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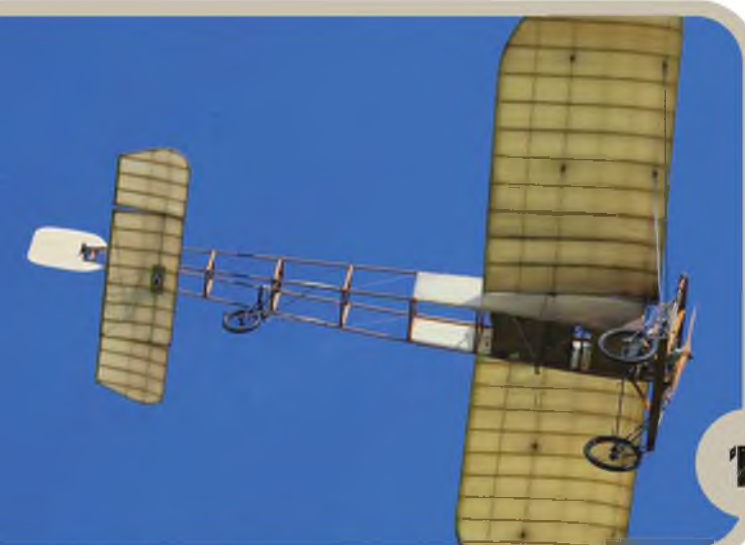


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CONTACT

I suppose the majority of mainstream scale modellers feel the need to build one of the range of 'usual suspects' models - Spitfire, Me 109, Mustang etc. at some time during their time in our hobby - and why not?

But it is noticeable that many now seek out the lesser-known types for their scale modelling subject choices, a trend that has long been there in the field of Indoor free flight scale, as emphasised in our recent report on the BMFA Indoor F/F Scale Nationals (June issue).

This month's issue features some fairly-to-very-rare full size aircraft worthy of scale modelling and in this respect, no one digs deeper into the obscure than FSM's Peter Rake, whose full size free plan feature this month is the Nieuport Swallowtail.

Never 'eard of it? Well neither had I and I've found nothing on the web, but for all that, it's a nicely proportioned little monoplane from the pre-WW1 era that requires careful attention to airframe weight-saving at rear end.

Winter LS1 Zaunkoenig anyone? O.K, again' never 'eard of it ... a WW2 German investigation into ultra low speed flight, circa 1940. Captured and transferred to UK post WW2 and tested along with many other Germany WW2 types, the sole example eventually found it's way back to home soil via Ireland where it now resides at the Deutsches Museum at Unterschleissheim, Munich.

Avro Anson anyone? Well, c'mon now if you were an Air Training Corps cadet during the late 1950s and early-to-mid 1960s, you would surely have been taken on one of those weekend 'Air Experience' flights that were very hard to come by when demand was so high, at a time when the ATC was a so much larger youth group than nowadays. Almost certainly, the aircraft you would have flown in would have been a late variant Avro Anson, by then a purely (and elderly) 'communications' aircraft.

Master scale modeller Duncan Hutson produced a very nice approx 80" wingspan Anson Mk.1 for two 0.30 size engines and published the plans quite a long time ago. Later, Sid King of the Cotswold R/C Society built a much bigger Anson, 135" span, which I suspect may have been an enlargement of Duncan's original - looks good in action on the CRCS web site.

All of them now aircraft of relative obscurity - what might your next choice be?



Sid King's 135" wingspan Avro Anson Mk.1, very nicely turned out in WW2 era warpaint. A Warbird that did not exactly pack a massive punch!
(PHOTO: Alex Whittaker)



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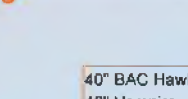
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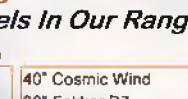
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Building your very own model from plan is one of the most satisfying achievement any modeller can experience..... so go on, give it a try and don't miss out on this wonderfully therapeutic side to this great hobby...Tony Nijhuis

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FULL SIZE FREE PLAN FEATURE

NIEUPOORT SWALLOW TAIL

A 30 inch span, electric powered scale model of an unusual pioneer era-monoplane, designed by Peter Rake

Now before I go any further, I must point out that I have only seen one reference source for this model, a drawing and a plan in one of the old Bill Hannan books about rubber power models. However, having been hooked, there was no way it wasn't going to end up as an electric powered, radio control scale model.

The model you see here is actually the second version of this type I've drawn up and is aimed at either the GWS IPS power

system (a geared, brushed motor) or a small brushless outrunner. Just like the Nieuport IV that appeared last month, this plan was actually drawn up several years ago and originally only showed the GWS unit. Realising just how few of you are actually likely to have a functioning example of that type of motor (they were a bit variable in quality) I decided to update the drawings to include details of the more modern power unit. Either system works just fine and if you do have a useable GWS unit it's likely to be a good

one to have lasted this long, so don't be afraid to use it.

THE MODEL

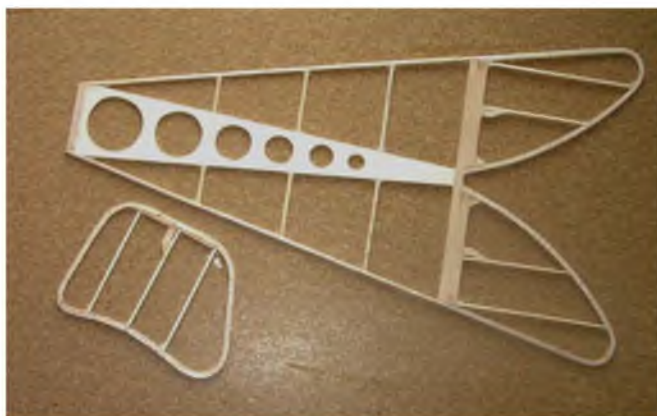
A quick perusal of the plan will instantly reveal two very important points to consider while building this one. The first is just how short the nose is, making the achievement of the correct fore/aft balance point a matter of definitely needing nose weight (especially so if using the brushless motor option). The second involves both the length of the tail

The model makes a slow pass for the camera. Although, pretty much all flying is pretty slow.





The rear fuselage frame jugged up for square and the ready assembled basic forward box ready to have the rear part attached to it.



That tailplane, and the laminated outline version of the rudder. Anything that saves weight at the tail is worthwhile.



Rear fuselage frame is built in the time honoured fashion, and the second frame built over the first to ensure they are identical.



Although actually from a larger model, the forward fuselage parts remain much the same. Note the laminated former that sets the dihedral.

and the sheer size of the tailplane. Quite obviously, that tailplane is going to have to be kept LIGHT if we are to minimise the amount of nose weight required.

Although the tail end needs to be light, don't compromise on the strength of the longerons. I can assure you that opting to use light balsa for the longerons is something you will regret at some point. Use nothing less than the hardest balsa you can find, or substitute bass for balsa.

Uprights and cross braces need be nothing more than medium balsa, but only really hard will suffice for the longerons. As I said, the tail is quite long, so there will be a lot of stress where the longerons join the sheet sides should you suffer a mishap during landing.

An example of what I'm talking about was my first version of this model. Fortunately I had used bass longerons and, when I managed to spin the model into the ground (getting used to a new transmitter with digital trims and letting the model get too far away), the only damage was a broken prop, dinged wingtip and dislodged motor plate. Whilst walking across to collect the bits I had envisioned a totally mangled rear fuselage, so considered myself lucky to get off so lightly.

Whilst the landing gear is pretty straightforward, I would strongly suggest that you do add the extra section of axle indicated on the plan. Because of the length of unsupported axle even fairly gentle landings will cause it to flex. With

the forward rigging terminating immediately above the wheel there's every likelihood of the wheels getting wrapped in the rigging. This will do nothing to aid a smooth landing and make the next take-off (if you don't spot it) a total non-event. I'll leave you to work out how I know that.

The other point worth mentioning is the use of bamboo for the skid. Please don't be tempted to use anything else for this because it's unlikely to prove strong enough to survive the first time it snags on something during take-off or landing. Garden canes are cheap enough and splitting and shaping one is easy enough to do so it's well worth the minimal effort required.

Finally, you'll notice that there is a non scale tailskid shown on the plan. The original used the rear of the main skid to keep the tail off the ground but I could see far too much risk of the rudder getting ripped off so settled for the compromise. The choice is yours, of course, but I know which option I prefer.

TAIL SURFACES

As already emphasised, these need to be kept light, especially that huge tailplane. The best way of achieving that is to use thin, laminated outlines. The laminating process provides the required strength, while the small amount of wood required for this process saves a great deal of weight. Remember, every extra gram at the tail of a model with this sort of a nose

could easily require 5 or 6 grams at the nose to compensate for it. Even with all the weight saving, my original model still required a considerable amount of lead in the nose to get it to balance.

So, onto the build. There isn't really anything particularly complicated about building the tail surfaces other than making the laminated outlines in the first place. I find them a simple, strong and lightweight method of producing thin flying surfaces, but I know many people have trouble with them. That being the case, maybe it's worth taking a look at how I do it.

Begin by making templates of the surfaces concerned, taking the inner edge as your reference. These templates can be anything you like really, Depron, balsa or thick card. Just as long as they are at least as thick as the wood you're going to be shaping around them. Then either tape or wax (rub with a candle) the edges to prevent the laminations sticking to them. Pin them down to a polythene covered board and set about preparing the strips you'll be laminating.

The wood you use for the laminations doesn't need to be particularly hard. In fact, medium grade wood is perfectly adequate since they will gain a lot of strength from the actual laminating process. Cut the strips over length and dump them all in a bowl full of warm water, weighted down to ensure they all get thoroughly soaked.

While they are soaking, make yourself a

The naked model shot reveals that there is nothing complicated about the structure.



set of waxed pieces of scrap balsa with which to hold the laminated strips tightly against the templates you made previously.

Once the soaked strips are nice and floppy, glue together (white woodwork glue, not CA) the required number and use one of the scrap pieces to secure them at one end of the template (press it firmly against them and pin it to the board). Now we come to the important bit. Put some tension on the laminated strips and PULL them into place around the template, using the scrap pieces to secure them at regular intervals. It's important that you pull them round, rather than pushing them into place because it drastically reduces the risk of cracking any of the strips. It's the fact that they are continuous lengths that gives laminated outlines their strength, so cracked strips are always going to be a weak spot in the structure. For much the same reason, it is important that the strips are glued together securely, with no gaps between

them. Allow the laminated outlines to dry completely before removing them from the board.

All that remains now is to pin the outlines over the plan (but not with the pins pushed through them) and build the tail surfaces in the usual manner. Allow to dry, sand overall and round off the edges. As I said, nothing at all difficult apart from actually making the outlines.

Once dry, the elevators can be joined using the wire joiner and the tail surfaces are ready for covering. If using closed loop control linkages (which are the lightest possible form of linkage), and if you're sure you can make said linkages identical on both elevators, the wire joiner may be omitted to save a little more weight where it counts.

WINGS

The only major point worth mentioning about the wings is that the spars must be at least bass. Spruce is fine, if a little heavier, but balsa (even hard balsa) is just

not up to the task unless you make the rigging fully functional. Even then there's always the risk that it will shear off at the fuselage join in a less than perfect landing.

Pin down, over the plan, the leading edges, trailing edges and parts WT, gluing as required. Now cut the spars to length, trim the inner ends as shown, mark the root rib angle onto them and notch and taper the tip ends. These can now be pinned over the plan and glued to WT. Glue in place the wing ribs, remembering to align R1 with the marks you made on the spars to allow for dihedral. Fit the hard balsa rigging blocks.

You'll notice the option of cut outs at the wing root. These were shown on the drawings the model used for inspiration, and have been included on the prototype models, but are entirely optional. I included them because they are supposed to be there, and the parts are shown on the cutting sheets, but they do complicate the build slightly. Once

CONSTRUCTION



Wings really don't get much simpler than this.



A wing root showing the sheeting in place and that optional leading edge cut-out.



A suitably drilled bottle cap and commercial cylinders not only provide a dummy engine but also add a little nose weight.



How the undercarriage wires glue in place and the bamboo skid bound and glued to them. Note the double thickness axle to help prevent flexing - it almost does the job.

you've decided whether you'll be including them on your model, the upper surface of the wing roots can be sheeted. The sheeting is only 1/32 balsa, but it helps prevent the root ribs from bowing as the covering shrinks. Trim and sand and set aside for covering.

Just exactly when you fit the locating dowels is unimportant, just as long as it's before you glue the wings to the fuselage. They aren't intended to be load bearing but do ensure that both wings go onto the fuselage at the same incidence angle.

FUSELAGE

Having decided which power system you will be using the fuselage is a pretty straightforward build. You'll see from the photos that it is built as two basic box structures, that are then joined before the final bits and pieces are added. This means there are no curves in the longerons as they pull in to the tail, so using matched longerons is less important. Just bear in mind what was said earlier about using only hard wood for them. Once the two sections are joined the longerons should be sanded flush with the sheet sides.

The rear fuselage box structure is totally conventional, consisting of strip wood side frames joined with balsa cross braces and the two little wedges at the rear. Those wedges not only add strength to the box structure, they also provide mounting points for that non scale tail skid. Work over the plan and ensure you keep everything perfectly straight and square.

Almost as basic as the rear fuselage, the front fuselage box is that much more substantial. Pre-assembly steps include assembling former F4 and laminating F3/F3A to create the former that will set the dihedral. Also, once you've marked the former positions, glue parts UC to the inside of each sheet side and any additional mounting blocks you feel you might need for the u/c and rigging pylon. Groove them for the wires so that when it comes time for assembly, the landing gear wires can simply be glued (epoxy not CA) into the grooves and the skid bound in place and glued - CA this time.

CUT PARTS SET FOR THE

NIEUPORT SWALLOW TAIL

Get straight down to construction without delay! This month's full size free plan feature is supported by a laser-cut set of ready-to-use balsa and plywood components. This provides the parts that, otherwise, you would need to trace out onto the wood before cutting out and includes wing ribs and tips, tail centre parts, fuselage doublers, top deck, formers etc.

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Drifting by overhead. The model is a stable flyer that handles smoothly.

If using brushless power, F2 may be opened up considerably since it no longer needs to support the motor post.

FINISHING AND ASSEMBLY

Either Lifespan or tissue can be used to finish the model. In my opinion, those are the two most suitable types of covering for models of this kind. Film coverings are either too heavy, too transparent or just too shiny. At least, they are to my mind. On tail surfaces as thin as these you need to be able to control the amount of shrink if you aren't to find serious warps creeping in whenever the weather gets a bit warm.

As discussed, the undercarriage assembly is simply a glue in place job. Whether you add fairings or not is a matter of taste. Don't, however, fair the single, diagonal strut (elastic thread). On the full size aircraft that was actually the rod that operated the wing warping. Besides, you may well need to unhook it for battery changes.

Fit the wings by gluing the root ribs to the

fuselage sides and the spar extensions to the step formed by F3/F3A. The locating dowels set the incidence angle and the F3/F3A assembly sets the dihedral. Now use this assembly as a guide to installing the tail surfaces.

As you may have gathered, from the way the wings are fitted, rigging isn't absolutely essential. However, the model will look naked without it and it really is worth the minimal effort required in terms of both looks and additional strength.

On a model of this kind there are two main rigging options. First is monofilament fishing line, whilst the other choice would be nylon coated beading wire (as sold in craft shops that stock jewellery supplies). In either case I would rig the model by running each cable from the upper pylon, through the rigging block in the wing and ending it at the lower rigging point. Don't glue anything into the rigging blocks until all the cables are in place. Then you can gently work out any warps that may have been induced, check that everything still

aligns correctly and, if desired, introduce a little wash out into both wings. Once happy everything is as it should be, run a spot of CA into each rigging block to lock it all in position.

FLYING

Whilst the model has proved stable and relatively easy to fly, there are certain points you need to bear in mind. The first is fairly obvious, avoid any hint of tail heaviness like the plague - even if that means adding lots of nose weight. As you can imagine, with that long tail and huge tailplane getting the model to balance slightly nose low when suspended at the point shown isn't going to be particularly easy, but is pretty much vital to the success of the model. Slightly nose heavy is fine, it just tends to make for a more sedate flyer, but any hint of tail heaviness is a recipe for disaster sooner or later - probably sooner.

The next point involves the u/c skid. The model will take off, but it needs to be from a smooth area if the skid isn't to snag on a tuft of grass or bump. Much the same applies during landings, so try to bring the model in just slightly nose high and flare it gently onto the ground. If you stall it onto the ground you'll find those unsupported axles giving you problems with flexing and tangling the wheels in the rigging.

Apart from those points the model really is very pleasant to fly. Not aerobatic by any means, but that would just be so wrong for this type. However, gentle loops and stall turns are possible and don't look too far out of place. Since most Nieuport types of the time were considered racers, go relatively fast (not really that fast at all) and turn left around the pylon.

