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Tachikawa Type 95

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SCALE DETAIL FILE - ALBATROS D.Va IN CLOSE-UP DETAIL

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ON THE COVER

Jeff Hartnoll tends to esckew 'mainstream' subjects for scale modelling as his entry at last year's BMFA Nationals confirms. His Tachikawa Type 95 was built to 1:4.5 scale. With a wingspan of 90 inches, it weighs in at 23 lbs and is Laser V300 four-stroke powered. Full story of theis Master Model in this issue

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CONTACT

ON REPLICAS AND RESTORATIONS...

This issue of FSM includes a feature on that most elegant of German WW1 fighter types, the Albatros D.Va. We've dealt with this aircraft before, but we've never before been able to run a close-up detail study of it, which is perhaps no big surprise since only two genuine original examples still exist - one at the Australian War Memorial, in Canberra and one, a truly epic restoration by staff of the Smithsonian National Air & Space Museum, in Washington D.C. So painstaking was the restoration of that particular example of the restoration skills involved, that Smithsonian published a book on it - a goldmine of info for scale modellers by the way!

However, population of representative D.Va airframes increased by 50% in late 2011 when the New Zealand based *The Vintage Aviator Ltd.* completed and flew a replica of the type. It used an original Mercedes D.III engine supplied by the Royal Air Force Museum for which the replica machine was built and was shipped to UK the following year, along with a 40% original Sopwith Snipe and a Royal Aircraft Factory RE8, also a replica.

All three were briefly flown in UK at air shows in UK in the late summer of 2012.

After an appearance at one of those air shows at Imperial War Museum, Duxford, the D.Va was flown back to nearby Shuttleworth Museum airfield at Old Warden, where we were on hand to watch the return arrival and where Mike Reynolds had his camera on hand to capture the close-up detail study that appears in this issue.

Air shows are a prime source of inspiration for scale modellers and over the years, the restoration and replication of historic aircraft types has greatly expanded the range of historic aircraft types that we are able to see performing in the manner in which such aircraft would have performed when these were the face of current aviation technology.

There have been some amazing, successful replications, of which the D.Va is but one from the 'wood-and-wire' era, and there are many others from various periods of aviation. Some of those that come immediately to mind are the three portly little Grumman F3F U.S. Navy carrier fighters, one of which was flown at the Flying Legends air show in 2001 and the replica Focke Wulf Fw190A, also a 'star' at Duxford 'Flying Legends'. Ambition seems to know no bounds in the aircraft replication field, successfully taking on such exotica as the Messerschmitt Me 262 WW2 twin jet fighter. This particular project went through a lot of pain before completion, in a saga that's not worth relating here, even if there were space available, but the project did reach completion and Me 262 replicas did fly.

So how does all of this relate to our hobby? Well, we all appreciate seeing, in action, the aircraft we like to replicate in miniature, and the full size aircraft restoration and replication movement has added greatly to the opportunity.

To the people involved, who make it happen, FSM salutes them all.

Just two examples historic aircraft replicas. Right, Grumman F3F and below, Focke Wulf FW 190A

CATO BUTTERFLY

PART 2: Concluding the construction article for a 45" span electric powered scale model of the LWF-Cato model L 'Butterfly'. Designed by Peter Rake with the prototype model built and test flown by Ulrich Schraudolph.

We left things last time with the wings and tail surfaces of our model built and ready to cover. Now I suppose it's time to build something to attach them to - the fuselage. However, before we go any further, let me remind you of what I said about the way Ulrich finished his fuselage because it resulted in a heavier than necessary model.

Although only sheeted with balsa, Ulrich then proceeded to fill using a type of automotive putty, cover it with *Polyspan,* add two coats of dope and follow that with filler/primer before painting it. Yes, there was a lot of sanding down along the way, but you can see how easily this approach could add a lot of weight to the tail end of a fairly short nosed model.

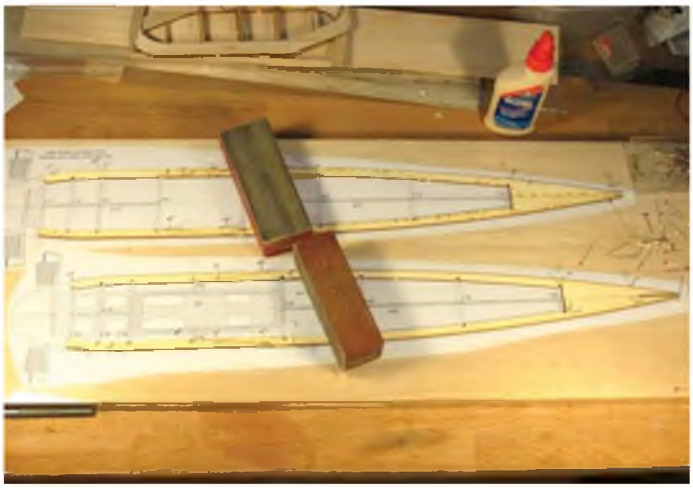
Consequently his model needed over five ounces of weight adding to the nose and pushed up the finished weight to 42 ounces. I do stress that even at this weight the model flies extremely well and can be flown very slowly; it's just that he used a larger motor and 3S LiPo to help with balance and that combination rather restricts flight times.

Battery space is limited on this model, so anything that helps reduce current drain is a good thing - unless you like five-minute flights. (Shades of the brushed motors and Ni-Cad batteries of 20 years ago - although we were quite happy with that at the time. Brushless motors and LiPo batteries have really spoiled us in recent years and actually cost less than what we were using back then. It's a very unfair world.

In my opinion there's nothing wrong with the way Ulrich finished his model, just with his choice of covering material. It's very true that a silver painted finish is going to need a VERY smooth base if it's to look good, and there's no denying he did a very good job of that, but there are lighter techniques. *Polyspan* is relatively thick, so any seams are going to need more filler/primer to lose the edges. Add in that it isn't exactly the lightest covering to begin with and it absorbs quite a bit of dope and you begin to see why it isn't the ideal choice for a potentially lightweight model. I know the 'clam shell' structure isn't the lightest possible, but it does help ensure that you end up with a straight, twist-free fuselage for the least effort.

How I would probably go about finishing this model can be approached in two different ways. Firstly, you could carefully

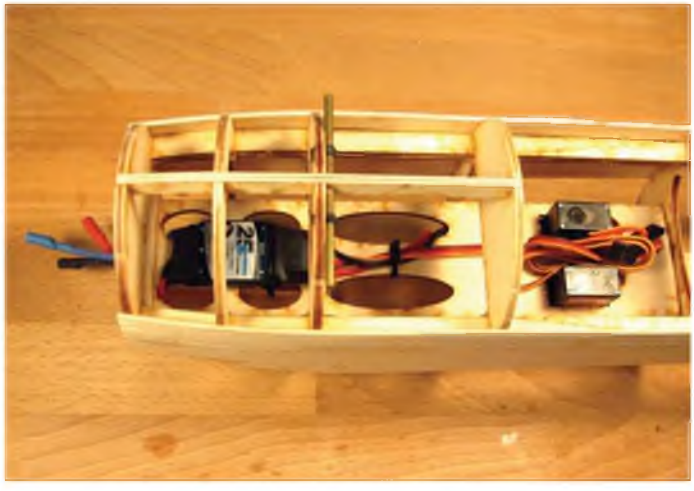
A sleek, attractive and very unusual model, the Cato Butterfly poses in the sun.



The upper and lower shell keels drying on the board.

Here you see the formers in place along with the remaining keels, radio tray and hatch seat. See text about order of fitting.

The sheeting process started with the frames still pinned to the board for support.



Ulrich opted to join the shells before completing the sheeting but it allows us to see much of his radio installation.

sheet the structure, with as few joins as possible, using medium balsa so that it's strong enough to handle but requiring as little filling as possible, or there's the other method mentioned on the plan. If you aren't sure you can apply the sheeting that accurately, use thicker, lighter wood to plank the fuselage and then sand it back to 1/16".

The possible advantage of the second option is that any gaps in the planking can be filled using lightweight filler (Red Devil or the one sold by Deluxe Materials) and will almost certainly be lighter than the wood you are filling. Then, the sanding-back process will give you an almost flawless surface to which you can begin applying your finish.

Wood grain takes quite a lot of filling before it disappears, but it can be done with nothing more than multiple coats of filler/primer, sanded back to virtually nothing between coats. That way you gradually fill all the grain and are finally left with a very thin, but very light and smooth surface to which to apply your silver paint.

If you don't fancy quite so much filling, sanding, filling and more sanding, then covering the fuselage with lightweight tissue before beginning that process will already have taken care of much of the wood grain before you ever apply any filler/primer. Tissue is much thinner than the covering Ulrich used, and once doped, can be sanded without going fuzzy, so the elimination of those edges will require a lot less filler/primer and a lot less effort on your part.

More importantly, it reduces the weight of filler/primer that you'll be adding behind the balance point, significantly reducing the amount of dead weight you'll need to add to counter it. Yes, I know you could just cover it with film and be done with it, but even a film-covered finish is only as good as the underlying surface allows it to be. If that finish happens to be silver, every little imperfection is going to stick out like a sore thumb.

So, how you finish the fuselage can make the difference between a more portly model with restricted flight duration, but a model that will handle a little more breeze or, alternatively, a lightweight (ish) floater that can be flown on much less power for longer flight times. I leave those sorts of decisions to you, the builder. I just design the things, so it's my job to make you aware of potential problem areas.

Now, with that finally out of the way, I suppose it's time to begin some actual building.

PREPARATION

With that said, there are some preparatory steps that need doing before you start gluing bits of wood together.

The first task is to check that your servos will actually fit into the openings in part BT. If they don't, it's much simpler to fix that before the part is firmly ensconced in an almost complete fuselage shell. Either open up the slots if they're too small, or add some scrap ply rails if they're too big. You may want to fit the servos at this point too.

Next up in the preparatory tasks is to bind and glue the brass tubes to formers F3T, F3B, F5T and F5B. It's important that these align precisely, so this job is best done while you can use the drawings to ensure the accuracy of that alignment.

Make sure that the wing mounting tubes are EXACTLY the length shown on the drawings, and positioned precisely as shown. Otherwise you could have an interesting time of it when it comes to fitting the wings to your completed model.

As for the strut and undercarriage tubes, you'll notice that those are shown only extending to the edge of the formers, not to the outer face of the fuselage sheeting. The reason for this, and it seemed to make sense to me, is that you'll be doing quite a bit of sanding on the fuselage sheeting/planking (depending on which route you take) and balsa tends to sand an awful lot more easily than brass tube.

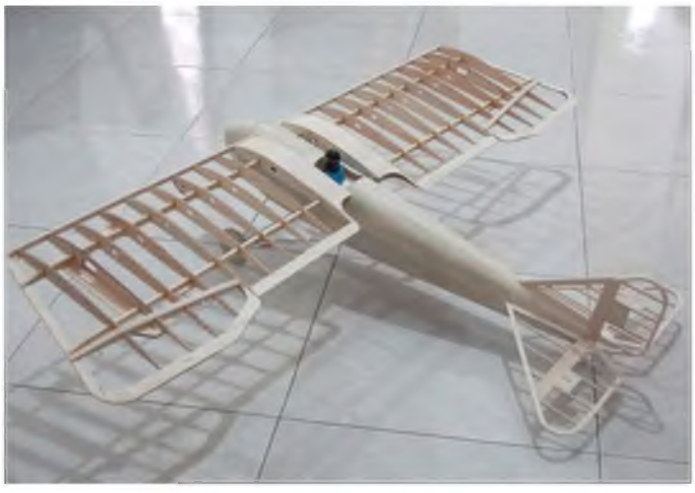
Once you have the lower shell sheeted, it's a relatively simple task to look through the open side (top) and use a pin to locate the tubes. Having found them, open up the pinholes with a drill before you start sanding and finishing the completed fuselage, after all, having got your fuselage perfectly smooth, the last thing you want to do is start poking holes into your lovely smooth finish.

Now you can actually do some real building.

LOWER SHELL

Due to the way the parts key together, you'll find that it really doesn't take too long to get

Fuselage all sheeted/planked and the two halves Ulrich used for his nose block. The other piece is the radio hatch blank.



Not really a complicated model, just a lot of sanding involved.

Here you can just make out the spacers used while shaping the tail fairing blocks.

The additional detail Ulrich added to his dummy cylinders isn't hard to do and really brings them to life.

the basic shells built. Sheeting them may be an entirely different matter, but the actual building won't take long at all.

Start by pinning down, and gluing together, parts K3 and K4B. Next, join parts F1B, BT and F5B, ensuring that they are perfectly square, and glue the assembly into the relevant keel notches. Ensure that the formers are exactly upright (90 degrees to the building board) and allow the assembly to dry so that there's no risk of moving them as the building sequence proceeds.

Now glue in place F2B, F3B and K1B, trapping (and gluing) part X in its' slots in F3B and F5B. Glue in the remaining forms and keel part K2B. You may just need to notch parts F4B to clear BT, but it's only a very minor modification. Sorry about that.

That's it, the basic lower shell frame is now ready to be planked or sheeted while it is still securely pinned to the building board to avoid distorting the frame. You might as well spot glue the hatch block in place and rough shape that too.

TOP SHELL

Not too surprisingly, this goes together pretty much as per the lower shell - except it uses parts with the T suffix and has the added complication of sheeting around the wing mounting tubes.

It's a good idea to ignore the cockpit opening during the sheeting process and cut that out once everything is finish-sanded. You could, in fact, make that the very last job you do to the fuselage, since it's much easier to sand, cover and finish without having to work around a gaping hole in the structure. I'm afraid working around the wing tubes is something you'll just have to live with.

Similarly, it isn't a bad idea to include the tail fairing blocks with the basic fuselage shell for ease of finishing and to avoid an obvious join line. Using scrap spacers where the tailplane and fin will fit, ensures that the blocks can be securely glued to F8T, but only spot glued to the spacers. Despite the fact that Ulrich appears to have made them as separate items, I'd personally be inclined to leave the spacers and blocks in place until the fuselage is ready to paint (while you can still see where you need to cut out the spacers) before carefully slicing out the spacers.

Obviously you will need a completed fuselage before this stage, so let's get that sorted out.

FINISHING THE FUZ

Really, the only remaining tasks on the fuselage itself are to make up the hollowed balsa nose block, fit the motor mount spacers, then install the motor and remaining radio gear. Needless to say, these jobs can only be done after the two basic shells have been joined, but before the final sanding and finishing is completed - you'll need to sand the nose block to blend smoothly into the rest of the fuselage.

Spot glue the nose block in place and roughly shape it. You can finish-sand it at this point if you think you can remove it, hollow it out and make the prop shaft exit hole without damaging your carefully shaped block. Personally, I'm not that good, so I'd rough shape, hollow out and then tack back in place for finishing after the motor is fitted. How you retain the nose block is up to you. I'd spot glue it, but locating pegs and magnetic retainers would work just as well. These motors require very little maintenance, but there's always a risk of needing to get to the motor for something. So, although it could be permanently glued in place that isn't an option many would choose.

As regards fitting the motor, there are enough spacer parts to allow a bit of leeway over what motor you actually use. Either way, the plan explains just how to go about it.

ASSEMBLY

This is pretty straightforward and is permanent. Shape the undercarriage wires and slip them into their tubes before binding and soldering the axle in place. Soldering first may make the fitting of the undercarriage to the fuselage just a little complicated - like as in impossible. Add the scrap balsa fairings and glue in place the tail skid.

Next, slip the wings onto their wire joiners and make up the struts in situ. Both the wing joiners and the struts may be glued in place if you have no intention of dismantling the model for transport and storage - joiners glued into tubes in the wings and the strut

ends glued into their fuselage tubes. It's only to avoid any risk of movement in flight, so they don't need to be glued that securely.

Now that you have something with which to align them, the tail surfaces can be hinged and glued in place.

Carefully drill holes at the indicated positions for the cable exit tubes, glue the tubes in place and install the closed loop controls. Open up some holes for the aileron extension leads and install them. Make up the wheels, fit some sponge rubber tyres and secure the wheels to the axle.

The dummy cylinders are made up from balsa and ply discs, slipped onto 1/8" dowel and glued together (or you can use commercial items). Prime and sand smooth, add any details you feel inclined to add to enhance the effect and glue them into holes bored (sharpened brass tube) into the nose block.

Cut the cockpit opening at some point during this stage, add cockpit trim and install your pilot figure and you will have a ready to fly Cato Butterfly.

FLYING

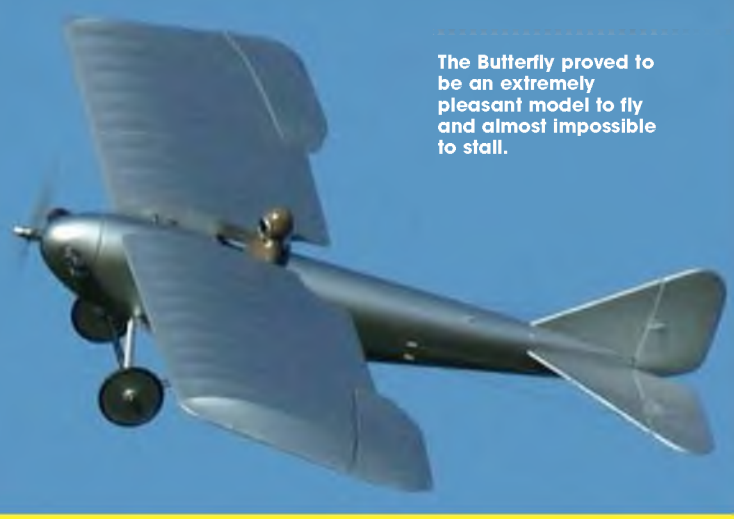
Now for the part you've all been waiting for. Rather than me telling you how the model should fly, I'll simple repeat what Ulrich said about his maiden flight with the Butterfly. Just bear in mind that English is not his first language. The balance point shown on the plans is 'safe', so could contribute to his comments about 'elevator': -

"This evening it was very calm and at this time the air at our field is not so busy so I decided to give it a go for the maiden, and she flies really great!! I hand launched her and as usual had to fight with the trims, 5 clicks left and almost fully nose up. But once the trim was settled, she flew incredibly calm and easy. She can be slowed down even more than the Peter's Eastbourne Monoplane (I had dusted this one off recently to practise for the Butterfly), and seems impossible to stall. She needed elevator control to keep the nose from dropping. However that is not a problem since she flies very sedate and calm, the high weight might actually contribute to that steady character. She is very smooth on the ailerons and the low dihedral doesn't seem to matter. I had flown the Rumpler Taube and the Nieuport 11 (other FSM plans from yours truly) in the morning, and have the impression the Butterfly is easier to fly than these; but the comparison might be unfair since she is also bigger. She looks beautiful in the air, just like the grainy pictures of the original.

I landed after about five minutes, a bit fast (perhaps the forward CG contributed.) and so on our rough field after rolling a bit she flipped on her back. But no damage, which is great since I was worried for the landing gear in view of the weight.

Unfortunately, due to my impulsive maiden, there was no photographer, I hope to get some flying pictures next week!

The motor I selected has lots of excess power with 3S, I kept the throttle well below half through most of the flight. However my battery of 1.3mAh seems a bit small, after 5min it was down to 3.8V with power off. I didn't want to fit a bigger in order not to drive up the weight even more, but perhaps that wouldn't matter that much. Also, it might be possible to fly much more energy saving; perhaps even at the low throttle setting I was pushing her against all that drag through the air, while she can fly really slow. Since I had only one battery of that size and shape (it must be a very flat 3S to fit in the compartment) I couldn't try again. I am looking forward to the next weekend. This plane will be great, not just the looks!"



The Butterfly proved to be an extremely pleasant model to fly and almost impossible to stall.

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Tachikawa Type 95

The trainer that went to war

Jeff Hartnoll's unusual and appealing biplane wowed the crowds at the 2015 Scale Nats. Alex Whittaker reveals the detail

"As well as the type's training role, it is claimed that examples saw action: some may have been pressed into action as makeshift kamikazes"

This flying shot really shows of the Type 59's attractive airframe.

