Bleriot XI

DESIGNED BY DAVID BODDINGTON

Classic model from the pioneer days of aviation. For 2 or 3 function R/C systems and .15-19cu.in motors

WHEN designing and building model aeroplanes is your business, as well as your pleasure, it is possible to become stale and loose your desire to build models in your spare time. Occasionally, very occasionally, this happens to me as it did a few months ago. The malaise did not last too long and what brought me out of this unnatural state was the designing of a series of vintage scale models. Shortly to be screened was the T.V. Series 'Flambards' and we had so much pleasure building and flying these models that I decided to draw them up in miniature form for 2 or 3 function radio and .15 and .20 engines.

Presented here is the *Bleriot XI* but I have also built the *Blackburn 1912* Monoplane and the 2 seat *Blackburn*, 'Mercury' type monoplane. Having also designed ¼ scale versions of the *Bleriot* and *Blackburn 1912* you will realise how much I am 'hooked' on them. I must confess that before the 'Flambards' contest came along I hadn't contemplated building this type of model, the 1914-18 war period was more my scene. Now I know what I have been missing. The models offer great rewards for the model builder and they are charming to fly with a real vintage aerial flavour.

One word of warning, if you are genuinely a 'put it together tonight and fly it tomorrow' modeller then I suggest you pass this one up and have a look at the foam/glassfibre adverts. On the other hand, I know from the response to WWI free plan issues that many of you do enjoy a building challenge so this one's for you. As a matter of interest I started building my *Bleriot* in my spare time on a Saturday morning and it was completed, apart from covering and radio, by the Sunday of the following weekend. When I say spare time I do mean dedicated spare time and the family didn't see too much of me during this period. However, as the construction period included building the wheels and undercarriage from scratch it does prove that it is not so time consuming if you get stuck into it.

To ease the modellers load, and to supply some of the more difficult to obtain items, I am offering an accessory pack for those of you who prefer not to go it completely alone.

The *Bleriot* type XI first flew in January 1909 and was, of course, famous for becoming the first powered aircraft to fly the channel in July of that year. It was probably the most successful aeroplane of its era and was produced in large numbers and there were many versions of the type XI. The version presented here is not the earliest one but represents a model used by a number of countries both for civilian and military purposes. In addition to the single seat *Bleriot XI's* there were also two and three seat versions and some using a parasol wing.

