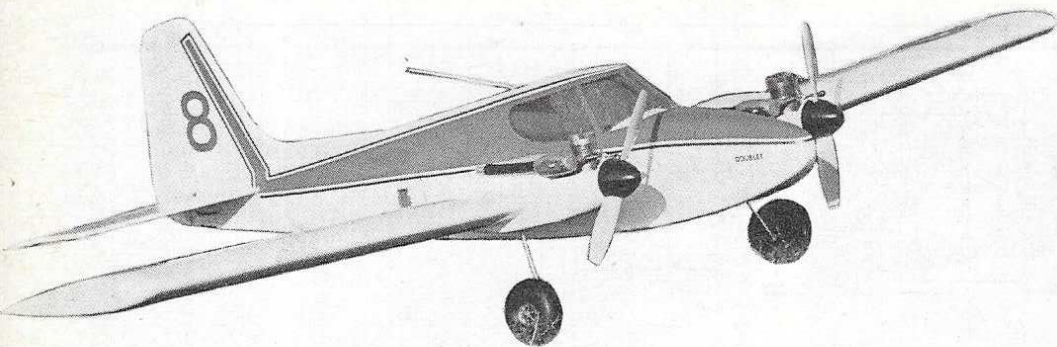




AFTER spending some weeks looking around for a new project, I developed the urge to build a twin, and the sight of a large twin flying at Esher Club symposium last year finally spurred me on. I really wanted an aerobatic model, and, as there didn't appear to be a commercial plan available, I set out to design my own. The basic aerodynamics are those of a conventional aerobatic single engined model, but with the two engines and a scaly fuselage. The resultant model is really satisfying to fly, being quite lively on the two-19's and it really dispels some of the fantasies put around about what will happen if one motor cuts!

'Doublet' will loop, bunt, roll, spin, and fly inverted as well as any single engined model of the same calibre, and that beautiful beat of the two motors, I find a real thrill. If a motor does cut, she will hold off with a little aileron and even climb slowly, so, if you feel you want to have a go, let's make a start.

Construction

This model is not intended for the beginner, rather a new adventure for the reasonably accomplished builders and flyers, so I will do my best to point out possible pitfalls in construction rather than provide a blow by blow, A to B method of construction.

Wing

The original model had a home-made foam wing covered in mahogany veneer, with strengthening hardwood spars to carry the undercarriage and to stiffen the area by the nacelles in the positions shown on the plan, but a built up wing is shown should you prefer this type of construction. Join the two halves together using the two $\frac{1}{4}$ in. plywood dihedral keepers, and web in between top and bottom spars at the two inner bays using $\frac{1}{8}$ in. hard balsa, grain vertical.

