Peter N. Scott reconstructs Col. C. E. Bowden's Famous 1935 Biplane

THE IDEA of building a replica of Col Bowden's 1935 *Mouse* biplane design originated in 1972 after locating a copy of F. J. Camm's *The Model Aircraft Book*. The design was shown in reduced 3-view form; after receiving a polite reply from Newne's that ". . . considering that nearly 40 years and a World War had passed since the book had been published," they could not supply full-size plans. Therefore the job of scaling-up the 3-views began.

That in itself was a time-consuming task; and for one reason or another, construction was not commenced until 1975, with the intention of entering the completed model in the 'Model Engineer' Exhibition. However, the problems involved in trying to safely transport the model from Switzerland to England were prohibitive, and so not until the Spring of 1976 were flight tests commenced.

At 4½lbs all-up weight, complete with Brown Jnr and an original Bowden-type *metal* prop (still legal in Switzerland), the *Mouse* flies slowly and sedately, and certainly re-echoes those early days at Faireys. Flights of reasonable duration are possible, thanks to the model's delightful ability to fly with the motor throttled back, in low-altitude circles around the operator – while the likelihood of thermal loss is small!

This 9cc petrol-driven model biplane was designed by Captain Bowden to be entirely dismantled and if a heavy landing is made the various component parts will get knocked off. We can refer back to the original article of 1935 to learn of its construction.

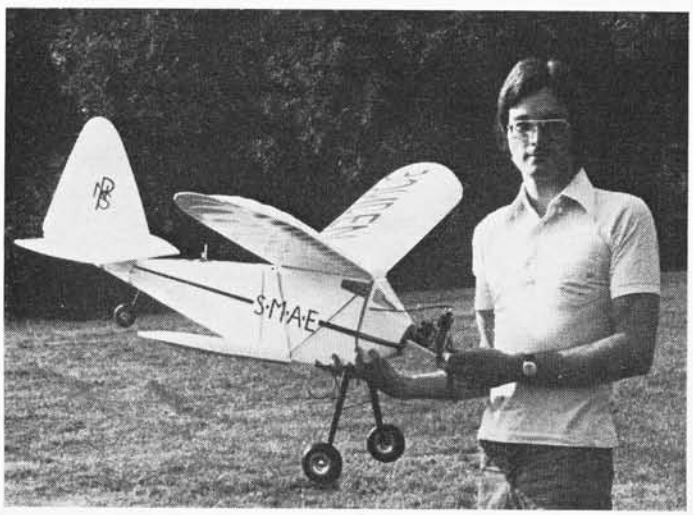
First of all a full-sized drawing should be made up, from the outline drawing, of the fuselage in side elevation, the wing and tailplane, taking great care to locate thrust line and angles of incidence of mainplanes correctly.

