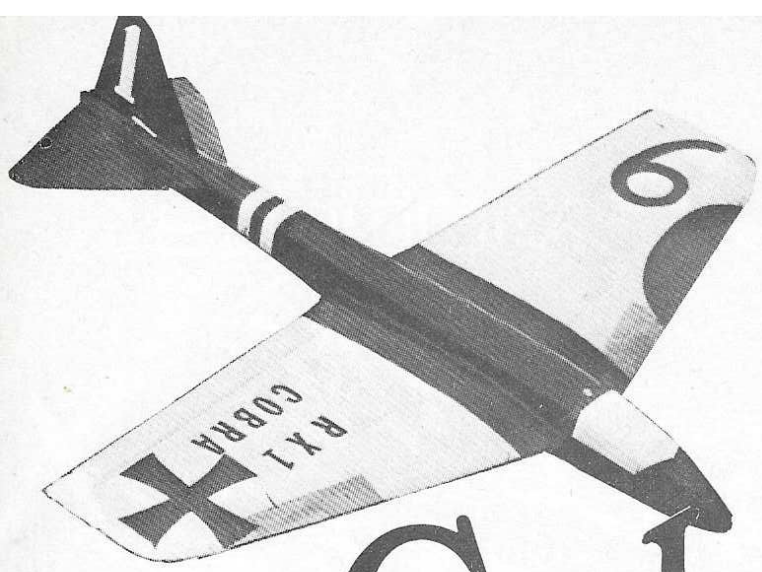


Left: racy line of *Cobra* and small size should make this model an attractive proposition for modellers with small cars and big families!

Cobra

41in. span slope aerobatic glider for 2 or 3 function R/C

Design by Richard Liddard

THE Cobra was developed during last winter. I felt, that with the excellent slope soaring sites we have at our disposal in this part of the country, a soarer plane capable of flying in light or marginal conditions wasn't really necessary. What was required was a small, compact, relatively simple model which would fly in the strong winds that prevail during winter months. It also had to be aerobatic, not in a competition sense, but something which would make for exciting, enjoyable flying. I also wanted to to look a little different from the established slope-soarer, but it is difficult to make an aeroplane not look like an aeroplane! After toying around with semi-scale jets, I disregarded them as being too complex for my purpose, but making excellent projects for the future and one or two have appeared on the slope already.

So, after much scribbling on scrap pieces of paper, the present layout was eventually produced. It is fairly small by most standards, only 41in. span but it has a wing area of approximately 430sq.in., a fully ten per cent symmetrical section was used, with the maximum thickness at 35-40 per cent of chord to give good penetration plus full aerobatic capability. The anhedral tailplane was almost an afterthought, it seemed to suit the plane, what the aerodynamic qualities are I'm not sure, but they are certainly not detrimental to the handling. The plane will perform the usual looping maneouvres both upright and inverted, in fact it flies better inverted than upright, presumably due to the anhedral wing, but it does make flying upside down a little easier. In contrast the rolling manoeuvres are carried out at an alarming rate, so take it easy on the aileron control to start with.

Construction

This is fairly easy, I'll start with the wing, which is of conventional built-up structure. The ribs are made by the 'sandwich method.' Due to the large variation in size from root to tip over a short span, all the ribs for both wings are placed in the jig and paired off after sanding to shape. Spar notches are cut off before separation. The wing is built the 'right-way' up with the bottom spar flat — so that the wing has a slight anhedral.

Fuselage

Cut the fuselage sides from medium-grade ⅛in. balsa and use an impact adhesive to glue the 1.5mm ply doublers to the sides. Glue the ¼in. square top longerons and the ⅜in. triangular bottom longerons to the fuselage sides with P.V.A.

Cut the former F2 from ¼in. ply increasing the width if necessary to accommodate your radio equipment and glue to fuselage side with epoxy. When set, glue F1 into place making sure that the sides have equal curvature. Pull the rear end together and fit by placing a piece of 1.5mm ply with sandpaper glued to both sides between the fuselage sides and moving back and forth until the desired fit is achieved. The top and bottom sheeting is from medium grade ¼in. balsa, but just tack the top sheeting where the hatch will be. Fix the nose block and carve/sand the whole lot to shape.

