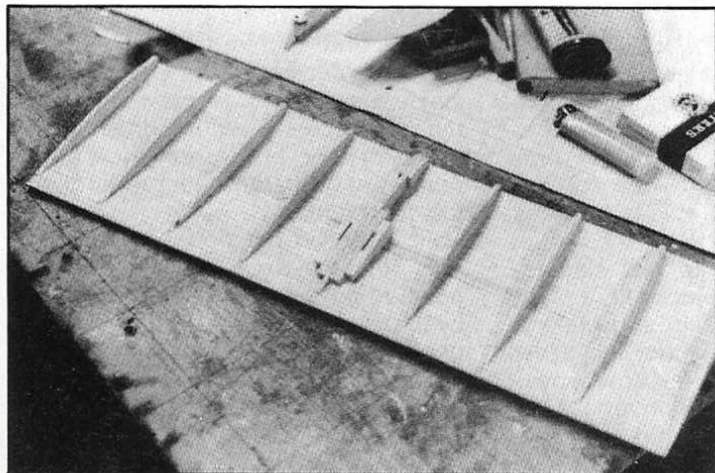


Remove from the board and fit the lower rear spar and $\frac{3}{16}$ in. trailing edge strip followed by the T.E. sheeting. Do this with the top surface lying flat on

the board to avoid warping. Now fit the leading edge sheeting.

Trim off all sheeting flush with the root and tip ribs, fit the $\frac{1}{4}$ in. leading

The tailplane has no spar, relying instead upon a 'stressed skin' construction.



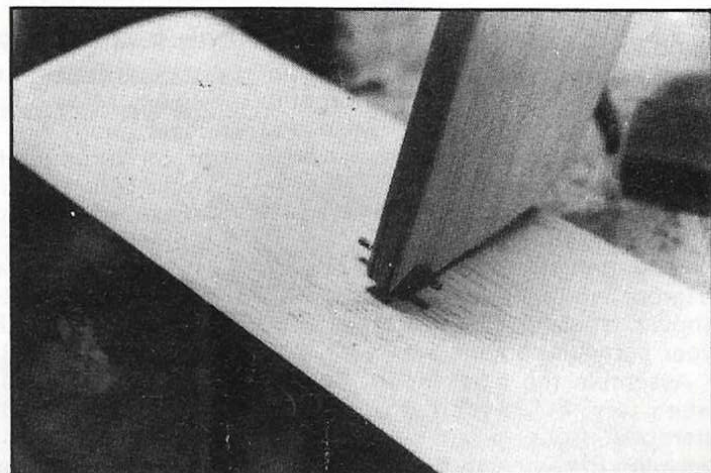
edge and cap strips to all ribs, plus a 2in. wide band of $\frac{1}{16}$ in. below the bellcrank with a slot for aileron push rod movement.

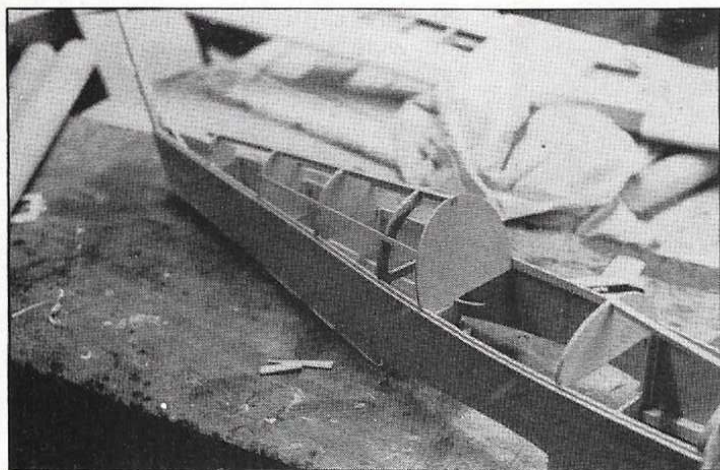
Make up the tip blocks from laminated $\frac{1}{2}$ in. soft sheet, glue this to the tip ribs but *not* the end of the aileron. Shape the tips and leading edge to follow the wing profile.

