

# Harry Hawker's Sopwith Bee

Mike tracked down this unlikely W.W.1 one-off and presents drawings for a 27" span replica for 400-size electric motors

I have only two photographs of this endearingly silly aircraft, both from my Bible of Sopwithness ('...and his Aircraft', published 1970 by Harleyford) and the very minimum of description. It was "...used by Hawker for aerobatic displays... powered by a 50 h.p. Gnome and... built from Pup components", and that's about it. No dimensions and few clues except (by inference) the wing chord and the wheel diameter. You try sketching it as a three-view and you'll see that it's not as easy as it looks, particularly around the cabane and centre-section area.

I had at least three tries before the final drawings and I'm not really sure that it is finished. The span of the full-size must have been about 18 feet, compared with the Pup's 26 feet 6 inches, so it was quite a small aeroplane. For those readers like me, who look at a free plan to fire up the imagination, get this one enlarged by 100% and you've got a genuine quarter-scale model for a modest Speed 600, gearbox, scale prop and seven or eight cells, weighing perhaps 4 lb ready-to-fly and spanning only 54". And it would still fit in a

Peugeot 206!

But here we have a 20 oz., 27" span 1/8th scale option for Speed 400 which flies wonderfully well on rudder and elevator, although the original had warping for lateral control. Should you wish to try, this option is easy to fit and very effective. Construction is straightforward, even though I have used a thin wing section and functional rigging. If this puts you off, just build the wings with a thicker section, like my *Triplane* or *Tabloid* or any of Peter Rake's lovely scale models, and I'm sure it will fly just as well - but it might not look quite so good on the ground.

Colour information is limited, but I strongly suspect that the Bee was made to look as much like a Service aircraft as possible. The roundels and markings are authentic, so PC10 khaki-green upper surfaces and plain varnished fabric underneath is the order of the day. Tempting though it might have been to the Works, and will be to the Lazy Bee fans amongst you, a yellow and black striped Sopwith Bee is not authentic!

## Let's go

I started with the fin and rudder, to see what they look like at 1/8th scale (normally I can't wait to get at the fuselage) and completed the laminated wing-tips and the centre-section cut-away at the same time. Just make a line of pins to the inside edge, cut three or four strips of 0.8 mm balsa, wet them out, slosh on the glue and thumb them firmly together. Then lay them round the pin outline and gently persuade them that they want to curve round it by pinning the lamination tight up against the outline. Check that there are no gaps where air can get in, then leave for at least 24 hours to dry. Laminations are strong, light and very easy to plane or sand to section because you are always working with the grain.

Finish the rest of the fin and rudder with 3 mm strips, sand carefully, slot for hinges (I used simple and effective figure-of-eight sewn hinges) and control horn, then cover with your favourite material. I just can't resist painting the fin markings at this early stage because you can start to see the finished



model. I used Tamiya Acrylics and was very pleased with the result.

The shape of the tailplane is a bit of a mystery. The Pup tail is surely too big for this little aircraft, and the photograph taken side-on seems to show that it was more like the revised Triplane or Tabloid SS3 shape, but I'm not really convinced. You chose - but whichever you go for, it's simple to make and can be covered and put to one side. I find that I can make these components in 2 mm balsa without getting warps, and with the scale rigging they are strong enough for flight.

## Wings

Now, when Hawker said to Sopwith "Just give me some Pup bits and pieces and I'll get on with it", you would have thought Tom would have known better (just look what happened to the Gordon Bennett racer - Tabloid parts? I think not). You can see evidence of STLBP or Sparrow components, but the Pup wings are very different. There are no ailerons and, of course, the span is much less than the original. On the model the upper wing is made in one piece (it's only 27" span) but the lower wings are built separately and plug into the fuselage on simple wire pegs, to be rigged and braced during final assembly.