The prototype Tachikawa Type 95 first flew in January 1935. The aircraft was a radial-engined two seater, with a wingspan of 33' 10.25" (10.32m). The initial powerplant was a 350hp Hitachi Ha-13a / nine cylinder radial. Interestingly, she sported unequal span top and bottom wings.

Later versions were painted in the common Japanese bright orange trainer scheme, sometimes nick-named *ake tombo*, which translates as 'Red Dragonfly'.

The Type 95 was used for both initial and advanced training duties and the same basic airframe was fitted with different engines for each training role. As well as the type's training role, it is claimed that examples saw action: some may have been pressed into action as makeshift Kamikazes. Around 600 were built, the type remaining in service until the Japanese surrender in August 1945.

The model

Welsh scale man Jeff's Hartnoll is well known to UK scale model enthusiasts and fastidiously scratch builds his own models. If you attend the annual BMFA Nats, you will see him fly each year. His Tachikawa is entirely scratch built to 1:4.5 scale, weighs 23lbs, and is Laser 300V Twin powered.

Documentation

Jeff developed his own plan from a three-view scale drawing that he discovered in an obscure Japanese monograph - *'Famous Airplanes of the World No.73'*. (Copies are available on Amazon).

Fuselage

Jeff used one of the most popular constructional methods for the fuselage, beginning with a basic box fuselage from balsa, to which he added plywood formers, to deliver the scale surface contours.

The front curved panels from the front cockpit forward, either side the box fuselage, are faired over the box structure by 1/16" balsa sheet 'shells'. The simulated stringers down each side of the fuselage are made from 1/8" sheet, which Jeff tapered to shape, front-to-rear. The fuselage turtle deck was formed from 1/16" rolled ply, while the curved rear top fuselage was built up with formers, with balsa stringers on top.

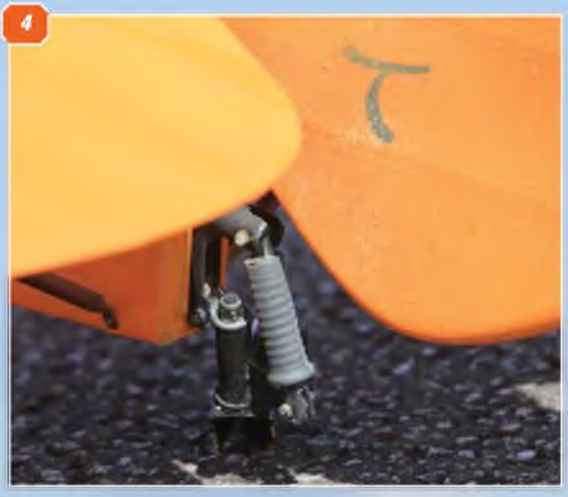
Wings

From the outset, Jeff decided on plug-in wings for easy storage and practical transport. Also, since he had the aerofoil drawing, he decided to use the scale wing section. The traditionally constructed

1: Jeff's mainly home-moulded GRP dummy engine is a masterpiece.

2: Slip-ring cowl is a masterpiece of truth. Louvers and pipe are sublime, too.

3: How's your Japanese? Note tailplane struts.



4: Nicely fabricated catering tailwheel assembly with gaiter.

wings use balsa ribs, on spruce spars, with vertical webs added between the top and bottom to the spar members.

Jeff notes that the full size original had very odd rigging incidences on the wings. The bottom wing incidence was calibrated at 0 degrees, but the top was set at minus 2 degrees, but decided to use the same incidences on his model.

Tailplane

Core and riblet construction was used, with a 3/32" balsa core, and1/8" riblets. The top and bottom of the tailplane was

Jeff's Tachikawa Type 59 is just over 1/4 scale and spans 90".

then sheeted with 1/16" balsa sheet. Similarly, the elevator and rudder used a 3/32" balsa sheet core plus 1/8" balsa riblets. The tail is set at zero incidence.

Engine:
Laser 300 V glow engine with no on-board glow.

Dummy Engine
This is based on a quarter-scale Williams Brothers plastic cylinder head, which was used as a pattern from which to then create a silicon mould. Multiple cylinders were then cast from lightweight resin. Jeff used a home-made balsa pattern, turned on his lathe, as a mould from which to cast the glass fibre crankcase.

Dummy exhaust pipe
This is a prominent feature of the original.

The exhaust pipe was made from a 1" cut taken though a polystyrene disc, ending up like a Polo mint, with a hole in it. This annulus was then faired to section, like sanding a model tyre from foam.

Next, lightweight fibreglass resin was used to coat this Polo shape and thinners were then used to melt out the inner foam core, to revealed a neatly cast glass fibre exhaust pipe.

Prop:
20"x 10" wood.

Exhaust:
Jeff used Laser engines flexi-tubing to route the exhaust to scale egress under the fuselage.

5: Aerodynamically balanced rudder areas apparent in this view. 6: Rudder and fin use a balsa core and riblet construction. 7: Jeff built up the wheels from commercial tyres, plywood hubs, and home-moulded GRP covers. 8: The top fairing on the undercarriage is more apparent from this view. Note oil filler cap.

9: Neat and minimal dashboard arrangement, suitable for a trainer.

10: P2's office is appropriately furnished.

11: Real leather upholstery!

Main undercarriage

Piano wire was used for the basic undercarriage components. Struts are balsa covered with lightweight glass cloth and resin.

The neat fairings into the fuselage are made from balsa and filler, faired and sanded, then coated with GRP and resin. Jeff bought all the cloth and resin used on this project from Fighteraces.

Wheels

These use commercial tyres on home-made plywood hubs, with Jeff's home-moulded glass fibre covers.

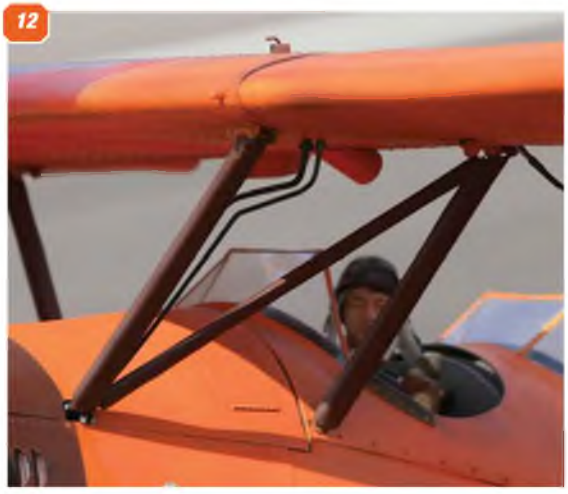
Covering and painting

Sig Koverall was used to cover the entire model. Thinned shrinking dope was used to seal the fabric and give a good substrate for subsequent finishing.

Pacific Theatre radial engine warbirds have real character.

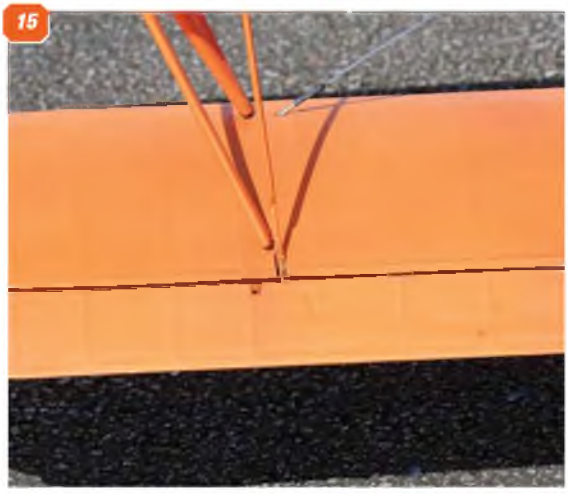
12: Neatly plumbed feeds from the upper wing fuel tank.

13: Ailerons extend a good way down the span.



14: Note treadway, wing root fairing, steps and (dummy) longerons.

15: Neat hinge detailing on ailerons. Note rib tapes.



Tamiya acrylic paints were used throughout. Jeff mixed up his own colours as per the colour chip supplied with the Japanese publication. The whole model was then fuel proofed with Klasskote from Fighteraces.

Weathering

A home made dirty wash was made up from a dab of black and brown acrylic mixed with the base orange acrylic. This was airbrushed lightly on to the model, as per the airflow in flight. It is suitably subtle, and therefore very convincing.

Legending / Decals

The stencils, markings, and letterings were all sprayed on with masks supplied by Flightline Graphics

Pilot

Jeff experienced difficulty finding a suitable pilot of appropriate quality. Eventually he sourced one from Fighteraces.

http://www.fighteraces.co.uk/

Scale details

Eschewing the internet, Jeff based all his scale detailing on the publication 'Famous Airplanes Of The World No73' Jeff moulded his own top fuselage tank bay.

Flying notes

Jeff says that once he sorted out the original aileron and elevator throws - which were too much, - the model now flies like a trainer. Long approaches, touch-and-goes, and all the appropriate manoeuvres for the type are now perfomed with no fuss.

Unfortunately, due to a run of bad weather, Jeff could only fly the model three times before the 2015 Nats. In the end, it did not matter. She performed well, and handled the difficult wind conditions with aplomb. The Nats crowd loved her, and her unusual colour scheme. ■

SPECIFICATIONS:

Aircraft type: Tachikawa Type 59

Scale:	1:4.5
Wingspan:	90 inch
Weight:	23 lbs
Engine:	Laser V300 (50cc)
Prop:	20"x10" wooden

The lower wing has a reduced span.

Two wings and round engine is winning scale formula.

SCALE MODELLERS DATAFILE

ALBATROS D.VA

A IN DETAIL

The Albatros D.V and D.Va were the culmination of a design line that started in the spring of 1916 with the D.I, to be quickly followed by the D.II. Both were conventional biplanes, incorporating the same fully plywood skinned fuselage that imparted a degree of fuselage streamlining and elegance, the top and bottom skin panels being steam pressed into compound curve shape, but with flat fuselage sides.

This fuselage construction method continued with the subsequent D.III variant that followed on in 1917, still with flat sides, but with the wing style changed, with smaller 'sesquiplane' lower wing panels, intended to provide a better downward view for the pilot - an innovation first introduced in a 'scout' type by the French Nieuport 11.

It was the Albatros D.V, introduced in mid-1918, quickly followed by the D.Va, that took on the ultimate elegance of the Albatros line with its fully curved fuselage shape and which so attracts scale modellers.

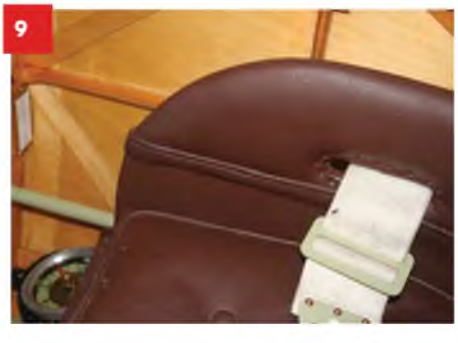
The Albatros D.Va aircraft which is the subject of this close-up detail study is actually a flying replica built by New Zealand Company *The Vintage Aviator Ltd (TVAL)* in 2011. It uses an original contemporary Mercedes D.III engine supplied by the Royal Air Force Museum and is painted in the livery of a D.V aircraft from a batch of 400 ordered in May 1917and represents an aircraft flown on the Western Front by Jasta 61 in 1918.

Flown a number of times in New Zealand and the UK in 2012, including an air show appearance at Duxford, Cambridgeshire during a weekend in early September that year, early the following week, it was flown to nearby Shuttleworth Museum airfield at Old Warden, where Mike Reynolds was in hand to photograph the aircraft in detail for FSM.

It arrived at RAF Museum Hendon in October 2012 and is currently in full view in the museum's Grahame White Annex, together with many contemporary types.

Of more than 3,000 D.V/D.Va examples built, only two originals remain, one at the Smithsonian, in Washington, D.C., and another in Australia. ■

Tucked away in one of the Shuttleworth Collection's hangars at Old Warden after a return flight from nearby Duxford, the Albatros D.Va, destined for permanent static display in the Grahame White Annex at the RAF Museum, Hendon.



COCKPIT

1 & 2: Pilot's eye view of the cockpit interior and instrumentation. The green bar across the front is the rear mount for the twin Soandau guns. 3: Right cockpit side, showing the hanger for the map holder and the grease gun for the fuel tank pressure pump. 4: Cockpit seat. 5: Leather covered, cushioned cockpit rim.
6: Throttle and megneto, left side. 7: Left cockpit side. 8: Rudder control bar. Note the foot stirrups. 9: Pilot's leather covered seat. 10: Groundcrew lifting ring on rear fuselage side.

FUSELAGE

11 & 12: Some of the overlapping plywood fuselage skin panels. 13-15: The fin is fully plywood skinned with press-moulded fairing at the base.

WING

16: Wing interplane strut detail. Note the forward stay re-inforcer strut that runs forward toward the wing leading edge.
17: Interplane strut lower wing anchor point. 18: Leading edge wing strut upper anchor point. 19: Rear wing strut top wing anchor point, also showing the forward crank link to the aileron. 20: Further view of the wing interplane strut lower wing anchor point, viewed from the rear, showing the control wire runs up to the aileron crank on the upper wing.
21 & 22: Windspeed meter mounted on the right hand front interplane strut.
23: Complete wing interplane strut, right wing. 24 & 25: Metal feed shute for the amo belt to the right hand gun.
26: Underfin and tailskid, showing the bungee cord shock absorber.

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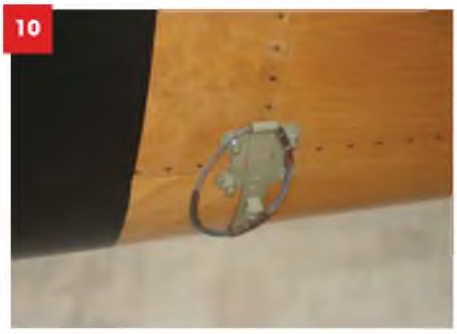

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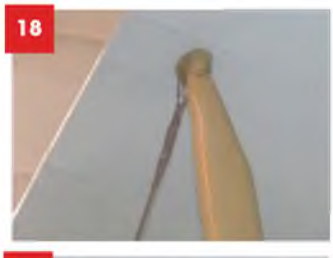

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WING RADIATOR

27-28: Two underside views of the engine radiator mounted in the upper wing centre section. The long metal link controls the grille slots.

TAILPLANE

29: Tailplane leading edge, showing the attachment bolt. Note, the tailplane panel slots into the plywood fairing on the fuselage side. 30: Elevator hinge. 31 & 32: The upper surface elevator control horns and adjustable control wire links. Undersurface similar.

MAIN UNDERCARRAIGE

33: Wheel hub, inner side view, showing bungee cord shock absorber, partially covered over. 34: Aerofoil main undercarriage axle fairing. 35 & 36: Mainwheel outside face, showing the access panel. 37: Further view of the main undercarriage and struts.

NOSE SECTION

38: The propeller spinner. Note the space between the cowl and spinner to pass cooling air. 39: Wing bracing wire anchor points on the fuselage nose. Note the foot step for groundcrew access to the engine. 40: Access hatches and cooling louvres on fuselage side. Right side similar.
41 & 42: View rearward along the lower fuselage.
42 & 43: Engine cowl latch on nose section. Right side simplar. Some aircraft had two latches each side.

CENTRE SECTION STRUTS

44: Wing centre section struts. 45: Re-informent bracet, fuselage centre section. 46: Centre section strut bracket. Four, all similar.

WING BRACING WIRES

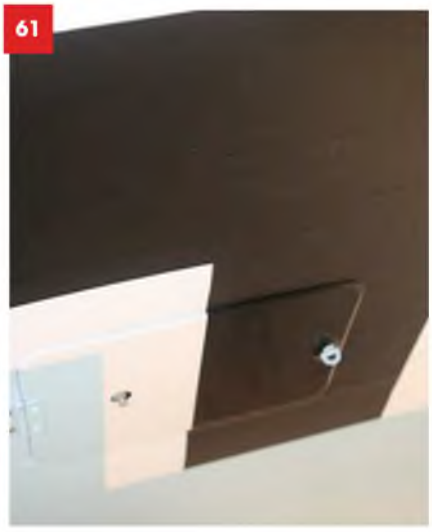
47: Wing bracing wire anchor points at lower wing/fuselage position.48: Bracing wire that runs from upper wing underside, to the fuselage nose.

FORWARD FUSELAGE

49: Access hatches and louvres in the fuselage nose section. Note also the front main undercarriage leg attachment and the pinning lines on the overlapping surface skin panels. 50: Centre-section wing strut and upper engine cowl. 51: External brace plate below cockpit rim. 52: Cockpit mounting stirrup in fuselage, left side below cockpit. 53: A further view of the fuselage access panels and undercarriage mount, right hand fuselage side.

WING

54: Upper wing underside, showing the aileron control crank. 55: Lower wing-to-fuselage joint and rear undercarriage strut anchor. 56: Radiator in upper wing centre section. 57 & 58: Aileron on upper wing. 59 & 60: Two views of the lower wing mating with the fuselage fairing, viewed from below. 61: Access panel to the aileron control wires on the lower wing underside.



BRISTOL F2B 'BRISFIT'

GARY SUNDERLAND'S 117" WINGSPAN QUARTER-SCALE, BRISTOL F2B 'FIGHTER'. PLANS ALSO AVAILABLE AT 1/5TH SCALE, WITH A WINGSPAN OF 93.5".

Removable observer figure lends scale to the massive 'static-judging' propeller, formed from three laminations of 1/2" balsa. Stub exhausts and radiator shutters are all functional, the latter being opened up for flight to allow for engine cooling.

Armed with a good collection of books and Data-files on the Bristol F2B 'Fighter', plus a close look at three F2Bs in England where I took lots of photographs, I started the construction of a 1/4 scale model with some confidence. At nine feet nine inches wingspan this was going to be a large model; with previous experience with my DH4 at 1/6th scale, I knew the flying qualities were going to be docile and reliable.

Researching the subject

The 'prototype' selected to model was B1146, a much-photographed presentation machine of No.1 Squadron, Australian Flying Corps, in Palestine, early 1918. These photographs showed that the early 'Brisfit' had a simple set of only five radiator shutters, and far fewer cut-outs and louvres to the cowl when compared with the Bristols now existing in England, which are all of the much later Mk. IV configuration as regards their engine installations.

The forward cockpit area also seems to differ from the later variants and the early versions have flat sides and a most peculiar transition into the fuel tank area. Needless to say, none of the available drawings provided this detail and most photographs are impossible to interpret, as this area is usually indistinct, under the shadow of the upper wing.

Similarly, most drawings seem to indicate that the shape of the cowl top continues into the tank area, ahead of the pilot, where there is one filler cap. This is incorrect for all versions. Actually there were three fuel tanks. The two main tanks and the two filler caps were situated either side of the pilot's machine gun, which was located under the cowl, directly in front of the pilot and fired through a tunnel and a hole in the radiator.

A clue is provided by J. M. Bruce in his book on the *'Bristol Fighter'*, where he reports of pilots complaining that the view forward on the later model, 275 h.p. version, was worse '"*..due to the larger radiator required for the Falcon III engine."*

Given that none of the drawings or photographs indicate any change to the radiator shape, I suspect it is more likely that there was a change to the upper cowl, to increase the main fuel tank capacity and to fair in the shape better. Thus, for my model of the early version which had the 220 h.p. Falcon II engine, I copied the few photographs of this area as best I could and 'guessed' the location of the two filler caps.

A few construction comments

The rest of the structure is quite straightforward and simple, apart from the lower wing centre-section, which is mounted some distance below the fuselage. This was sheeted all over in balsa for rigidity, with 3mm ply sides.

After building the undercarriage from steel

Fuselage parts completed and covered, prior to painting. Metal panel areas are covered with lithoplate aluminium sheet, epoxied over balsa sheet.

The undercarriage and lower wing centre-section were first built and mounted separately. Then the centre-section was cut in half at the rear leg position and spliced together onto the undercarriage.

