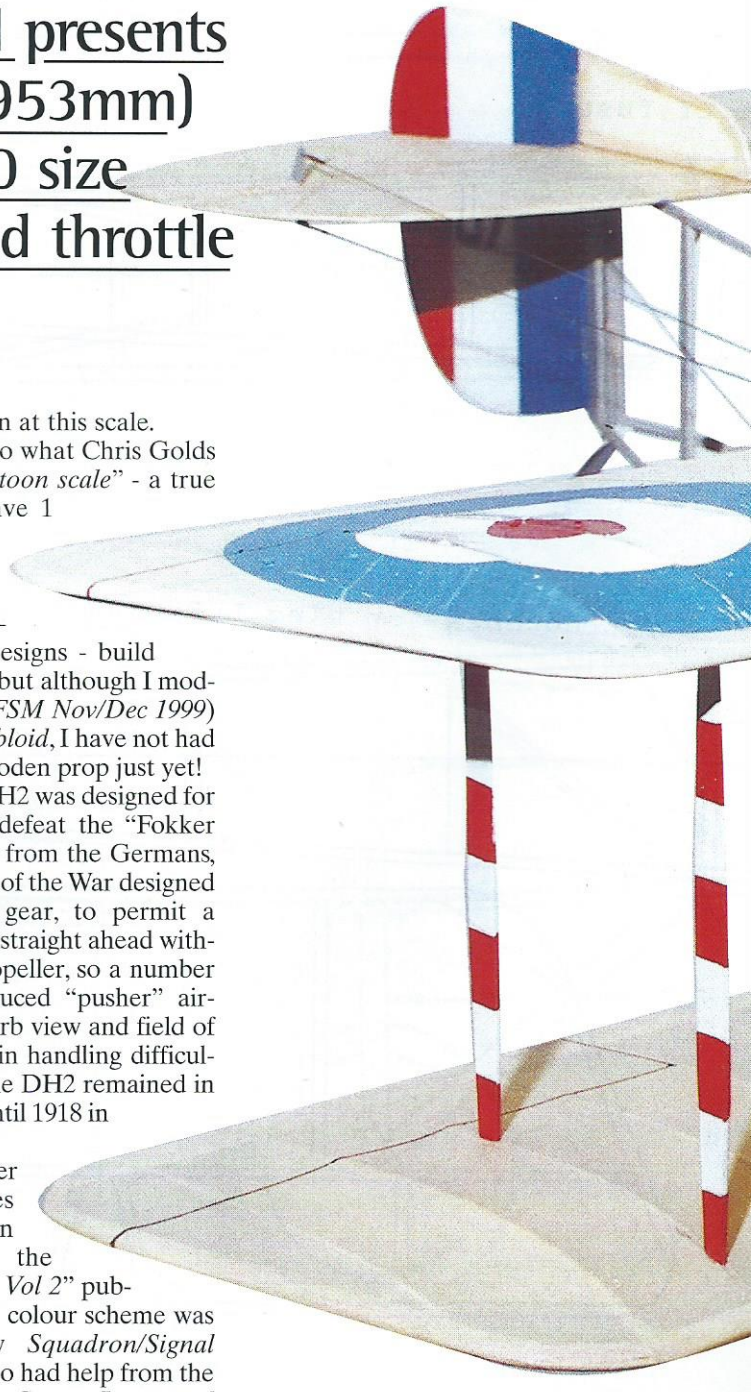
Ah - de Havilland!

AIRCO D.

Here's something really different for R/C electric scale. MIKE ROACH presents plans for a 1/9th scale 37.5" (953mm) span sport-scale replica for 400 size motors and rudder, elevator and throttle controls

ALSO SEE P 56.



It was "Uncle Roger", whose column on the back inside page of *Flight International* Magazine I always read first and whose love of de Havilland aircraft obviously infected me, who used to caption his pictures of D.H.Moth aircraft with the sigh of "aaah - de Havilland".

However, I don't think that he would have had quite the same to say about the DH2, a single seat fighter of 1915. In fact it has a certain logical neatness in its design (unlike its contemporary, the FE8, a truly horrible looking aeroplane), but perhaps none of the elegance that Uncle Roger so admired in de Havilland's later aircraft shapes. Its open cockpit, pusher engine and blizzard of struts, bracing and control wires are certainly a challenge to produce in 1/9th scale for a geared 400 motor and seven cells!

There are some advantages of course. For example, the battery and servos can be at the front and are easily accessible (and well out of the way of the propeller, which is safe from damage and can be a nice wooden one) and the Pete's Pilot figure can play his full part in making the model look realistic. Although the aircraft looks complicated, there is only one really tricky bit and that is the final assembly of what is, inevitably, a one piece model, which is somewhat unconventional.

The remainder of the structure is remarkably easy. Of course, the elevator and rudder require external control wires in "real" locations, but this is now normal modelling practice, even at this scale.

