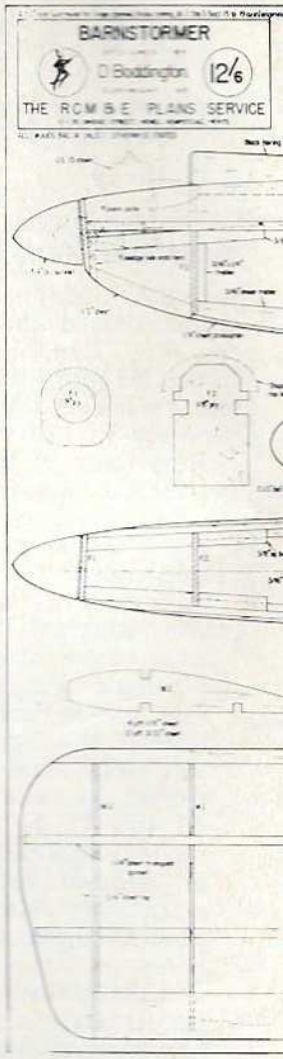
BARNSTORMER

By David Boddington



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THERE is a general and constant outcry from R/C aeromodellers for 'different' types of R/C designs to allow them to get away from the 'standard' models. Perhaps the majority of single-channel models are high wing cabin types with slab-sided fuselages, and multi models tend to be low wing bombs with tricycle undercarriages of apparent identical appearance. Perhaps, also, the average modeller does not want to go to the time and trouble of building scale models but there are problems in presenting 'out of the rut' designs.

For one thing, these types do not always have sufficiently popular appeal – and magazines must try to cater for the majority of readers – and frequently with single-channel designs, the designs do not have the flying qualities of models such as the 'Pal Joey', Robot, Super Sixty, Tyro, etc. It is possible to have a 'different' design which remains easy and pleasant to fly and, equally, be simple enough to build to appeal to a wide section of modellers.

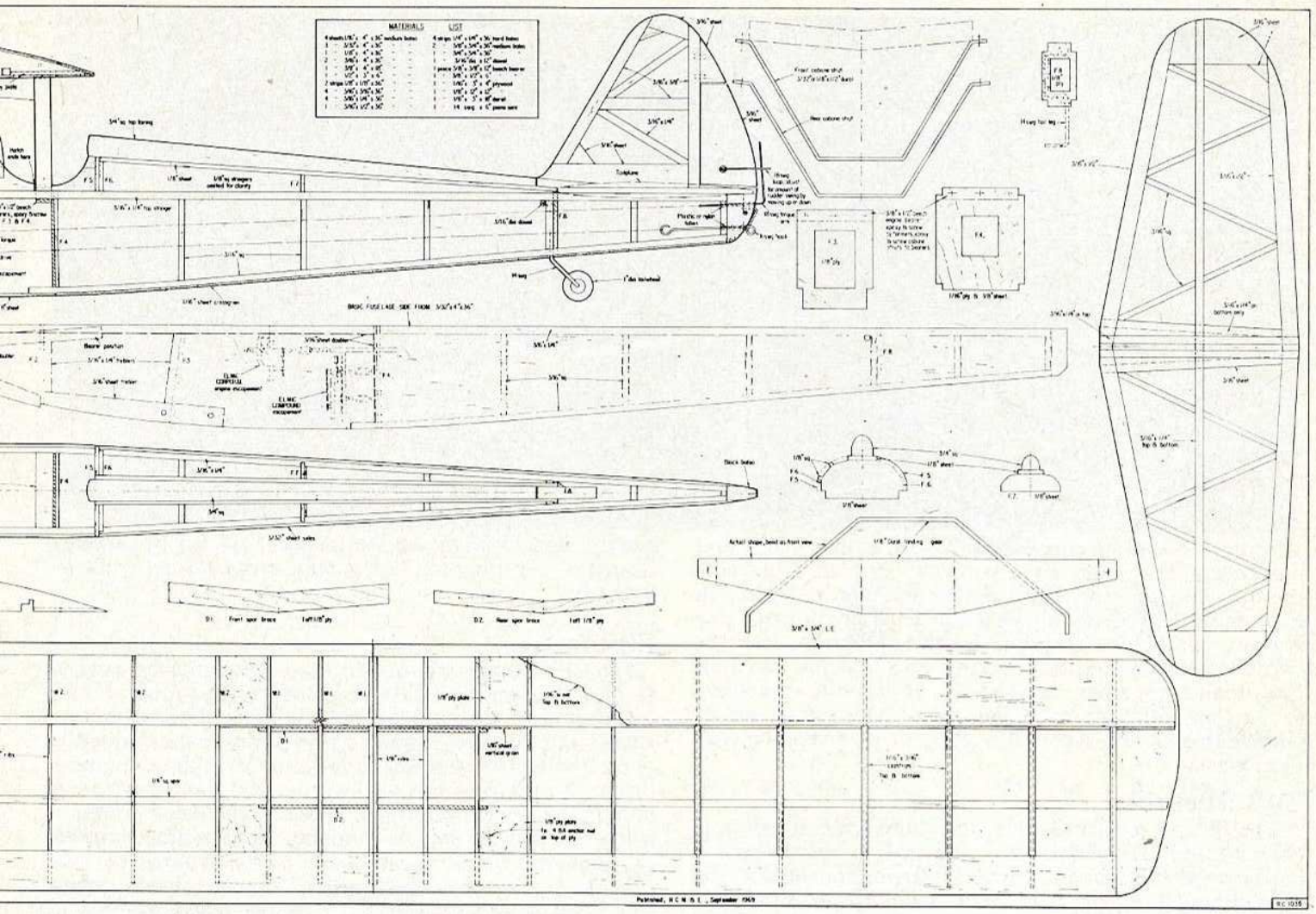
The 'Barnstormer' was designed with these aims in view and the prototype now in its third year of flying, has suggested that these aims have been fairly well met. With its parasol wing and open cockpit, the 'Barnstormer' is reminiscent of aircraft of the late 1920's and early '30s', an era when aeroplanes were full of character. One problem with parasol wing models is the formation of the carbane struts, this is usually overcome by using piano wire struts faired with balsa. The bending of the piano wire has to be accurate otherwise the wing seating is out of alignment and this problem alone is enough to frighten off many would-be builders. Dural flat strip material has been used for the carbane struts on the 'Barnstormer'; this material is easy to bend to shape (it is only bent in one plane) provided it is accurately marked.