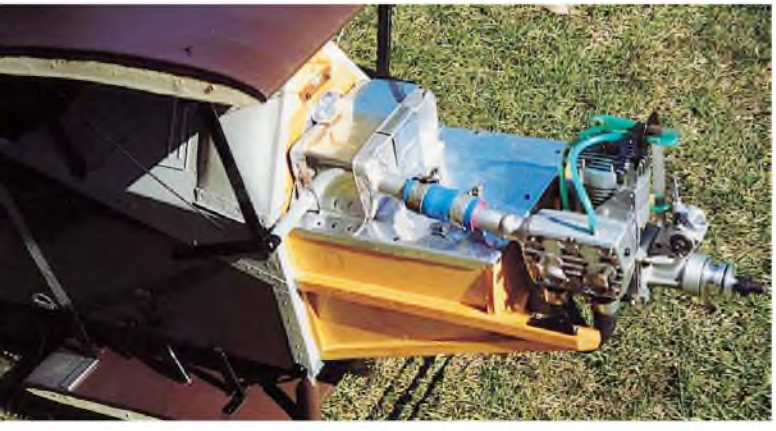
Engine cowl is designed to remove with minimum disturbance of the engine controls, exhausts and 'plumbing'. Unit, which is lithoplate over built-up balsa and ply on the outside, and glassfibre on the inside, is attached with just two screws.

After final painting, the wings are being rigged. Note incidence meter clamped to upper centre-section, also that the nose cone is removed to access engine mounts. Engine and tail are at zero degrees, wings at one degree incidence.

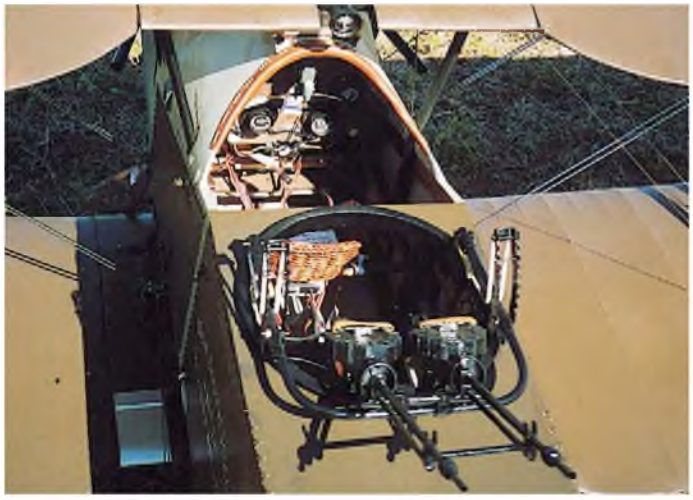
> "The 'prototype' selected to model was B1146, a much-photographed presentation machine of No.1 Squadron, Australian Flying Corps, in Palestine, early 1918"

wire, mounted on an aluminium base-plate, the centre-section was cut in half and the two assemblies spiced together onto the fuselage, taking care to reproduce every strut and bracing wire of the original. Apart from fidelity to scale, all those wires had a purpose on the full-size, to carry the flight and landing loads, and are equally necessary on the model.

All of the fuselage structure was copied exactly, including the engine mount area where the forward truss carries a wire brace back to the wings. The wire fittings are secured by one 4-40 cap screw to each side and these screws also serve to hold the removable nose cowl, which can be slid off to expose the engine. The nose cowl was built up from ply and balsa, onto the slides and is covered with lithoplate on the outside and fibreglass inside. Even when painted, nothing looks



Pilot and observer figures in close-up; the fuselage fabric lacing is linen thread and uses over 1000 brads. Twin Lewis gun barrels are from old paint brush handles - their aluminium ferrules were reversed to represent the muzzles.



High level of cockpit detail includes the twin Lewis MG mount, pilot's wicker seat and instrument board with compass mounted in the upper centre-section. A scale 'throttle' operates the Rx on/off switch.

Tail-end close-up showing tailplane bracing and aircrew; pilot of No. 1 Squadron RAFC's B1146 at the time was Lt. Ross Smith (later Sir Ross) and observer was Lt. 'Pard' Mustard.

more like metal than metal!

There are quite a few scale access holes in the cowl and the controls and 'plumbing' are so arranged that the cowl can be slid off without disturbing anything, other than the propeller and the two attaching screws. I am getting more cunning in my old age!

Finishing off

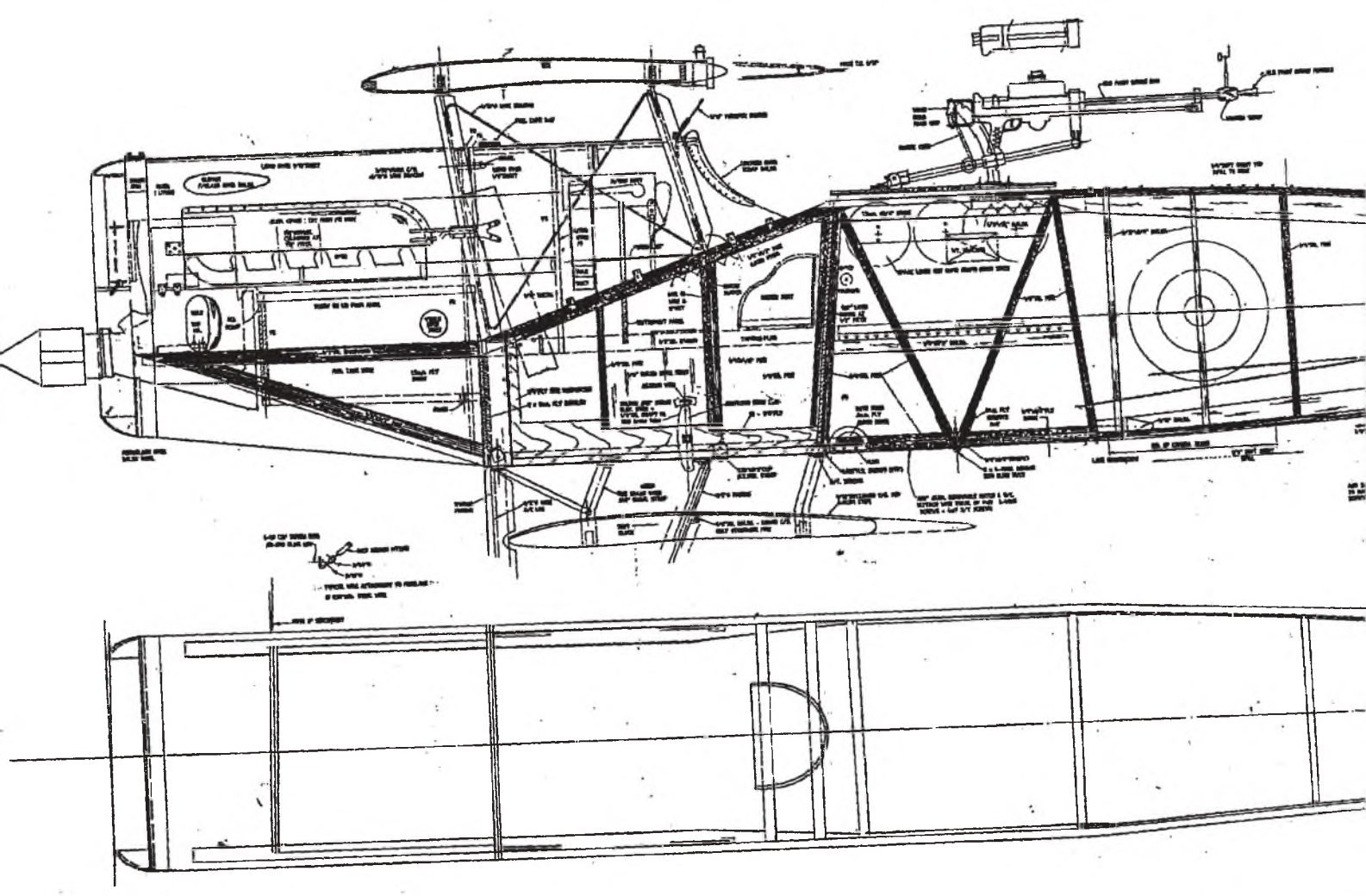
The fabric covering is all *Sig Koverall* with two coats of nitrate dope. The rib tapes, of silk, were applied with a hot iron onto Cover-Grip - a water-based adhesive - then sealed with butyrate dope. The final finish is of *Flair PC-10* paint with an overspray of clear satin urethane varnish. This final 'black/brown' colour is an exact match of the colour of the Shuttleworth Trust's full-size 'Brisfit' at Old Warden, for which I have many photos and videos.

Rigging the wings was initially carried out with 0.032" piano wire. In fact, the first few flights were carried out with the temporary rigging. This was eventually replaced with *Mick Reeves' flat strip* and his stainless steel fittings. Incidentally, full marks to Mick for his airmail service to the antipodes - not just for the excellent products like tiny screws and Flair paints, but also the speed and reliability of the service.

In the air

Flying the 'Brisfit' was pretty much as expected. It really flies just a powered glider and trundles through the air like a big basic trainer. Open the throttle and it goes up; close the throttle and it glides

The Moki 180 30cc two-stroke is mounted on a Du-Bro mount. Exhaust via a J-Tek muffler is into a welded aluminium box and then into two scale exhaust outlets.



BRISTOL F2B 'BRISFIT' (PLAN FSM/21)

Full size copies of this plan are available from Flying Scale Models Plans Service, ADH Publishing, Doolittle Mill, Doolittle Lane, Totternhoe, Bedfordshire, LU6 1QX.

Tel 01525 222573

enquiries@adhpublishing.com

Price £24.95 plus p&p (U.K £2.50; Europe £4.00; Rest or World £6.00.

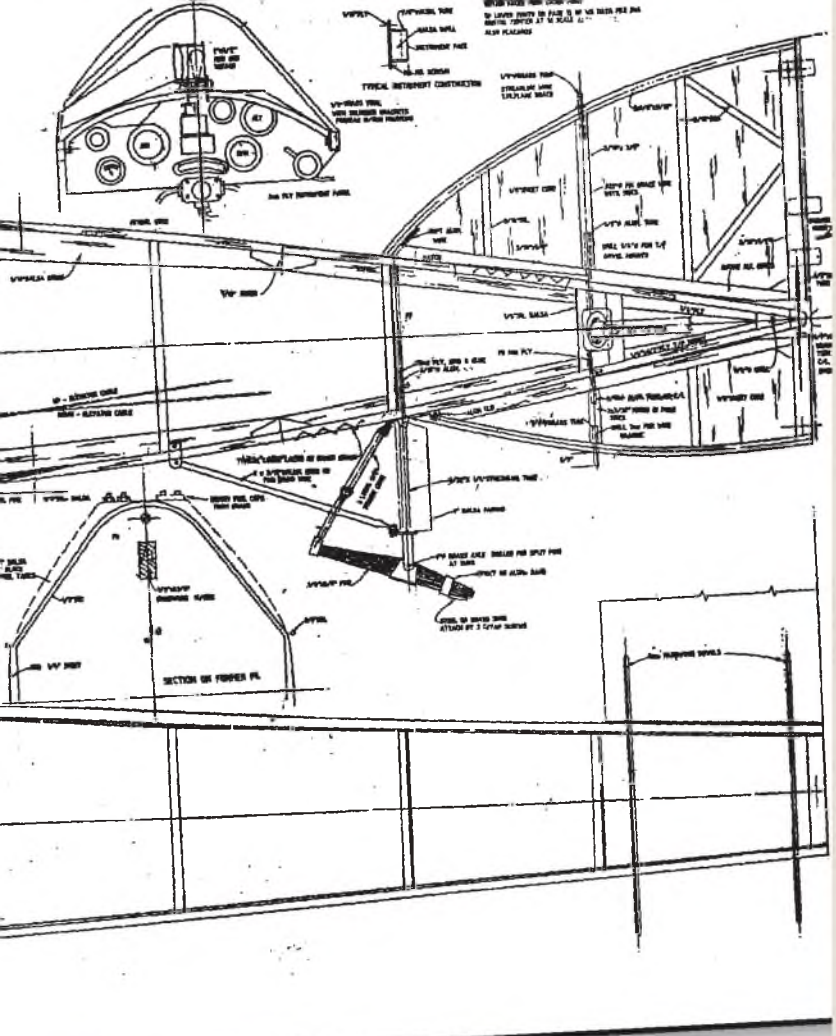
TOO BIG?

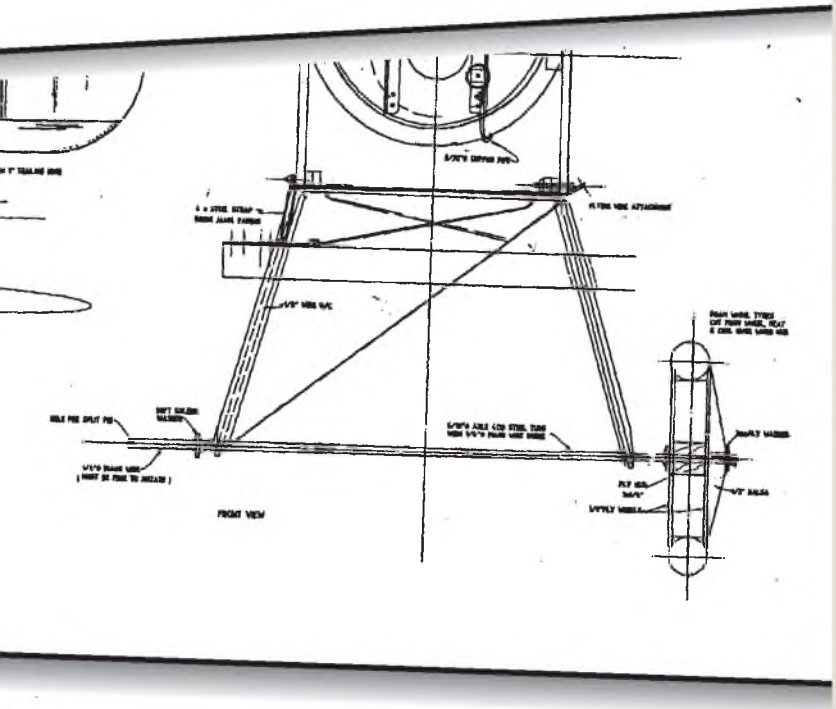
ALSO AVAILABLE IN 1/5TH SCALE...

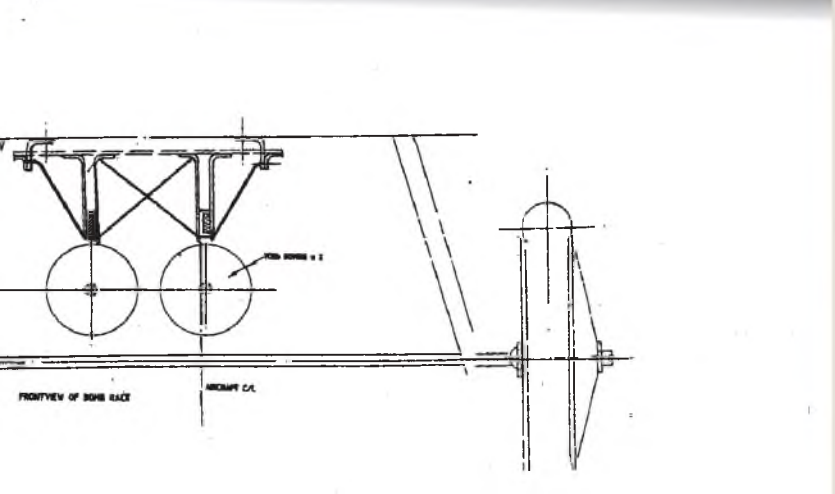
We offer this alternative on the understanding that no test prototype model has been built, but if you prefer to model the Bristol F2B at a reduced size, with a wingspan of 94.2" (2393mm) , you will find these reduced-size sheets a good basis for a model that suits your size requirement.

Plan price is the same as for the larger model, but please order plan FSM/23

CUT PARTS ALSO AVAILABLE AT 1/5TH SCALE







CUT PARTS SET FOR THE

BRISTOL F2B 'BRISFIT'

IN BOTH 1/4 AND 1/5TH SCALES

Get straight down to construction without delay! This month's full size free plan feature is supported by a laser-cut set of ready-to-use balsa and plywood components.

THESE PARTS SETS PROVIDE: formers, doublers, wood wing ribs, blue foam wing ribs, blue foam wing panels (not veneered) and tips, elevator and rudder core sheet.

NOT INCLUDED: STRIP AND SHEET MATERIAL OR SHAPED WIRE PARTS

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gently down! Take-offs and landing must be into wind, and that is about it.

The only problem experienced was a few momentary radio glitches during distant turns. I normally run the radio aerial under the belly of my scale models, with a rubber band tension onto the tailskid. We decided the problem with the Bristol was the mass of wing bracing wires compared with my other models. The solution was to re-locate the aerial onto the top of the fin, and this seems to have solved the problem.

The original target weight for the design was 25lbs and the actual flying weight is 30lb. This is due to the complex and heavy lower centre-section mount, plus the weight of two 'occupants' and all that detail. With the Moki 180 up front, the performance is adequate, but not startling - very much like the full-size 'Brisfit' at Old Warden that rumbles around gently at half throttle for most of the time.

With a 22 x 8 Bolly propeller, the mighty Moki turns at 6,300 r.p.m. static, but is a bit noisy in the air due to tip speed. Thereafter, it flew with a 22 x 10 wooden prop that gave 5,500 r.p.m. static and is suitably quiet, with about the same performance.

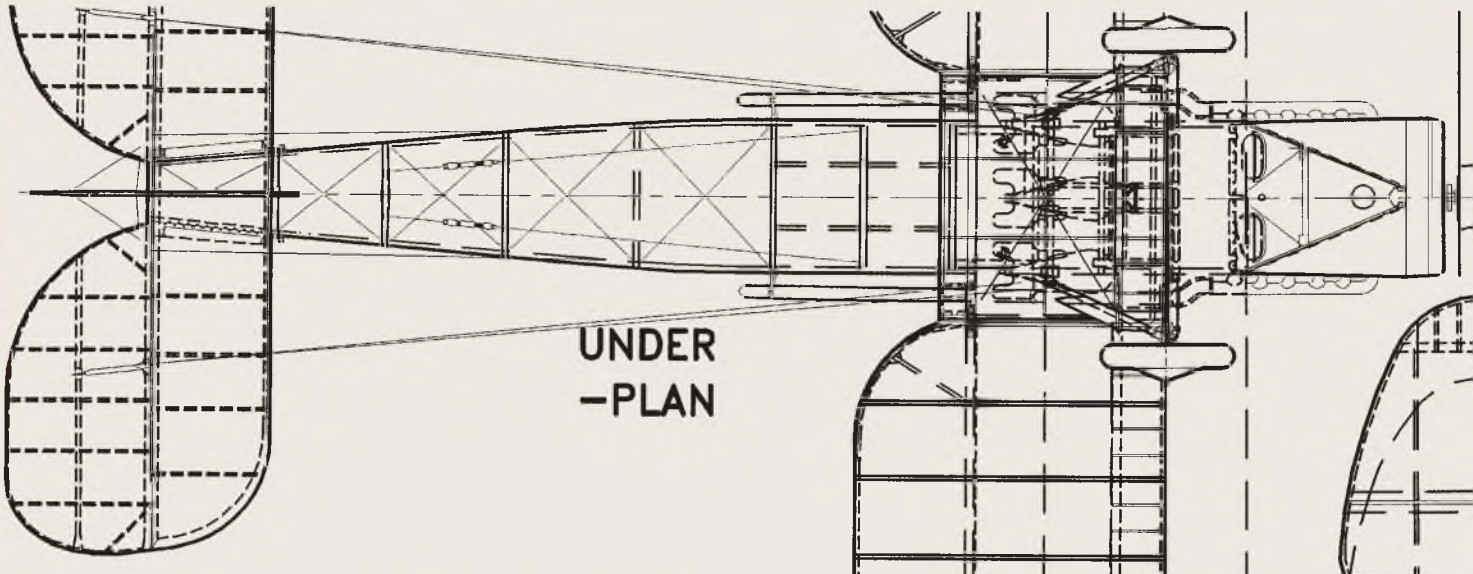
This is all very adequate for display flying, but a more vertical performance is required for contest work. For that, the 'Brisfit' needs to be fitted with a larger and even more powerful engine. There is plenty of room in the 'Brisfit's cowl to cope with a large range of possible engine options. ■

SPECIFICATIONS:

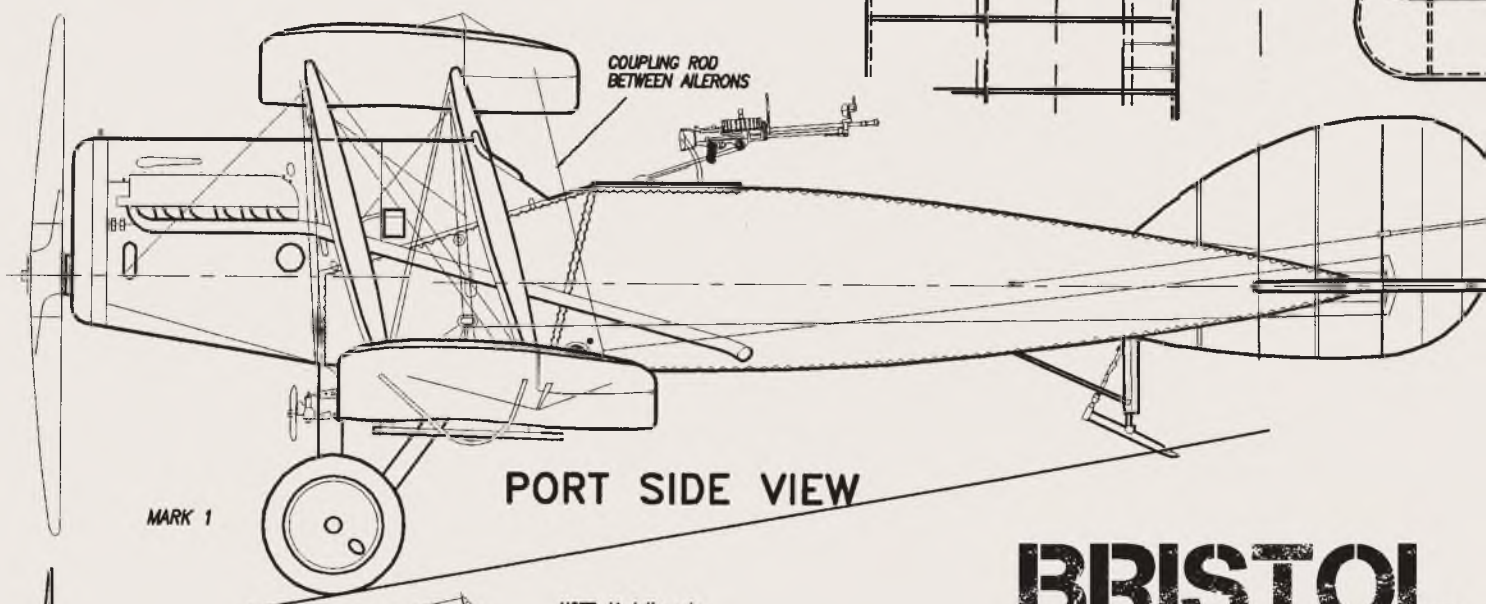
Model name:	Bristol F2B Fighter
Model type:	1/4 scale
Designed by:	Gary Sunderland
Wing span:	117"
Power range:	30 to 40cc
Engine in p'type:	Moki 180 30cc two-stroke
Propeller:	Bolly 22 x 8
Control functions:	Rud./elev./ail./throt.
Construction:	Built-up balsa/ply
Covering:	Sig 'Koverall'
Finish:	Flair PC-10 paint over two coats of dope with clear varnish overspray
Markings:	Hand-painted Humbrol enamels
All-up weight:	25lb (anticipated) 30lb (actual)

Gary's 1/4 scale replica spans 117" and weighs 30lb without fuel. Power is a Moki 180 two-stroke 30cc turning a Bolly 22 x 8 propeller at 6,700 r.p.m. static.

SCALE 1:40



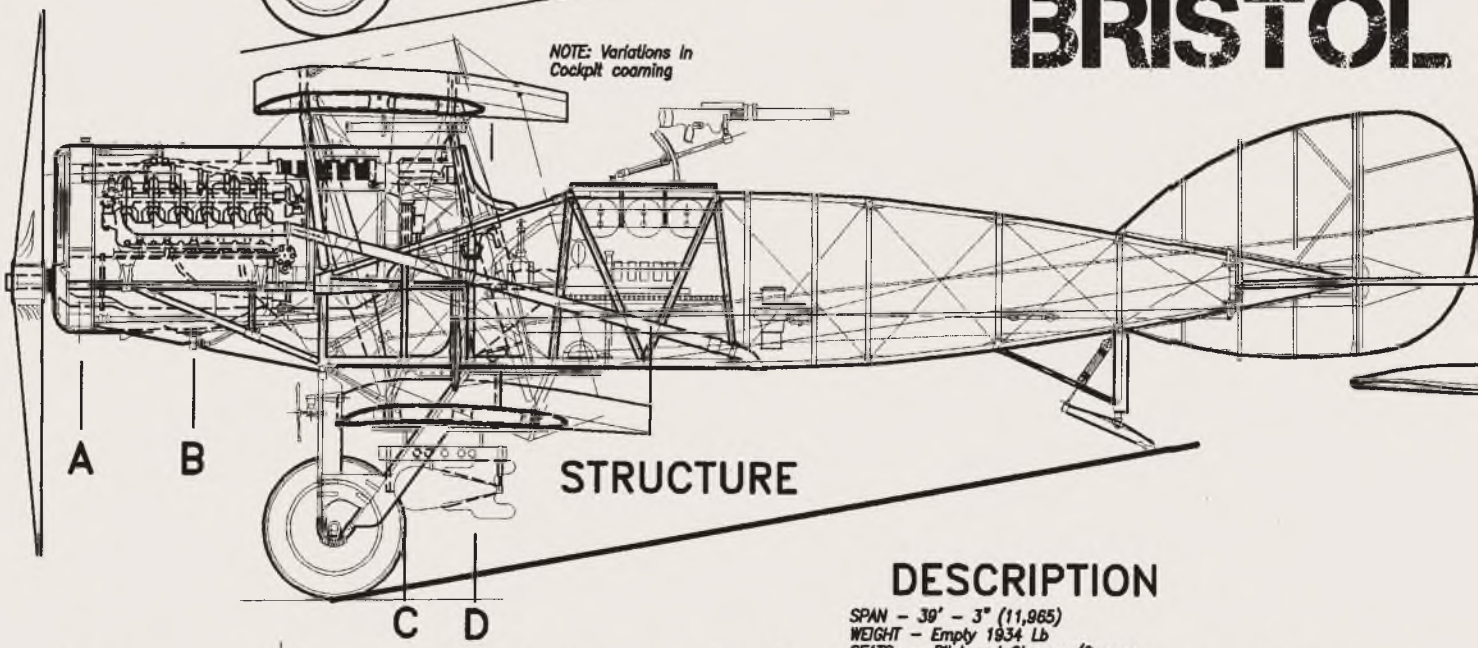
UNDER
-PLAN



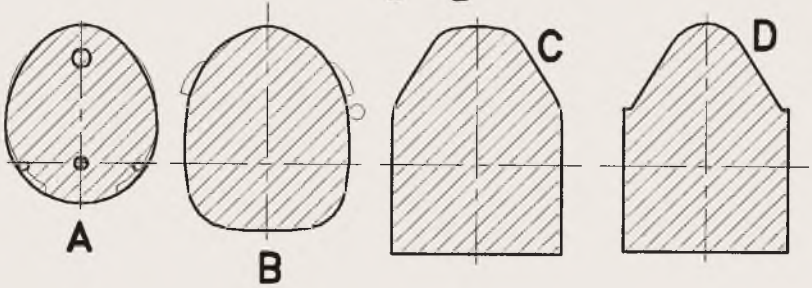
PORT SIDE VIEW

MARK 1

BRISTOL

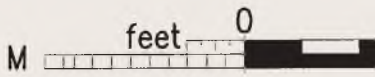


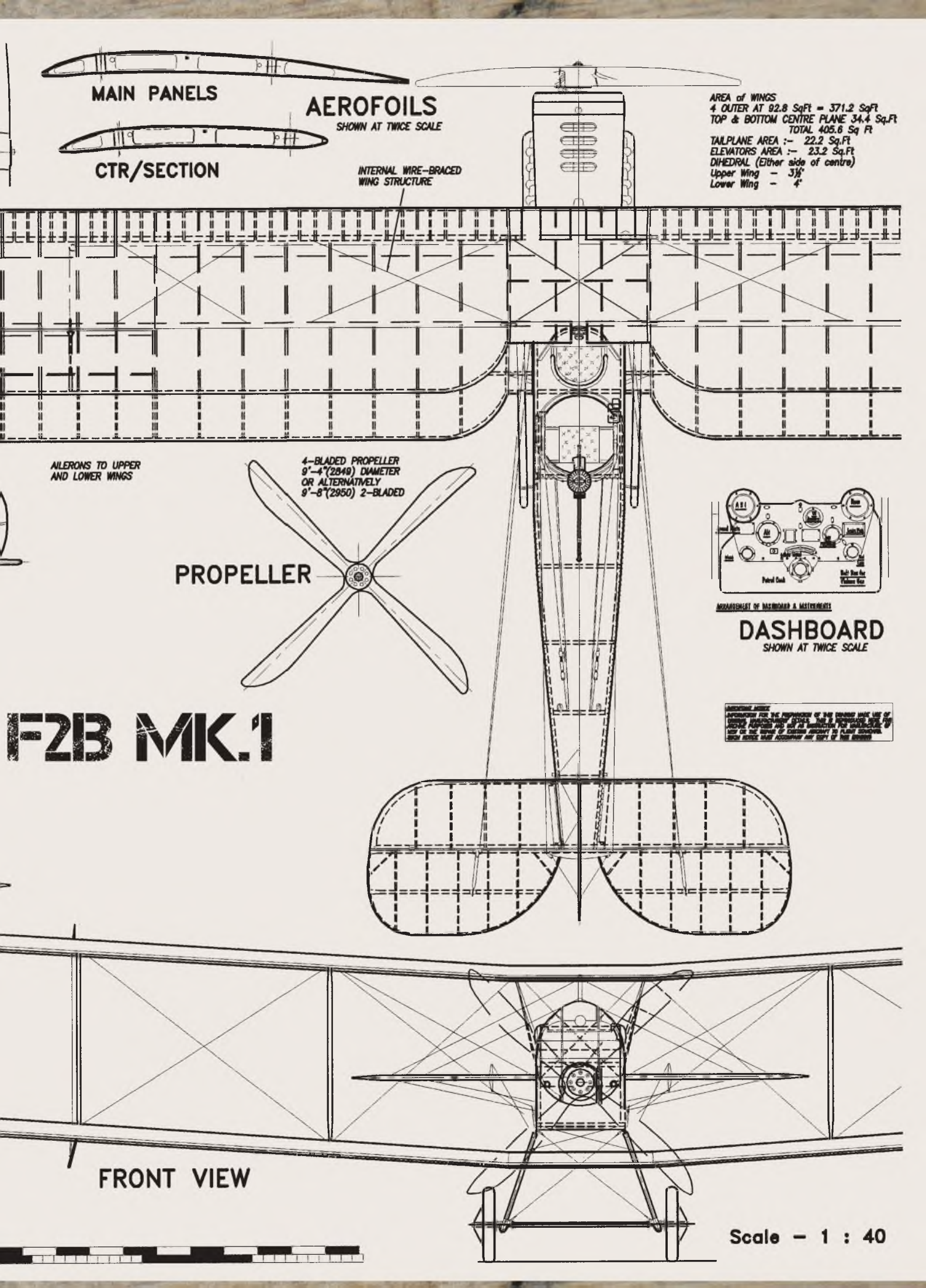
STRUCTURE



DESCRIPTION

SPAN – 39' – 3" (11,965)
WEIGHT – Empty 1934 Lb
SEATS – Pilot and Observer/Gunner
ENGINE – MAJORITY R.R.Falcon I/II (230/' 253 hp) 12Cyl.Vee
(also used Hispano–Suiza, Siddeley Puma & Wolseley Viper)
ARMAMENT – Single or twin Lewis guns on Scarff ring and
Vickers gun fixed in vee of engine (synchronized).
Bomb rack fitted under lower centre section
SERVICE – RFC, Western Front from March 1917, all purposes
Later Mks served post–war in Europe, Middle East, and India



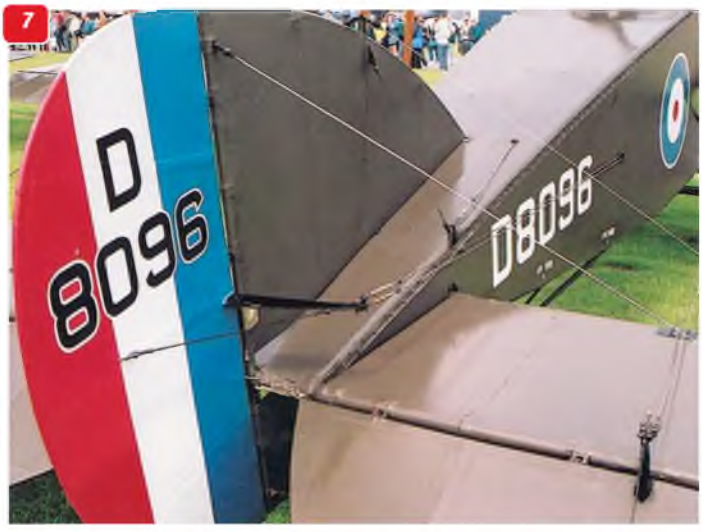

MAIN PANELS
CTR/SECTION
AEROFOILS
SHOWN AT TWICE SCALE
AREA of WINGS
4 OUTER AT 92.8 SqFt = 371.2 SqFt
TOP & BOTTOM CENTRE PLANE 34.4 Sq.Ft
TOTAL 405.6 Sq Ft
TAILPLANE AREA :- 22.2 Sq.Ft
ELEVATORS AREA :- 23.2 Sq.Ft
DIHEDRAL (Either side of centre)
Upper Wing - 3½°
Lower Wing - 4°
INTERNAL WIRE-BRACED WING STRUCTURE
AILERONS TO UPPER AND LOWER WINGS
4-BLADED PROPELLER
9'-4"(2849) DIAMETER
OR ALTERNATIVELY
9'-8"(2950) 2-BLADED
PROPELLER
ARRANGEMENT OF DASHBOARD & INSTRUMENTS
DASHBOARD
SHOWN AT TWICE SCALE
F2B MK.1
FRONT VIEW
Scale - 1 : 40

BRISTOL F2B 'BRISFIT'

CLOSE-UP PHOTO STUDY FOR THOSE WHO LIKE TO PILE ON THE DETAIL

1 & 2: Shuttleworth Collection's Mk.III showing the long exhaust and the lacing the the fabric fuselage covering panels.

3: Fuselage underside view at the nose showing the main undercarriage and its bracing wires.



4: Nose of Shuttleworth's RR Falcon III V-12 powered F2B Mk.III showing radiator shutters. 5: Earlier style shutter arrangement on The Fighter Collection's F2B. 6: Lower wing centre section showing the archor points to the fuselage. 7: Tail end, showing the control runs to the rudder and elevator, and the tail braciing wires.
8: Tailplane trim linkage wire connects direct to leading edge crank turnbuckle.
9: Close-up view of the double control wires to the rudder control horn and fabric panel lacing on The Fighter Collection's machine.
10: Control wires all out in the breeze are very much part of the character of the Bristol F2B.
11 & 12: Wing interplane struts showing the upper and lower wing anchor points.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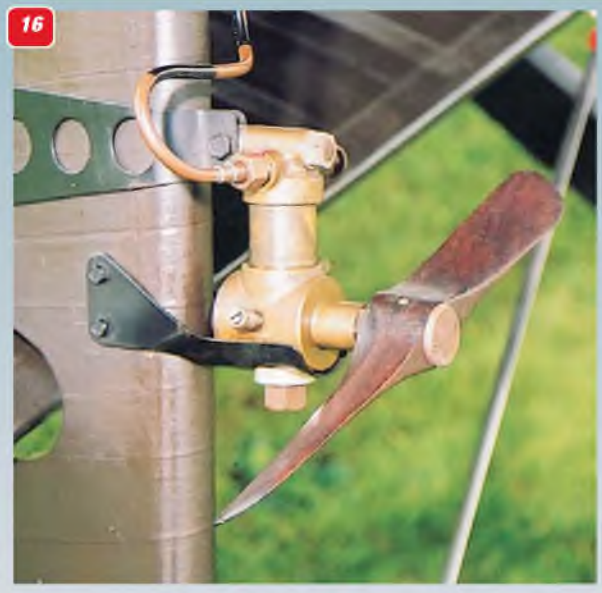
13: Elevator horn with duplicated control wires and turnbuckle adjusters. 14: Wing tip underside, showing the protective skid and the aileron horn. 15: Upper wing top surface, showing aileron control horn. 16: Close-up of the Rotherham Pump mounted on the starboard front undercarriage strut - pressurises the fuel tank. 17: The tail skid. Note bungee cord shock absorber. 18 & 19: The main undercarriage and its mounting.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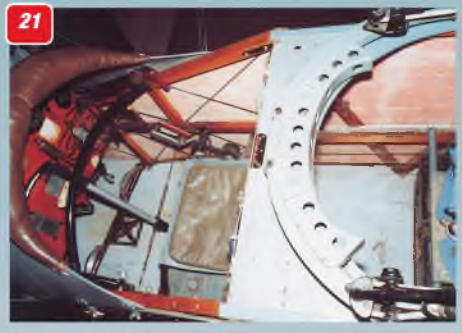
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20: The rear gunnner's posittion, showing the Lewis Gun and Scarff ring mounting. 21: View into the pilot's cockpit well. 22: View into the rear gunner's perch. 23: Pilot's instrument panel.

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AeroDetail series

Making a scale model?

Finding the detail needed to finish a scale model can be difficult and getting full size images is not always practical. Our range of detail photo collections provides extensive close ups of a wide range of popular aircraft all on CD in J-peg format

Whitman Tailwind CD106
Two examples shown of this U.S. homebuilt lightplane, with boxey shape ideal for modellers. Complete close-up detail. (62 images)

Westland Lysander CD105
The Shuttleworth Museum's airworthy example shown in both camouflage and Special Operations black finishes. Full close-up detail. (62 images)

Waco Ymf-5 CD104
Beautiful and graceful spatted undercarriage biplane of the 1930s 'golden aviation era'. Example photographed is an accurate-in-every-detail modern replica. (130 images)

Vickers Supermarine Walrus CD103
The famous 'Shagbag' biplane seaplane, used during WW2 as an air-sea rescue craft and fleet gunnery spotter. (80 images)

Tipsy Belfair CD102
Highly attractive Belgian low wing light aircraft from the era of simple, open cockpit private flying. Machine offers scale modellers pleasant lines and simple shape. (35 images)

Thulin Tummelisa CD101
Swedish 1919-era fighter trainer that served the Swedish air arm for many years. Example depicted is a faithful reproduction. (55 images)

Supermarine Spitfire MK.XVI CD100
Last of the Merlin-engined Spifires. This collection depicts the cut-down fuselage, bubble cockpit canopy later version. (116 images)

Supermarine Spitfire MK.IX CD99
The most numerous version of the classic Spitfire that turned the tables on the Luftwaffe's Focke Wulf Fw 190. (90 images)

Supermarine Spitfire MK XIV CD98
2nd of the Griffon-engined Spits (Mk.XII was first), the bigger engine forced a change of the classic Spifire shape. (58 images)

Supermarine Spitfire MK Vc CD97
Shuttleworth Museum's airworthy example presented in it's latest form with classic rounded wingtip planform. (160 plus images)

Supermarine Seafire Mk17 CD96
The Seafire 17 was no navalised Spit. A true ground-up naval fighter. (64 images)

Stinson 105 CD95
Light, private aircraft of the 1940-50s era, with lots of character. (75 images)

Steen Skybolt CD94
Attractive U.S. aerobatic biplane, presented in full detail. (89 images)

Sopwith Triplane CD93
The last example of the 'Tripehound' is the one built (in 1980!) from original Sopwith drawings by Northern Aero Works and given sequential manufacturer's number by Sir Thomas Sopwith himself in recognition of the outstanding workmanship. Extensive detail. (120 images)

Sopwith Pup CD92
The charismatic Sopwith Scout (to give its correct designation) is a great scale modellers' favourite. Example depicted is the one preserved and regularly flown at the Shuttleworth Collection, Old Warden. (50 images)

S.E.5A CD91
Shuttleworth Museum's airworthy example presented in full detail. (100 plus images)

Ryan Pt-22 CD90
US military primary trainer aircraft that served with both US Army and Navy, thus providing ab-initio flight training for the majority of US airmen of the WW2 period. A highly attractive aircraft. 90 images of the preserved, airworthy aircraft, hangared at the Shutleworth Collection, Old Warden.