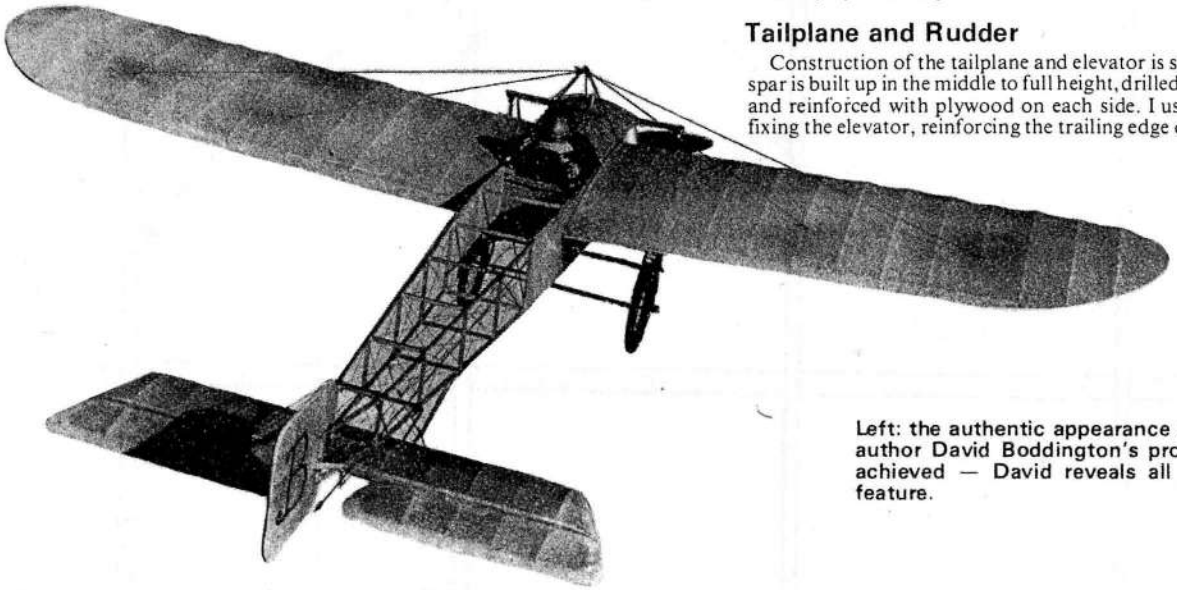
Construction

Before talking about the actual building, a word about materials. The open structure of the fuselage *is* strong enough, providing you are careful with the selection of materials. There is ⅛in. sq. (3×3)mm) spruce *and* ⅛in. sq. spruce. Pick the wood that is slightly oversize rather than under, and do select straight grain material of approximately equal pliability. You will note that beech is specified for the undercarriage upright and horizontal members. I know that this size is not readily available at the model shops (it is provided in the accessory pack) but your local timber merchant will probably cut some for you if you speak nicely to him. Sprue can be used in lieu of beech but it is not quite as strong — nor does it have the character of beech. Wing ribs, there are a lot of them, should be from medium stock with the hardest examples retained for the root ribs. On the prototype model I made the mistake of using nylon monofilament line for the fuselage bracing and although this is a nice material to work with it is too flexible. The bracing does add a lot to the rigidity of the fuselage and I would suggest using strong black thread (i.e. Blakes Button thread) and not the ordinary sewing thread. Laystrate wire or fishing trace line is too stiff to bend on a model of this size.

The position of former F2 can be adjusted to suit the spacing of the servo bearers, there is ample room for three servos to be fitted side by side. Between former F1 and F2, and below the fuel tank, is situated the receiver and battery (250 MAh size) and, again, there should be sufficient room for most modern receivers. If you are a bit cramped for space I would suggest lining this compartment with thin foam *rubber* instead of trying to wrap the individual items. On the prototype I used a *PAW 19* diesel engine — now available with R/C throttle — as diesels have the ability to swing large props (11in. ×4in.) at moderate revs. This both looks right and sounds right. A glomotor would work equally well but check off the spacing of the bearers and the carburettor position. It will be necessary to use a small dumpy silencer with a glo-motor but a moderate reduction of power will not be of any significance. No additional nose weight was needed on the original, despite the small nose moment, but if this situation occurs with your model it is possible to move the batteries forward to a position under the engine. Naturally, they will require protecting from oil and fuel by wrapping them well in polythene bags.

