

DAINTY

This model came about because, having seen the problems caused to a lot of beginners by the run of the mill foam wing trainers and having had the same problems myself but noticing that friends who tried the powered glider approach seemed to fair better in the early stages, I thought that something needed to be done. The snags with the ordinary powered glider is that they do not always look very appealing and have no undercarriage to practice take-off, also the engine commonly used, being a small glow, does not often find another home after the first model.

Dainty tries to fulfil most of these criteria, although it is a low wing and thus quite a change for a trainer. Because the wing is large and the model is built light, it has a low wing loading and is able to fly slowly with a gentle flight handling capability. It is slow to react to the sudden control movements of a learner and if the controls are released it will self-right itself and fly straight like a good trainer should. Also, being of built up construction it is inexpensive to build and easily repaired. These attributes gave rise to the name. A fellow club member of the Leisure Lakes Model Club, upon seeing the model, said to call it 'Dainty'.

The style came about one day when I saw a full size Jodel Bebe flying over my home to land at the nearby Woodvale airfield. The model used originally a P.A.W. 2.49 throttle equipped diesel engine which is economical on fuel and can always be used in another model. It would probably fly equally well on a 0.15-0.19 glow but don't use full power on a .19 as it would then fly faster and lose its character.

Flying

I always read the flying notes of plan features first so I will give you these first!

With the 2.49cc P.A.W. diesel powering the prototype, the model has a typical light plane flight pattern. The take off from a short grass strip is fairly lengthy with a gentle shallow climb out. The aerobatic manoeuvres that can be performed always require a bit of additional speed provided by a shallow dive beforehand.

With the C of G as per plan and the control throws as indicated, the first flight is simply a matter of switch on, start the engine, point her into wind and let her go, she will trundle along, the tail will lift and she will fly off without any assistance. Once a reasonable height has been gained, apply some rudder and get the feel of the turns — usually no elevator control is required as the turns are flat and gentle. If the nose does drop a bit then a small amount of up will hold it and produce a beautiful wide gentle turn. Release the controls and the wings will straighten up and Dainty will fly along straight and level. With very prolonged use of the rudder, a gentle spiral dive will develop which will stop on release of rudder control. Even with full up elevator and full rudder a spin will not develop.

If it's relaxing flying you're after, Eric Strefford's three function model, designed around a P.A.W. 2.49 diesel, could well be the answer.



Treat 'Dainty' like her name — any aerobatics you do should be slow and sedate. This is one model that will happily thermal on calm days.

After flying around for a while, reduce the throttle and Dainty will gradually lose height. She loses height in a long, slow glide and is fully controllable using just the rudder. If you are a bit too high on your final approach, large 'S' turns will lose the height. As the model gets to within inches of the ground a touch of up elevator will flare her out nicely to land.

After the initial flight you can then see what you can do in the way of aerobatics but try not to be too hard on her as she is 'dainty' and looks best when flown like that. Loops, stall turns and wingovers are possible but do require that little extra airspeed — not too much as she is not stressed to be flown like a Pitts!

I find the best time to fly her is on a nice summer evening without a breath of wind. Then I let her gain height, throttle back to tickover and go hunting for thermals. She will stay up for quite some time on days like that, even when the engine has stopped she will fly for quite a while. So if you want a nice relaxing model that can be used for touch and go or spot landing competitions, give her a try. Nearly everyone who has seen

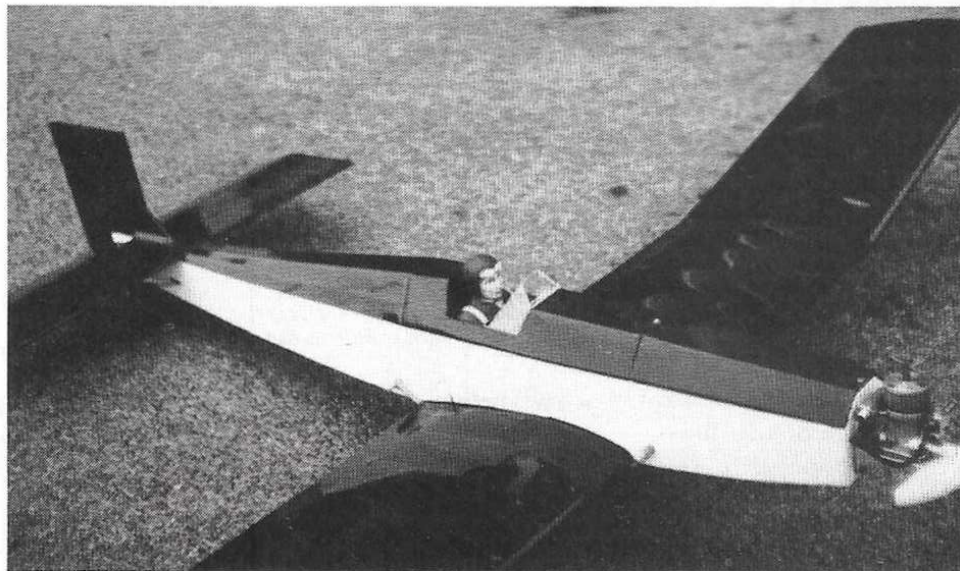
her fly has been very favourably impressed. So out with the building board and let's begin.

