'MISS 38'

A 45in. span vintage style radio assist model for 1-1½cc engines, by Vic Smeed.

INTEREST IN EARLY 'gas models' has become considerable over the last few years, partly as a reaction to modern almost-ready-to-fly designs which fail to satisfy the urge to build, partly from nostalgia, but mostly from the discovery that flying such models is much more fun. There is enormous satisfaction in actually building a structure rather than sticking a few pre-cut sheets and blocks together and joining a pair of ready-made foam wings, and flying the result is relaxing and enjoyable.

There is one tiny fly in the ointment, and that is that most of the early power models were *big*; they needed to be for the weight of the early ignition engines, and in those days balsa was unbelievably cheap, especially in the USA. As an example, ⅛ × 2 × 6in. sheet was the equivalent of just under ½p a sheet, nearly 1p if you wanted 3in. width, and ⅛in. square worked out at 12 strips for 1p. In 1937 you could buy, in America, a kit for a 7ft. model for £1, though in a de luxe version at £1.75 you got a finished prop, airwheels, all the ribs cut rather than printed, and two half-pint cans of colour dope. Cement was always included in kits.

British prices in those days were higher (⅛ × 3 × 36in. was the equivalent of 2p a sheet) but many of the power designs over here used a lot of spruce and ply and were on average considerably heavier than American machines. In many countries (Germany for example) balsa was never used.

Building a replica of one of the big models today represents quite an investment in materials as well as offering problems in storage and transport. Why not, then, build a half-size one? Although the majestic flight would to some extent be lost, the general shape and much of the attraction could be retained, and a lot of people unwilling to tackle a 7-8ft. model might be tempted with a small and relatively inexpensive one. Since scaling up or down is a departure from true-vintage, it is not much more of a step to a new design incorporating vintage characteristics, though it is appreciated that this is an approach which the true-blue vintage enthusiast

Full size copies of the plan reproduced here to 1/7th scale are available as Plan No. PET/1431 price £2.65 plus 40p postage and packing from Aeromodeller Plans Service, PO Box 35, Bridge Street, Hemel Hempstead, Herts., HP1 1EE.

might frown upon.

Thus *Miss 38*. Old hands might discern touches of Garami, Effinger, Struck, Shereshaw or Plecan; recent modellers will perhaps find the methods of construction something of a challenge, although it is all straightforward. The intention was free flight or rudder-assist, the latter being quite different from rudder-only control. Only a small rudder is fitted, and should be used gently to produce wide circles. As with a long tail moment, a lifting-section tail and the consequent rearward CG position, tight turns will rapidly develop into spiral dives. Opposite rudder may straighten such a dive out but the excessive speed then means a loop and/or stalling all over the sky, which is not the sort of relaxed flying originally envisaged.

Wings

The flying surfaces are fairly normal in construction, though the opportunity has been taken to use spruce for one of the mainspars, just in case unintentional aerobatics occur. Making the wing panels separately and then joining has always seemed to me making unnecessary difficulties. Far better to build one panel, prop it in place at the correct dihedral and build the next panel on to it, repeating until the entire wing is assembled. The dihedral braces can then be added after a check that all angles are correct.

With both the wing and tailplane tips, the upper spars should slope down to the sheet tip outlines, and this is best achieved by cutting across the top of the flatways spars (i.e. wing mainspar) and cracking downward, rubbing cement into the crack and all round the spar. Vertical sections need to be cut and jointed unless the change of angle is only very slight.

Fuselage

Crutch construction is used for the fuselage, the crutch being a frame of $\frac{1}{8} \times \frac{3}{8}$in. strip built accurately over the drawing. Make sure the cross-member ends are cut vertically and that they are located accurately and upright on the drawing. While this is drying, trace and cut the formers; gaboon ply was used for B1, B2 and the cabin top on the prototype, as it is adequately strong and quite noticeably lighter than birch ply. It is the reddish coloured, fairly open grain ply used for flush door panels etc. and known as luan ply in some places. Note that the underside stringers rest on all the rear formers but are half sunk into those in the cabin area.