The upper centre-section, though, is unusual. Because the top wing is so low (Hawker's eye-line must have been just about level with the undersurface), there is a huge semi-circular cut-out to allow him access and some good upward vision, and I've made this from laminated 1.5 mm balsa strips. The exposed rear spar is stained wood: just to make things even more interesting, the dihedral breaks are on the spar, not at the end rib positions! It all works out easily enough but was hard to figure out from the photographs. If you want wing warping, the warp wire runs underneath the rear spar, and a strong structure is very easy to achieve.

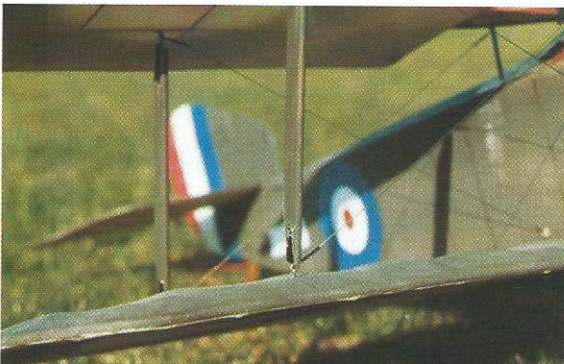
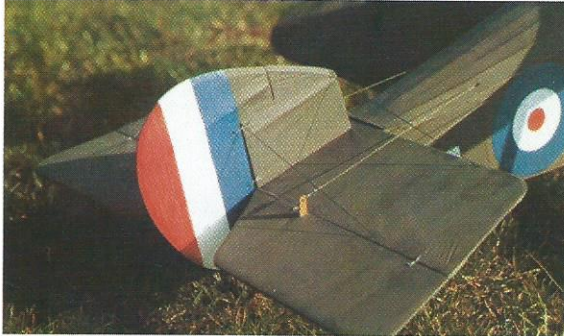
Make up the full top spar with all reinforcing doublers from basswood or hard balsa, then cut out the ribs and make one side at a time with the other 'up in the air'. Add the dowel leading-edge and the sheet trailing-edge, not forgetting the 1 x 1 mm edge to the TE. The purpose of this strip is to provide a clean line for the covering and it really works well, greatly improving the look of the finished wing. Drill the spar for split pins, which locate both the struts and the rigging.

This time I cut to size and pre-painted all the materials before assembly, using stained white Litespan and Tamiya paints (XF-51 Khaki Drab, but this is a bit dark for PC10). This made it much easier to paint the roundels but I have to admit that covering was more difficult than usual as the paint tended to stick to the iron. I stain the underside covering of Litespan with thinned Colron wood dye (Antique Pine) which gives a realistic finish for no extra weight, but cream Litespan is nearly as good.

## Fuselage

The fuselage is very straightforward and is just 3 mm balsa sheet and strip with liteply formers and thin ply panels on top and sides. Note that the side panels stop at the lower wing leading-edge - most unusual! The Speed 400 sits on a liteply plate and there is lots of room to fit a speed controller on the back of the motor if you wish. The battery and servo plates are shown as liteply, but I used a sheet of 6 mm pink foam for my servos. This took the place of the servo plate and F4, so made a useful weight saving. I made the cowl from a single wrap of 0.4 mm ply, the disc of liteply that is C1 and lots of 5 mm block on the front. It looks great when filled, sanded, painted and clear varnished, but I suppose that burnished litho plate is more authentic.

The undercarriage and cabanes are all wire faired with various diameters of alloy tube, which I got from Lesro Models in Christchurch but is available from most model shops. The tube can be squashed between two pieces of wood in a vice, over a thin balsa dowel former to prevent it 'dishing'. I have found this system to be simple and strong. It certainly beats epoxying strips of hardwood onto wire, which always seem to spring off into the grass during my landings! The struts are hard balsa, drilled for split pins and reinforced on the ends with some litho plate strapping in scale locations.



The STLBP, from which the Bee is probably descended: this is a 1/10th scale 'foamie' with Pico Stick gear, for indoor or calm weather flying. A very successful model and I will be drawing it up for FSM. You can see this and other indoor scale models at: [www.wcaero.fsnet.co.uk/pastevents.html](http://www.wcaero.fsnet.co.uk/pastevents.html)

Getting in close. The fin and rudder have these very prominent ribs. The scale rigging adds considerable strength and is merely thread spot-glued into the surfaces. The scale control wires have adjustment at the servo but didn't need any 'clicks' for the first flights once the C of G was correct.