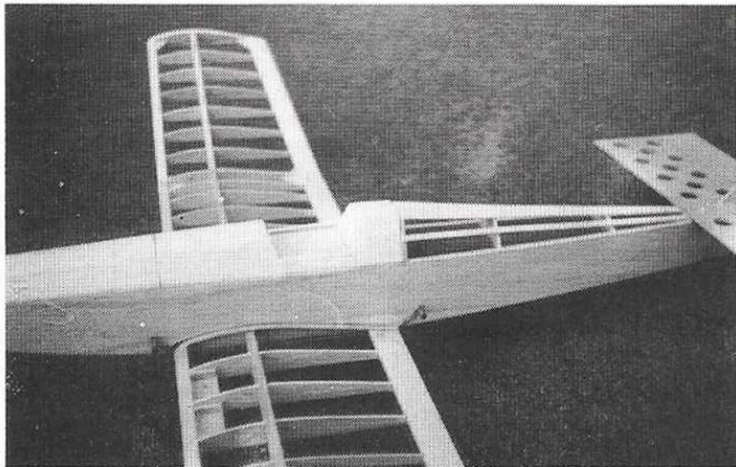
Wings

I always like to build the wings first as I feel that they take the longest and once they are built they seem to encourage me to carry on.

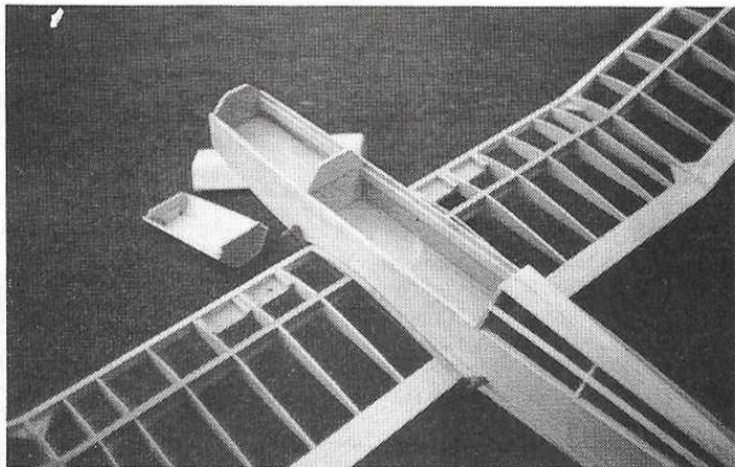
Start with the wing ribs. I usually cut a 1/16" ply pattern to start with and then cut each rib, this way there is less wastage of wood. The same pattern is used throughout but different thickness of balsa is used. All ribs marked W1 are of 1/8" sheet and the rest are of 3/32" sheet. Also required are six rib doublers of 1/16" ply for around the undercarriage mounting plates. Note these doublers only extend back to the mainspars.

Take 14 ribs (7 for each tip) for the tip sections. These will require trimming for the change in chord of the tip. If you do not wish to reduce the chord at the tips then





Built as a fair weather model, 'Dainty' uses traditional building techniques. Note particularly that the stringers are inset into F3A but run across the outside edges of F6 and F7.



The cockpit and tank hatches are removable for access...

just build the tips with a straight trailing edge and not a tapered one. It will make no difference to the flying, just the looks. If you are having tapered tips, this is how the wing ribs are produced. On the ribs, mark the new lengths for W2-W8 (2 of each) and trim to length. Then on this new trailing edge of the rib mark the thickness of the trailing edge section, then reshape the top edge of the ribs from the mainspar to the trailing edge. Note only the top requires reshaping as a flat bottomed section is used. The exact shape is not critical — just a nice smooth curve.

Cut out of $\frac{1}{16}$ " ply the dihedral braces and take a length of $\frac{1}{16}$ " balsa sheet 2" wide. From this cut out 24 pieces of $\frac{7}{8}$ " long for the spar webbing between the ribs. Also required are 2 pieces $1\frac{7}{16}$ " wide and 2 pieces $1\frac{1}{8}$ " wide by $\frac{7}{8}$ " long.