This 1/9th model is to what Chris Golds would have called "*cartoon scale*" - a true scale replica would have 1 mm diameter tail booms. It is very closely based on the constructional principles of Peter Rake's designs - build light and fly carefully - but although I modified his *Sopwith Pup* (*FSM Nov/Dec 1999*) into a *Triplane* and a *Tabloid*, I have not had the courage to use a wooden prop just yet!

In full-size life, the DH2 was designed for just one purpose - to defeat the "Fokker scourge" in 1915. Apart from the Germans, no one had at that stage of the War designed a reliable interrupter gear, to permit a machine gun to be fired straight ahead without shooting off the propeller, so a number of manufacturers produced "pusher" aircraft, which gave a superb view and field of fire, at the cost of certain handling difficulties. Despite its looks, the DH2 remained in service until 1917 and until 1918 in the Middle East.

I have used a number of information sources for this model. The plan was enlarged from the "*Aircraft Archive W.W.I Vol 2*" published by Argus and the colour scheme was taken from the new *Squadron/Signal Publication No 171*. I also had help from the Harleyford "*Aircraft Camouflage and Markings 1907 - 1954*" (which I was given as

4.2

a birthday present in 1954 - age 10); it has a very clear photo and a three-view). *R/C Scale International* for Jan/Feb 1998 has an excellent article by Herman Groebler showing his 1/4 scale model in amazing detail.

Now, I am not a good pilot - I prefer research, drawing and building and my weekends are taken up with sailing or windsurfing, so I never get to the shows, but the DH 2 does fly, the motor has plenty of power and it looks good on the ground and in the air. All you W.W.I enthusiasts have just got to have a go!

