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ON THE COVER

Australian Gary Sunderland's scale interest era is firmly rooted in the WW1 Era and earlier. This is his Royal Aircraft Factory BE 2, for which we start his two-part construction series this month. 1:5th scale, 84" winsgapn model is O.S.91 four-stroke powered.

PHOTO: Bill Whelan
(Also flying shots page 26-32)

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CONTACT

Most scale modellers tend to limit their choice of modelling subject to an era of aviation that dominates their personal interest. Depending on the route taken to a finished model there are inevitably varying degrees to which one needs to become acquainted with the full size aircraft.

ARTF kits demand little in the way of study of the full size, but if it's a scratch-build own-design model or even one built from a published plan, the depth of detail undertaken may demand careful study of pictorial proof, that can be found in the huge range of publications available from specialist publishers. The more detail one applies, the more reading material and information sources are amassed and in the process, one gathers a fascinating insight into the active life of an individual aircraft.

Internet is also a rich source of information and detail. For example, more in hope than anticipation, I recently dialled in *" ... Albatros D.II cockpit detail ..."* and found more than I could possibly use! There was individual cockpit instrument images photographed from life that I could download and print out onto photographic paper to provide the dial faces of a whole range.

In this issue our major construction feature is another from the earliest days of aviation, courtesy of Australia's Gary Sunderland who presents the first of two parts covering his BE 2/2a. Gary has a huge personal interest in the really early aircraft and chose the BE 2 (the really earliest of the BE line) partly because the type was the first military aircraft type used by the Australian Army Flying Corps , but also because it was the first type to be sent to France, in August, 1914, by the Royal Flying Corp. Photographs from the period leave one wondering how intrepid pilots dared to mount such frail machines - but then, these were the pinnacle of aviation technology - but then, as now, the latest in technology engenders trust and a feeling of safety!

"...What the eye doesn't see, the heart can't grieve over...", as my dear old mum used to say!

Another example of the manner in which individual scale modellers 'adopt' a particular era of aviation can be found in the review, this month, on Martin Fardell's Short S.17 Scylla, a truly fine scale modelling achievement from a period of aviation that follows the thread of a long line of models that Martin has successfully flown in scale competitions.

In the air, it is a majestic sight from a time when unhurried elegance was the spirit of the time - as least for those able to enjoy it.

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COUNTERWISE

1:6 L-4 GRASSHOPPER

We all know the Piper J-3 Cub, but Piper developed a military variant variously designated as the O-59 (1941), L-4 (after April 1942), and NE (U.S. Navy). The variety of models, as well as similar, tandem-cockpit accommodation aircraft from Aeronca and Taylorcraft, were collectively nicknamed 'Grasshoppers' and were used extensively during World War II for reconnaissance, transporting supplies and medical evacuation. In Europe, the final dogfight of WWII occurred between an L-4 and a German Fieseler Fi.156 Storch. The pilot and co-pilot of the L-4, Lts. Duane Francis and Bill Martin, opened fire on the Storch with their pistols, forcing the German aircrew to land and surrender.

After the war, most L-4s were destroyed or sold as surplus, but a few saw service in the Korean War. The Grasshoppers sold as surplus in the US were redesignated as J-3s, but often retained their wartime glazing and paint.

Maxford USA's 71" span 1/6 scale model model is made of balsa, light-ply and fibreglass, and is based on the original L-4 'Grasshopper' as used during World War II. It features Scale-look shock absorb main undercarriage, skylight windows, 'A' shape bars inside canopy for scale-look and the functional side door can be open or closed. A magnetic hatch at bottom of the fuselage allows battery change or access to the fuel tank.

The Maxford USA is a 95% pre-assembled ARF kit, design for both .40-.46 glow and electric equivalent (with optional motor box), and comes with all necessary hardware and decals.

The Maxford USA L-4 Grasshopper costs £139.95 from all MacGregor Industries stockists.

SOMETHING DIFFERENT

First flown in 1938, the **Vought OS2U Kingfisher** was an American naval observation aircraft operated both in landplane and floatplane configurations, the latter specifically for catapult-launch from large warships, for use as the eyes of the Fleet during naval engagements. Far from being at the 'glamour' end of naval air combat with the famous shipborne fighters like the Hellcat and Corsair, the Vought Kingfisher nonetheless has great 'character' and appeal as a subject for scale modeling.

Rob Bulk of **RBC Kits** in The Netherlands obviously thinks so, now offering a 1:7 scale 1500mm (59") wingspan model. What's more it's a full wood-built kit and not an ARTF, with CNC cut fuselage formers and wing ribs, vac-formed engine cowl, wing tips and cockpit canopy, pre-shaped main undercarriage and 'tab-lock' construction technique.

Designed for electric power using a 4120-7 motor fed from a four-cell 3700-4500 mAh lipo power pack the Kingfisher is likely with weight 2.7 kg (6 lbs) ready to fly.

The RMC Kits Vought OSU2 Kingfisher kit costs 179 Euros (plus 20.90 Euros freight) direct from RBC Kits, Rontgenweg 16G, 2408AB Alphen aan den Rijn, Netherlands. (Tel: 0031(0) 172533954.

Look them up at www.rbckits.com and see their extensive range of scale model kits.

SEEING THE LIGHT

Douglas McDonnel
F-15 Light Set

There's no end, these days, to the aftermarket goodies available to enhance the illusion of realism that can be applied to scale models.

Except in some very specific categories including historic and simple light aircraft operating to 'visual flight rules', modern aviation regulations demand that aircraft have operating lights of all kinds - from light aircraft right through to airliners and front-line combat aircraft.

So operating lights on flying scale models becomes one of the ultimate touches of realism, all catered for by the offerings of **Braincube Aeromodels Ltd**. where there has been a considerable range of such items for quite a while.

Now, they have expanded of their range of high-end LED systems for model aircraft with new sets available for the Hawker Hunter, L-39 Albatross, F15, F16, Viper Jet and F-100 Super Sabre.

Also being launched is a new Delux Jet Set for the non-scale jet fliers who also want the same authentic touch


Hawker Hunter light set


Viper light set

Each set includes an intelligent, 20W power regulating LED controller with ten flash patterns and the ability to simulate a rotating beacon. BrainCube LED modules are designed and manufactured in the UK specifically for model aircraft. Five years of continuous development, cutting edge power LED chips and a unique manufacturing process have resulted in light modules that are only 8mm in diameter yet can handle up to 10W of power and produce up to 360 lumens!

For more information and to buy direct, visit their website at www.braincube-aero.com

1:15 SCALE GOTHA G.IV HEAVY BOMBER

The **Gotha G.IV** heavy bomber was used by the Imperial German Air Service during World War I after their Zeppelin dirigible airships proved to vulnerable. Designed for long-range service, on 25 May 1917, Gotha G.IVs bombing London caused the most severe casualties of any bombing raid of the war, each raider delivering up to 1,100 pounds (500 kg) of bombs from externally hung bomb racks.

The Gotha G.IV was an innovative aircraft - the pilot's seat was offset to port and a connecting walkway allowed crew members to move between gun stations. An unusual innovation was a 'gun tunnel' - the underside of the rear fuselage was open, and there was a slot in the upper surface of the fuselage that allowed the rear gunner to fire down through the fuselage to provide defense against attacks from below and behind.

The **Maxford USA** 62.5" span sport-scale ARF twin electric-powered pusher (2 x 160W motors) is designed for mid-to-advanced- level pilots, features outer wing panels that are removable, scale-looking engine nacelles and landing gear.

The Maxford USA Gotha G4 heavy bomber twin costs £169.95 from all Macgregor Industries stockists.

NEW SAVOX HV CNC ALUMINIUM PERFORMANCE SERVOS

The all-new aluminium cased high voltage servo range from **Savöx** builts upon the success of their existing standard and high voltage range that has been available for some time now. Beginning with the SB2284SG cyclic and SB2283MG rudder/tail servos, Savöx have retained their existing tried-and-trusted gear trains and servo electronics and added a striking aluminium and orange anodised case.

This aluminium case serves two functions. Firstly it dissipates more servo heat with the aid of the purposely designed cooling fins which helps to keep the servo performance more stable and efficient in flight and under the heavy loads of 3D flight load whilst also prolonging it's life. It also makes the servo more attractive and makes it a must for your next HV setup on a helicopter.

See www.cmldistribution.co.uk for details and pricing of the whole Savöx HV CNC Aluminium Performance Servo Range.

AVIOS SEA FURY

New to the **Avios** is a 1200mm (47.25") wingspan model of the legendary **Hawker Sea Fury**. This is a no-glue ARTF airframe, which is presented with all electronics pre-installed, just needing a battery and radio system to complete. The model is of the definitive FB11 version finished in the livery of Commander Peter 'Hoagy' Carmichael, the only British pilot in a piston engine aircraft to down a jet driven airplane during the Korean War.

The all-EPO molded foam replica is powered by a 600kv outrunner motor, controlled from a 60Amp ESC and requires a 4S x 3300-4000mAh lipo battery.

The model features functional split flaps, retracting main undercarriage with gear doors and sequencer, LED lights, scale five-blade propeller, wing mounted rockets, and remotely activated drop tanks.

Also included in the box is a five-blade spinner, for the utmost in scale realism as well as the four-blade version, which allows you to run standard sport propellers for optimal performance.

The Avios Sea Fury costs £166.32 (price varies according the $ exchange rate) from the Hobbyking UK warehouse.

Moska MB bis

An easy-to-build 45" (1143mm) wingspan 1/7th scale electric powered scale model of an early of an early WW1 Russian fighter. Designed by Peter Rake, with the prototype model built and described by Clancy Klein

While searching around for something not too difficult to draw, that would still make an interesting and attractive model, I discovered (again) the original drawing I'd used for my 36" span Moska. Recalling that it wasn't difficult to build and flew really well, I felt it might be time for a larger version. Something of a size that would suit the inexpensive 'bell' style outrunner motors. Although drawn up fairly quickly, the design then proceeded to sit there on my computer. A request for prototype builders for a few un-built designs prompted Clancy to volunteer and the result is what you see here.

So, with the history of the design briefly covered, I'll hand you over to Clancy for all the details of his build.

Swooping in for either a low pass, or on a landing approach. An interesting and attractive model that's easy to build and flies well.

Absolutely nothing complicated about building the wings. Note the joiner tubes bound to the spars and the block area for the rigging pylon tubes.

How the rigging blocks glue to spar and wing rib. The rigging cables pass through the blocks, only being glued once all is aligned and adjusted for tension.

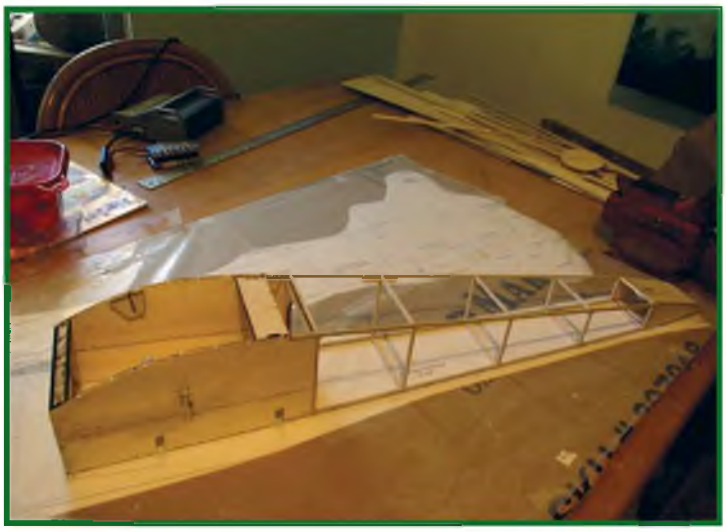
After some searching, I found that the Moska MB bis was a joint venture between an Italian airplane designer named Francesco Evgistovich Moska and his Russian assistant Bystritsky, thus the MB in its name. 'Bis' I cannot find in Russian; however, it means 'twice' or 'again' in French, that could be the meaning since it is a version of an earlier two-seat recon version, the Moska MB.

The Moska MB bis was a folding fighter. Both the wings and elevator fold for easy transport. The MB bis I built does not have folding wings. It would be great to make one that with that feature and maybe if Mr Rake would kindly design such a plane, I would build it. The elevator part would be tricky. *(Sorry, that is highly unlikely to happen. Although I do intend to draw up an 18" span model, it won't have folding wings. At least, they won't fold intentionally. PR)*

As with many of the really early aeroplanes, the Moska MB and MB bis had wing warping instead of ailerons. The aircraft used a 80 hp Le Rhone engine, which was was an upgrade from the previous MB's 50 hp engine. Being a fighter, it had a machine gun that was on a stand to fire over the propeller. I am afraid the ground crew forgot to install my gun and my poor fellow is unarmed.

Fuselage side frames are built in the time-honoured manner. Build one over the plan, turn it over and build the other one on top of it.

This is Clancy's solution to the cruciform motor mount issue and his dowel and magnet cowl attachment. I've no idea what the canoe is doing there though!



Having a virtually continuous straight edge, and no curve to the sides, makes accurate fuselage box assembly a relatively painless affair.

Fortunately Peter has included the gun on the plan, and those who want to model the gun will have a good idea of its size and how to mount it. About 50 examples of the Moska MB bis were made before the 1917 revolution in Russia. During the revolution, the Reds used these 50 planes and had another 50 built to use in their fighting with the counter-revolutionary 'White' forces.

WINGS

So let's get on to the building. I used the kit of laser cut parts Peter arranged because this was a prototype build and I wanted things to go faster and smoother. I like to start with the wings because they are not too complicated. These are a standard sort of thing in that this is a three-function model and without ailerons. The root rib is not even tilted for the dihedral because the wing does not touch the fuselage sides.

The wings have brass tubes tied and glued to the top of the main spars to line up with the brass tubes on the fuselage. It's a very good idea not to actually glue the tubes and bindings until you are absolutely to sure everything will line up correctly - I did not. I matched the laser-cut rib to the fuselage plan and saw that it matched and went ahead. It may be more prudent to wait with the glue, especially if you're building from scratch. *(It's a lot easier to, and safer, to wait until you have a fuselage, centre section (c/s) struts and wire joiners to plug the wing panels onto before you smear a load of epoxy around the joiner tubes. Plug them onto the fuselage, ensure everything aligns as it should and THEN epoxy the tubes to the spars while they are on the joiners. Just make sure you don't epoxy them TO the joiners. PR)*

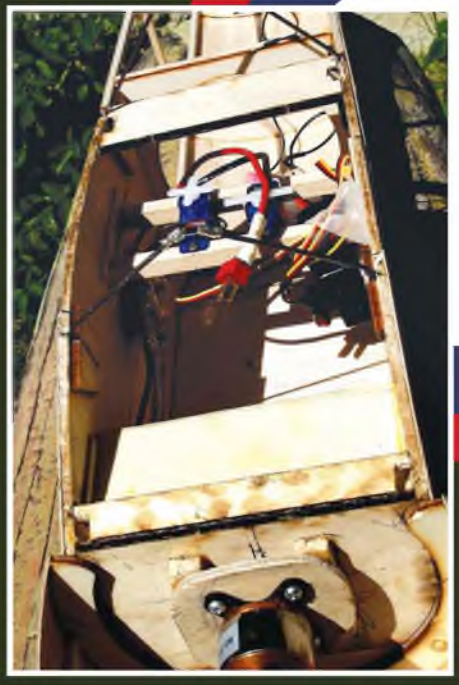
The wings also have balsa block on the front inside corners to hold the brass tube for the upper pylon, but I would advise waiting until you have the wings completely finish and sanded before gluing the tubes in place.

The tips of the wing are made of four 1/16" x1/8" balsa strips laminated against a cardboard form. Cutting out a cardboard form covered with plastic wrap is my preferred way of laminating balsa. *(If desired, although it complicates the task a little, you can also curve the formers, so that once set and fitted to the wing the tips simulate the impression of an under cambered wing. It isn't essential, but adds a lot to the appearance of the finished model. PR)*

The final task on the wings, prior to trimming, sanding and covering is to fit the hard balsa rigging blocks. Ensure the balsa you use really is hard, or substitute bass for these items. The last thing you want is for the rigging to cut into the blocks as you are trying to pull it tight. *(Been there, done that, didn't like it one little bit. PR).*

FUSELAGE

Because the body is a straight taper without any curve in plan view, it is easy to build the fuselage in one piece. I built both sides, one on top of the other, with wax paper in between. I left the wing supports off. The top of the fuselage is flat, so I intended to lay that down over the top view when putting the sides together. After the sides were joined with the formers and 1/8" sticks, I then



Clancy has his servos well back in the fuselage, possibly accounting for why he needed so much nose weight.

The obligatory naked model photo revealing the straightforward nature of the build.

laid it over on its side and glued on the bass wing supports. I use non toxic wood glue for most wood-to-wood gluing. A doubler was added behind the wing supports. Don't be tempted to omit the small ply patches each side of the struts. These add a lot of strength and avoid the risk of the area above the tube hole splitting away. *(It's never a bad idea to have more than just the rigging holding the wings onto the fuselage. PR)*

MODEL SPECIFICATION

Wingpan:	45"
All up weight:	32 oz
Motor:	E-flite Park 450
ESC:	Turnigy Plush 30Amp
Battery:	Turnigy 1500 3S LIPO
Flying prop: :	APC slow-fly 110" x 6"
All-up weight:	32 ozs

At this point, I shaped my wire for the wing rigging pylons and wing dihedral. I then started the hatch/cockpit located between the brass wing supports. It's a relatively simple balsa carving exercise to make the hatch/cockpit and results in something you aren't afraid to handle while changing batteries. Originally, I used magnets to hold down the hatch, but when I added a pilot the drag became too great and I had to add a latch to hold it on.

Next up, I sheeted the top of the fuselage with 1/16" balsa. I then added a little detail on the sides. Detailing is a choice people make depending on what they think will make the plane look right to them. I chose side panels and authentic exit cables to the control surfaces over the machine gun or wing warping or whatever. I won't do them all, I am not that dedicated I'm afraid. *(Absolutely nothing wrong with that. How much detail an individual adds is a very personal thing. Some will want to add as much as possible simply because they enjoy doing it, while others want a practical flying model. Personally I try to tread the middle line, adding enough detail to draw the eye to what I consider to be the interesting areas, while drawing the eye away from less detailed areas. PR).*

The cowling was made by taking scrap balsa spacers to glue between C2 and C3. When that has dried, you wrap that assembly with 1/32" ply. Then glue the C1 pieces or block balsa to the front of that and sand it to the desired shape. Once satisfied with the shape you can paint or cover it. (For such items I favour painting rather than covering simply because it's the best way to end up with a totally

That's better, now we have someone in charge of the 'office' and all ready to commit aviation.

There's that canoe again, along with the covered tail surfaces all ready for installation on the model. Interesting shapes, aren't they?

smooth finish on what is supposed to be a metal area. Build up coats of primer until no grain remains, sand it all smooth and then apply the finish colour - PR).

I use pegs and magnets to hold it on to the front of the fuselage but it could just as easily be lightly glued in place. The landing gear is made the landing gear with bass wood legs and 1/32" ply patches each side to reinforce the joint. Once sanded to a pleasing streamline shape it can be glued into UC1 and UC2 at the desired spread and have the axle bound in place. However, it is a good idea to cover the sheeted section of lower fuselage before fitting the landing gear and rigging pylons, so you don't have to cover around them.

THE POWER SYSTEM

It was now time to install the motor and electric equipment.

If your motor uses a small, circular mount the parts shown work just fine but a cruciform mount will require larger discs, or some other arrangement such as spacers and a ply plate.

Working with the original parts, taper one spacer at a three degree angle and fit the assembled spacers and mount plate (ply) to the firewall at a 45 degree angle. This will mean the motor then has twodegrees right and down thrust. Please make sure you get it the right way around because two degrees up and left will do nothing to improve the way the model flies.

Mount the servos low in the fuselage and as far forward as will still leave access through the hatch, but leave you room to get the battery pack in and out - unless you intend to leave it in and charge it in the model. Check where the closed loop cables exit the fuselage and install some nylon guide tubes - supported with balsa where required.

TAIL SURFACES

The rudder and elevator are both quite unique and are one of the main things that attracted me to build the Moska. They are both laminated 1/8" x 1/32" balsa strips around cardboard forms. The elevator is just the basic structure. It will later be hinged onto the back of the fuselage in the normal way. The rudder, however, has two paddles that are held together with a piece of carbon rod that is held to the fuselage with an aluminium tube between the two rudder pieces. After the two rudder forms are built, epoxy the carbon rod to one of the rudders. Place the aluminium tube on and carefully epoxy the other rudder piece on so as not to foul the tube from spinning free of the carbon rod. Lay this assembly flat on a surface so the two pieces align straight. The tailskid has a tube to hold the bottom of the rudder in place. I then assembled the whole thing together to see if it fit OK before covering.

COVERING

I used *GM* tissue, but *Litespan* is the same stuff. This requires the use of an adhesive like *Balsaloc*. I like this material because paint adheres well to it. I also used a self-adhering silver fabric for metal cowl and plating. I covered everything except the bottom of the fuselage. I then drew the cockades on the wings and tail surfaces with a compass using a piece of scrap 1/32" ply taped on to stop the compass from poking a hole in the material. Then I used water-base enamel to paint the cockades.

(If applying markings direct to the covering, I find using a fine, permanent marker in the compass does a good job of lining them in. Then you don't have to paint quite so accurately because the sharp lines have been made by the coloured markers. PR)

ASSEMBLY

I always start with the wings since all other flying surfaces are aligned with these airframe components. I placed the wire with dihedral in the wings and set them in the body so that the wings tipped up, and then glued them in place. After the wings are on, the rudder is glued in place.

The tail skid was attached at the same time. Then the elevator aligned to the wings and hinged on. I sew my hinges with needle and thread, so I sewed on the elevator to the fuselage and used a drop or two of CA glue two lock the thread in the right spot but not so much as to damage the hinging. I then ran my fishing line control cables which I painted black with a Sharpy to look more like control cables. I covered the bottom of the fuselage in sections to avoid using the iron over the cables. The 'down' elevator cables and rudder cables exit through the bottom of the fuselage, while the 'up' elevator cables come out through the top.