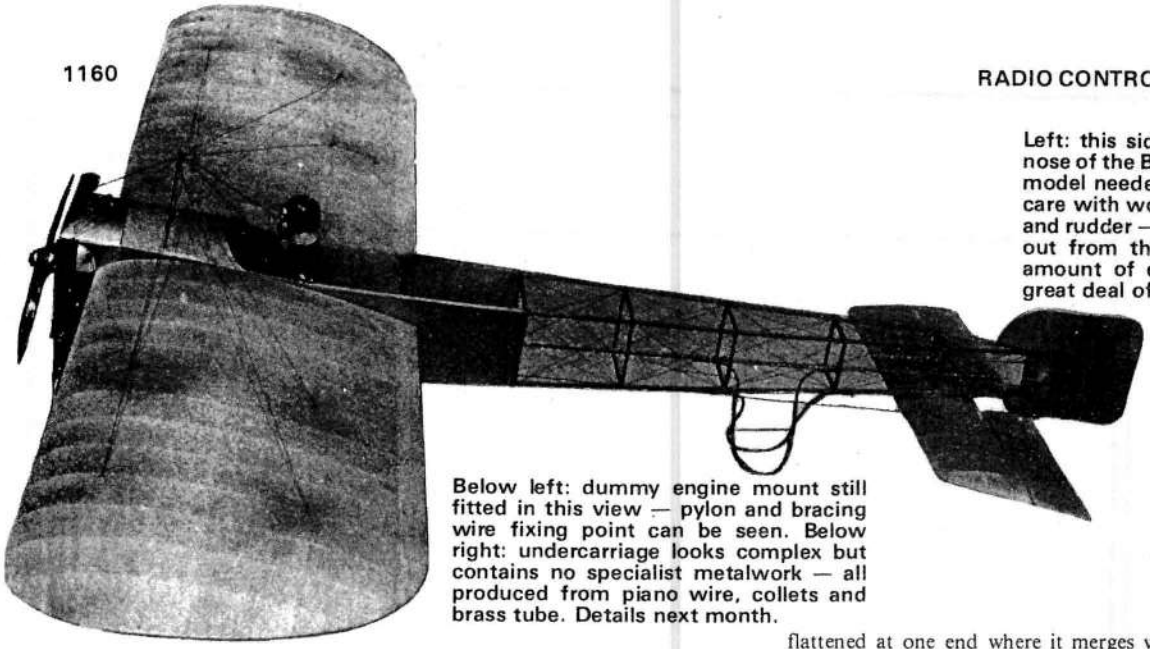
Tailplane and Rudder

Construction of the tailplane and elevator is straightforward. The centre spar is built up in the middle to full height, drilled for aluminium tube sleeves and reinforced with plywood on each side. I used mini barbed hinges for fixing the elevator, reinforcing the trailing edge of the tailplane and leading



Left: the authentic appearance of the covering on author David Boddington's prototype was easily achieved — David reveals all in Part 2 of this feature.

CHRISTMAS FULL-SIZE PULL-OUT PLAN PART 1



Left: this side view emphasises the short nose of the Bleriot. Although the prototype model needed no ballast in the nose, take care with wood selection for the tailplane and rudder — they are mounted a long way out from the balance point and a small amount of excess weight will require a great deal of balancing out.

Below left: dummy engine mount still fitted in this view — pylon and bracing wire fixing point can be seen. Below right: undercarriage looks complex but contains no specialist metalwork — all produced from piano wire, collets and brass tube. Details next month.

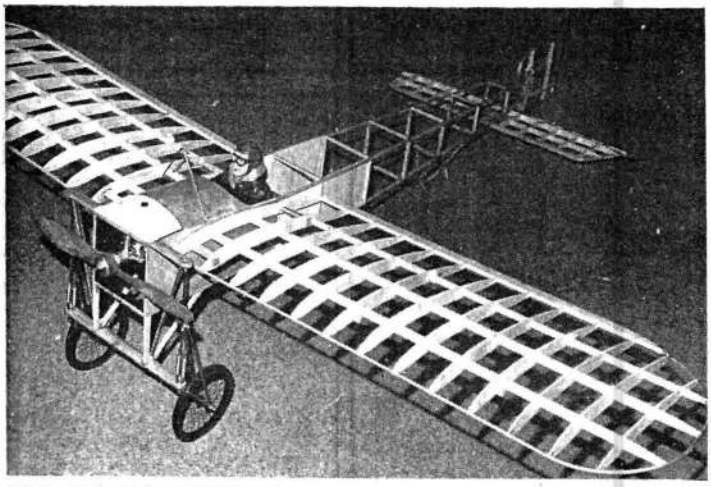
edge of the elevator at these points with pieces of ¼in. sq. (6mm) balsa. Form the outline of the rudder by laminating with three layers of .8mm plywood or alternative layers of .4mm plywood and 1/32in. (.4mm)balsa. Pins fixed at regular intervals around the inside of the fin outline will act as a former for this operation. Dampen the .8mm ply strips before laminating makes them easier to bend. When the basic construction of the rudder is complete taper the ⅛ × ¼in. (3 × 6mm) uprights and crosspieces to blend in with the laminated outline. The rudder horn should be fitted after covering.

