

HIGH PERFORMANCE RUBBER MODEL

INTRODUCTION.

The Witch II is a redesigned and improved version of the original model, being simpler, lighter in weight, and possessing a better performance. The kit incorporates the same outstanding features as previously, having all the parts cut to shape and numbered to correspond with the drawing, shaped undercarriage, moulded balsa airscrew blades, plastic wheels, strip rubber, etc.

The main components can be built over the plan. Before commencing, pin this to a flat board, and cover it with a sheet tracing or greaseproof paper to prevent the cement sticking to it. The cut parts only require easing from the panels with the help of a razor blade, to cut the retaining sections.

Dope and cement are not included in this kit, but can be obtained at any model shop. Use quick-drying Balsa Cement, such as Frog Universal, for the best results.

BUILDING INSTRUCTIONS.

FUSELAGE. The Balsa Strips are supplied in knife-cut panel form, and only require separating with a razor-blade. Remove any rough edges with sandpaper. First put aside 9 strips of 1/8in. square for the longerons and spars, before cutting the short pieces.

Make up the bulkheads first, over the diagrams in Fig. 1. Two large ones and one small one are required. While these are setting, build the fuselage sides over the plan, using pins to hold the parts in place, as shown in Fig. 2. Make two sides together, one on top of the other, with strips of greaseproof paper to separate the joined joints. Note that parts 2, 3, and 4 (sheet 1) are flush with the outer surfaces, so by pieces of 1/16in. packing between the two sides at these points. If the sides are built separately, the starboard side can be laid flat on the board, but parts 2, 3, and 4 on the port side, require raising to the top surface. The longerons are built up from 2 strips jointed together with an extra strip to cover the joint, as indicated on the drawing.

When the sides are set, remove them from the plan, and assemble them together with the bulkheads A and B, as in Fig. 3. Check it over the Plan View to ensure that they are square. Cement strips to the front bulkhead 5 (keep the inner piece to fix to the noseblock), and cement it to the front of the fuselage, using elastic bands to keep the longerons in place. Then fix the bulkhead C into place, and cement the rear ends of the fuselage together. Check for straightness by sighting along it from each end.

Next cut the cross struts 6 to length, and cement them in place where shown on the Plan and Side Views. Note the position of the front ones, to allow for the centre stringers on top and bottom. Cut these front stringers 7 from 1/8in. square strips, and cement them into place. Add the small gussets 8 behind the bulkhead 5, bevelling the edges to make them a good fit. Cement the tail piece 9 level with the top of the fuselage. Cut the wing-fixing dowels 10 to length, and cement them in place, together with the gussets 11 (sheet 4). Cut two pieces from the 5/8in. x 3/32in. strip for part 12, bevel the edges and cement them to the inside of the wing mountings 4. Cut the strips 13 from 1/4in. x 3/32in., and cement these in place also. Note the extra strip for the front edge, see Fig. 4.

UNDERCARRIAGE. Fix the wire undercarriage 14 in place, well cementing it against bulkhead A. Cut the cross-strut 15 to length, the full width of the fuselage, bind it with thread to the wire, and cement it against the bulkhead and struts. Add gussets 16, and the vertical strips 17, which are cut away to fit strip 15. Cement the wheel-halves together, and fit them to the undercarriage; solder washers to the axles to hold them on.

UNDER FIN. Build up the under-fin over the plan with strips as shown, and shape it after it has set. Sandpaper the whole fuselage smooth to obtain a good finish before covering.

NOSE BLOCK. Mark the outline from the drawing, and the front bulkhead, and cut the nose-block to shape. Cement the inner part of bulkhead 5 to the back of it, and sandpaper it to the final shape against the fuselage. The block is ready drilled for the bush bearing; continue this through the back insert, and coat the front face of the block with cement before fixing the bush into place.

WINGS. Build these up over the plan in two halves. First pin down the Trailing Edge W1 with the front edge raised as shown in the wing-section diagram. The Leading Edge W2 is assembled after the main ribs W3 (sheet 2) are in place. Groove the front edge of the tip pieces W4, to take the Leading Edge, and cement these in place, together with parts W5 and W6 (sheet 3) and tip ribs W7 and W8 (sheet 2). Raise the tips with packing as shown on the drawing, and cement the spar W9 in position, tapering it at the tip.

When both halves are set, remove them from the plan, and place them together, with the tips raised 3in., and assemble the centre-section. The main spars meet at the centre, and the Leading and Trailing Edges are butt-joined to the centre-section. Cement the ribs W10 in place. Cut the jointing-strip W11 and short strips W12, and cement these also. Then add the gussets W13 (sheet 2).

This completes the wing structure: shape the tips to blend in with the Leading and Trailing Edges, and smooth the whole wing with fine sandpaper before covering.