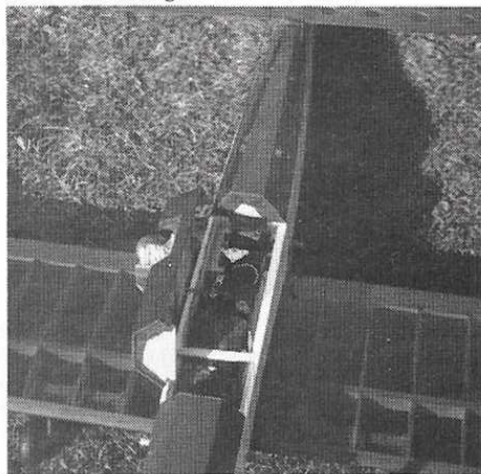
Take a length of $\frac{1}{4}$ " square spruce for the lower mainspar. Mark out the centre of this and pin to the plan to line up with the centre line of the wing. Take some pieces of $\frac{3}{16}$ "

sheet 3" wide to use as infill between the centre to ribs W1A. Mark the centre of these pieces and line up with the mark on the main spar. Glue and pin in position and glue ribs W1A either side of this sheeting. Working away from the centre fit webbing then rib alternately until the second $\frac{3}{32}$ " rib is fitted, then fit the $1\frac{7}{16}$ " web, then another $\frac{3}{32}$ " rib, then the $1\frac{1}{8}$ " wide web, then a $\frac{1}{8}$ " rib. Add leading and trailing edge sections and upper mainspar, using scrap $\frac{3}{16}$ " sheet fit gussets where shown between L.E. and rib and T.E. and rib. Fit $\frac{1}{16}$ " sheet over rib W1A, allowing $\frac{1}{2}$ " overhang.

Now for the wing tips. These are built using a similar method but using balsa spars instead of spruce. Start at rib W2 and work towards the tip block, remember to set W2 at the angle required for the dihedral.

Whilst the tips are setting go back to the centre section. Take the ply undercarriage plates and the rib doublers and cut the rib doublers carefully so that they fit round the U/C plates. Glue the rib doublers to the ribs

...to the radio gear and fuel tank.



with epoxy and hold in position with clothes pegs until set. Then glue in U/C plates, again using epoxy.

Now taking the wing tips and the centre section, pin the centre section to the board. Pack up the tip 4" to give the correct dihedral

angle and glue to the centre section. When dry carefully cut through the ribs at the join and fit and glue the dihedral braces. Repeat with the other tip.

The wing is now complete apart from covering.

Tailplane and Fin

Cut out the tailplane, fin and elevator and rudder from light $\frac{3}{16}$ " balsa. Sand to section and drill the lightening holes shown with a sharpened piece of 22mm copper pipe. Glue fin to tailplane using $\frac{1}{4}$ " triangular gussets as shown, taking care to keep square in both directions.

Fuselage

Cut out the sides from $\frac{1}{8}$ " sheet and doublers from $\frac{1}{16}$ " sheet, mark the outline of doubler on both sides, taking care to produce a right and left side. Coat doublers and sides where they meet with P.V.A. glue and leave to dry. Whilst the glue is drying, cut out the fuselage formers. Drill F1 ($\frac{1}{4}$ ply) to suit a commercial engine mount, fuel lines and throttle control.

Now back to the sides. Position the doubler on the side and, once sure it is correct, take a hot iron and iron them together. You will find that the heat from the iron will bond the glued surfaces together. Repeat with the other side. Now carefully mark the positions of the various formers. Glue the strip longerons into position.

Take one side and glue into position formers F2, F3 and F4, taking care to position them correctly and squarely to the side. When the glue has set, position this side so that its top edge is lying flat on the building board, take the other side and glue and pin in position — having the top edges of the side on the building board will ensure squareness. Leave overnight to let the glue thoroughly harden. With the part built fuselage still in position on the building board pull the tail ends of the sides together. Glue and clamp or pin together and add the $\frac{3}{16}$ " square spacers between the sides, top and bottom, in the positions shown. Take care to obtain an even curve to each side so that the tailpost is central and allow the whole assembly to dry still fastened to the building board so that a nice, square fuselage will result.

Next position the fuselage so that the front end where F1 is to be fitted just overhangs the edge of the board. Glue F1 into position along with the tank bay floor (F5) using epoxy and ensure that F1 is square in both

directions. When set, glue in the extra doublers between the tank bay floor and the bottom of the fuselage. Add the sheet in-fill from F1-F2, the in-fill at the rear and the tailskid. This completes the basic fuselage assembly.

