1/6 SCALE

The British Aircraft Co. Ltd, was founded by Mr. C. H. Lowe-Wylde in 1930 and the company set up a factory to manufacture sailplanes at Maidstone, Kent. On the 4th January of the same year he also founded the Kent Gliding Club and designed the B.A.C. I primary glider which was built by the members of this club. The company built eight further types to his designs during 1931-32, most of these being built at the Maidstone factory.

Lowe-Wylde also pioneered the development of auto-tow launchings from flat gliding sites and gave many demonstrations of this around the country, a lot of these being with Sir Alan Cobham's Flying Circus. In 1932 a B.A.C. VII two-seat tandem sailplane was converted to power by deleting the rear cockpit and mounting a Douglas Dragonfly flat twin motor cycle engine over the wing driving a pusher propeller; this type was named 'The Planette'. Unfortunately on 13th May 1933 Lowe-Wylde was killed whilst flying a Planette when he side-slipped into the ground from 400ft after being taken ill in flight.

The company was then taken over by the Austrian sailplane pilot Robert Kronfield – the first pilot to contact a thermal and use it to get away from the hillside by flying in circles! Kronfield revised the Planette design and renamed it the 'Drone'; he also moved the factory to Feltham, Middlesex where he built 28 drones and one Kronfield monoplane (a revised Drone) before closing down the company in 1937.

Our subject, the B.A.C. IV was designed in 1930 and was a single-seat secondary sailplane with a span of 40ft 9in, a wing area of 184 sq.ft. and weighed only 200lbs – a touch over 17oz per sq.ft.! As far as I can ascertain only two were built and were given B.G.A. Nos 181 and 255, though where they went to and whether they still exist I have not researched to date.

This then is the background to the B.A.C. IV which I chose to model for its simple lines, the fact that it is a vintage wooden type and I just plain liked the looks of it! The scale of 1/6th was chosen because the slopes available to me are quite small and a small, nimble model is a lot easier to fly in the limited lift available, especially when a lot of other models are airborne.

A few deviations from true scale have been taken in the interests of efficiency. These are a slightly longer nose to save adding weight to balance, top hinged ailerons to seal the gaps, an all-moving tail and a modern E 193 wing section. The model as drawn has coupled aileron-rudder and elevator control on two functions; however there is room for a third servo if you wish to operate the rudder separately and do your own coordinating. The torque tube aileron drive is a little unusual though quite effective and easy for rigging; it could probably be replaced by micro servos in the wing if you have them and wish to do so. And so to construction...

A 78in. span near-scale vintage glider by Tony Mellor

Fuselage

Cut two sides from 1/16in balsa (firm, springy sheet please) and pin and glue the 1/8in square balsa edging longerons and the rear diagonal framing in place. Make sure you have a pair! Now fill in the front section with 1/16in sheet balsa, grain vertical to form a balsa two ply. While this is drying cut F1-F2-F3 and F4 from 1/8in ply taking care to get the slots in F3-4 really accurate, and face F3 with 1/16in balsa sheet. Also make a W1 rib template with holes positioned for wing mounting tubes and torque tube. This can then be used not only for root ribs but also to position the holes in the P1 pylon pieces. These can now also be cut from 1/8in ply.

Glue F3 in position on one side and, when dry, add the other side, packing up parallel until dry. Remove from the building board and glue F4 in position. Draw together the tail end and glue in the 7/16in x 3/8in fin post. Check for correct alignment and leave to set. Glue F1 and F2 in position plus the 1/8in balsa fin false leading edge and all other formers along the rear decking. A couple of 1/8in square spacers across the fuselage top rear are also needed and a few along the fuselage bottom will help to hold the shape whilst sheeting.

Cut and fit the nose sheeting former between F1 and F2 and the 1/8in square spine. The servo mountings can now be fitted and the balsa infill between the sides in front of F1. Fin sides are from 1/32in ply; cut to fit and drill a hole for the A.M.T. horn bearing plus the curved slot and do a trial fit with the horn to ascertain the cut-out required in the fin post. When satisfied all is well glue them in position. Fit the P1 pylon pieces now and thoroughly check alignment with tubes and wires through the holes before leaving to set.

All control systems can now be fitted, a little time spent here to make a really slop-free smooth working set-up will pay dividends later when flying. Both square and round telescopic tubing is available at most model shops these days and finds a lot of use in my models. Be very careful to ensure you have the rudder cables installed so that the rudder operates with and not against aileron – servo reverse will not get you out of this one!