One bonus in using a parasol wing is the high efficiency of the *total* wing area due to its 'clean' state and lack of fuselage/wing junction drag. Despite the relatively high (12–14 sq. ft.) wing loading, the glide is extremely flat and the position of the wing makes for a very stable configuration. Motor control is a definite advantage with this model if only to allow slow, low fly-pasts to take full advantage of the model's attractive appearance in flight. The only trouble encountered with the prototype was the firing of the carbane struts to the fuselage. After the model had been upturned in the long grass of our flying field a few times the struts were knocked off. The method of fixing the carbane struts has now been revised.

Take care in building the 'Barnstormer' both accurately and strong and you will be rewarded with months of faithful service and enjoyment. Select your balsa wood carefully, particularly with regard to fuselage sides and wing spars which should be carefully paired. Balsa for the fuselage need only be of medium weight as there is plenty of wood in the construction so the stressing is relatively low. I will describe the construction in reasonable length, so that a modeller with one or two models' experience should cope, without any trouble.

Fuselage

First, cut out the 3/32 in. fuselage sides, noting that a 36 in. sheet does not span the full length of the fuselage, but allows for sanding the nose and tail areas as shown on the plan. Mark on the sides, the positions of the doublers, formers, longerons, etc., and glue these in position. P.V.A. glue can be used for all parts except for metal to wood joints when epoxy adhesive should be used, also contact adhesive (Evo-Stik or similar) may be used for the large doublers. When the doublers, etc. are dry the engine bearers and treblers may be added. Glue and screw carbane strut bearers to formers F3 and F4,



also drilling the bearers to receive the carbane struts screws. Glue these formers to the fuselage sides and when they have dried, glue the remainder of formers and tail post in position, drawing in the fuselage sides at the nose and tail making sure the slope is equal on both sides. Note that the rear tail wheel leg should be bound and glued to former F8 before it is fitted. Cut and fix 3/16 in. sq. and 3/16 in. x $\frac{1}{4}$ in. crosspieces to rear of fuselage. The carbane struts may now be screwed and epoxied to the bearers followed by block top cowls, stringer, underside sheeting etc. When all is completely dry, and do not be tempted to rush things – the fuselage should be shaped and sanded rounding off the corners of the fuselage particularly around the nose.

The engine plate is cut from 1/8 in. sheet paxolin but note that the engine bolts must be of the countersunk type so that the plate will seat correctly on the bearers. I usually put a spot of epoxy adhesive on the head of the bolts where the seat goes into the countersunk hole of the paxolin plate. In this way the bolts will hold firm and allow the engine to be removed without unscrewing the whole plate. The plate is screwed to the bearers with four screws, preferably of the self-tapping variety for maximum grip. Sometimes after removing the engine plate once or twice, the screws become rather loose in the bearers and this can be cured by squirting a little P.V.A. or balsa cement in the hole, followed immediately by the screw, to obtain a tighter grip.

Use either a formed tinplate fuel tank or a 1 or 2 oz. polythene clunk tank, but whichever type is used, the area around the fuel tank, and the engine bay, should be liberally fuelproofed.