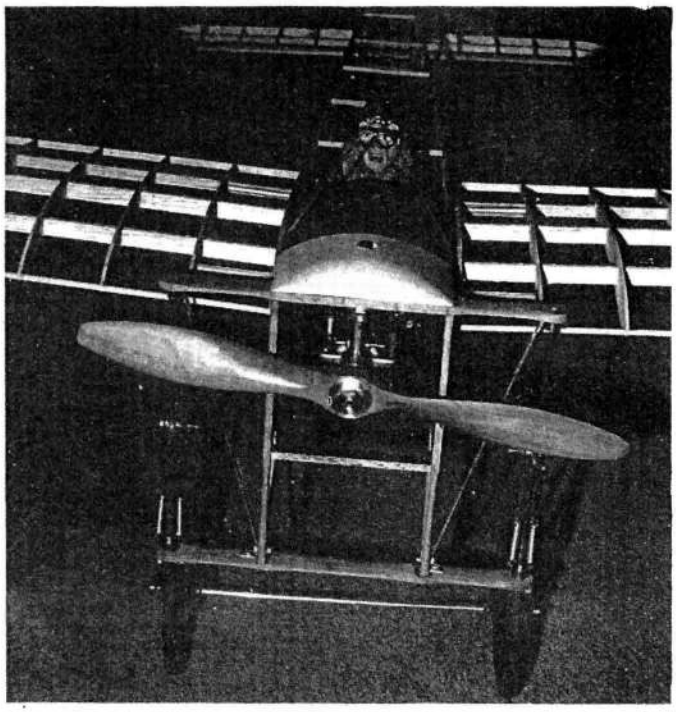
Wings

Cut all of the wing spars and trailing edges accurately to length, remembering to cut the root ends to the dihedral angle. Place the spars and trailing edges over the plan, side by side, and mark the positions of one side of the ribs with a soft pencil (ballpoint ink pen tends to 'bleed' through the covering when doped). The end two ribs are of reduced length and half round notches are cut on the ends to receive the wing tip. Slot the ribs on to the spars roughly positioning them adjacent to the marks. Glue the ribs to their marks with P.V.A. glue, pin down the trailing edge slotted for the ribs, over the plan and glue the rib/spar structure to it. The ⅛in. (3mm) dowel leading edge can now be fitted but first drill the tip end of the dowel and insert a short length of 18g. pianowire. This will make the junction with the wing tip although bamboo or cane might also be satisfactory. The tube is flattened at one end where it merges with the balsawood trailing edge. Shape the tube to the outline shown with the hands, don't worry if it is not perfectly regular as the covering process will help to cure this. In any case, the originals were often far from perfect. I 'tack' cemented tips to the spars etc with cyanocrylate and then reinforce the joint with epoxy. Reinforce the root end with a .4mm or .8mm plywood rib.

If you have adjusted the position of the fuselage formers F1 or F3 it will also be necessary to adjust the position of the wing dowel tubes. The diagonal bracing to the root rib is fitted to prevent the bowing in of the ribs after doping the wings. Cut the ¼in. (6mm) sq. spruce rigging blocks to the full depth of the rib at their positions. Drill a small (1/64th .04mm) diameter hole through the blocks to take the small split pins used for rigging attachment points.

Next month in part II of this feature I will describe fuselage construction and the finishing and flying of the model.





Parts for Bleriot Pack

1. ABS Moulded Pilot.
2. ABS Moulded Front engine frame.
3. 1 = Mustard tin tank and brass tube.
4. 2 = 4mm plywood strips for wheel rims.
5. 2 = ⅜" dia. neoprene rubber tyre lengths.
6. Nylon monofilament for spokes.
7. Black strong cord for fuselage bracing.
8. 25 feet nylon converted metal trace line for rigging.
9. 2 = ⅛" × ⅝ × 10½" beech undercarriage supports.
10. 2 = ⅛" × ⅝ × 10" beech horizontal undercarriage members.
11. 2 = ⅜" × ½" × 5" beech engine bearers.
12. 4 = tension springs for undercarriage.
13. 18 = miniature split pins.
14. 2 = ⅛" dia. aluminium thick wall tube × 15¾" for wing tips.
15. 8 = 0 × ¼" woodscrews.
16. 4 = 12g aluminium collets.
17. 1 = elevator horn.
18. 10 = solder tags.
19. 2 = ⅛" dia. cane × 12" for tail skid.
20. 4 = 12g P.W. × 3½" wing dowels.
21. 1 = 12g P.W. × 9" axle.
22. 2 = 12g P.W. × 6⅞" U/C upright.
23. 1 = 16g P.W. × 10" for Cabane strut. Top.
24. 2 = 18g P.W. × 10" for Cabane strut. Lower.
25. 1 = 18g P.W. × 3" Rudder post.
26. 1 = 16g P.W. × 6¾" Elevator joiner.
27. 2 = ¼" wide metal strips × 7" U/C diagonals.
28. 2 = 12g Ali tube × 3⅝" fuselage/wing dowel.
29. 4 = 12g Ali tube × 1⅞" wing dowel tube.
30. 1 = 12g Ali tube × 1" tailplane sleeving.
31. 1 = 16g Ali tube × 6" for rigging crimps.
32. 1 = 18g Ali tube × 1⅜" rudder posts.
33. 1 = 12g Brass tube × 4" wheel hubs and sliders for U/C.
34. 1 = 12g × 1½" thick wall × 1½" sliders for U/C.
35. 4 = 12g Brass × 1½" × 5⅜" U/C forks.
36. 4 = 12g × 1½" × 5⅜ × 2½" U/C forks.
37. 4 = large diameter washers for wheel hubs.
38. 4 = 8 b.a.nuts, washers and ⅝" bolts for tailplane and rigging.
39. 4 = 8 b.a. nuts, washers and ⅜" hex. bolts for U/C hinges.
40. 4 No 8 b.a. nuts, washers and ¼ bolts for U/C diagonal.