I filled the ends of the aileron drive torque tubes on my model with small pieces of

B.A.C. IV

aluminium and filed them to a point to assist assembly of the wings; a piece of hardwood would probably work just as well. Cut the skid from 1/2in x 3/8in hard balsa and fit and glue in place the 1/16in ply strut mounting plate sanding flush with skid sides when set. The skid can now be fitted into place and glued in. We can now fit the bottom sheeting; this is 1/16in ply from F1 to F3 and 1/16in balsa with the grain across the fuselage for the remainder. Grade it lighter towards the tail end and don't forget the 1/8in square spruce tail skid.

A piece of 1/32in ply is wrapped around the nose and makes a really tough finish to this area – you may need to steam it to shape though! Nose sheeting is 1/8in balsa with the grain from sides to middle; apart from some careful cutting and sanding of angles this is quite easy. Don't round off the apex of the 'V' or sides too much though, the full-size would probably only have been 1/16in ply sheets edge to edge! The rear decking is similarly sheeted, only this time with 1/16in balsa sheet. Go carefully with the sanding here too. Fill in the fin top between sides with 1/8in sheet and fit the leading edge, carefully sanding to fit at the bottom. Finally face the top edge with 1/32in ply. The space between the P1 pylon pieces can now be filled in with balsa, not forgetting a piece of 1/8in ply at the rear to stop compression.

Now epoxy in the 8 swg brass tubes for wing mounting, and make a couple of brass sheet right angle brackets for strut attachment and bolt in place through the skid with 8 BA bolts. The pilot (the one in my model is a cut down Cindy doll!) will need a 1/8in ply base and a couple of 1/8in square runners to sit on. Mine is held in place with a piece of Velcro tape which seems to work well. There is no windscreen, pilots were hardy in those days, so apart from finishing sanding the fuselage is now complete.

Rudder

The rudder is the next part needed as this completes the fuselage assembly. Simply pin the outer frame in place over the drawing, packing up the trailing edge 3/16in to centre it with the leading edge. Cut all ribs by measuring the length from the drawing and tapering from 1/2in to 1/8in over this length and glue in place. When the glue is dry remove from the plan and fit the rudder horn plus the 1/32in gussets. Finally, sand the whole assembly to finished profile and fit the hinges to the rudder and fin post; don't glue the hinges in place till after covering.

