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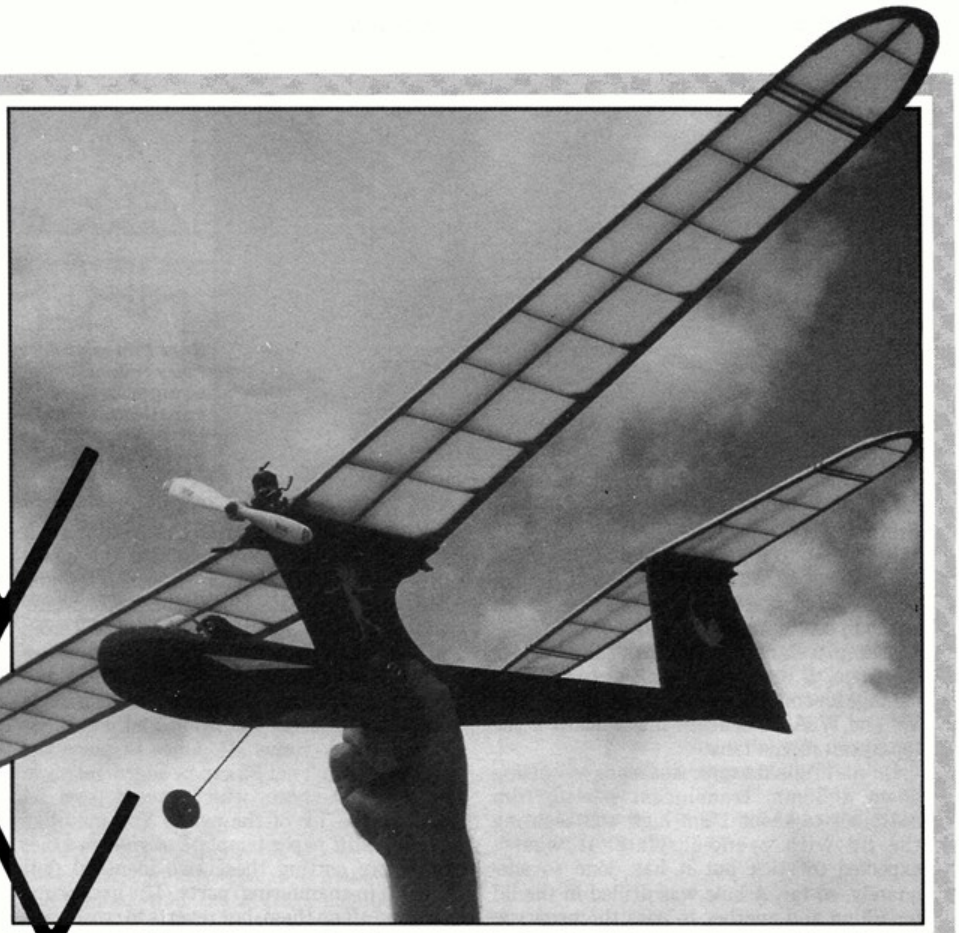


AIRY FAIRY

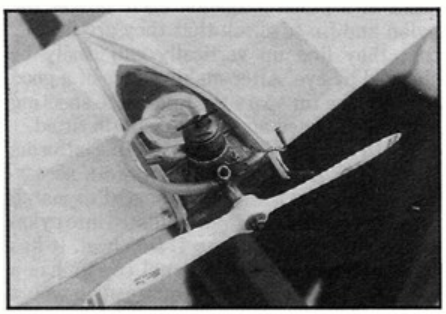
Vic Smeed's forty-eight-inch powered-glider style free flighter for motors up to 0.8cc

POWERED gliders and ultra-lights go back a good few years and have provided some of the less conventional aircraft shapes, an aspect continued with today's microlights. The basic concept of the slightly weird-looking Airy Fairy originated in the late '50s when drawings for a free-flight version were made; it did not get built and neither did a slightly larger version for rudder-only radio. Regrettably these drawings, with others, including the Courtesan original featured last year, were ditched by a zealous colleague, but the general configuration remained in the mind and it was not difficult to draw it out and detail a suitable structure when the time came...