I recall an amusing story about Bleriot, who's aircraft were proving much slower than the Nieuports he was racing against, sawing a couple of feet off the wings to help make his plane faster. Needless to say, he wasn't the one due to fly the thing in the next heat. ■

All finished with pilot figure, dummy cylinders and rigging. Not the sleekest racer around.



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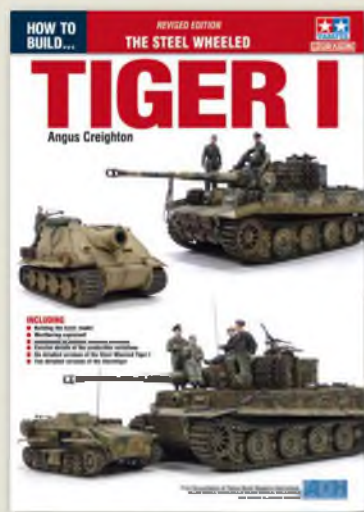
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MASTER MODELS

Blériot XI:

Gallic Icon

This fragile monoplane changed the way we viewed ourselves and the world

When erstwhile lorry headlamp inventor Louis Charles Blériot turned his creativity to aviation, the whole world was forced to

sit up and pay attention. When he crossed *La Manche* in a heavier-than-air machine on the 25th July 1909, his 36-and-a-half minute flight made him an international celebrity. Britain stopped



1: The model has good rudder authority, and turns are always initiated by the rudder.

2: No-nonsense rudder.

3: Beautiful joinery and metalwork. Note wires and bracketry too.

4: A further view of the tailplane, showing the tailplane-to-longeron braces



being an island, and France began its formidable aviation industry.

NUMBER XI

The 1909 Blériot XI is one of the great icons of aviation. When others were obsessed with biplanes, Blériot saw the future belonged to monoplanes. In fact, the Blériot XI was largely designed by Raymond Saulnier (he of Morane-Saulnier). It was a development of the Blériot VIII, which first flew in the previous year.

The XI's three-cylinder Anzani engine, at the wing's leading edge, pulled it through the air, and its wooden box-girder fuselage, open at the rear, employed wire cross-bracing. A cabane on the fuselage braced the flying wires to the wings. The Chauvière Intégrale propeller was significantly innovative too. It was made of laminated walnut, and was the first European design to match the efficiency being achieved by the Wright Brothers in the USA.

At the conclusion of his epic flight, Blériot was forced to make a pancake landing, and the XI suffered some damage. It was hastily patched up for display at Selfridges department store in London, but never flew again. It went on display at the Musée Des Arts et Métiers in Paris.

THE MODEL

This Blériot XI model is owned and flown by James Gordon. He acquired the XI

Slight down elevator in level flight is utterly authentic.



from her builder Don Coe, who is a hugely respected scale builder, famous for his utterly fastidious approach to scale accuracy. The Blériot XI took Don two-and-a-half years to build. She was awarded the Shuttleworth Trophy at the Old Warden Scale Weekend last year; this is in addition to many more scale awards since.

PLAN & DUNCUMENTATION

The model was built from the *Mick Reeves Models* plan with Don Coe's addition and is based on the example held in flying condition at the Shuttleworth Collection at Old Warden, Bedfordshire. Don was able to visit the original to take measurements and a series of detailed photos on which to base his model.

The Mick Reeves plan is considered very accurate. Don takes a highly meticulous approach to building and the model's structure very closely follows that of the original.

FUSELAGE

The longerons and cross pieces are made from cyparis, a hardwood, and tapered over their length. These structural components are held together with hand made metal brackets are attached with 10BA bolts, and threaded tensioners, then braced with wires which

carefully replicates the full size.. Note that no glue was involved in this construction.

WINGS

Don used the Mick Reeves rib pack, which requires five spars and to achieve the authentic aerofoil shape the Blériot has a wire trailing edge. Each wing panel is over 52 inches long, with a 27 inch chord. Note that wing has fully functioning wing warping, of which more later.

TAIL

For easy transport, the tail is made detachable and is of mainly beech construction. It is held to the fuselage with scale bolted brackets, with authentic adjustable incidence for trimming.

RUDDER

The pilot's rudder bar moves with the rudder, with all the radio hidden under the floor of the fuselage.

ENGINE REPLICA

The superb dummy three-cylinder Anzani engine is made up from Mick Reeves core parts, with Don's additions, and mounted around the Laser engine. The finished result is very impressive.

DUMMY BRASS FUEL TANK

The wonderfully characterful dummy brass fuel tank situated in front of the pilot was

entirely hand made by Don, complete with hand fuel pump. It is held in place with 22g phosphor bronze straps, with 1.5mm brass rivets.

EXHAUSTS

Dummy exhausts are made up from aluminium tube, with the exhaust gases exiting under the model.

SCALE PROPELLER

This is hand-carved from mahogany and beech. It complements the engine beautifully.

MAIN UNDERCARRIAGE

The undercarriage uprights are made from solid 5/8" x 18" silver steel mounted on beech longitudinal and vertical members, all carved to shape and bolted together, as per the full size. The undercarriage is fully sprung with rubber bungees.

All three wheels were hand made by Don, with wrapped ply rims laced together with about 40 spokes per wheel.

DUMMY PILOT FIGURE

This began life as a Mick Reeves Models latex pilot, to which Don has added a natty Edwardian frock coat, and suitable trousers.

COVERING AND FINISH

Natural Solartex was used for the



5: Ultra thin undercambered section is apparent in this view. Note engine right on leading edge. **6:** A great shot for all stirrup and step fanciers. **7:** Don used the core element of the Mick Reeves Models dummy engine to make up the Anzani. **8:** I defy you to tell this from the original. **9:** Undercarriage faithfully models the original. Note bungees and their terminations. **10:** The magnificent dummy engine is based around Mick Reeves Models core parts with Don's additions.

11



12



11 & 13: The cockpit area is a thing of beauty. The more you look, the more you see. **12:** Don fabricated the brass tank and pump from scratch.

13



14: Thye model has beautifully executed wood work and metalwork throughout.

15: Don made up the spoked wheels himself. **16:** Naturally, all taping and stitching is functional.

covering, with fully functioning rib stitching on wings and tailplane.

Weathering was achieved by sponging on a mix of matt white and black. This was then varnished with Ronseal Quick Drying Gloss.

The covered side panels to the fuselage are attached with press studs, as per the full size, which allows access to the radio and linkages.

FLYING WIRE AND BRACKETRY

All flying and landing wires are completely structural

with fully working wing warping to control roll. Every bracket and wire is exactly like the full size, and every link does a job in holding the structure together. Such attention to detail has produced an astoundingly faithful scale model.

PILOT'S NOTES

To quote James:

"The Blériot really is a delight to fly; O pen up the Laser and it just flies itself off the ground. The rudder is surprisingly effective considering it's small size, and

14



15



16



the wing warping works superbly. In the turns, lead with rudder and add wing warp to suit. It is very controllable, even in quite strong winds.

The elevator is quite sensitive in flight, but a bit of power is still needed for a smooth flare for landing. The Laser sounds gorgeous and it's a model that is just as imposing in the air as on the ground. Scale like speeds are easily obtained and it sits in the air beautifully. On some low passes, the wind gets under the pilots arm so it looks like he's waving as it comes past.

It really is just magic to fly and so rewarding, especially the landings!" ■

SPECIFICATIONS:

Bleriot XI - Built by Don Coe

Scale:	1/3rd
Wingspan:	116"
Weight:	21 lbs
Engine:	Laser 360v (60cc)
Prop:	Wooden 28x7



17 & 18: Rear undercarriage springing arrangements.



LOUIS BLERIOT AND HIS FLYING MACHINES

Louis Bleriot was by no means the first man to successfully develop and fly a heavier-than-air aircraft, but the late Ron Moulton's appreciation here reveals the typical single-minded determination and application that rewarded the pioneers of aviation with the success they worked for

When the first *Salon Aeronautique* opened on Christmas Eve 1908 in Paris, Louis Bleriot exhibited three of his latest machines. The

type IX monoplane had a 16 cylinder Antoinette engine mounted within the fuselage, which was commendably streamlined with extended longerons to a tapered nose. The Type X was to the Wright

formula, being a biplane with capacity to carry three including the pilot and for its first ever public viewing, the Type XI monoplane was shown with a seven cylinder R.E.P. engine driving a four bladed airscrew.

Mike Beach in his authentic replica, accepting special airmail envelopes from an Airline Captain.





Daily Graphic, Monday July 26th 1909 edition, full of reports on the channel crossing by Bleriot the day before. The landing was at 5.08 am! The paper included interviews with Louis Bleriot on "How I flew the Channel" with a description of his costume and cork waistcoat for flotation.

Bleriot was then age 36 and had mixed success with many diverse experiments since the turn of the century. He began with ornithoptors, then he linked with Gabriel Voisin to establish the first ever aircraft manufacturing company, producing float equipped gliders which were towed into the air from lakes and rivers, not always blessed with success. The Type IV was typical of the extreme efforts made in the attempts to achieve flight. It had two 24hp engines linked to drive contra-rotating airscrews, yet failed to lift from either water or land.

After witnessing the famous flight over 200 metres by the Brazilian Santos-Dumont in his 14bis canard, Bleriot was inspired to follow the canard arrangement in his Type V, using wing warping controls via a single joystick. Taken to Bagatelle where Santos-Dumont had flown, the attempts to fly in March and April 1907 resulted in a few hops and crashes.

Then came a complete departure in Type VI with a tandem wing layout as used by Samuel Langley in America on his 'Aerodrome'. Louis Peyret had been testing this layout over the previous four years and was pictured in the mid fuselage cockpit. It had wingtip controls but no elevators in the conventional sense. Known as the Libellule or 'Dragonfly' it went through many tests beginning in July 1907, involving increase of wing area and a weight shift arrangement with the pilot seated as though in a skiff, so that Bleriot could move fore and aft. The feature gave Louis his true *Baptême de l'Air* with a 120 metre hop and then a turning flight of 200 m within the same month.

Changing the 24hp engine for a 50 hp Antoinette was to give Bleriot a valuable lesson in crash survival when the engine quit at 25m and le Patron threw himself onto the parchment covered wings as the Type VI's short life ended. Bleriot was to

become a 'Monoplanist', producing the VII which flew up to 500m and only crashed when a wheel ran into a hole. After that came the VIII of April 1908 with its stronger 'bedstead' style undercarriage, enclosed fuselage and the 'Cloche' bell shaped base to the control column which operated ailerons and elevators by cables.

At first it had extended longerons like the earlier Type V, but changes removed that feature and other experiments included addition of a third surface with a mid mounted stabiliser and two types of pivoting ailerons at the wingtips. At last Bleriot was able to rival his contemporaries with long flights. He was awarded a 2,500 Francs prize for altitude and achieved national fame for a cross country flight from Toury to Artenay (with stops for magneto repairs).

By then a self-trained pilote with the three machines to show in Paris, Louis Bleriot had used up all his and his wife's financial resources. The Type IX proved to be too heavy, the Type X was inadequate and his only hope was the Type XI engineered by Raymond Saulnier and first flown at Issy le Molineux on January 23rd 1909.

Initially, it needed an increase of wing area from 12 to 14 square metres to make flights of 700m., but after moving from Issy to Buc near Versailles, Bleriot was flying up to 2,500m and able to perform the basic manoeuvre of turning. It was then using a seven cylinder R.E.P. engine and had a teardrop shaped vertical surface mounted above the landing wires pylon. The device was intended to stop side-slipping.

An offer from Alessandro Anzani to borrow a much lighter three cylinder engine was taken up in May 1909 with immediate success. Although the Anzani rattled as it spewed oil and greasy film at every stroke, it could keep running reliably for an hour. Bleriot tried to get exclusive rights, but Anzani asked for more than he

could afford. Fortunately, Alice Bleriot had rescued the son of a Haitian Planter from serious injury and, in gratitude, the deal with Anzani was settled, so Bleriot's fortunes began to change.

Only six months after the Type XI had begun first tests, Bleriot was flying between landing sites. He shared the 100,000 Franc Osiris prize for scientific discovery with Voisin and won a further 9,000 Francs from the Aero Club de France for a 40 kilometre flight. As with his rivals, he began to look at the £500 offered by Lord Northcliffe of the Daily Mail, later raised to £2,500, for the first to fly across the English Channel.

La Manche

Others planning an attempt were Charles Rolls and the Count Serge de Bolatoff, but the strongest of the competitors was the British adventurer Hubert Latham who was supported by Leon Levavasseur and the large Antoinette, already established at Blanc Nez near Calais by July 13th while Bleriot was flying to Orleans.

Latham made a test flight from a field behind the cliffs and after circling around Sangatte, missed his intended landing spot in a clover field and arrived in standing corn. With a broken wheel and landing strut repaired, an attempt on the crossing was made six days later and as history has recorded well, the Antoinette came down in the sea six miles offshore when the engine failed.

Another Antoinette was prepared and was being assembled as Bleriot's Type XI arrived by rail at Calais on July 21st. With two contenders for the Daily Mail prize, the excitement reached a fever pitch. Although hobbling on crutches because his leg had been burnt twice during long flights, Bleriot selected a farm at Les Baraques as his flying site and waited for a change in the weather. Up at 2.30 am on July 25th when clear skies and the wind



Just room enough to remove Mike Beach's Bleriot Type XI replica from his garage where it was made, and move it to a trailer carrying the wings and tail assembly.

had died, the machine was flown around Calais for fifteen minutes at 4.00 am and landed back safely to await sunrise. Topped up and checked, Bleriot took off again half an hour later, while Latham and his team were still asleep in their hotel!

Flight into history

Charles Fontaine of the 'Le Matin' French daily newspaper had already established himself near Dover Castle with a large Tricolour flag to signal location of a suitable landing site. He was not to be disappointed as Bleriot neared the end of his famous 23 mile flight into history. The flag was seen, but as the Type XI entered the gap towards the North Foreland Meadow that Fontaine had selected, it was tossed and turned in turbulence from the buildings and arrived heavily but safely on the slope, now marked by a permanent memorial.

Recognised as a national hero and feted wherever he appeared, Louis Bleriot and his machine became a symbol, said to

mark the end of British insular safety according to politicians, but much more importantly, it was to signal the beginning of practical aviation.

When reflecting on how the aeroplane had derived from a series of self-designed experiments; had been used to train its pilots who had no experience of flight; how it launched Bleriot into mass production and Bleriot flying schools training aviators from many nations at Pau; the Type XI is seen as the originator of general aviation as we know it today.

Only nine months after its first flight, the Bleriot Type XI had accumulated orders for over a 100 copies, in itself a problem eventually solved by establishment of a factory that employed 150 engineers at Levallois near Paris. About 150 Type XIs were supplied to private owners, Air Forces and the Bleriot flying schools, one of them established at Hendon.

There were many clones and in due course of time, true-to-type replicas, one of

which, made by Mikael Carlson of Sweden, repeated the channel crossing, as did Jean Baptiste Salis who re-traced the route twice with an original Type XI in 1954 and 1959.

Survivors still ...

The Shuttleworth Collection has a fine, and occasionally airworthy example with the constructor's number 14, as used in the Bleriot School at Hendon, crashed in 1912 then stored under Blackfriars Bridge in London until rebuilt by A.E. Grimmer, then sold to Richard Shuttleworth in 1935. In its original form with tailwheel and castoring main wheels, it retains the 25hp three-cylinder Anzani, though others were fitted with the 50hp Gnome. This example is probably the world's oldest aeroplane with the earliest aero engine, still in flying condition.

Well known for his restoration of vintage flying models, Mike Beach worked for four years on his 1:1 scale Type XI until completion in 1979. Made with every intention of flying, Mike did manage to create an altitude record of 410ft above sea level over Booker airfield which gave him a safe (!) 10ft clearance above the runway on one of the hops, but he was wary of the low power from an ABC twin cylinder engine, and the controllability at 34mph airspeed.

Exhibited in the London Millenium Dome and thereafter in the Brooklands Museum at Weybridge, it is true to all the detail of the originals and was made to drawings by Hayward and the Dutch engineer John Rozendaal.