Mark the position of the back of the rear spar at the aileron and another line $\frac{1}{4}$ in. further back on the top surface and $\frac{1}{2}$ in. back on the bottom surface. Cut through the $\frac{1}{16}$ in. sheet only on the top and bottom surface and remove the two strips between the two lines. Now cut through each rib, angled back, release the aileron. By cutting through the sheeting alongside the rib at the aileron root, remove the tails of ribs behind the rear spar. Add the $\frac{1}{4}$ in. sq. hinge blocks where shown, fit the $\frac{3}{8}$ in. riblet for the horn mounting and the $\frac{1}{8}$ in. root rib, set back $\frac{3}{16}$ in. from the aileron end. Trim off the $\frac{1}{16}$ in. sheet flush, add the $\frac{1}{8}$ in. sheet leading edge sanding to aileron contour. Similarly add the $\frac{3}{32}$ in. sheet to the rear of the aileron spars, across the aileron.

Pin the two outer panels over the plan each side of the centre section, jugged up to the dihedral angle. The top spar should meet in the middle. Fit the lower main spar between the root ribs, fit W2 and W1, cutting the top spar slots deeper to allow for the spar angle. Fit the $\frac{1}{4}$ in. web between the main spars and the $\frac{1}{4}$ in. gussets at W3 and the bottom spar. Fit the $\frac{1}{16}$ in. ply brace followed by the $\frac{1}{4}$ in. balsa/ $\frac{1}{16}$ in. ply leading edge and rear top spar. Sheet the top of the centre section leaving the servo box open, line the rear of the box with $\frac{3}{32}$ in. sheet. Add the $\frac{3}{16}$ in. cheeks inside of W2 at the leading edge, remove from board and add the bottom rear spar, $\frac{3}{16}$ in. trailing edge and $\frac{1}{4}$ in. reinforcing. Fit the $\frac{3}{16}$ in. webs between the rear spar at W3, add the bottom sheeting, fit the $\frac{1}{8}$ in. ply servo plate on $\frac{3}{16}$ in. sq. bearers shaped to lower wing profile and fit the $\frac{1}{16}$ in. ply bolt plates after sanding.

All moving T-tail is simply pivoted, epoxy glass board (p.c. board material) forming the hinge.





Fuselage deck sheeting is supported by formers and stringers.

Bolt the bellcranks to the ply plate together with the 16g push rods, these can be joined in the centre with brass tube drilled to take a 10BA bolt to locate in the servo arm or use a commercial item. Hinge the ailerons with preferred hinges after covering, cut the horn from formica, dural or $\frac{1}{16}$ in. GF PC board as I did.

Tailplane

Make a ply template for the ribs and cut them from $\frac{3}{32}$ in. sheet, except for the centre rib which is $\frac{1}{8}$ in. Make up the two skins from medium $\frac{3}{32}$ in. sheet, mark the rib positions on the bottom skin and assemble the rib to the skin with slow-set cyanoacrylate by attaching the ribs at the trailing edge and rolling forward. Fit the $\frac{1}{4}$ in. hard blocks alongside the centre rib at the pivot position and the outer hard $\frac{3}{16}$ in. slotted for the pivot horns. Similarly add the $\frac{1}{8}$ in. each size at the leading edge, cutting slots through the skin for the horns. Sand the blocks flush and add the top skin followed by the tip blocks and leading and trailing edge. Fit the horns after covering taking care that the pivots are aligned parallel to the trailing edge and lower surface by using a 12in. length of suitable gauge piano wire through the pivot holes.

Fuselage

Cut the sides from $\frac{1}{8}$ in. sheet and the doublers from $\frac{1}{32}$ in. ply, laminated to the sides with Evo-stik. Add the $\frac{3}{16}$ in. sq., $\frac{1}{8} \times \frac{3}{8}$ in. stringers and $\frac{1}{8} \times \frac{1}{4}$ in. uprights, add the $\frac{1}{2}$ in. sq. reinforcement between F1 and F2 also the $\frac{1}{2}$ in. triangular at rear of F1. Don't forget to make left and right side, I also add $\frac{1}{8}$ in. sq. each side of the former positions to make assembly easier by ensuring they are accurately located. Cut out the ply formers and make up the engine mount from $\frac{1}{2}$ in. sq. beech bearers and $\frac{1}{4}$ in. ply gussets, as shown, spacing the bearers to suit your particular engine.