TAILPLANE. Pin down the Leading and Trailing Edges T1 and T2, then cement rib T3 (sheet 3), and the 6 ribs T4 (sheet 4). Next fix the tips T5 and T6 (sheet 3) and ribs T7 and T8. Taper the ends of the spar T9 in place, and cement this in place, and the gussets T10 against the centre rib. When it is set, remove the tailplane from the plan, and cement the locating strip to the underside.

Shape the tip pieces, and sand the whole structure to obtain a smooth finish.

FIN. Build this up on the plan, with shaped parts F1, 2, 3, and 4 (sheet 1) together with the 1/8in. square strips F5, and gussets F6. Fix the trim tab F7 by means of the aluminium strips, slotted and cemented into the wood.

When it has set, sandpaper the fin to shape, tapering the front and rear edges to a streamlined section. The fin is cemented to the tailplane after the latter is covered.

AIRSCREW. Join the two blades together with the ply piece as shown in Fig. 5. When it is set, round off the centre part, and sandpaper the whole airscrew to obtain a good finish. Make a hole in the centre of the bush, and cement this into place from the rear. (The curved outer-surface of the blades should face forward). Check that the airscrew runs true, by spinning it on the shaft, before the cement sets. If the airscrew appears to be out of balance, sand the surface of the heavier blade (not the edges) until they are equal.

Give the finished airscrew 2 or 3 coats of dope or lacquer, sanding lightly between each coat. Small errors of balance can be corrected with an extra coat on the lighter blade. To strengthen the centre of the airscrew, bind it with a strip of tissue, doped on.

Assemble the airscrew to the nose-block and shaft, and bend the hook on the front end. This is used to wind the motor.

The free-wheel device is a length of wire with a loop at one end, screwed loosely to the airscrew, so that it engages with the loop on the front end of the shaft, as shown in the Side View.

COVERING. The fuselage, wings and tail unit are covered with tissue-paper. Use pieces of dope, for fixing it to the framework. Cover each panel separately, cutting the paper to allow 1/4in. overlap all round. Do not pull the covering tight, but aim at getting a uniform surface with no deep wrinkles. The under-surface of the wings being cambered, the paper must be stuck to each rib, using dope or cement.

After covering, spray the paper with water to shrink it, and pin the wings and tailplane down in such a way as to prevent warping whilst they are drying. The tailplane and fin should be quite flat, the wings being given a slight "wash-out" towards the tips. When thoroughly dry, give one coat of dope to the wings, tailplane and fin, again pinning them down to prevent warping as soon as the dope begins to dry.

The fuselage should be given two coats of dope, and a coat of thin lacquer over the whole model is beneficial.

Painting should be restricted to lining on the fuselage only, to save weight.

RUBBER MOTOR. Make up the motor into a skein of 8 strands of 3/4in. x 1/30in. x 25in. long. A longer motor can be used for competition flying, allowing more turns to be obtained. It is essential to apply a lubricant on the rubber, using soft soap, glycerine or castor oil.

Loop one end on to the airscrew shaft, tying it in place with thread, then drop the other end down the fuselage and secure it with the dowel.

RUBBER TENSION. The purpose of this is to prevent the rubber motor bunching unevenly when it is unwound, and so upsetting the glide. A tensioned motor also helps to keep the nose block in place.

Form the elastic into a skein of double normal length and half the number of strands. Hook one end on to something solid, or get another person to hold it and wind about 60 turns backwards.

Bring the two ends together, allowing the skein to twist together. Smooth out with the fingers, then fit it into the fuselage. It should now be short enough to keep the nose-block in place. If it is still too long, take the motor out again, and increase the number of turns as above.

DETHERMALISER. This device is used to restrict the length of flight, and prevent it going too far and being lost. It is essential to have it operating on a warm, sunny day, and on this model, the "flip-up tail" type is used. This is operated by a slow-burning fuse attached to the loop of thread holding the back of the tail down as shown clearly in the Side View drawing. When this has burned through the action of the elastic band at the front tilts the tail up at an angle as shown in Fig. 6, slowing down forward travel, and causing the model to descend vertically on an even keel. The fuse is made by soaking some string in a solution of saltpetre, and drying. Cut off a length to suit, and insert it in the loop of thread as shown.