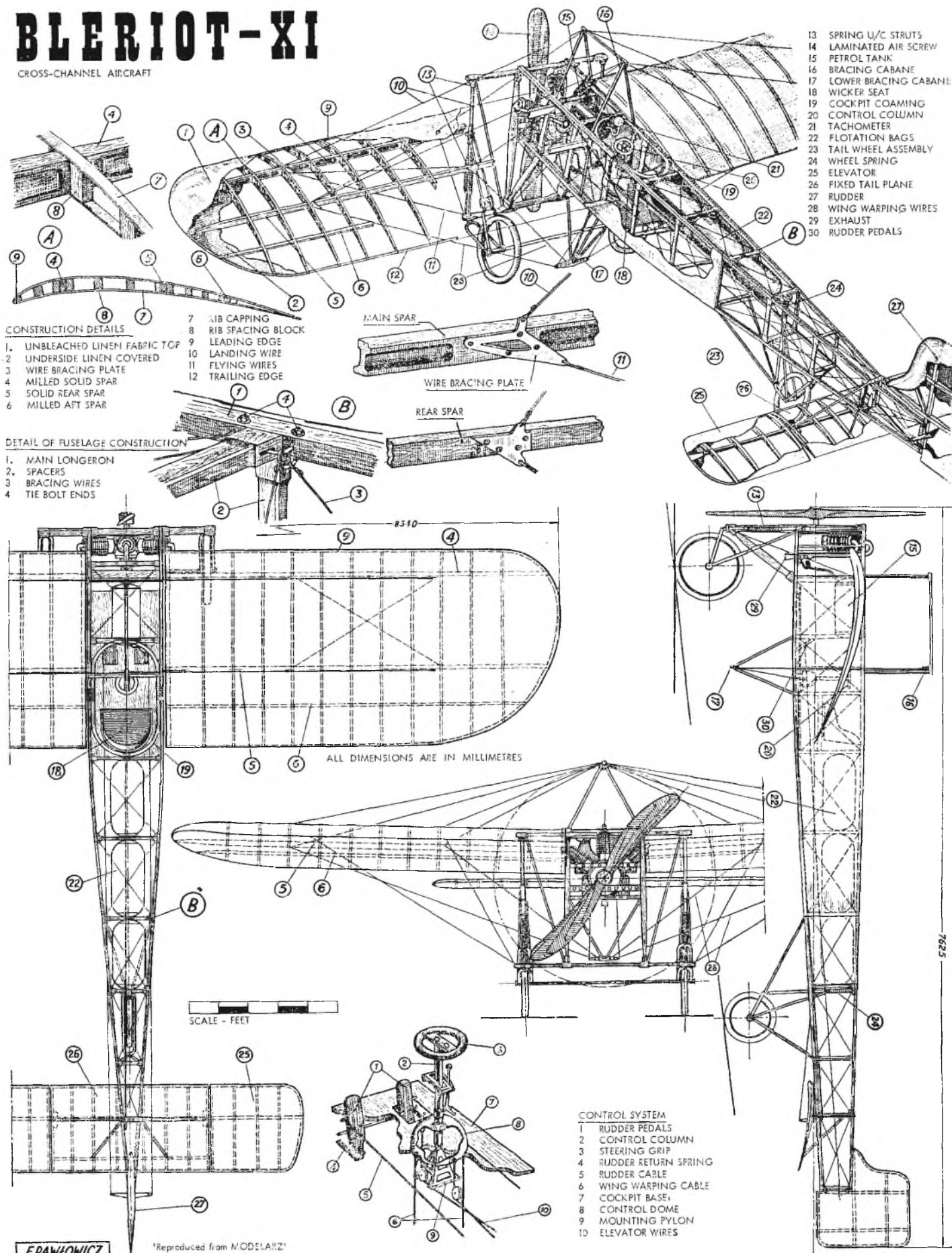
Twenty five actual originals survive in Museums of thirteen nations around the world, but surely the most famous of all, Bleriot's own cross-channel Type XI is the one in the Musee National des Techniques, 292 Rue St.Martin. ■



The oldest authentic Bleriot Type XI, with the oldest engine, still capable of airborne action belongs to the Shuttleworth Collection at Old Warden, where it can be seen up close any day of the week for a very reasonable fee.

BLERIOT-XI

CROSS-CHANNEL AIRCRAFT



Reproduced to 1/60th scale, this most famous of all the Bleriot types is eligible for the scale model contests beginning in May, 1965, for subjects in the 20th Century Fox film "Those Magnificent Men in their Flying Machines".

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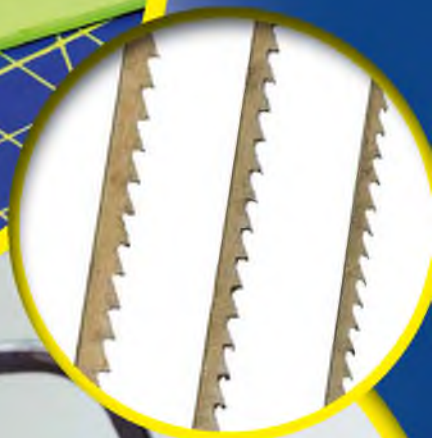
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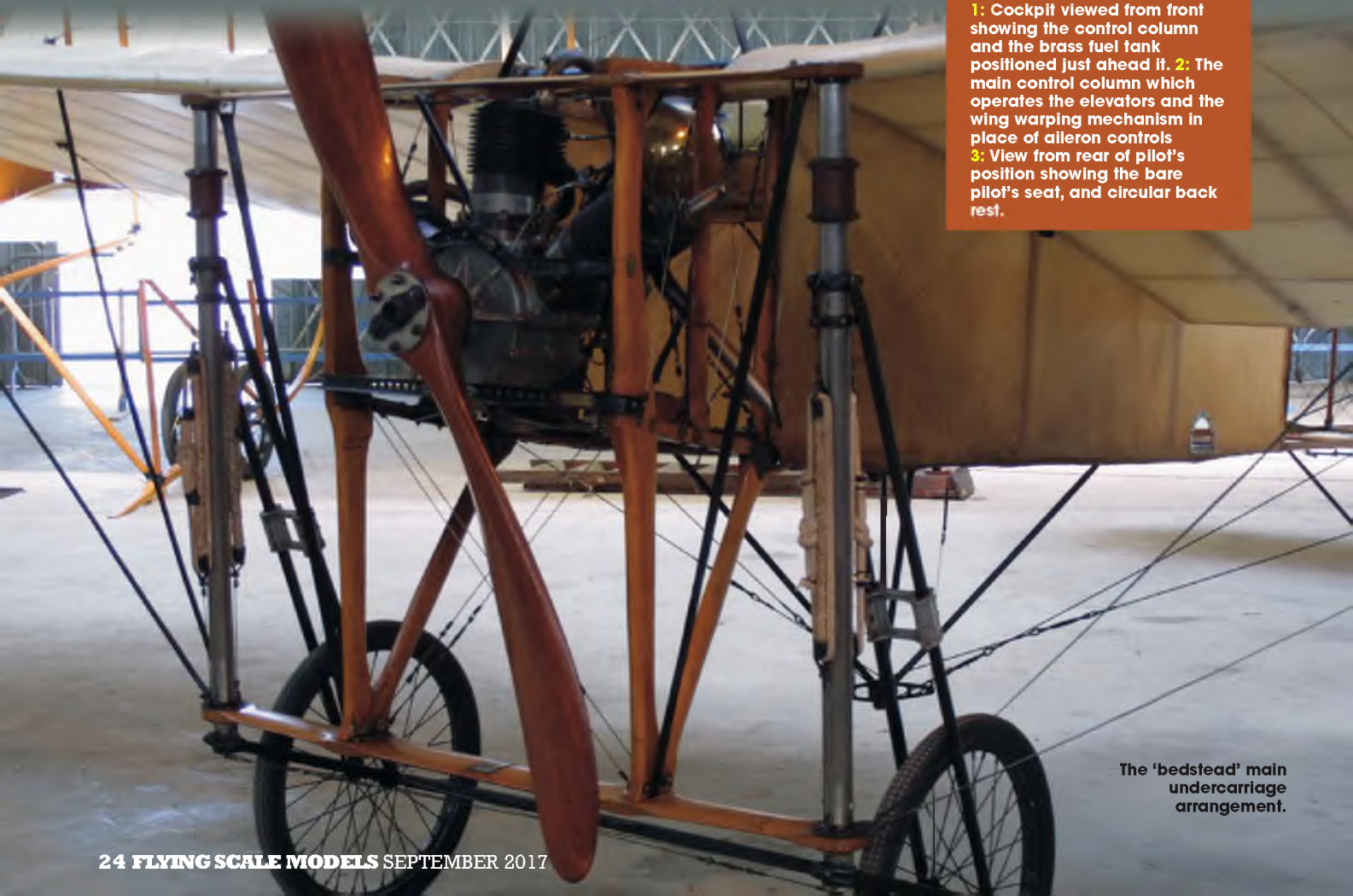
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Blériot XI

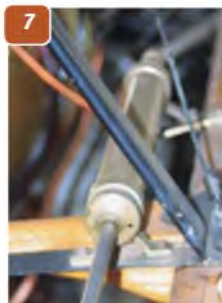
A close-up look at the Shuttleworth Collection's authentic original machine on display at Old Warden airfield, Bedfordshire.



1: Cockpit viewed from front showing the control column and the brass fuel tank positioned just ahead of it. 2: The main control column which operates the elevators and the wing warping mechanism in place of aileron controls. 3: View from rear of pilot's position showing the bare pilot's seat, and circular back rest.



The 'bedstead' main undercarriage arrangement.



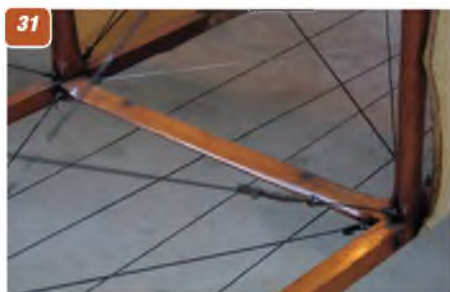
4: Rim of the cockpit. **5:** One arm of the wooden rudder bar on the front 'floor' of the cockpit well. **6:** The manually operated pump to the fuel tank looking from a position ahead of the cockpit area. Pump is mounted on the right hand cockpit edge and also seen from the pilot's position in picture **7**: Tank needs to be regularly pumped during flight. **8:** Ignition switch in left hand upper corner of cockpit. **9:** Fuel gauge - left hand side of fuel tank tank. **10:** The front truss above the fuselage ahead of the cockpit, for the wing bracing wires. Rear truss seen in pic **11**. **12:** The tailplane, showing metal bracing and 'all-flying' elevator outer panel. **13:** Elevator control horn and the barckets that secure the tailplane to the fuselage longerons.



14 & 15: The brass fuel tank mounted ahead of the cockpit. **16 & 17:** Two views of the three cylinder Anzani engine installation. **18:** Close-up of the metal engine mounting brackets. **19:** Underside of the fuselage below the pilot's position showing pulley guides for control wires leading to rear control surfaces. Vertical wires lead down to the wing warp mechanism, braces to which are the angled metal tubes also in view. **20:** The wing warp mechanism below the fuselage. Vertical wires lead up to the control column, others to the outer wings.



21: Detail of the propeller hub. **22:** Slightly scimitar shape to the propeller. **23:** Typical example of turnbuckles for adjusting the bracing wires. **24:** Typical anchor point for wing bracing wires - this one on top wing surface. **25:** The all-moving fin (no separate rudder) also showing the control horn. **26:** Close-up detail of the rudder horn. The vertical metal post ahead of the ruder post is for adjusting the tailplane incidence. **27:** Rear fuselage structure. **28:** Longerons strengtheners at tailwheel mount position. **29:** Typical wire bracing on rear fuselage **30:** Linen covering to fuselage sides from pilot position forward. **31:** Detail of typical wooden fuselage cross brace.

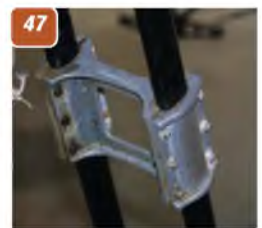


32: Tailwheel. This one is steerable and non-authentic, although structure is basically correct. Modification by Shuttleworth makes aircraft easier to handle. **33:** Detail of the steering linkage. **34:** Coil sprung tailwheel strut. **35:** Foot stirrup on the left side of the fuselage behind the wing. **36:** View down the fuselage from the front.





37: Wing leading edge.
38: Wing underside wire brace anchor point.
39: Wire braces on wing upper surface.
40: Anchor point for main undercarriage brace strut.
41: The left undercarriage leg.
42: Detail of upper main undercarriage support.
43: Close-up of the attachment for the castoring mainwheel.
44: Close-up of the bungee cord undercarriage shock absorbers.
45: The full main undercarriage shock absorber, top mount of which is detailed in 46.
47: Detail of cast metal spacer on the front vertical mainwheel fork.
48: Mainwheel unit and castor.
49: Another view of the main wheels, showing the metal vertical and horizontal fork braces.



Flight of 217 (General Reconnaissance) Squadron Anson Mk.IIs on patrol. The type entered service with Coastal Command with 48 (General Reconnaissance) Squadron at RAF Manston in March 1936, becoming the first monoplane to enter squadron service under the RAF expansion scheme. (Richard Riding Collection).



AVRO ANSON

Created as a Warbird, the 'Faithfull Annie' was destined for a long and less aggressive service career with the Royal Air Force that spanned over 30 years



In December 1939, the Royal Navy's submarine *HMS Snapper* was attacked, in error, by an R.A.F. Avro Anson Mk. I. The attacker scored a direct hit with one of the 100 lb. bombs released, this devastating strike resulting in a total damage of four broken light bulbs!

One may imagine that *Their Lordships* at the Admiralty might, having overcome

their initial annoyance at this 'Blue-on-Blue' incident might well have enjoyed a spell of mirth at the expense of '*Their Airships*' at the Air Ministry for having commissioned a bomber incapable of bombing the skin of the proverbial rice pudding!

That Ansons were a mainstay of Royal Air Force Coastal Command in 1939 illustrates the weakness of this Service.

Their eventual replacement by Lockheed Hudsons was a major step forward.

Even so, and even though that incident demonstrated the Anson's inadequacy for its intended purpose as a maritime patrol and reconnaissance bomber, the R.A.F. was far from done with the Avro Anson, which remained in useful service, in later variants, for training and communications roles well into the 1960s



Cockpit view over the shoulder of the crew of G-AMDA, taken by Richard Riding during 1961, the Anson Mk.1 now in full warpaint at IWM Duxford.



Anson VX-F in full military livery. It features the smooth engine cowls, devoid of the blister rocker box fairings. (Richard Riding Collection)

and also in civilian service. Indeed, this quaint old lady found her way around the world to a surprising number of countries and as such, she well outlived most of the more warlike warbirds of her generation.

A GOOD EXCUSE FOR DOING NOTHING

After the end of WW1, successive British governments, and indeed others too, adopted their 'Ten Year Rule', which assumed no major military confrontation for at least a decade, thus allowing armed forces to be run down to very low levels.

With that run-down, military weaponry development suffered in equal measure as governments sought to recover from the crippling cost of four years of total war and as economic recovery faltered, so the 'ten year' assumption was successively re-applied.

REARMAMENT - BUT WITH WHAT?

Thus, when governments began to wake up to a changing worldwide political landscape in the early 1930s, minds began to refocus on the need for rearmament and to bridge the technology gap created by more than two decades of military stagnation - including in aviation. Unsurprisingly, redefining what represented state-of-the-art military equipment required something of a 'blank-sheet' approach, not least in the field of aviation, where the undoubted successes also spawned failures of varying degrees!

Initially known as the Avro 652A, the Anson was developed during the mid-1930s in response to an Air Ministry requirement of 1933 for a relatively inexpensive landplane for coastal maritime reconnaissance duties in which the proposed aircraft would perform as a supplement to the more capable, but expensive flying boats that the RAF had adopted for conducting long range maritime reconnaissance missions.

Avro's response to this requirement was based on their earlier Avro 652 airliner, the competitor aircraft for the contract, de Havilland's DH 89 also being airliner based. Single prototypes of each were ordered, the Avro aircraft being first flown on 24 March 1935. Following an evaluation in which the Type 652A bested the competing de Havilland DH.89 biplane, Avro's aircraft was selected as the winner, leading to Air Ministry Specification 18/35 being written around the type and an initial order for 174 aircraft was issued in July 1935.

Given the maritime support role envisaged, the Type 652A was promptly named after British Admiral George Anson.

INTO SERVICE

The Anson initially entered service in 1936 for maritime reconnaissance operations alongside the larger flying

Anson Mk.I NK713, without turret, was operated by No 1 Ferry Pool Air Transport Auxiliary at White Waltham, where it was photographed in July 1945. (E.J. Riding photograph)





A camouflaged Aldergrove-based Anson I of No 502 (General Reconnaissance) Squadron on convoy patrol early in the war. (Richard Riding Collection).

boats. With only a single fixed forward firing machine gun and another in an upper rear fuselage turret, plus 360 lbs (160 kg) of free falling bombs, (160 kg) which could consist of a maximum of two 100 lbs. (45 kg) and eight 20 pounder (9 kg) bombs carried in the aircraft's wings, by the time of the outbreak of the Second World War in 1939, the Anson was soon found to have become obsolete for front line combat roles.