Total value of £6.50 for only £5.00 plus p&p from: For limited period.

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CHRISTMAS FULL-SIZE PULL-OUT PLAN PART 1

Bleriot XI

IN PART TWO DAVID BODDINGTON DESCRIBES FUSELAGE CONSTRUCTION AND FINISHING METHODS FOR THIS CLASSIC PIONEER AIRCRAFT MODEL

Above: Author's prototype about to be hand launched - a really smooth take-off area is required for R.O.G. The bamboo skids will need facing with piano wire if tarmac operation is envisaged.

BEFORE COMMENCING the purchase of fuselage materials it would be as well to refer to the notes on selection — just in case you've forgotten. It may well be that the more patient amongst you have not yet started, preferring to wait until the whole plan is to hand; if so, re-read the wing construction information before starting. For those who have already completed the wings, read on!

Fuselage

I have shown alternative methods of bracing the fuselage. The first method is to drill vertically through the longerons on either side of the upright. This way is probably more scale-like in appearance but requires care in drilling the holes — just large enough for a fine needle and the thread to pass through. It is easier to pre-drill these holes before commencing construction of the fuselage sides. The alternative method is to add small plywood gussets to the longeron/upright junctions with the bracing holes drilled for the internal junctions. Using this method obviates drilling the longerons and is the "safer" way of bracing. Cut and drill the gussets in sets of half a dozen or so.

Pre-drill the holes for the servo fixing screws in the bearers, as these are glued to the formers before fitting. The rudder and elevator are operated by closed loop controls which are scale, easy to install and very effective. Cut the slot for passage of the control wires in the former F3 to suit your positioning of the throttle, and consequently, the elevator servo; the rudder servo is positioned centrally. The elevator horn should also be offset to suit the positioning of the elevator servo. Bind and glue the 12g wing dowel tubing to formers F1 and F3 after bending to the dihedral shown. Glue the servo bearers to formers F2 and F3 and ½ sq.in. spruce hatch blocks to the bottom of all formers.

The basic sides are constructed over the plan noting that the ⅛ × ⅜in. beech undercarriage supports are included as part of the fuselage side. These should be shaped and rounded before fitting soft ⅛in. sheet infil, which is fitted between the former and the outside covered with .4mm plywood. If 4mm plywood is unavailable .8mm (1/32ft.) can be substituted and the infill omitted. Twenty four hour epoxy or PVA white adhesive can be used for glueing the spruce strip but the joints must be accurately cut if the latter is used. Join the fuselage sides by first fitting the formers and engine bearers — drilled for the engine. When this assembly is dry the cross pieces can be added in sequence from the front. Note that the rear ⅛ × ¼in. cross-pieces are pre-drilled for 8 B.A. clearance. It may be necessary to steam the longerons to achieve the bend at the rear of the fuselage, it is important to keep an equal curvature on each side. Bind and glue the top and bottom cabane struts to the fuselage, the legs of the top cabane should be kept to the inside of the fuselage sides so that the cockpit coaming will cover them. Solder the short lengths of brass tubing to the cabanes for rigging attachment.

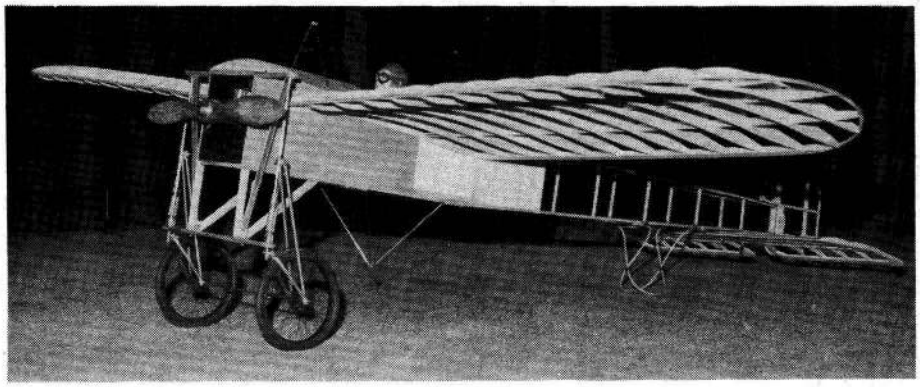
Brace the rear fuselage at this stage to give rigidity. Take a length of thread, tie a knot in one end and feed it through a hole at the front end of the fuselage and commence the bracing in a diagonal pattern until the stern post is reached. From here cross to the opposite side of the fuselage and diagonally back towards the front of the fuselage.