Republic P-47D CD89
Bubble-canopy version of the much loved 'Jug', photographed in fine detail. (105 images)

Polikarpov Po-2 CD88
The world's most numerously produced aircraft of all time, the P0-2 was a great maid-of-all-work used by both military and civil groups in the old Soviet Union and its satellite states. Example depicted is pristine, and now in storage at Old Warden. (170 images)

Polikarpov I-15 CD87
The ultra agile Russian biplane fighter aircraft that saw widespread service prior to and in the early years of WW2 and during the Spanish civil war. Example illustrated is a superbly restored machine. (100 images)

Pitts S.1 CD86
Homebuilt example by Bob Millinchip, as seen at 2002 PFA Rally. Complete detail study. (36 images)

Piper Tomahawk CD85
Cranfield Flying School example of this civil ab-initio trainer aircraft. (54 images)

Piper Super Cub CD84
The later, 'cleaned-up' version of the famous Piper J-3, with more elegant engine cowl. Two examples shown. (80 images)

Piper L-4 Grasshopper CD83
Military version of the famous Piper J-3 Cub used during WW2 and close reconnaissance and spotter aircraft and for many other tasks. (80 images)

Percival Provost CD82
Airworthy, preserved example of the RAF piston engined basic trainer used in the 1950s. Full detail. (30 images)

Percival Mew Gull CD81
Famous 1930s racing and record setting aircraft that will forever linked with the achievements of British aviator Alex Henshaw. (35 images)

North American T28 CD80
The advanced trainer aircraft that served in many air arms worldwide and also became a counter-insurgency ground attack aircraft. Examples illustrated are from France, where the type served for many years as the 'Fenec'. (100 plus images)

North American P51D Mustang CD79
The definitive bubble canopy Merlin Mustang. In detail, showing several restored examples. This is the Fantasy of Flight Museum's overpolished example, but the close-up detail is all there. (102 images)

North American P51B/C CD78
First of the Rolls Royce Merlin engined Mustangs, this collection depicts the Fantasy of Flight Museum's restored example, with overly polished plain metal surfaces. Much detail. (102 images) Also, 41 images of The Fighter Collection's P-51C in bare metal restoration, showing much surface and internal airframe detail. A real bumper bundle! (over 140 images)

North American B25 Mitchell CD77
Fantasy of Flight Museum's example. Photographed soon after superb restoration. Full nose to tail detail. (74 images)

North American AT6 Harvard CD76
AT-6, SNJ, Texan, Harvard – call it what you will. 55,000 were built – this example is in U.S. Army colours, with comprehensive close-up detail, nose to tail. (76 images)

North American A36 Invader CD75
The ground attack variant of the Alison engined P-51A. Photos, in detail, of the world's only airworthy example. (69 images)

Morane Saulnier MS406 CD74
French WW2 fighter that fought in the Battle of France, 1940. Swiss restored example (92 images)

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BRISTOL F2B

THE WWI FIGHTER WITH A BITE IN ITS NOSE AND A STING IN THE TAIL THAT GERMAN JAGDSTAFFELN LEARVED, THE HARD WAY, TO TREAT WITH CAUTION

What a sight! These three Bristol F2Bs lined up on the Imperial War Museum's Duxford airfield grass.

Few comparably successful aeroplanes have suffered so ignominious a beginning to their service life as the Bristol F2B. The Royal Flying Corp's No.48 Squadron was the first to receive the new machine and on their very first operational sortie, six machines were pounced upon by Manfred von Richthofen and four of his Jagdstaffel, who shot down four of the six 'Brisfits'.

The fault lay not in the machine, but in the manner of its innitial use. Royal Flying Corps pilots, unaware that the new machine was as manoeuvrable as a single-seater and quite strong enough to withstand the strains imposed by aerobatic flight, adopted the conventional

two-seater tactics and held formation, using their aircraft simply as gun platforms for their observers; this even though the pilot had forward-aimed firepower as the two-guns fired from the rear cockpit.

When, however, the Bristol Fighter's superb qualities were understood and it was flown as a single-seater with the added advantage of a gunner to protect the tail end and sides, it became possibly of the most formidable aerial combat weapons possessed by either side. So dangerous was it in fact, that German fighter pilots would avoid attacking a formation of more than three 'Biffs', and in order to get a fight, Royal Flying Corps pilots had to fly in twos or singly.

Development

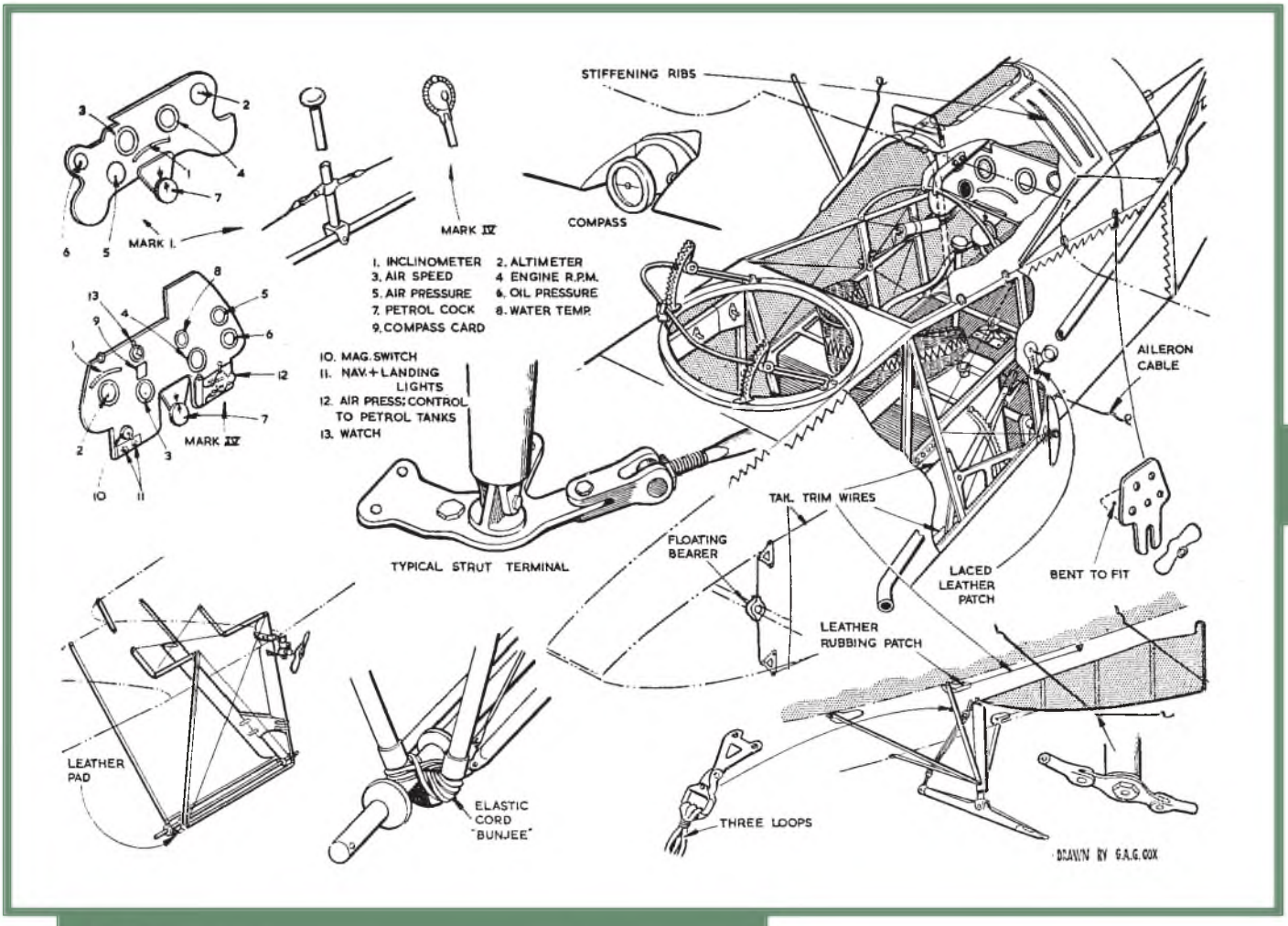
Designed by Captain Frank Sowter Barnwell, the aircraft first appeared in the autumn of 1916 as the Bristol F2A, under the classification of Fighter-Reconnaissance aircraft. The first prototype, A3303, had the Rolls Royce Falcon I engine of 190hp which was very neatly cowled, but it had a long, narrow radiator attached in a vertical position on either side of the fuselage, level with the main undercarriage leg. The wingtip shape was similar to that of the BE2C and the lower centre-section was left uncovered, with large vertical end plates at the join-line with the outer panels.

It soon became apparent that the radiators drastically reduced the pilot's forward field of vision and the prototype was modified, bringing the radiator to the nose. An initial batch of fifty machines was ordered; serialed A3305-A3354 and these not only had the new radiator, but also the familiar blunt wingtip form. They retained the open centre-section, but the end-plates were discarded. Service experience soon showed that even with the side radiators removed, the forward view was still limited and therefore a major structural change was made to all succeeding airframes.

The upper longerons, which were horizontal forward of the observer's cockpit on the F2A, were inclined downwards making it possible to reduce the width of the main petrol tank and the cowling panels, thereby considerably improving the pilot's forward vision along the side of the nose, rather than through the windscreen, and the first RFC squadron to receive the F2A was No.48 in December 1916, which they took to France in March the following year, just before the Battle of Arras where, on patrol, they suffered that initial massacre at the hands of von Richthoffen's Jasta 11. There were other similar disasters, which raised the question of the F2A's suitability for its intended combat role, but a few enterprising crews soon proved the type's worth by ignoring the practice of relying on the observer's gun as the primary offensive armament, instead applying the basic fixed gun point-and-shoot technique of the single-seat scout, with the gunner at the rear protecting from rear and side attacks. It worked!

Improvements to the basic aircraft, as initially introduced, included enhanced forward view for the pilot, revised

"Designed by Captain Frank Sowter Barnwell, the aircraft first appeared in the autumn of 1916 as the Bristol F2A, under the classification of Fighter-Reconnaissance aircraft"



In its original form, the second prototype Bristol F2A had a 150 h.p. Hispano-Suiza engine. Note the two flank radiators mounted adjacent to the lower wing roots.

The F2B Mk.III was a post-WW1 development introduced in 1926, redesigned to to take higher stress loads.

horizontal tail surfaces and a Scarff Ring mount for the observer's rearward firing gun. This improved model was designated F2B.

All Bristol fighters from A701 onwards were to F2B standard and had fabric covering to the lower centre-section. The first 150 F2Bs were powered by the Rolls Royce Falcon I engine, the next 50 by the Falcon II (220hp) and all the others were intended to be powered by the 275hp Falcon III. However, the combat success of the type was such that engine production began to lag badly, prompting adoption of a variety of other power plants including the Sunbeam Arab, Hispano-Suiza and Siddeley Puma, the installations of which dictated some revisions to the shape of the engine cowling and associated cooling systems.

In any case, the primary airframe contractor, *Bristol & Colonial Aircraft Co.* possessed airframe production facilities well short of what would satisfy demand, greatly increased when, in mid 1917, the War Office in London decided to standardise the F2B for all fighter-reconnaissance squadrons so that, in stages, no less than eight different contractors were required to satisfy requirements.

Interest from 'Over There'

When USA entered WW1 in April 1917, there was nothing in their military arsenal that remotely

> "The first 150 F2Bs were powered by the Rolls Royce Falcon I engine, the next 50 by the Falcon II (220hp) and all the others were intended powered by the 275hp Falcon III"

One of the early Sunbeam Arab powered F2Bs, which featured a blunt nose with radiator shutters, remiscent of those used on the SE 5a, some of which also had Sunbeam Arab engines.

An example of the F2B with Siddeley Puma engine reveals its distinctly different nose contours.

represented a combat aircraft that could be taken to war, prompting consideration of adopting European types and on the recommendation of General Pershing in August that year, plans began to produce the Bristol F2B in America.

To suit American production, the 200 hp Hispano-Suiza engine was initially selected, and a production contract for 1,000 examples was issued to the Fisher Body Co., but thereafter transferred to the Curtiss Aeroplane & Motor Co., which at least, had a sound background in aircraft design. But many unqualified fingers of 'officialdom' began dipping their fingers in that production pie in a manner that rendered all the production drawings created by Curtiss to be completely obsolete and left Curtiss without a production contract at all.

Further 'development' pursued more engine changes and even a prototype-stage semi-monocoque fuselage variant, but in terms of any contribution to the American war effort, it all came to nothing - as good an example as any of the '...if it 'isn't broke, don't mend it ...' principle.

Soldiering on

By the time of the WW1 armistice on November 11th 1918, 3,800 'Brisfits' had been built, and these formed the equipment of Nos. 11, 20, 22, 36, 48, 62, 88, 138, 139, 140 and 141 Squadrons. Production continued after WW 1 to supply the needs of the peacetime Royal Air Force, which was extensively utilised as a perceived cost-effective means of 'policing' and protecting 'British Interests' in overseas territories from the Near and Middle East, to Afghanistan.

The first post-war variant was the Mark II, which had a tropical radiator and enlarged 'desert' wheels for service in the Middle East. The Mark III followed, which was basically a Mark II with the refinement of an oleo tailskid. The last variant was the

The first of the American 'developments' of the F2B, designated XB-1A, with semi-monocoque fuselage, much in the style of the German Albatros D.1 - D.5a series.

After WW1, the use of the Bristol F2B overseas in countries including India and the Middle East, led to cooling problems in climates well in excess of those encountered on the Western Front in Europe. One cure investigated was the application of extensive cooling lourves around the engine cowl.

A further development of the American XB-1A, in which the lower wing has been faired into a deeper fuselage underside.

Seen in action at The Flying Legends Air Show at Duxford in July 2000, The Fighter Collection's rebuilt F2B.

Mark IV with Handley-Page slots, a horn balanced rudder and strengthened undercarriage. Post-war production brought the grand total to 5,103 machines, ending in December 1926, with J8458.

Soldiering on

The Bristol Fighter did yeoman service with the Royal Air Force after WW1 with seventeen squadrons based in eight countries occupied or administered by the British Government and was finally replaced by the Armstrong-Whitworth Atlas and the Westland Wapiti in 1931 - fourteen years after that fateful patrol over Douai by No. 48 Squadron.

In Foreign Service

Prodigious war time production inevitably led to a large surplus of Brisfits for disposal after cessation of hostilities, with aircraft being put up for disposal in large numbers.

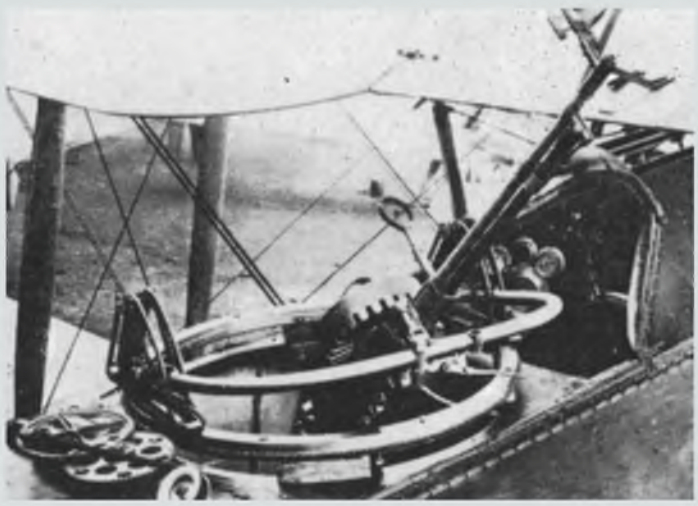
Norway was an early customer, taking reconditioned examples in 1922. Belgium took an initial fifteen in 1923, followed by a further sixteen, while in 1925 the newly formed Irish Free State took eight, and then an additional six. Spain ordered twelve brand new production examples in 1924, while Mexican took ten in 1928.

Surprisingly, very few British Empire countries received F2Bs. Two went to Canada, while New Zealand received two initially and then a further five, the last, in RNZAF service, being finally withdrawn in 1936.

Over and out...

Service with the Royal Air Force ended with the withdrawal of the last F2Bs in

'Front Office' of the Bristol F2B, showing instrumentation and the spade-grip control column.



Lewis Gun on Scarff Ring mount at the Observer's pposition.

THREE OF A KIND!
ABOVE: The Fighter Collection's Duxford based restored example. BELOW:Imperial War Museum's E2581 is the oldest and most original surviving F2B, ex-No.39 Squadron, North Weald. BOTTOM: Shuttleworth Collection's F2B has been a cornerstone of their Old Warden air-shows for decades.

1932. It might, perhaps be argued that its combat success gained during the years of service during WW1, perpetuated a reputation well beyond justification, rather like that of an elderly prize-fighter.

It might, perhaps be that such a nostalgic reputation became erroneously extrapolated to the pre-WW2 Operational Requirement that resulted in the disastrous Boulton Paul Defiant 'turret gun' fighter, decimated during initial combat sorties in 1940.

Perhaps 'Their Airships' at the Air Ministry forgot, or even chose to ignore that the Bristol F2B did, at least, have fixed forward firing armament! ■

B

Setting up and flying the The Black Horse Heinkel 111 twin IC

Front view of the completed He111, ready for engine running and setting up.

BEAST OF THE BLITZ!

PART 2

Last month, in Part 1, I covered the build of the model and fitting it out with twin I/C .25 glow motors. Electric would be an easier, quicker fit - and would overcome the 'one-engine-out' problem of I/C but, as reported there would, I suspected, be a CG issue. If the electric power option were chosen, then positioning the lipo flight packs far enough forward to achieve correct balance would liekely also requirequite a bit of additional nose balast, which is the plague of all small-to-medium scale models. I have not been able to contact anyone who has gone down the EP path with this model, so if you opt to go

Gently airbrushed build up of exhaust 'oil' stains on and around the nacelles, greatly add to the overall effect.

The 'dirtied' starboard top wing surface with its extensive exhaust 'staining'.

Tail detail, showing rudder and elevator 'grease stains'.

Detail of the starboard cowl before the engine change to O.S. 25 motors, showing the scale profile of the scale spinner supplied.

this way, I can offer no insight!

So, with the model fully built, with systems in and tested, the CG was sorted at (130mm back from wing leading edge at the root). This entailed introduction of a lump of lead as far forward as possible in the cockpit and the Rx battery placed under it. This balance state was with empty fuel tanks and the undercarraige retracted,

Now, it was time to set up the controls as advised in the instructions, including the flaps, but mixing in 2mm of 'down' elevator with the flaps (my own judgment, not in the instructions). After a final check to make sure everything moves in the right direction and by the right amount, it's time to set up those engines!

Twin I/C set up

First thing; off came the cowls to give easy access to the throttle servos and linkages, refitting the props and spinners to prepare for running the two .25 motors. The important thing before trying to start the motors is to ensure that the geometry of the throttle servo arms, pushrod linkage and motor throttle arm, is identical for both engines. The motor installation in each nacelle is the same, so it is easy to make sure the servo and motor throttle arms are at the same angle as the opposite unit. There would probably be

The mode in its pristine un-flown guise, sporting the shiny finish and the supplied, but flimsy, scale profile spinners.

Scarily realistic for a smallish scale model, the He111 really evokes the Blitz period. Note the non-scale-profiled red commercial spinners used for flying (see text).

"So, I decided to swap both quite elderly motors for a pair of O.S.25FPs which a fellow club member had in his spares drawer for a project that never was started - brand new, one run for 5 minutes only, the other new-in-box"

fine-tuning needed when actually running, but to start with, the taskn was to get the geometry identical.