However, large numbers of the type was put to use as multi-engined aircrew trainers, having been found to be suitable for the role and became one of the mainstays of the British Commonwealth Air Training Plan. The type continued to be used in this role

throughout and after WW2, remaining in RAF service as a trainer and communications aircraft until 28 June 1968.

During the post-war years, the Anson was increasingly produced for the civil market, being used as a light transport and executive aircraft. By the end of production in 1952, a total of 8,138 Ansons had been constructed by Avro in nine variants, while a further 2,882 aircraft were manufactured by Federal Aircraft Ltd in Canada from 1941.

WHEN 'ANNIE' WAS NO LADY

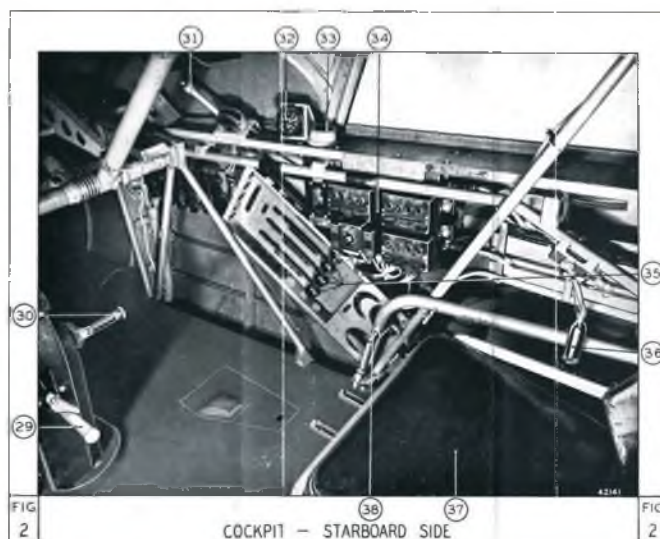
Although combat actions involving the Anson were few indeed, one incident of raw combat involving the type occurred

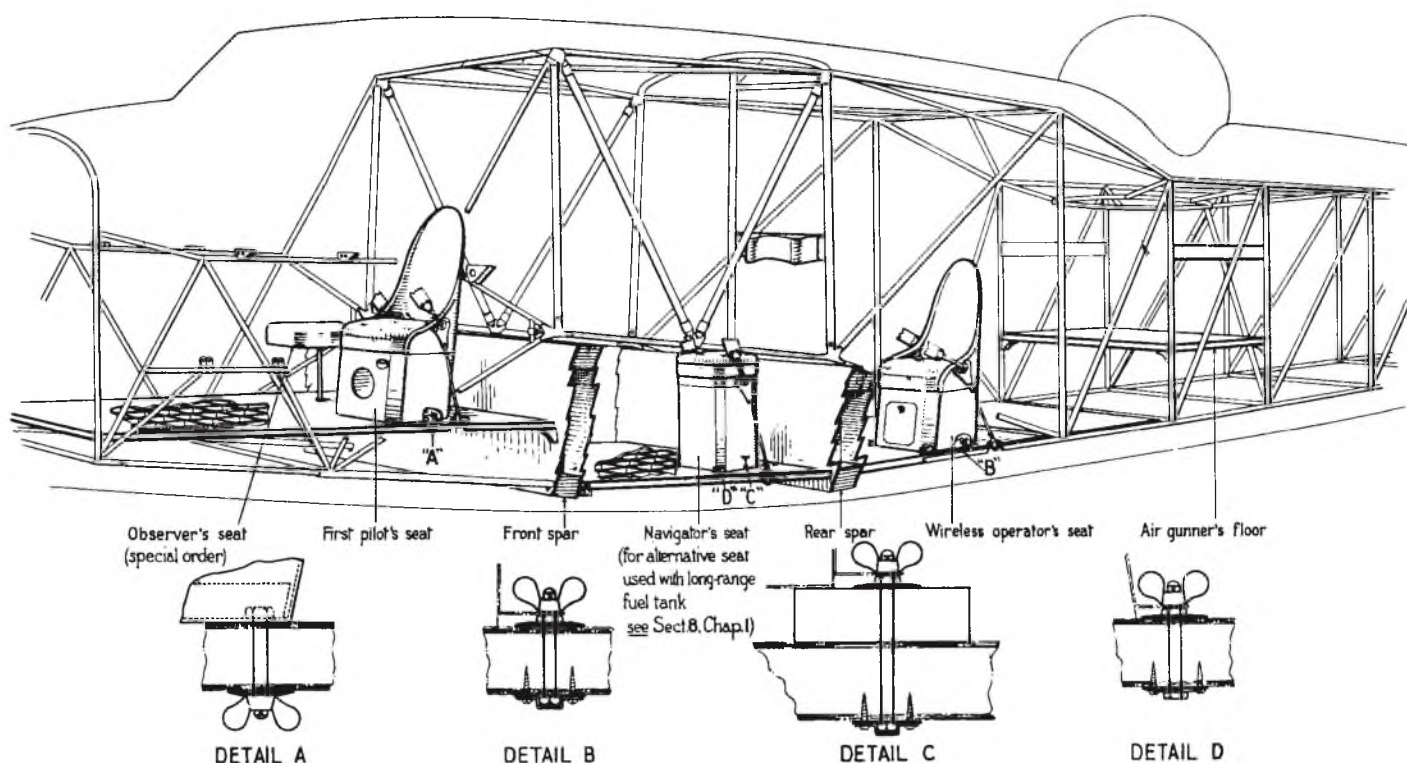
In June 1940, when a flight of three Anson Mk. Is was attacked by nine Luftwaffe Messerschmitt Bf 109s. Remarkably, before the dogfight ended, without losing any of their own, one of the Ansons had destroyed two German aircraft and damaged a third.

MAID OF ALL WORK

The aircraft's true role, however, was to train pilots for flying multi-engined bombers, such as the Avro Lancaster. The Anson was also used to train the other members of a bomber's aircrew, such as navigators, wireless operators, bomb aimers and air gunners. Post-war, the Anson continued in the training and light transport roles, until the Royal Air Force

COCKPIT





finally bid farewell to 'Faithful Annie' in 1968.

During the 1939-45 war years, the British Air Transport Auxiliary operated the Anson as its standard taxi aircraft, using it to carry groups of ferry pilots to and from aircraft collection points. There was no fatal mechanical failure of an Anson in ATA service, and it was typically very well regarded.

TO FAR-AWAY PLACES WITH STRANGE-SOUNDING NAMES

The Royal Australian Air Force (RAAF) operated a total 1,028 Ansons, the

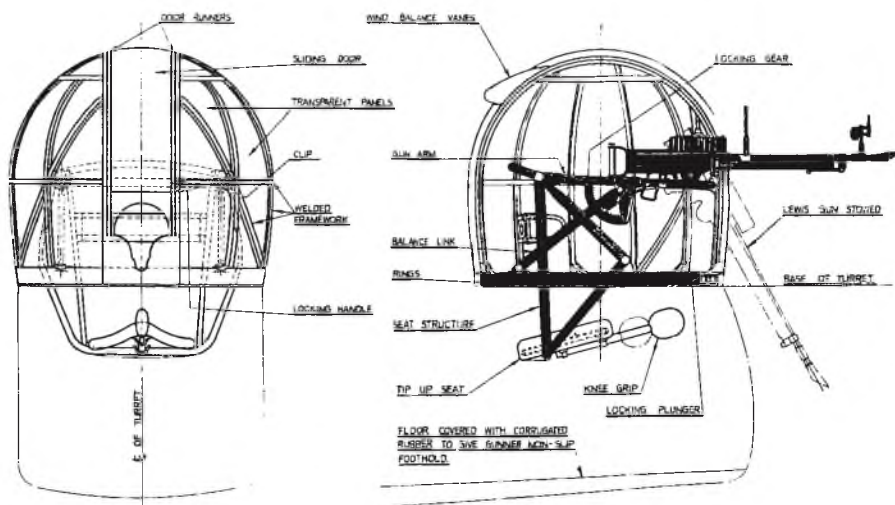
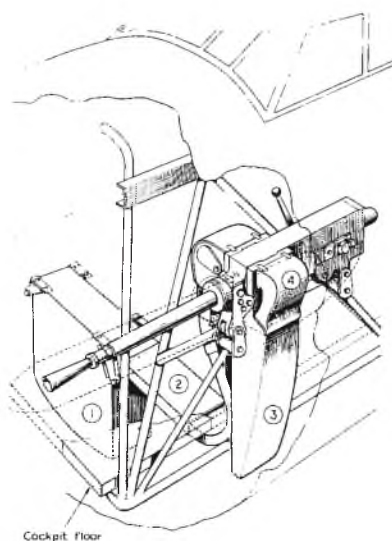
majority of these being Mk Is. and these aircraft continued to be operated until 1955.

The Royal New Zealand Air Force (RNZAF) operated 23 Ansons as navigation trainers during the Second World War, (alongside the more numerous Airspeed Oxford), and acquired more Ansons as communication aircraft immediately after the war.

The Royal Indian Air Force operated several Ansons as part of the No. 1 Service Flying Training School (India) for Pilot and Navigation training. These Ansons continued this role post-independence,

until retirement at an unknown date.

The Royal Canadian Air Force (RCAF) and Royal Canadian Navy (RCN) operated the aircraft until 1952. Canadian Ansons were used throughout the training schools of the British Commonwealth Air Training plan for training aircrew, some aircraft were pressed into operational service with the RCAF's Eastern Air Command for combat operations with the EAC during the *Battle of the St. Lawrence River* from 1942 right up until V.E. Day in May 1945, undertaking patrols and action against German submarines interdicting the





The Anson Mk.1 was put into production at Yeoman in 1935, the first example of which (K6152) was first flown in December 1935. (Richard Riding Collection).

lower St. Lawrence waterway and islands on the Canadian east coast, where U-Boats were periodically attacking shipping convoys and lone merchantmen. Avro Ansons, each carrying two, 250 lbs bombs were impressed for this task.

Interestingly, United States Army Air Forces (USAAF) employed 50 Canadian-built Ansons, which were given the USAAF type designation AT-20.

The Egyptian Air Force (EAF) operated a fleet of Ansons in communications and VIP duties. A specially outfitted Anson was presented to the (then) King Farouk of Egypt by the RAF. The Royal Afghan Air Force obtained 13 Anson Mk.18 aircraft for various duties from 1948, these examples surviving until 1972.

Other military operators included the military air services of Belgium,

Czechoslovakia, Estonia, Ethiopia, Finland, France (Air force and Navy), Greece, Imperial Iranian A.F., Royal Iraqi A.F., Republic of Ireland, Israel, Norway, Paraguay, Portugal, Rhodesia, South Africa, Syria, Turkey and Yugoslavia, plus civilian operators in Bahrain, Brazil, and Cuba.

In all, there were a total of nineteen versions, many of them post-WW2, as Anson production continued with Avro at Woodford. Large numbers of these were being produced for civilian use, where they were operated as light transports by a range of small charter airlines and as executive aircraft by large corporations. Countries which saw civilian operations with Anson's included the United Kingdom, Canada, Australia and Denmark. ■

SPECIFICATION

(Military spec. Mk.1)

Crew: Three-four

Length: 42 ft 3 in (12.88 m)

Wingspan: 56 ft 6 in (17.22 m)

Height: 13 ft 1 in (3.99 m)

Powerplant: Two x Armstrong Siddeley Cheetah IX radial engines, 350 hp (261 kW) each

Performance

Maximum speed: 188 mph (302 km/h) at 7,000 ft (2,100 m)

Range: 790 mi (1,271 km)

Armament

Guns: 1 x .303 in (7.7 mm) machine gun in front fuselage

1 x .303 in (7.7 mm) Vickers K machine gun in dorsal turret

Bombs: 360 lb (163 kg)



Built at Yeoman in 1943 Avro-owned Anson I LT764 pictured at the Aeroplane & Armament Experimental Establishment at Boscombe Down. After serving as the prototype Anson X it was struck off RAF charge in 1949. (Richard Riding Collection).



Anson I G-ALEM, built at Yeoman in 1943 as MG756 and flown latterly by 85 Group Communications Squadron RAF, seen at Croydon bearing its temporary civil registration letters in November 1948 after sale to W.A. Rollason Ltd. It never acquired a Certificate of Airworthiness and was broken up for spares shortly after. (E.J. Riding photograph).

SCALE 1:70

GLAZED NOSE

LANDING LIGHTS
MOVED TO WING
L/E ON GLAZED
NOSE VERSIONS

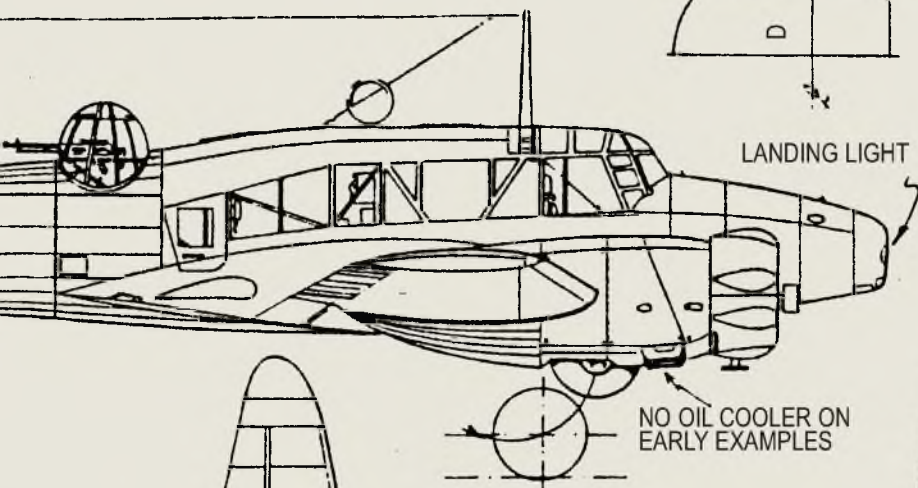
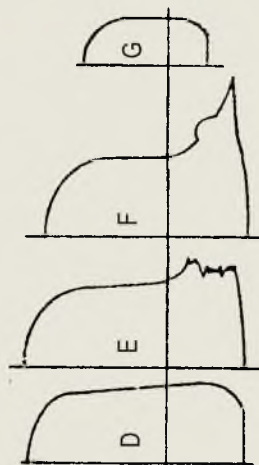
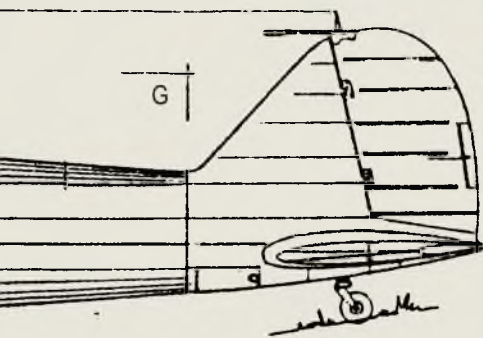
AVRO ANSON Mk.1

DETAIL OF EARLY SLOPED
WINDOW FRAMING

SIDE WINDOW

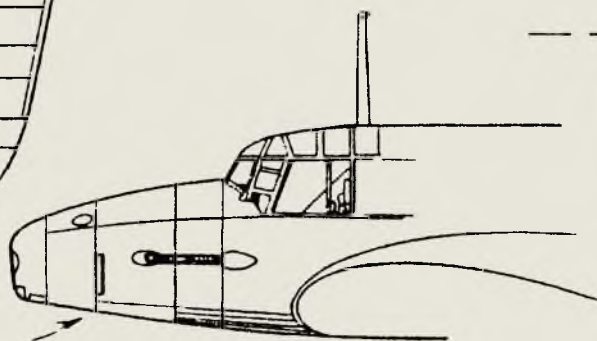
SMOOTH COWL, WITHOUT
ROCKER BOX FAIRINGS



