

— THE AVRO CADET — TYPE 631 —

A 1/15 FULL-SIZE SCALE MODEL—24 in. SPAN

Designed by E. J. RIDING

This photograph is of the real machine. The engine is a 135 h.p. "Genet Major."

front cockpit and the fireproof bulkhead.

The centre section, supported by six steel tubular streamline struts in the form of two sloping "Ns," was placed well forward of the front cockpit, giving both occupants of the machine an excellent view upwards, in addition to giving easy exit in case of emergency.

The adjustable tail-plane was also of wooden construction and was actuated by handwheels on the left-hand side of each cockpit, which, through an arrangement of cables and a screw jack, raised or lowered the tail-plane, the whole being hinged about the front spar.

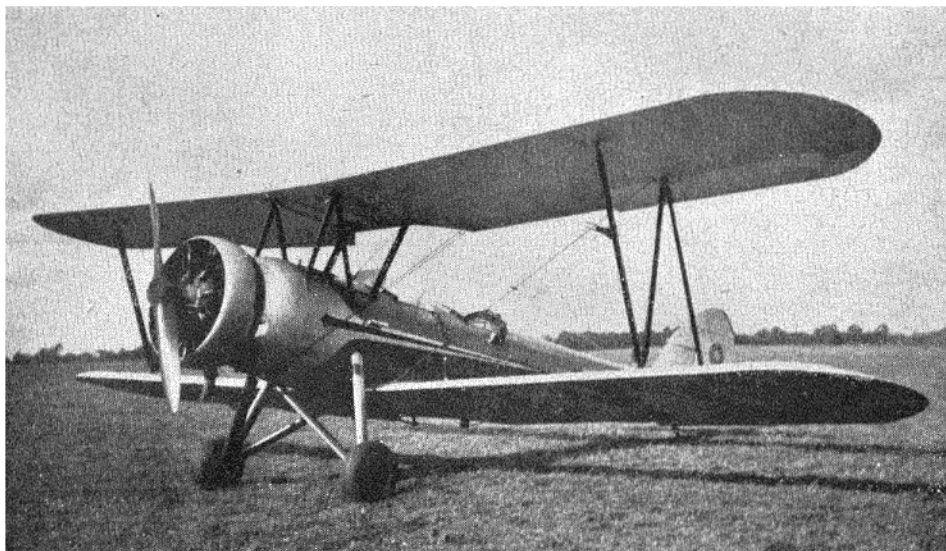
The Cadet's undercarriage was similar to that of its predecessor, the Avian, in that it was of split triangulated pattern, consisting of two shock-legs employing coiled steel springs, attached to the top longerons and braced fore and aft with streamlined radius rods; low-pressure air wheels were fitted. The swivelling tailskid was of leaf-spring pattern tipped with a cast-iron shoe.

With the Armstrong-Siddeley Genet Major engine, the Cadet could do 118 m.p.h. at ground level and 105 m.p.h. at 10,000 ft. The cruising speed was 100 m.p.h. and the landing speed 35-40 m.p.h. The duration at cruising speed was about 3½ hours.

Photographs of the 631, 638 and 640 appear elsewhere in this article. The presence of the Townend Ring on two of the machines illustrated is explained by the fact that the photographs were taken prior to 1936; in that year an Air Ministry Notice to Ground Engineers and Aircraft Owners (No. 34 of the year 1936) ordered all Townend Rings fitted to Avro Cadet aeroplanes with Genet Major I and Ia engines to be removed, in order to facilitate adequate cooling.

INSTRUCTIONS FOR BUILDING A 24 IN. SPAN SCALE MODEL.

The model described in these pages is built to a scale of 1/15 actual size. This scale was chosen for the convenience of making a 24 in. span model, and although the following description refers to a non-flying built-up type, so as to incorporate as much internal detail as possible, "solid" modellers will find no difficulty in building the machine to their own requirements, as the dimensions apply to both methods. No doubt the majority of scale modellers have their own particular scale to work to, in which case the three-view general arrangement drawing can very easily be scaled down to suit their requirements.



Commence construction with the fuselage framework shown in Fig. 1. The side elevation of this framework should be drawn out on white paper pinned to a conveniently flat surface and covered with a sheet of grease-proof paper. The longerons, made from $\frac{3}{32}$ in. dia. birch dowelling or any similar material, are pinned into position on the drawing. The vertical and diagonal cross-members and compression struts are then cut to size and cemented into place. When the frame has set, repeat the operation for the opposite side of the fuselage.