The procedure I recommend is to run one engine and set it up to run smoothly first, before touching the second motor. Make sure the transition from tick-over to full throttle is smooth without any hiccup. When happy that the engine is running steadily at full revs, richen the throttle needle by opening 1/8th of a turn. Stop the engine and repeat the procedure with the other engine. Only when both engines run smoothly, separately, should both be run together.

I never use a tachometer, preferring to use my ears to tell me when the motors are synchronised - the sound is unmistakable. To get to this condition, always richen the faster running motor, slowing it down to match the other engine, rather than leaning out the slower running engine to speed up to the other - that way leads to disaster! What you want is NOT full out, screaming power, but fast, reliable power. Don't plan for a 'one-engine-out' scenario, tune the engines not to stop! Also, don't forget the 'hold-the-model-nose-up' test to check for leaning out at full power.

If you are using new motors, put at least two tanks of fuel through them, checking that both run consistently at high and low throttle settings, throughout the runs. When completely satisfied that the engines are running smoothly in any attitude - and only then - you are ready to commit aviation!

Engine change!

All the above is fine, but only if both the motors run nicely. This, unfortunately, was not the case for me. One motor was easy to set up and ran sweetly - the other, for some reason proved to be a pig! It would start and run easily enough, but it wouldn't hold top revs for more than a few seconds (the best was 20 seconds) before cutting out; most unusual.

I checked the tank plumbing, checked the silicone tubes for pinprick holes, stripped and cleaned the carb, fitted new plugs and changed the fuel to a higher nitro content - all to no avail. I'm sure someone out there with more glow-experience than I will be shouting out the likely solution, but I couldn't get the darn thing to run consistently!

So, I decided to swap both quite elderly motors for a pair of O.S.25FPs which a fellow club member had in his spares drawer for a project that was never started - brand new, one run for five minutes only, the other new-in-box. O.S. have a well-deserved reputation for reliability and so it turned out. Once set up, both engines ran sweetly with minimal adjustment. You get what you pay for, I guess, and for twins, only the best is good enough (said he in hindsight!).

So let's get back to the beginning of the previous paragraph, re-setting up the engines!

Finishing

Most photos of He111s that I've seen show them pretty grubby and stained - discoloured even, so I reckon it's worth taking the time to dirty her up as bit. Try it - it's not particularly onerous or even difficult. At the very least, spray it with matt fuel proofer to get rid of that unrealistic gloss finish on the heatshrink covering! I was in a hurry to get it finished and so, rather than wait for some decent warm weather suitable for spraying outside (I don't have a spray booth!) I picked a cold, somewhat damp day - wrong! Or at least, I thought so at first, as the fuel proofer dried out blotchy and very unevenly matt, white almost, in places.

Oh dear, I've really mucked this up, I thought, but as it dried out, it began to look quite realistically weathered - pure luck, rather than clever judgment! It looked really war-weary! All that was needed to finish it off was a bit of exhaust staining using a thinned black wash in my airbrush (photos of the full-size showed that this staining was quite heavy on the cowls and adjacent top and bottom wing

CLEAR TO TAXI! Ken gets ready for the first take off of the Heinkel He 111.

surfaces), holding the airbrush a few inches from the model surfaces and building up the depth of staining. There is a photo hereabouts of the model in the 'pristine, as supplied' completed model, the rest are in the final 'dirty' finish, just to let you see what you can do - if you've got the courage to try!

A word or two on spinners...

The supplied spinners certainly looked right on the model, but in use, a couple of worrying points arose. In part one, I have already mentioned that the spinner backplate is rather thick, which means, in my case, omitting the prop nut washer in order to have enough thread to safely retain the prop - and that was using Graupner props which have thinner hub depth than some other popular brands.

However, a more worrying 'fault' revealed itself during the engine running and setting up. The backplate has eight radial cut-outs around the central solid hub, which leave the outer rim quite thin. I noticed after running the I/C engines for a few times, taking off the spinners to allow different props to be used, that the rim had cracked adjacent to the two screw mounting lugs on the backplate. When the spinner was removed, a closer examination revealed that the rim was broken right through, necessitating the whole spinner to be scrapped. Now, it could be that I overtightened the screws, or that the frequent removal and refit of the spinners weakened the backplate, but either way, they were just not suitable for purpose, in my opinion.

In an EP installation, the spinners would probably be a single 'fit-and-forget' application, but, in my opinion, the screw retaining lug/rim design is inadequate. Solution? - bin the backplates and get a couple of backplates turned up from a suitable material, without the cut-outs - or buy a pair of commercially available replacements. Not having a lathe, I opted for the latter and fitted a pair of red nylon spinners. Both are shown in the photos hereabouts and all the flying was done with the 'un-scale' red ones, which are a little smaller in diameter.

Flying the Heinkel

After a thorough ground running to check out the new motor set-up and flap/retract operation, all the excuses were gone - it was time to top up the Tx and Rx battery and the glowstick - and off to the field.

The day was bright, but cold, with a little breeze across the strip, so we went for the cross-field diagonal that gave us the nearest to into-wind take off run, not knowing how long a run would be needed. In fact, there is no shortage of power at full throttle, despite the reduced motor capacity and with the two .25s on song, the Heinkel accelerated to flying speed in a matter of about 15 metres, the tail coming up and the smallest of 'up' elevator being needed for a fast, low angle, climb-out.

A little right rudder was needed for a straighten the take off run, and at a safe height, on low rates for both elevator and aileron, very little trim adjustment was needed, just a couple of clicks of right rudder to compensate for the twin engine torque to attain straight-and-level and, as regards speed, 70% throttle was all that was needed for what I would call scale-looking flight - excellent!

A few circuits to get used to the feel of her gave the immediate impression that she was pretty solid with no tuck in turns, no pitch changes at different throttle settings and the control responses felt very comfortable (low rates maintained throughout). For a relatively small model, she had great 'presence' in the air. After some low passes for the camera, it was time for the serious side of flight-testing. As befitting a scale bomber, manoeuvres were kept to those in the manner of the full-size, plus a few rolls thrown in for good measure (it shows how confident I was feeling), with eights, stall turns and low passes being the order of the day - OK, the rolls are not scale-like, but she's more than capable!

The moment of truth - daylight under the tailwheel as the He111 accelerates to flying speed. Note the revise commercial (smaller diameter) spinners.

A reminder from part 1 of the review, showing the noseweight needed to achieve the recommended CG position, with the 6v x 2000mAh NiMH flight battery hidden under the floor pane extension, just behind the lead.

Unfortunately, both supplied spinner backplates broke during engine runs, necessitating replacement with commercial items.

Slowed down into level flight at a good height, flaps were tried at first setting, producing hardly any discernable pitch-up, but at full throw, some elevator mixing would be needed (about 4-5% is a good starting point) to prevent her ballooning. The flaps are quite effective and you have to be ready to up the power as the speed does noticeably bleed off.

With flaps back up, throttle was applied to climb to a good height to check out the stall. Being aware of the higher than normal wing loading for a model of this size, I was prepared for a sudden wing drop as the speed decayed on full up elevator. As it was, the wing did drop, but not viciously - quite gently, in fact - and control was regained very quickly after half a roll.

Being not sure of the fuel situation - the flight was timed at five minutes at this point - I decided to land, just in case. The approach without flaps was flat, looking good and I kept the speed up for a two-pointer, letting the tail drop for a neat roll out - sounds a bit big-headed, I know, but it was a great landing!

One thing my spotter reminded me during our post flight inquest, was my feeling that she turned easier to the left than to the right, probably due to the built-in twin engine thrust lines. At home, after checking out the model in a post-flight examination, I decided to put a 1/16" packer under the left hand side of the starboard engine mounting to give it a little right thrust, reasoning that it would help with the straight tracking, and IF the port engine should stop in flight, it would help maintain flight, turning away from the dead engine (planning for emergency!).

The second flight was a repeat of the first, with the side thrust seeming to have done the trick and at all times, the Heinkel looked and felt very 'at home' in the air. I was content to fly at about 60% throttle and the little two-strokes sounded very nice and never missed a beat - OK, the absence of twin four-stroke 'beat' is possibly a tick in the other column, but not having a pair of .20 - .25 four-strokers on hand, beggars can't be choosers! For peace of mind, regarding the possibility of a 'one-engine-out' situation, electric power with contra-rotating props would, perhaps, be a safer option, but the noise of two I/C engines just does it for me every time.

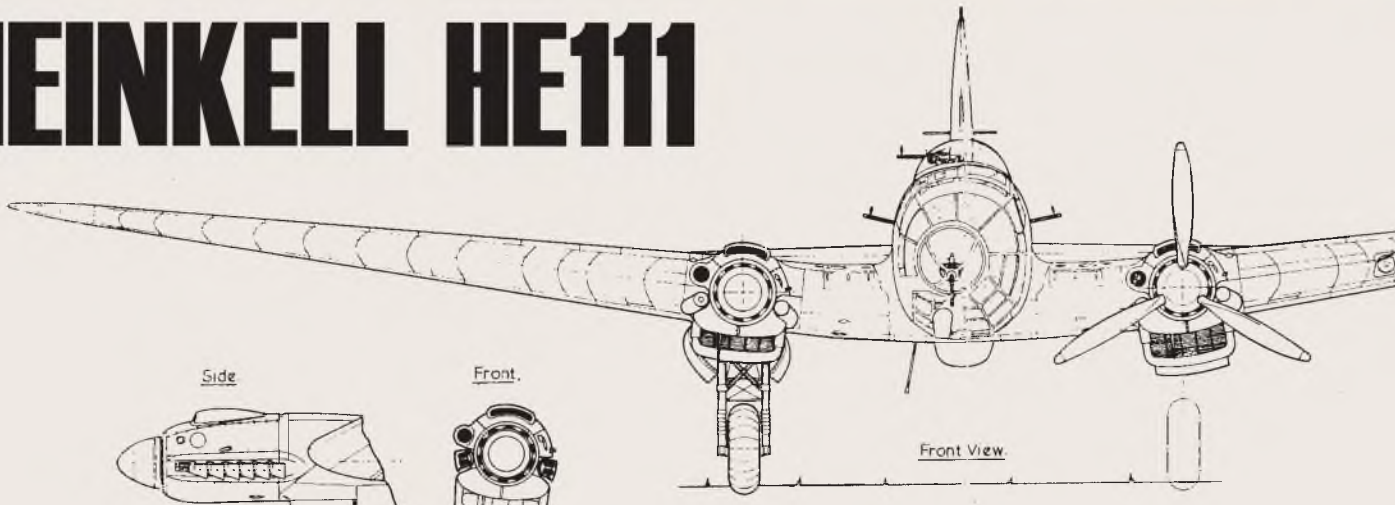
This time I decided for a flapped landing and so dropped the legs before selecting the first flap position in the downwind leg of the circuit, bleeding off speed and height, keeping the final turn flattish and wide radius, much as the full-size final approach must have been. I tend to set the elevator trim so that the approach is level, controlling the sink with throttle, keeping her level until just off the ground, easing off throttle, landing on the mains and then dropping the tail to roll out, then full up elevator to taxi off the strip.

After letting the engines cool down, refueling and checking the battery level, the third flight was equally as satisfying and I could really appreciate how good she looks in the air. Black Horse and Ripmax have certainly got a winner in the Heinkel He 111 - if you're thrill is relaxed confident twin warbird flying, without the hassle of transportation and storage problems, this kit could well be what you've been waiting for. But be aware of the need for extra noseweight, the need for a little starboard motor sidethrust, and the frailty of the supplied spinners! ■

SPECIFICATION:

Manufacturer:	Black Horse
UK Distributor:	Ripmax Ltd.
Wingspan:	1,750mm (68.9")
Length:	1,280mm (50.39")
Weight:	3.2 - 3.5 kg (7.04 - 7.7 lb)
Servos:	7-9 (Req. - mini size incl 2off retract)
Functions:	6 channels minimum (Req.)
Electric Motor:	2 x OS 1200kv out runner (Recommended.)
IC Engine:	2 x .25 2-Stroke (Req.)
Speed Controller:	2 x 40A (Recommended.)
EP battery:	2 x 3S x 2200mAh lipo packs (Recommended) Part no. A-BH143
Price:	£344.99

HEINKELL HE111



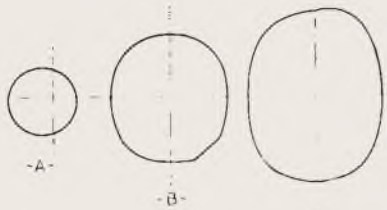
Side

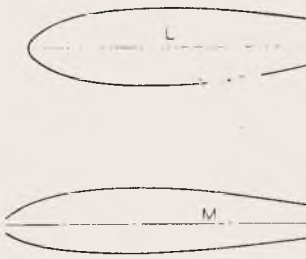
Front.

Front View.

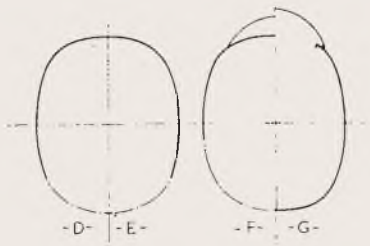
Alternative Nacelle & Exhaust system.
(Later Marks.)

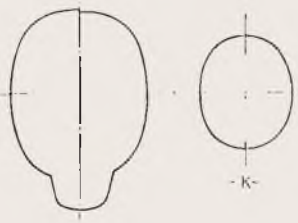
Colour Notes:
Aircraft standard Black green/Dark green Splinter Uppersurfaces.
Light blue Undersurfaces.
'A','1' & 'T' : Black.
'B' : Yellow (9th Staffel.)
Spinners : Yellow.
White Bars : Upper surface Starboard Wing.





Wing Sections.

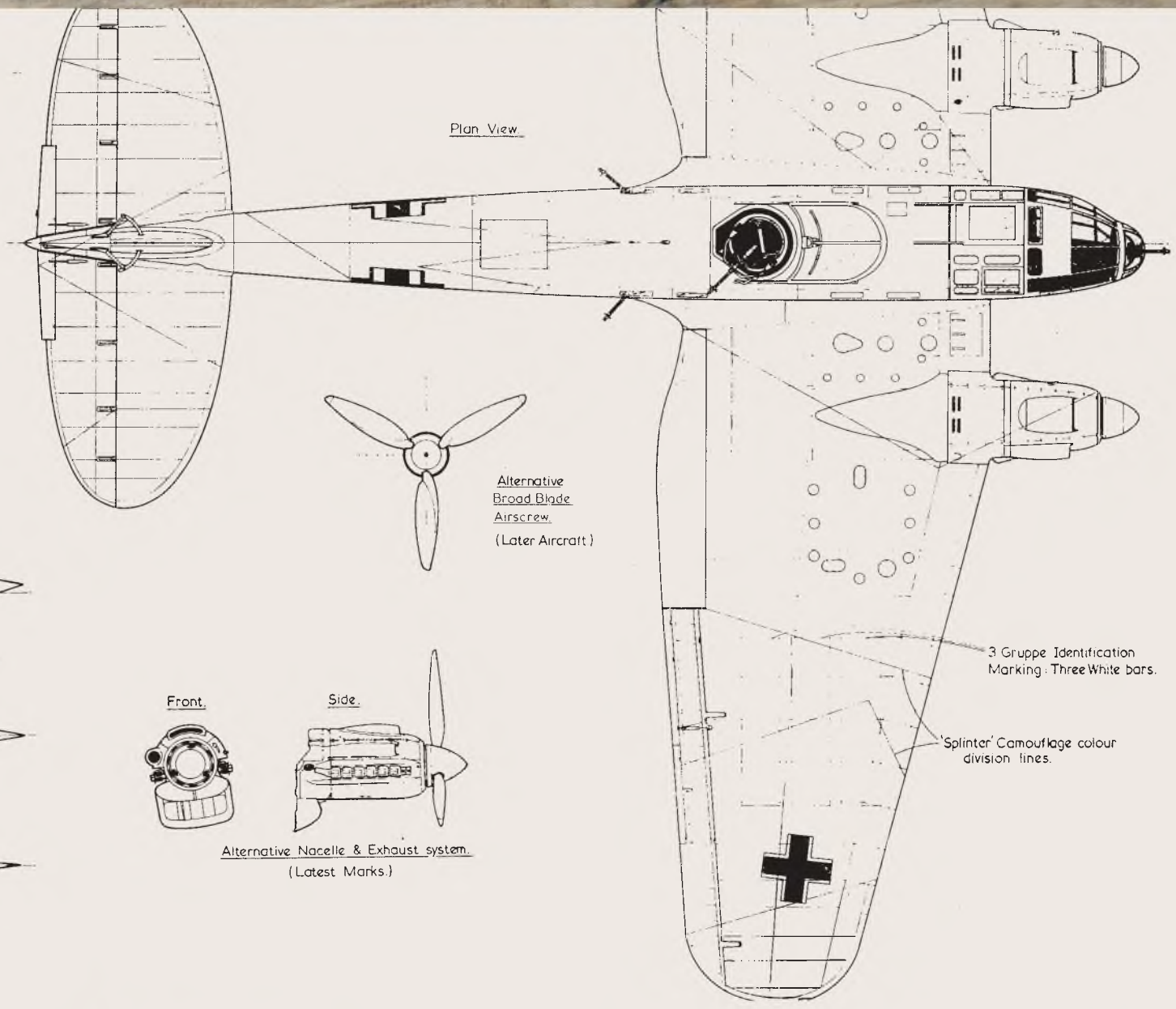


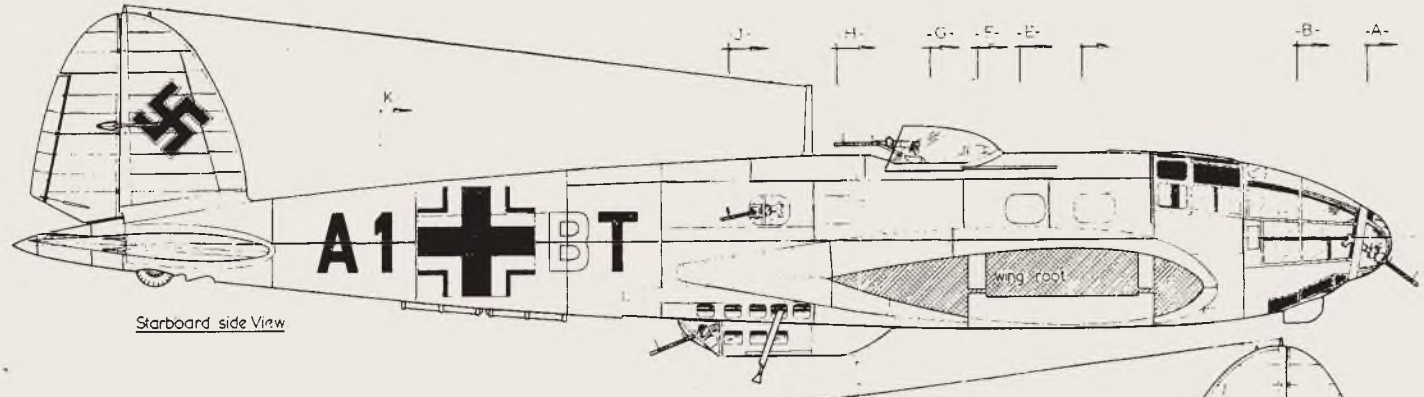


Underplan View.

