P. H. Ingrouille's 56 inch span .40 powered semi-scale

SPITFIRE

Introduction

If you've always wanted to fly a model of the *Spitfire*, and have been put off by all those tales of woe about terrifying vices, such as tip-stalls on take-off, etc. – don't believe it; it ain't necessarily so!

Here's one (though not 100 per cent true to scale – more a sort of 'nearly-scale', I like to call it) that has quite good manners.

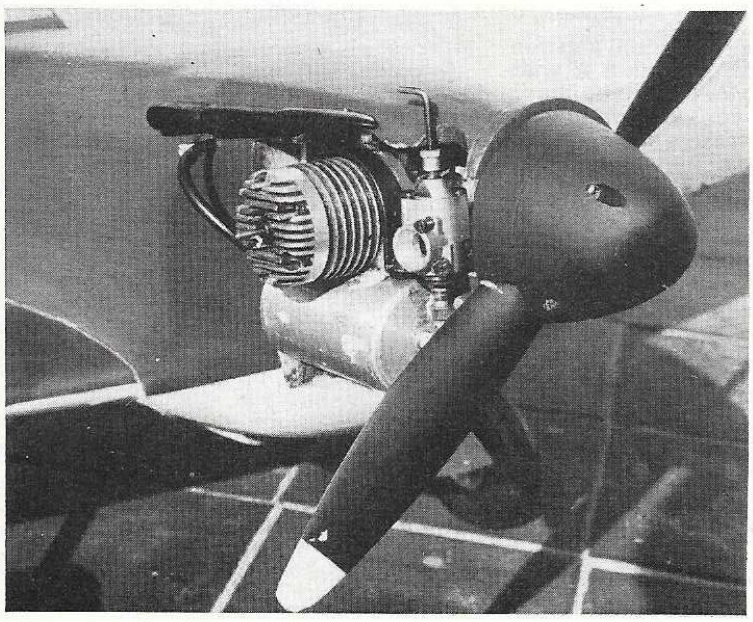
A word or two here about the history of the prototype, might be of interest. The idea was first conceived when my club, 'The Guernsey Model Club' became involved in preparing for a special Battle of Britain model flying display. It suddenly dawned on us that – horror of horrors, we hadn't got a Spit!

I elected to put something together and was told: 'Don't worry – as long as it looks about right at 150ft, and you can keep it in the air for a couple of minutes – that'll do!' Well, I got a bit carried away and ended up with much more than that. I now have a model which is great fun to fly and has been used as a general sport model ever since the display.

The model is for motors of around the popular and economical .40 cu. in. size. (Mine flies well on an aging ST.46 well past its peak, so a good .40 will be more than adequate.)

It uses either a polystyrene foam wing with balsa leading and trailing edges, or conventional built up wing. We have to cheat a little – sorry, a lot!! – in order to reproduce that elliptical plan form. The fuselage makes use of balsa-covered foam sections, which are light and make for quick, easy building. At this point I refer you to the excellent article in RCM&E April 1974, by Derek Hardman and Squire Kay which contains a lot of very useful information on this subject.

Below: well-used ST .46 was fitted to prototype, author considers that any good .40 would provide adequate power. Two degrees right sidethrust and one degree downthrust, added after test flight, resulted in the poor spinner-to-cowl line on this prototype.



This design is of no particular Mark of *Spitfire*, the idea being that you can 'dress it up' to represent any one of the dozens of versions that were built. Also, no attempt has been made to satisfy the purists, who must have true scale outline at all costs!

Importance has been placed on ease of flying, coupled with quick and easy construction, in an attempt to offer the average club flier a model which, in the air particularly, will be instantly identified by almost anyone as a replica of the greatest fighting aircraft ever built.

Wing

Cut your foam blanks exactly to the plan view shape shown, and attach the root and tip templates with small spots of 5 min. epoxy. The tip template must be set at minus 2 degrees relative to the root, in order to give the required washout. A little time spent getting a good finish to the edges of the templates, is well worth while, and a coat of dope, a sand-down, followed by the application of a soft lead pencil, will help to give a smooth cut. Mark off the templates with equal divisions, so that your end of the cutting wire exits at the trailing edge at the same time as the end held by your helper.

For all foam cutting on the prototype, I used a simple cutting bow made up from a piece of 1in.×2in. timber with 8g piano-wire 'legs' supporting a 30in. length of nichrome wire (obtained from a new 1000 watt wall-heater spiral, fed from a fully charged 12v. car battery.

With the templates made up as shown, you will have a slight overhang at each end which serves as supporting lead-in and lead-out for each cut. Remember to make opposite handed panels and label every piece of foam, as the waste serves as a jig whilst sheeting, so preserving that washout.