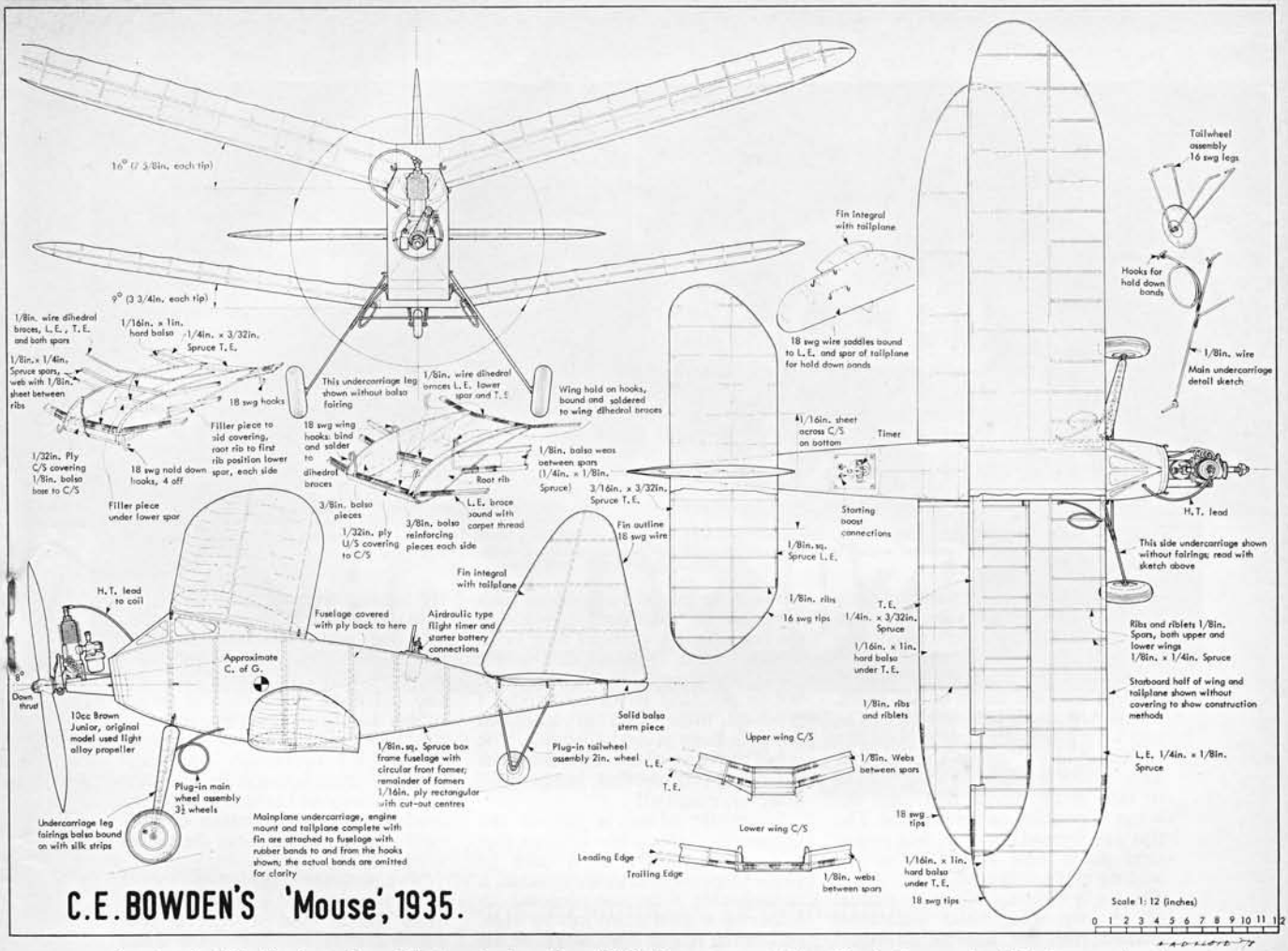
The fuselage formers are stuck and bound at their corners to the longerons. Nos 2, 3, 4 and 5 formers are all made of $\frac{1}{16}$in three-ply wood in the form of rectangles, the centres being fretted out for lightness, leaving rims of about $\frac{1}{2}$in. The distances between formers vary from each other. The uprights strengthen them and lie alongside the formers. Cross-pieces of $\frac{1}{8}$in$\times\frac{1}{8}$in birch are glued in to strengthen the tops and bottoms. The forward part of the fuselage is made very strong, as it has to take engine loads as well as undercarriage mountings.

The undercarriage requires two brass tubes to be bound and glued across the fuselage bottom at Nos 2 and 3. These tubes are of $\frac{1}{8}$in internal diameter to receive the wire prongs of the detachable undercarriage legs. Two smaller brass tubes across the fuselage at formers No 8 and No 9 accommodate the wire prongs of the detachable tail-wheel mounting in the same way. The undercarriage can therefore, alsobe taken off and floats fitted if the owner later desires to experiment with the model as a seaplane.

Next a small cabin must be erected on top of the fuselage to act as the platform for the top mainplane. The angle to the thrust line must be carefully adhered to in order to ensure the correct angle of incidence. The cabin is constructed by glueing two uprights of $\frac{1}{8}$in balsa across the top of the fuselage supporting a platform of $\frac{1}{8}$in balsa. Finally the cabin sides and a V-shaped front of 1mm ply wood with windows of thin celluloid are stuck around the cabin. Next the

Peter Scott who is also the secretary of the International Model Aero Engine Collectors Society based in Switzerland, holds his replica of Col C. E. Bowden's 'Mouse'.