Then the landing gear is glued in place and wire pylons for the rigging. The axle is bound to the landing gear with elastic thread on my model, to provide some springing for those less than smooth landings. The wheels are basic built of 1/8" balsa, 1/32" ply and foam cord, as shown on the plan. Small fishing swivels are used to link the rigging to the pylons, with each cable running right through the rigging blocks in the wings. (An equally good method of attachment is to use small lengths of brass tube on the cables as crimps and loop each cable through the rigging loop and back through the tube. This allows adjustment to remove any warps induced during rigging before finally crimping the tube and adding a spot of CA to lock each one. The fact that they can then pass as turnbuckles is just a fortunate coincidence. PR)

FLYING

So now I check my balance and off I go to maiden the model. I wish I could say "So now I CAREFULLY check my balance and go off to maiden the plane." I looked at the plan and noted that the balance point is about a 1/4 inch behind the front spar. I stick my fingers about a 1/4 inch behind the spar and it seemed pretty good. It was tail heavy and this caused some very exciting flights and took a while for me to sort out.

I would say it is sensitive and needs to be spot on, then again I did add more than an ounce to the nose so it may be all me. NOW the plane flies nicely and can fly hands-off. I have only flown the Moska in circuits and figure eights and a loop or two, which seems right in keeping with the original. It has plenty of power and at 24 oz can fly quite slow. With all moving rudder and elevator, you will want to be careful setting your rudder and elevator throws. The Moska looks very interesting in the air and reminds me of a fish.

The ground handling is nice and smooth with this plane. Landings are very smooth and gentle. Even when it was not properly balanced, the Moska would float down and land gracefully. I am happy with my Moska and feel it to be a pleasant plane to fly and quite unique. ■

TWICE THE FUN!

LMA Elvington combines full-size and scale aviation in a great family day

I reckon that the Large Model Association have a winning formula with their resuracted version of the much-missed old Elvington Show. As well as a full scale modelling display, it included an extensive trade village

DH Vampire

The first 'new-to-me' model I spotted was a Canadian-schemed, vividly striped, yellow-and-black DH Vampire. Scratch built and flown by Andy Johnson, she spans 12 feet 3 inches, with Wren 160 power. This gas turbine powered model was not quite finished, and was having her proving flights, but what an impressive debut. Andy is a noted show pilot so he was able to display the model to best effect to an appreciative crowd.

Avro Vulcan

Andy's Dad (...and Chairman of the LMA) Dave Johnson has retired his long serving original Vulcan and arrived with - another! This time in white and with a 20 foot wingspan, XH558 looks very crisp indeed. David flies her very smoothly and the whole crowd fell silent as she took to the air. An hour or so later, the LMA had arranged for the last remaining airworthy UK Vulcan - XH558 - to fly over.

Nicely finished Focke Wulf 190A cli
In the flight line mêlée

out says Alex Whittaker

Only then could we appreciate the authenticity of David's model is, but also how authentically he flies her.

Viper
Now this is rare - a model of a home-built jet! At first, I thought that Colin Conklin's Viper was a modern freelance model design. However, Colin put me right. In fact she is a scale aircraft. The Viper Jet Corporation's 8.48 metre span aircraft first flew in October 1999,

mbing out over the boundary trees. , I failed to catch up with the owner.

The full size XH558 appeared later, and truly rent the heavens - what a sound!

One of my favourite high-wing light aircraft flew in for the day from Breighton, a full size Auster Autocrat. Delightful.

Another beautifully restored full size Auster, this time a rare J/1.

As last year, this impressive and very muscular-sounding full-size Yak-52 flew in. She gave a great display, which included smoke.

FULL-SIZE ON SHOW

The 2014 event included at full size aviation element the undeniable starof which was a fly-over by XH558, the last airworthy Vulcan. However, that was not all. For those of us who like classic British high-wing light aircraft, no less than two immaculate Austers flew in, one a very rare Kingsland.

To the trad. Brit. modeller brought up on classic kits, these are old friends. It was life-affirming to see them 'in the fabric'. Later on we had some full-size Yugoslavian exotica, in the form of a Soko P2, and a fine aerobatic Yak 52, plus a numberof light aircraft movements. So the theme was a blend of scale and full-size, with the emphasis on flying scale models.

Even full size jets were represened in the form of ex RAF Hunting Jet Provost XM 479, now in private hands and earning it's keep doing the full size summer airshow rounds.

Full size Jet Provost T.3A, now in civilian hands (G-BVEZ), banked high. Astounding!

Jet Provost XM 479 on a scorching low run. She is immaculately kept and has very low hours.

There was a good mix of gas-turbine and prop-driven scale models all day.

Ian Turney-White's colossal Bristol Bulldog put in a number of superb flights, as usual.

and is designed expressly for home-building. (A follow-on from the Bede BD-5 perhaps - Ed.). Base price of the kit for the full size is $182,000, but on average customers spend $350,000 dollars on their kits. They also expend between 3000-3,500 hours to complete their Vipers. You live and learn.

DH Sea Vixen

We have mentioned George Firth's intriguing DH Sea Vixen once before a few years ago, but this scratch-built seven footer stills pleases. Sea Vixen models are cruelly rare, which is pity since this is such an elegant and quirky British paraffin burner. The offset canopy on the full-size always tickles me.

George's example is Wren 100 gas-turbine powered, and weighs 30lbs. The Vixen is a very slippery shape, so her turn of speed on low passes is especially impressive, given the vintage of her design.

Heinkel III

Just a quick bit of news on Phil Robertshaw's large and well-loved show beast. After many years service, Phil is resting his Heinkel III for a complete refurbishment and re-scheme. This will please many of her admirers, and as we all know, hard-core scalistas love a rebuild!

Fokker Eindekker

My auld mate John Elkington first introduced me to these amazing kits by Paolo Severin, so I was keen to have a good gander at the huge Fokker Eindekker parked in the Elvington pits. This was flown by German visitor Gerhard Reinsch. It is hard to do this model justice in mere words. Its construction and materials, exactly mirror the full size which, in this case, means a metal tube structure.

The model was complete right down to its dummy Oberursel seven-cylinder radial. The Eindekker is four metres in span, powered by a hidden Valach 120cc petrol four stroke engine, and weighs just 19 kgs. The fuselage is a cool 2.73 metres long.

OK, that gives a little background, but what does she fly like? Well, I have to say Gerhard is a very fine pilot, with ice-water in his veins. In a

Gerhard Reinsch's very large and very impressive Fokker Eindekker EI from the incredibly detailed Paolo Severin kit. 4 metres in span, weighs around 19 kgs. Featured very convincing dummy Oberursel 7-cylinder radial on Herr Reinsch's imposing Fokker EI. There is a Valachi 120cc petrol engine hidden in there, too.

buffeting wind just under the BMFA limit, he threw the large Eindekker gracefully all over the sky. He skilfully put the Eindekker in a variety of dog-fight attitudes at a variety of heights, some very low. The rolls, inverted flight, and vertical stoops had me gripping my camera body. Especially so when you consider the model has no ailerons, just that authentic WWI version of 'variable geometry surfaces', also known as wing-warping.

Exhilarating is all I can say. I was able to grab a few extra shots of the Eindekker in the pits, so more details of this fine flying scale models soon.

Jet Provost

I cannot conclude this photo report without mentioning a deeply impressive flight by a visiting full-size Jet Provost. The Jet Provost is a wonderfully evocative British military aircraft, and this example, although on the private register as G-BVEZ, is kept in her immaculate RAF training colours.

In short: she is beautiful. To the crowd's delight, she actually flew in and landed, and later did a slow taxi for the cameras. I was able to get a shot of her shimmering through the heat haze. When she took off and did her display, the pilot even rolled her so that we could get an excellent view of her pretty plan-form. Lovely.

The Verdict

The wind varied from bracing to

Ken McCormick'sBoeing B-17G Flying Fortress limping home whilst belching smoke.

Richard Scarbrough's well-known Red Hot Mama P-47D Thunderbolt rumbling in.

Colin Conklin's gas turbine powered "High Performance Training" Viper. The real one is a homebuilt jet aircraft of 8.48 metre span.

John Braithwaite's very pretty Meyer Little Toot.

George Firth's nostalgic, seven foot span Sea Vixen. Note the trade mark asymmetric pilot's cockpit. Traditionally built, too.

Andy Johnson wowed is all with this Canadian-schemed DH Vampire. Not quite finished, but a superb flyer. 12 foot span, Wren 160 power.

I am a great fan of the Little Toot and John Braithwaite's example has a superb rendition of the famed original scheme.

George Firth's own-design, scratch-built DH Vixen. Wren 100 gas turbine powered and weighs 30 lbs.

The Johnson gas turbine powered DH Vampire has an appropriately vivid yellow-and-black striped training scheme.

Andy and Colin Wynn's Hawker Tempest V about to land. 1/5th scale, 98" span, DA 85cc power. Weighs 43 lbs.

His previous Avro Vulcan now honourably retired, LMA Chairman Dave Johnson flew his new all-white Vulcan.

Dave Johnson's brand-new Vulcan looking serene in the air. The real thing appeared later, and looked the dead ringer.

annoying, but flying never stopped. LMA Elvington is a pukka scale model event with an impressive full-size aviation show seamlessly interwoven. It offers great value for money, it has a very impressive Trade Village, and the flight line action is non-stop. In addition, LMA Elvington seems to attract some of the rarer Clubman scale models that may not appear on the summer show circuit. If you are looking for a "high-summer" model show that is a bit special, and also suitable for the whole family, this is the one. ■

Dave Swarbrick's Grumman F9F Panther fitted with a Harold Dowbekin shed-built gas turbine engine.

IMPERIAL ELEGANCE: SHORT S 17 SCYLLA

Alex Whittaker takes a close look at an majestic BMFA Scale Nats competito

The Short Scylla was a product of the days of Empire; elegant foreign travel and the era of the flying boat. Her immediate fore-runner was the Short S.17 Kent. This British four-engined, 15-seat biplane was designed as a luxury flying boat airliner. She was intended to meet the Imperial Airways requirement for a type with a greater range than the existing Scipio Class Short Calcutta.

With this bloodline, the Kent was essentially an enlarged Calcutta, with four engines. In turn, the Short Scylla all-metal biplane airliner was based on the Kent, but was a landplane, and her capacity was far greater, at 39 seats. Her main function was to supplement the Imperial Airways HP 42 fleet, and she was designated for scheduled flights between Paris and London. Two examples of the class were built, Scylla and Syrinx. They were built side-by-side in Short's seaplane works at Rochester. Shorts had concentrated on seaplanes, so there was no airport at their works. This meant that the completed aircraft had to be stripped down, transported by land to Rochester Aerodrome, and laboriously reassembled out in the open, there being no building big enough to accommodate them. This work took place over the winter, so one can imagine the hardship inflicted on the assembly staff.

The prototype first flew on the 26 March 1934. Scylla required four crew to support her 39 passengers. Her wingspan was 113 feet and she was powered by four Bristol Jupiter air-cooled radials, each developing 555hp. Later power plants included the fitting of four Pegasus XC engines. They were designed for economical cruising in some luxury, rather than record-breaking speed.

In service, Syrinx was blown over by a side

wind at Brussells and needed extensive refurbishment. Her sister was written off in a gale in Scotland, and later Syrinx was sent to scrap. These were the last of the large biplane airliners operated by Imperial Airways, and both had left service by 1940.

The Model

Noted Lord-of-Scale Martin Fardell is a fine aeromodeller with an eye for the unusual, and the quirky. Martin also has a wry sense of humour, which I think can be detected in his flying scale models. Readers may remember one of his earlier models that had a neatly munched ham-sandwich on the Navigators Desk. Maintaining scale accuracy to the last, one could note the scale outline of the Nav's gnashers, clearly visible in the white bread. Even the accompanying mug of coffee was still half-full.

So when it comes to Martin's magnificent Scylla, we can guess that she has been chosen as a much for her playfulness as her good looks. The first thing to note is the sheer presence of this opulent model. This is a scale model aircraft that makes a bold statement. Like the real thing, she is pure theatre. In her own way she is as grand, elegant, and glorious, as an Elizabethan flagship. A substantial scratch-built scale model, built to 1/12th scale, and with a wingspan of 113 inches, she has a certain luxurious style. This makes her a very large scale biplane indeed. She weighs 22 lbs and is electric powered. Martin usually selects internal combustion power, but he pointed out to me that choosing electric power drastically reduced Scylla's building time. In particular, it made the power installation much easier than four glow engines. In fact, Martin fitted Four E-Max motors, each drawing about 300W on their 10"x 8" prop.

On the ground her unique looks win high praise, and in the air - defying the truth - she looked utterly gorgeous. I say defying the truth, because although Martin always looks calm, he was actually wrestling with the controls at The Nats

THE EPITOME OF THE FUSSY 1930S "AVAILABLE TECHNOLOGY" BRITISH EMPIRE LUXURY AIRLINER.

1: Martin chose electric power. Four Emax motors drawing about 300 Watts each on 10"x8" electric props. 2: Electric power obviated the need for bulky, hard to hide, hard to make, engine silencers. 3 & 4: Wonderfully involved tail treatment with outboard trim tab. 5: Pure 1930 kitsch. 6: The prototype luxury airliner could carry 39 passengers, their downward view unobstructed by wings.

flight line last year. Scylla, as he originally propped her, had a mind of her own, and was hard to keep tidy in the air. The rest of us were blissfuly unaware of this struggle and we thought she looked magnificent. Martin later developed a solution to the problem, but that was sometime later.

Documentation

Martin based his research and documentation on lots of vintage photos sourced from the internet.

Plan

Martin scratch-built the model to his own plan, based on what he engagingly terms " ...a scrappy 3-view off the internet...".

Construction

The whole construction is traditional, with the copious use of balsa, plywood, and spruce. Martin also moulded some key scale components from glass reinforced plastic.

Fuselage

This 1930s version of a wide-bodied fuselage is essentially rendered as a balsa

SYRINX ON A LOW PASS, THAT'S A LOT OF RIGGING FLYING IN CLOSE FORMATION.

box. Cleverly, Martin has represented the complex corrugated aluminium skin by strips of 1/16" balsa. So far so good. However the way he affixed the strips is very interesting indeed; he simply ironed them on with Balsaloc adhesive!

Wings
All traditional, built up structure with spruce spars and balsa ribs.

Tail
Fully built-up open structure, as per the wings.

Motors
Martin has departed from his usual internal combustion power, to explore electric

7: Syrinx has a homebrew telescopic undercarriage based on B+Q ally tube. 8: Martin made his own wheels, as well as the undercarriage. 9: Sprung undercarriage has that authentic Thirties look.

MARTIN ALMOST CATCHES A CRAB AS THE RUTHLESS BARKSTON CROSSWIND SIDE-SWIPES SYRINX.

propulsion. Four E-Max motors, each giving about 300W on 10"by 8" props were initially chosen. These proved to be problematical. Martin used 4s separate Lipos for each motor (3300mAh), which delivered a comfortable 12 to15 minutes gentle cruising.

Engine nacelles
Martin home-moulded these in glass fibre. Dummy engines have cylinders moulded in polyurethane resin. Moulding was wise move since 36 cylinders were required in total!

Props
10"x8" electric type. Originally he had used 12" diameter props, which proved problematical.

Exhaust
None. "Thank goodness..." says Martin.

Undercarriage
Mostly home-fabricated from B&Q aluminium tube. Martin used home made wheels, and introduced springing in the oleos.

Covering
Silk on tissue. Martin says this light and tough, and gives the right look to the finished covering.

Painting
Cellulose, with a light spray of Mick Reeves clear satin epoxy over the silver.

Legending / Decals
Mixture of hand painting, and spraying with masking tape.

10: The engines nacelles are set very high. Martin home-moulded all 36 cylinders. 11: Lots of absorbing scale detailing wherever you look. 12: The prototype had 4 crew. Look at that crew entrance door. 13: Forward fuselage hatches have that soft metal look. 14 & 15: Fuselage corrugations achieved by Martins innovative balsa strip ad Balsalock iron-on process!

Scale Details

Struts are all made using very light aluminium tube with balsa fairing. Most rigging wires are fishing trace, with some Mick Reeves flat wire rigging, with adjustable ends at the centre section.

Martin's Flying Notes

"Very disappointing initially, as we saw at the Nationals. It wouldn't fly slowly, and was very reluctant to turn nicely. I eventually worked out the cause of the troubles, but sadly too late for the Nats. The original 12" props just reached to the level of the underside of the top wing, putting high speed air over the lower surface of much of the top wing. This destroyed the lift over that area, as there was no corresponding high speed air over the top surface. Changing to 10" props has transformed the model. The top wing is now generating its proper lift contribution and Scylla now flies quite nice and slowly. Not at scale speed though - the full-size speed of 137mph equates to about 11mph for the model!"

MODEL SPECIFICATION

Short Scylla scratch built to Martin Fardell's own plan

Scale:	1/12th
Wingspan:	113 inches
Weight:	22 lbs
Motors:	Four E-Max motors, each giving about 300W on 10"x 8" props.

Quite amazing layout, with four engines and the mainplanes well above the fuselage.

SCYLLA SYRINX LOOKS ABSOLUTELY AMAZING IN THE AIR.

BE 2 & BE 2a

PART 1: Gary Sunderland presents his 1/5th scale 84.1" (2136mm) wingspan model of the Royal Flying Corp's first true warplane - taken to France in August 1914

My favourite free flight scale model has always bee the Royal Aircraft Factory BE 2c with lots of dihedral and perfectly stable. My old '2c was built in 1985 and is still going strong, but is now on its third engine - the others just wore out! The Grandfather of the BE2c was the BE2 of 1912, designed by Geoffrey de Havilland when he was working at the Royal Aircraft Factor as their designer and test pilot.

After re-designing and flying my 1/5th scale Bristol Box kite (see FSM JUNE & JULY 2012) my thoughts turned to the Be 2 as a back-up model. The Boxkite is really a handful in any sort of wind and is restricted to flying in the early morning in calm-ish conditions, before the thermals start to bubble up. A playful gust meeting the Boxkite on take-off or during landing would lead to dire consequences!

In Australia, two of the 'new' BE 2 were our first military aeroplanes; these served throughout WW1 as 'advanced' trainers alongside the Bristol Boxkite, which made the actual first military flight here. A BE 2 model would be a natural partner for the Boxkite and could cope with model flying conditions short of a howling gale. If the weather is flyable, then I am confident that the BE 2 is capable of performing.

Back in UK at that time, the BE 2 was superseded by the BE 2a, which was almost identical, apart from a shorter top wing. The BE 2a had equal span wings


1


2


3


4

and was stronger. The 'a' version went to war with the Royal Flying Corp (RFC) and the Royal Naval Air Service (RNAS) through 1914-15 and deserves to be modelled more. The drawings presented here provide for the BE 2a as an alternative subject.

From the start, I decided to design the BE 2 to 1/5th scale - the same scale as my Boxkite and model it as a simple 'Stand-Off', without complications such as wing warping thin wings. Thus the top surface of the wing is near scale, but the undersides are flat, with the trailing edges of the lower wings converted to function as ailerons. The model looks like the BE 2 on the ground and in the air, as long as you don't look too close - which is really what Stand-Off Scale is all about!

FUSELAGE CONSTRUCTION

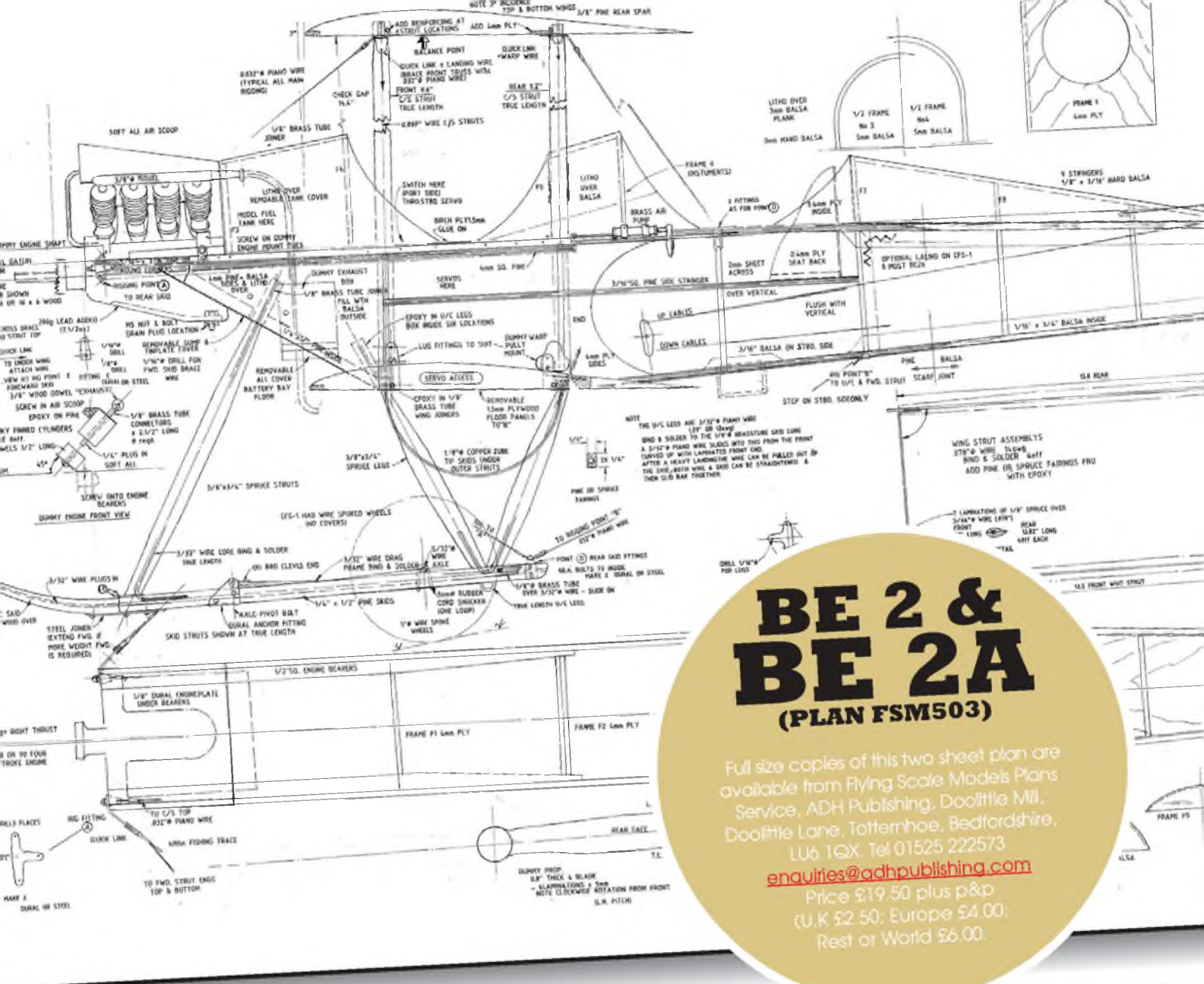
The two fuselage sides are built flat over the plan, one at a time with the starboard (right) first. Pine or spruce forward and balsa aft. The plywood and timber I use is Hoop Pine, a local timber equivalent to spruce. As usual in my models, the rear balsa longerons are reinforced inside to keep them straight **(Photo 1)**.

