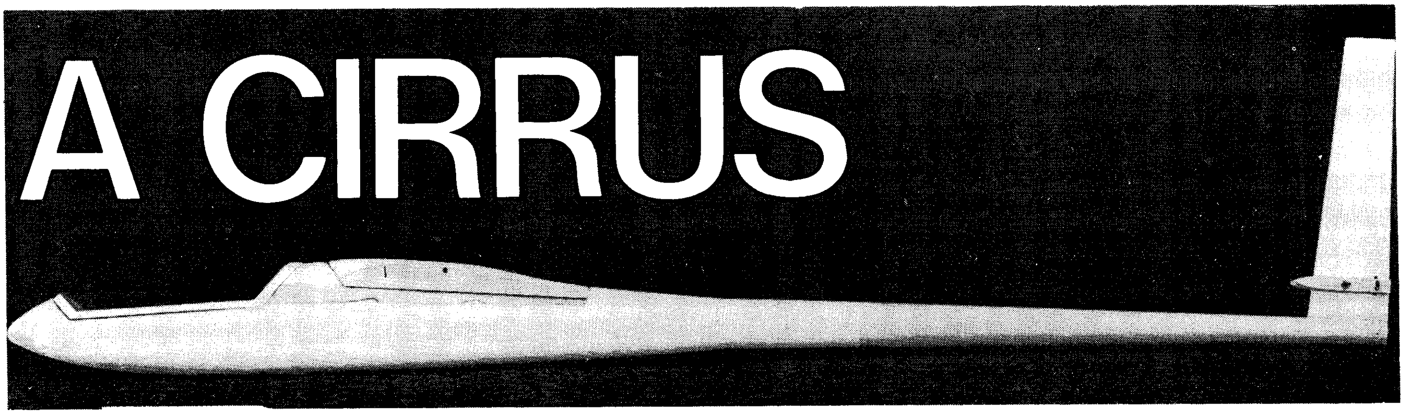
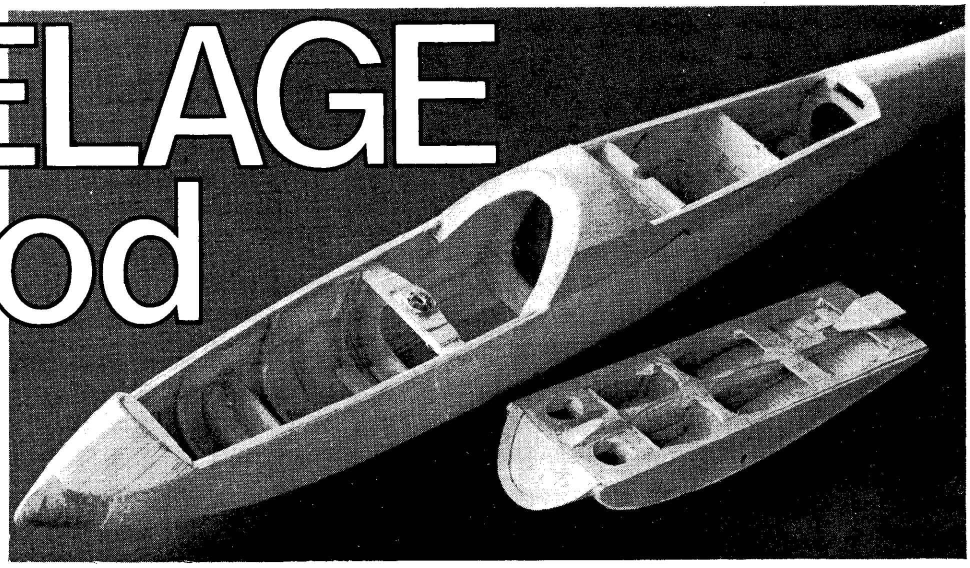
A CIRRUS FUSELAGE in wood





By Trevor Faulkner

EVER suffered a Cirrus fuselage brake? Join the club chaps! Cold weather and hard impact take their toll of these plastic fuselages. Here's a way to make your own replacement in standard balsa construction tough enough to stand up to typical British conditions. Performance-wise it may not match the original in every respect but it does the job well in a model that could be called a stand-off Cirrus. It sports repaired Cirrus wings and tail, but a very much boxier fuselage than normal. The model gets away adequately, but doesn't have the edge that one usually associates with the original. AND it looks nowhere near as pretty!