Strut end connections are simply made with split pins. The hard balsa struts are reinforced with litho plate strapping in scale locations. The flying wire ends are made by doubling back the fishing wire through crimps, with a dot of superglue to hold them tight.

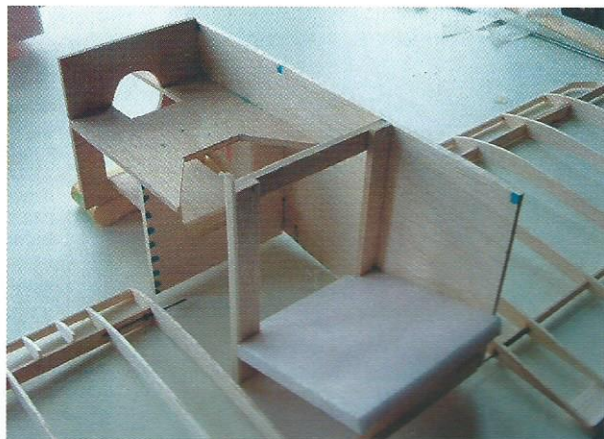
Markings were painted on before covering. The huge cut-out for the pilot's head is easy to make using laminated balsa. The exposed spar makes a great carrying handle!

The cowl cut-out also serves to hide and retain the battery connectors (Deans plugs, in this case) and does not need to be removable.

It's a small model (only 27" span) and fits easily into a hatchback. A 54" quarter-scale version would just about get in!

Main pic far left: The Bee as it appears in 'Sopwith, the Man and his Aircraft'. The prop is the right shape but quite a lot too small.

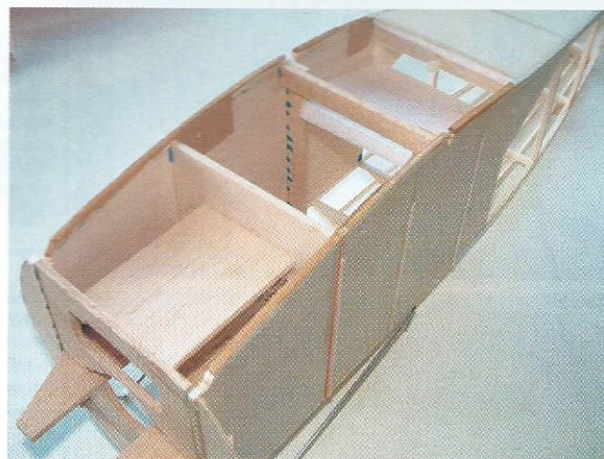
**RIGHT:** The method of building the fuselage and my foam servo plate which takes the place of F4 and the liteply servo plate shown on the plan.



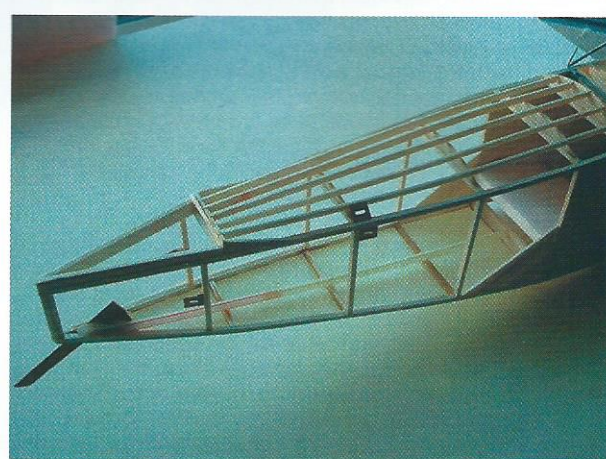
**FAR RIGHT:** A clear view of the unusual cabane arrangements with alloy tube sheathing and split pin ends.



**RIGHT:** Note the battery plate, the incidence wire doublers and the thin stringers on the fuselage sides where there were prominent ribs on the prototype.