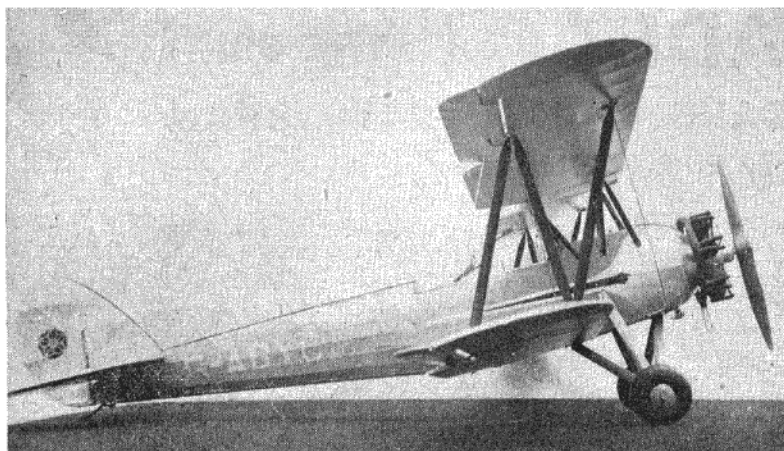
The two frames are then joined together with top and bottom cross-members of $\frac{3}{32}$ in. dia. birch dowelling, checking periodically for squareness.

In assembling the frames it is essential to refer constantly to the dotted outline in the plan view on the general arrangement drawing to obtain the correct taper on the fuselage.

Whilst the fuselage is setting, work can commence on the cockpit decking. This is constructed in one piece, which runs from the front bulkhead to just behind the rear cockpit. It is almost semi-circular in shape and is made of either smooth white card or $\frac{1}{32}$ in. balsa sheet bent over six formers, as shown in Fig. 1. The cockpit openings are cut out and the completed decking cemented into position on the top longerons.

Cut out the almost circular front bulkhead from 0.5 mm. ply or $\frac{1}{32}$ in. hard balsa and cement it into position flush with the front end of the fuselage for guidance when fitting the stringers.

It will be observed that the fuselage is roughly circular in cross-section at the front bulkhead, changing through various degrees of ovality until it reaches the sternpost, where it is virtually slab-sided. Aft of the rear cockpit there are 15 stringers, distributed evenly round the back and sides of the fuselage, and two additional ones running the whole length of the underside. Owing to the slight variations that are bound to occur when individual modellers apply their



The fine workmanship of the wing coverings may be seen in this photograph of Mr. Riding's model.

own particular methods of construction to a job of this nature, I have omitted to give separate scale drawings for any of the stringer supports. Provided there is close adherence to the three-view diagram, they can soon be drawn out on 0.5 mm. ply or $\frac{1}{32}$ in. hard balsa sheet and trimmed to an exact fit on assembly. Admittedly, this is the hardest job of the lot. The stringers themselves should be made from fairly stout material, in order to preserve the shape of the fuselage after doping. $\frac{3}{32}$ in. by $\frac{1}{16}$ in. spruce is recommended.

The completed fuselage is covered with superfine Jap tissue and treated with two coats of clear, followed by two coats of whatever pigmented dope is required.

The engine cowl, roughly hemispherical in shape, can now be cut to shape from a block of hard balsa, or, if facilities permit, it can be spun from 22 s.w.g. aluminium sheet. The engine is built up from balsa dowels wound with black thread, seated on a crankcase of hard balsa; rocker boxes and push-rods, of which there are two to each cylinder, are added, and the complete engine mounted on the nose cowl. Carve the airscrew from a block of mahogany, $5\frac{1}{2}$ in. by $\frac{3}{4}$ in. by $\frac{1}{2}$ in., and mount on a spindle of 20 s.w.g. piano wire pushed through the centre of the crankcase. An aluminium face-plate and pin heads to represent bolts will add to the appearance of the model.

The undercarriage legs and radius rods, made from 20 s.w.g. wire and faired with balsa, are fitted in position as shown in Fig. 1.