Use a wing jig if you have one, to preserve alignment, note that ribs 4 and 5

DOUBLE

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By DENNIS



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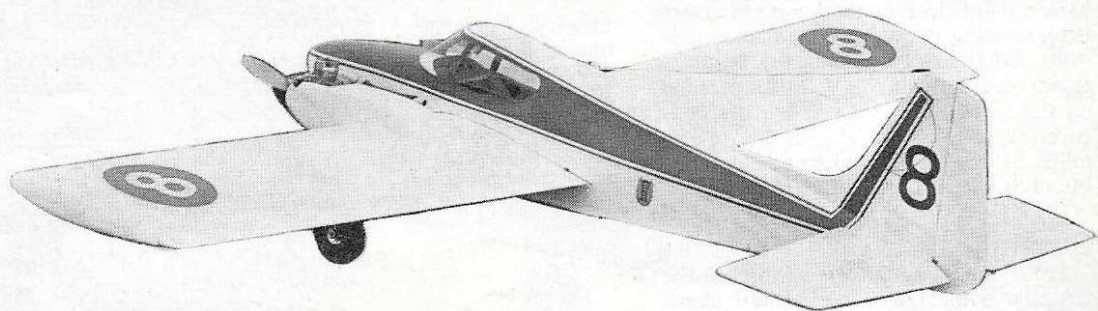
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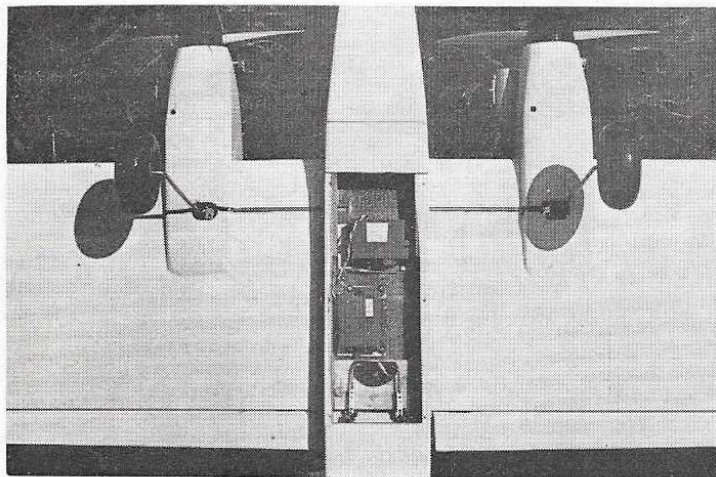
are cut off in front of the hardwood spars. Do remember to install the engine throttles, bowden cables-in-nylon tube, before covering. The prototype has a single cable connecting both engines, with the movement reversed on the port engine by a bellcrank in the nacelle. Keep the cable sweep as large as possible to retain freedom of movement and to minimise backlash. After covering, add the tips, and bandage the centre section with 3 in. glassfibre tape which is quite adequate.

Cut out the nacelle sides to drawing, and stick the 1/32 in. ply doublers to the balsa sides making sure that you make two of each hand. I use *Dunlop Thixofix* as an adhesive, it's quick and does not warp the wood. Cut out the two ply formers for each nacelle and assemble both nacelles on to the wing using plenty of white glue. Ensure that there is 3 deg. to 4 deg right thrust on the starboard engine only, true everything up and set aside to dry.

Fuselage

It is important to keep the tail end of this model as light as possible, so select your wood carefully. Cut out the fuselage sides from medium soft 3/32 in. balsa, and the 1/16 in. and 1/32 in. ply doublers. *Thixofix* these together, and add the 1/4 in. x 1/4 in. longerons and the 1/4 in. x 1/8 in. stiffeners. Whilst these are drying, cut out the formers. Add the 1/4 in. balsa treblers to the sides using 'Thixofix' again, clean up the profiles and join them together using formers 3 and 5 to start with. Allow to set. At this stage you can build the fin and tailplane on the plan, these need no explanation, but once more, select your wood carefully to keep it light. Pull the rear of the fuselage together, glue, add the remaining formers taking care to keep everything true. Fill in with 1/4 in. sheet where shown in front of the tailplane, and add the 3/32 in. upper sheeting at the rear end. Check the size of the fuselage to the