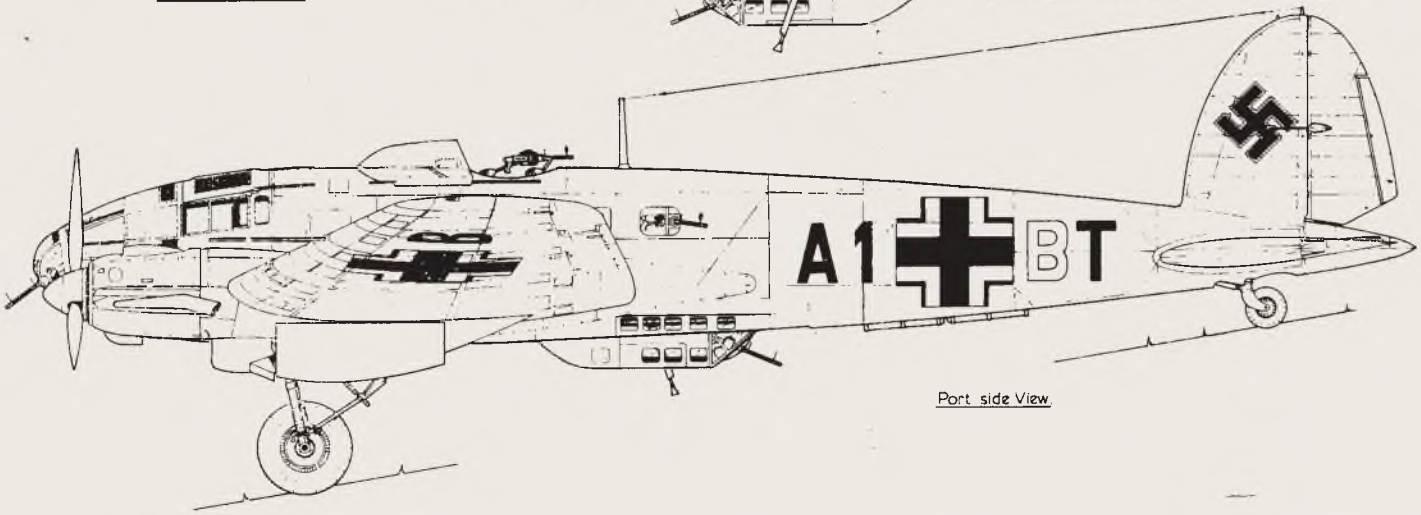
Scrap Part View of Nose Section.

Note : Solid Black areas denote 'far' side of fuselage interior.

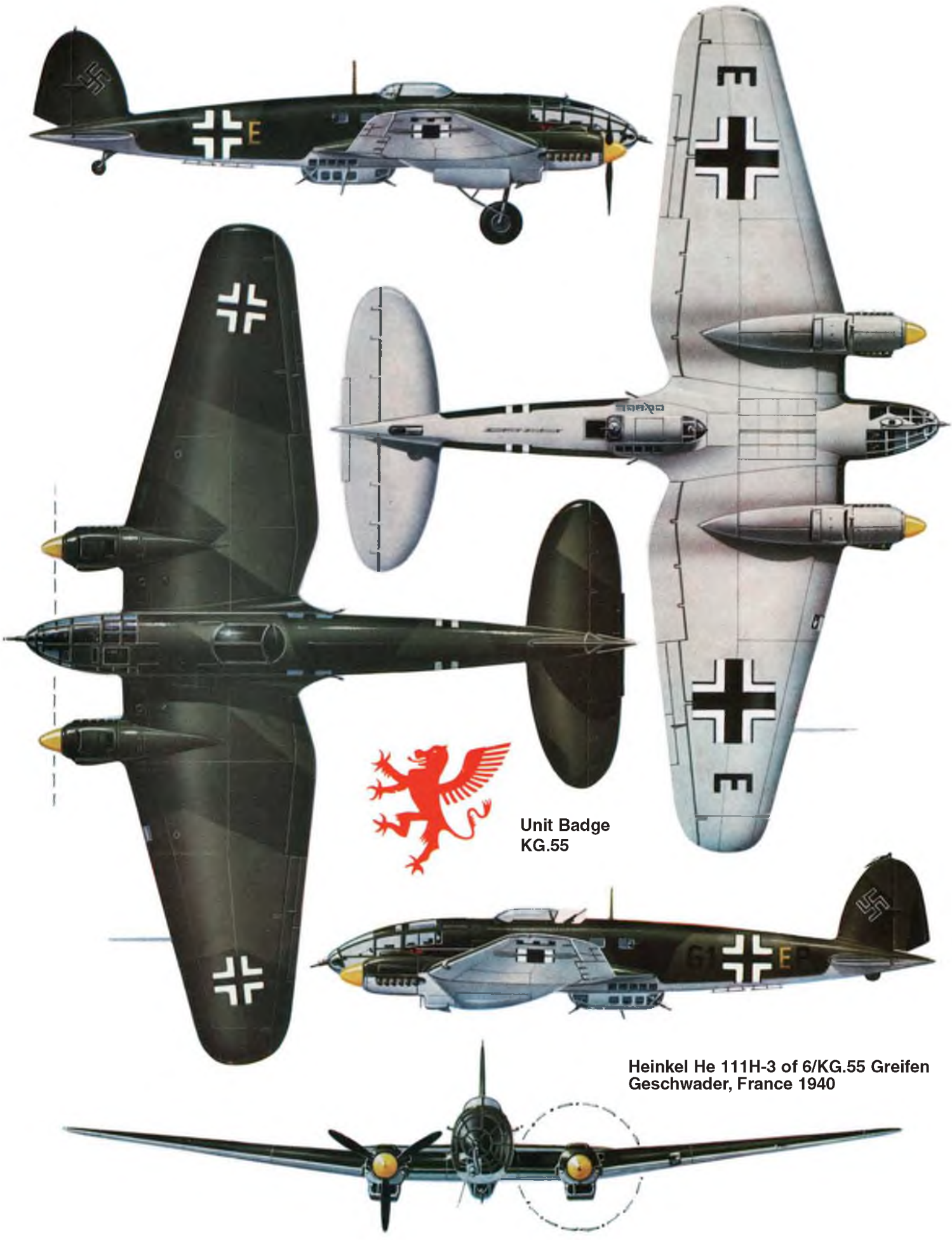




Starboard side View.



Port side View.



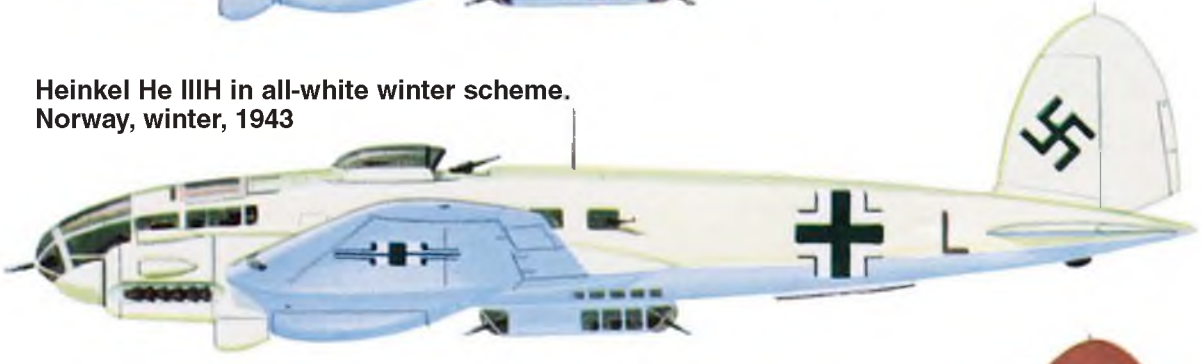
Unit Badge
KG.55

Heinkel He 111H-3 of 6/KG.55 Greifen Geschwader, France 1940

Heinkel He IIIH of II/KG.26

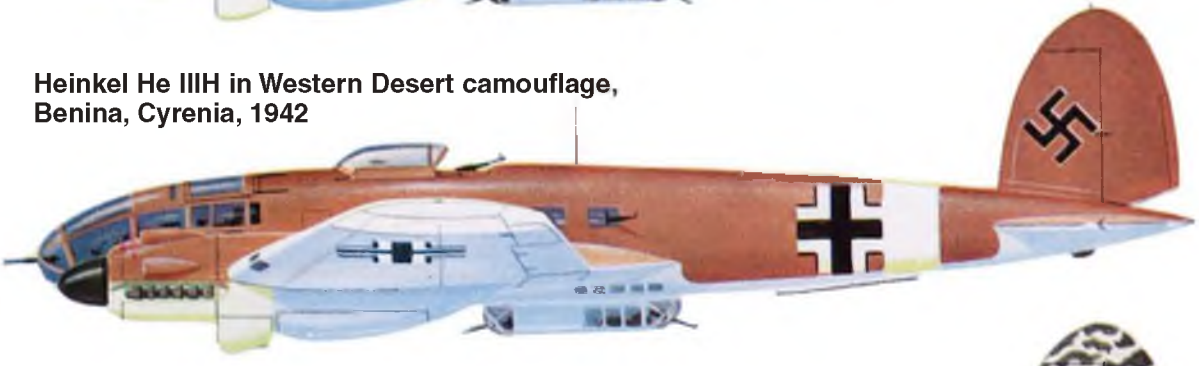
III/KG.26

Heinkel He IIIH in all-white winter scheme.
Norway, winter, 1943



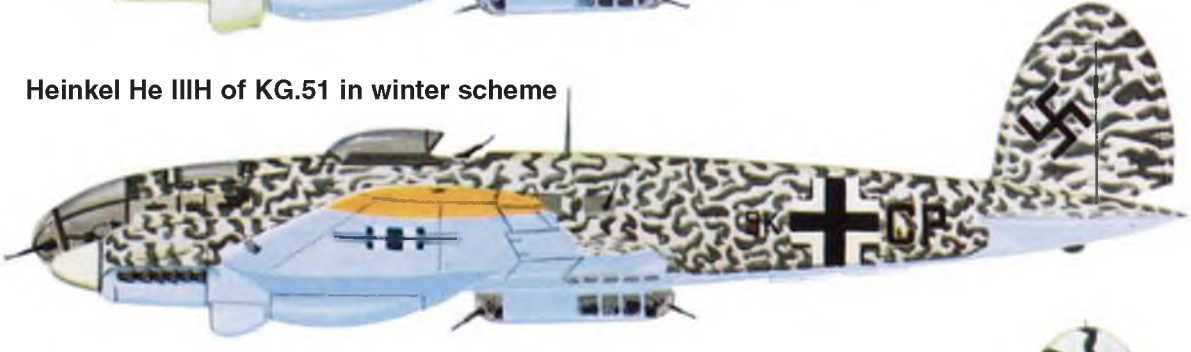
KG.4, General Wever

Heinkel He IIIH in Western Desert camouflage,
Benina, Cyrenia, 1942



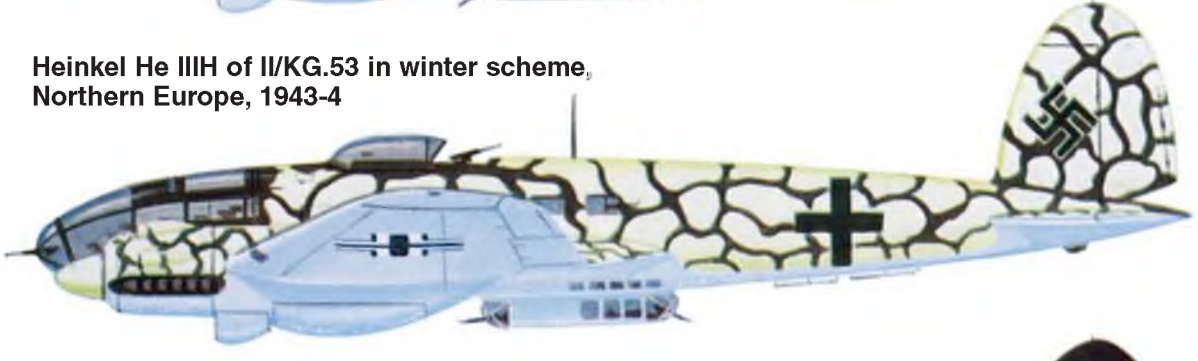
He 111, Communications unit, Western Desert

Heinkel He IIIH of KG.51 in winter scheme



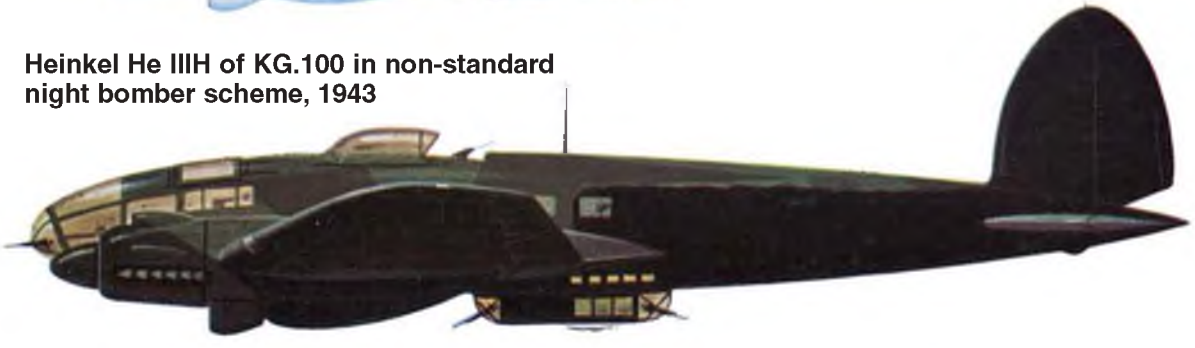
KG.51, Edelweis Geschwader

Heinkel He IIIH of II/KG.53 in winter scheme,
Northern Europe, 1943-4



II/KG.53 Condor Legion

Heinkel He IIIH of KG.100 in non-standard
night bomber scheme, 1943



KG.100

SCALE WATERPLANES AT WET WINGS

Attracted by the idea of scale models on water, Whittaker heads for Carr Mill Dam

When the opportunity came to visit an autumn scale waterplane event, I quickly put the date in my diary. Carr Mill Dam is in Lancashire, about half way between Liverpool and Manchester. It is very close to the M6, and the M62, so getting there is very straightforward.

The Wet Wings Club was formed only a few years ago on the enthusiasm of David Barker. The lads of the Club really are mad keen on flying scale models off water and Carr Mill Dam is just about ideal. It is the water of the illustrious Lancashire Powerboat Racing Club, whose members race full-size craft - boats that is!!!.

When David approached them to fly over their water, they could not have been more supportive. Game on!

Tooled up

Since the waterplane enthusiasts are guests of a pukka powerboat club, they have access - via helpful Powerboat Club members - to a fully equipped safety boat. This makes recovery of engine-out or waterlogged waterplanes very easy indeed. On the day, the wind was light, and conveniently blowing up and down the quay. The meeting was very well attended, and the flying was continuous.

If you are a model seaplane fancier, you would be hard pressed to find a better water. As for the welcome, well it matches the Gold Standard set by the famed Windermere Club, which is saying something.

Power struggle

There was a good mix of power sources in evidence at the lakeside. These covered glow, petrol, and electric, proving that water and electric can mix. At the time, I was dabbling with the idea of a cheap-'n-cheerful floatplane. I wanted to 'get-my-feet wet' for minimal effort whilst I work-d on a homebrew scale floatplane.

I soon noticed that many of the committed traditional scale modellers at Carr Mill - equipped with proper scale models - usually had an ARTF scale quickie with them, too. This made good sense: tune-upyour floatplane flying skills with a cheap-and-simple model before committing your 1,000 hour scale job to the water. In fact, the very next week I bought a simple commercial seaplane to do just that.

If you wanted an easy scale introduction, there were many present on the day. *ST Models'* 59" foam DHC-2 Beavers, and the very similar Sea Beaver from *Pelican* were very popular choices for introductory models. Consolidated PBY Catalinas were also popular; again, with foam airframes and electric powered.

Classic kit

As a scale kit fancier, I was utterly delighted to spot what looked like a classic Pilot kit. Closer inspection proved

1: Simon Tweedale's Thunder Tiger Cessna Cardinal with Saito 72 FS power, 13"x6" prop. 2: My new best mate Geoff piloted the Rescue Boat all day. Geoff is a Member of the Lancashire Powerboat Racing Club. 3: David Baker's Canadair CL 218 Super Scooper on a low, low flypast. 4: David Baker's Canadair CL 218 Super Scooper from the Mike Smart plan. Scratch built from 3mm Depron foam. 5: This little Beaver caught a crab, but lived to tell that tale. 6: Inexpensive ARTF electric / foam Beavers such as this were out in force. They come complete with floats sets.

that it was indeed the famed *Pilot* kit of the pretty Lake Buccaneer. This aircraft is an American four-seater light amphibian with retractable trike undercart, which was itself a development of the earlier Colonial Skimmer first introduced in the late 1940s. It is a beautifully harmonised pusher design, and looks well in model form. Its owner, Mike Forey had eschewed the glow powerplant for which the kit was originally produced in favour of a conversion to electric power using Turnigy G-25 motor power. Said motor drives an 8"x6", three-blade prop, driven from by a four cell 3,200 mAh pack. An elegant classic model.

Supermarine S6B

Professional model builder, and ex-Top Gun, USA Award Winner, Paul 'Limey' Rice, was assembling his almost completed Supermarine S6B seaplane as I arrived. This is a faithful model of the glamorous Schneider Racer. Paul has created a dazzling metal finish, although she is of traditional construction under the skin. The finished curved panels are beautiful, the detailing is exquisite, and the quality Paul achieves really sets her apart.

She spans 100" and is electric powered. Paul built her for a British client who may take her to the Scale Schneider Races at Lake Havasu in, Arizona, USA.

Short Sunderland

David Barker flew his magnificent scratch-built, electric powered, Short Sunderland. Readers will remember that we featured her in these pages last year. This fine scale

Limey's Supermarine S6B coming back to the slipway.

model is doubly remarkable, since David based his model on the classic Airfix Sunderland static plastickit!

The model is of traditional all-built up balsa structure, plus a little plywood. Built to 1/16th scale, she spans 86" and weighs 7lbs. The fuselage is made of 3/32" balsa built-up formers, and 1/16" sheeting. The wing uses three-piece 3/32" balsa ribs, with 1/16" sheet leading and trailing edges and an open centre to the leading edge, with 1/16" cap strips. The main spar is 1/16" hard balsa, with 1/8" square spruce top and bottom, on one side only. The nacelles are built up and planked balsa structures.

The tailplane comprises 1/16" balsa ribs, with 1/32" balsa sheeting, on top only.

7: Stately long range patrol form David Barker's Sunderland. 8: She stoops to conquer; David Barker's Sunderland dips her starboard float. 9: Quayside maintenance! 10: Float detail on the Sunderland. Note bracing. 11: Phil Cross's 106" span electric powered Hangar 9 ARTF Cub. e-flite brushless 110 outrunner motor. 12: Phil Cross's Cub uses an e-flite brushless 110 outrunner motor.

Spars are thin-walled aluminium tubes, the main spar being a 250 size helicopter boom. The model is covered in Oracover, the shiny film dulled back with a Scothbrite pad.

The Sunderland uses four Turnigy 1400kv 180 Watt brushless motors driving four 8"x 3.5" 3-blade counter-rotating props. The flight battery pack comprises 2 x 2650mAh three-cell packs. David reports that a charge rate of 25-50c gives around ten minutes flight time.

This 'Fliegendes Stachelschwein' (German nickname for Flying Porcupine) looks utterly convincing with all four motors on song. Its water handling was also very good.

Canadair CL-218 Seaplane

David is also experimenting with multi-engined seaplanes made from foam. He had also brought his striking 28" span electric powered model of the Canadair CL-218 'Super Scooper' water bomber, designe. It uses two 1450 motors and two 2,200mAh 2S packs.

The CL-218 was built from the *Mike Smart* plan, with David using 3mm Depron foam. This flew miraculously well and had very good handling on the water. A real triumph, I thought, and it opened my eyes to this construction medium for such everyday scale models.

Big Piper Cub

Phil Cross flew a smart yellow *Hangar 9* Piper J-3 Cub off water, something I had never seen before. This well-known model is 106" span, and looks good on floats. I noted that Phil had fitted electric power using an *e-flite* brushless 110 outrunner motor. She performed well. Most Clubs have a Hangar 9 Cub on their books, and I note that pre-loved examples often show up at Swapmeets. Hmmm.

Another variant of the electric Sea Beaver theme from Pelican. 1520mm span and very pretty. Good performer.

The Verdict

This was a fascinating scale meeting on a number of levels. First of all, scale seaplanes, floatplanes, and waterplanes are intriguing scale subjects in their own right. Then, there is the medium itself: flying not off land, but off the wet stuff. Then, there are the challenges of scale construction and power related to this strange medium of water.