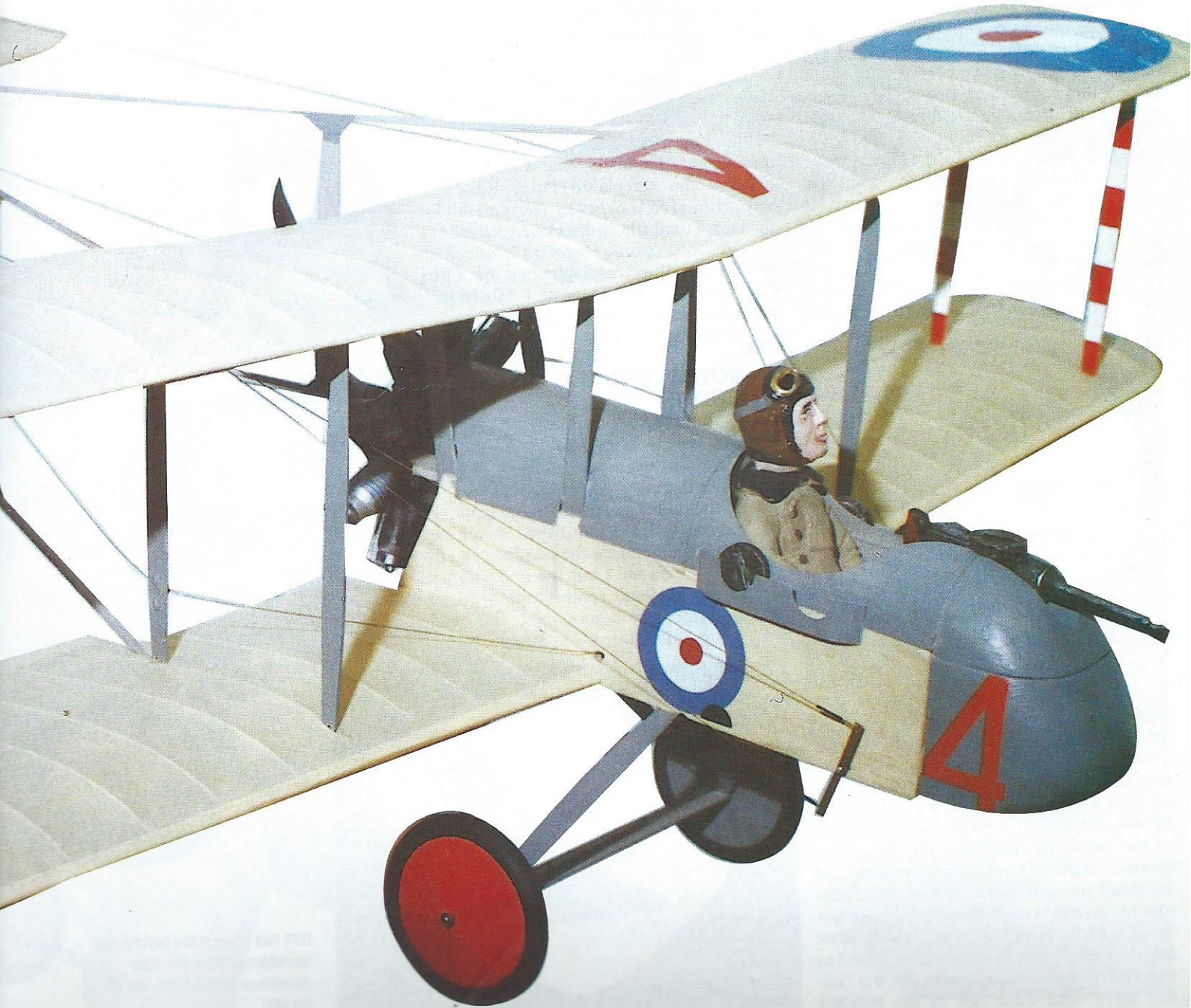
CONSTRUCTION

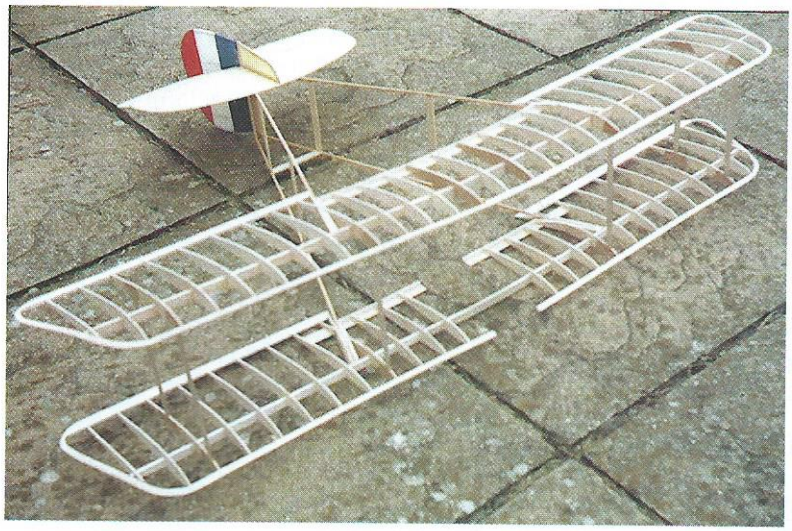
As you can see from the photograph of the naked aircraft, the fuselage is a very simple box structure with integral struts, motor mounting plate and battery floor. The tail group is easy, light and non load-bearing. The wings are standard single spar structures without ailerons, using diagonal housings to accept the boom, which is made of ⅛" (3mm) square spruce longerons epoxied to hard ⅛" (3mm) balsa uprights and may be rigged with button thread. In fact the whole model could be rigged to give a more scale effect - but life's too short!

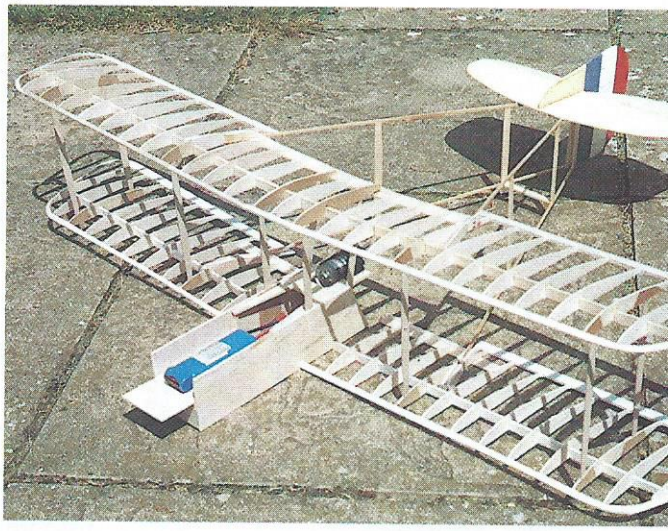
The building and assembly sequence is critical in that nearly all the covering and finishing can take place before the major components are glued in place. This does demand accuracy and it may be better to make card jigs for wing incidence rather than rely on your eyeball as I did. Apart from the wing spars and the boom components, all balsa can be medium or light stock. I bought all mine from "*Kits & Bits*" in Southampton or *The Model Workshop* in Christchurch where no one minds if you go through all their stock looking for the best. All dimensions are in millimetres

FUSELAGE

Make two sides from 3 mm sheet with 3 x 3mm former supports. Make the cabane struts from two laminations of 0.8mm ply and don't worry if they seem thin and bendy as you make them: the glue adds considerable strength and rigidity. Use them as a pattern to cut out their slots in the sides and glue them in over the plan to ensure early







accuracy to your project. When dry add the 0.8m ply patches to reinforce the joint.