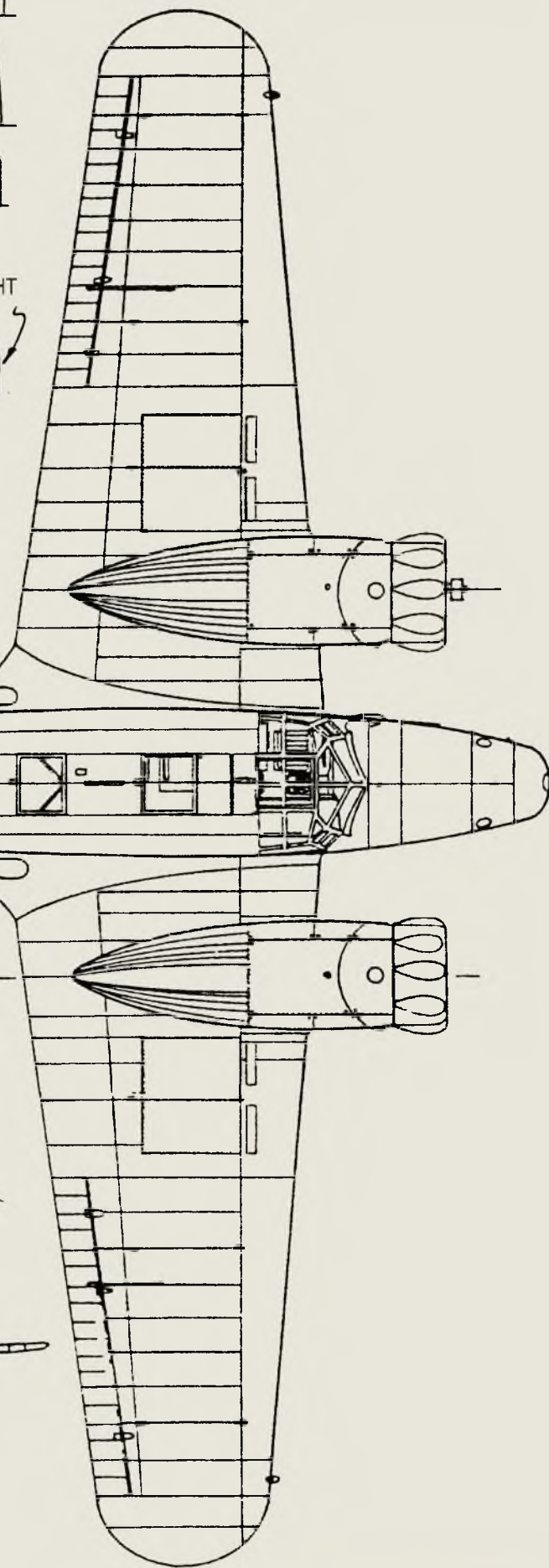
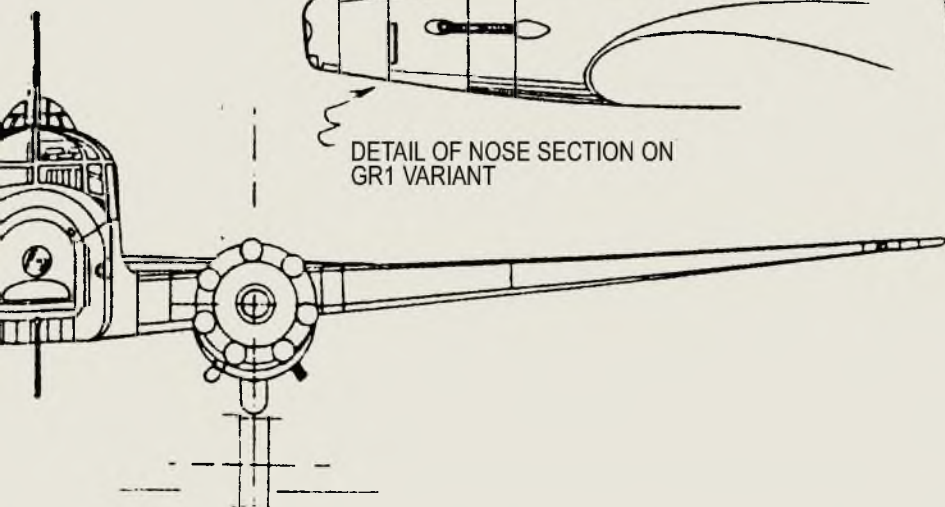


AVRO ANSON GR 1
PLAN VIEW

A.W. TURRET



DETAIL OF NOSE SECTION ON
GR1 VARIANT



AVRO ANSON MK I FLYING COLOURS

Avro Anson Mk I, 6070, No. 1 Central Navigation School, Royal Canadian Air Force. Dark Earth/Dark Green upper surfaces with yellow undersides; serials in Night. Yellow panels and blue/red type roundels above wings (see below, far right)



Below: 'A' scheme pattern of Dark Earth and Dark Green usually applied to Avro Ansons with even-ending serials; note early style upper wing markings with yellow surround. This was modified to blue/white/red roundels General Reconnaissance aircraft from November 1939 to July 1940



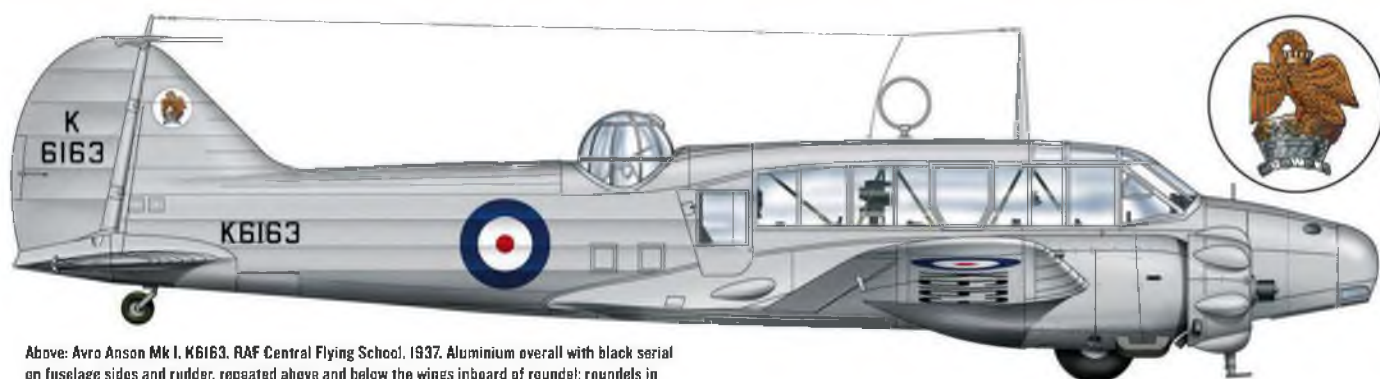
'B' scheme pattern applied to Avro Ansons with odd-ending serials; blue/red roundels



Above: Avro Anson Mk I, R3337, 37-N, No. 1 Air Navigation School, Royal Australian Air Force, Parked (NSW), September 1941. Dark Earth/Foliage Green upper surfaces with yellow undersides; Yellow bands around rear fuselage and wings (outboard of engine cowlings - see scrap view above left). Black code 'N', white serial on rear fuselage and rudder. '37' repeated in white on nose; blue/red roundels above wings, blue/white/red roundel of non-standard proportions on fuselage sides

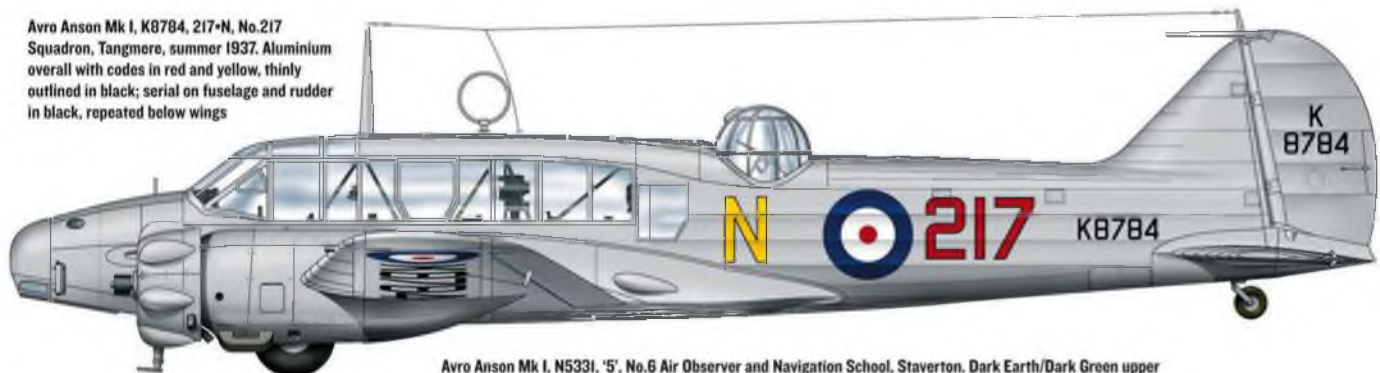
Below: Avro Anson Mk I, EG504, MK+S, No. 67 Squadron, Royal Australian Air Force, Laverton (Victoria). Earth Brown/Foliage Green upper surfaces with Sky Blue undersides; codes and serials in white. Blue/white roundels in six positions



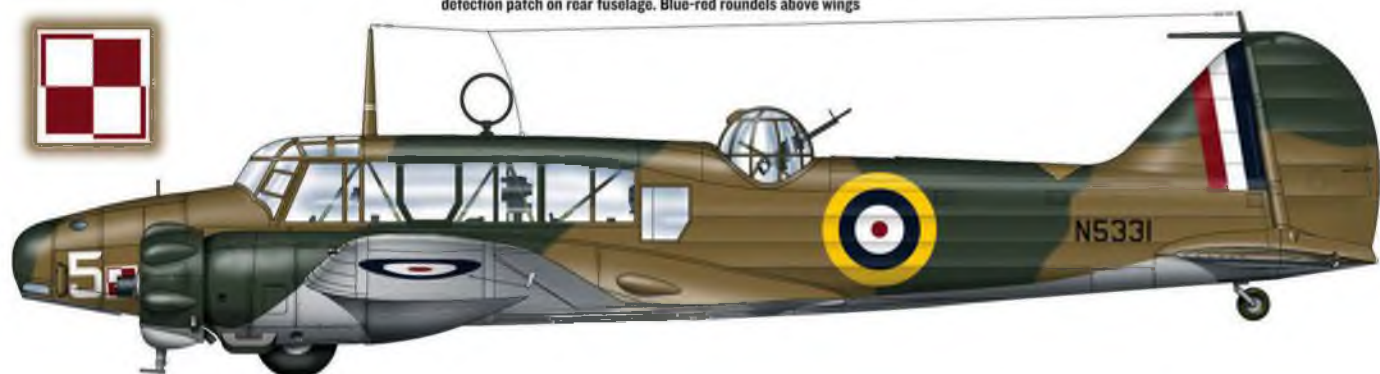


Above: Avro Anson Mk I, K6163, RAF Central Flying School, 1937. Aluminium overall with black serial on fuselage sides and rudder, repeated above and below the wings inboard of roundel; roundels in six positions. CFS crest in a white disc on fin

Avro Anson Mk I, K8784, 217-N, No.217 Squadron, Tangmere, summer 1937. Aluminium overall with codes in red and yellow, thinly outlined in black; serial on fuselage and rudder in black, repeated below wings



Avro Anson Mk I, N5331, '5', No.6 Air Observer and Navigation School, Staverton. Dark Earth/Dark Green upper surfaces with Aluminium underside; Night serial, white code '5' on nose. Polish badge on nose; note mustard gas detection patch on rear fuselage. Blue-red roundels above wings



Avro Anson Mk I, K6285, MW-F, No.201 Squadron, RAF, 1940. Dark Earth/Dark Green upper surfaces with Aluminium undersides; codes in Medium Sea Grey. Night serial on rear fuselage; orange triangle on fin, outlined in black. Note non-standard fuselage roundel proportions; blue/red roundels above wings



Avro Anson Mk I, K6189, XV-R, No.206 Squadron, Bircham Newton, spring 1940. Dark Earth/Dark Green upper surfaces with Aluminium undersides; codes in Medium Sea Grey, serials in Night. Blue/white/red roundels above wings



AVRO ANSON

Close-up study of the Anson Mk.1 held on display at the Imperial War Museum, Duxford

1 2 3 4 The front cockpit screen, showing the multiple component frame members.

5 The crew cabin roof, showing the clear vision panels.

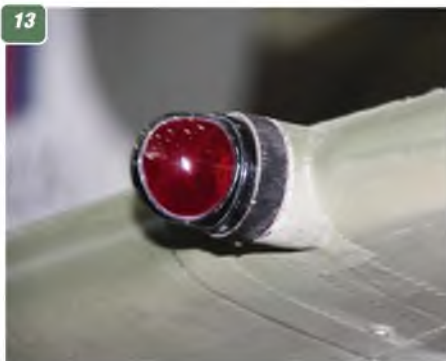


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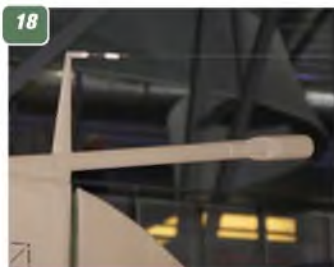
5, 6 & 7: The Avis Leonides engine that powered the Anson. 8: The central bomb bay positioned close to the wing leading edge, showing four 20 lbs. bombs. 9: Two further bomb bays are position left and right of centreline closer to the wing trailing edge. These carried larger bombs. 10: Landing light, wing leading edge. 11: Upper wing surface showing left aileron hinges and control horn. 12: Lower wing surface, showing aileron control horn. 13: Navigation light on wing. 14: Detail of the aileron control horn on wing upper surface.





15: Exhaust damper on right side engine, also showing the undercarriage leg and oil cooler.

16: Left side engine exhaust damper is mirror image of right side. Main undercarriage also shown here.



17: Tail light.

18: Rudder mass balance and aerial mast at top of rudder.

19: Rudder trab.

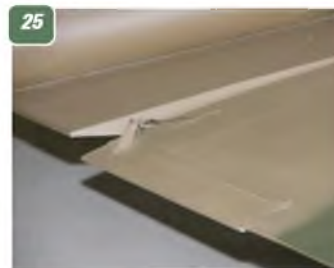
20: The fin & rudder showing hinge positions. Note, there is no cuff fairing.



21-24: Views of the rear gun turret, showing the devastatingly lethal single Lewis gun!

25: Elevator trim tab. 26: Tailplane, showing the elevator outline.

27 & 28: Two views of the non-retractable tailwheel.





29, 30, 31 & 32: Details of the extreme fuselage nose section.

33: Further nose section view, showing the position of the single, forward-firing machine gun just ahead of the front windscreen.

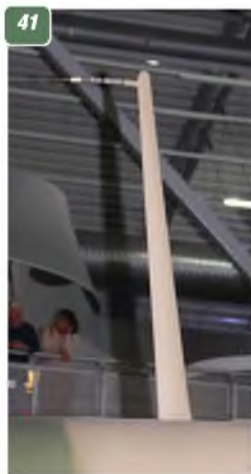
34 & 35: Front and rear views of the retracting main undercarriage.

36: Smooth style engine cowl. Others had rocker box fairings.

37: Air intake fairing in bottom of engine cowl.



38: Retainer latches on engine cowl access panel. 39: Oil cooler positioned just behind the cowl. Position also revealed in pic. 40. 41: The forward radio aerial mast. 42: Cabin access door, right fuselage side only. 43: The long glazed cabin area. Note the deep wing-to-fuselage fairing and fairing bulge just below the cabin access door.



Winter LF1 Zaunkönig V2

A 3/10 scale 94" span radio controlled scale model
designed by Jeremy Collins

This model Zaunkönig is built to a scale of 3/10 full-size (the scale being dictated by the availability of suitable DuBro 'Cub' wheels). Span is 94" (2.4 metres) and weight of the prototype model is around 20 lbs. Power is supplied by an ASP 180 four-stroke. Initially, a fairly old O.S. 120 was fitted, which produced an interesting taxi demonstration, but lacked power for take off. The ASP 180 provides power in reserve and a modern 120 or 150

might well be adequate. However, as nose weight will almost certainly be needed, the extra mass of the 180 is probably sensible.

Five-function radio is essential as mixing of aileron and flap is required and big trim changes occur with flap, I would recommend a radio with seven or more functions and several free mixers. The prototype used a Futaba FF9 and mixes are needed on aileron to rudder, flap-to-elevator and flap-to-aileron droop and

elevator. Throttle-to-rudder mix is also desirable, although this could be offset by incorporating non-scale sidethrust. See the flying notes for more information.

Drawings are based on the three-view published in the September 1950 *Aeromodeller*. This drawing appears to be very accurate and, coupled with study of the full-size restored aircraft, has allowed an accurate replica to be produced. The staff at the *Deutsches Museum* outstation at





1: Rear wing strut to fuselage fitting. 2: Wing strut (adjustable fuselage end). 3: Wing strut end and fitting (wing underside). 4: Upper end of oleo strut/fuselage fitting. 5: Wheel hub cover. 6: Detail of wheel hub inside face.