An unusual feature of the full size BE 2 design was that the top and bottom of the rear fuselage were covered with thin plywood, instead of the usual wire bracing. I recently came across some very thin 0.04mm birch ply from Finland, presumably made for the folks who build those magnificent scale sailplanes - just the thing for the BE 2 rear fuselage and **Photo 2** shows this being added. Trim this back later with a pair of scissor.

The formers and stringers are shown being added in **Photos 3 & 4** - nothing at all difficult here.

The fuselage is covered next. I always use *SIG* adhesive and *Koverall*, with two coats of nitrate dope, water-based 'primrose' paint to better replicate the colour of the fabric of the full size aircraft and a final spray with satin polyurethane varnish. In Europe you might use *Solartex* and save some time, but it does get a bit hot in Oz. (I just checked inside my car, which is exposed to the sun and the temperature inside is 62 degrees).

The undercarriage is made next, being drawn on a sheet of plywood, using pins to hold the



BE 2 & BE 2A

(PLAN FSM503)

Full size copies of this two sheet plan are available from Flying Scale Models Plans Service, ADH Publishing, Doolittle Mill, Doolittle Lane, Totternhoe, Bedfordshire, LU6 1QX. Tel 01525 222573

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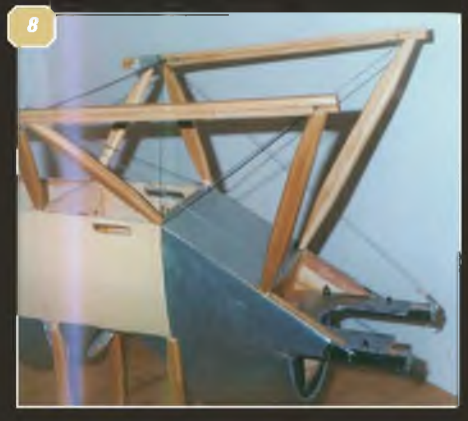

piano wire and brass tube. Soft solder together, bind with tinned copper wire and solder again. **(See Photo 5)** shows the undercarriage being added to the fuselage. The wire ends are boxed in with timber and plywood and epoxied in place.

Now is a good time to check for level **(Photo 6)** and add the balsa top decking. When the epoxy is fully cured - I use '24-hour' epoxy for strength and wait 2-3 days for this, the legs are spread and the cross brace soldered in. Then the wood undercarriage is built up either side of the wire and epoxied in place. **(Photo 7)**.

Note, the engine mount bolted in place and the bracing wire from the forward fitting back to the undercarriage, goes outside the skid leg. **(Photo 8)**.

A trial fit of the fuel tank, engine and wheels are next **(Photo 9, 9a & 9b)**. Note the dummy 'engine sump' underneath. Also the forward skids, with a wire centre, plug-in at the front. An aluminium clip, not shown, will hold them in place. With any luck, the forward skids will bend rather than break. The top decking has been litho plated and the forward passenger added. Wheel hubs were normally covered on Be 2 and BE 2a aeroplanes, but in Australia these were often absent. Anyway, I had a nice set of wire-spoked wheels to show off!

The BE 2 tailskid **(Photo 10 & 10a)** is easier to make than to explain. The centre

part is a wood dowel with aluminium tube and sheet bolted on. A coil spring provides the 'give'.

The next step is to add the carbon tube rudderpost. The original had a steel tube, but the carbon tube is lighter and is the correct colour, black, so you don't have to paint it! Carefully file away the rear fuselage with a round file to seat the carbon tube exactly. Check, by sighting, that the tube is vertical in end view and remember that the top of the fuselage and the tailplane are at two degrees positive incidence.

When satisfied with the set-up, 'ZAP' in place with thin cyano and check once again. Then apply thick cyano along the sides. On my model, I also added aluminium straps over the carbon tube for a 'belt-and-braces' finish - probably not necessary, but I am conservative (but not in politics!)

Glue on the tailplane with acetate glue **(Photo11 & 11a)** and add the controls. The fittings are all duraluminium sheet scrap, retrieved from scrap bins at the local airfield.

A bit more scrap dural is applied to the top wing centre section **(Photo 12)**. Note that the front fittings are in line with the spar and take most of the load. For the rear wing rigging, the original full size aircraft's warping cables were inside the rear struts and consequently offset inwards on the model.

The lower fuselage fittings are similar, with the rear bracing attachments offset as shown in **Photo 13**. The servos and receiver are stowed below the observer bust, with aileron Y-lead located through the slot

The centre section struts are NOT glued in, but the wires should be a tight push fit into the drilled holes. CHECK that the distance (gap) between the bottom of the fuselage and the bottom of the centre section is exactly 14.4" (366mm).

NEXT MONTH:
Building the remainder of the airframe and the test flights.

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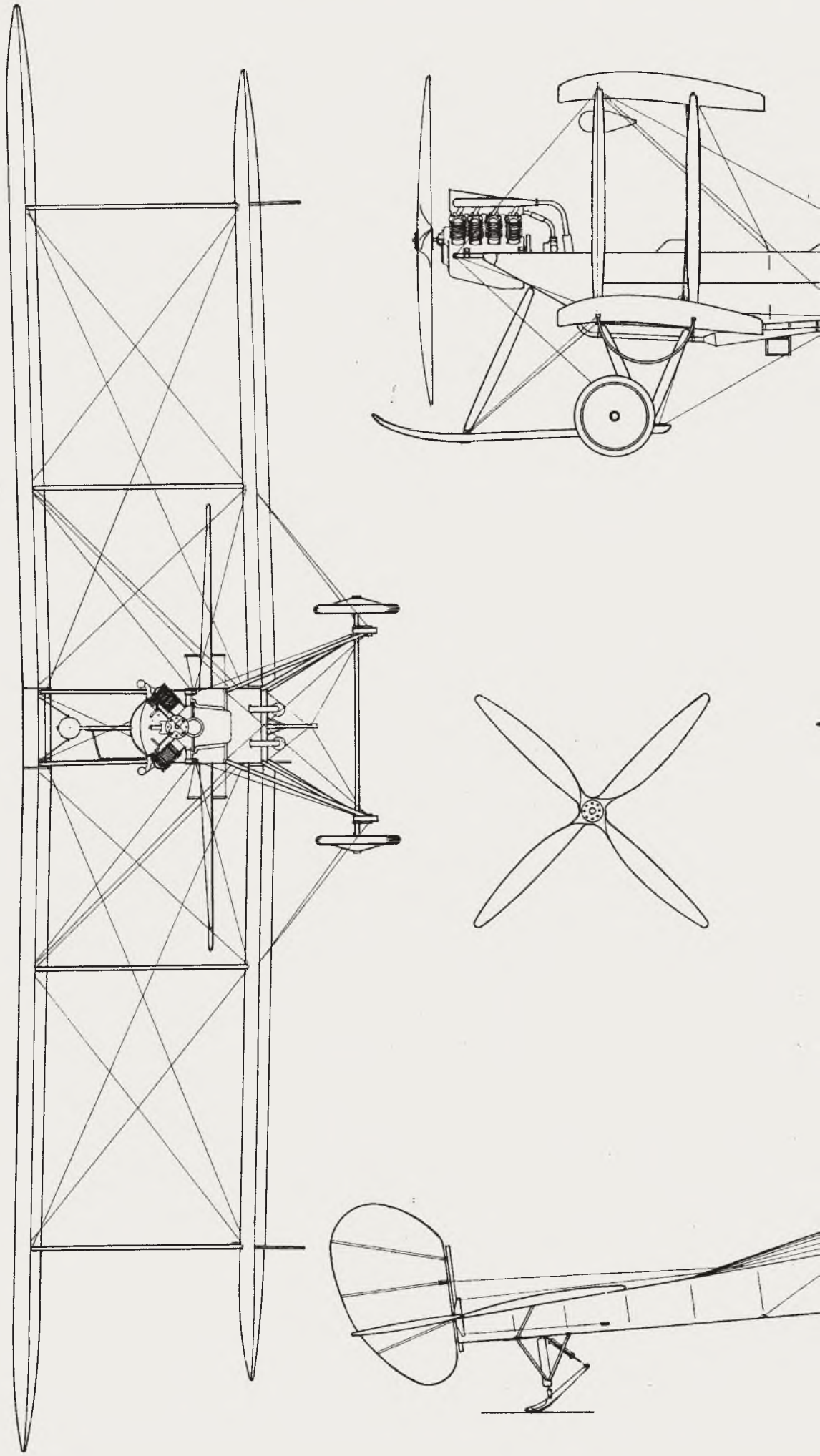
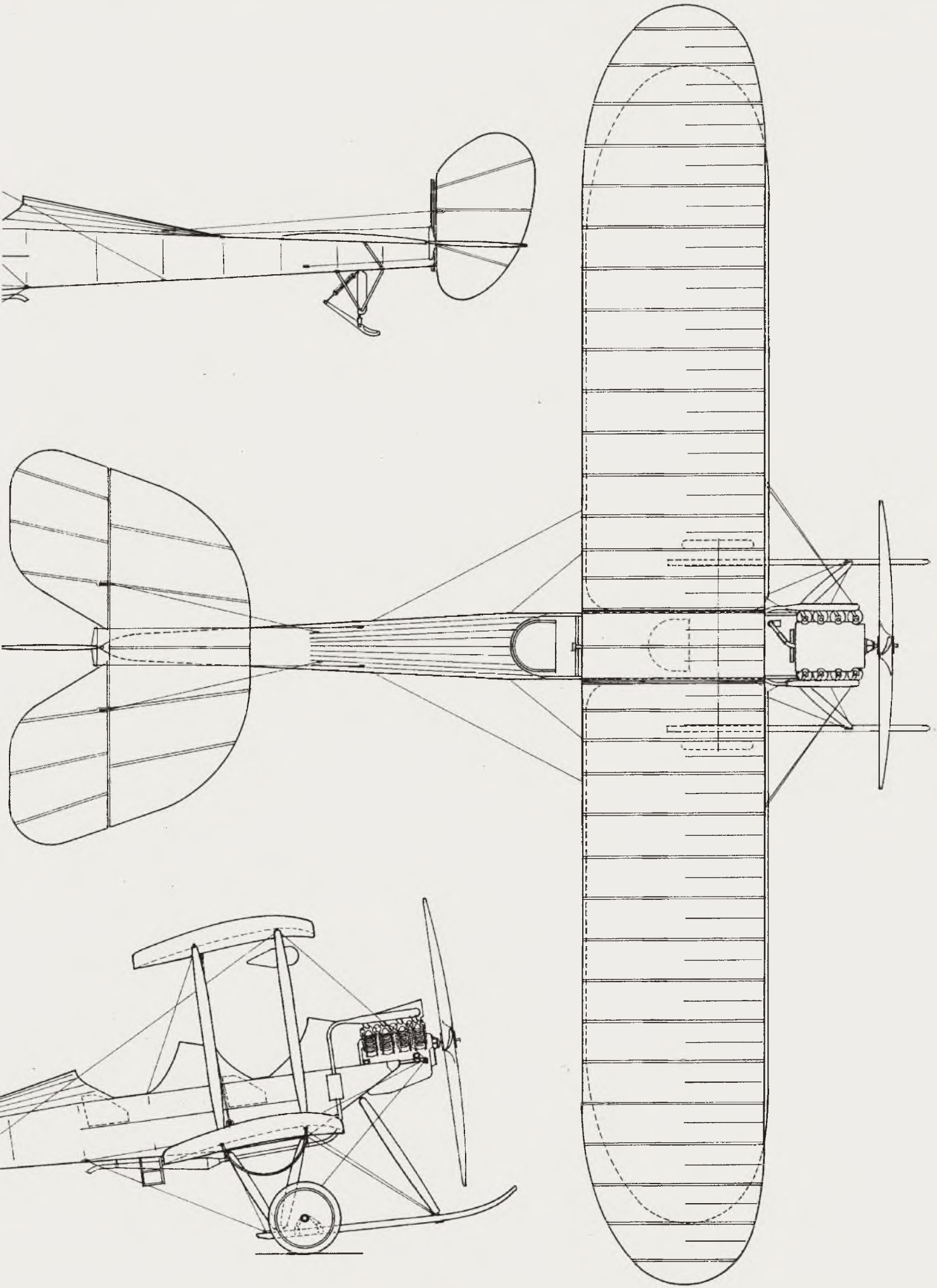
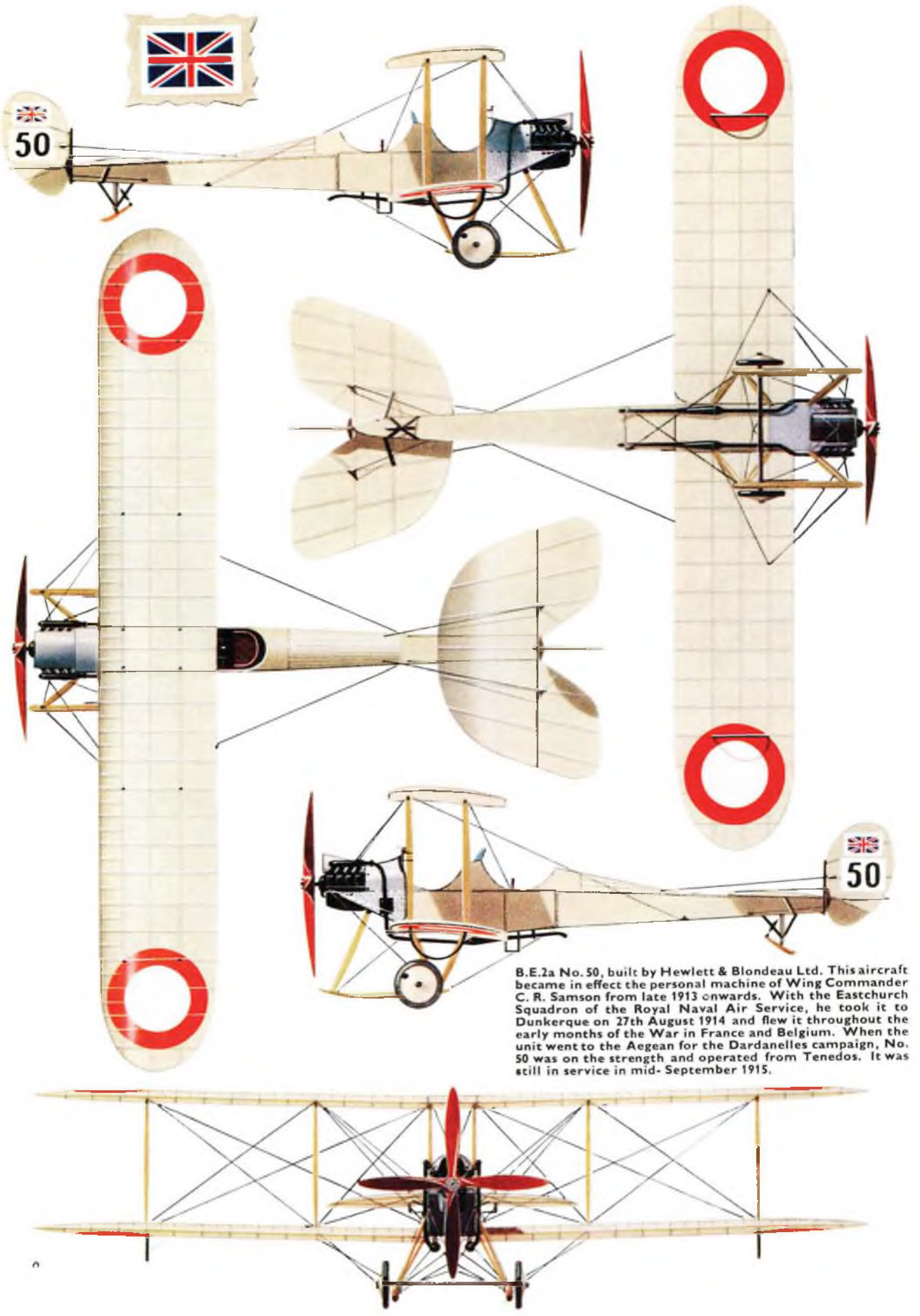
Length : 765 mm / 30.1 in.	ESC : 20A Brushless
Weight : 695 g / 24.5 oz	Motor : DST-1100
Propeller : 8x6(Two blade propeller)	Servo : 9g x 4
Recommended radio system : 4CH	

SCALE 1:40

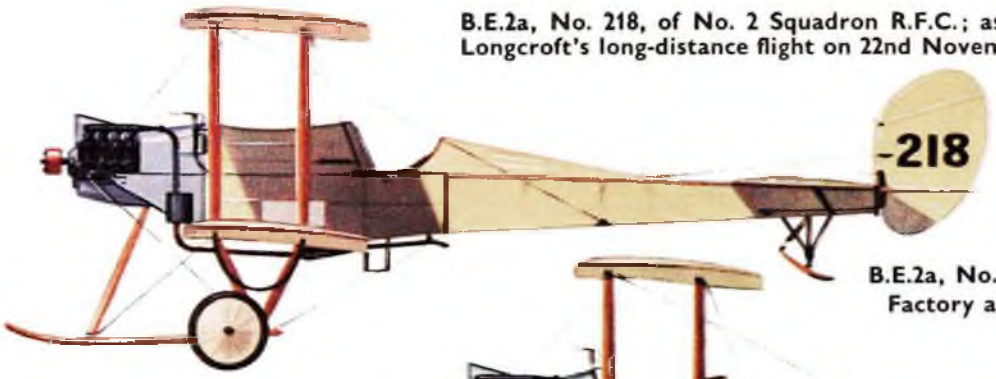
ROYAL AIRCRAFT FACTORY BE 2 & BE 2a



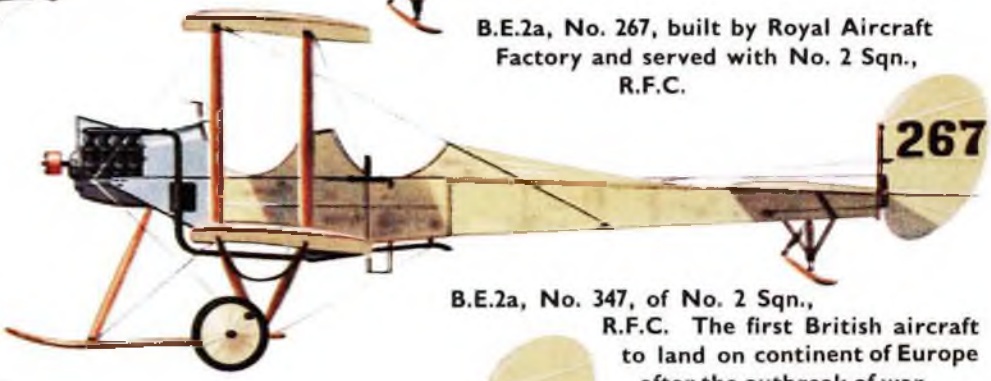




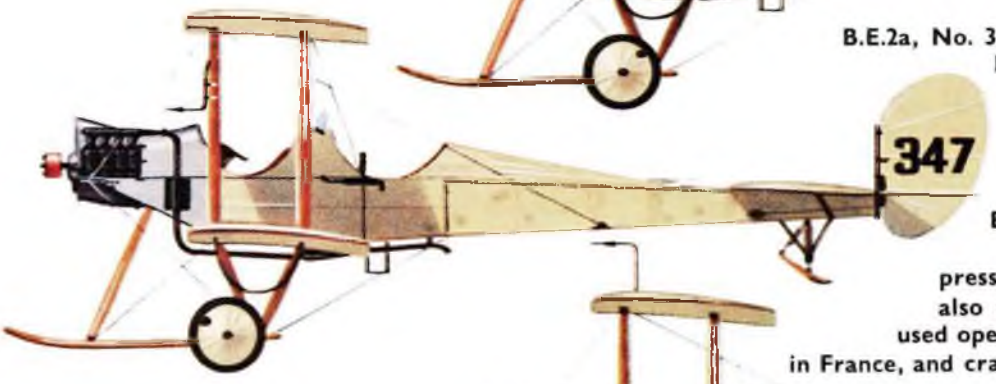
B.E.2a No. 50, built by Hewlett & Blondeau Ltd. This aircraft became in effect the personal machine of Wing Commander C. R. Samson from late 1913 onwards. With the Eastchurch Squadron of the Royal Naval Air Service, he took it to Dunkerque on 27th August 1914 and flew it throughout the early months of the War in France and Belgium. When the unit went to the Aegean for the Dardanelles campaign, No. 50 was on the strength and operated from Tenedos. It was still in service in mid-September 1915.



B.E.2a, No. 218, of No. 2 Squadron R.F.C.; as modified for Capt. C. A. H. Longcroft's long-distance flight on 22nd November 1913.

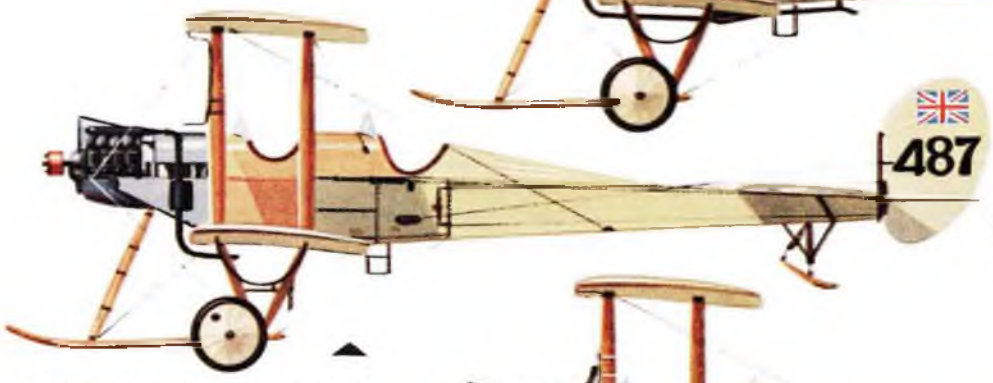


B.E.2a, No. 267, built by Royal Aircraft Factory and served with No. 2 Sqn., R.F.C.