After shaping, cut the top decking using a razor saw, add the ply facings and the ¼in. square locating strips. The hatch is fixed using a commercial nylon wing fixing bolt on the centre section with spruce tongues locating the forward section.

Tailplane and fins

These are quite straightforward and are made up from an ⅛in. balsa sheet frame covered with 1/16in. sheet balsa. Complete the whole tailplane with elevators before cutting in half to give the anhedral, which is 15° either side. No braces were used on the original, just some bandage glued with balsa cement along the joint, this is strong enough once the tailplane is mounted on the fuselage. The elevator connectors are made from two pieces of wire in nylon tubes, the shape is easier to see from the plan rather than describe. The elevator horns were connected using a commercial nylon clevis but with the locating pin cut off and a hole drilled right through both sides. The fin is made in a similar manner, in one piece and the rudder cut out after completion.

Final assembly

The original was constructed as a 'one piece' model, a feature which has presented no problems. I felt that with a model this small, a 'knock-off' wing was not necessary. The model is compact enough to go into most car boots.

Cut the fuselage sides to take the wing with the centre join against the former F2. Cut the slot at the rear to take the tailplane and fin, making sure that the tailplane is at zero incidence to the wing. When satisfied that the angles are correct and the tailplane is symmetrical about the fuselage, glue both in place.

On my prototype the wing root was reinforced with polyester resin and the glass fibre tape. This was found to be adequate, even for the occasional rough landing.

Finishing

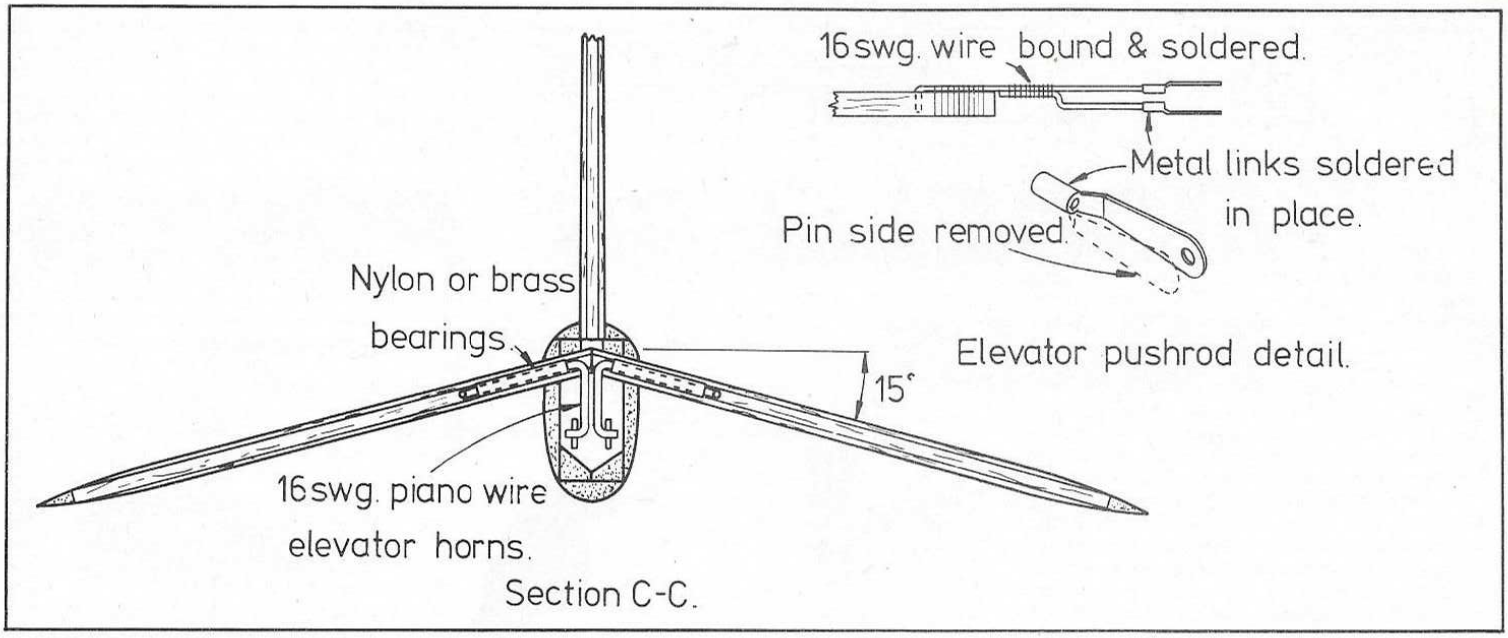
I have a preference for the conventional approach to finishing and on the original, the fuselage, tailplane and fin were given two coats of sanding sealer and tissue covered, two more coats of sanding sealer, rubbed down and then painted with brushing cellulose. The wings were covered with nylon, doped and then finished with a final coat of clear polyurathane. The structure is quite strong enough for an iron-on film finish. The weight was originally 34oz. all up, but after numerous repairs and a bit more glass fibre it is now 44oz, and still flies in a good breeze.