Unterschleissheim near Munich were most helpful in allowing me full access to D-EBCQ to take measurements and detail photographs. This visit cleared up many uncertainties about the detail of the undercarriage and strut work which could not be deduced from photographs and also the cockpit layout. The only piece of equipment missing from D-EBCQ (removed I think when the fuel tank was taken out) is the fuel sight gauge. This is a very noticeable fitting, but study of two excellent quality photographs from the Imperial War Museum have, I think, produced a fair interpretation. The lower cowl line on my prototype model is slightly inaccurate, but this has been corrected on the drawings and will in due course be incorporated in my model.

Construction overview

Basic construction is straightforward, if a little unusual in some areas. However the undercarriage, if built to true scale, is complex and requires the use of a lathe and extensive silver-soldering or brazing. Some of the attachment points of the undercarriage may, on first impression, appear a little fragile for a 20 pound model. In practice the undercarriage has stood up to a fair beating due both to my less than expert flying in gusty weather and the initial lack of damping in the undercarriage, which resulted in a few 'kangaroo' arrivals. The one failure has been a fractured oleo piston, which was of thin-walled aluminium tube - now strengthened.

No doubt anyone contemplating building this model will have sufficient experience to be able to simplify the undercarriage if absolute scale accuracy is not required. I would still advise provision of adequate springing in any revised undercarriage, but many of the articulated fittings could be dispensed with and the hubs simplified. This would probably save some weight, which would be desirable. The articulated wing - and tail-strut ends could also be eliminated or simplified if desired.

Centre section and wing strutter and

flappery require some care in lining up and assembly. The wing and tail units entail more parts than a 'normal' model, but are not complex. The fuselage is built on a crutch system similar to some of the Keil Kraft Flying Scale series, then covered in thin ply throughout.

Every care should be taken to keep the tail end light, but despite this, I recommend installing the elevator servo at the rear of the fuselage. The elevator is heavy and the initial installation, with the servo at the front of the fuselage resulted in excessive play. A high-torque servo (6 Kg) is needed.

Fuselage

Good quality five-ply should be used for formers F1 - F3. The remaining formers can be either 3-ply birch or liteply, although I would recommend birch ply for F4 and F5. The dural sub-formers M2 and M3 and the various undercarriage, cabane strut and wing-strut fuselage fittings are prepared and bolted to their respective formers with 3mm bolts and locktited nuts. The front cabane strut fittings are a little complicated and require care in bending and assembly. Study of the photographs of the full-size fittings will help in understanding the layout of these parts. Fix captive nuts to the back of F1/M2 for the engine mount assembly. Assemble the tailplane fixing brackets and tail strut fittings to formers F10 - F12.

Pin down the 3mm bass crutch on the side view and glue in place F1 - F12. Add 6mm square bass longerons (these will need scarf jointing to make up the length). Install Sullivan yellow inners for the rudder cables and blue Sullivan outer for the elevator servo leads. Add 3mm x 6mm bass stringers.

The fuselage should now be partially skinned. On the prototype model, each half was completely skinned before removing from the building board. However, between removing from the board and completing the internal fitting out, the fuselage shells bowed slightly, making it difficult to join the halves without developing a slight twist. I would therefore suggest skinning completely

between alternate formers and only partially skinning the intermediate bays, leaving a little flexibility in the structure. The ply skinning is then completed when the fuselage half-shells have been joined. Aft of F4 is skinned with 0.4mm ply, forward of F4 is skinned with 0.8 mm ply. Each bay is skinned separately as a single curvature - as full-size. The fin is built integral with the fuselage.

Repeat for the second half-shell. Internal fitting-out - elevator servo, pushrod and leads, rudder control cables, dummy throttle and flap handle, cockpit floor panels, hinge blocks for rudder pedals, safety belt anchorages, control column etc can be completed at this stage. If the cockpit interior is to be painted, complete at this stage. Again, study of the photographs of the full-size interior will assist. Note however that on the museum example, the fuel tank has been removed and the rudder pedals disconnected from their mountings, probably to gain access to the fuel tank mountings.

Now join the two half-shells, taking great care to avoid any twists in the assembly - a temporary jig could be advisable. Bolt the dural bulkhead M1 to the front of F1. Add the 12mm ply undercarriage mount, complete the skinning and add internal glassfibre reinforcement to the area around the back of F1 and 30 - 40 mm along the fuselage skin, plus all along the undercarriage mount. Cut out the cockpit opening. Make and install pilot's seat and seat back.

Cover the fuselage with heavyweight tissue and dope in individual panels, joining panels on the former lines. The headrest can now be built up in-situ. For absolute scale accuracy, cover the headrest in small panels of 0.4mm ply to give the 'quilted' effect visible on the full-size - see photo of D-EBCQ in the Unterschleissheim museum.

Silver-soldering

The undercarriage, and various other parts, require silver soldering in their assembly. Whilst not difficult, silver soldering appears to



WINTER LF1 ZAUNKOENIG V2 (PLAN FSM/298)

Full size copies of this three sheet plan are
available from

Flying Scale Models
Plans Service, Doolittle Media, Doolittle Mill,
Doolittle Lane, Totternhoe,
Bedfordshire, LU6 1QX.
Tel 01525 222573

enquiries@doolittlemedia.com

Price £24.50 plus p&p (U.K £2.50;
Europe £4.00;
Rest or World £6.00.

be regarded as something of a 'black art' and a few words of explanation would probably be helpful.

There are three main Ingredients for successful silver soldering: a good source of heat, the silver solder itself, and a flux. A really substantial blowlamp is essential. My own is from B&Q or a similar store and runs on cans of butane-propane mix. This produces a pretty healthy flame, but even so is only just sufficient for fabricating the undercarriage legs - so look for the heftiest blowlamp you can find.

Silver solder is available from Nexus Modelling Supplies (address at the end of the article). They can supply in both 1/16" diameter wire form and a much finer wire, which is ideal for some of the smaller fittings. A good engineering supplies firm will also have silver solder in differing grades. The different grades have slightly different melting points, so that if making up a complex assembly, the higher melting point solders can be used for the sub-assemblies. A slightly lower melting point solder is then used for the final assembly, thereby avoiding melting the earlier joints. A good general purpose flux is Johnson Matthey 'Easy-flo'. Again, this is available from engineering supplies firms (try Yellow Pages) or can be obtained, together with silver solder and most of the non-ferrous metals used in this project from John Keatley Metals in Birmingham (address below).

A simple brazing hearth is very helpful as it concentrates the heat from the blowlamp

and reflects heat back into the workpiece, helping to keep everything nice and hot. A simple hearth can be made from the replacement hearthbricks available from old-fashioned ironmongers or possibly builders' merchants - see the photograph.

Silver soldering can be used on steel, cast iron, brass and copper, but not aluminium or its alloys. The joining surfaces must be clean and bright. Joints must be reasonably close-fitting but not so tight that some solder cannot flow into the joint. It may be helpful to use soft iron wire to hold the parts together while soldering. Mix a small amount of flux powder with water to make a creamy paste and apply to the areas to be soldered.

Now wear eye protection! Gently heat by wafting the flame over the joint until the water in the flux paste evaporates. Now heat more fiercely. For a successful joint, the whole of the joint area must be heated to a bright orange - dull red is no good! At this point, the appearance of the fluxed joint becomes quite different - difficult to explain, but obvious when you see it, the flux turning more silvery in appearance. At this point introduce the solder into the joint. If the temperature is right, the solder will melt and then 'flash' into the joint - again quite

unmistakable when it happens. If the solder sits on the top in a blob, then either the work is not hot enough or the flux has not taken properly. Once the solder has 'flashed' into the joint, remove the heat, wait until the parts have cooled down to 'black' heat and then drop into a tub of cold water. Clean up the joint with a wire brush and examine for any missed areas in the joint. If necessary, thoroughly clean up again to bright metal and re-solder as before.

Undercarriage

The main undercarriage legs are made from 10mm diameter steel tubing - obtainable from larger B&Q DIY stores. First task is to turn the axle from mild steel. File up the 2mm steel oleo attachment lug, slot the axle unit to fit and silver solder the lug in place. Cut the main undercarriage legs oversize - at least an inch to allow for mistakes.

Make a jig to hold the two main undercarriage legs and axle at the appropriate angles and spacing and by trial and error, file the legs to fit snugly around the axle unit. When satisfied, silver solder legs and axle together. This will need a lot of heat, so use a substantial blowlamp.

Cut the other end of the main undercarriage legs to length and file to fit

7: Front undercarriage leg-to-fuselage fitting. 8: Rear undercarriage leg-to-fuselage fitting. 9: Tailskid.





10: Fuel sight gauge and filler cap. 11: Front cabane strut fuselage fitting. 12: Front cabane strut fuselage fitting.

snugly to the 6mm tube, which will make up the mounting lugs. The drawing shows how a single piece of tube is used to span across both undercarriage legs, thereby ensuring the mountings are parallel. Once silver-soldered in place, the majority of the tube between the legs is cut away and discarded. If tube of the correct diameter (6mm) and bore (3mm) is not available, use 6mm rod and bore each end 3mm for about 25mm. Silver solder in place, then cut away centre and file slots as per drawing.

Make up the undercarriage mounting plates by silver soldering 6mm x 3mm bore steel tube to 2mm mild steel plates. Then mill away parts of the tube to match the corresponding tubular lugs on the undercarriage legs. Note that the port leg locates forward of the starboard leg - see drawing. The mounting plates are epoxied to the fuselage and secured with 12mm long screws (servo mounting screws) into the ply undercarriage plate. These screws provide adequate strength but will tear out as a fail-safe. No problems have been experienced so far!

The undercarriage oleos are made from 22mm copper water pipe. Make up the bottom plate and lugs for the oleo tube from 2mm thick brass or mild steel and a turned brass 'plug'. Silver solder the lugs to the plug and soft solder the assembly into the bottom of the oleo tube. The oleo piston is turned from aluminium and incorporates a groove for an O-ring (I found a suitable one in a pack of O-rings at Halfords). A tiny (0.4mm) hole is drilled in the oleo tube near the bottom to restrict the flow of air into and out of the oleo as it is compressed and rebounds and provides reasonable damping. Springs should be as strong as possible: I used two springs arranged one inside the other - both obtained from hardware stores. Assemble the oleo, springs,

piston, piston rod and top 'plug'. Epoxy the top 'plug' in place and pin with short steel pins inserted in holes drilled radially. The springs should be under slight compression when the unit is assembled.

The articulated fittings on each section of the undercarriage look a little complicated, but are worth the effort as they allow some flexibility and movement. The plans detail how each fitting is made, mainly involving filing and silver-soldering. All undercarriage members are faired with balsa to a streamline section and then covered with litho plate. D-EBCQ in the Deutsches Museum has no fairings to the undercarriage members, these having been removed at some stage.

The scale wheel hubs require use of a lathe and could no doubt be eliminated by drilling the standard DuBro 'Cub' hubs oversize and sleeving with an appropriately sized tube. If making the hubs shown on the plan, be sure to grease well with Vaseline when fitting the wheels, to avoid the aluminium-to-aluminium bearing seizing up. The large diameter hub is epoxied to the axle unit. The main hub is assembled around the DuBro tyre and then slips over the axle/hub unit with the wheel itself secured with a split-pin.

Cabane struts and wing centre section

The centre-section wing mounting allows the wings to fold against the fuselage as per full-size. To fold, the wings are pulled away from the centre-section to expose the hinge, twisted through 90 degrees and folded back against the fuselage with the leading edges uppermost.

If this feature is not required, the wing joining rod can be made solid. The wings are held in place on the joining rod by 3mm bolts in tapped holes through the tube and

rod. Cut out and/or turn all parts from mild steel. Temporarily bolt the cabane struts to the fuselage fittings and check all angles for correct line up, adjusting the holes in the cabane struts if necessary. Check incidence (four degrees positive to fuselage datum for the wing itself, three degrees positive measured between the centres of the front and rear holes of the centre-section). In particular, ensure that the wing joining rod is aligned correctly, at right angles to the centreline and horizontal - use an over-length rod while lining up. The actual wing joining rod (or the hinged version for folding wings) will be held in place in the centre-section by a 3mm bolt through tapped holes. Dihedral will be set by the alignment of the tubes in the wings and is assured by the positions of the holes drilled in ribs W1 - W4. When satisfied, silver solder the

assembly. Remove the cabane strut/wing centre-section assembly from the fuselage.

Slip K&S streamline aluminium tubes over the cabane struts and at the same time run servo extension leads down each cabane strut for the wing-mounted servos. Drill oversize holes in the streamline tubes to line up with the corresponding holes in the cabane struts and fuselage cabane strut fittings. Bolt the cabane struts to the fuselage fittings. Leave the lower hole in the streamline tube open (as full-size) and fill the upper hole. Fix the streamline tubes in place by injecting silicone bath sealant down the top of the streamline tubes.

Tailplane

Build the tailplane on the support jigs - these keep the tailplane strut fittings and tailplane attachment fittings clear of the building board. The tailplane strut fittings are bolted to the spars prior to assembly. Tailplane is skinned with 0.4mm ply, elevator is Solartex or tissue covered. The only notable feature of the tailplane is that the rear tailplane mounting bracket is bent at right-angles to form the inner hinge for the elevator, retained by a small self-tapping screw into the elevator. In other respects, the drawing should be self-explanatory. One elevator horn is fitted to each elevator half. The tailplane is designed to fold down flat against the fin when the tailplane struts are disconnected. When assembled and folded up, the elevator horns are aligned each side of the elevator ball-joint and are joined by a 2mm bolt and nut, plus an additional bolt through the upper part of the horns. Full down elevator will be necessary to access the ball-joint. Note that the tailplane is set at 3.5 degrees positive to the datum. The tailplane is attached to the mounting lugs on the fin with 2mm caphead bolts and 'nyloc' nuts. Tail struts are from K&S

13: Centre section - note servo plugs and servo-slow. 14: A further view of the centre section. 15: Pilot's seat.





streamline aluminium tube with end fittings as shown on the plan. For added strength, epoxy a 3mm carbon fibre tube or rod down the centre of each strut.

Wing

The wing is of conventional construction, save for the slats and ailerons/flaps on underslung hinges. Build the wing on the lower sheeting and cap strips, adding upper sheeting before removing from the board. Two alternative locations for the flap servos are shown, one requiring an intermediate crank. Servos are mounted onto 1.5mm ply plates in the wings. The crank sizes and servo horn positions shown on the plan provide the necessary angular movements of the control surfaces.

The flaps and ailerons are built onto full-chord lower sheeting (0.4mm ply).

Slats are laminated from balsa and sanded to section. After covering the wing, the flap support brackets are epoxied into slots in the leading edge of the wing. Sections of slat are cut to fit snugly between each of the flap support brackets. Each slat section is then covered top and bottom with litho late, attached with contact adhesive. Epoxy each slat section into place with short (6mm) lengths of cocktail stick through the holes in the support brackets, flexing the brackets out as each section is fitted. Fill the gaps with car body filler. Note that on the full size the slats are in two sections on each wing with a small gap between.

Wing struts are made up from 6mm diameter carbon fibre tube, end fittings as drawn on the plan (bottom ends are adjustable) and faired with sections of K&S streamline tubing and routed bass fillers. Simple hardwood fairings could be substituted.

Engine mount unit

The complete power 'egg' can be removed from the fuselage and is held in place with 4mm cap head bolts. This also allows access to the throttle and rudder servos.

Make up the engine mount from 16g (1.5mm) aluminium. The various parts are assembled with 19mm aluminium angle and 3mm nuts and bolts. The assembly is then fixed in a similar manner to the 3mm aluminium firewall. 9mm square aluminium engine bearers are bolted to the engine mounting plate and the engine secured with cap head bolts into tapped holes. Use Loctite throughout.

Engine, tank (SLEC black tank) and plumbing are installed. A custom silencer is made up from 22mm and 15mm copper pipe and fittings, connected to the engine with 'bendy' pipe and right angle elbows.

The silencer is attached to the engine mount with brass straps and exhausts through scale exhaust stubs.

Cowlings are built up from 3mm ply frames, covered in 0.8mm ply and then lined inside and outside with litho plate. A glassfibre front moulding (split on the thrustline) is epoxied in place. Alternatively, the nose cowling could be made from 1.5mm ply for the front face, which is almost flat, and balsa laminations. The lower cowl is retained by 4mm caphead bolts through the engine mounting plate into captive nuts in the cowl. The upper cowl is retained by the dummy oil filler cap locating onto a 6mm bolt fitted to a bracket over the engine mounting plate - fit a spring under the filler cap to prevent it vibrating loose.

Radio Installation

Servos: Elevator servo must be a high-torque (6 Kg) type. Rudder servo is also a high-torque type, connected to an intermediate bellcrank at the front end of the fuselage and thence by closed loop cables to the rudder. Throttle servo, aileron servos and flap servos are standard types. With full flap, the flap servo arm is almost at the point where blow-back is impossible.