Strange shape

It is a strange-looking, spidery machine; perhaps the nearest one could get would be to describe it as an elongated, tractor version of the BAC Drone, though of course it is much more of a model designed for flying rather than one following scale practice. And fly it certainly does, muct better than anticipated, to the extent that in anything but dead conditions a tip-up tail dethermaliser is a wise precaution. No special attempt was made to keep weight down on the prototype, but it came out at only 7.1/2 ozs. (about 213gm.) ready to fly, quite a low weight for a 48in (1219mm) power model, albeit of high aspect ratio and with only a 0.5cc engine. In fact the Dart motor originally used is about 1955 vintage, though equipped with modern cylinder, fins, and seems to be of ideal power for this design. Fortunately, trimming is fairly easy; but even so, 0.8cc (.049cu.in) represents about the maximum engine size for lively sport flying. Quite possibly, in expert hands and with fairly hard balsa used throughout, up to 1.1/2cc could be used to provide a sensational climb, but if you try this – on your own head be it!

Construction is a little different from convention as far as the fuselage is concerned, but the wing and tail are fairly normal. Tapered flying surfaces make some builders turn away, but when you look at the plan you will see a representation of about one foot of 1/16 x 3in sheet with all the wing and tail ribs crowded on it. All that is needed is to get a photocopy (or two if you wish) made on the usual 'black powder' machine,



Motor detail shows simple mounting, fuel tank from 35mm film canister and DC Dart with exhaust collector ring, a one-time DC accessory.

invert this on to a piece of 1/16in sheet and iron over the back with a warm flat-iron. This transfers the lines, and all the ribs can be cut; use a straight-edge on all straight lines. The cut ribs can be used as templates to cut a second set, or the process may be repeated with a second photocopy if preferred. This should remove most of the pain from building the tapered surfaces!

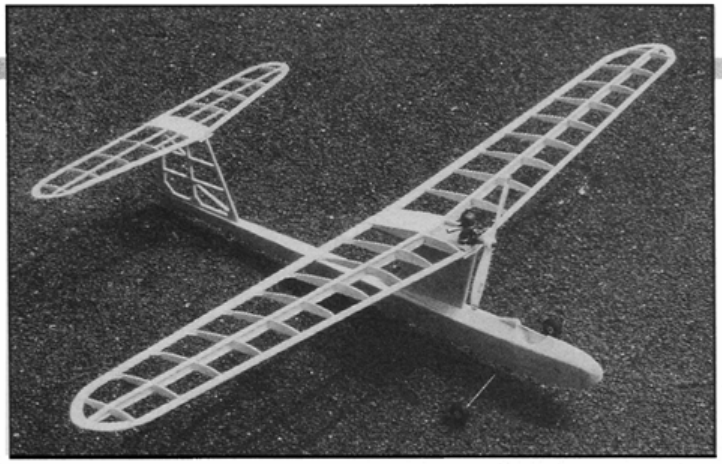
Get on with it!

The only departures from normal are the use of a tapered wing trailing edge cut from hardish, 1/8in sheet and the installation of a flat, 1/8in ply motor mounting plate in the centre section. All that need be said about the trailing edge (TE) is to taper it in section by slicing away small 'flakes' with a very sharp blade, using only a minimum of sanding. Doing it all by sanding will induce a considerable bow; the cure for this is to sand the opposite side, but it is difficult to get it flat and true again. Cutting small chips – don't try to cut a couple of inches at a time – so that only a light sanding each side is needed will result in a more accurate and less warp-prone wing.