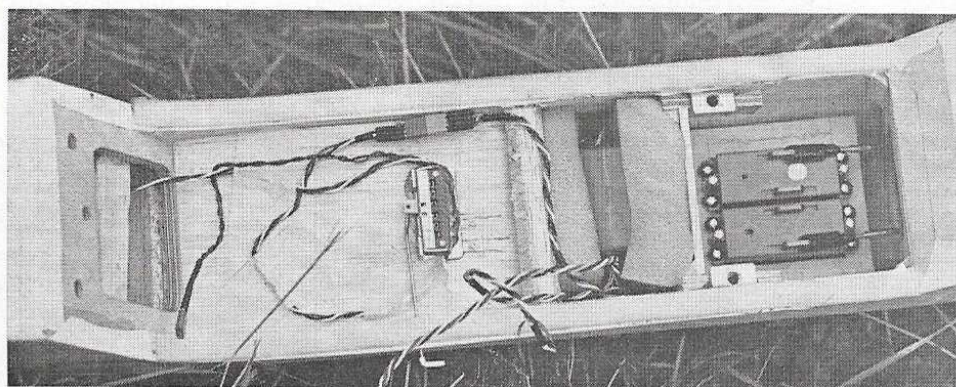
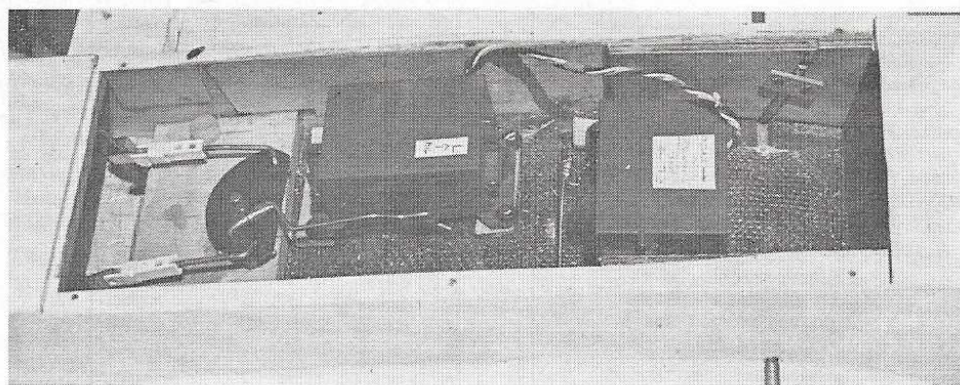


Wing underside showing the simple undercarriage installation arrangement and the equipment compartment in wing centre section.

stall the landing gear as shown and sheet in the nacelles leaving the tank areas open.

Drill the motor mounts in position on the formers, and fit the engines. Glue the side and bottom fairing blocks in position, when dry, face off the ends square, and glue on the 1/16 in. rings in line with the spinners. When dry, remove the engines and fair in the blocks completely. Make up the three removable hatches, one for each tank bay, and one for the servo compartment in the wing. Fabricate the fuel tanks, I used 3/8 in. B.S.F. brass nuts thinned down to about 3/32 in. soldered to the angled part of the tank and a short (1/4 in.) bolt with a thinned head (about 1/16 in.) as a

Right: close-up of the wing underside installation compartment showing the throttle and aileron servos in place. Note the bellcrank linkage to the strip ailerons by use of push pull servo, mounted horizontally. Below: radio installation in fuselage compartment is fairly sparse. Note the internal switch arrangement and wire toggle.



plan shape of the 3/8 in. sheet decking, profile to shape, and after ensuring that the decking seats correctly, glue to the fuselage.

Add the top nose block and sheet in the underside of the nose, but leave rear fuselage underside open for the time being. Finish off the cabin area with 1/4 in. x 1/4 in. and the 1/4 in. sheet doublers between formers 3 and 4 where shown, fair in the top nose block, add the nose block proper, then cut out and fit the 1/4 in. ply central cabin strut, and glue in the 1/8 in. balsa cabin floor. At this stage, have a good clean up session on the fuselage, sanding everything to shape carefully, cut the slot allowing the tailplane to seat correctly at the + 2 deg. profiled on the fuselage. When you are perfectly sure that all is ready, glue in the fin and tailplane. Make the rudder and elevators, but don't attach until after covering.