Brace both the sides and top and bottom in this manner. Slight twists in the fuselage can easily be introduced at the bracing stage so try to keep an even tension on the line. I prefer to complete the bracing, and ensure that the fuselage is square, before securing all of the bracing points with a spot of cyanocrylate adhesive.

A mustard tin type fuel tank is shown as this can be sealed into the fuselage without the need for further hatches. As a precaution the inside of the fuel tank bay should be well fuel-proofed. Epoxy the fuel tank in position, the feed and fill pipes projecting through F.1. With a two pipe fuel tank, as shown, the aircraft must be held nose down for filling. Before the top undercarriage rail is glued in position you should ensure that the engine can be fitted after the rail is secured. It may be necessary to carve a semi-circle at the rear of the rail to give adequate clearance for the cylinder. Drill the fuselage sides for the wing dowel tubing and glue them in position,.

The cockpit coaming can be from .4mm plywood (with reinforcing strips of .4mm ply and the front and rear) or from .8mm plywood. Make up the side cheeks, top cowl and

Left: D.B. with "Valvespout" of diesel fuel in hand for priming the PAW diesel, prepares for a flight, assisted by David Toyer.



Above: the underside cabane can be clearly seen here - no rigging wires are fitted until covering is completed. Note the 1/16 balsa internal doublers aft of the cockpit.

engine front support from balsa and plywood or trim and test fit the ABS mouldings supplied with the accessory pack. Cut the top cockpit hatch from .8mm plywood, the front end slots under the ⅛sq.in glued to former F4 and is screwed in place at the rear. The on/off switch may be fitted to this hatch, in front of the pilot or to the bottom hatch.

Form the tail skid from two 'Us' of ⅛in. diameter cane (the type sold at arts and crafts stores), steaming and bending them to shape before binding and glueing to the bottom longerons. Also bind and glue them where they cross each other. Thread cross bracing may also be employed — it was used on the original aircraft.

Undercarriage

Suspension on the undercarriage is authentic and is very forgiving and realistic in appearance. This very effective system adds a lot to the character of the model as well as being practical.

Epoxy the bottom beech rail to the undercarriage legs checking that it is parallel to the top rail. Cut the 12g piano wire posts to length and test them for fit. Make up the brass tube crosspieces for the slider and the bottom hinge point — silver soldering is preferable to soft soldering for these items. Solder the bottom hinge points to the ends of the piano wire posts. The wheel forks are made up from thick walled brass tube (⅛in. od) flattened at the ends in a vice. 18g piano wire is used for the crosspieces of the main forks but these may be omitted if preferred.

Fitting the posts and fitments must be carried out in the correct sequence i.e. first a rigging solder tag is slid on the post and the post is then pushed through the hole in the bottom rail. A collet is then slid onto the post (with two screw fixing points) followed by a second collet, the slider is, the collet and the ¼in. wide diagonal strap. When the collets have been secured in position the forks can be added using 8ba bolts and locknuts — the arms of the forks must be free to rotate. The axle is fed through an outside arm of the main and bottom forks, through a wheel, through the inside arms and across to the opposite forks and wheel. Washers are soldered onto the axle on either side of the arms to retain their positions but do put a piece of silver paper under the washer before soldering. This acts as a heat sink and prevents solder flowing into the brass tube wheel hub. Suspension springs are hooked over them both securing the bottom collet up to and over the slider. Piano wire 'S' hooks can be used as extenders for the springs. Construction of the spoked wheels has been covered in a separate article (Sport and Single, December, '79) but they are a virtual "must" from the appearance point of view.

Covering

Cover the tail surfaces and the front end of the fuselage with heavyweight tissue — remember not to get dope on the plastic cowl parts as it may "pickle" the plastic. The wings should be covered in lightweight nylon for added strength. With the bag method of covering (see Sports View, page 70) the bag should be sewn a good ⅛in. wider than the actual plan chord of the wing.