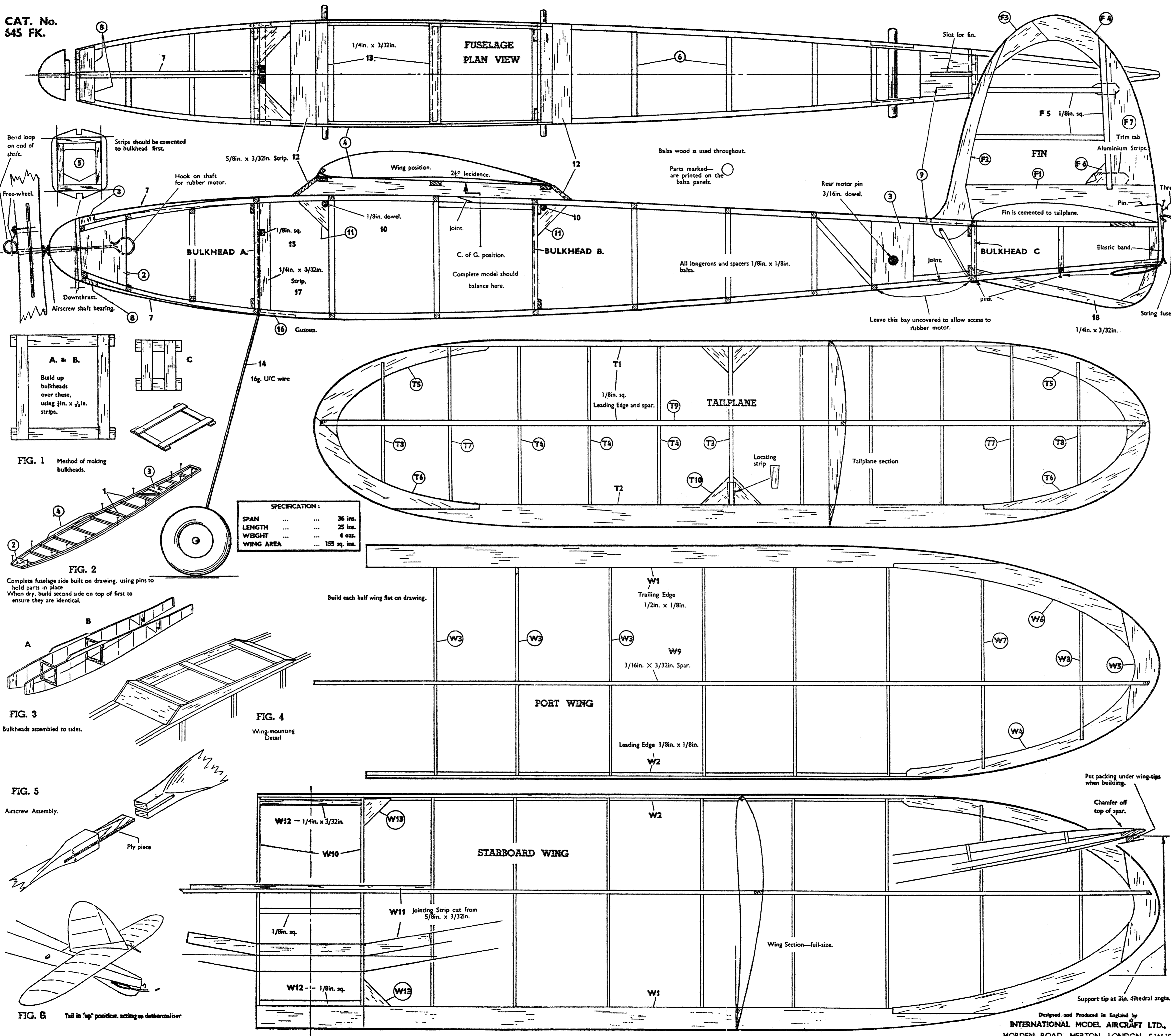
FLYING. Assemble the model completely, and look for any warps, or wings and tail out of alignment. Correct these, if present, before testing.

First, (with the motor tensioned as described above), check the centre of gravity of the model. This should be close to the point indicated on the plan, but a slight variation can be corrected by the tailplane, i.e., nose-heaviness can be overcome by raising the rear edge of the tailplane with a piece of card, and vice-versa. In extreme cases, a small amount of ballast may be added to the nose or tail end.

Choose a calm day if possible for the first tests, and glide the model, (into the wind, if any). If the model has a tendency to nose-up and stall, adjust the tailplane by slipping a piece of card under the leading edge, whilst nose-heaviness is corrected as before.

Put a few turns on the motor and launch into the wind. The model should make a straight flight to start with. Adjust it to make a wide turn to the right with the trim tab or side-thrust on the nose. When the trim is satisfactory, the turns may be gradually increased. To obtain the maximum turns, the motor should be stretch-wound, using a wheel brace with a hook fixed in the chuck. An assistant is required for this operation, to hold the model, one hand holding the fuselage at the rear motor hook, taking most of the strain, the other steadying the front end. Hook the wheel-brace to the airscrew shaft, and start winding whilst stretching the motor 5-6 times its length. Then gradually shorten it until the nose-piece is back in place.

It is advisable to have your name and address affixed in a prominent place on the model if long flights are attempted.



SPECIFICATION:

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| SPAN | ... | 36 ins. |
| LENGTH | ... | 25 ins. |
| WEIGHT | ... | 4 ozs. |
| WING AREA | ... | 155 sq. ins. |