Assemble the sides to F1 and F2, when dry fit F3 and F5, cut the sternpost from $\frac{1}{2} \times \frac{1}{4}$ in. and glue between the sides at the rear. Cut the

deck formers from $\frac{1}{8}$ in. sheet, fit in position together with the bottom spacers from $\frac{1}{8} \times \frac{3}{8}$ in. notched over the $\frac{3}{16}$ in. sq. longerons. Fit the $\frac{1}{4}$ in. sq. top and $\frac{3}{16}$ in. sq. deck stringers and the lower $\frac{3}{32}$ rear sheet.

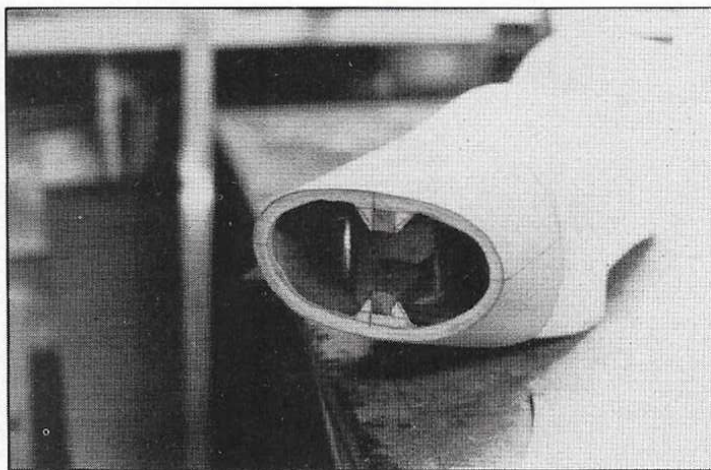
Trial fit the wing in position, trimming the cut out to fit. Mark the wing dowel position through F2 and drill and fit the dowel to the wing. Fit the $\frac{1}{8}$ in. ply plate for wing bolt nuts, bearing on $\frac{1}{4}$ in. blocks each side. With the wing in position drill through for the wing bolts, fit the captive nuts and bolt wing in position, fit a piece of $\frac{1}{4}$ in. sheet to the bottom of the wing with holes cut to clear the wing bolts and shape to fuselage contour.

Fit the bearers for the elevator 'snake'. Use one with a plastic outer that will glue to the bearers.

Fit the $\frac{1}{32}$ in. ply cockpit floor with cut outs for switch and charging lead. Add the front and rear top decks, each in two pieces from $\frac{3}{32}$ in. med sheet. I wet these on the outside, hold them in position and get someone to dry them off using a heat gun or hair dryer, then trim and fit in position. If they are fitted wet, they will shrink on drying out and sag and/or split. Behind F8 the deck laps onto the $\frac{1}{4}$ in. stringer for about 1in. then opens out to fit either side of the stern post. This area is then trimmed flat to follow the top fuselage line to form a good seat for the tin. Fit the $\frac{1}{2} \times \frac{1}{8}$ in. between the front and rear decks at the cockpit and sand to match the decks.

Fin ribs are from $\frac{1}{8} \times \frac{1}{2}$ in. strip, shaped towards the leading edge as shown. Make up two skins from $\frac{1}{16}$ in. sheet, about $\frac{1}{4}$ in. longer at the bottom to be trimmed later to match rear deck. Drill holes in the ribs for the 'snake' where shown, this terminates at the top rip.

Assemble the ribs to one skin together with the $\frac{1}{2}$ in. block at the pivot point, add the other skin and make a cut out in top rib to allow for clevis movement. Slide the fin down over the snake, with the skins overlapping the stern post, mark and trim the lower edges for a snug fit on the fusel-



Cowling under construction. C1 is tack glued to the bearers. Note the join line for the outer lamination of $\frac{1}{64}$ in. ply.

age and allowing the root rib to sit on the fuselage top. Remove the fin, add the leading edge and sand to shape before finally gluing the fin in position. Ensure that the fin is vertical. Cut the two bearing plates from $\frac{1}{16}$ in. GF or formica, remove the triangle of $\frac{1}{16}$ in. sheet and glue the plates in position flush with the outside of fin.