Now, why didn't the builder duplicate the sleek lines which had probably prompted him to part with hard-earned (we hope) cash in the first place? Well, it's easier to build a box; it is debatable whether there's much to be gained in performance for the effort involved, it's lighter . . . here wait a minute. Just what is this game if it's not involved with small refinements and marginal advantages? Put a rule around the perimeters of a box job and an elliptical or circular section fuselage and what do you get? Of course, a greater outline dimension of the box with a greater drag co-efficient, in effect, a bigger fuselage when seen from the front and of a less efficient shape. Oh yes . . . bigger fuselages imply more material, more material means greater weight, and by now we're disenchanted with the undertakers' favourite section if we cherish any ambitions at all.

So what's stopping us? Well, isn't it complicated? Don't we need to be experts to build smoothies? And don't we need a lot of expensive block to carve away to nothing?

Take heart, for the load is about to be lightened. YOU TOO can be the envy of your friends without breaking the bank. And here's how.

Design Decisions

The basis of the prescription is a generally acceptable size of component bearing in mind current R/C gear and present popular sizes of models. The draughting methods are so simple as to be capable of reproduction by anyone wishing to indulge individual fancies of style within the general idea. The wood sizes are easily available and formed to the curves required; the rear half of the fuselage needs no formers of the conventional type, but a mandrel *is* used. (This is always a useful commodity for a modeller to have around anyhow, so time spent on this could be regarded as an investment). The mandrel can be of any desired proportion to match a modified front-end. For economy, formers are almost all made in three parts, this allowing careful economisers to juggle the shapes around on the sheet more easily before cutting than when one-piece formers are used.

Construction

Basic sides cut from 3/32 in. medium balsa, and a crutch constructed using the rectangular strips from the centres of each former. These can be of any convenient thickness so you won't have to carve up any new sheet for these parts. It is advisable to stay with 1/8 in. or 3/32 in. stock, medium sheet, or 3/16 in. medium soft, or a combination of all or any of these. Just be sure to check that all the X-members fit at right angles to the datum line when gluing in place.

The lower former sections can now be cut out. Here is the really sneaky bit of this design. With the exception of F1, all the lower sections have a common radius profile, and a constant depth . . . so all you need is a strip of wood on which you:

1. Mark the length of the piece from the plan
2. Square the ends when cutting to length and recess 1/32 in. for floor strip.
3. Finally, cut the quarter circle profile to touch the ends and lower edges of the rectangular strips tangentially. (It is worth making up an alloy, steel or formica template to speed this process.) Note that the lengths of centre and lower sections differ by 1/16 in. (1/32 in. at each end).

Formers which have to perform particular tasks can be ply-faced if appropriate. Such facings must be carefully profiled and fitted as one-piece units. The drawing shows typical examples of this, which cater for locating and hold-down systems. At the stage where the lower former-sections and floor strip have been fitted, the first sheeting can commence. Medium soft straight-grained strips of 1/16 inch sheet are soaked and wrapped with crepe bandage around a suitable circular sectioned object. When dry, they will form the basis of the planking and made to conform to shape with the minimum persuasion and fitting. (In fact, offcuts carefully taken will prove eminently suitable for gap-filling). The writer always uses bandage to help hold sheet in position when gluing up, so avoiding pin-holes and the like. By planking evenly, distortion is avoided, but slight twisting can be rectified by damping the glued sheets and inducing equal and opposite twist until the job is dry.

The upper parts of the formers are then added, along with the stringers if required for wing mount and canopy "beefing up". This section is then planked as for the lower part. One tip may not be generally known and that is the addition of strips of 1/32 in. ply (grain across the strip) which are "sprung" between the basic sides and the floor strip and glued in place. These strips add little to the weight, but help enormously in preventing the "starved horse" look when we apply the final sheeting. Scrap diagonal "props" can be improvised to hold the strips in close contact with the insides of the curved sections.

The nose block is built up to fair into the 1/16 in. sheet, and the entire unit sanded to blend in sides and floor with the sheet. The next stage is the application of a final layer of 1/32 in. medium sheet over the entire fuselage section so far built. Paper patterns can be of assistance in determining the shapes of sheeting. The prototypes used approximately two sheets of 3 in. x 36 in. balsa, applied in two main areas: first, forward of F13 to F5, then from here to the noseblock. As can be seen from the photographs, a strip of 1/32 in. ply was used to provide a little more strength and a lot more wear resistance below the wing mount. It is better to damp the outside of any sheets before applying them, UNGLUED, to the layer below. Bandage them in place and allow them to dry so that there is an accurate means of checking fit before gluing in place with white glue. Try thinning the glue slightly with water so that it can be applied thinly to both surfaces and penetrate the pores of the wood for good mechanical keying on a microscopic scale.

The front end has the largest double curvature area, and careful pattern cutting makes all the difference here. Keep any slivers removed for filling later.