Fit and glue the lower formers, battery and motor plates to one side, then, when all is square and dry, add the other side and the top halves of the formers. Now's the time to do some painting and decorating to the cockpit area, make up the instrument panels and give Pete the Pilot his first fitting. The full-size was only 24" (610mm) wide so must have been quite a squeeze in flying kit and two layers of Long Johns! The top of the fuselage is simply a wrap of 0.4mm ply. I made a thin card pattern first which appears on the plan - but you may have to do a little trimming to get a perfect fit. The large cockpit opening leaves room for the battery to be loaded without the need for hatches, but you may find the pilot needs very personal surgery to get him in the right place, but fortunately you can leave this to the very last moment.

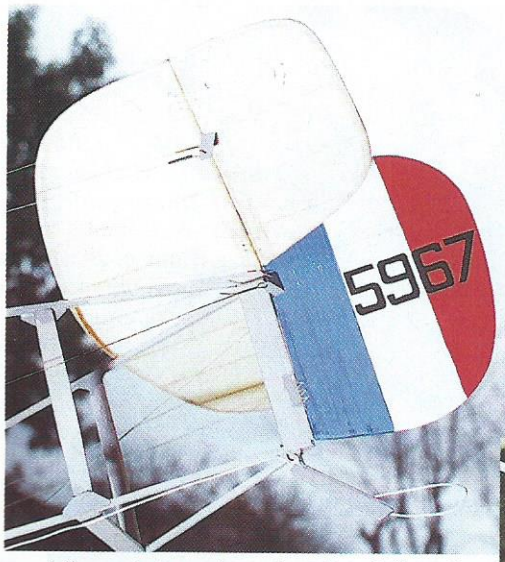
The front cowling was made from alloy in 1915, but you can use block balsa, foam or a moulding, whatever is easiest. Just follow the very obvious panel lines on the three-view for a scale effect. Install the motor (I used an *SP 400* with 2.33:1 gearbox) and all the rest of the hardware, including the distinctive elevator crank. This is a simple wire and squashed tube affair running in tube bearings on each side of the fuselage. A nice hot soldering iron is all you need. The elevator servo is taped onto a small ply plate, glued to the side of the fuselage. I didn't fit the rudder servo until quite late in the building process, but the plan shows the location and geometry needed for correct rudder movement.

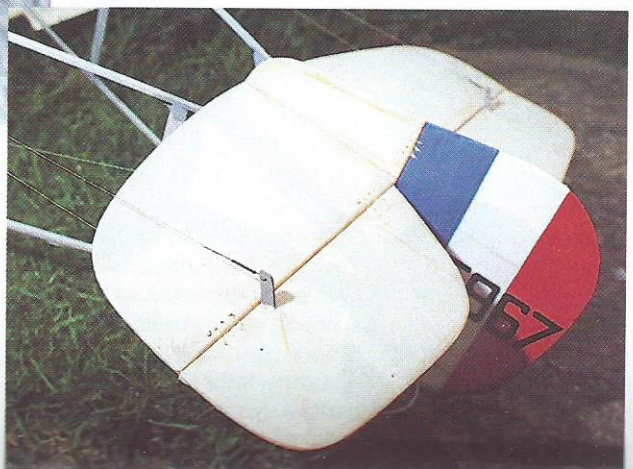
I did all my painting and decorating at this stage. I like sanding sealer, dope and tissue, but Litespan is just as good on the fuselage sides. All the ply and fittings can be painted mid-grey with as much weathering as you like. I do not think the DH2 was a clean aircraft. Fuel spills from the dorsal fairing, mud on the step, blood on the carpet...

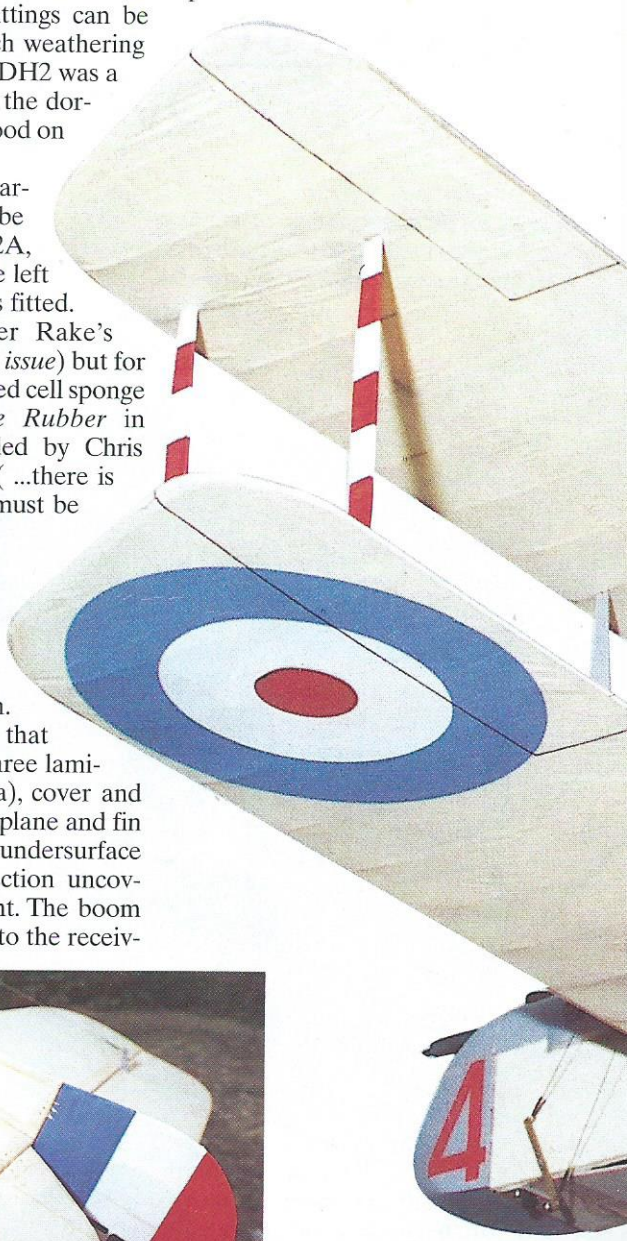
If you make up the undercarriage now, the front legs can be sewn to F2B and epoxied to F2A, but the rear mounting must be left undone until the lower wing is fitted. I made the wheels to Peter Rake's instructions (*FSM Sept/Oct '00 issue*) but for the tyres I used 10mm dia. closed cell sponge rubber cord from *Portmere Rubber* in Southampton, as recommended by Chris Golds in the other magazine (...there is no "*other magazine*" - Ed! It must be all that sea air!).