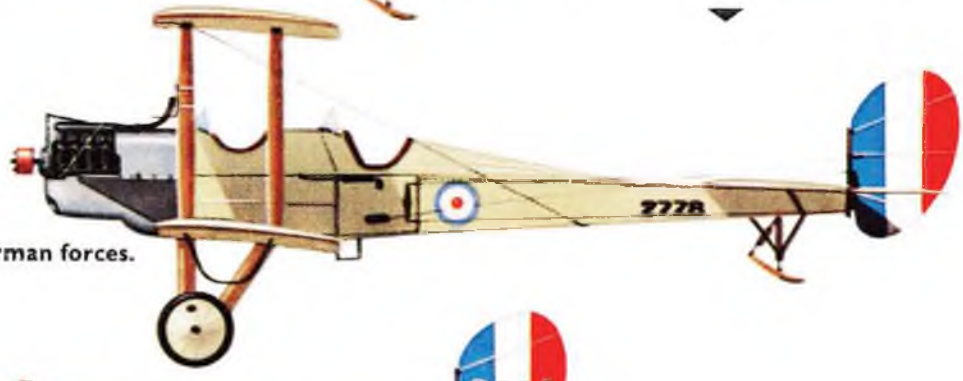
B.E.2a, No. 347, of No. 2 Sqn., R.F.C. The first British aircraft to land on continent of Europe after the outbreak of war, flown by Lt. H. D. Harvey-Kelly.

B.E.2a, No. 470, Central Flying School, Upavon, summer 1914. Note a.s.i. pressure head positioned above port wing; also rear cockpit windscreen. Subsequently used operationally by Nos. 6 and 9 Sqns., R.F.C. in France, and crashed 15th December 1914.



B.E.2b, No. 2778, served with unidentified training unit in United Kingdom, 1915. Note V-strut undercarriage, and cowled engine sump; engine cowling probably salvaged from a B.E.2c.

B.E.2b, No. 487; France, 1914. Note bomb rack between undercarriage V- struts. Aircraft subsequently captured intact by German forces.



B.E.2b, No. 2884, the first Whitehead-built B.E.2b; served with unidentified training unit in United Kingdom, 1915. Thought to have carried legend "HELENE" on starboard forward fuselage before delivery to Farnborough.

- MASTER MODELS
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- ELECTRIC
- SCALE INDOOR
- SCALE REVIEWS
- SCRATCH BUILD

SCALE FROM SCRATCH

WANT TO TAKE A STEP BEYOND KITS AND ARTFS? KEN SHEPPARD CONTINUES A SERIES TO ENCOURAGE OWN-DESIGN SCALE MODELS

Part 2: Decisions and compromise!

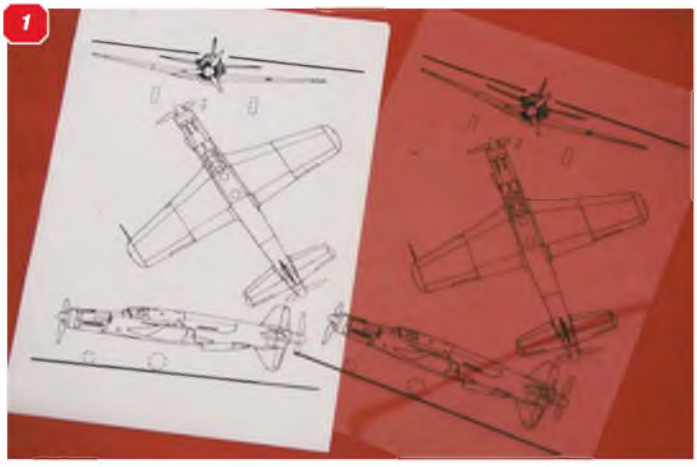
ABOVE: The Dornier Do335 Pfeil - the project prototype used in this series - unusual layout raises a few design 'opportunities' (Photo is of a Tamiya plastic kit - great for accurate detailing!).

MAIN IMAGE: The author's most successful 'odd' design to date, the Blohm und Voss Bv141B. Nine feet span, powered by a Zenoah 38. Flew like a dream, once the secrets of the lateral balance was worked out. This, in fact, was the author's second Bv and was scaled up 200% from the original .40 powered version. Met it's demise at a show in France - version three is 12ft span and LMA certified!

In the first part last month, I outlined how to get started - using a .40 - .60 size model as a 'first time' objective - by enlarging a three-view scale drawing into a model-size workable outline, on which we can start to base our design. Before we start designing the structure, however, we have to weigh up some basic decisions and maybe make a few compromises...

DECISIONS, DECISIONS...

Since writing the first part of this series, I have realised that it would be better to use a specific



1: The Do335 three-view showing the long nose, tall undercarriage, small tail and underslung fin - each a challenge in its own right! 2: Ways of getting round things! The author's B-24 Liberator had enlarged ailerons, flap servos under the inner nacelle rear fairing and outer wing panels retained by a screw through the dummy undercarriage wheel centre (fixed to the outer panel), into the ply u/c 'leg', fixed to the centre section. 3: The B-24 was a big cheat! The outer engines were dummies and the outer props were taken off for flying - you couldn't tell the difference! It doen't have to be complicated to look good! 4: Retracting undercarriage geometry can be used to get over scale position problems - angling the mounting blocks allows you to retain scale position, but incorporates forward rake - and ensures wheels fully retract inside the wing (legs on inside of wheels). Wing is the author's Spartan Executive .60 design.

subject aircraft - rather than generalise - and take you through the stages of designing an actual flying replica. Building the model will follow on from that and will be reported on in future issues, hopefully. My current project is a just bit outside my remit of a .40 - .60 sized model, but I think it would cover most design techniques that we are about to encounter with fixed wing, propeller-driven, model aircraft.

I prefer my designs to be a bit unusual and for a long time, my 'must-build-one-day' list has included the Dornier Do335 Pfeil (Arrow), the push-pull WW2 Luftwaffe twin WW2 fighter/night fighter. What has put me off this design in the past is the problem of positioning of the rear engine to give a suitable fore/aft (CG) balance point - on the full-size, the second engine was placed behind the pilot, driving the prop via an extension shaft.

LATERAL THINKING - FRIEND OF THE SCALE MODELLER!

My engineering skills are somewhat lacking and achieving a successful second IC motor installation would be highly unlikely. But then came along the 'out-runner' electric motor - and an idea! What about combining the noise of a four-stroke IC engine with the power of one of these high-torque EP motors? The batteries for the latter could be placed forward in the fuselage and the CG problem would be solved - and you would have the sound of the four-stroke, something that an all-electric model lacks!

SIZE MATTERS

As explained last month, the first step is to get an idea of the optimum size of model for the intended power available. My first concern was that the model would fit in the car a Volvo estate car! The Do335 fuselage is longer than most WW2 fighter aircraft, relative to its wingspan, so that practical consideration dictated the maximum size of the model - simple!

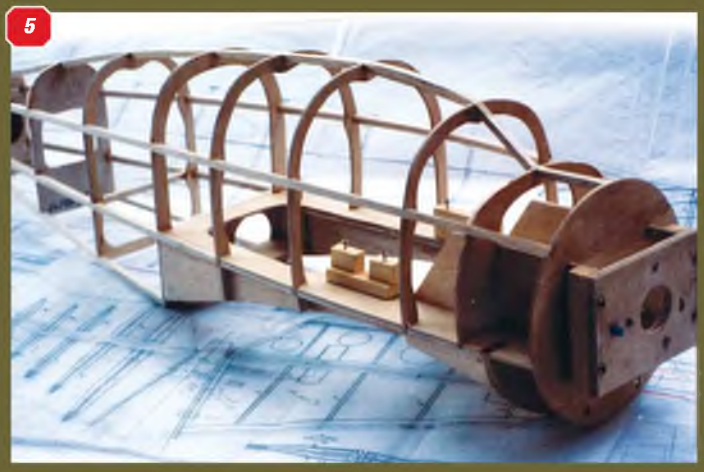
This maximum length of model gave a wing span/area a bit smaller than I wanted for the optimum wing loading, so I simply enlarged the wing by a couple of inches to about six feet, giving a wing area of approx. 820sq.in. Given the speed of the Do335 (very fast), a typical wing loading would be in the region of 20 - 25 oz/sq.ft, dictating a target weight of just under 10lb. Using the chart in Gordon Whitehead's book - *R/C Scale Aircraft Models For Everyday Flying* - as a guide (the chart was published in Part 1 last month), the power/weight ratio for this type of aircraft is 13oz/cc, so the combined size of the two motors needed would be equivalent to just over 12cc (.70 cu.in.).

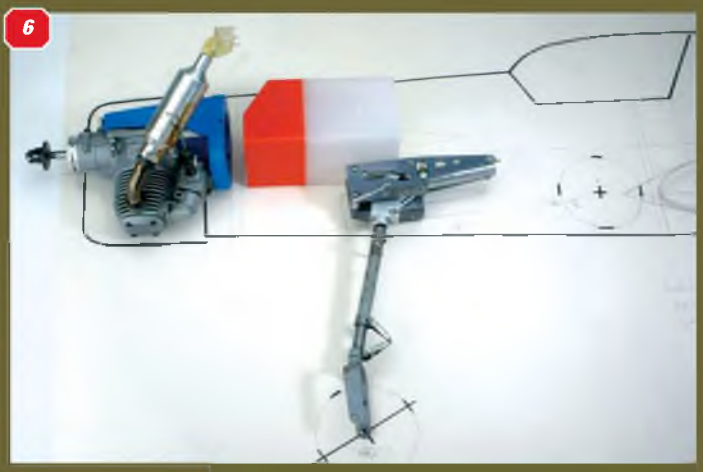
Another feature of the Do335 is the somewhat small diameter front cowl. In order to fit within a scale diameter (almost - more on this later) of six inches, I could use my RCV 58 four-stroke (.58cu.in.) which, due to its unique design has a very low height - perfect! Combined with the power of the RCV, I reckoned that a 30-sized outrunner right at the rear would provide more than enough power to make the Do335 really move. Two 4S lipo packs of 3000 - 4000mAh connected in parallel would give a reasonable duration if I conserved the rear revs during cruise, just banging on the revs for take-off and fast passes.

So, now I have a model of the right size and a suitable combined power plant option (I hope!) - where do we go from here? Back to our pencil outline...

CHECK AND COMPROMISE

We take a critical look at the outline. The accuracy of published three-views varies enormously - even view-to-view on the





5: It doesn't have to be boxy! The rear fuselage is just a means of keeping the tail linkedto the wing! The structure can be light, without losing valuable strength - the fuselage was planked with 1/16" sheet over this structure (Spartan Executive).
6: Lay the main units on the plan outline in position, to check what compromises have to be made - cowl diameter, tank position, undercarriage noseleg length and angle, etc.

same drawing - and even from side-to-side on a top view! So we need to check that the various parts of the outline match up (especially if we deliberately change size/scale of the surface areas!). Does the wing root chord on the fuselage side view measure exactly the same as the root chord in the plan view? If it does, all well and good, but if not, then amend the fuselage side view to match, by extending or shortening the section at the wing trailing edge. Again, compare different dimensions between the two views, making similar adjustments as necessary, so that you end up with all three outline views matching up.

Next, we consider the tail area. The larger the tail, the more the longitudinal stability damps out pitching (also reducing manoeuvrability). A long moment arm between the wing and the tail means more tail leverage so that a smaller tail could be equally practical. At this point, consider how you want to fly the model - it is scale after all, so super manoeuvrability may not be appropriate, whilst stable, predictable flight very much would be.

A rule of thumb is that trainer-type aircraft, bombers - and other slower types, need a tail area of about 20-25% of the wing area, whilst agile fighters can have tails with as little as 10% of wing area - I'm sure some of you can come up with exceptions to this - but as I say, it's rule of thumb only. However, it is generally accepted that most accurate scale tail areas tend to be on the small side of practical, for normal stable flying. Therefore to make our model more easily flyable, it's a good idea to increase the tail area a bit.

How much? Well, for a start, work out the wing area and tail area of your outlines and check the ratio. If it is already 20/25%, you can leave it as it is, if less than 20%, then for a .40/.60 sized model, you can increase your tail outline by 3/4" all round (probably increasing the tail area by about 25%) to get a better ratio. Nobody will notice, either!

On the Do335, the increased wing area (already calculated when sizing the model) is 820 sq.in. The scale tailplane area worked out to be 158sq.in, so the tail/wing area ratio was just over 19% - a bit on the small side. In addition, the wing/tail moment arm (for the moment, lets say the distance between wing TE and tail LE - more on that later) on the proposed Do335 model is only 15.75" (less than the root wing chord of 18.75"), so again, a larger tail would be beneficial. By adding an inch all round, the outline of the scale Do335 tail, the area is increased to 200sq.in. (a surface area increase of

THE MOST UNUSAL SCALE DESIGNS ATTEMPTED BY THE AUTHOR - THE ARUP FLYING WING FOR 40 POWER - MIXED SUCCESS, BUT PERSISTENCE PAID OFF IN THE END.

26%), giving a new tail/wing ratio of 24.4% - much more practical.

The same applies to the vertical tail surfaces (although not so critical) - if the fin/rudder looks a little small, enlarge it a bit! Keep the proportions the same and no-one will notice. In the case of the Do335, it has a fin/rudder both above and below the tail. The latter could create a problem on take off and landing, so I shortened it in height to allow the use of commercial u/c components (to be discussed later) and to provide adequate tail clearance (it'll have a built in skid, anyway). To make up for the loss of area, I increased the top fin area accordingly (only the most nerdy anoraak, clutching an accurate three-view, will ever be able to tell the difference). Did I say that I'm not a competition flier? Being a sports scale man, 100% accuracy isn't mandatory in my deliberations

OTHER COMPROMISES?

At the front end, nose sections can be lengthened or shortened a little to give a better weight distribution around the CG (minimising additional 'dead weight' ballast) and in the case of the Do335, the radial cowl diameter can be increased slightly to completely hide the RCV 58. These considerations will come up again when we start to draw in the various components (tank, undercarriage, radio, etc.). I didn't change the nose moment on the Do335 (it is very long) because I think that the weight of the outrunner motor and ESC will balance the weight of the RCV 58 right out in front (I can also move the battery flight pack quite a bit to compensate, if necessary).

On the wing plan, look at the size of the ailerons; on the full-size aircraft these are probably smaller than our scale models need, so look to increasing their area proportionally, too. Are you going to fit a single, centrally mounted servo, needing torque rods, or are you going to have a servo in each wing panel? The former method probably means full span strip ailerons which, whilst not scale, won't be too noticeable on a .40 size model, but more obvious on a larger model, or use Bowden cable and bellcranks and keep the ailerons to scale.

The use of individual servos for ailerons allows aileron differential to be adjusted easily with a computer Tx and makes it easier to build-in wing flaps, although I personally wouldn't recommend flaps on a .40 size model - or even .60 powered ones, it's been my experience that the benefits would be marginal, compared to the extra complexity of their installation and the probable weight increase due to the extra servos, leads and associated linkages.

The other major decision/compromise/cheat to be made at this stage is regarding the undercarriage - is it going to be fixed, or retracting? Naturally, if the full-size gear was fixed - no problem, but if

Certainly a competitor for the author's 'most unusual' scale design, the all-electric Blohm und Voss (again) P170 fast interceptor model. Still work in progress taming the beast - it flies, but not comfortably, still experimenting with the motor differential control on the tip motors - a stronger undercarriage needed, too!

retracting, you have to decide now. Personally, I try to copy the full-size, as nothing looks more 'toy'-like than a WW2 fighter being thrown around the sky with the landing gear hanging down - awful!

Practically, however, as this is your first 'own design', fixed undercarriage may be the best way to go (or choose a prototype with fixed gear, to begin with). Position of the undercarriage is however, all-important. To be practical, the u/c axles must be perpendicular to the fuselage centre line to allow straight tracking, raked forward in front of the CG (on a tail dragger) to prevent nosing over, and long enough to keep the propeller clear of the ground when the tail comes up during the take-off run. For a tricycle undercarriage, the main legs have to be a bit behind the CG, to stop it from sitting on its tail.

In the case of the Do335, the tricycle nose leg is very long and raked forward. Now I happen to have a *Robart* noseleg that I used on the Gold Edition *Top Flite* P-39 Airacobra some time ago, which fits the bill - almost! To get it into roughly the same position and for the scale-sized wheel to retract completely into the fuselage, meant reducing the ground clearance by 1/2" - not a problem (except for the lower fin/rudder already mentioned), as the flying prop will be a smaller diameter than the full-size prop scaled down. Reducing the length of the main legs by the same amount keeps the 'sit' of the aircraft on the ground the same - and the retract mechanism doesn't have to work so hard, lifting the shorter gear!

Throughout this second part, I have referred to the CG (centre of gravity). The single most important calculation you have to make at this stage, right now, is to work out where the final position of the CG must be on the model before you attempt to fly it. A CG that is a little bit too far forward (nose heavy) is not too bad, as it will make the pitch control response a bit less responsive - a CG that is a little bit too far back (tail heavy) could well turn out to be catastrophic - and give your pride a very short life! Next month, I'll show you how to calculate it exactly, rather than using the often all too fatal 'guesstimation'.

MANDATORY READING

As mentioned last month, get hold of a copy of Gordon Whitehead's book *'Radio Control Scale Aircraft Models For Everyday Flying'* and read it from cover to cover - it really is the 'bible' for practical scale model design. It's out of print, I know, but try and find a copy. ■

NEXT MONTH...

Calculation of centre of gravity, finalising u/c position, choice of wing section and - starting the detail drawing of the D0335 plans...

HORIZON HOBBY PIPER PA 20 PACER

A 51" (1295mm) wingspan bundle of weekend club-field flying fun

Right from the launch of Piper Aircraft Inc. back in 1927, the name Piper has been synonymous with the design and manufacture of small aircraft, mostly for private and leisure aviation. Between then and closure in 2009, the company produced 144,000 aircraft in 160 models. Of these, by far the most numerously produced was the J-3 Cub and its military variant the L-4, of which 19,888 were made starting in 1935, through to 1947.

Post-WW2, Piper sought to extend the longevity of this (very) basic aircraft with revisions to the simple welded tube, fabric covered airframe concept with development types that included the PA 18 Super Cub.

That was followed by their PA20 Pacer, of which 1,120 were built, leading quickly to the tricycle undercarriage Tripacer - unkindly dubbed the 'Milking Stool' due to the stalky appearance on its tall three-pin trike undercarriage layout.

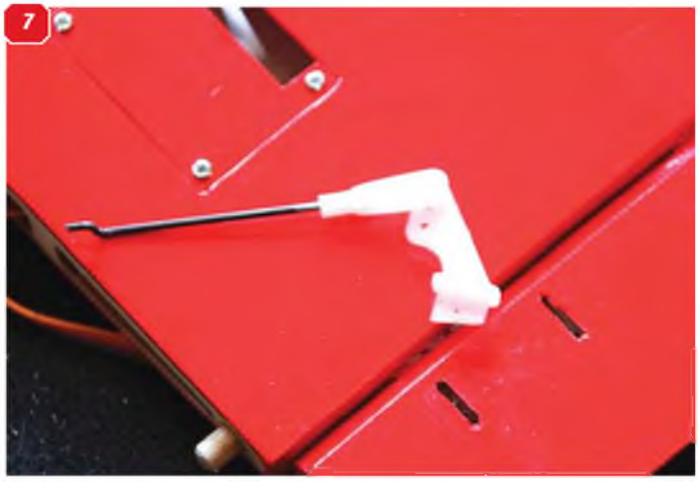
The PA20 and its trike layout follow-on were among the last of the welded tube/fabric covered Pipers, before the early 1960s advent of the pressed metal skin 'spam cans' with stamped surface indentations (shades of the Junkers corrugations of a much earlier era) that imparted airframe stiffness.

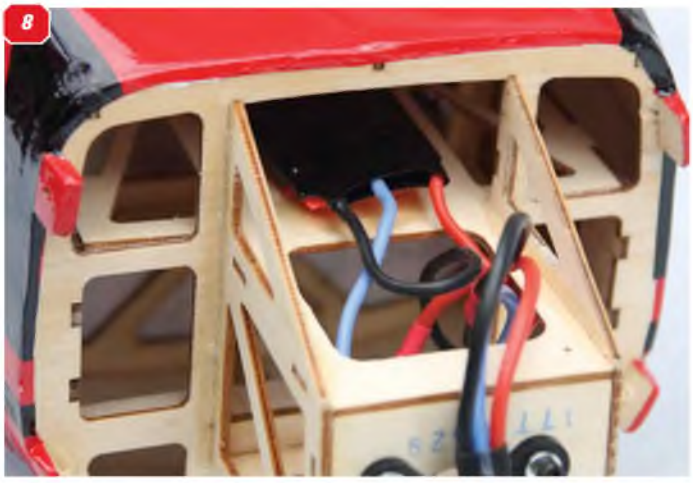
Thus, the Piper Pacer has an 'individuality' and style appeal that makes it an attractive subject for scale modelling.

THE KIT

Horizon Hobby's approach to almost-ready-to-fly scale models is one that seems to find new levels of comprehensiveness with each new introduction - there always seem to be some additional nice little touches that minimise the route to completion - and the PA20 Pacer is another example of this progressive trend. The model requires a minimum four-function radio control system and either five or six functions if the in-built wing flap option is applied (five if the two wing-panel mounted flap servos are ganged via Y-lead from the flap control function, or six if the flap control is

1 & 2: Plywood axle supports, stacked together to provide a locator for the wheel collet, inside with glass fibre moulded wheel spat.
3, 4 & 5: The adjustable nylon end-tags for the wing struts can be distorted with a pair of pliers to lay flush with the wing surface.