Build the wing using your preferred approach; that is, either in separate halves to be joined, or building the second half on to the completed first half. Build flat and incorporate the W2 ribs and the rear part of W1. When the halves are joined and dry, add the front part of W1, the two W2B bits and the two bottom front W2As. Cut the rectangular motor mounting plate to fit on the W2As between the W2s, cutting to the dihedral brace at the rear and flush with the LE at the front. Carefully pare away the LE as necessary for the plate to seat fairly. Cut and drill the plate for the motor to be used before cementing it in place.

More on motor mount

If a radial mount motor is to be fitted, cut an appropriate firewall and cement it to the LE. Use a full rib front for W1, obtained by tracing the front of W2 and cutting the remainder fractionally long. Sheet the centre section, on top of W1 and W2 on the upper surface but inset between them beneath, then



Bare bones of Airy Fairy reveal straightforward construction and attractive lines. Start yours now!

carve fillet blocks to support and fair in the firewall.

Returning to the beam mount, cement the upper parts of W2A in place and fuel-proof all round. Position the motor and check what needs to be cut away, both to seat the motor on the plate and to clear bolt-heads under the plate. If a separate tank is to be used arrange for this, then fit sheet panels between W1 and W2A/Bs beneath the plank over the top to suit motor/tank.

On the original a tank was made by cutting down a 35mm translucent plastic film container to about 1/2in high and securing the lid with cyano-acrylate. It wasn't expected to stick but it has done so adequately, so far. A hole was drilled in the lid for filling and another to pass the neoprene feed tube, the tank then being stuck to the mount plate and a soft balsa fairing positioned round it. The engine is started and before launch the feed tube is pulled out of the tank; this particular Dart seems to run about 20 secs on the contents of a 2.1/2in length of tube!

La couverture de l'empennage

The tailplane needs no comment as it is entirely conventional to build. Some modellers find this component a bit of a chore, but it deserves at least as much care as the wing. This one somehow has a pleasing shape to which makes you want to see it finished! (*Build it first and get one-third of the model over and done with... GC*) Probably, Lightweight Modelspan is the best tissue for covering the wing and tail, though the original used an unusual tissue obtained from an Old Warden stand, rather like heavy 'sap' without the grain. It shrinks well and needs little dope but punctures fairly easily. The model in the pictures was taken, uncompleted, to a meeting at which it rained and there was a degree of irregular shrinkage and slight warping as it dried out, but it had been trimmed in that state rather than risk the warps returning after correction and trimming.

Fuselage facts

Cut the two sides and all the formers. Cement the two pieces of B3 together, bend the undercarriage to shape and sew to B3. Assemble the sides on the formers, checking for symmetry, and while this is drying cut the parts for the pylon frame and assemble over the drawing. Sheet the upper side as it lies with medium 1/16in (noting the grain direction) and when dry, lift from plan and sheet the opposite side. Check for fit and slide into place through slot in B5, with TE cutting to B6. The slot should ensure that the pylon is aligned vertically but ensure that it is absolutely central on B6. When satisfied cement in place and add the hard 1/8x 1/4in front braces.

If a seat is required in the cockpit fit it now. It is structurally helpful if the model flies into an obstruction! Sheet the top and bottom of the fuselage by slicing appropriate-width strips from across a sheet of 1/16in so that the grain runs across the fuselage rather than along it; this adds stiffness and strength. Note that the upper sheeting butts up to the sides of the pylon and continues along flat as far as B4. Once in place the two top triangles of B5 can be added, followed by the fillet sheets which extend from B4 back to the TE of the pylon. You may like to cut a stiff paper template to give an exact fit before cutting these two identical (but handed in chamfering) parts. The grain runs fore and aft on them, but reverts to crossways forward of B4, where it now forms an inverted 'V'.

Sand off any surplus sheeting at B1 and fit the nose block. A small headrest block is also needed. When the nose has been sanded to fair smoothly in you may like to add a 1/4in wide skid cut from 1/16in ply, or even acetate, particularly if you are fortunate enough to fly off an old runway. The skid would then take landing wear.