The servo wires for the aileron and flap servos are routed through the cabane struts or, if this was overlooked when assembling the cabanes, the signal 'white' wires for the wing servos can be routed through the dummy flap torque tube on the rear cabane strut. Common positive and negative wires for the wing servos would then be routed through the dummy aileron torque tube on the front cabane strut.

In view of the long servo leads, clip-on chokes near the receiver end of the leads are strongly recommended.

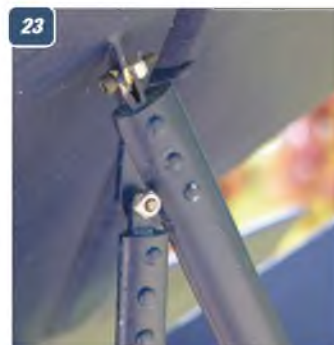
The receiver is velcro'd to a small shelf fixed to the back of the instrument panel, which is in turn held in place against F3 by small screws.

A 4.8v 2400 mAh receiver NiMH is installed in the engine bay. I also installed an onboard glo-driver and battery in this area.

Colour scheme

I have not been able to confirm the initial colour scheme with total confidence. One relatively contemporary (1950) source gives the overall colour when registered as D-YBAR as light grey-green (almost certainly RLM 63 green/grey - see www.warbirdcolors.com) with registration in black and a black swastika in a white circle on a red band on the fin and rudder. The name 'Zaunkönig' appears in Gothic 'Frakturschrift' on the fuselage side above the undercarriage oleos. Another source suggests the overall colour may have been

16: Headrest; note 'quitting' effect of thin ply covering. **17:** Windscreen. **18:** Engine and exhaust installation on removable 'power egg'. **19:** Engine installation - receiver nicad and on-board glow driver behind engine. **20:** Elevator horns - note one horn per elevator half. **21:** Detail of rear tail strut to fuselage fitting. **22:** Detail of front tail strut to fuselage fitting. **23:** Detail of tailplane strut to tailplane fitting.



silver with markings as above.

The markings are confirmed by photographs, but it is difficult to be sure about the base colour. At Farnborough, the Zaunkönig was at least partially repainted, with the band on the fin and rudder being overpainted and the military serial VX190 applied. On leaving Farnborough, the whole aircraft was painted in dark roundel blue (the only colour available in the stores) with either white or duck egg blue / sky registration; John Fricker, who flew the aircraft away from Farnborough recalls the registration as white. Remnants of the roundel blue scheme can still be found on some of the fuselage formers in front of the instrument panel on the preserved machine. This is the darker roundel blue used towards the end of the war, again see www.warbirdcolors.com for a sample.

Various other schemes have been worn, including all-white, and as D-EBCQ it is now painted a pale metallic silver-blue with mid-blue trim and black registration. The other survivor, D-EBCG wears a flamboyant yellow, red and dark blue scheme.

Setting up

Centre of Gravity. Yes, it does look quite ridiculous at 42% chord, but this is correct. The position was worked out theoretically and has proved to be fine in practice and adequately stable - giving a 15% theoretical margin of stability. It is so far off mainly due to the long tail moment and relatively large tail. The full-size CG was even further back. With the CG further forward than shown, you may run out of elevator travel when flaring out. Even with the CG at the position shown, about one-and-a-quarter pounds of noseweight was needed on the prototype model.

A radio-operable of 'flaperon' set-up is required. One switch should be assigned to lower the flaps to 15 degrees and to droop the ailerons 5 degrees at the same time.

A second switch (or lever) should be assigned to lower full flap (40-45 degrees) and a linked mix to additionally lower the ailerons to 15 degrees. If flaps are assigned to a switch, a 'servo slow' unit should be connected to the flap servos. This will give more time to sort out trim changes caused by lowering full flap.

There is a considerable nose-up trim



Rear three-quarter view gives a good view of both the leading edge slaps, flaps and ailerons.

change with full flap. It is wise to mix in about 10 percent down elevator with full flap as a starting point.

It is also desirable to mix in some right rudder with increasing throttle, as no side thrust is built in. Coupled aileron and rudder helps considerably with turns.

The control surface movements shown on the plan are the full-size maximum deflections. These should be followed so far as practical; in particular plenty of up elevator movement is needed. Check that there is no binding with all possible combinations of flap and aileron deflection.

Flying

Despite the above comments, flying characteristics are generally pleasant. For take off, lower flaps 15 degrees, open throttle slowly and the model will take off in about 20 yards with little interference and will climb quite steeply.

Take-offs and (especially) landings must be directly into wind. Out-of-wind take-offs and landings can be hairy. Reduce throttle to one-half to two-thirds for general flying. Raising the flaps will give a small but manageable nose-down trim change, although I generally fly with a small amount of flap for the whole flight. As throttle is reduced, I find I am generally holding in

some up elevator to reduce the flying speed; mixing in elevator to throttle would probably be sensible.

The Zaunkönig is not aerobatic, but manoeuvres such as Lazy 8s, wingovers etc are quite practical.

For slow fly-bys and the landing circuit, first lower take-off flap (15 degrees), reduce speed and then lower full flap. I am still exploring how slowly the model will safely fly. The stall is unremarkable; progressively reducing speed and feeding in up elevator will eventually produce a mushy stall and slight wing drop. You will probably run out of elevator movement before anything drastic happens.

If opening up after a slow fly by or aborted landing, be aware of a strong nose-up trim change and get the flaps up quickly to take-off setting.

When landing, bleed off speed with elevator and use throttle to control the rate of descent. The model was prone to bouncing on landing on concrete (less so on grass) but this seems to be mainly when landing with excessive speed. The modification described above to pneumatically damp the undercarriage seems to have helped.

Good luck! ■

REFERENCES:

Aeromodeller September 1950 (3-view drawings and free-flight model); Flugzeug Profile Nr. 39 (LF1 Zaunkönig) (published by Unitec-Medienvertrieb, Ludwigstr. 11, 86669 Stengelheim, Germany www.Unitec-Medienvertrieb.de), detailed description, history, photographs, drawings (inaccurate) - German language; Flying Review International January 1966 ((Slow and Low)); Air International December 1976 ((The Slow and the Foolproof)); Air International May 1982 ((Zaunkönig - A study in slow motion)), good photos of G-ALUA, flying characteristics; Control Column (Air Britain publication), Vol 3 No. 11, photo of G-ALUA in all-white scheme; Aeroplane Monthly November 1992 and December 1992 ((Slow Bird from Brunswick)), photos, descriptions, flying characteristics; (Aeroplane Affair) autobiography by John Isaacs, some photos, flying characteristics; Deutsches Museum, Unterschleißheim, near Munich (preserved Zaunkönig V2 D-YBAR/VX190/G-ALUA/EI-AYU/D-EBCQ); Internationales Luftfahrtmuseum Manfred Pfumm, Villingen-Schwenningen, Germany (preserved Zaunkönig V4 D-EBCG in yellow/red/blue colour scheme); Imperial War Museum, Negative Nos. MH4914 and MH4915, Zaunkönig V2 D-YBAR at Farnborough postwar; The A J Jackson Collection www.ajjcollection.co.uk, photographs of G-ALUA / VX190.

MATERIAL SOURCES:

Nexus Modelling Supplies, I The Green, St.Peters Way, Northampton, NN1. Tel: 016 - silver solder, caphead bolts, nyloc nuts, split pins, rivets.

John Keatley Metals Ltd, 33-35 Shadwell Street, Birmingham B4 6HD Tel: 0121 236 4300 / 9386. Fax: 0121 236 8576 - silver solder, (Easy-flo) flux, aluminium, dural, brass.

Photos: A.J.Jackson Collection

Winter LF1 Zaunkönig V2

German aeronautical engineers were among the first to systematically investigate low-speed flight. This was one of the experimental types used

Looking more like an aeronautical designers nightmare than a viable aeroplane, the Zaunkönig (Wren in German) has its origins in 1939 at the *Technische Hochschule* (Technical High School) at Braunschweig (Brunswick) in northern Germany. At that time, Professor Hermann Winter joined the Technische Hochschule from the Fieseler works, where he had been closely involved in the series production of the Fi.156 Storch high wing STOL aircraft.

Professor Winter's concept was that the students would benefit from carrying out practical design projects, including designing and building aircraft that would then be used for specific research work. Two areas were of particular interest to the Germans at the time: research into both high speed and low speed flight.

The field of low speed flight was selected for the students' project and the Zaunkönig

was born. Initial design sketches were produced in May and June 1939 and by September of the same year the design had crystallised as a small single-seater aircraft to be powered by a four-cylinder 51 hp Zündapp inline motor. The final design emerged as a streamlined monocoque fuselage on which was mounted a parasol, slatted wing with flaps and a high set T-tail clear of the downwash from the wing.

Among the potential uses envisaged for the design was that of a submarine-borne reconnaissance aircraft, although this was never taken beyond the outline design stage as it would have meant constructing the machine from corrosion-resistant light alloy. Although take-off from the submarine was not envisaged as a problem, retrieval certainly was! Towards the end of WW2r, the Zaunkönig was experimentally fitted with a Panzerfaust (a sort of RPG launcher) above the centre-section, or alternatively on the

An aeroplane with a history! Zaunkoenig prototype V2 was originally registered in Germany D-YBAR, and then received the British military serial VX190 during post WW2 evaluation at Farnborough. Repainted in dark roundel blue, it was passed to the Ultra Light Aircraft Association as G-ALUA before passing on to Ireland as EI-AYU, thense home to Germany as D-EBCQ.



port wing strut, with the intention of using it as a tank-buster, but it is not known whether the aircraft was ever flown in this configuration. In view of its slow speed, it would have been an easy target for ground fire.

Construction of the LF1

(*Langsamflugzeug Nr. 1* or slow-flying aircraft No. 1) as it was now provisionally known, commenced in mid-1940 with the construction of a full-size mockup to confirm accessibility, visibility and the layout of controls. There were plans, never realised, to fit the wing with ground-adjustable variable incidence, giving an incidence angle of between 0 and 16 degrees. The tailplane does however appear to have the necessary fittings for ground-adjustable incidence.

Wind tunnel tests were used to develop a new aerofoil section as none of the available sections were considered suitable. Interestingly, the construction of the prototype was overseen by the aeronautical department of the famous piano makers Steinway, also based in Braunschweig.

The first flight of the unmarked aircraft took place around 17th December 1941, with Professor Winter himself at the controls. The registration D-YBAR was allocated and testing continued through to the middle of 1941. The following figures give the performance of the prototype: maximum speed of 141 kph, minimum speed with full flap of 47 kph, an initial climb of 2.85 m/sec and the ability to operate out of an area 100m x 20m.

In May 1941 however, disaster struck when Professor Winter was exploring maximum gliding speed. At 215 kph severe flutter set in and one of the slats broke away, resulting in a crash, which seriously damaged the aircraft and slightly injured Prof. Winter. The aircraft was quickly repaired only to suffer a second and final crash in October 1942 during roll rate tests when the right wing broke away and the pilot had to take to his parachute.

After the loss of the first (V1) prototype, a second prototype (V2) was built and confusingly also registered D-YBAR. This is the aircraft which survives today in the Deutsches Museum at Unterschleißheim north of Munich. It was taken to Farnborough after WW2 for testing, registered as VX190 and then passed on to the Ultra Light Aircraft Association with the registration G-ALUA. After passing through various hands in the UK and then as EI-AYU in Eire and D-EBCQ, again in Germany, it was retired to the museum, still in flyable condition. Two other machines V3 (D-EBAR) and V4 (D-EBCG) were built after the war. D-EBAR was lost in a fatal crash and D-EBCG survives in a museum in Villingen-Schwenningen in the Black Forest. It is thought that a series production run of between seven and ten aircraft was laid down early in 1945 but of these nothing remains.

So easy was the Zaunkönig to fly that it was claimed that novice pilots could be sent solo in the machine after a few hours of ground instruction. In fact, the head of the aerodynamics flight at the RAE flew the Zaunkönig after six or seven hours dual in a Miles Magister. ■



Second Prototype Zaunkönig in its original German colours, thought to have been light grey-green (almost certainly RLM 63 green/grey). The aircraft in the background is a clipped wing Spitfire, so this picture (and the one below) could well have been taken at the time of the aircraft's arrival at Farnborough for evaluation trials.



Winter LF1 Zaunkönig V2

Some close-up detail images of the example held in the Deutsches Museum at Unterschleißheim, Munich



1: Top view of D-EBCQ. 2: Rear tailplane strut-to-fuselage fitting. 3: Front tailplane strut-to-fuselage fitting. 4: Elevator horn; note one horn per elevator half. 5: Rudder control horn and lower hinge.





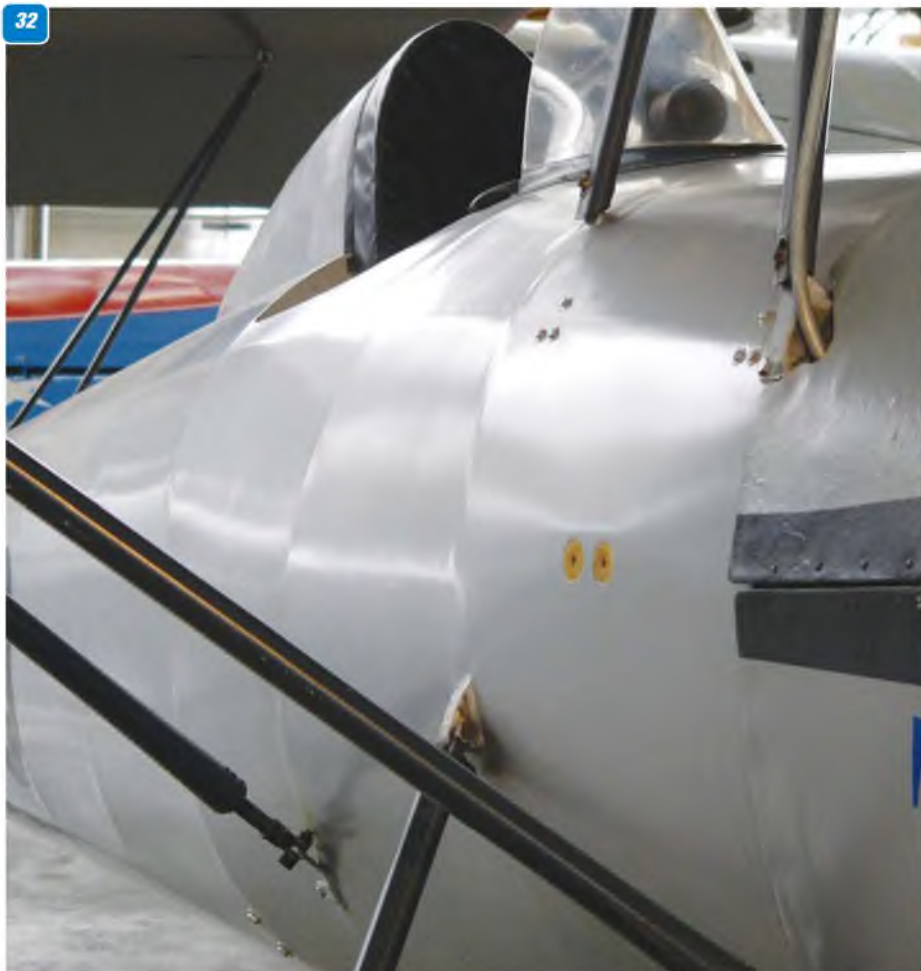
6: Aileron horn, pushrod & shroud. 7: Flap hinge (aileron hinge identical). 8: Top of oleo strut fitting to fuselage. 9: Wing strut end-fitting at underside of wing. 10: Front (starboard) cabane strut fitting at fuselage. 11: Starboard rear wing strut fitting at fuselage. 12: Upper end of cabane struts at wing centre-section. 13: Port rear cabane strut fitting showing flap actuating torque rod. 14: Starboard rear undercarriage leg fitting - note port leg fits forward of starboard leg. 15: Port undercarriage and wheel. 16: Outside face of wheel. 17: Cockpit showing throttle and flap controls.



18: Cockpit interior - note rudder pedals have been demounted and are lying on cockpit floor. 19: Starboard cockpit interior. 20: General view of tail; note D-EBCQ is now fitted with a tailwheel.