6: Two types of flap servo covers are supplied. For non-flap configuration, there is a fixed surface tag that connects the fixed link to the flap horn and locks the flap at neutral. 7: Each flap has two positions for the flap horn. If the two flap servos are Y-lead linked, these will drive in the same direction of a given command; so one of the servos needs to be flipped over to provide the same drive movement on opposite wing panel flaps. Dual control horn slots accommodate this. 8: The E-flite 40 amp ESC mounts on the fuselage installation tray ahead of the Lipo power pack. 9: Servo extension leads for the flap and aileron servos can be colour coded for identification.

ganged to one of the auxiliary control functions.

Unsurprisingly, the kit is tailored to the use of Horizon Hobby products for the R/C system, power train and other necessary accessories needed to complete the model ready for flight, but the servo installation trays supplied will accommodate a range of alternative-range servos. Recommended electric motor is the E-flite Power 10, 1100Kv and the blind mounting nuts on the firewall are spaced to mount this motor. It's also worth noting that this motor installation sets the glass fibre moulded cowl exactly right for the recommended E-flite 1.75" (44mm) dia. metal spinner which, when mounted, sets the spinner backplate at the exact clearance from the cowl front. It's a very nice spinner, but anything else does not easily suit so make sure you can get hold of the right one when you buy the kit.

The 48-page fully pictorial assembly manual provided covers all stages in a completely comprehensive manner and there is virtually nothing we can add here beyond just a few pointers; for example, the wing struts are secured to the fuselage via adjustable nylon ends. These don't sit flush with the wing undersurfaces without distorting the end-tags with a pair of pliers (see picture). Servo extension leads are required to link the wing mounted aileron and flap servos and it is worth colour coding these - we used red and while Humbrol enamel on the connectors.

TO FLAP OR NOT?

Whether you use them or not, the flaps are there and, as with the ailerons, ready hinged as the kit comes in the

E-flite Power 10 motor in place on the 'firewall'. The retaining blind nuts are spaced for the cruciform mounting bracket supplied with this motor.

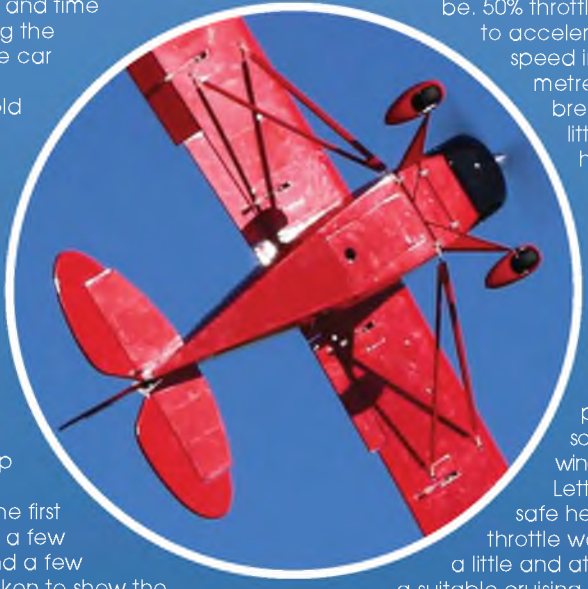
box - you just have to apply thin-type cyano to secure the hinges. To accommodate preferences (flap or not) the kit includes two types or cover for the flap servo hatches on the wing panel undersurfaces. For flap servo installation, the covers each have a slot for the flap servo drive arm but also, if a non-flap set up is preferred, there are two alternative hatches which have fixed, non-moveable surface tags that link to the flap control horn and lock the flaps at neutral.

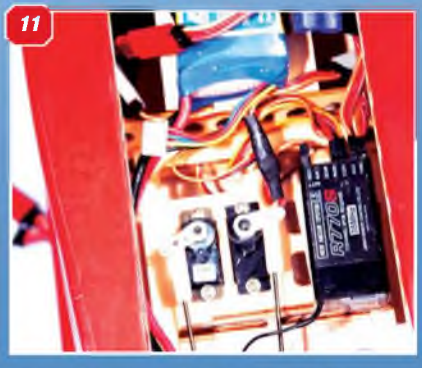
Assuming the necessary fifth and sixth control functions are available, the flap control function is a bit more fun to play with. Properly applied, flaps do not just create lift - they also create drag, to produce a steeper rate of decent during landing approach - making 'spot' landings more accurately judged.

AIRBOURNE

The 51" span of the Pacer means that it can be transported easily in one piece to the field, which is a boon, as the winter creeps in and time spent assembling the model out of the car needs to be minimised! In cold weather, also warming the flight batteries on the way to the field helps with performance, so two 3S x 1800mAh packs were placed on the dash where the heater gave these a warm-up on the way.

Before fitting the first of the batteries, a few static photos and a few minutes were taken to show the model off to the guys, who, it has to be said, were very interested in the pretty lines of the Pacer - it certainly makes a change from the all-yellow Cubs seem to be popular in any club.





10: Vac-moulded dummy rear seat backs glue in place best if balsa in-fillers are first glued into the bottoms of the mouldings. 11: Control system installation in the fuselage. 'Velcro' type retainer straps are supplied for the 1800 mAh Lipo pack recommended.

Fitting the battery and doing the usual pre-flight checks power generated at full throttle from the motor/prop/battery combination was impressive and it was clear that, being so light, full power would probably not really be needed unless for vertical climbs - and so it proved to be. 50% throttle was enough to accelerate up to flying speed in just a few metres into a light breeze, with just a little up elevator held in to keep her from nosing over, a bit of right rudder to keep the Pacer straight and we were up and off - the climb out looking particularly scale-like, for a high wing cabin type. Letting it climb to a safe height, the throttle was eased back a little and at levelling off to a suitable cruising speed, the control response was checked out. Control throws had been established on the low settings recommended, with 50% more on high rate - unfortunately, high rates had been unintentionally switched in and this made the Pacer definitely twitchy in both pitch and roll but low rates, quickly switched in brought a far more stable and comfortable feel.

Response was now crisp and positive, without being overly damped. In fact, once opened up, the Pacer PA-20 10e is just a joy to sport fly, so that loops, rolls, stall turns, split-S, inverted and so on can be executed with precision. That 'period' colour scheme really helps visibility and even with grey skies which tends to make most models dark and less easy to see, the red finish stood out against the gloom very well. 'Scale' flight speed is less easy to achieve with smaller models but the Pacer certainly seemed to produce a convincing flight speed at a little over 50% throttle. The final bonus was that the E-flite 1800mAh battery (not included) gives a great flight-time duration.

The stall was benign and the flaps brought on no real change in pitch, but certainly slowed the model down. First impressions? Terrific! The little Pacer PA-20 10e looked a picture in the air - and received quite a few comments from the usual spectators, in between flights, saying just how good the little Pacer 10 looked in the air.

THE VERDICT

In every way, a very nice little model for casual club-field flying. Just one question Mr. Horizon Hobby ... how about a bigger one, twice the size, please?

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REMEMBER ...
YOUR ARE DEALING HERE WITH 240 VOLT A.C. MAINS ELECTRICITY.
BE ABSOLUTELY SURE YOU WORK FOLLOWS GOOD, SAFE ELECTRIC PRACTICE.

BE SURE - BE SAFE

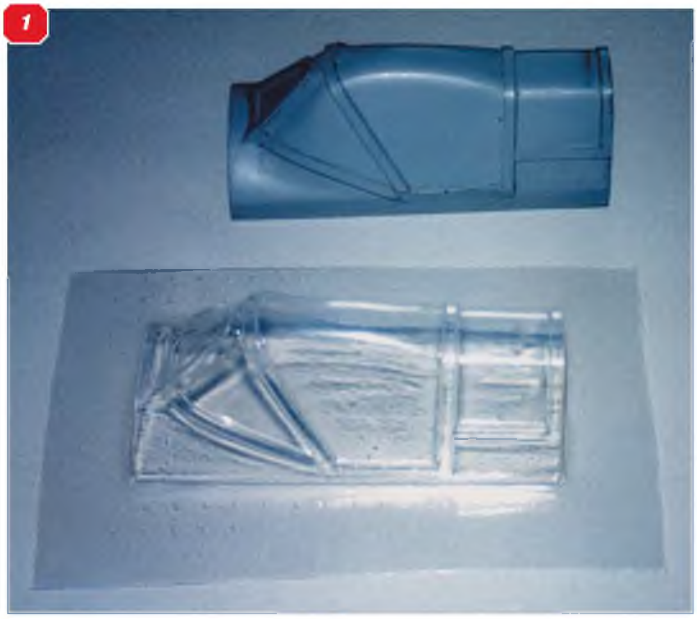
COCKPIT CANOPIES AND THE LIKE ARE THE OBVIOUS CANDIDATES - BUT THERE ARE MANY, MANY SURFACE DETAILS THAT COMPLETE REALISM IN A SCALE MODEL AND WHICH CAN BE CREATED WITH THE VAC-FORM PROCESS. DENNIS PITCHER SHOWS HOW TO MAKE THE NECESSARY UNIT

Having been thinking about it for some time (well, haven't we all?), I finally decided - I would make a vac-forming machine.

I knew the principles involved - a heat source to soften (almost melt) the plastic, something to hold the sheet plastic to save fingers from being burned, a box with holes in the top through which air could be sucked and something to provide the suck - no problem.

I started by finding out from my local polystyrene stockist, that a standard size sheet of polystyrene was 610mm x 457mm and could be purchased in 0.5mm, 1.0mm thicknesses, these being the most useful size, at a cost of about a £1 a sheet. As each sheet was going to be cut into four to be used on the forming tool (305 x 228.5mm), this meant that each item formed would cost about 25p. Could I afford it I thought?

Next, the heat source. At first, all I was offered were circular electric kettle elements, but they weren't quite right. I then remembered that a TEFAL mini cooker had been sitting in my loft for years, never having been used, so I extracted the heating element from that. It turned out to be exactly the right size and power - 700watts, measuring 236 x 143mm.



1: The canopy and plug that Denis made for his Spitfire. 2: The cowl is a three piece unit - two sides and the bottom. 3: Denis's system as described here - an old Hoover provides the suck! Note the reminders on the sides! 4: The base unit, showing the holes drilled at 1/2" spacing.

The sucker unit came in the form of an old vacuum cleaner, the attachments of which had long since given up, but which still had plenty of suck. Actually, any cleaner with a hose will do, as you will see.

I started off with a large cleaner which had a tube that pushed straight into the base. When first tested, the suction was such that it was quite hard to pull off a piece of card that I had placed over the holes in the top. I then tried a smaller cleaner and found that the suction was the same. This had a curved tube, so I fixed a length of rubber tubing over the hole in the base and slipped it in to that. It does not have to be a sealed fit.

ASSEMBLY...

Not knowing, when I started, if the end product was going to work, I simply used items that were to hand. Using the sizes and materials given here in the materials required list, you will end up with something that works. Should you vary some of it to suit what you have, bare in mind the basic requirements.

I first made the carrier base (the part that holds the plastic) from a length of Deal. Rebate the wood in one length first. I mitred the corners, glued and re-enforced them with 50mm flat corner plates. Make sure the polystyrene sheet fits easily before final assembly.

The lid (also from deal) is made slightly narrower, to allow it to open up between the corner supports, and is hinged as shown. Screw a simple wooden catch to the carrier base to hold the lid down tight.

I used cyano to glue lengths of rubber draught excluder to the underside, in line with the rebate, to grip the plastic. I covered the top and inside edges with strips of thin metal sheet, cut from a biscuit tin, to prevent scorching.

Next came the base frame, which was made from 12mm MDF. See diagrams for sizes, etc. I did not use any glue, just screws and pins. Do counter drill first to prevent splitting.

The depth of the base frame depends on the size of the hose you intend to use, but 64mm should be adequate. Cut a hole in one end to suit your hose.

With hardboard pinned to the bottom, cut the top to size, also from 12mm MDF, then place the carrier base over it. Mark round the inside of the base onto the top, and draw a grid of 12mm squares. Drill 2mm holes in each corner of the grid. Finally, drill three holes along each edge, counter drill and screw down onto the frame.

The heat box came next and was made up as shown. The sides are cut to allow the bearers to screw up underneath. Both pieces of 3mm ply are sandwiched between the two bottom bearers and the small side blocks. They provide a barrier between fingers and electrical connections.

Drill the inner piece to take the ends of the element and bolt it in place. Drill a hole in the outer one for the mains cable and connect using spade connectors. A separate in-line switch was then fitted as shown on the photograph.

I also removed the top plate from the cooker, but as its function was to act as a grill, a large amount of heat came up from it. I covered the top with hardboard that had a number of large holes cut in it to allow the heat to escape. I then lined it with tinfoil. If you are worried about burning your fingers on the element underneath, you might consider fitting the grill used in the instant BBQs. So far I haven't had a problem!

With the box duly made, I clamped it, the carrier and the base together, and drilled 1/4" (6mm) holes through each to take the support rods. I found the height of these to be quite critical. I happened to have two lengths of 6mm steel rod which, when cut in half measured 355mm long, so this became the height - all very scientific. I suppose that wooden dowels would do as well.

With the holes drilled, insert the rods and screw the grooved blocks over them into the base frame. An easy, but not sloppy, fit is required.

Separate the units and slightly enlarge the holes in the carrier to allow easy movement up and down the rods. The

5 & 6: The two sides of the top heater unit. Note the in-line lighting switch. 7 & 8: An open and shut case! The unit that holds the plastic sheet, showing the draught excluder strip that grips the plastic.

holes in the heat box were covered over on top with scrap ply corner blocks to stop the rods from going right through.

Lastly make up the two wooden clips that hold the carrier in place and hinge to the ends of the heat box. This should be the easiest part to do, but for some reason I had to have several goes at it.

ALL SYSTEMS GO...

With the unit completed, I put the vacuum cleaner in position, switched on the heating element and waited for it to get hot. I then lifted the carrier lid, placed the polystyrene in place, replaced the lid, turned the catch to hold it tight, lifted it up and clipped it in place.

It's at this point that you place the plug (the thing you intend to make your canopy from) onto the base. It does help to glue a couple of scrap bits of 1/16" balsa sheet under the plug to allow the air to be drawn under it. The plastic began to sag and then went back up - normal procedure. Then it began to sag again and at this point, this is where experience tells (at first it really is trial and error, but you soon get the hang of it).

Having decided the time was right, I switched on the cleaner, unclipped the carrier and brought it swiftly down over the plug.

Switching off the heat, I unclipped the lid and pulled out the plastic, complete with the plug. It was still quite warm at this stage, so I held it at the reverse end of the vac and let the cold air play over it. Even so it took some hefty bangs on the

bench to get it out. Again, this is quite normal, even though I had given it a few coats of furniture polish spray as a releasing agent. The vac was then switched off.

The result was 99% perfect first time. The only thing not quite right was that it had not pulled tight enough to the bottom edges of the plug.

At this stage I had only drilled holes in the base at 1" intervals, so decided to drill more at 1/2" spacing, just around the edges of the base of the plug. That done the heater was switched back on, a fresh piece of plastic put in, etc. This time the end result was worse than the first!

BACK TO THE DRAWING BOARD!

I switched everything off, dismantled the unit and drilled holes all over the base at 1/2" intervals. I switched the vac on to suck out the bits that had dropped through and then took the end out of the box to clean the top.

With the unit reassembled, I went through the starting procedure again. With the heater on, the plug and the vac in place, I switched on the vac and pulled down the carrier. Not only did I get a perfect canopy this time, even the holes in the base showed up through the spare plastic - a complete success. Allowing the element to get really hot seems to be the secret.

With regard to the plug, it was a cockpit canopy that I had made for a Spitfire that I had designed (with a little help from Mr.Mitchell of course) It measures 180L x 80W x 75mmH (7" x 3 1/4" x 3") and was made of laminations of MDF. Unlike wood, it's possible to get a very smooth finish with no grain showing. I sprayed it with numerous coats of grey car body primer and then, when completely cured, I sprayed it with furniture polish. This was buffed up with a soft cloth with another application just before use.

It has been suggested that just applying sanding sealer might do as well, but I have yet to try it. It would, I am sure, still need a release agent.

By the way - the words ` VAC ON - PLUG ON' on the photo are there to remind me to do just that - put the plug onto the table and switch on the vac. It's possible that you will be so busy concentrating on the plastic, that it's easy to forget one - or even both.

FINALLY...

Since making that first cockpit, I have made a further three plugs for the engine cowl - two sides and a bottom, which has produced a very effective looking front end. Well, I don't think I've missed anything out - it really isn't all that difficult or costly. If you had to buy everything required, I think it

would come to about £40 - about £18 of that being the heating element. I was lucky - I only had to buy the four corner plates. Anyway, it could prove to be a good club investment. ■

MATERIALS REQUIRED

All MDF parts from one sheet, 610mm x 61O x I 2mm.
All dimensions in millimeters.

BASE
1 off 400 x 267 hardboard bottom.
2 off 400 x 65 MDF sides
2 off 242 x 65 MDF ends
1 off 400 x 267 x MW top.
4 off 65 x 45 x 2O deal grooved blocks

CARRIER BASE
1 off 1525 x 57 x 2mm deal

CARRIER LID
1 off 139 x 35 x 12mm deal

CATCH
1 off 32 x I 9 x I6mm deal

CORNER PLATES
4 off 50mm plated metal

RUBBER SEAL
1127mm draught excluder

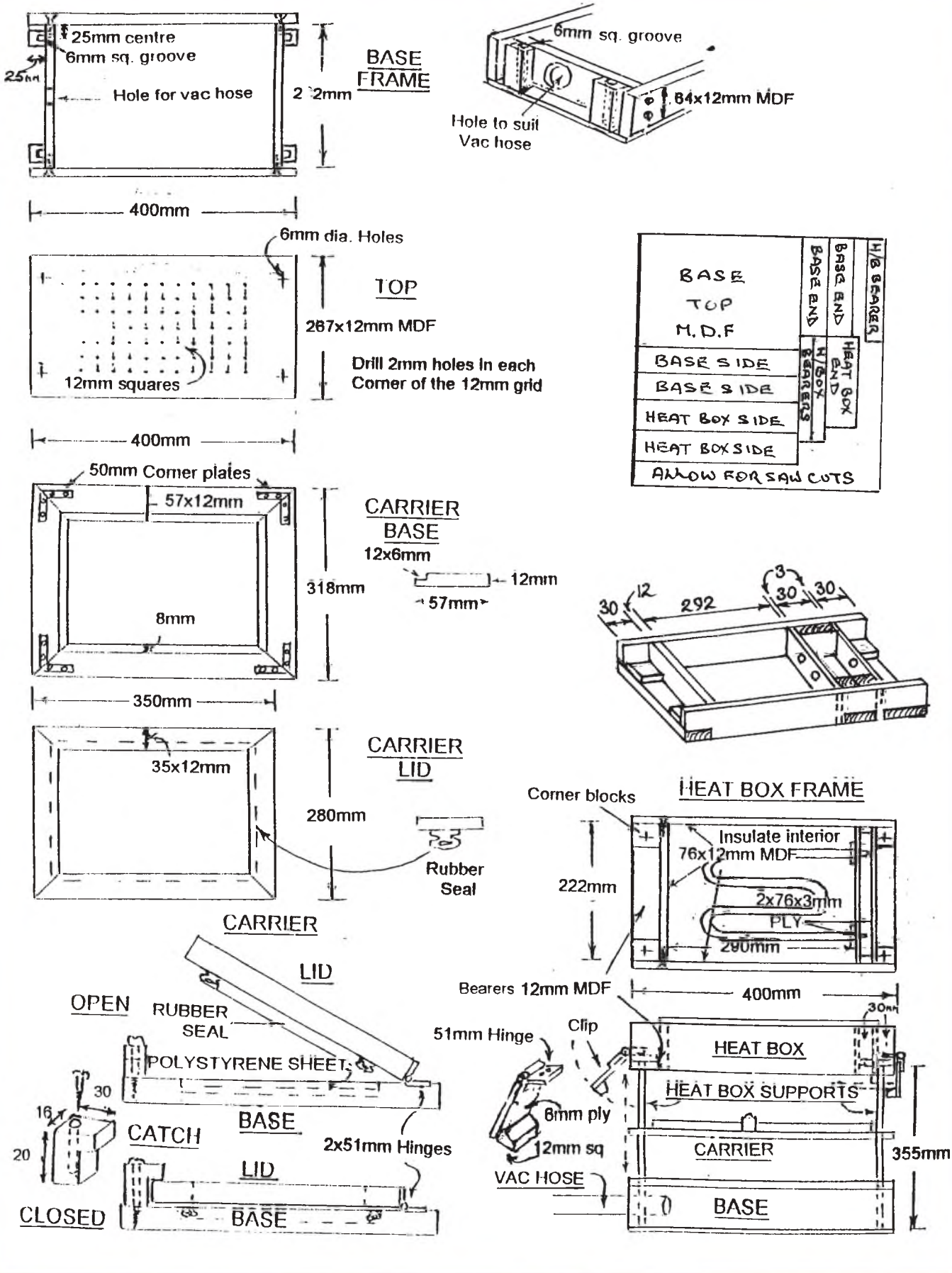
HEAT BOX
1 off 320 x 248 Hardboard
2 off 400 x 76 MDF sides
1 off 222 x 76 MDF end
2 off 222 x 76 x 3mm ply ends
2 off 248 x 30 x I 2mm MW bearers
1 off 248 x 45 x I 2mm MW Bearer

CLIPS
2 off 51 x 51 x 5mm ply
2 off 50 x I 2mm sq. deal
2 pff 50mm hinges
4 off 65 x 45 corner blocks from scrap
4 x 355 x 6mm.dia. rod

HEATING ELEMENT
From Tefal Compact

COOKER
Ref. 392 4CO (700watts) or similar

SKETCH-PAGE


25mm centre
6mm sq. groove
25mm
Hole for vac hose
BASE FRAME
2 2mm
400mm
6mm sq. groove
Hole to suit Vac hose
64x12mm MDF
6mm dia. Holes
TOP
267x12mm MDF
12mm squares
Drill 2mm holes in each Corner of the 12mm grid
400mm
BASE TOP M.D.F
BASE END
BASE END
H/B BEARER
HEAT BOX END
H/BOX BEARERS
BASE SIDE
BASE SIDE
HEAT BOX SIDE
HEAT BOX SIDE
ALLOW FOR SAW CUTS
50mm Corner plates
57x12mm
8mm
CARRIER BASE
12x6mm
12mm
57mm
318mm
350mm
30
12
292
3
30
30
CARRIER LID
35x12mm
280mm
Rubber Seal
HEAT BOX FRAME
Corner blocks
Insulate interior
76x12mm MDF
222mm
2x76x3mm PLY
290mm
Bearers 12mm MDF
400mm
30mm
51mm Hinge
Clip
HEAT BOX
HEAT BOX SUPPORTS
6mm ply
12mm sq
CARRIER
355mm
VAC HOSE
BASE
CARRIER LID
OPEN
RUBBER SEAL
POLYSTYRENE SHEET
30
16
20
CATCH
BASE
2x51mm Hinges
LID
CLOSED
BASE