When the crutch is dry, lift it and cement in the formers, back to the foreside of its respective cross-member. Check that all are upright and not twisted in any way. Before fitting B1 and B2, bend the undercarriage legs and sew them to their formers. Drill or pierce the holes marked (use a $\frac{1}{16}$in. drill or the point of an old pair of school compasses) and thread a needle with a length of strong button thread. Tie through, round the wire, at one bottom corner, then take the thread diagonally across the plain side of the ply, bring it through the next hole, round the wire and back through, diagonally to the next hole etc. until you reach the opposite bottom hole. Pass the thread through the holes and round the wire three times, then move diagonally back, putting two turns round the wire at each pair of holes, until the starting point is reached, when you can tie off to the original end. Rub cement into and around the thread on both sides. The reason for this method is in a heavy landing, the long crosses formed by the thread are less likely to tear through the ply than short stitches between each pair of holdes, and the wire is unlikely to cut the short stitches round it, so the result is a stronger and more efficient mounting.

Cement B1 and B2 to the crutch but do not solder the undercarriage legs together yet. Fit the top centre fuselage spine and the cabin top, turn over and fit the bottom three stringers. This anchors B1 and B2 sufficiently for the undercarriage to be completed by making any minor adjustments to the bends and binding and soldering the bottom ends together. Use thin copper wire, or tinned copper wire, for binding, and the areas of wire to be soldered till they are clean and shiny. Wind the copper wire round leaving gaps between turns; close winding looks nice but the solder may not penetrate to the piano wire. Flux the area (Baker's Fluid works best on piano wire) and heat the joint with a large iron or a small blowlamp flame until when the soldier is touched on, it runs into all the joint. Do not overheat or you may draw the temper of the piano wire. Scrub under a tap to remove all traces of flux.

The remaining stringers can now be added, tapering them at the tail to fit neatly together, then add the two top corner longerons. Before going further, if radio is to be fitted, make the servo mount and the pushrod, both detailed on the plan. Sheet in the top last bays beneath the fin l.e. and make up the fin flat on the drawing. Sand the spine and top longerons to a smooth angle.

Now comes rather a tedious bit, sheeting between the stringers from B1 to B4, followed by the upper cabin sides, which is an easier job than it looks. Trace the shape off the plan, allowing a bit of spare where it curves over B1, fit and glue in place flat, without trying to cement to B1. When dry, coax the sheet to lie on B1 (if necessary, warm or even lightly dampen it) and cement in place. Trim when dry. Add the small strip of sheet round the curve of the cabin top and fit sub-fin, gussets and dowels as shown.

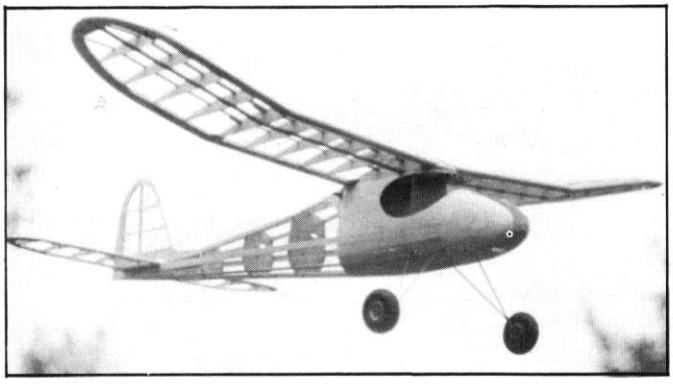
Engine installation

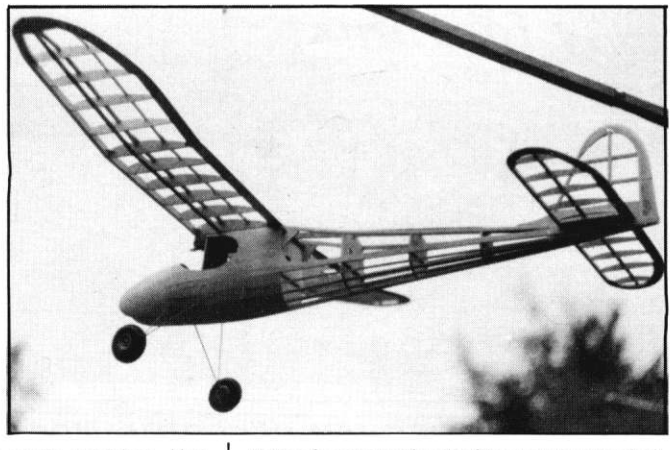
You will have decided on the motor earlier. Cut the bearer notches in B1 to suit the width of your engine. The next step is to cut and fit the bearers, using a card template to obtain the correct downthrust angle. Mark and drill for the engine bolt-holes before cementing the bearers. It is probably easiest to cut a pair of cheeks to the profile of the nose from soft balsa sheet, cementing these in place and the bearers to them. Use a scrap spacer to hold the bearers parallel and check to see that they are square in plane to B1.