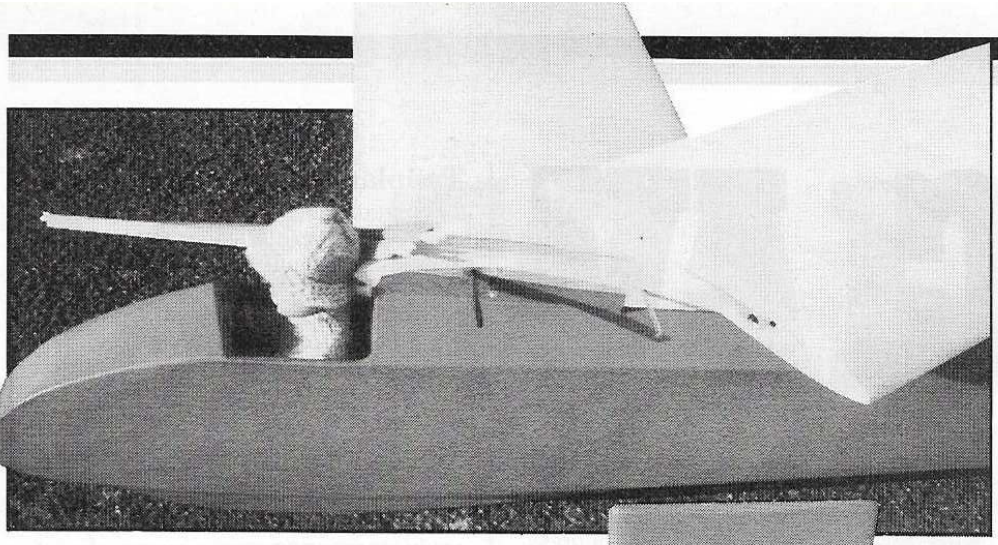
Tailplane

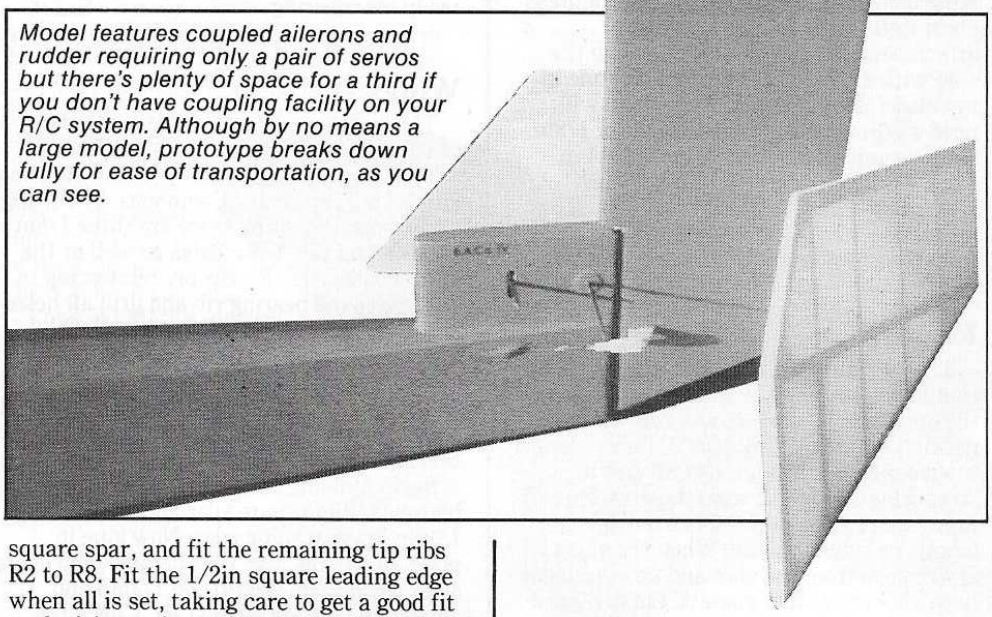
Both tailplane blades are identical and can be built over the same drawing. The main frame is built from 1/4in square balsa with 3/8in x 1/8in balsa trailing edge. This needs packing up to 1/6in during building. The ribs are from 1/8in x 1/4in balsa; glue them in place plus all gussets and sand the rear portion down to the 1/8in trailing edge when all is set. Next drill holes for the 14 swg aluminium mounting tubes and epoxy the tubes in place. Do this very carefully if you want a true tailplane! Finally, face the inner edge with 1/32in ply and finish sand ready for covering.

Wings

The wings are of entirely conventional construction with balsa spars, which are buried beneath the airfoil by 1/16in sheeting and 1/16in cap strips. Commence by cutting all ribs needed noting there are three 1/8in ply ribs and two 1/8in balsa as well as the 1/16in balsa ribs. Fit the ply reinforcing to the torque rod bearing rib and drill all holes needed in the root end ribs using the R1 template rib made earlier to position these. The torque rod holes in the inboard ribs and root facing rib are left oversize as this end of the torque rod is supported by the pylon bearings when assembled.

Begin building by pinning down the bottom 3/16in square spar and the 1in x 1/16in lower trailing edge. Now glue in place all R1 ribs. Cut the aileron 1/16in facing spar, packing up the tip end 1/16in and glueing in position against R1. Check the straight edge is on top! Pin in place the lower tip spar (1/8in x 3/16in balsa) scarf jointing where it joins the main 3/16in





Model features coupled ailerons and rudder requiring only a pair of servos but there's plenty of space for a third if you don't have coupling facility on your R/C system. Although by no means a large model, prototype breaks down fully for ease of transportation, as you can see.

square spar, and fit the remaining tip ribs R2 to R8. Fit the 1/2in square leading edge when all is set, taking care to get a good fit at the joint and centring on the ribs to allow for 1/16in sheeting top and bottom. Cut and fit the 1/8in balsa tip and glue in place the top 3/16in square and 3/16in x 1/8in front spar fitting spar webs as indicated. Glue in place the top rear 3/16in x 1/8in spar and top 1/6in sheet aileron subspar top sheeting and leave to dry.

Installation of the control torque rod, bellcrank and snake can now be done, again take care to make a smooth working system. Fit the 8 swg wing joiner tube and the 10 swg incidence tube and epoxy in place. Do a final check on the control system and, if all is well, sheet the leading edge back to the spar with 1/16in sheet, and the root area. Glue cap strips to all ribs and fit the top tip braces then leave to thoroughly dry.