ONE MAN'S MORANE

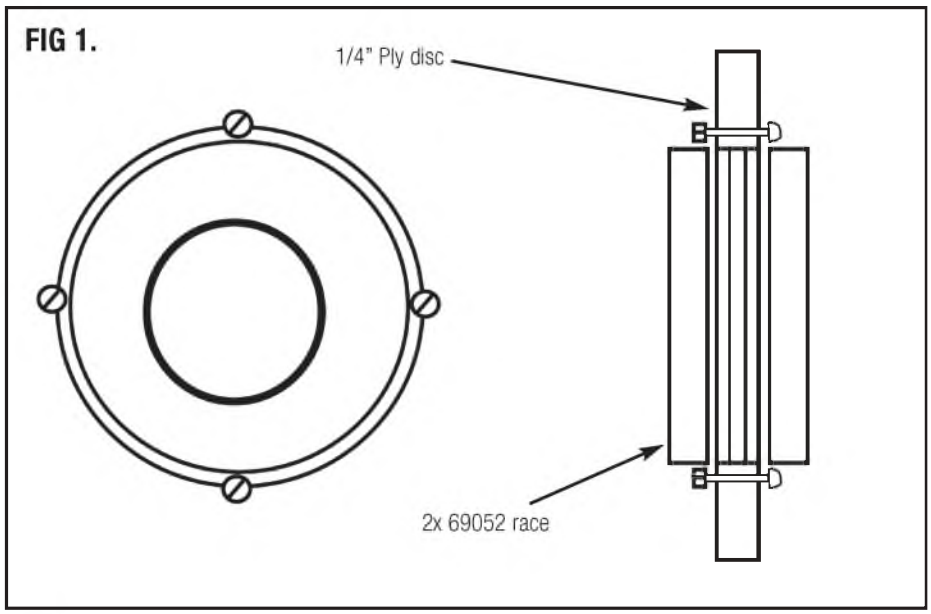
PART 3: John Marriage concludes his description of this 1/3rd scale beauty with notes on dummy engine and rigging

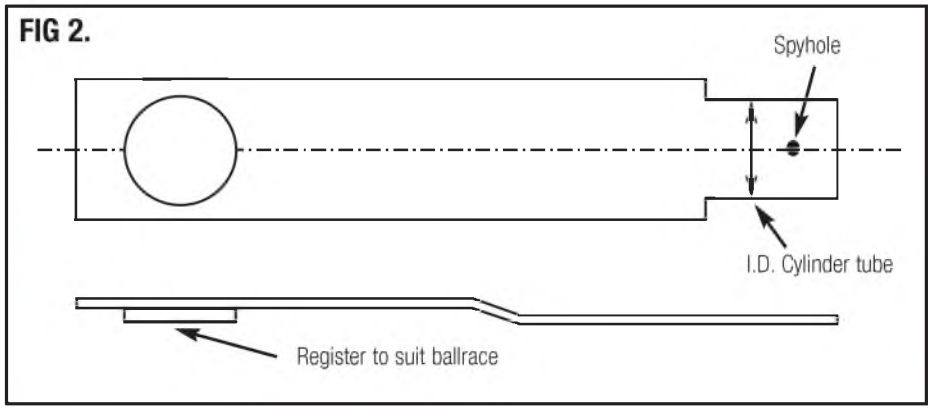
Dummy engine

Although this is a sport-scale model, I hope that overall realism makes up for the departures from true scale. One area that I was keen to show was a rotary engine that actually rotated; in my view, too many true scale models spoil the illusion of their rotaries as soon as the prop rotates, leaving the cylinders static. Of course, with a huge spinner hiding a high percentage of the engine, this subject was relatively easy, but it is necessary to produce a reasonably close impression of nine 80hp Le Rhone cylinder heads and their top few fins. It was obvious that the dummy engine would have to withstand considerable centrifugal force, although I had no idea just how fast it would rotate (come to think of it, I still don't, as it is impossible to 'clock' whilst the propeller is rotating).

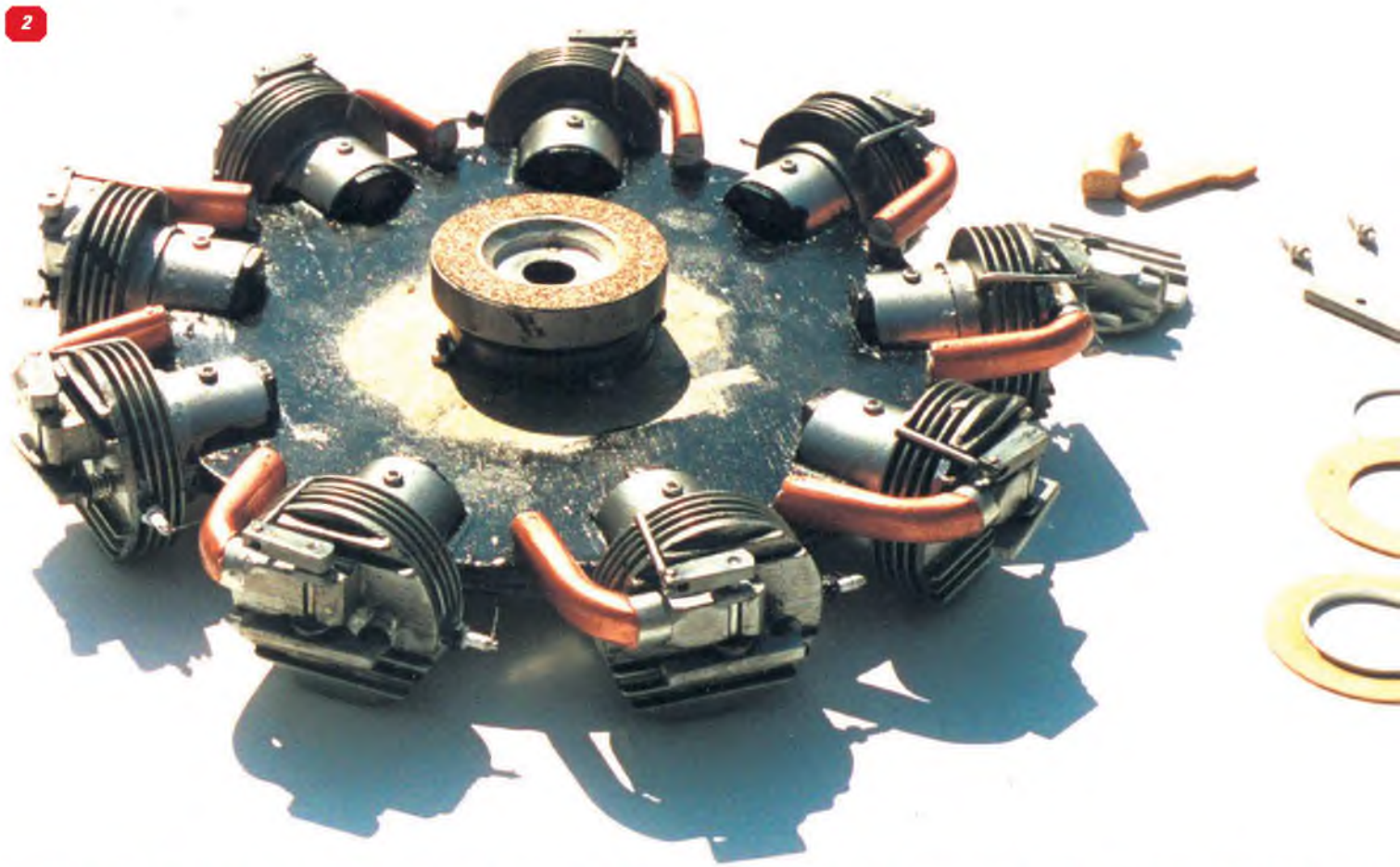
The real engine that I used was a 28cc *'Champion'*. This is a converted McCulloch strimmer engine which the distributor supplied as a 'part modified kit'. Unfortunately, this has long since ceased to be available, but there are many more modern substitute options possible.

Back to the dummy. First mark out a disc





1: Cylinder details 'in the raw'. 2: Dummy engine, assembled to prop driver. Note coarse Permagrit ring epoxied to driver to add some 'bite'.



7

on 1/4" good quality birch ply, 1" smaller than the spinner diameter. Then mark out radial lines at 40 degree intervals for our nine cylinders. Turn the outside diameter, and, while still mounted in the lathe, bore the centre out 1.5/8" (42.3mm) to an accurate fit in the ballraces. Now drizzle some cyano around the bore and allow it to harden, carefully removing any raised grain to restore the accurate fit.

Next, drill four 2.9mm holes as close to the snap ring as possible. Harden the holes as above, then drive four 3mm pan-head screws, hard up against both rings. Add washers and lock nuts, and fit the assembly to the prop driver before fully tightening. The disc should revolve freely and true **(see Fig. 1)**.

Now, find some appropriate tubing for the cylinders. You need to find two thin-walled tubes about 1" diameter, but an accurate fit on each other. Now make up a cutting jig, for slotting the cylinders into the disc, as shown in **Fig. 2**. To use, simply engage the spigot in the bearing, then, using the spy hole, line up with each centre line in turn. Use a hacksaw or other fine blade as close a possible to the wall thickness of your tube, err on the tight side, then ease the slots out with a thin *Permagrit* file (or similar). Work carefully to ensure that each pair of slots is an accurate, close fit on your tube.

Make up your cylinder details; I cut fins

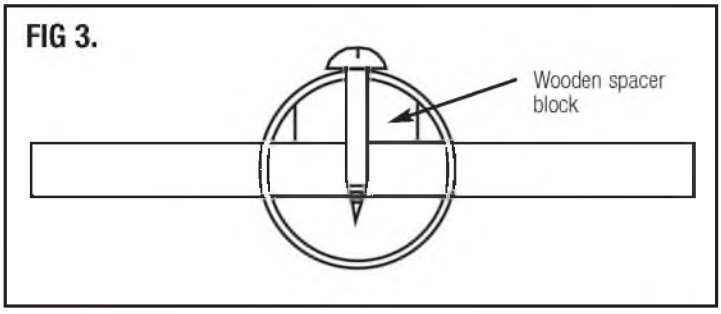
3

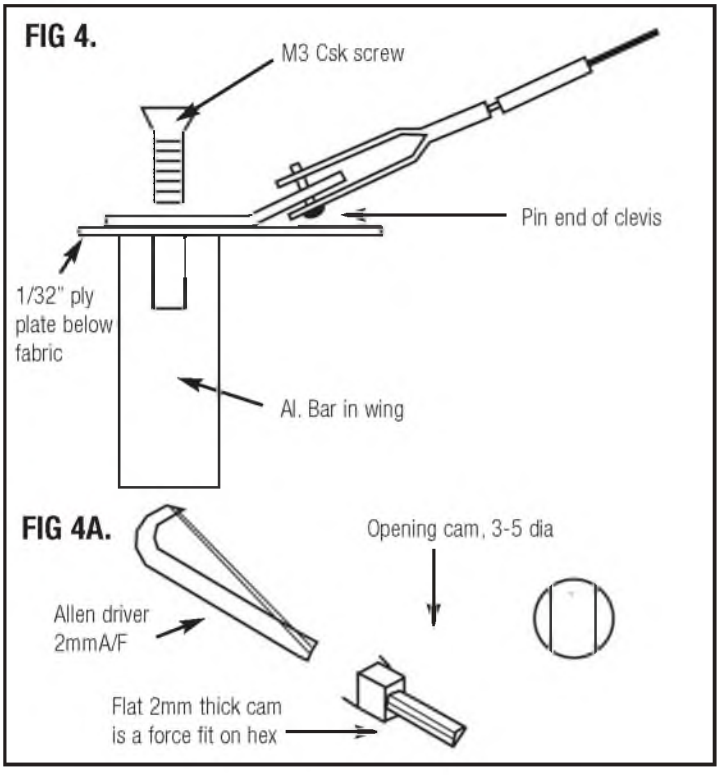
4

5

6

3: Spinner - turned, laminated hardwood former, and the real thing, ready for painting. 4: Top rigging. 5: Underside rigging (wheel removed for clarity). 6: Top rigging to 'A' frame. 7: Eyebolt detail.



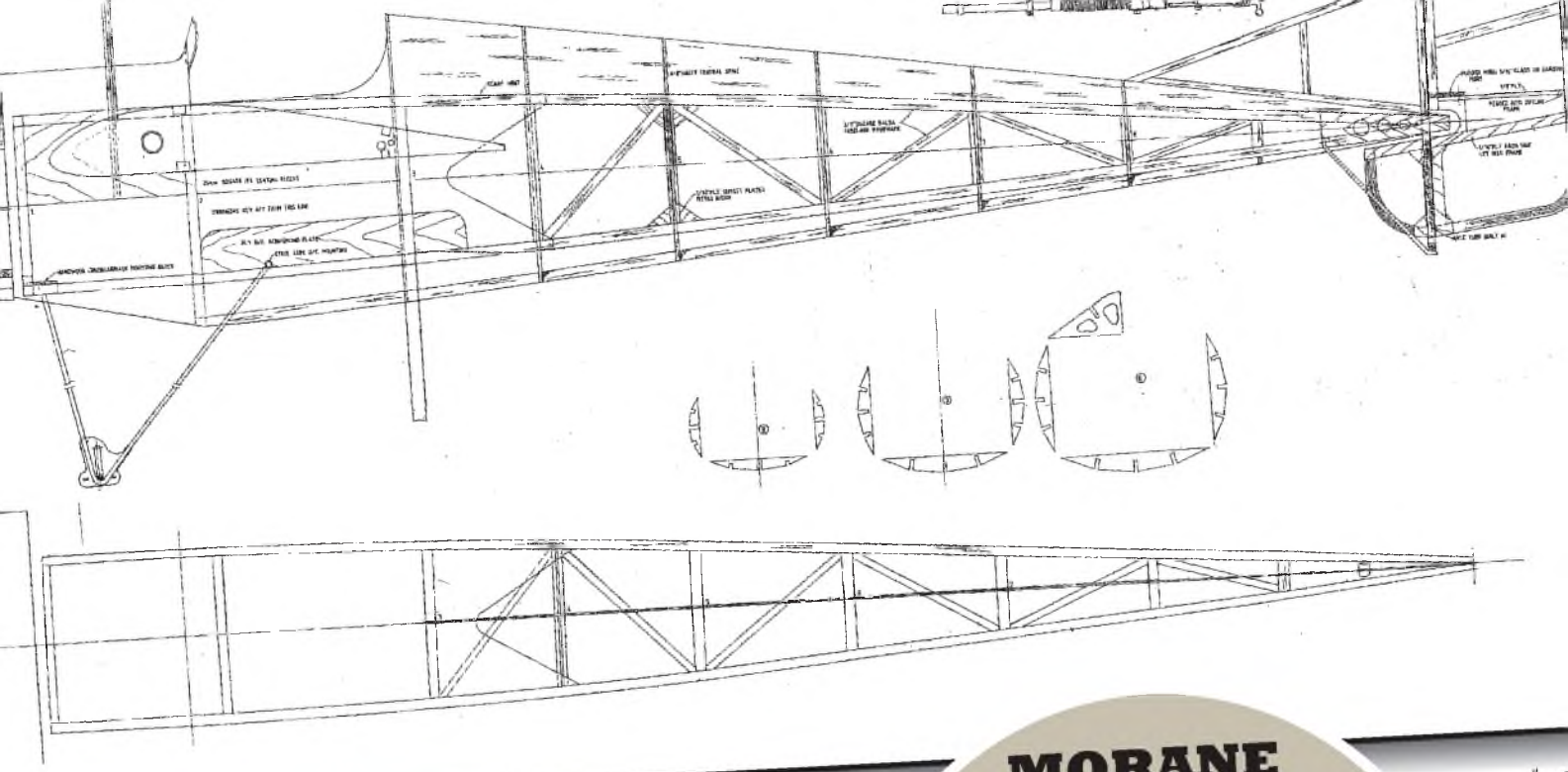


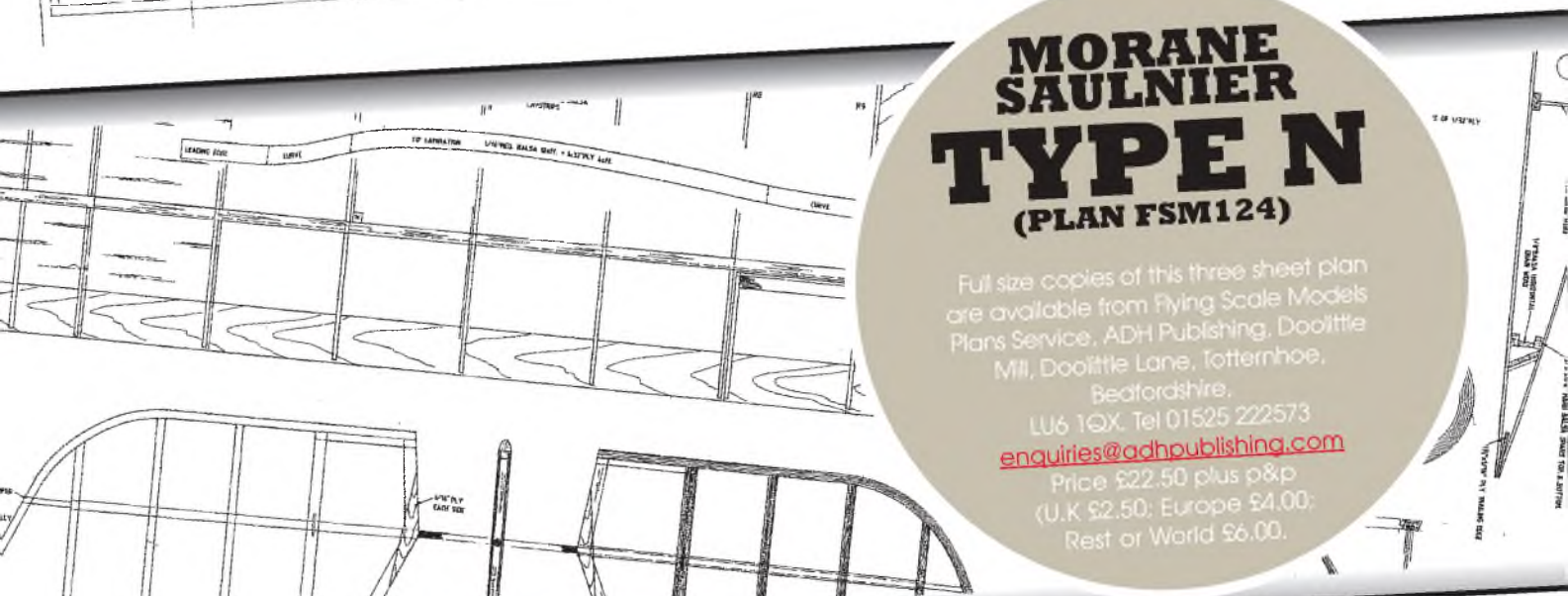
from 1/32" ply using a cheap hole saw of the type with lots of concentric cutters around a common mandrel. I assembled a 1" and a 1.3/4" saw at the same time, making the job fairly simple, but boring. I needed four fins per cylinder. Cylinder heads were 2mm liteply discs, same diameter as fins, with saw cuts along the grain to hold 1/32" ply fins, 2mm high. Other small components (inlet port, valve crank, rocker, inlet pipe, etc.) were made from liteply or hard balsa, with axles and pushrods from hard aluminium rod. Fin spacers, 2mm long, are simply parted off from the larger diameter tube. Each cylinder head also had a tight-fitting 1/8" liteply register, fitting the inside of the cylinder tube, securely glued to its underside, accurately centred.

Cut nine cylinder tubes accurately to a common length; you will have to do some measuring 'on the job' to work out the exact length needed. The cowl lip is fairly shallow, and the cylinder head details should just start to disappear inside it. The tubes are held to the centre by screws passing through shaped wooden blocks, and into the ply centre but it is best to leave the screwing till final assembly - **see Fig. 3**.

Assemble each cylinder in turn, using epoxy, making sure that everything points the same way. Final details such as pushrods, plugs, valve stems and springs are best left untill after painting. Start with primer or sanding sealer and let this dry thoroughly, rubbing off any rough patches or whiskers. Then, use acrylic primer/filler straight from the aerosol. This should need little rubbing down before applying a couple of coats of 'steel' silver car paint (inlet pipes, which are quite prominent, should be copper-coloured).

Final assembly, again with epoxy, consists of screwing each cylinder assembly to the ply centre and anchoring inlet pipes to the ply with model railway track pins. The ply disc is painted black, the whole engine is 'dirtied' using a very thinned-down black enamel, which creeps into all the corners and crevices. Fuel-proof when thoroughly dry, taking care to avoid the ballraces. Statically balance the assembly, by removing a bit of aluminium tube where it doesn't matter, or adding a tiny screw or two.