**FAR RIGHT:** The rear fuselage, tail skid and control wire 'ins and outs'.



## Assembly

Fix the flying and landing wires to their fuselage attachment points, spring the top centre-section in place and plug in the lower wings. Weight down the fuselage and prop the wings to the correct dihedral angle (15 mm under each tip rib looks scale and is enough for stable rudder and elevator flight. Attach the struts to the lower wings, plug the upper wings in place and attach the struts to them. A dab of superglue or epoxy will be needed to hold them securely. Then rig the wires to their outboard locations, pulling out all the slack, but not making them bar-tight.

I used 15 lb. Pike Wire and Drennans slim crimps for all rigging: the local fishing shop is used to me now. However, 'extra strong' thread by Amann from your haberdashers (or the sewing box in the lounge) is cheaper and looks just as good, but it is more difficult to make into neat ends. If you have made everything to the correct length, it will all true up perfectly without warps or twists. The only other commercial item is the 10 mm Portmere sponge rubber cord which I use to make tyres for my lightweight wheels and get from Portmere Rubber Ltd, Victoria Street, Northam, Southampton, SO14 5QZ.

## Flying

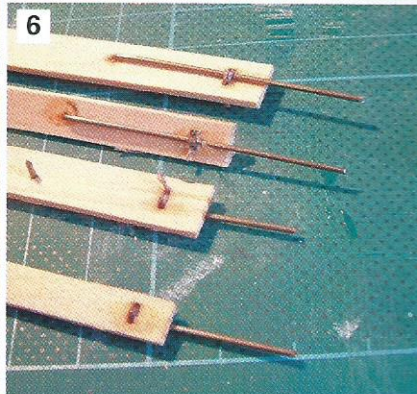
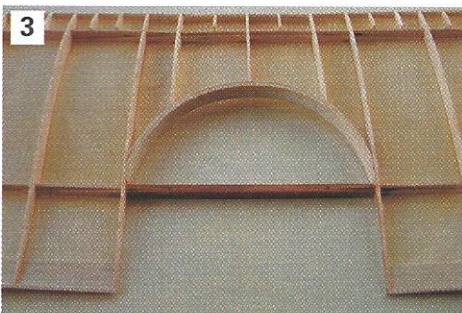
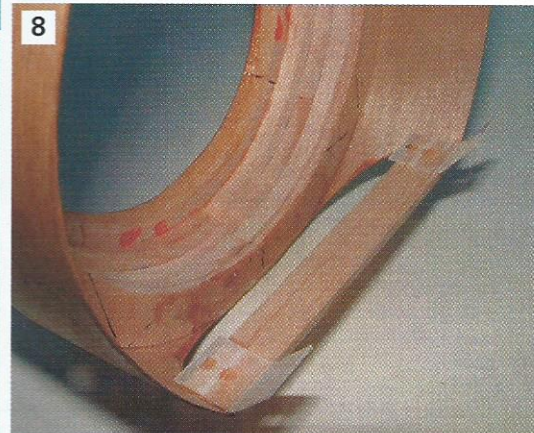
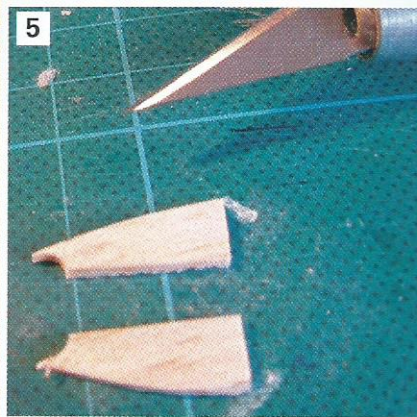
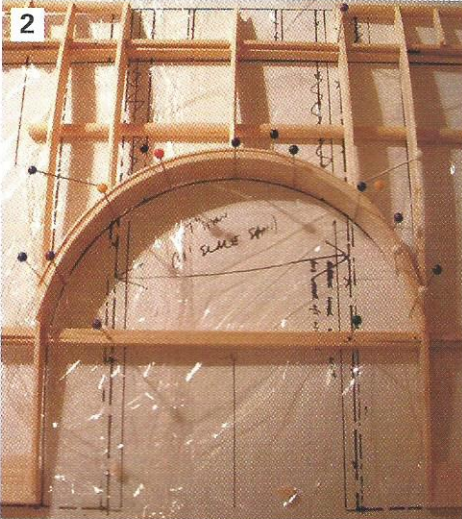
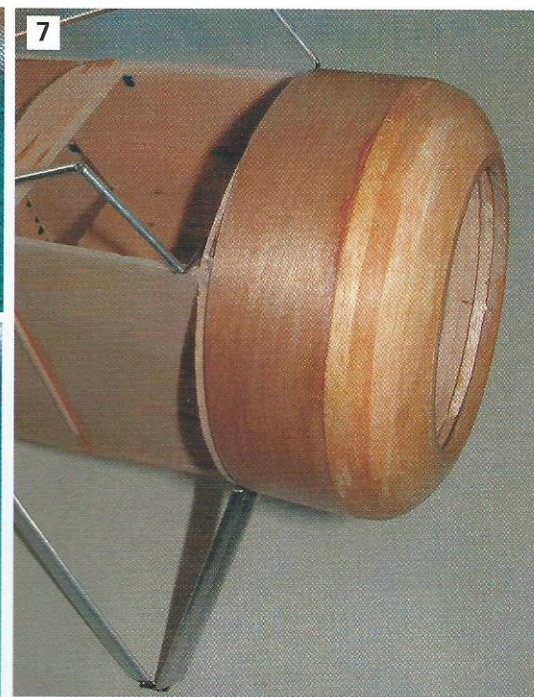