Accurate sewing is essential to obtain a good fit. Give the wings a full coat of dope covering and sand lightly. Rub balsa cement onto the under-cambered areas of the wings to give better adhesion of the covering. I prefer covering dry and doping through the nylon to fix it to the framework. Whichever method you use try to pull the nylon evenly over the whole wing to avoid warping — use the warp and the weft of the material as a guide to tightening the material. You may have to lightly spray the underside of the wing with water when doping the undercamber of the wing (every rib). Give the tail surfaces three thinned coats of dope and the wings one full coat and two moderately thinned coats of dope. Do hold down the wings and tail surfaces when they are drying to prevent them warping.

Finishing

The Bleriot's had a variety of finishes to the fuselage front end. Some only had aluminium panels immediately adjacent to the engine and fabric behind this. Others had aluminium followed by plywood and then fabric and further example had aluminium right back to the open structure area. Silver paint, on ABS plastic, can be something of a problem. For the Bleriot I tried Humbrol silver enamel but found that this dissolved as soon as I tried to brush on the fuel proofer. There are a number of different types of silver paints and heat resisting enamels around and I suggest you experiment on a scrap piece of plastic to see which gives the best results. Perhaps you would like to let me know of your results because I am still looking for the ideal solution. For the fabric areas I use a discoloured clear dope that has been in a rusty tin for some time and this gives a yellowish tinge to the nylon that is a good basis for the original fabric colour. All of the fabric areas are then given a hair laquer spray of mid-brown and a touch of black on the "dirty" areas. (See Sports View, page 70). Paint the inside of the engine matt black and the undercarriage fittings — not the piano wire posts — and the cabanes black.

Spruce, when it is only clear varnished, does not appear dark enough for the original wood so it should either be treated with a coloured varnish or sprayed with the brown hair lacquer before it is varnished. For fuel proofing of the whole model I used matt polyurethane clear varnish. Whether you wish to decorate the model will depend on how scale a model you are making and whether you are following an actual example.

Radio installation

On the prototype the throttle servo was mounted upright and the rudder and elevator servos inverted. The throttle servo may also be mounted inverted, making the top hatch unnecessary, but it complicates the linkage to the throttle. Allowing the rudder servo control lines to cross gives an easier exit of the lines at the tail end. Fishing trace line (15-20lbs strain is more than adequate) should be used for the control lines. I did not bother to fit any form of adjustment on the control lines, the transmitter trims should adequately take up any minor variation of trim required. If you are grossly out of trim check the wing rigging. Use the inner holes of the servo disc for elevator and the middle holes (Futaba) for the rudder.

Rigging

Fishing trace line (15-20lbs should also be used for the wing rigging, although nylon monofilament line (15-18lbs) may be used for the cabane strut and tailplane rigging. Cut small split pins to length and cyanocrylate these in the holes in the wing rigging blocks and fuselage sides, the split pins to the top u/c rail can be pushed through and peened over. Commence rigging with the outer lower rigging wires, a small "S" hook retains the rigging to the undercarriage solder tag. All of the other rigging is from the split pins to solder tags retained by B.A. nuts and bolts. Cut ¼in. lengths of 18g ali, or brass tube for the crimping pieces but do not clench them tight until you are satisfied that the wings are correctly rigged. The bottom followed by the equivalent top rigging lines in sequence is the easiest method to use. Your eye should be good enough (lining through from the trailing edge) to obtain a straight wing — some washout is acceptable, even desirable.

Flying

Make all of the usual checks of c of g, radio range, correct operation of the controls etc., and do pick a calm day for the test flight. Hand launching is recommended unless you have a really smooth take-off area. A little bit of up may be required with tailplane incidence as shown. Don't expect the Bleriot to be highly aerobatic, it is virtually limited to loops and stall turns but the original aircraft was doing very well to perform even this. I guarantee that you will get a lot of fun flying this type of model and quite a few admiring looks and comments from fellow modellers.

It always worries me slightly, on reading through the construction article, that it all sounds too difficult and complicated. Believe me it isn't. I found the building highly enjoyable and a refreshing change from the all sheeted modern type models. Finally, I am indebted to Arthur Searle for first enthusing me in the pre-1914 period and for being responsible for many of the constructional methods used in this Bleriot.

CHRISTMAS FULL-SIZE PULL-OUT PLAN - PART 2