BOOM AND TAIL GROUP

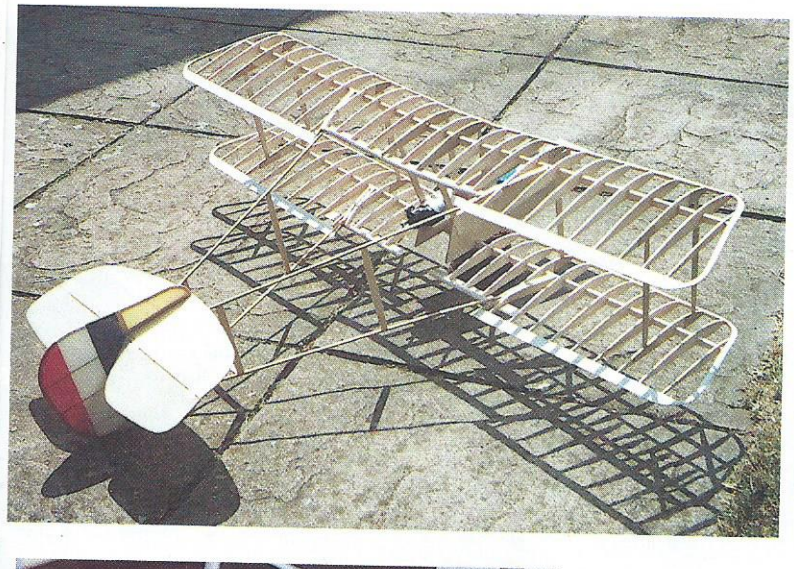
Build the boom sides and when completely dry, join over the plan. Build the tail group (note that all the outlines are from three laminations of 1 x 3 mm balsa), cover and decorate, then glue the tailplane and fin onto the boom. I left the undersurface of the tailplane centre section uncovered to ensure a good joint. The boom group should (must!) fit into the receiving slots in the lower wings, but you can d number of dry run assemblies and adjust fit of components as necessary. The flexi ty of the hardwood boom arms means th is easy to do this at any stage of the build process.





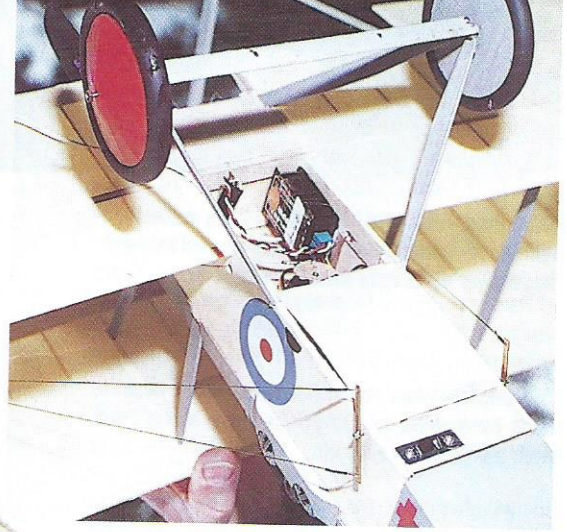


LEFT: two views of the tailplane and fin/rudder, showing the scale closed-loop control runds and the tail skid.



LEFT: three views of the basic aircraft in stages of assembly to a one-piece model.