Finally, I was mildly surprised at how the commercial manufacturers were already catering for this segment of the market. There is now quite a variety of highly affordable, easy-to-get-in-the-air offerings to tempt the scale man. If you Google some of the designs here you will be astounded at how cheap they can be to buy. It was also gratifying to see that David Baker and his pals had forged such a productive relationship with a powerboat, club to mutual advantage.

All very encouraging stuff. Now where is my new floatplane...? ■

Contact Details

Wet Wings Model Flying Club
Carr Mill Dam,
Garswood Old Road,
St. Helens,
Merseyside WA11 7LZ

http://wetwingsmfc.beep.com

Not much freeboard on the Pilot Lake Buccaneer!

Techno Scale

Mike Evatt sc

Austars Model was established in 2007 and is located in Sydney, Australia, with a web presence at www.austars-model.com They are a manufacturer and distributor for quality hobby products designing and manufacturing large scale sports and Cessna series planes. Their production is based in China and Thailand and their products go to customers worldwide.

Their 134 inch wingspan Gulfstream G550 Turbine Jet shown in the screen-shot looks impressive. It features Honeycomb/Hybrid Composite construction and is designed for an 10KG-16KG turbine.

I always enjoy a visit to *Micron Radio Control's* website at www.micronradiocontrol.co.uk to browse their stock of *Stevens Aero Micro Models.* Their 1919 Ricci Triplane has a wingspan of 11.6ins! Lifelong Italian aviation enthusiasts, brothers Umberto and Ettore Ricci, started their aviation careers with rigid hot-air airship models and free flight gliders. They went on to design huge flying boats, and a series of small aircraft, conceived as flying motorcycles. The Ricci Triplane is one of these designs. The 10-foot, 7-inch wing span aircraft, was powered by a six-cylinder Anzani engine that could propel the plane through the sky at approximately 78 MPH.

Laser Cut Sailplanes at http://lasercutsailplanes.co.uk aim to produce cost effective wood parts for plans that are already available, whilst developing their own plans and helping other like-minded designers with theirs. They offer a range of short kits from various designers throughout the world as well as a laser cutting service. Their 1:4 scale vintage design of the Scheibe Bergfalke II/55 by Chris Williams has been redesigned from an original drawing to be lighter and more efficient. Its all wood construction is not for the faint hearted, and results in a superb multi-function scale model.

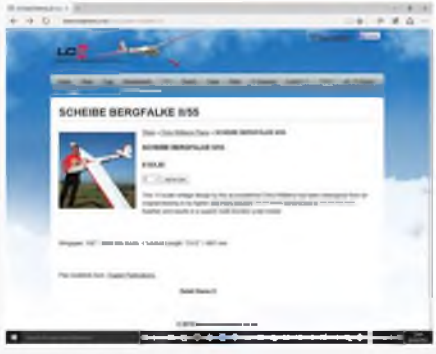
Increasingly, modellers are turning to laser cutting for their components. For the scratch builder it may be useful to develop your prototype 3-view into CAD drawings. There are many software packages that could be used but **devCad** offers software for the design of flying surfaces and fuselages, mouldings and cutting paths for foam cores. It also offers full integration with *Profili* and *Profili Pro,* to import ribs, templates and wing plans. Talking of plans, their website at www.devcad.com also contains an extensive downloadable plan catalogue.

Airtech at www.airtech-rc.com is a French manufacturer of R/C gliders. They offer a wide range of models dedicated to thermal or slope modellers. Their Ventus 2 AX/CX in available in 5.00m and 6.00m wingspan. The Ventus-2a and 2b are 15 metre sailplanes. The 'a' version has a narrow fuselage and the wider fuselage version is called the 2b. Winglets are used with these models. The 18 metre span Ventus-2c was introduced in 1995. From 2003 the Schempp-Hirth Discus-2 fuselage was used for all versions, which now have the designations 2ax, 2bx and 2cx.

Mountain Models is a source for quality laser cut radio control electric model aircraft kits that are made in the USA. Their *HiperBipe* is a 1/8th Scale electric radio

Austars Model's Gulfstream G550 Turbine Jet shown looks impressive.

This 1919 Ricci Triplane has a wingspan of 11.6ins!.



A 1:4 scale vintage design of the Scheibe Bergfalke II/55 sailplane.

devCad offers software for the design of flying surfaces and fuselages.

The Ventus 2 AX and CX are available from Airtech.

Mountain Models' 1/8 Scale electric RC laser cut kit of the Sorrel SNS-7 Hiperbipe.

ours cyberspace for more TechnoScale Topics...

control laser cut kit of the Sorrel SNS-7 Hiperbipe. This model is a park flyer model designed to give you a great scale model that is unique, aerobatic, easy to build, and easy to fly. The HiperBipe was designed using a state of the art 3D CAD package, to allow for exceptional interlocking parts design and fit. 3D design also allows them to provide clearer assembly images, without having to use photos that might be indistinct. Take a peek at their website at www.mountainmodels.com

Banana Hobby at www.bananahobby.com have many products of interest to the scale aficionado from EDF Jets to Biplanes and Warbirds. What took my attention here was their *BlitzRCWorks* F4U Corsair R/C Warbird. This is a new version featuring a 60A Hobbywing brushless ESC and eight operable channels (aileron, elevator, throttle, rudder, retracts, flaps, LED lights, folding wing mechanism). The model is constructed of durable EPO flex foam.

Since 2008, **RC Aerodyne** has provided customers around the globe with top quality scale R/C aircraft, helicopter kits and an wide selection of hobby parts and upgrades from their on-line operation at www.scaleflying.com If airliners are your bag then check out their Airbus A330. This ARF model is designed for a twin 70mm electric ducted fan system and has a 2 metre wingspan. The epoxy resin fiberglass fuselage comes in plain white gel coat and the wings are balsa/ply rib and spar construction with balsa sheet surface and Oracover finish

Skyshark Hobbies at www.skysharkrc.com is committed to providing their customers with high quality products that are designed and engineered for the discriminating hobbyist. They stock a good range of models and components including a nice range of scale spinners. If you are looking for 'head & shoulders' pilot figures they stock a vast array in scales from 1/9 to 1/4.

RCV Engines Limited have been developing and manufacturing their patented Rotary Valve internal combustion engines since 1997. Based in the United Kingdom, they have exported to over 50 countries, provided development engines to international customers and established licencing agreements. RCV's innovative technology provides unique advantages in many small engine application areas including model aircraft, handheld garden tools, portable generators and Unmanned Air Vehicles (UAVs). Their website at http://rcvengines.com contains some very good images and details of customer's scale creations.

A colleague reminded me the other day that **Brooklands Museum** is not just about cars! The Museum displays a wide range of Brooklands-related motoring and aviation exhibits ranging from giant racing cars, motorcycles and bicycles to an unparalleled collection of Hawker and Vickers/ BAC-built aircraft, including the Second World War Wellington Bomber, Viking, Varsity, Viscount, Vanguard, VC10, BAC One-Eleven and the only Concorde with public access in South East England. It's well worth a visit. Check it out at www.brooklandsmuseum.com ■

BlitzRCWorks F4U Corsair from Banana Hobby features a folding wing.

A 2 metre wingspan Airbus A330 from RC Aerodyne.

Skyshark Hobbies stock a vast array of 'head & shoulders' pilot figures.

RCV Engines website contains some very good images of customer's scale creations.

Brooklands Museum is not just about cars.

That's all there is time for from me this month so press the button and if you find something out there of interest that might be good to share, email me at:

mikeevatt@hotmail.com

THE QUIET ZONE

R/C SCALE ELECTRICS WITH PETER RAKE

OUR COLUMNIST RECOUNTS SOME OF THE MILESTONES OF PROGRESS TOWARD THE PRESENT SUCCESS OF ELECTRIC POWER FOR FLYING SCALE

Yes, I'm afraid it's that time of the month again, time for more manic meandering from that bloke who rabbits on about electric flight. After last month's look at forthcoming designs that you might expect to see in these pages at some point in the future I found myself wondering what to follow it up with. Feeling that the column has rather lacked waffle content of late, I did consider totally ignoring our usual topic and just filling it with rambling nonsense (Who said I do that anyway?). However, thinking that I'd never get away with that, I had to hunt around for something more electric flight related to write about.

So, since we've dealt with future models, my mind started to wander over past models. Not just past designs from FSM, but my past models in general. Whilst nothing that appears here is likely to come as a surprise to long-time 'electrolites', it may prove of interest to more recent converts, and those who've never tried any other form of modelling than modern electric power. Hopefully it will also serve to demonstrate just how much things have improved over the last few years.

THE NOSTALGIC BIT

Although, I'm not absolutely sure nostalgia is quite the term I'd use for my early experiences with electric flight, what you have to understand is that back in those days (I started playing with electric power for my models in the early to mid 1980s), is that unless you wanted to spend a lot of money, your options were pretty limited.

Most of the commercial models available were kits of power gliders (boring!!!), powered by direct-drive brushed motors. Did I hear somebody ask what the heck is a brushed motor might be? Oh, do come on, they're still in use these days in the small RTF models. You can't be THAT steeped in brushless technology!

Anyway, a brushed motor is one that's pretty much like you'd find in most electric powered toys. A can, an armature (that's the bit with all the wire wound onto it) and, surprise, surprise, brushes to carry the current through the commutator. Commutator? That's the little segmented brass coloured bit on the end of the armature. Do try to keep up, this is hardly rocket-science. Yes, it does look extremely like a brushless 'inrunner'. Just like the inrunner, the can stays still and the shaft is fixed to the rotating armature.

However, and it's a darned great big 'however', brushed motors are far less efficient than even the cheapest of brushless motors. They are heavy, for the power they develop, and unless suitably 'suppressed' (with electronic components wired in to reduce 'electrical noise'), have a nasty habit of interfering with the radio gear - especially if the brushes are either being bedded in when new, or are worn when the motor is old.

Now, as you can probably imagine, A motor that's already struggling to haul an overweight model around, but also making radio efficiency somewhat less than stellar at times, is hardly an ideal combination.

A WEIGHTY PROBLEM

As if the motors weren't enough of a problem, in effect your options were limited to one of a variety of 'buggy' style motors (basically a Mabuchi 540) with differing wind-counts and magnet styles (who remembers struggling for more power by using 'wet magnet' motors?). Add into the equation that the only battery packs easily available were six-cell Ni-Cad packs that weighed around 12 ounces and you can start to see

At 30 inches span this Air Sedan can be equipped with just the sort of gear you're likely to find in most good model shops. Far from the case a few years ago.

Although a poor photo, and not the actual model mentioned in the text, this is what a Chiribiri N5 looks like.

Even though this Antionette is 72 inches wingspan, you'd have been hard pressed to find gear that would both fit, and be capable of flying this model when I started experimenting.

You could only dream of models like this 10 inch span, sub 10 gram triplane until relatively recently. Even now it's a bit specialised.

Thanks to the ready availability of micro equipment (ex RTF) 18 inch indoor/local park models like this are easy as pie these days. Not too long ago a single servo weighed more.

why electric flight took a little while to become a firmly established method of powering a model aircraft.

Equally understandable is why the models needed to have plenty of wing area to get all that weight aloft, even if it didn't stay up there too long after the motor cut, the duration not helped by the fact that most 'buggy' packs were either 1,200 mAh or 1,700 mAh, thereby making flight times fairly restricted to begin with.

AND SO...

Given all of the above, it's something of a wonder that anybody persisted with electric power for their models. The equipment easily, and relatively cheaply, available was heavy and inefficient and results gained were nothing to write home about. For someone used to the ease of wet-and-smelly (engines and fuel) flying, it all seemed like a backwards step.

None of this is to say it couldn't be made to work, it was just that it took far more dedication and expenditure than I was prepared to invest. I did actually have one very successful electric powered model and it wasn't a powered glider either. No, far from it, it was a 45" wingspan shoulder wing model finished to look like a between-the-wars German fighter, you know - those things they weren't supposed to have. I was just rather taken with He-51 colour schemes at the time, so based it on that - all light blue and deep red Solarfilm with a few sticky markings cut from Fablon (the joys of not needing to fuel proof!).

This model actually flew rather well on its direct-drive 540 motor and six-cell 1,200 mAh Ni-Cad pack. It seemed to have adequate power and could even be persuaded to loop, although that did cause some concern on one flight, when the battery pack decided to eject itself through the fuselage bottom hatch. Fortunately, that episode was not quite the disaster it might have been because the only type of connector readily available was that horrible, clip together, Tamiya connector used by the model car fraternity. It was just as well the pack was mounted below the balance point because it meant that it simply dangled while I landed the model. It made for a few 'interesting' moments though!

The main problem, however, was that unless your flying site was a lot smoother than ours, that 12 ounce battery back picked up quite a bit of inertia during flight and during landings, so that the model usually stopped long before the battery pack did. At best, it would punch out a former, but could just as easily smash its way right out through the nose of the model. Not too surprisingly, I soon tired of repairing models that had to be lightly built (if there was to be enough power to fly them) and went back to nice, reliable four-strokes and scale models - for a while.

THE NEED PERSISTS

Maybe, (and it has been suggested on more than one occasion) I'm perverse, but the idea of quiet, clean electric flight just wouldn't go away. By the time a few years had passed, more hardy souls than myself had continued to tweak and improve upon what equipment was more widely available. Maybe not the sort of thing you'd find in every local model shop, but sufficiently more viable that commercial producers had invested time and money to make them available. Graupner were probably one of the 'big' names, but there were others starting to come around to our way of thinking.

No longer was it necessary to use model car cast-offs to power our models. A whole range of different size, brushed motors were now available, with gearboxes to suit, specifically aimed at electric flight. It was heaven on earth to those strange modellers (like myself) who had yearnings to be able to fly clean, quiet models of precisely the style they wanted.

Knowing roughly what I wanted to be flying (WW1 and pioneering types of around 36-40" span), I studied the magazines (FSM and this column not being available at the time) to see what other modellers were using to power precisely the type of model I envisaged. I studied construction techniques, although most were flying models much faster than I had in mind, checked out the sort of weights the designers were talking about and was pleasantly surprised to find it wasn't going to cost me a vast fortune (always an important factor for me since I'm known for my meanness).

Thus armed, it seemed time to try my hand at electric flight again, albeit in a small way. This time it HAD to be a scale model and it HAD to be something that actually

Yes, it is an electric powered model. Not even vaguely viable without vast expense in my early electric days. And it would have ended up MUCH heavier.

appealed to me, rather than something purely to suit the equipment. So, lashing out slightly (we all have moments of madness, even mean beggars like me), I treated myself to a Graupner Speedgear 400, speed controller, 600 mAh Ni-Cad pack (six cells) and an inexpensive peak charger.

Okay, for those only used to LiPo batteries, a peak charger is different to what you would use these days. Apparently, Ni-Cad and NiMH (Nickel Cadmium and Nickel Metal Hydride) cells develop a slight peak and tiny drop off in voltage once fully charged. Well the peak (peak-detect to be more precise) charger identifies this and automatically shuts down when the cells are at maximum charge. Don't ever try to use this type of charger on LiPo cells. They don't peak and the charger will just keep pumping in the power until they explode.

So, knowing what equipment I had available, roughly what weight of model it would suit and a rough idea of the type of model I wanted it to be, it was time to start searching for exactly what model that would turn out to be. While there were kits available, these tended to be aimed more at sport flying, vintage models and WW2 warbirds - not what I was looking for at all. Obviously I was going to have to 'roll-my-own'.

A while before, I'd been rather fond of small rubber powered models and had several of Walt Mooney's Peanut-Scale plans kicking around the model room - it was time to peruse those for inspiration. If you've never considered it, these designs make excellent inspiration for electric powered models. The structures aren't too far removed from what you'll need and whilst not always the most accurate rendition of a given prototype, they prove a good starting point. Okay, so 13" span is a bit on the small side for what we want but it isn't difficult to enlarge them by 300% to be right on the money size wise.

The model that caught my eye was a Chiribiri N5 pre-WW1 monoplane. It had a nice simple, box fuselage, rounded wing tips and an aluminium clad nose (with louvers), plus skidded undercarriage to add interest. With a plan drawn (pencil and paper, then inked (I like to work from a fully completed plan). the model was built in my usual style., developed during this build and refined since then. You see, I don't just draw a lot of lines, there is some thought that goes into where I put them.

Covered in Litespan, with very thin aluminium sheet on the nose panels and with its rigging installed, it looked every bit what I'd been hoping for. All that remained now was to see if the damn thing would fly better than my previous attempts at electric flight - and land without ripping itself apart.

Being a 4:1 ratio, the Speedgear needed a fairly large prop and I needed to avoid it clipping the ground if the take-off didn't go according to plan. Having lashed out on one of the more expensive choices of geared Speed 400, the last thing I wanted to do was put any of the gears at risk. With that in mind, and a friend (yes, I do have some, despite what you thought) standing by with a camera to record the results for posterity, the battery pack (about 5 ounces of it) was connected, gear checked, throttle opened and the poor unsuspecting model heaved into the air.

Believe me, there was nobody more surprised than me when the model proceeded to climb sedately away from launch. It flew quite slowly (as you'd expect from a pioneer type), but climbed nicely, proved very stable and controlled very nicely indeed. My friend climbed a small hillock (more of a bump) next to our strip and I proceeded to fly circuits around him while he happily clicked away with the camera. Needless to say, I came away a very happy modeller, and the die was well and truly cast.

After a few more outings to prove that the first flight wasn't actually a fluke, and having proven the model could take off successfully, The model was entered in our club comp that year and actually managed to take second place in the scale group. What more could I ask from my renewed interest in electric powered flight?

SINCE THEN...

Well, that was it as far as I was concerned; electric powered scale models that didn't weigh a ton (this one was about 20 ounces), flew well and didn't cost the earth were obviously possible, and I was hooked. More Speed 400 powered models followed, including a 36" span Sopwith Pup and DH6, and the decision was made. I much preferred not to have models dripping oil over everywhere and which could at last fly; indeed, just the sort of model I enjoyed building, at the size I wanted to build, so all my engines were sold to club members and I converted solely to electricity as the motive power for my models.

There was still a lot of experimenting to do, larger motors to try out and bigger models to build, but I knew what I enjoyed and the challenges all added to that enjoyment. Oh yes, there were failures (like my attempted conversion of my existing DB Moth .20 that would do no more than waddle across the strip), but they were in the minority.

Compared to those early experiences, electric flight is almost easy these days. The range of available products has expanded to almost unbelievable levels, equipment is far more reliable and the cost seems to be going down (in real terms) all the time. Batteries are lighter, power pack capacities much higher and the whole thing is an awful lot more reliable than when I started; not, I hasten to add, that that takes much doing.

Do I ever regret going all electric? Only on those days when you know the stupid motor should be running, the wires are all connected and the battery is charged, but still it point-blank refuses to spin that prop (or as the wind picks up as you wait for a battery pack to charge).

Fortunately, those times are becoming increasingly less frequent. I suppose the thing that sums it up best is that, with over 200 of my designs published in the modelling press, all of them have been quiet, clean and electric powered. Whether that be brushed power using Ni—Cads or brushless and LiPos (and all stages in between), I've enjoyed them all.

As usual, should you wish to contact me, even if only to tell me to stop waffling (not going to happen), you'll find me at PETERRAKE@aol.com ■

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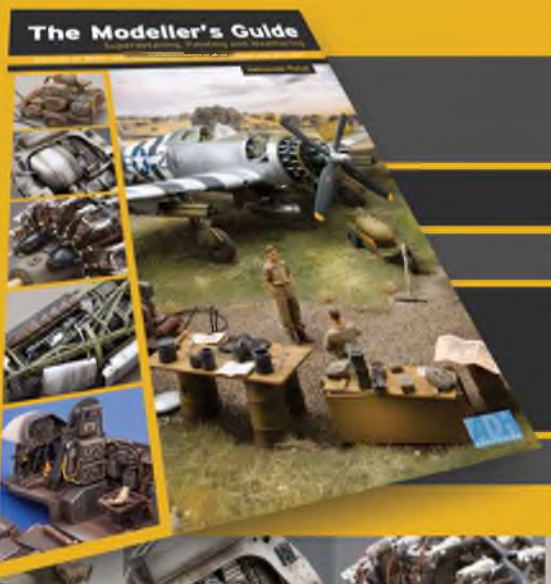

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