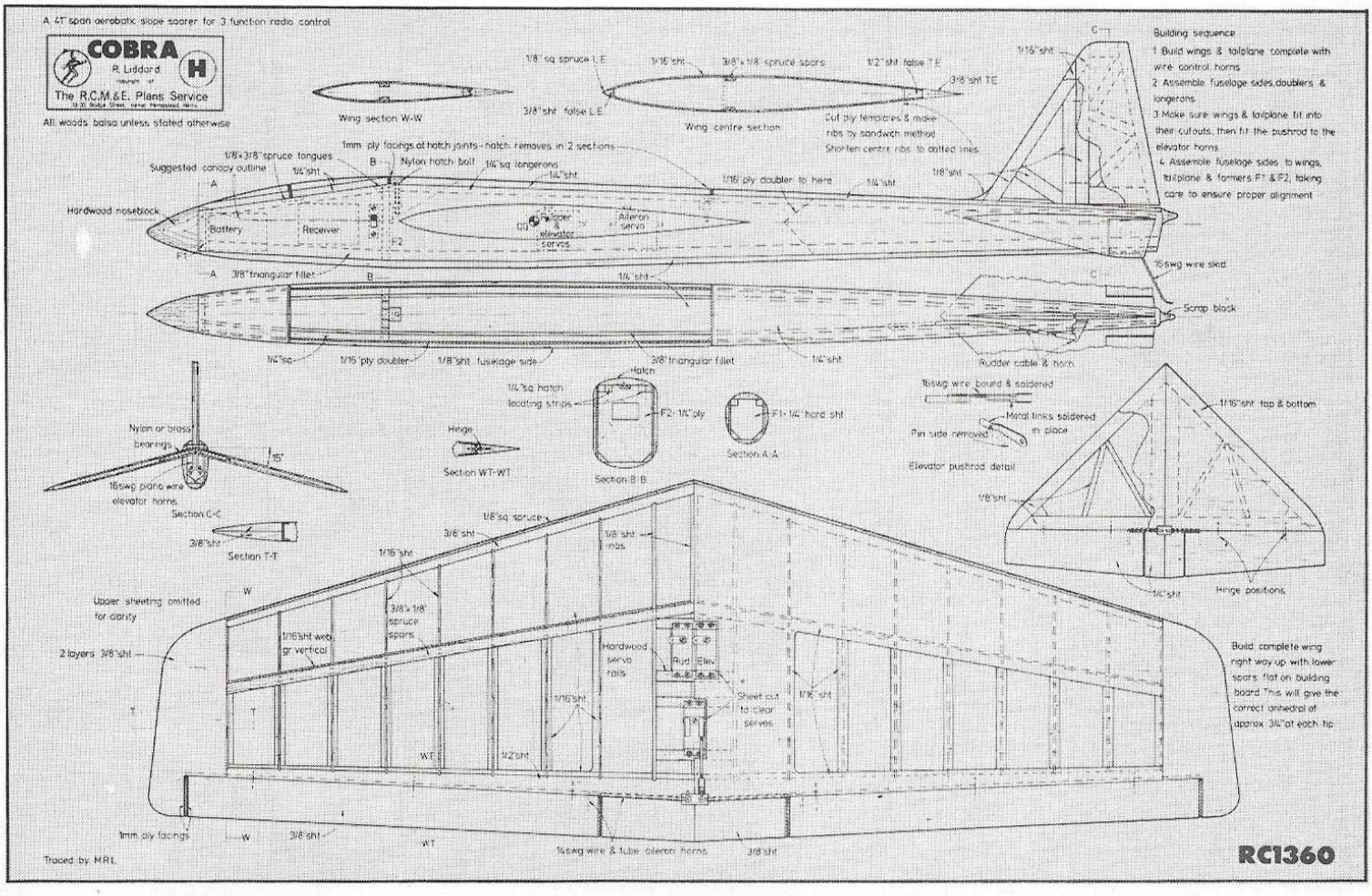
Flying

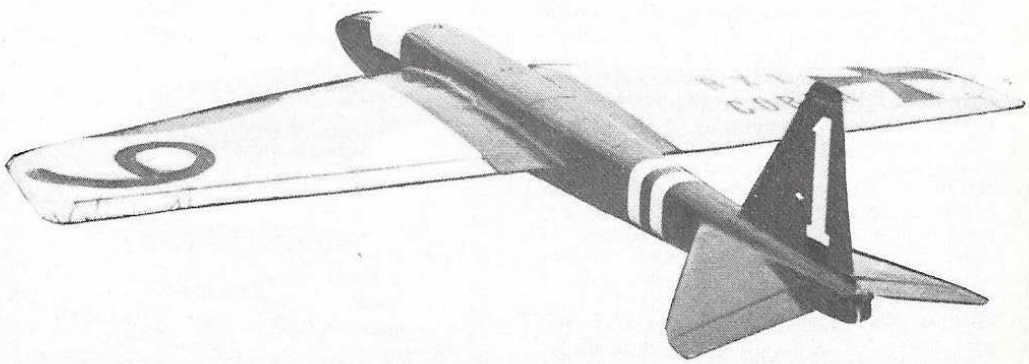
Make sure the model balances on or in front of the marked CG for initial flight — about 1½oz. of ballast was required in the nose of the original. Also, make sure the wings balance level, by burying small pieces of lead in the wing tip where necessary. Check the movement of the controls + ⅜in. for the elevator + 1½in. for rudder and + ⅜in. for the ailerons. This could be reduced for initial flights as this model is very sensitive to aileron control as would be expected from such a short wing-span and low aspect ratio design. Differential aileron movement was used initially and later removed with no detrimental effect, so take your pick — differentiate or not!

For your first flight choose conditions of good, steady lift at your soaring site. I have flown the *Cobra* in 45 mph+ winds and although landing presents a problem the flying was certainly good. An excellent series of articles on trimming aerobatic slope-soarers was published in 1974/75 *R.C.M.&E.* by Ken Binks and I suggest you follow the procedures outlined for the *Cobra* to get the best results. Once trimmed, you will find *Cobra* very responsive and capable of performing the usual looping manoeuvres, both upright and inverted.

The rolling manoeuvres can be carried out at an alarming rate, especially at speed so take it easy to start with, but don't fly too slowly as *Cobra* was meant to fly fast. Above all you will enjoy flying *Cobra* and it really doesn't cost too much to build another one should you have a mishap.







Full size copies of the plan shown at 1/7 full size are obtainable from *R.C.M.&E.* plans service. Plan No. RC1360, price code H (£2.20) plus 30p post and packing. Export orders can be obtained through appointed agents, price £4.90 ($8.60 U.S.) or direct by post (add 40p 80 cents U.S.))from Plans Service, P.O. Box 35, Bridge Street, Hemel Hempstead, Herts., HP1 1EE.