BELOW LEFT: view of the fuselage pod underside, showing the undercarriage struts, receiver installation and the dummy control runs. BELOW: detail of the mail wheel and undercarriage struts.

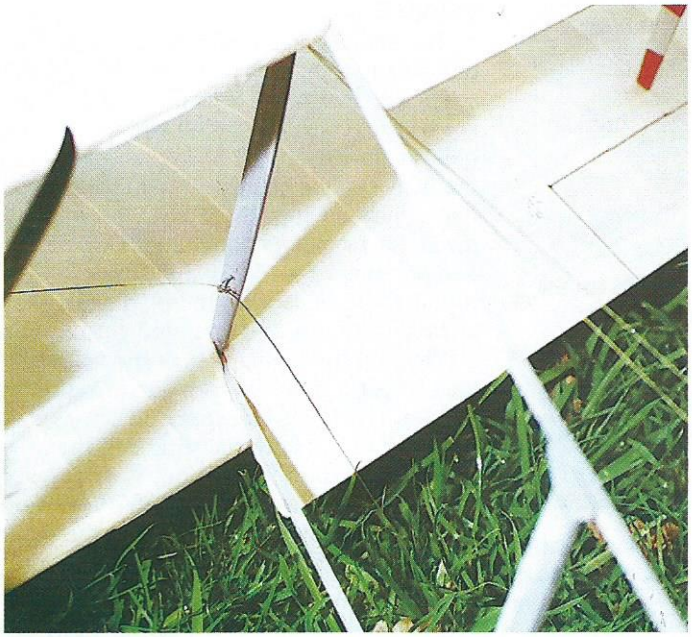


WINGS

Build the wings and top centre secti ensuring that the ribs that are to receive struts are reinforced with ply patches a are correctly angled so that stresses are built in during assembly. I let the ribs i the wing trailing edge: butt joints and sm fillets may be just as strong. The tips a made up from four laminations of wett and pre-glued 1 x 4 x 320 mm strips, form round a line of pins on the plan while th are still wet from the water and glue.

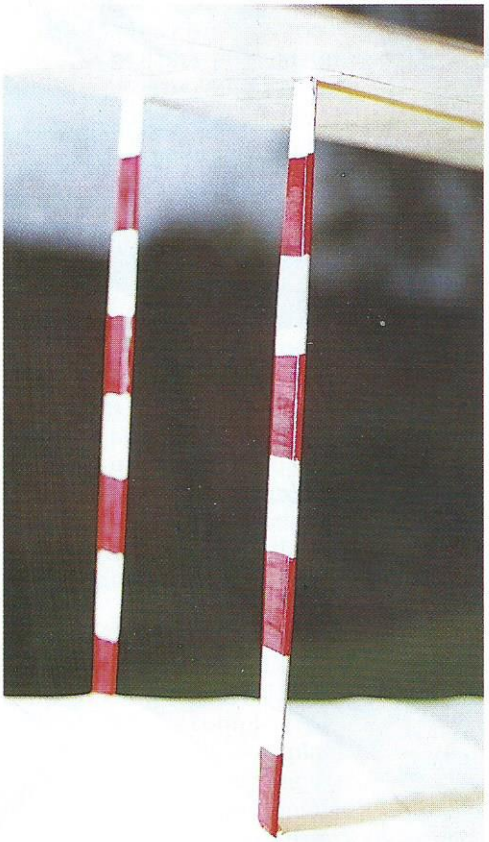
Pack up the lamination as shown on t plan to get a good looking curve at the t section. The boom housings are pre-asse bled before fitting to the wing and then t back half of the ordinary ribs is fitted ov the top, for scale effect. Join the top wi panels to the centre section using the dih dral braces (but measuring the dihedr accurately at each tip rib) and the low wing panels to the spar/dihedral brac (there is no lower centre section).

BELOW: the dummy rotary engine hangs out in the breeze and really needs to be there for realism's sake.



COVERING AND DECORATION

I used cream *Litespan* to cover all flying surfaces, matt side out and cut across the grain of the material. For newcomers, *Litespan* has a grain running along its longest side - covering an open-structure wing with cross-grained pieces allows more sag between the ribs; using pieces cut along the grain gives a flatter, tauter covering. It also has a "satin" side (next to the protective polythene) and a matt side. Experiment, then chose a side and a grain direction and stick with it for the whole aircraft, or you'll have a patchwork. I also find it helps greatly in the covering process to use a Gluestick to wipe round the outline. This gives the covering something to grip onto while you get it in exactly the right position, and does not affect the *Balsaloc* at all. I made the roundels and letters from painted *Solartrim*, which works well on flat surfaces but is less happy on complex curves such as the upper wing. Much better to paint directly onto the *Litespan* before actually covering the wing - something I will do next time!



ABOVE: details of the tail boom, showing the anchor points on the wings and the inter-bom vertical spac The receiver aerial runs down one side of the tail b

LEFT: wing interplane struts. Since this is a one-piec model, these struts are glued permanently in place. bands are Squadron markings.