Make up the rudder from $\frac{1}{16} \times \frac{1}{8}$ in. triangular ribs, $\frac{1}{16}$ in. sheet and leading edge from $\frac{1}{4} \times \frac{5}{8}$ in. with a small $\frac{1}{2}$ in. block for the horn mounting and tail wheel. Cut horn from $\frac{1}{16}$ in. GF or formica and glue into saw slot after covering, hinge after covering also.

The cowling is made up from two laminations of ply using the ply C1 and fuselage as templates. The ply former C1 should be made a very tight fit on the engine bearers and tack glued in place. Cut the two panels of the first laminations from $\frac{1}{32}$ in. ply to pattern joined with a $\frac{1}{4}$ in. strip of $\frac{1}{32}$ in. ply. Wrap around former and fuselage trimming the edges for a snug fit, remove and join with a second strip of ply, then slide it into position over C1 with joints top and bottom. Run Cyano around C1 to attach the skin. Cut two pieces of $\frac{1}{64}$ in. ply and laminated to the first layer with Evo-stik, putting the joints at each side about on the thrust line. It is best left in position for a couple of hours to let the Evo-stik 'go off', to hold the shape. Mark the rear line of the cowl to give about $\frac{1}{4}$ – $\frac{3}{8}$ in. overlap onto fuselage, release C1 from engine bearers and remove the cowl. Cut the cowl front from $\frac{1}{2}$ in. sheet, glue to cowl and sand to shape, trim off the rear edge of cowling, tin snips are good for this, and run cyano around rear edge and add a fillet of epoxy to inside of C1.

Fit motor in position and make cut outs for cylinder head, exhaust and needle valve access, making them oversize to allow good airflow. Glue the small hardwood blocks to F1 flush with inside of cowling. Slide the cowl into position and drill for small self-tapping screws. Fit these and leave cowling on model for about 12

hours to let it maintain shape.

The undercarriage I used is a standard commercial item, although one could be made from 14g dural to any pattern, attached to the fuselage with 6BA size self tappers, the axles are from 4BA HT bolts.

Trial fit the tail plane with a 5BA bolt through tubes as shown and check that there is at least 1/2in. of movement up and down.

The tailwheel can be either a fixed or a steerable commercial unit, screwed to a ply plate let into the rear fuselage, or steerable one made up as shown on the drawing.

My radio gear fitted where shown, the tank held in place with foam plastic. The rudder linkage is via a closed loop system or a pushrod can be used if desired.

Finishing is a matter of personal preference. For speed and lightness I

reverted back to Solarfilm, it is amazing how, after two years of using Solartex, one forgets the slightly different technique for Solarfilm, definitely requires more care than Solartex.

All covered and ready to go Poppet weighs in at 5 3/4lbs and balances between the points shown, so yours should too.

Flying

If you are unfamiliar with tail draggers, don't worry, you can hold on full up all the way until she leaves the ground without stalling at take off. However, because of the 'T'-tail and lack of prop wash over the elevator, slow speeds on rough surfaces or long grass are not easy, so if your patch has long grass get a friend to hold her and release on full throttle, with full up and some right rudder, and away you go. My Enya 40-4C with a Graupner 11 x

6in. prop has enough power for flying aerobatics. It won't go vertical for ever, but she will perform all of the usual manoeuvres, probably moving the balance point aft and increasing the control throws could make 'Poppet' into a real 'hot ship'. Landings are a doddle, just line her up, ease off the throttle and she will cruise in, but don't let the speed drop off too much as she will nose over and spoil your landing. I have landed and taken off on 3in. long grass using the techniques above without any problem at all.

Don't worry if the elevator wobbles a bit from side to side it doesn't affect the flying any, in fact all my slope soarers with 'T' tail do it. And please put a 'dolly' in the cockpit, it looks rather empty without one. For your next model after a high wing trainer pop an order in the post for the Poppet.