Glue on the 1/4in. sheet false leading and trailing edges and sand to contour; add undercarriage blocks and lay the core into its corresponding piece of waste, and sheet with soft 1/16in. balsa which should have been joined and sanded beforehand.

Use Copydex as a contact adhesive when gluing the balsa sheet to the foam core, making sure that the thin film of glue has dried fully, before bringing the two surfaces together. Now turn the panel over into the other half of the 'jig' and sheet the other side.

With both panels now fully sheeted, add the leading edge proper, made from 1/2in. sheet. Note the curve which should be planed and sanded.

The trailing edge, ready cut to its plan-view shape, should now be tack-glued only into place.

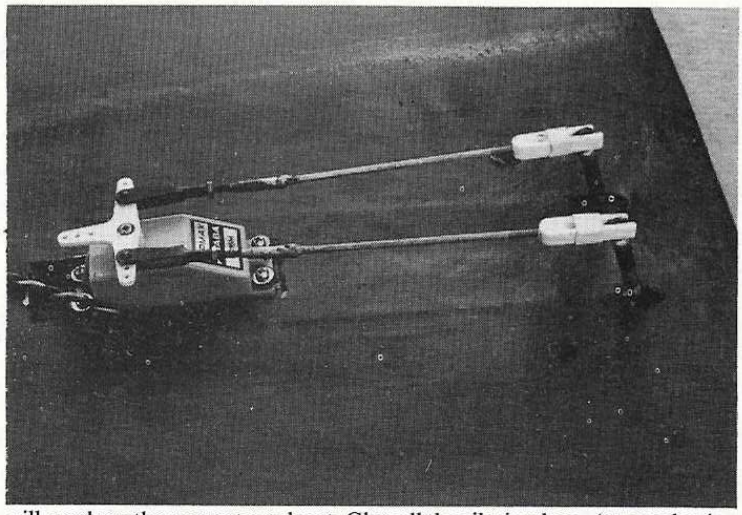
Cut and fit the tip block, then draw a centre-line right along the rear face of the trailing edge before finally planing and sanding the whole thing to final contour.

Remove the tack-glued trailing edge in order to fit the aileron linkage and separate the aileron itself. Finaliy, refit the inner part of the T.E. and sand the panel roots to give 2 3/4ins. dihedral under each tip (about 6 degrees).

Now join the panels with epoxy and add the small 1/32in. ply patch where the u/c leg protrudes through the top surface. Strengthen the centre joint with the usual glassfibre and resin bandage.

Wing – (built-up version)

If you opt for the built-up version of the wing, I would recommend the following procedure. After cutting out the ribs, lay down the lower main-spar and place a tapered packing strip along the trailing edge to support the rear ends of the ribs. This packing piece can be cut from 1/8in. balsa sheet and should taper from 5/8in. at the root to 7/16in. at the tip; this



Above left and above: radio system installation, note switch is operated via a pushrod passing through fuselage side. Power pack is immediately behind the square section fuel tank and RX between power pack and servos. No, the screws are not missing from the servo lugs, the Futaba tray has clips which hold the servos securely in position.

will produce the correct washout. Glue all the ribs in place, (remembering to angle the root ribs to allow for dihedral), followed by the false leading edge and trailing edge and the top spar. Fit the vertical grain 1/16in. sheet webs between ribs. Repeat for the opposite panel, then glue the two panels together making sure the spars line up exactly. Now, temporarily remove the section of W1 ahead of the spars and fit the forward dihedral brace. When the glue has dried you may replace the rib section and repeat the operation behind the spars in order to insert the rear dihedral brace. When replacing the rear section of the centre rib you may remove part of it to allow for the servo-box.

All that remains is to fill around the bolt holes with scrap block, glue into place the dowel support ribs W1a and fix the u/c block into place before finally sheeting the whole wing with soft 1/16in. sheet. Remember to jig the wing securely whilst sheeting to avoid locking warps in irrevocably.

From here on the procedure is exactly the same as for the foam version, that is leading edge, trailing edge, aileron, tips, etc. I would also recommend the use of glassfibre tape and resin over the centre section joint.

Fuselage

Here we have an ordinary box structure with triangular longerons, capped with three balsa-covered foam sections.

When you cut out the fuselage sides, note that the right-hand one must be slightly shorter at the nose, so that the correct side-thrust is built in.

Contact glue 1/32in. ply doublers into place and add the rear 1/2in. triangular longerons only before joining the sides, using F2, 3, and 4 – this helps to keep the curve at F4 as sharp as possible (important when foam sections are used). Bring the sides together at the rear using F5. Now you may add the remaining 1/2in. triangular longerons from F4 forward. The foam cores are cut as detailed on the plan and sheet with cross-grain 1/16in. balsa on the flat side, 1/16in. end plates and 1/32in. balsa over the curved section; it will help on the rear top section if you wet the outside of the sheet where it wraps around the sharp radius at the top. Once again use Copydex as the adhesive and glue on the sheeted foam sections, noting the gap between the front and rear top ones. This is filled with soft block which can be sanded to follow the curve mentioned earlier.