LAST LAP

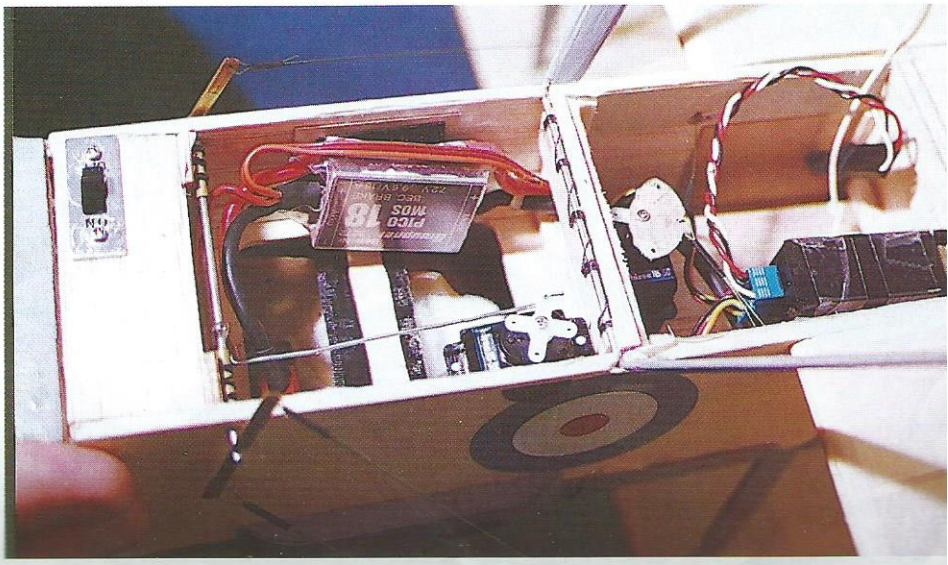
Now you can glue the lower wing into the fuselage. The dihedral brace just slots into the pre-cut sides, up against F3 and the end ribs should fit snugly against the fuselage. Jig carefully for correct incidence and dihedral. Next, sew the rear undercarriage legs to F4A and epoxy this to F4.

Make and paint the struts and make sure that they are an accurate and tight fit into their respective ribs, which must not be twisted out of alignment by them. The exceptions are the rear inner struts, which, because they lie at the intersection of rib, housing and boom, must be butt jointed at the top and can only be slightly let in to the bottom wing. I have to admit this is a weak point of the model's design, but epoxy and reinforcing fillets have held together so far!

ASSEMBLY

Glue the upper wing to the cabane struts, and eyeball or jig for correct incidence and "squareness" to the fuselage and lower wing. When this is completely dry, fit and glue the boom group into both wings. Re-check incidence and squareness of the asse while you have the chance! The wings flexible enough for you to epoxy in all o interplane struts (except the inner ones), then check again for squareness incidence.

If the top boom longeron is level wit underside of the top wing and the wing square and parallel, all will be well. If want to add rigging, this is the time t some of it. Glue in the inner rear interp struts (which must include the rudder elevator cable guides) and their reinfo ments. I cannot think of a better way o ing these struts, since they really sh "bolt" onto the boom arms, but at this that seems to be too difficult. Fix and fo



Finally, install external control runs and test for free movement.

Test fly, at a design weight of no more than 1 lb 10 oz. The prototype weighed 1 lb 7 oz (650 grams). Here you will discover that the model must take off from your grass or tarmac - I didn't dare try to hand launch!

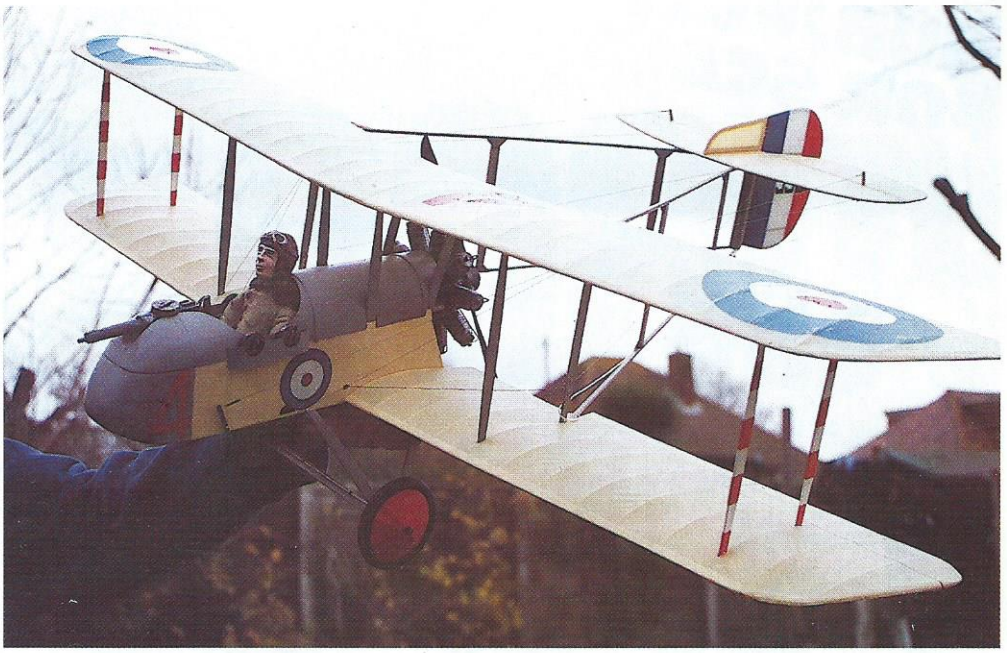
Add the Lewis gun and the dummy engine (which bolts directly onto the *Graupner* gearbox using the existing bolts) and any other lightweight detail. The real engine would have rotated with the propeller, but spinning a balsa dummy at 7,000 rpm is asking for trouble, in my view! I used *Revell* silver to paint both items, then dry-brushed matt and gloss black to give "life" to them. If they look like metal, you've done well. *Humbrol* do a "metallic black" enamel that does much the same job in a tenth the time.