It will be seen that the fin extends into the tail of the fuselage at the LE and spar positions, and it may therefore help if the bottom fuselage sheeting at the tail is left until the fin has been fixed in place. It is a simple flat structure, tapered at the TE; and when it is cemented into the fuselage it must, repeat, must be aligned with the pylon. Lay a straight-edge a true sheet of balsa at a pinch – against each side of the pylon and fin to check that they are in line; that they line up vertically can easily be checked by eye. After making sure of a good joint for the fin spars the underside sheeting can be completed and the tail subfin fitted.

Both wing and tailplane sit in platforms made from hard 1/16in sheet, grain acrossways. That for the wing is angled to match the dihedral and each half is filleted into pylon by a strip cut from scrap 1/4in sheet. It has to be cut because the internal corner has a slightly obtuse angle and square strip would thus not fit. The strip is carved away and radiused using a worn rat-tail file or a scrap of fine grasspaper wrapped round a dowel of appropriate diameter. No fillets are needed for the tailplane platform, but check alignment of the surfaces carefully.

Finishing

Now sand the whole assembly all over, rounding the pylon and fin leading edges and tapering the trailing edges. A trim tab in the fin TE is desirable, or one could be stuck on after cutting it from thin aluminium, such as is used for soft drink cans. Drill and glue in the wing dowels and those for the tailplane. If a fuse dethermaliser is fitted mount a snuffer tube on the fin TE; and above this, insert a wire. The rubber band to be melted holds the fuse against this wire, thus preventing the dowel above it from burning. A thread adjusted to give the right angle of tip is tied to the dowel and a small fin, bent into a hook, is inserted in the tailplane TE. A second rubber band from the front dowel engages on this hook and flips the tailplane up smartly when the first rubber band metls through.

...and covering

Tissue cover the fuselage by doping-on Lightweight Modelspan or similar. This not only covers up the grain of the balsa and allows a better and ligther finish, but adds considerably to strength and resistance to surface damage. Apply any additional colour carefully to avoid building up too much weight. Fuel-proof around the vicinity of the engine, solder the wheels in place, add the cockpit windshield and you're ready for trials.

Away you go!

Assemble the model and check that it balances close to the point marked on the plan. Provided you are within, say, 1/4in, it should be simple enough to get a smooth, flat glide with a little packing uder the tail LE or TE; but if it is further out than this a little ballast is a better answer. Tape coins, washers or bits of lead sheet to nose or tail as needed; instal them permanently once trim is established.

As with any model, get the glide right before making adjustments to the power part of the flight by altering the motor thrust line. High thrust line models can have their noses pushed down by the thrust/drag couple; so, although a small amount of upthrust is incorporated in this design, think immediately of increasing upthrust if the model seems reluctant to climb. Conversely, in the unlikely event of stally power flight, slacken off the engine bolts and shim in a little downthrust. Sidethrust should not be needed but if a touch of right is built in, trimming will probably be a little safer, especially with motors near the top end of the power range. Most engine lugs seem to be drilled for 6BA or, at smallest, 8BA, but with under-1cc power, four 10BA bolts are adequate for strength and will hold the motor firmly if washers are used under the heads and under the nuts. Slightly slackening the nuts will thus allow the motor to be twisted a degree or so, to be held sufficiently when the nuts are retightened, so that sidethrust can be adjusted on the field.

Aim for wide circles in either direction under power and glide, starting (in the usual way) by running the motor rich to cut the revs and allowing a long enough run to climb to a height from which the glide can be studied. Lean out gradually through three or four flights. The model seems very forgiving but a little caution doesn't come amiss.

R/C reflections

Building the pylon nearer the width of the fuselage would provide stowage for a small receiver, battery and mini-servo, reached perhaps through a door in the side. This hasn't been tried but even at 12oz (that is, 4.1/2oz of radio) we would expect the Dart to give a steady, gentle climb and the model to show soaring capabilities in reasonable conditions. It would be difficult to get cheaper power radio flying!