Should you be lucky enough to fly regularly from a tarmac area, it is quite acceptable to use a bolt-on undercarriage system, nylon bolts (4 BA) are best for this purpose as they will break under crash conditions. For normal grass flying conditions a removable undercarriage held on with rubber bands is more practical. Do not forget to fit the small spruce stops on the fuselage at the rear of the U/C as it prevents the U/C being knocked back into the softer balsa area.

Wings

The wings are made in two halves and joined by plywood dihedral braces. Although the wing has a semi-symetrical section, the rear lower part of the ribs are flat allowing the wing halves to be constructed on a flat building board. Commence by pinning down the lower 1/16 in. x $1\frac{1}{4}$ in. sheet trailing edge and the $\frac{1}{4}$ in. sq. lower spares (packed up on 1/16 in. scrap). Glue ribs in position followed by the $\frac{1}{4}$ in. sq. top spar, and also the 3/8 in. x 3/4 in. leading edge (packed up on 3/16 in. scrap). When the ribs have dried, the top trailing edge and leading edge 1/16 in. sheeting can be added. The 3/16 in. medium soft balsa sheet tips follow a line from the centre of the leading edge to the centre of the trailing edge. To achieve this line the rear spar must be cut away slightly at the tip and the rear of the 3/16 in. sheet tip sanded to fit between the 1/16 in. sheet trailing edge. Remove the wing half from the building board and cut, fit and glue the 1/8 in. ply fixing plates for the carbane struts. Screw and epoxy to these plates 4 BA anchor nuts to receive the carbane strut fixing screws. Note that the carbane struts fit directly up to the ply plates and the balsa under the fixing area must be recessed to receive the strut ends. The 1/16 in. leading edge underside sheeting, and capping strips can now be added, also the 1/16 in. vertical webbing between the first three ribs.

Shape the leading edge carefully with a razor plane and finally sand the whole of the wing half smooth. Construct the opposite wing half in a similar manner. Cut slots in the first three ribs to take the dihedral braces, a razor saw is most suitable for carrying out the operation. Join the two wing halves together making sure that the two root ribs make together accurately. It is not necessary to further reinforce the centre of this wing either with centre section 1/16 in. sheeting or by wrapping with fibre glass.

Tail Surfaces

The fin and rudder are of straightforward conventional construction. Diagonal 3/16 in. x 1/4 in. members are used on the tail plane to prevent warping problems, and 3/16 in. and $\frac{1}{4}$ in. spars top and bottom further stiffen the structure. When fitting the tail plane to the fuselage and the fin to the tail plane, cut away the fuselage and fin to receive the tail plane spars and not vice-versa.

Covering and Finishing

Nylon covering is ideal for the 'rougher' flying site but if you are a competent flyer operating from a tarmac area, then Solarfilm will give a quick finish and keep the weight down. Refer to photos of Luton Minors and Westland Widgeons if you want to do a 'full size' decoration job for that 'semi-scale' appearance.

Radio Installation

With the increasing number and types of radio control equipment available it is impossible to give precise details with regard to radio installations. The prototype first flew using a utilised Rx, escapement, battery arrangement as described in the *Aeromodeller*. Any form of single channel equipment should be suitable providing it works efficiently, and G.G. (using an elevator of 5/8 in. average chord) or two-function lightweight proportional will also fit the bill.

Flying

First, the usual reminders about free linkages, correct C. of G., no warps, 100 per cent operating radio, reliable engine and good weather. Test glides may be tried but for a model of this size, I prefer a low-power 'extended' glide. Have the engine running slowly (or if a glow engine is fitted, put the prop on backwards) and have a friend to launch the model into wind. If the model sinks gradually to the ground but has no tendency to turn greatly to left or right or to stall (a condition to be avoided like the plague), try another flight with about two-thirds power. The hand launch for the 'Barnstormer' needs to be level but fairly fast, as she has a slight tendency to sink a little before climbing away, if launched too slowly.

Turns to left and right present no problems providing a control is not held on too long. If it is, a spiral dive will result. Even if the latter condition is involuntarily achieved, a recovery can be effected by setting everything to neutral and waiting. (Providing one has sufficient height to spare, that is!).

The 'Barnstormer' has only limited aerobatic potential, i.e. comparable with full size aircraft of this style, and even if one could achieve sustained inverted flight it would not look 'right'. This is the sort of model to fly simply for the enjoyment of circling round and *looking* at the model, of the satisfaction in flying precisely and carrying out accurate landings. A final word to prove the efficiency of the wing position, the prototype 'Barnstormer' picked up a thermal, on dead engine, one summer evening, and it took quite a lot of persuading to come down.

Barnstormer is an attractive single channel model which gets away from the usual boxey appearance of sports R/C model. 52 inch span machine takes a wide variety of 2.5-3.5 c.c. motors. Prototype seen here uses E.D. Racer motor, and Staveley Tone-Lock radio.