C.E. BOWDEN'S 'Mouse', 1935.

front end of the fuselage, from No 1 former to 15½ins back, should be covered with 1mm three-ply wood.

The engine used in the original was the American 'Brown Junior' two-stroke of 10cc which weighed 6½oz, less propeller and mounting, but the tank, coil, and condenser add a further 5½oz. It was capable of between 4,000 and 5,000 rpm with a suitably low-pitched propeller.

The engine must be run in its upright position with cylinder uppermost. The motor is bolted to a circular disc of ⅛in ply, at the rear another piece of ply in the form of a square fits into the forward bulkhead of the fuselage, similar to a rubber model noseblock. Wire hooks are placed on the engine mounting and on each side of No 2 bulkhead of the fuselage, to allow rubber bands to retain motor. The coil and condenser are fixed to the floor of the fuselage inside by wiring retaining straps, and are positioned to the rear of No 2 former. Wires are led out to the engine with plenty of slack to allow the engine to be knocked off or taken off its detachable mounts.

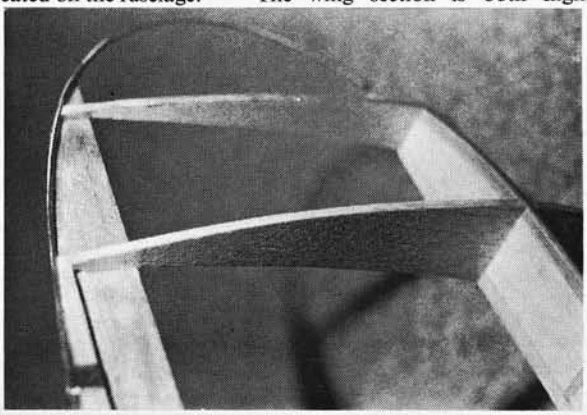
The timing mechanism to control the duration of flight is most essential. Wires must be carried back to No 6 former where the timer is fitted to the top of the fuselage. The action of screwing up or unscrewing the milled head controls the speed of the air-leak operating the 'dashpot'. Two sockets for the detachable plugs allow the model to start up from an accumulator on the ground.

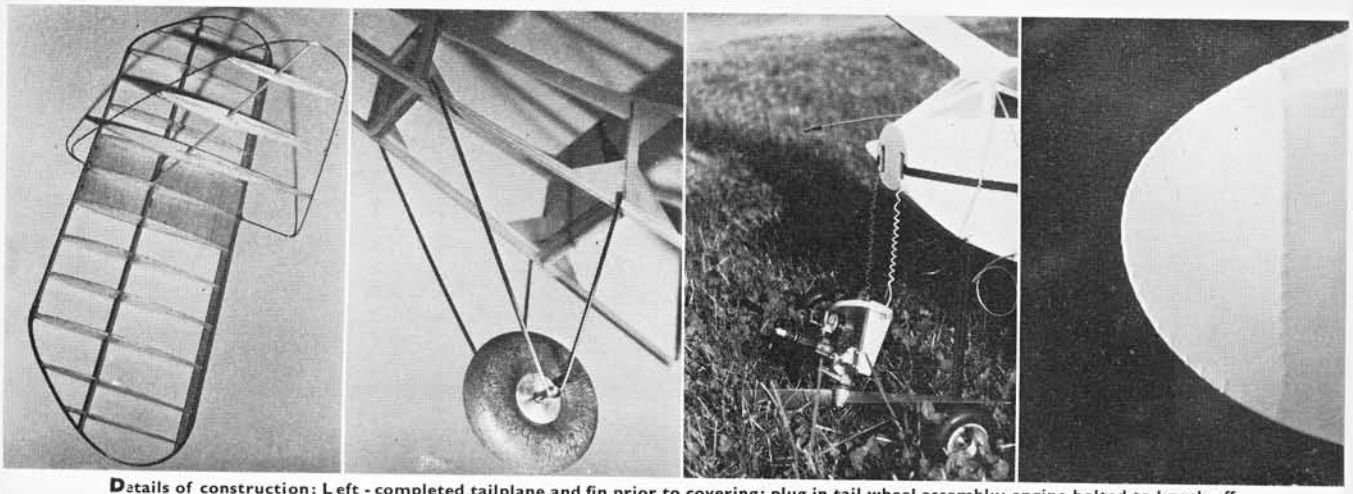
The two main undercarriage legs of ⅛in diameter spring steel wire are bent inwards at the tops to form prongs to place into the forward brass tubes already located on the fuselage. The bottom ends of the legs are bent outwards to form stub axles for the wheels. Elastic bands are used to keep the two legs tight against the fuselage. A cross-bar is carried between the legs, made of the same spring steel wire, and bound to the legs with florists' wire and soldered. From this point two rear spring legs are also attached, by binding and soldering, with their rear ends turned inwards for 1½in to form prongs to insert into the rear brass tube fitted to the fuselage.