When dry, cut and fit very soft block either side, or build up laminations of soft sheet. Fill between the cheeks with more soft sheet or scraps of block, sufficiently thick to be able to carve the nose to shape. Before closing everything off, make provision for a tank if radio flights are intended, (1oz should be plenty for the sort of motor intended) and put in engine bolts with a touch of epoxy under the heads (see later). Check as you go along that every-thing can be fuel-proofed; if not, fuel-proof as work proceeds.

Carve and sand to shape when thoroughly dry, aiming for a smoothly rounded effect blending into the main fuselage aft of B1. Different engines will affect the shape very slightly by different cut-out requirements, but make sure that access is adequate for bolt tightening and refuelling.

Sand the fin to shape with the trim tab and rudder tack-cemented in place. For free flight only the tab need be cut away,





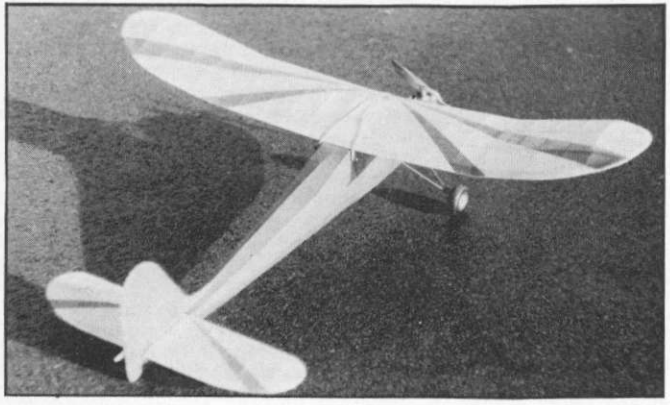
The sturdy structure can be clearly seen in these two photographs. Covering and colour finishing if required, should be completed before adding the cabin glazing.

repositioning with soft wire so that adjustments can be bent in. For radio, the rudder shown should be hinged with thread or Mylar, or any recognised method, and a horn fitted as shown. Cement the fin to the fuselage, slotting in a reinforcement tongue as drawn.

Again for radio, it is desirable to strengthen the bottom of the fuselage beneath the cabin area by covering it with nylon or silk (a piece of ladies' tights would do). Check that everything on the drawing has been completed and sand over the entire model ready for covering. Heavyweight tissue is recommended with doped-on lightweight tissue for decoration. The prototype was lightly sprayed with colour dope, but an alternative has been tried successfully on other recent models where the tissue has been applied with coloured dyes. Your DIY shop will have powder dyes which are mixed with methylated spirit, then thinned with water. This was stroked on with a cotton-wool wad instead of plain water for water shrinking, and produced an even overall colour which was then clear doped. It won't 'take' over filled areas, e.g. if you have attached the tissue with dope or cement, and it is desirable to treat a few tissue trimmings, dried flat, so that there is something with which to patch small punctures; it gives a brightish colour for negligible weight increase.

Covering

Tissue covering a stringered fuselage may be new to some builders, but if it is done in fore-and-aft strips, it is not difficult. Cover the solid nose with narrow strips, the edges of which will disappear after doping and sanding. The rest of the fuselage and the flying surfaces are virtually conventional, except that the fuselage top is best done in two strips.



Our model is covered in heavyweight model span tissue. This is an ideal subject to use the dying tissue colouring method. See page 529 of the October 1981 issue.

Flying

Check that the surfaces are all warp-free and sit square to each other from ahead and above, and that the model balances at the point shown or fractionally ahead of it. A couple of gentle glide tests will indicate if there is anything severely wrong, but the final glide trim should be adjusted after longer flights. Start these off by running the engine over-rich, gradually leaning out as the trim is established.

For free flight, the engine can have a small amount of sidethrust to the right, especially if a 1½cc motor is used, and should have right trim tab. With no engine offset, don't be afraid to use 15-20° of right tab. The aim is a wide right-hand circle for both climb and glide. For radio, ideally straight flight under power and on the glide should be sought, which means adjusting right sidethrust. If the bearer holes are larger than the engine bolts, slackening the nuts and relightening while holding the engine twisted as required should give enough adjustment, which is why only the bolt heads should be epoxied and not the shanks of the bolts in the holdes. If necessary, use right trim tab to get straight flight or slight right turn, as the rudder is larger than the tab and will still allow the model to be steered gently around the sky.

Finally, do make sure that the nose end is thoroughly fuel-proofed. This sort of model can put in a lot of hours flying on those lovely calm summer evenings and the biggest hazard to a long life is likely to be fuel soakage!