Fit the block pieces around the nose area and add F1 – temporarily fitting the motor and mount at this stage. Now you can busy yourself for a while with knife, plane and sanding block, blending everything to its final shape. Be careful here not to cut through the thin sheet into the foam.

Incidentally, there is no reason why obechi veneer could not be used in place of the 1/32in. balsa sheet, to cover the foam sections – 'you pays your money and takes your choice'.

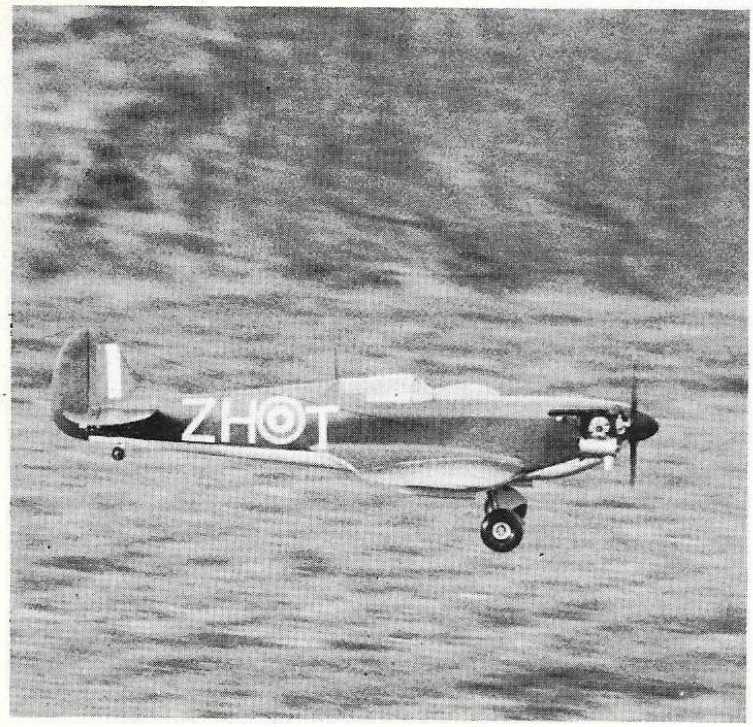
Tailplane and fin are best added after the final shaping.

The wing to fuselage fairings are made up by slipping the crossgrain 1/32in. ply bases between fuselage and wing; then bolting up the wing while the glue dries, protect the wing surface from excess glue by interposing a piece of thin polythene sheet.

Fit the 3/16in. gussets between ply and fuselage side, then cut the 1/16in. balsa fairing to shape and chamfer the inside edges – wet the inside to help get the right curve. Finally, fix into place with PVA glue.

Tailplane and Fin

I made use of soft 1/4in. sheet for these components on the prototype, but if you can't get hold of really light quarter-grain sheet, it would be



Pat Ingrouille's Spitfire on final part of a landing approach. Landings are straightforward, no wing dropping tendencies, due to 'modified' wing design with washout at the tips.

better to use the alternative built-up structure shown on the plan.

I cannot over stress the importance of getting the tail-end as light as possible, in view of the fairly short nose.

Installation

Experiment with position of servos, etc., in order to avoid adding ballast. There is considerable scope here, as the wing seat opening is quite large.

If you find the model a little tail-heavy, try moving the servos forward with the receiver behind them – it will probably be enough to tip the scales, so to speak.

Finishing

The prototype was tissue covered overall, followed by a couple of coats of sanding sealer, then rubbed down to a smooth finish before spraying on the colour. Roundels, insignia, etc., were made from matt white Fablon, painted where necessary and simply stuck on before giving the whole model a coat of matt clear polyurethane.

Flying

If you've built your model correctly and have got the C of G in the right place, you'll have no worries.

Just hang on to 'up' elevator on the ground until she's built up sufficient speed – you'll probably have to correct for a little swing to the left, then, as you ease off the up, she'll just lift off.

The model is quite aerobatic, but of course a Spit just doesn't look right doing consecutive outside loops!

I find it very satisfying trying to fly this machine in a scale-like manner, as they say. That's one of the great things about scale modelling even if the model isn't Class I (or Class II for that matter).

Landings are no sweat, particularly if you've flown a tail-wheel model before – just remember you can't bomb in at too high a speed as you can with a trike. Slow up and aim for a three pointer just off the stall.

I wish you well with your *Spitfire*, but watch out for those *Me.109's* coming out of the sun.