The wing section is both high

¼ scale copies of the above drawing together with full size rib outlines are available as Plan PET/1346 price 60p plus 20p postage from Plans Service, PO Box 35 Bridge St. Hemel Hempstead HP1 1EE.

Right: Close up of 18 swg wire wing tips. The exceptional undercamber is clearly evident.





Details of construction: Left - completed tailplane and fin prior to covering; plug in tail wheel assembly; engine bolted to knock-off mount which is then elastic banded in place; stitching visible on tips and rib.

lifting and stable, and varies slightly for top and bottom wing, as each wing has a slightly different function in the design of this model. The ribs are kept of uniform chord, except at the tips and are made of $\frac{1}{8}$in balsa, riblets are used between ribs. The two wing halves are joined with the correct dihedral using shaped wire with hooks bound and soldered on, to take elastic bands that keep the wings in position on the fuselage. The tips are formed from 18 swg spring steel piano wire bound on to the leading and trailing edge and glued. The fin is built up of a wire outline of 18 swg wire, balsa streamline shaped ribs are inserted at equal distances, and is covered with silk on both sides.

The fuselage is a straightforward job to cover, but the wings, tailplane and fin are decidedly tricky. This is due to the heavily under-cambered airfoil section, coupled with the wire framework of the fin outline and wing/tail tips. The only solution is – as per the original – to stitch the silk covering to the fin outline and each wing/tail rib individually; this calls for considerable patience and yards of silk thread. One coat of full size glider dope was called for originally, but in practical terms with today's products three coats of undiluted cellulose dope proved adequate. The use of heavy weights to hold down the structure and prevent warping is, however, essential!

Since the writer is not of the apparently fashionable opinion that a model aeroplane need only be viewed from several yards distance, a considerable time was devoted to achieving a good paint job. A wide, soft brush makes light work of the large areas involved; rubbing down with ultra fine wet-and-dry paper (used wet and lubricated with soap) results in a good surface finish – but go easy over the rib profiles!

Trim on the original was red-on-white, whereas this replica uses black-on-white. Whilst purists may hate the name emblazoned across the wings, and the liberal use of transfers, the fuselage trim at least is authentic! One concession to modern materials was the addition of small local-reinforcement pieces of white 'Fablon'-type material around the wing and tail hook positions – a strong rubber band, on breaking, makes a lethal projectile as far as a piece of doped silk is concerned. The model when complete is assembled by placing the wings and tailplane upon the fuselage using elastic bands of sufficient strength to just bear the model when lifted by a wing.

No claims are made for this model to be 100 per cent unique – indeed Mike Beach had a replica (but differing in several important detail points) at the 1975 Bowden-Haggart meet. However the constructional details are identical to those of 40 years ago – and the result is an 'antique' model aeroplane which, whilst perhaps not an intrinsically beautiful design, does look like a 'Model Aeroplane'.

The completed model may well be familiar to British readers who have seen Mike Beach's version at meetings. Fablon patches used to protect the surfaces near band hooks, a useful tip which could be adopted for modern models!