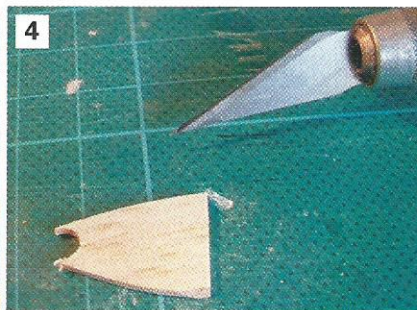
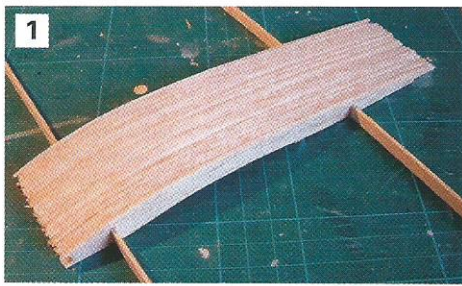
An imminent holiday in New Zealand and the usual windy February weather along the South Coast made me wonder if I was going to get a flight in before I too was airborne, but a sunny and calm day came along with a week to go. After a short hop at my local field to prove that it would take off and fly straight and level, I went to Kings Park in Bournemouth, but it was obvious that it was unstable immediately after take-off, side-slipping to an ungainly arrival.

I was relieved to find the only change necessary was to move the C of G forward slightly - I simply didn't have time to fix wing warping! Now it flew buoyantly and accurately, swinging round in stable turns to right and left, using three-quarters throttle. The huge roundels make orientation easy and it looks a treat in the air, just drifting past at head height, with Harry Hawker peering over the side.

Progressive up elevator on the landing run allows the huge wing area to slow it down dramatically for a smooth landing on short grass. A second flight confirmed the gentle and forgiving flight characteristics, as well as the aerobic potential (those rigging wires take all the worry out of loops), and I'm looking forward to further flying when I'm back

The other 'full-size' shot in the book shows the 'sawn-off' nature of the aircraft. The cowl and panels should be burnished alloy, but I was concerned about weight increase. If anyone knows a way of 'riffing' painted ply, I would like to hear from them!