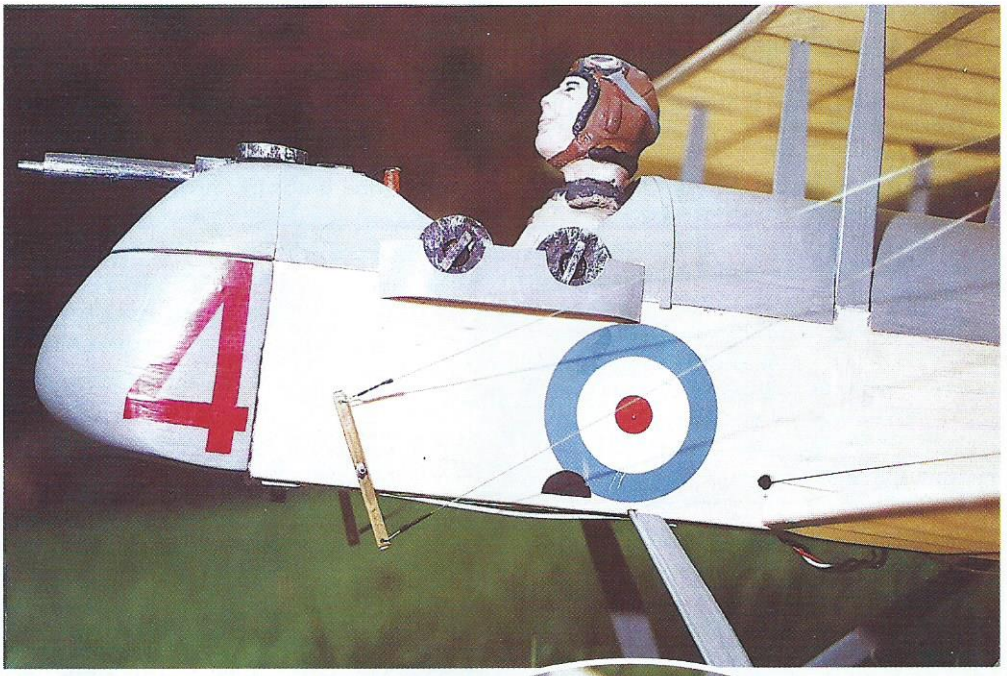
FLYING

The storms and rain of October and November 2000 delayed my test flight until a mild and gentle day finally appeared. As I said, you cannot hand-launch this model, but even on roughly cut damp grass, she lifted off smoothly and flew "straight off the drawing board" into a 1 0-knot breeze. My friends in Christchurch & District MAC will not be surprised that the landing was a wheels and nose affair, but this remarkably attractive model flies just as well as more conventional aircraft. It needs all the rudder movement you can give it, but only the usual elevator, especially with power on.

If you build the DH2, you will enjoy a rarely modelled, but very rewarding aircraft and a unique shape in your sky. Please drop me a line or e-mail me with your comments; Mike Roach, 5 Foxwood Ave, Christchurch, BH23 3JZ. or Roachfoxwood @aol.com.

Now what's next? I have the *Westland Welkin* a quarter built for two Speed 400s and a super-light 48" span *Westland Wizard* for geared 400. Interested?





BELOW: here, Pontius has been removed from his throne to reveal the inside of the cockpit area. RIGHT: the man himself, gunned up and ready for the Barron. For details of machine gun construction, refer to Peter Rake's feature on the subject in FSM Nov/Dec '01 issue.

OPPOSITE PAGE BOTTOM: fuselage underside with hatch removed to reveal the full radio and battery installation.