MORANE SAULNIER TYPE N

(PLAN FSM124)

Full size copies of this three sheet plan are available from Flying Scale Models Plans Service, ADH Publishing, Doolittle Mill, Doolittle Lane, Totternhoe, Bedfordshire, LU6 1QX. Tel 01525 222573
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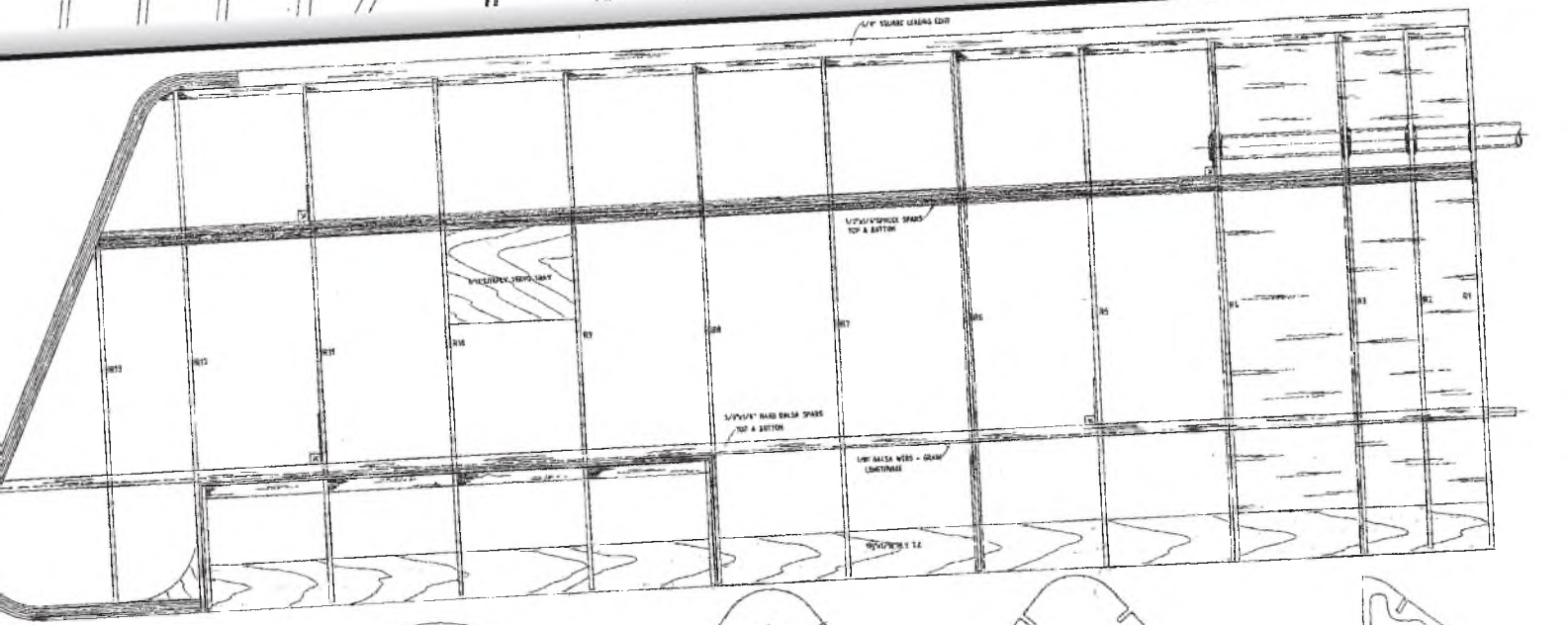
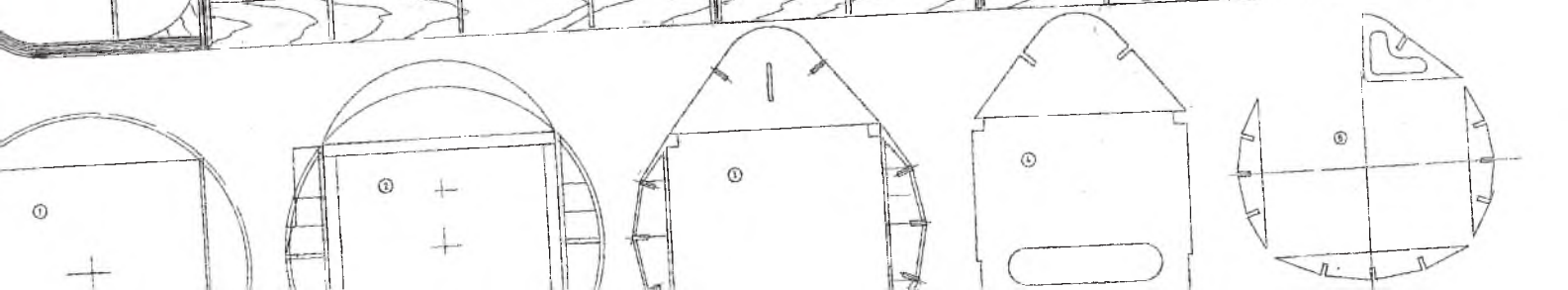
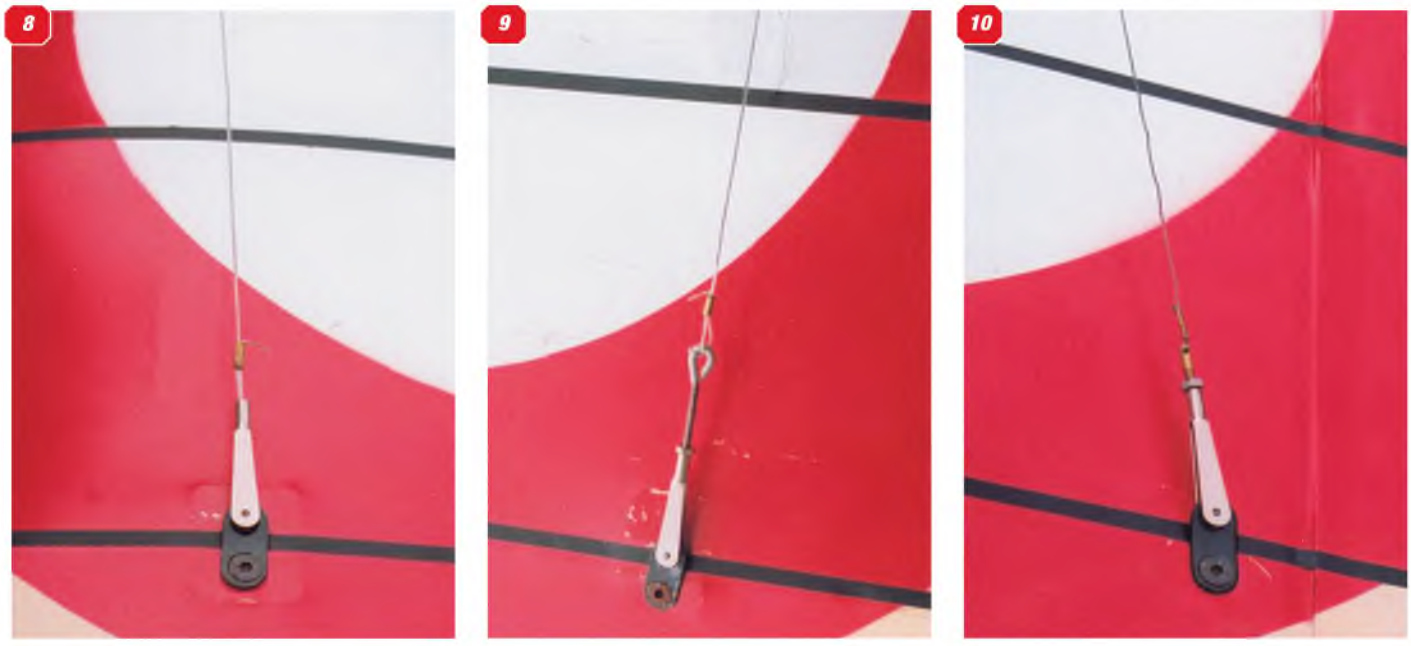






8: Top main spar (outer shown). 9: Left: Underside front outer. 10: Top rear outer (typical). 11: Close-up of lacing.

Spinner

This is very prominent, and, after much thought, I decided it had to be spun. I read some articles in old *'Model Engineer'* magazines, made up a hardwood former, and spent a month of weekends going round to various friends' lathes and reducing quite a lot of aluminium sheet to buckled scrap! It needs a massive lathe and quite a few horses to spin this sort of diameter successfully.

Happily, I discovered a (fairly) local firm of metal spinners who made a couple of spinners from my former, and even agreed to do some more, if necessary. I used a 1/4" ply disc as a backplate, and mounted the spinner to it with eight servo screws, 'hardening' the holes after forming the threads.

Rigging

The rigging positions are fairly authentic (see photos); one or two slight changes have been made to enable anchorages to be beefed up, or clearances (wheels, in particular) to be increased. Nevertheless, I can assemble and rig the model in about 20 minutes.

Each wire has to be adjustable, and is attached to its rigging point with a standard 2mm steel clevis, generally used for control pushrods.

As mentioned in Part 1 (Feb. issue), the mounting lugs for the wings are formed from chain links. Take a length of chain (I used 3/8" pitch, but 1/2" would be just as good) and heat it red-hot, letting it cool slowly. Dismantle the chain, preferably using a link-extractor to avoid distortion, then countersink one hole in each link to accept an M3 screw head (mine are Allen socket screws, which make life a lot easier than slot-heads). Now put a slight bend in each link, angled to suit its final position on the wing (you need 16, plus a few spares).

Most of the clevises need threaded adapters of the type used for closed-loop controls. I made mine from 2mm hard brass rod with 3/4" thread and 1/4" plain, cross-drilled 0.7mm. The plain end was rounded, and the sharp edge of the hole was relieved to avoid chafing the cable. The 0.5mm diameter cables need to be crimped at each end. I use a crimper designed for fine electrical connectors (e.g. servo plugs). This produces a 'Lazy B' crimp, and I consider it to be far superior, for this purpose, to any other style of crimp. I make my ferrules from 1mm bore brass tubing, cut to the right length by rolling the tube between a long sharp knife-blade, and a hard support block. Score deeply, then snap off, to avoid an internal burr, then slightly flatten the tube to allow two pieces of 0.5mm cable to lie side-by-side. Form the crimp, trim the free end to about 8mm, then bend it back on itself.

When rigging the model for the first time, it helps if you can find an enormous flat table or floor to work on. Support the tail in the horizontal position, then proceed carefully, checking for tension and twisting as you go. I started by fitting a temporary cable from each top outer main spar link, to the top of the 'A'-frame, checking that the zero dihedral was accurate both sides, then fitted all the other cables in pairs, outers first, checking all the time that tensions were even and not excessive, and that I was avoiding any warps.

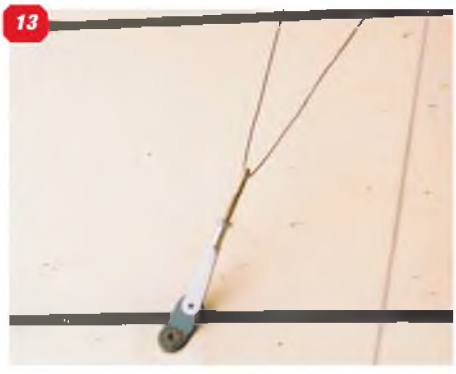
I have sketched the special tool that I devised, which is a godsend whenever you are rigging or de-rigging the model. In use, you slacken off the countersunk screw in the link, using the Allen end, unwind the cable, open the clevis with the flat part of the tool, then introduce the pin into the link. If you make sure that the 'pin' side of the clevis is closest to the wing, the link, when tightened, will trap the clevis in position - **see Fig. 4**.

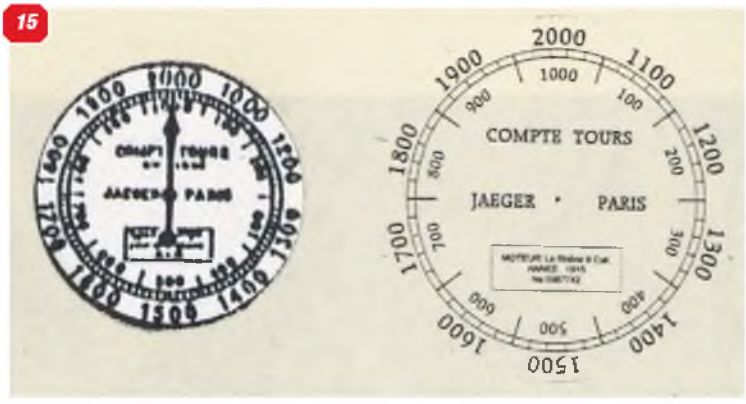
In use

Let me describe each cable in turn, starting with the top.

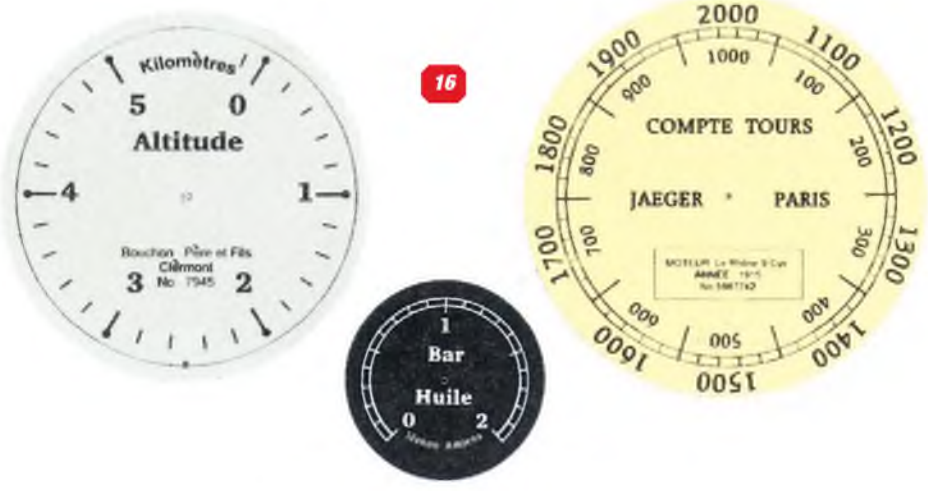
(i). Front spar brace. The adjuster on this is a tensioning eyebolt passing through one of the 2mm holes in the top of the 'A' frame. One end of the cable is secured directly to a clevis, and two turns of cable pass through the eyebolt before fitting the other clevis. The eyebolt is made from a 2mm pushrod end, but make sure yours is 2mm along the un-threaded part; some are only about 1.7mm. The cable is thus self-adjusting between the inner and outer fixing links, overall tension being set and locked with the 2mm nuts on the eyebolt.

(ii). Rear cables. These pass from outer to outer links, and from inner to inner links, each





12: Underside - main flying wire anchorage on u/c leg. 13: Underside front inner. 14: Rudder showing 'typical' period markings. 15: Instrument faces, as used on model, 1:1. 16: Comparison of commercial and 'in house' rev. counter faces.



passing round a dummy pulley en route. Adjusters on each clevis. Sort of self-equalising, unless you put a dab of cyano on each pulley, after fitting the cable.

(iii). 'A'- bracing cable. This holds the 'A'-frame upright and runs between the front gun mounts on F1, via the front hole in the top of the frame. I used a heavier cable here, from an old bicycle gear-change (never throw anything away!). It really needs a pair of 'proper' turnbuckles, preferably with steel screws and locknuts.

Now let's discuss the rigging underneath.

(i). Front outer. (I used a slightly heavier gauge of cable here, 0.7mm, as I felt these were doing most of the work). From the (heavier) clevis adjuster, to the undercarriage leg end bracket on the other side, taking care to avoid the other cables.

(ii). Front inner. From the lug on the undercarriage centre pivot, free-running through the tensioner on the clevis adjuster, then back to the lug on the front undercarriage mounting, just behind the cowl.

(iii). Rear inner and outer. From the clevis adjuster to the dummy control crank on the 'V'-frame.

As you can see, the lower cables are completely 'solid' and hold the wings flat, whilst the upper ones apply the necessary tension. I recommend the use of separate bobbins to wind each cable on when dismantled; they save an awful lot of tangles!

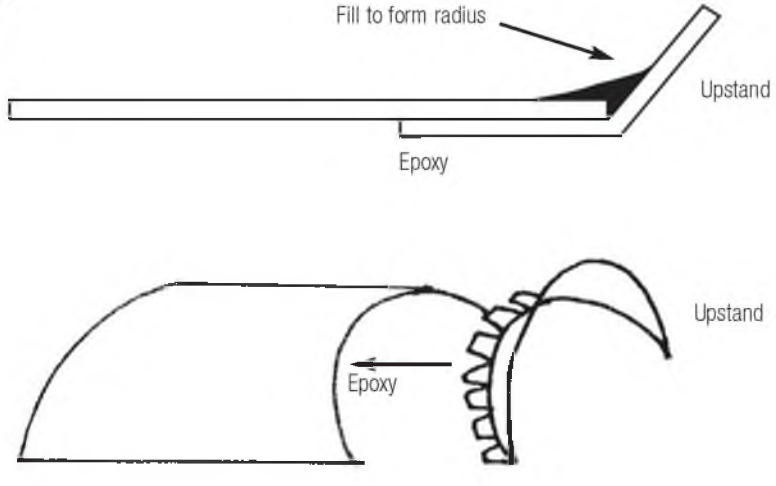
The control cables are straightforward closed-loops, with one standard servo used for each side of the tailplane.

Finishing

The model was covered in *Solartex* 'Antique'. I wanted to use real eyelets for the fuselage lacing; these are available from Mick Reeves, but he doesn't supply a closing tool; laborious use of several different-shaped punches was required. As it is impossible to get your arm inside the rear section of the fuselage, it was necessary to paint, eyelet, and lace the covering before attaching. This involved some careful fitting of paper patterns, prior to cutting and painting the covering.

All the coloured areas are car paint straight from the aerosol, but always applied over a white undercoat: this gives the colours more brilliance. The markings on the rudder were put on with a chisel-ended waterproof felt-tip pen (after first testing for fuel-proofer compatibility). They are typical of the period. The red-white-red bands on the fuselage were added to some French Moranes, to help distinguish them from otherwise similarly-coloured Fokker Eindekkers

FIG 5.



and, hopefully, discouraging 'friendly' fire.

The model was finally given a good coat of *Tufcote* fuel-proofer, matt and gloss in equal proportions. It was applied with a small automotive touch-up gun, in a well-ventilated workshop. I gave considerable thought to the representation of the half-round retaining beading over each wing rib (as mentioned in Ron Moulton's excellent appraisal of the prototype in the May/June edition). The problem was, even in this scale, to find a suitable beading which would be happy bending around the leading edge radius, would stay in place, and would not add excessive weight. I nearly opted for basket-making cane, split down the middle in a special jig, but was unhappy about securing it to the wing; just glueing it to the fabric didn't seem adequate, and you could easily spoil a wing experimenting with pins, etc. My final choice was to go down to my local 'Signs Express' and get them to cut me some strips of satin black vinyl, 4mm wide. These went on in an hour or two, and are easily replaced if damaged (no problems yet!). The amazing thing is that with the fabric-hingeing, and the black stripes, the ailerons virtually 'disappear' - most satisfying!

Metal panels are made from thick litho plate or aluminium sheet. I think that raw cut edges look a bit naff and it is worth carefully folding over the edges, if you can do it without damaging the surface. The panels are mostly dead easy, having only unidirectional curves, apart from the flared 'scuttle' - this was made by cheating, and a fair amount of trial and error **(see Fig. 5)**. Glue the upstand to the horizontal part with epoxy, then carefully fill as shown, to produce a radius.

During the building of this model, I discovered *'U-Pol acid 8 etch primer'*. This is streets ahead of any etch primer that I have previously been able to purchase, and I found it in a local car refinishing supplier. Once fully dry, it needs no further undercoat for smooth Hammerite. I used black gloss on all metal panels and the spinner, and it has stood up well to the first season of flying (rather better than the real Moranes, judging from contemporary photographs).

Electrics

It seemed prudent to use a 1400mAh battery pack, although I stuck to the normal 4.8 volts. I fitted a large D-sized 4.0Ah cell as an on-board glow supply, switched on by the dummy throttle lever. As my engine peaks at around 5,500 rpm (on a 20 x 6 wooden prop.) I didn't think it would do much harm if left on all the time.

Flying the Morane

This is a bit of an anticlimax, really. With the C of G on the main spar, open the taps and point her into wind; she lifts off quite happily in her own time in a very realistic manner. With the amount of power available, no great altitudes are reached, and I have not explored the aerobatic envelope, but I think that is part of the appeal. In the air she looks and sounds realistic, and that was my aim. At a recent model airshow I saw a nice 1/4 scale Sopwith Pup charge down the runway for about five yards, climb out nearly vertical to 300 feet, execute a couple of flick rolls, then fly several low circuits inverted - hardly realistic flying!

Landings need to be as close into wind as possible, due to weather-cocking, and fly her all the way in, only chopping the power as the wheels touch. The all-up weight of the finished model is 18lb, giving a wing loading of 24oz./sq. ft.

I hope that I have achieved my original aim, which was to produce a good-sized, practical model of a great-looking prototype that looks as realistic on the ground as in the air. I look forward to seeing a few more of these, perhaps in British or Russian colours, around future model shows. ■

Carrying the assembled model can be a problem; DO NOT PUT ANY LOAD ON THE STRINGERS! This is a good technique, most of the weight is taken on the spinner, steadied by holding the undercarriage. Just don't try to walk through any low arches!

Techno Scale

Mike Evatt

The Design Bureau website at http://dbdesignbureau.buckmasterfamily.id.au is an extensive resource for the scale modeller interested in Australian-designed aircraft. It features Technical drawings and three-view drawings of aircraft that were designed and built in Australia, together with plans for free-flight models of some of these aircraft. All the plans featured have been designed using CAD, and are available for downloading free of charge. You can download them in Adobe Acrobat format, print them out and build them. The screen-shot shows the delightful Amethyst Falcon built from a scaled up DB Peanut Plan

HobbyKing have a Pilatus PC-9 available in a plug-and-fly format. It just needs some basic assembly, the installation of your choice of battery and radio system to be ready to take to the skies. The Pilatus PC-9 was an improved version of the earlier PC-7 though it features a larger cockpit with ejection seats, more powerful engine, and a host of structural improvements. It has been used by numerous countries as a advanced trainer aircraft. It was even built under license by Beechcraft and used by the United States Air Force as the T-6A Texan II. This version has a 1.2 metre wingspan which means it will better handle windy conditions and the retractable tricycle landing gear gives excellent ground handling even on rougher terrain. Check it out at http://hobbyking.com

Want to put yourself in your model? Then look no further than **3D FigureWorks** at www.3dfigureworks.com They capture your 3D image using their 3D Photo System to produce a virtual model. The resulting 3D image is in full color, high definition, and as life-like as it gets. Then, using a 3D printer, they make the virtual design into a physical model that you can see and touch. Their 3D printer then produces a 3D model in full colour - no painting required!