The wings are drawn out on paper as in the case of the fuselage. Ribs are cut from $\frac{1}{16}$ in. or $3/64$ in. balsa sheet to the rib template shown in Fig. 5, and threaded on to the two spars of $\frac{1}{8}$ in. by $\frac{3}{16}$ in. and $\frac{1}{8}$ in. square spruce or hard balsa and pinned into position on the drawing. Leading and trailing edges are made from $\frac{3}{32}$ in. dia. dowel and $\frac{1}{16}$ in. by $\frac{3}{32}$ in. spruce respectively and cemented into position. Wing tips are made either from 20 s.w.g. wire or $\frac{1}{16}$ in. dia. reed. Details of the Frise type ailerons are shown in Fig. 2.

Similarly, the tail-plane, fin and rudder are drawn out and assembled, using $\frac{3}{16}$ in. by $\frac{1}{8}$ in. spruce for rear spar, sternpost and rudder spar, $3/64$ in. or $\frac{1}{16}$ in. balsa sheet for ribs and riblets, and reed for trailing edges.

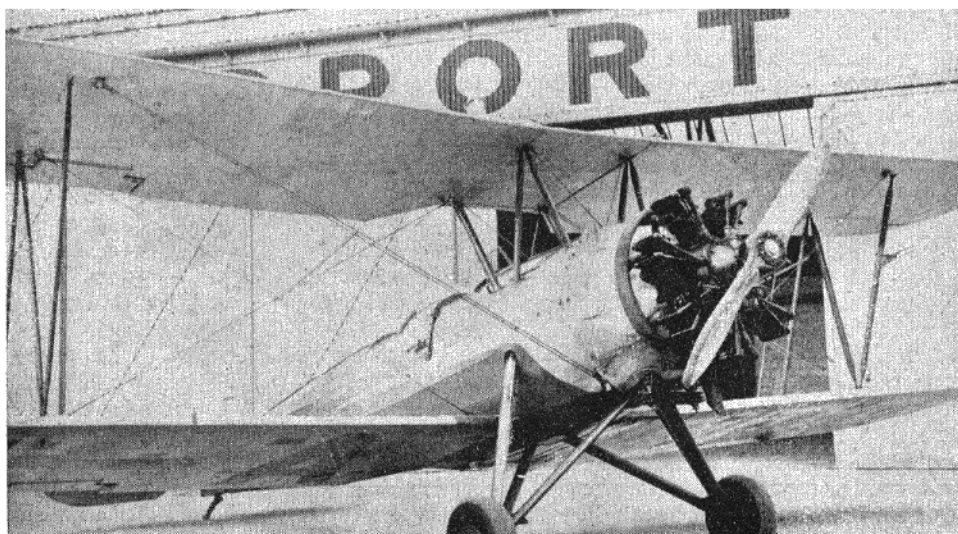
All the flying surfaces are covered in the same way as the fuselage with superfine Jap tissue, given two coats of clear and two coats of silver dope. Details such as tailskid, pitot head, venturi head, windscreens, etc., may be added after the final coat of dope.

The method of attaching the wings to the fuselage or top centre-section is shown in Fig. 3, and it is recommended that all four wings be fitted on to top and bottom centre sections before fitting the interplane struts.

Cut the interplane and centre-section struts from $\frac{3}{16}$ in. by $\frac{1}{16}$ in. spruce and sand to a streamline shape. The method of fitting these struts, and also the bracing wire lugs, is shown in Fig. 4.

A few suggestions about colouring may be of help. The aero clubs mentioned in the beginning of this article adopted special colour schemes of their own; for instance, the Lancashire Aero Club, York County and Bristol and Wessex Aero Clubs all had their machines painted royal blue with silver engine cowlings, lettering on the fuselage, and silver flying surfaces, with black lettering. Airworks Ltd.'s aircraft had white fuselages with green letters, and those of Air Service Training Ltd. black with white letters. The model illustrated is one of the Lancashire Aero Club's machines and is painted in their colours, i.e. blue fuselage, red struts, silver flying surfaces and the red rose insignia on the rudder.

The registration letters are G-ABYC (C. for Charlie!), and are painted in silver, $\frac{3}{4}$ in. high and $\frac{1}{2}$ in. wide, well down towards the rear end of the fuselage. The letters on the wings are black, 3 in. by 2 in., spaced $\frac{3}{4}$ in. apart. On the top wings the G-A is painted on the top surface of the port wing and the BYC on the starboard wing, and vice versa on the underside of the lower planes, with the tops of the letters adjacent to the leading edge.



Here is a "close-up" of the full-size machine, showing details of the undercarriage, oil cooler and engine.