1. All the ribs cut and mounted on a set of spars for sanding and trimming. 2. The extraordinary cut-out in the centre-section is easily made from a laminated section, made oversize to allow trimming before covering. 3. The finished centre-section. The dihedral breaks are unusual but look correct from the 1916 photographs. 4 & 5. Save time when cutting riblets: cut one and halve it. 6. The very simple method of attaching a wire incidence peg to the wing spars needs only one set of stitches per spar. The pegs plug straight into the fuselage sides, reinforced by small ply doublers. 7. The ply and balsa cowl, sanded and sealed ready for painting. I used Revel aluminium and gloss varnish, but really the cowl and side panels should be highly burnished alloy.. 8. I experimented with a hinged cowling to provide access to the battery, but there is enough space under the cut-away cowl to connect, disconnect and store the plugs.

from 'Aotearoa'. Control movements were: rudder - all you can get (about 40 degrees each way) and elevator 10 mm each way. The C of G ended up exactly 25 mm behind the upper wing front strut location.

### Notes to accompany the scale drawing

Sopwith's chief test pilot, Harry Hawker, had a number of one-off aircraft made for his racing, aerobatic and business use. The little Tabloid and the land adaptation of the Schneider Trophy racer are the best-known, but there were also the two 1914 Gordon Bennett racers, the SLTBP (a wing-warping 'proto-Pup' made in late 1915), the Scooter, made from Camel components in 1917, the 1919 Schneider racer and this diminutive 18 feet wingspan Bee, produced in 1916. In 'Sopwith, the Man and his Aircraft' it is briefly described as having a 50 h.p. Gnome engine and being built from Pup components and is illustrated photographically by a very good side-view and a low-level three-quarters front view.

After studying the photographs, drawing up the three-views and then building models of both the Bee and the SLTBP, I am convinced that it was the latter rather than the Pup that provided the inspiration and perhaps even the hardware for the Bee. They share the same type of engine, fin, tailplane and control system, whereas the wing is a real one-off, owing nothing to SLTBP or Pup.

In order to start somewhere, I assumed that the wing chord was, like the STLB, a fraction over five feet and made nearly all the other measurements and assumptions from there. I had to take a deep breath when fixing the dimensions of the cabane struts and the wing cut-out, but they do tie in with other measurements, even though the distortions in the photographs make it hard to be absolutely certain. For instance, I show only one set of rear cabane struts, and even these lean backwards, but that is the only solution I can see: it's not good engineering though!

The tailplane looks as though it is the same shape as the SS3 Tabloid and very similar to the later Triplane tail, but the fin and rudder are

pure SLTBP. The fuselage 'fits where it touches' to standard Sopwith practice and the rigging is obvious in the photographs. Harry Hawker must have clambered into the cockpit from above the top wing, but, once inside, he sat behind a little windscreen in a very snug cockpit, quite like the Scooter and Swallow.

The national markings are very clear in the photographs and imply that the Bee was made up to look just like an operational aircraft, with PC10 and natural linen in the usual places. The wheel covers are not painted and the cowl and side panels are brightly burnished alloy. The top panel, from the cowl to behind the cockpit, is probably varnished ply, though it is difficult to be sure. What is most unusual is that there is no Sopwith trademark on the fin or rudder, although it does appear in transfer form on the main struts.

Drawing the plans and making the model has been a fascinating exercise, but I make no claim that this is the definitive interpretation. I would love to hear from anyone else who has made a Bee, or any of the other 'one-offs' that decorate the margins of the best aircraft company in the world. Write to me at 5 Foxwood Avenue Christchurch, Dorset, England BH23 3JZ or email: roachfoxwood@aol.com

### Specification

<b>Name:</b>	Sopwith Bee
<b>Type:</b>	R/C Scale
<b>Designer:</b>	Mike Roach
<b>Scale:</b>	1/8th
<b>Power:</b>	Electric
<b>Wing span:</b>	27" (686 mm)
<b>Motor:</b>	Speed 400
<b>No. of channels:</b>	Up to three - rud./elev./throt.
<b>Construction:</b>	Built-up balsa/ply
<b>Covering:</b>	Painted Litespan
<b>All-up weight:</b>	20 oz.