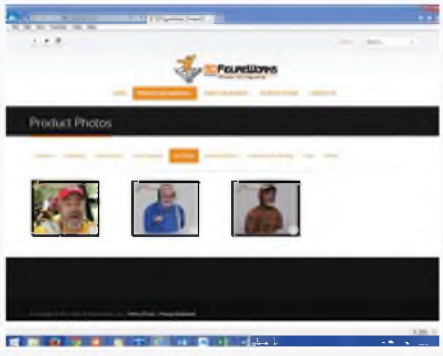
Oldmodelkits.com at, unsurprisingly, www.oldmodelkits.com sells rare, out-of-production and hard-to-find kits from the 1930s to the present. Maintaining a high level of customer service is very important to them as the vast majority of their business comes from repeat customers. They stock old classic kits from Aurora, Revell, Monogram, Hawk, Airfix, Frog, Strombecker and dozens of other manufacturers. The screen-shot shows a Guillows Douglas A-1H Skyraider kit. This 1970 scale stick and tissue rubber powered flying model kit includes die cut balsa parts and full size plans with detailed building instructions.

All the kits that **Probuild** stocks are ones only they have tested and would fly themselves. They have a full range of ARTF kits in-stock and available for next day or same day collection. They also stock a very extensive range of power units including the 3W-684 iB4 TS. This 42cc 4 cylinder beast has a heavy duty crankshaft with its large 6 ball bearings and needle bearings which ensure a long life for the engine. Vibrations are minimized and help to increase the lifetime of the airframe and on-board electronics. A rear output shaft is a standard feature and allows you to fit alternators, electric starters and starter/alternator units. Take a peek on their website at www.probuild-uk.co.uk

Skyartec.co.uk is a UK based company with mainly UK based stock. They work very closely with and are supported by the Skyartec factory in China. This linkup provides them with the great range of foam models from Skyartec and also access to their renowned experience in

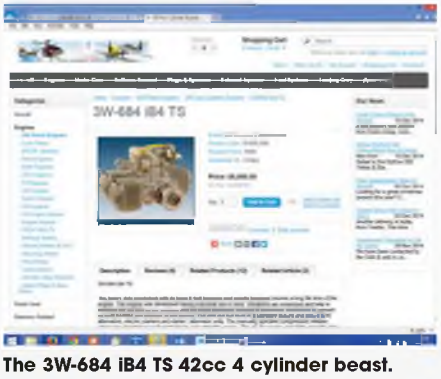
A delightful Amethyst Falcon built from a scaled up DB Peanut Plan.

The HobbyKing Pilatus PC-9 is a fine example of this popular warbird trainer.



Put yourself in the cockpit with a 3D FigureWorks replica.

A Guillow's Douglas A-1H Skyraider a genuine 1970 scale rubber powered flying model.



The 3W-684 iB4 TS 42cc 4 cylinder beast.

Skyartec's latest Yak 54 - Carbon Edition.

examines cyberspace for more TechnoScale Topics...

the world of small and medium size electric airplanes and helicopters. Check out their latest Yak 54 Carbon Edition on their website at www.skyartec.co.uk This has a1853mm wingspan and can be powered by a 30cc-40cc IC engine.

SC Models at www.scmodels.com.au is an Australian based company run by members of the Australian aeromodelling community. They have at least 20 years experience in building and flying all types of model aircraft, from competition standard scale models to sports aerobatic aircraft and the latest electric fun fly. SC Models import high quality products from overseas and due to their low overheads they can offer them to you at a great price - 'Quality at the Right Price' is their motto.

The screen-shot shows details of the short kit for a Boeing-Bell C-22 Osprey which was designed by Charles G Loud 111 and is a scale masterpiece. The aircraft is designed for two large electric motors and features tilt rotors. The short kit includes all fuselage formers and ribs, 631 pieces in total. A set of construction notes is also included. Balsa sheeting can be supplied separately as well as the fibreglass components, hardware kit and retracts.

The **Williams Brothers** machine guns are ideal for display or use on flying scale models. These kits are available from the **Sussex Model Centre** at www.sussex-model-centre.co.uk and represent the four best known aircraft machine guns of World War 1, the Lewis, the Parabellum, the Spandau and the Vickers. Extensive research for authenticity and meticulous care in creation of the moulds assure accurate detail. Each kit is complete with easy to follow instructions. Ammunition Belts in the appropriate scales are also available

South Coast Sailplanes at www.south-coast-sailplanes.com was established in 2005. If you don't have the time or inclination for building, they have the answer! Have your new glider built by an expert, and ready to fly. They offer a full building service for any of our range of models. Their website displays several scale sailplanes including a 4.5 metre span Ventus 2c, which has a fully moulded fuselage, wings and tail. All the parts are reinforced with carbon for extra strength. The wing profile is a special modified Eppler version to offer good performances in very broad speed ranges and conditions.

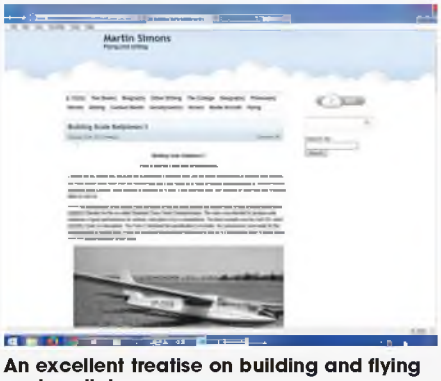
Martin Simons was born in Derbyshire, England in 1930 and subsequently became a university lecturer in London and Adelaide. He has had lifelong interests in education, philosophy, aeronautics, especially the sport of gliding, and has written extensively about these and other subjects. On his website at http://martinsimons.com.au you will find an excellent treatise on building and flying scale sailplanes. His book on model aircraft aerodynamics is a must for any modeller's bookshelf.

rcmodelcentre.co.uk at www.rcmodelcentre.co.uk are here to help you! They are a dedicated family team that is here to provide you with an unrivalled service in radio controlled models. Their ever expanding stock includes RC planes, RC helicopters, RC cars, RC boats and radio control associated tools and accessories. The Hirobo Eurocopter AS365 Dauphin 2 was made famous by the U.S. coast guard and Baywatch and is one of the most recognised helicopter shapes in the world. The sleek Dauphin 2 body contains the latest S60 II mechanics designed purely for the Hirobo scale helicopter series and retracts are incorporated as standard. ■

A Boeing-Bell C-22 Osprey short kit from the antipodes.

The Williams Brothers machine guns are ideal for use on flying scale models.

A 4.5 metre span Ventus 2c from South Coast Sailplanes.



An excellent treatise on building and flying scale sailplanes.

The Dauphin 2 was made famous by the U.S. coast guard and Baywatch.

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

mikeevatt@hotmail.com

THE QUIET ZONE

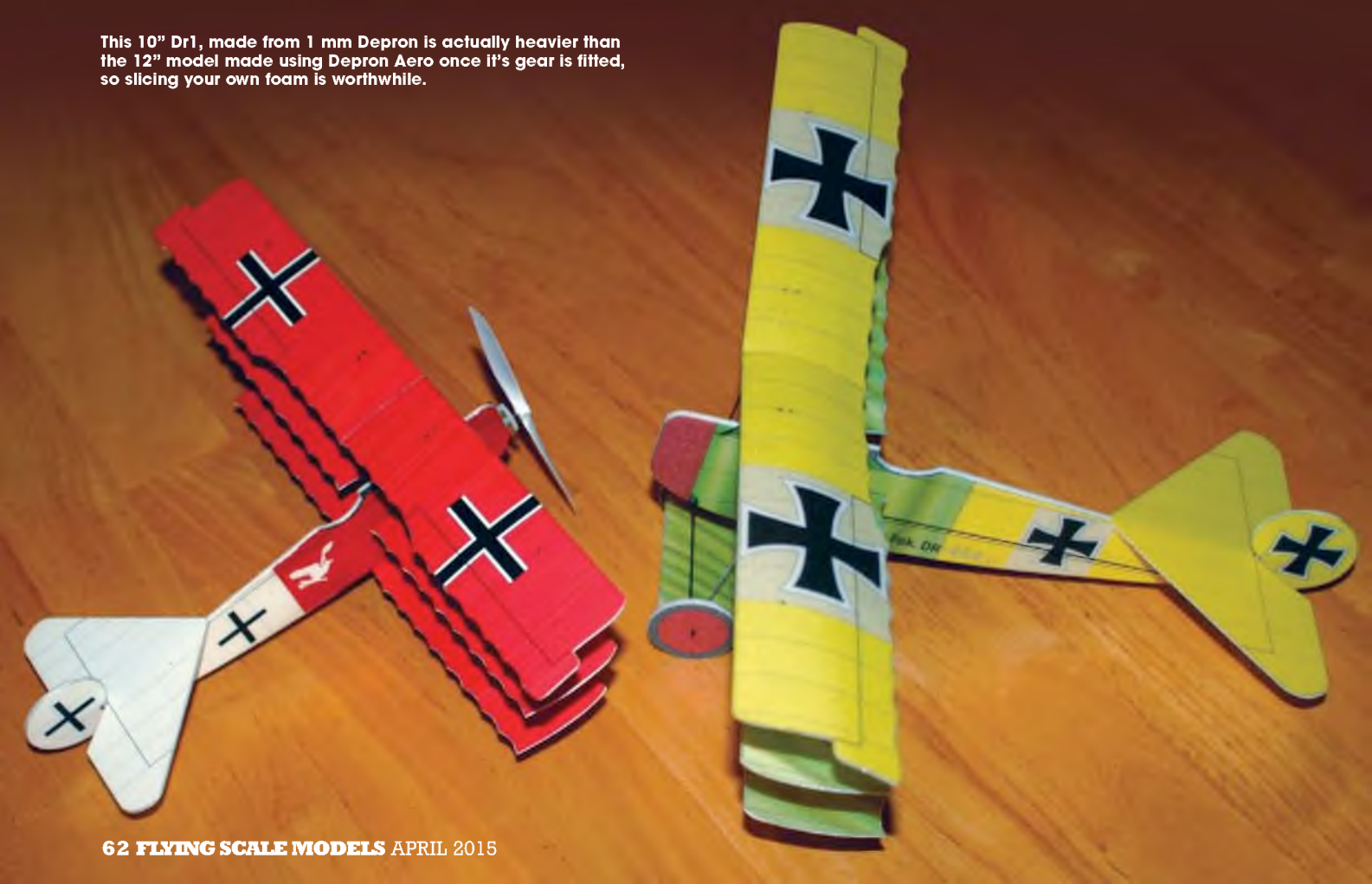
R/C SCALE ELECTRICS WITH PETER RAKE

Yes, it's that time again, that bloke is back to bend your ear about electric powered models. Small models again this time. Well, why not. After all, we are still in the depths of winter so talking about models we can still be flying seems a pretty good idea to me.

Over the past few months we have looked at some of my latest creations, all foam profile scale models. As you may recall, I mentioned using very thin (0.025") foam and that it's hard to get and costly - largely due to postal and tax costs since it comes from Canada (when you can get it at all). Well, you know me well enough by now to know how much I hate spending more than I have to in order to keep the models flowing. I still want the models - I just don't want to spend money to get them. Probably why I have as little as possible to do with RTF models. They're far too spendy for my taste. Mind you, I'll happily accept your cast off RTFs if you feel so inclined. No? Somehow I didn't think so, but if you don't ask...

So, you wonder, where is all this talk of not spending money leading? The simple answer is not very far. At least, no further than the modelling room.

I'm quite sure that if you are at all interested in indoor models you have stocks of Depron of varying thickness stashed away somewhere. I know I have, including some much too thick for the models I build with it. You have to experiment a bit to find out what will fly in the space available and models made from 2 mm thick Depron aren't one of them as far as I'm concerned. They end up either too heavy or too damn fast for the hall we use, so the Depron just sat in its box doing nothing. Add into the equation that I also had a hot-wire cutter not earning its keep and a little lateral thinking came into play. How could I use the one to turn the other into something that could be used? No you fool, not use the Depron to make the cutter more useful. Oh, hang on though, I suppose that is what's happening really despite that I



This 10" Dr1, made from 1 mm Depron is actually heavier than the 12" model made using Depron Aero once it's gear is fitted, so slicing your own foam is worthwhile.

There's nothing complicated about the author's foam slicing board. The ply strips act as guides for the cutting wire.

Add in an inexpensive cutting bow, making sure the board is actually flat and a power source and you're all set to slice thin foam.

Some of the slices produced using the illustrated set-up. All are roughly A4 size.

As you see, and this is one of the slightly thicker sheets, the heat does curl them slightly.

actually meant use the cutter to make useable foam sheet.

MORE ABOUT FOAM

Or, to be more precise, a bit more about the foam I've been messing around with. Basically, three types of foam are involved in the experiments I've been carrying out in the depths of my model room. First off there's good old Depron, for many years the staple of indoor modelling and something you should be too familiar with to require a description from me.

Next up is the packaging from RTF models (mostly helicopters and the Nano Stiks I've stripped down for their equipment). Although a beaded foam, whereas Depron is extruded foam, it tends to be of a much denser nature than the beaded foam you buy in large sheets for making foam/veneer wings. However, it is markedly lighter than Depron, even if of a somewhat more 'open' appearance than extruded foam. The advantage of its' denser nature is that, once sliced, it's a lot more rigid than normal beaded foam and is perfectly suited to small, very lightweight models. I say small models because although rigid enough for those, it soon starts to get floppy once the sheet size increases. Up to around 10" span is fine, but much more than that and you will need reinforcing to stiffen it sufficiently. As you can imagine, that rather defeats the object of using the lighter foam.

Finally we come to something that's new to me - Depron Aero. Whilst looking all the world like normal Depron, and presumably made in a similar fashion, it is claimed to be up to 20% lighter than regular Depron. Needless to say, this lightness doesn't come without a cost elsewhere. Depron Aero is much more flexible than regular Depron, but still rigid enough for the type of model we are considering here - even after it has been attacked with the cutting bow. One thing it most definitely is, is cheap. I paid a miserly £2.80 for a 1200 x 800mm sheet which is enough for several models of the size and type that I am building. Supplied cut into two 1200 x 400mm sheets to aid posting each half sheet provides four A4 and four almost A4 size panels. Once sliced that's enough foam for at least five profile models of around 12-14" span.

Its' one drawback, possibly, when compared to regular Depron is that I've not noticed any evidence of the 'grain' Depron displays. There is some, but it's pretty minimal so you can't really use it to stiffen longer pieces of the model. However, that aside it slices beautifully so that from each 3 mm thick piece you end up with one piece of less than 1 mm thick (around 0.7 mm) and one slightly thicker piece (about 1 mm). Both of which are ideally suited to our needs.

A much less helpful feature is that the outer surfaces appear to be coated with some form of release agent and nothing I've tried will remove it. Whilst it doesn't seem to cause problems either gluing or painting, it is most definitely a problem if you intend to print onto the foam. I've tried both InkAid and hair spray as a printing base, and both waterproof and cheap inks and in all cases the release agent inhibits drying of the ink. The result is that the feed rollers in the printer leave inky tracks across the printed surface and even the lightest touch will smear the printed finish.

Don't despair though, all is not lost

Once lightly sanded and treated to a coat of thinned InkAID those same sheets print very nicely.

when using Depron Aero. Because it cuts so nicely with the cutting bow a light sanding of the cut surface provides a perfectly good surface upon which to print your graphics no matter which form of printing base you use. As an added benefit, sanding the cut face takes off the 'skin' caused by the heat of the cutting wire, releases any tension and flattens the sheet beautifully. Once treated thus, and then given a couple of hefty coats of hair spray, the resulting sheets of foam feed very nicely through my top feed printer and give highly acceptable results. Not as sharp and strongly coloured with the hair spray base as when using InkAid, but definitely good enough to result in an attractive model. In fact, all the foam models you'll see here are printed onto hair spray treated foam and I'm perfectly satisfied with the finished item.

HOW TO CUT FOAM

Well, you could spend a small fortune on a special foam slicer (I have seen them on sale if you have around £400 to spare) or you could take the simple, cheap and highly effective approach that I use.

As I said earlier, I already had a small foam cutting bow not earning its' keep and that, combined with a flat board and a car battery charger works perfectly to quickly produce sheets of thin foam from which to build a multitude of models for me to annoy you lot with.

Believe me, it really is very quick and simple to slice sheets of 2mm Depron and 3mm Depron Aero. I spent a dull Sunday morning cutting three of the half sheets of Depron Aero I mentioned, into roughly A4 size pieces and attacking them with the cutting bow. The end result of just a couple of hours work was 48 sheets of useable modelling foam. Slightly curled sheets, due to the tension induced during the cutting process, but as I said the curl is removed during preparation for printing.

Since then I've printed and built three models that used just a fraction of said sheets. They print well, the release agent doesn't interfere with gluing and the models are definitely lighter than ones produced from 1 mm Depron. An example of how much weight can be saved is the two Fokker Dr1 models in the photo. The 10" span model, made from 1 mm Depron is 14% heavier than the 12" model built using sliced Depron Aero given that both use precisely the same equipment. 20% bigger and 14% lighter has to be a good thing when it comes to needing the model to fly slowly and take up minimal airspace.

Okay then, getting back on track after my little ramble, some more about actually cutting the foam. The arrangement I use is really very basic, but it works admirably well. Apart from a cutting bow, power source and some foam to cut the prime requirement is a perfectly flat board. I had the shelf from an old computer desk available that fitted the criteria and was big enough, so that's what I used. To this I stuck some narrow strips of 1/32 ply that had been sanded smooth to prevent the bow snagging them. Although I used an end stop strip I now don't think that was such a good idea because it limits the length of RTF packaging I can feed through. All you really need is a strip each side, with both strips long enough to provide a run in and run out for the bow. It's important that the wire is supported both before and after it actually enters the sheet of foam being cut, and after it exits said sheet.

As to the actual mechanics of slicing the foam that is simplicity itself. Put the foam on the board between the guides and lay another piece of board on top of it to both hold it flat and protect your restraining hand from getting burnt. Switch on the cutting bow, lay it on the

run in of the strips and proceed to guide it through the sheet of foam. You don't need to apply much pressure onto the guides, just enough to ensure the wire remains in contact with them throughout the cut. Similarly, don't try to rush the wire through the foam. Just maintain a steady forward motion of the cutting bow. That steady progress is the important bit otherwise, if you hesitate, the wire will cause a groove across the sheet where it lingers. It doesn't matter if the centre of the bow lags a little behind the ends because it's a flat plate you're cutting, not a curve like while cutting wing cores. Hold the top board to ensure that the foam doesn't move while you're cutting it and that's it really. One cut through 3 mm Depron Aero/Depron provides two sheets for modelling, but only one sheet if using 2 mm Depron. For some reason the majority of cutting loss appears to be above the guides and the piece you are left with is wafer thin and not much use for anything unless you are considering extremely small models.

Although I used ply strips as my guides piano wire works just as well and, being available in a greater number of sizes, increases the versatility of the arrangement in terms of how thin you can cut your foam.

When it comes to butchering RTF packaging you use a different technique with the same basic equipment. I found the 1/32" ply guides resulted in foam too thin for what I had in mind, but it does still remain a viable option for very thin foam. Instead I placed threaded rods (I was out of the correct size piano wire at the time) inside the ply guides and held the bow below the board, with the wire resting on the guides. Switch on the power and proceed to slide the block of packaging over the wire to cut the foam. Using 2mm rods provided foam that was really too thick for my printer to cope with, but thinner rods did the job just fine. Hold the wire tightly against the guides and just keep passing the foam over the wire and you'll soon end up with more sheets of modelling foam than you can shake a stick at - and all for free. So, if you aren't prepared to send me your cast off RTF models, the foam packaging they came in will do just as well thankyou very kindly. I can always find a use for more foam. Nano Stik packaging is ideal for this, and there's just a chance you might forget to remove the Nano Stik before you send the packaging. Well, we're all allowed to dream.

A WORD ABOUT PRINTING

Because of it's beaded foam origins, the sheets you get from hacking up RTF packaging will show this once they are cut. They come out quite smooth, and don't seem to suffer the curling issue you get from Depron, but the individual beads remain visible. Fine if you intend to leave your model in its' natural foam colour or want to paint it, but not so great if you intend to print your model onto it. As you'll see from the photos, even after printing the beads still show if you've used hair spray as a base. Although I have yet to actually try it (I've run out of InkAid) I would expect the matt white finish InkAid provides would go a long way to hiding this effect. I can't see that the beading shows on the surface, but because of the almost transparent nature of the foam you can see where each bead has been cut through. A bit like the finish you see on EPP models but a little smoother. Now there's a thought, I wonder how EPP would cut? I feel more experimenting coming on.

So, there you have it, all you need to know about simple foam slicing. I thought that after all the talk of foam models knowing a bit more about actually producing the sheets of thin foam might be an idea. Next time, I solemnly promise there won't be any foam involved.

In the meantime, if you'd like to contact me for details of where to send that packaging (I continue to live in hope) you'll find me at PETERRAKE@aol.com ■

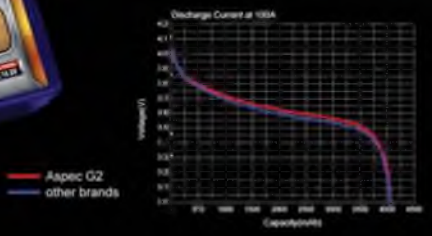
This 8" span model made from sliced RTF packaging weighs less than 3 grams as you see it here. Note the more open appearance of the foam.

Classifieds

UNFAIR ADVANTAGE

A-SPEC G2

COMP GRADE LITHIUM TECHNOLOGY



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Avios

1200mm Hawker Sea Fury FB11 EPO Warbird

Avios brings you a exemplary example of the legendary Hawker Sea Fury, the last propeller driven airplane to serve in the Royal Navy. A brilliant no-glue design arrives with all electronics pre-installed, all your require os a battery and radio system to complete. The outline is that of the FB11 version, which served well into the 1950s and was used during the Korean War. Modelled in the livery of Commander Peter "Hoagy" Carmichael, the only British pilot to in a piston engine aircraft to down a jet driven airplane during that conflict. The all EPO molded foam replica features functional flaps, retracts with gear doors, LED lights, scale 5-blade propeller, wing mounted rockets, and remotely activated drop tanks. The Avios brand is focused on premium quality design features, with no detail being spared. The Avios 1200mm Hawker Sea Fury is no exception.

ESC
60amp Brushless
Speed Control

Motor
Brushless Motor 3648
Out runner KV600

Length - 1100mm

Wingspan - 1200mm

Weight - 2100g