Now to make the tank hatch, cockpit deck and top decking. First the rear top decking. This is a very simple structure as can be seen from the photo's. Glue in position formers F3A, F6 and F7, allow to dry, then add stringers and top. The stringers are $\frac{1}{4}$ " by $\frac{1}{8}$ " strip balsa and the top is cut out of $\frac{1}{8}$ " sheet. Note that the stringers are set into the former F3A but are on the surface of F6 and F7. Add $\frac{3}{16}$ " sq. across the fuselage top in front of the tailplane leading edge as a stop for the stringers and top.

Take formers F1A, F2B, F2A, F3B and pin to formers F1, F2 and F3A. Pin in such a way that the pins can be removed before the top sheet is fitted. Take 2 pieces of $\frac{3}{32}$ " sheet to form the sides of the tank hatch and cockpit deck and glue them to F1A, F2B, F2A and F3B. Note that the sides overlap F1 but are not glued to it. Once set, trim the top edges to the outline shown using a sanding block across both sides so that a flat is formed on each side to which the top can be glued. Remove all pins then fit $\frac{1}{16}$ " sheet top from F1 to the front of the cockpit and a small piece behind the cockpit to F3B. When dry, sand all edges to shape then take your knife and cut through the decking in the centre of F2 to form two separate removable hatches. Remove these hatches, take the cockpit deck and make a floor out of $\frac{3}{32}$ " sheet, front and rear panels to fit inside the decking and form an open cockpit. Fit strengthening strips of $\frac{3}{16}$ " sq. as shown in

cross section to stiffen the edges of the removable sections. Drill pilot holes in F1 and F2 for screws to hold the hatches on. The cockpit hatch is held in position with an elastic band around the servo bearers to a piano wire hook fastened to the cockpit floor.

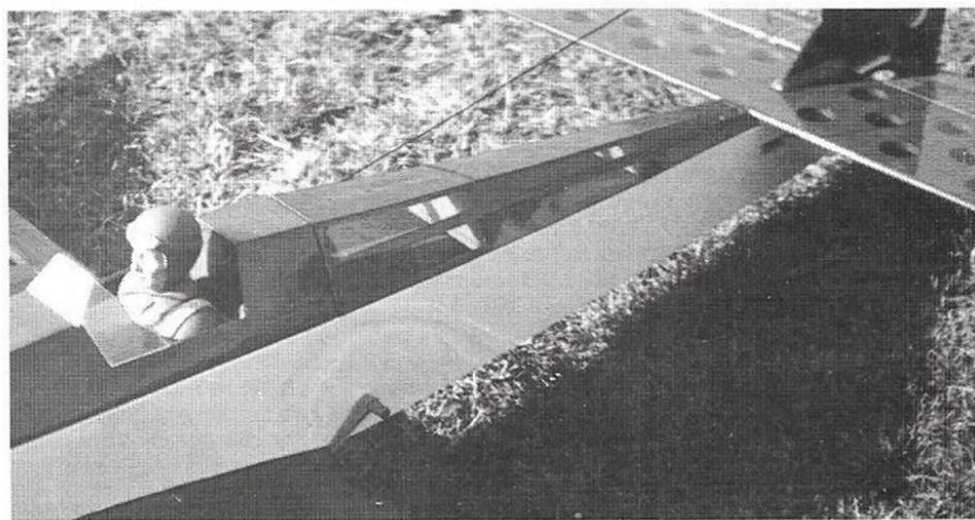
Finishing

Cover using your favourite covering. The original used transparent solarfilm on wings, tail and top decking and solid colour solarfilm on the rest of the fuselage so that the construction would show. Once covered, glue on the tailplane assembly, make up pushrods for rudder and elevator, hinge rudder and elevator using Mylar strip and fit control horns. Fit engine mount, engine, tank etc., then position radio equipment so that the correct C of G is obtained. Try not to add any extra weight if possible. Permanently fix the servo rails and servos, pack Rx and battery in foam, make up windscreen and glue in position. Don't forget to add a pilot!

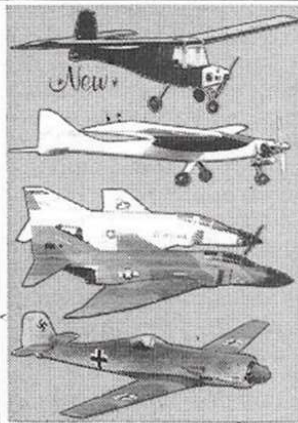
Check the direction of the controls are correct and movement is as shown and with batteries charged you are ready to go. For the first flight, try and pick a calm day or one with a very slight breeze. Due to the low power and wing loading she will not fly in windy weather.

If you treat her gently she will last a long time and give many hours of gently enjoyable flying. □

The completed and covered model really looks pretty with all your careful workmanship in full view through the transparent film!



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