Wing Mount (where required)

Trace out and cut a 1/16 in. ply base to match the opening. Hold this in position with masking tape on the fuselage, and add the two end formers, traced from the job. A centre longitudinal 'rib' conforming to fuselage profile *less* 1/16 in for sheeting is cut and glued in place, as are two ribs to match your chosen section and angled if straight dihedral is to be employed. Sheeting is applied after any tubes, lightening holes or other desiderata have been added as required by the builder.

Canopy

Proceed almost entirely as for the wing mount (base and two formers). Cut strips to provide an L-section along the top edge of the base, and scrap balsa inside the formers to give greater gluing area for the transparent sheeting at the ends. The base may now be fretted out if desired, and securing devices and interior painting done before glazing. (A balsa block 'canopy' is no problem to make and is therefore not described).

Note

Where a removable wing mount is not used, any tubes, tongues or boxes for wing fixing must be established and the fuselage interior strengthened locally to distribute loads. The 'hole' at the top of this area can then be filled in either of two ways: either a removable 'Hatch' can be built up or carved, or a fairing cemented in place.

The writer's choice is always towards the first method as, even with its slight weight penalty, it allows:

1. Addition of ballast at the C.G.
2. Installation of an extra function together with easy adjustment (e.g. Q/R towhook, Flaps or fuselage mounted aileron servos).
3. It facilitates inspection and repair, and further modifications.

Internal fixings are not difficult to devise (see R.C.M. & E. February 1976) and do maintain the uncluttered exterior, at which we are aiming).

Ply Boom

Methods of making these are well documented in MAP magazines. Briefly, a smooth, waxed mandrel is essential. *A slight convexity* along its length is immaterial, but concavity is fatal (like, the glued boom can't be removed!) There are so many lathes around nowadays that most of us should be able to turn up a or have a suitable shape turned for us.

Failing the lathe facility, there is no difficulty in producing a hand shaped mandrel, provided that a simple V-block is made to hold the form whilst planing a number of marked tangential planes prior to rasping and sanding to finish. Another worthwhile aid is an enlarged version of horologists' centres, simply two points between which the job can be rotated. This device can help in showing any deviations from true by the simple expedient of offering up a pencil, supported on a block, to mark highspots for removal. The centres themselves can be strong nails driven through the uprights of two blocks of wood clamped to a bench surface and pointing towards each other. The mandrel is located between the points and rotated by hand.

The ply blank is marked to provide about 1/2 in. overlap along its length, soaked in hot water, then persuaded around the form and bandaged until dry. The inside chamfer of the lap joint is sanded easily if the underneath part of the lapped area is temporarily placed outside the ply roll. A thin protective strip of metal (steel rule, steel packing or similar) is slipped between the edge to be sanded and the rest of the ply. This avoids the accidental scratching of the eventual outside surface. The glued joint can then be made, and the bandages replaced until dry, at which point the outer chamfer is sanded. The ply lines act as an excellent guide.

The writer has used both 1/32 in. and 1/16 in. ply booms, paper, silk nylon or uncovered. All have proved trouble free, and the thinner booms have served adequately on 13 foot span soarers.

Joining and finishing

The 'spigot' for boom attachment is fitted into the space vacated by F13 after its removal and AFTER the planking is complete.

The space between F12 and F13's position is lined with four sections of 1/32 in. sheet between the projecting basic members of crutch, floor and 'roof'. A ply tube is then rolled, chamfered, glued and quickly positioned and adjusted before the glue sets. (This is necessary as the taper of the hole is against us). The degree of taper on the spigot projecting reflects that of the front fuselage interior, and is too great to match the boom; the modification to the taper is simple – a 1/2 in. (approx.) wide strip of 1/32 in. balsa is wrapped and glued at the rear of the projection. When dry, it is carefully sanded from full thickness to nil, so decreasing the rapidity of the slope and matching the boom's I.D. The boom's outer surface is blended to a satisfactory shape using thin soft balsa sheet, after gluing the boom in place with P.V.A. adhesive (P.V.A. will allow the removal of a broken boom after soaking the joint . . . and although breakage is most unlikely, we can all suffer radio failure or crash damage).

The writer leaves the removal of former clearances (other than for ply formers) until assembly is complete. Then with the aid of ground-down, tapered and curved hack-saw blades, material is cut away to accommodate gear and linkages. The photograph shows that almost complete removal of some formers is possible without losing adequate strength. The ply ribs are of tremendous benefit here.

The cosmetics are up to the individual. The writer prefers a F/G skinning for gravel bashing, but after that considers any established preferred methods to be satisfactory.

SO . . . why not realise your ambition? Build a streamliner, or replace your broken bit of the Teutonic Economic Miracle for a couple of quid or less!