Remove from the plan and place back on the building board upside down, packing up as necessary to support in a true attitude. Don't forget the tip has a small amount of washout built in! Fit the bottom 3/16in x 1/8in rear spar and sheet the bottom leading edge and root. Cut and glue in place the bottom aileron subspar 1/16in sheet and fit capstrips to all remaining rib areas. Glue in place the tip braces and, when all is set, remove from the building board. Now for the dusty bit! Carve the leading edge to profile and sand the entire structure smooth. To finish the wing only requires the addition of the ply root facing rib and making a couple of brass sheet strut attachments. If these are made about a 1/4in wide and a lot of small holes drilled where they sit against the ribs, epoxy will hold them quite well without screws or bolts. Don't forget the ply reinforcing gussets inside the cap strips at the bottom. The aileron is simply carved and sanded from 1/2in soft balsa and frequent offering up to check fit and profile will soon produce this. A piece of masking tape for a temporary hinge also helps quite a lot here. Repeat all of this for the other wing noting that the aileron bellcrank is reversed this time to give one up and one down aileron!

Covering

The structure can now be covered. I used Solartex on my model as this is not only very tough but also gives a scale-like texture to the finish. Cover the fuselage and fin separately and glue in the hinges afterwards. You can then fit the control cables, preferably with adjusters and clevises to the rudder horn and check operation. Tail blades are the simplest job but don't overshrink or warps and pulled in tips will result. Wings are straightforward but do cover the inside edge of the aileron, the inside hinge and the aileron bottom first. Now with the aileron part hinged to the wing, cover the bottom surface of the wing and finally the top surface - this also completes the aileron hinge, of course. A slit at the tip where the tip curves down will allow free movement, the rest being fully sealed by the hinge.

Rigging

Cut the 8 swg and 10 swg piano wire wing joiners, rig the model and make the struts from 1/2in x 1/4in spruce. Sand these to airfoil section and drill a 1/8in hole about 3/8in deep one end. Epoxy a plastic clevis into the hole and clip onto the wing fixing to check the length. Cut off, drill this end 1/8in and and epoxy in another clevis; check on the model for length and if all is well make another three. Make a good job of these as they do carry some of the flying loads. I always carry a couple of spares when flying, in case a bad landing breaks a clevis.

While the model is rigged fit a clevis to the aileron snakes and check aileron operation too. Did you get it right? Right stick should produce right aileron up and left down when viewed from the rear, also right rudder. The tailplane is rigged by two pieces of 14 swg piano wire through the all-moving tailplane horn and into the tubes in the blades. A little kink in the wires will stiffen things up if they are loose in the tubes. Check correct operation (tailplane trailing edge rises with stick pulled back and lowers with foreward stick). The kink in the wires trick will also work with the wing mounting wires but alternatively a length of insulation tape not only holds wings on but also seals the gaps! Apart from checking the centre of gravity position (with the radio installed of course), you have a B.A.C. IV ready to fly. Mine came out dead right with no weight needed - the fact that a standard battery pack will fit sideways across the nose no doubt helped quite a lot!

Flying

If you have a little aileron experience handling this one should give no problems. The coupled rudder-aileron gives smooth precise turns which are a delight to observe and fly, and the elevator control is very positive. When flying light lift, I often switch to half rates, the control being well up to scratch at this even for my slow reactions! The model has shown no bad habits to date, the stall is quite gentle and easily recovered. However, don't try to fly turns too slowly or you may provoke a tip stall, again easily recovered but rather scary when scratching the slope edge. Vintage scale models do tend to slow up rather quickly during manoeuvres and a turn is just that.

Soaring performance is good, the model gaining height easily on my local slopes in winds of 8-10 mph and thermals will take her up quite easily. Wing overs are quite possible and loops are easy enough but make sure you have plenty of speed before pulling up. Roll reaction is very quick but I haven't had the heart to roll her all the way, though I'm sure she would. Landings are easy on the large skid and seem to float on for ever if the approach is too fast, a well judged turn in being essential if the landing space is limited - no airbrakes on this one!

Vintage scale sailplanes seem to be gaining in popularity (the Long Mynd Fly-in last year had 11 vintage to 12 modern) and they certainly look different in the air compared to modern glass fibre creations. The B.A.C. IV will not cost you a fortune to build, fits easily in the car and still leaves room for a second model plus the family.

See you on the slopes!