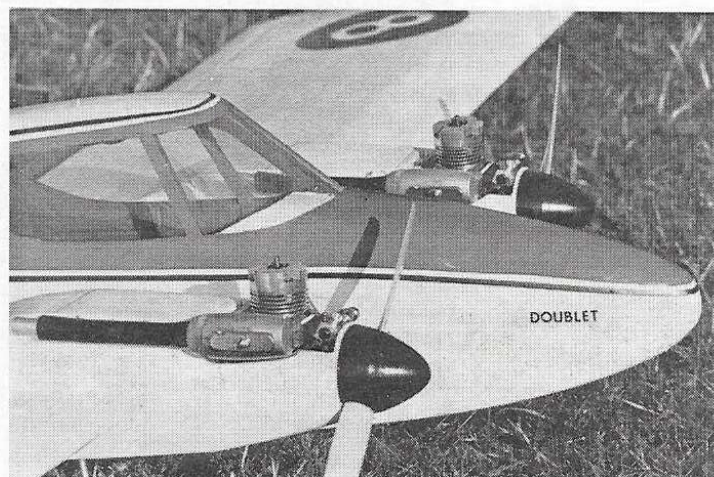
the lower part of the fuselage with the wing held in this way, fibreglass the small former 3 to the wing firmly, drill for the two 1/4 in. dowels and add the rear fixing bolts and nuts. Install your favourite controls for elevator and rudder, and position the servos before you sheet in the fuselage underside. Bend and in-

screw in plug, drilled to take two brass tubes, one for the clunk, and the other for the vent. The clunks were made by building up solder on to brass tube. Everything else is fairly conventional, the original has *Logictrol* servos in proper aileron mounts for the motor and aileron servos, but you will be dictated by your own gear to some extent.

Colour the cabin interior, and fit your 'pilot' before fixing the cabin windows. The model was covered with *Solarfilm* mainly to save weight, apart from the excellent finish. The power pack must be fitted in the nose area, and c. of g. checked. The original 'Doublet' needed 3 ounces of lead in the nose, hence my advice to keep the tail light.

Set up the engine throttle carefully so that they come up fully open together, and back to the closed stop together, this is not too critical as with a twin you will be flying flat out or landing! Set all the

Close-up of the power department showing two Enya 19 motors tucked snugly into the engine nacelles. Note the rubber tube exhaust extensions.



General

Hold the wing into position in the fuselage with rubber bands and check for alignment with the tail unit. Build up



Designer Dennis Tapsfield of High Wycombe M.A.C. with prototype shows off the size of the model.

control throws as shown on the plan and neutral all round. When you run the motors you may encounter some bad vibration, I did, and to cure it, I cut off about 5/16 in. from one propellor blade on each engine. Do this as follows: — set the engines at top dead centre, mount the 9 in. x 6 in. props straight up and down, and shorten the top blades.

The theory is that the engine is balanced better statistically, but not dynamically by doing this, anyway, it works, but don't put the props on in any other relative position, only at your peril!

Flying

The Prototype flew 'straight off the board' (no kidding), and has never been readjusted at all.

When starting the engines, I fire up the starboard engine first to get it warm, stop it, start the port, then come back to the starboard which should start easily whilst warm. Be sure that the engines are reliable, open up cleanly from tick-

over. If in doubt, set them a little rich rather than lean, as a flame out on take off is the only really tricky part with most twins.

Face the model into the wind, open up the throttles, holding her straight if necessary with a touch of rudder, (the original tracks like on rails). Let her pick up plenty of speed, and with a touch of elevator let her break ground, into a shallow climb away. This is best, as if you are unlucky enough to lose an engine, you will still be in control. Gain some altitude, trim out and enjoy the thrill of that twin! You will find her very responsive, and livelier than you expect. When you are ready, set her up for a landing, by taking her out, chop to about 1/3rd power and bring her in, chopping power to tick-over about 8-10 ft. up. She will hold off really well, but takes a little time to slow down being quite clean aerodynamically.

Some golden rules

1. Be sure that the motors are reliable for take off, as a flame out can be

tricky at this time.

2. No low, slow, fly pasts for the boys unless you are 100 per cent sure that the motors will open up O.K., and no overshoots if you can avoid them for the same reason.
3. Should one engine fail in flight, *DO NOT* allow the model to turn towards the dead engine. You will find she responds quite well to a little aileron, and will even climb gently! The important thing is not to let the speed drop, as the controls will become ineffective. If you are worried, chop the power, and bring her in as you would with a deadstick single engined model.

Good luck, lets see more twins in the air, they make a lovely sound! and are guaranteed to stop the action at your field, for a while at least.