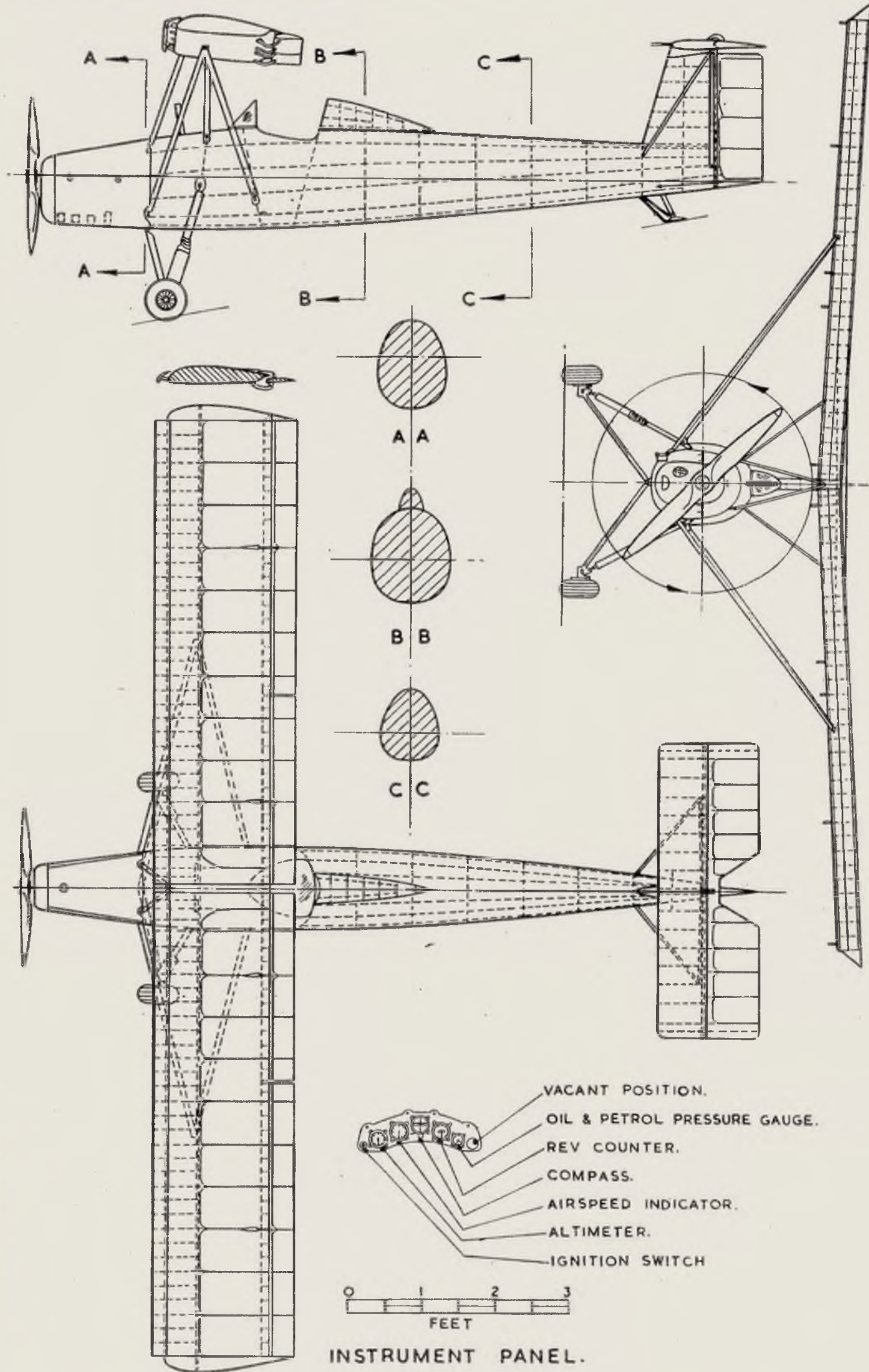


- 21: Elevator.
22: Engine cowling.
23: Engine cowling.
24: Starboard front wing, strut to fuselage fitting.
25: Oil filler cap.
26: Fin-tailplane fairing.
27: Headrest - note quilted effect of thin ply covering over stringers.
28: Upper front view of cockpit and windscreen.
29: End view of slat.
30: Upper view of forward fuselage.
31: Aileron/flap pushrod shroud.
32: View along fuselage showing how fuselage is covered in a series of single curvature panels.



WINTER LF-1 ZAUNKONIG

SCALE 1:40



INSTRUMENT PANEL.

KIT SCALE

@ THE BMFA FREE FLIGHT NATS 2017

Tom Daly files his photo report of the fastest-growing scale comp in the UK

Expect 20 booked entries...". I was told on the morning of the comp. Wow, That's a lot of kits, I thought. In the event I counted 23. Outdoor Free Flight Kit Scale has arrived!

CONDITIONS

At RAF Barkston Heath, we are so used to poor light, poor weather, driven rain, and blustery wind, that a moderately nice day had us raving. In truth, conditions

were better than for some years, but were still variable. At times, launching was a lottery. Some models were transported almost vertically in the gusts while others sheered off and made little height. To add spice to the occasion, models from all classes were being trimmed at the same time. It meant that launching, Judging, and Timing was literally all over the place. I decided to stay with my camera at what I felt was the rather

David Beals tensioning his Texan / Harvard / AT6, ably assisted by Gareth Tilston.





New Zealander Richard Bould and his beautifully finished Tiger Moth.

fluid centre of gravity of the comp, and took my chances.

MODELS I SAW

I had noticed Tony Rushby's 19" span kit of the Auster Autocar G-ALYV at the BMFA F/F Scale Indoor Nats earlier in the year. This is a printed-balsa kit from the *Hales FrogLife* range. Mind you, scale maestro and webscribe Mike Smith reckons that these kits were originally produced by Yeoman; all a bit before my time, but, utterly fascinating if you have a soft spot for post-WW2 British balsa flying kits, as I have.

John Sanderson was campaigning his

DHC-2 Beaver. It looked very smart and flew very well, eventually taking 5th Place. I also liked Mr Foster's Cessna 140. Another very pretty model was David Beal's North American Harvard / Texan / AT-6. It is one of the classic shapes of aviation. David's model flew very nicely indeed.

Andrew Hewitt's large Fokker E.V (D.VIII) was an utter cracker. It was big and bold enough to smite the Barkston blow with authority. It flew excellently. It was amusing when later, Andy was trimming his Sopwith Camel. I have mentioned that there was lot going on at once on the day. Well, in the mêlée, I snapped away with my camera, only realising later that

his Sopwith Camel was on a trimming flight for another comp, and not this one. I liked the pic so I have included it anyway!

The Smith Brothers can always be relied upon to put in a good flying performance. Peter, flying his nifty little 'Mr Mulligan', did better than brother Michael, this year flying his Tiger Moth. Incidentally, be sure to check the details of Mike's ace F/F Scale website below. While you are at it, check Mike Stuart's similarly fab F/F Scale website, too.

Peter Fardell's Fairchild 24 from the well-known *Guillows* kit had been prepared well for competition. It flew very reliably, propelling Peter into Third Place. The



My notes got a bit fraught. I hope this is Mr Foster with his Cessna 140!



SAM35 Chairman and keen competitor Ian Lever with his Maggie.



Taking time off from his SAAB Tunnan, maestro Steven Glass gives us a smile.



J. Sanderson and his DHC-2 Beaver. Flew reliably: placed 5th.

Runner Up was scale maestro Ivor Taylor, flying his Auster. You could see Ivor 'doping the wind' as he gauged each gust, judging exactly when to launch.

Ivor's models are always prepared well.

KIWI CONTINGENT

There were at least three Kiwi flyers

making the Round-The-World Trip to get to Barkston this year. These fine lads were Stan Mauger with his Auster AOP7, Richard Bould with his Tiger Moth, and



The Winner! Teenage sensation Gareth Tilston launches his KK Piper to victory.



Cracking launch in a stiff wind for Ivor Taylor's Auster. Well deserved Runner Up.



Scale maestro Mike Smith's Tiger Moth gets a great launch. Placed 9th.



It was busy out on The Windy Heath.



All the way from Portugal, Julio Isidro with his Dumas Piper. Placed 15th.



Kit Scale at The Nats: when doughty competitors stride out manfully on The Heath.



Superb launch in a challenging blow from Andrew Hewitt and his immaculate Fokker EV.



Peter Smith launches his Mr Mulligan. Beat his brother!



Good launch for Ken Bates' Cessna. Placed 6th.



Peter Fardell pausing between gusts with his Guillows Fairchild 24.



Peter Fardell gives his Fairchild 24 a textbook launch. Took Third Place.



Peter Fardell's Fairchild 24 climbing out strongly.

Don Spray with his DH Puss Moth. Incidentally, Team Kiwi acquitted itself well across all the BMFA Nats FF Scale comps this year.

PORTUGUESE PILOT

This was truly an international event. It was great to see Julio Isidro making the trip over from Portugal again. He was flying in

his adopted UK Club's colours: Peterborough. The Portuguese are our oldest allies in the World, by the way. Julio did well and placed 8th with his compact Dumas Piper.

PETERBOROUGH PARADE

Julio's pal, the elegant

SAM35 Head Honcho-cum-Peterborough Club leading light, Brian Lever, was flying a very pretty Fairey Junior. His baby brother Ian flew well with his Magister too. However, the Peterborough Club's child prodigy Gareth Tilston once again proved that doing your trimming



Ian lever's Magister being wound up.



Ian Lever gets his Magister off to a good start.





Mr Green and his very crisp Fokker EV.



Mr Green launches his Fokker D8 Straight & Level.



Don Spray from New Zealand gets his handsome Puss Moth away beautifully.



Kiwi visitor Don Spray's Puss Moth flying majestically.

homework paid dividends. When all the scores were computed (I think by Trish Dennis) Gareth was pronounced 2017 BMFA FF Nats Kit Scale Champion. Whilst the Peterborough Team celebrated with port-and-champagne, Gifted Young Gareth was given some lemonade and a

soggy paper straw. A deserving Winner!

EXECUTIVE SUMMARY

This was a bumper competition, showing that FF Kit Scale, indoors or out, is now firmly established on the UK competition scene. It is always amazing to see what

sort of kit will turn up, and of course there is that warm underlying buzz of nostalgia. Once again, the BMFA FF Scale Tech Committee's "clean machine" excelled itself. Roll on the August Nats! ■

Andy Hewitt's lovely Sopwith Camel wandered over the Kit Scale flightline.



RESULTS

KIT SCALE

	Name	Model	Total Difference
1	G. Tilston	Piper FC	14
2	I. Taylor	Auster	15
3	P. Fardell	G. Fairchild 24	16
4	G. Foster	Cessna 140	25
5	J. Sanderson	G. Beaver	27
6	K. Bates	Cessna	29
7	P. Smith	Mr Mulligan	38
8	D. spray	Puss Moth	38
9	M. Smith	Tiger Moth	40
10	T. Rushby	Auster	42
11	I.Lever	Magister	44
12	A. Hewitt	Fokker EV	48
13	A. Green	Fokker D8	61
14	D. Beales	Harvard	69
15	J.Isidro	Piper	71
16	R. Marking	Piper	102
17	B. Lea		110
18	R. Bould	Tiger moth	222

Podium Places

1. Gareth Tilston	Piper
2. Ivan taylor	Auster
3. Peter Fardell	Fairchild 24

Free Flight Scale Websites

By the way, scale maestro Mike Smith has a superb website dedicated to FF Scale. It is full of pix and comment: www.freeflightscale.co.uk

Another excellent UK site for the FF Scale scene is Mike Stuart's www.ffscale.co.uk

AeroDetail series

Making a scale model?

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



Monocoupe CD108

The Monocoupes were side-by-side two-seat lightplanes of mixed wood and steel-tube basic construction with fabric covering. A braced high-wing monoplane with fixed tailskid landing gear, and the reverse curve rear fuselage lines that were to become one of the signature identifier features of the Monocoupes. 55 photos

Miles Magister CD73

A firm favourite with scale modellers, this extensive collection of images depicts two examples in different Royal Air Force training colour schemes. (100 images)

Messerschmitt ME109G CD72

The 'Gustav' saw Luftwaffe service from late 1942 onwards. Subject version of this collection is a tropicalised G-6. (110 images)

Messerschmitt Bf109E CD71

The 'Emil' was the version of this WW2 fighter that was the mainstay of the Luftwaffe fighter force during the Battle of Britain in 1940. (150 images)

Me 410A - 1/U2 CD107

For those who fancy a twin, but something outside the 'normal' favourites, consider the Luftwaffe's final 'destroyer' heavy fighter that packed a powerful punch 79 photos

Martin B-26 Marauder CD70

The Fantasy of Flight Museum's example, photographed pre-restoration, soon after it was flown into the Museum site, thus in original, unrestored condition. (100 images)

LVG C.VI CD69

The sole survivor of its type from the WW1 era, photographed in extensive detail. This is the machine house at and flown from the Shuttleworth Collection airfield, Old Warden and now in storage, awaiting display at the RAF Museum. (110 images)

Luton Minor CD68

Just one example of this light aircraft, to which the owner has added many mods and variations. (32 images)

Luscombe Silhouette CD67

The elegant late 1940s U.S. light aircraft. Several examples provided, with much close-up detail for modellers. (74 images)

Kawasaki Ki100 CD66

A study of the late WW2 radial engine 'emergency' development of the Japanese Ki 61 Hien (Tony) that provided an unexpectedly superior performance for the squadrons of the Imperial Japanese Air Force during the closing stages of the Pacific war. (60 images)

Junkers Ju87G-2 Stuka CD65

The aircraft that defined the term

Hawker Typhoon CD109

The Hawker Typhoon was a British single-seat fighter bomber, produced by Hawker Aircraft. While the Typhoon was designed to be a medium-high altitude interceptor. 117 images

Hawker Tomtit CD64

Mid 1930s RAF biplane trainer aircraft, from the era open cockpits of silver dope and polished metal. (140 images)

Hawker Tempest Mk 2 CD63

The final development of Hawker

Hawker Sea Fury FB XI CD62

Hottest of all the piston-engine fighter aircraft, the carrier-borne Sea Fury is also admired for its elegant profile. (140 images)

Hawker Hurricane MK1 & MKIV CD61

Two versions of the famous 'Hurri' - one a true Battle of Britain survivor painstakingly restored to perfect authenticity, plus the cannon-armed, Mk.IV 'tank buster'. (170 images)

Hawker Hart & Hind CD60

A combo collection featuring the RAF Museum's Hart bomber and Hart Trainer, plus Shuttleworth's Hind. (115 images)

Hawker Fury CD59

No authentic example now exists, but the accurate replica photographed in extensive detail in this collection is as good a guide as can be found of this elegant 1930s RAF fighter. Includes some general arrangement pictures authentic to the period. (55 images)

Grumman FM-2 Wildcat CD58

First of Grumman's highly successful line of prop-driven 'Cats', the Wildcat, in guises from F4F-3 to FM-2 held the line after the Pearl Harbour attack and served from then until the end of WW2. It was idea for operations from the small escort carriers. (90 images)

Grumman F8F Bearcat CD57

Hottest of Grumman's prop-drive fighters - it arrived too late for action in WW2 but was standard ship-borne fighter equipment in the immediate post-WW2 era. (90 images)

Grumman F7F Tigercat CD56

The awesome twin engine long range fighter of the late WW2 era operated by US Navy and US Marines. (60 Images)

Grumman F6F Hellcat CD55

The US Navy's most important, and most successful fighter of WW2, photographed, close-up, from nose to tail and wing tip to wing tip. Example shown is part of The Fighter Collection, based at Duxford. (90 images)

Grumman F3F CD54

A study of the faithfully replicated example of the 1930s U.S. Navy biplane as seen at the 2001 Flying Legends Show. (34 images)

Gloster Gladiator CD53

The Royal Air Force's last biplane fighter, star of late 1930s air shows and flown in combat during early WW2, including Battle of France, Battle of Britain, Mediterranean operations and North Africa. (50 images)

Fokker D.VIII CD52

The Fantasy of Flight Museum's example of the late WW1 Imperial German Air Service monoplane fighter, in full detail. (69 images)

Fokker D.VII CD51

The most famous of all the German fighter aircraft of WW1. The collection depicts the RAF Museum, Hendon's authentic, restored example. (44 images)

Focke Wulf FW 190A CD50

Germany's 'butcher bird' fighter of WW2, active on all combat fronts from 1941 onwards.

Fieseler Storch CD49

Arguably the first military STOL aircraft, this storky looking aircraft has long been a modellers' favourite. Two examples are represented, the machine at the Fantasy of Flight Museum in Florida and the RAF Museum Cosford's example. (images)

Fairey Gannet ASW1 & T.2 CD48

The Royal Navy's post-WW2 anti-submarine workhorse, that also served with a number of other air-arms. Most images are of Mk.T.2, that was more-or-less the same as the ASW. 1. (110 images)

Fairchild Ranger CD47

Elegant U.S. high wing light aircraft in full detail. Two examples shown. (60 images)

Erco Ercoupe 415 & Avalon Ercoupe CD46

The elegant twin finned light/sport aircraft. Both original Type 415 and later Alon resurrection examples. (115 images)

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Techno Scale

Mike Evatt scou

Having rediscovered my old S&M ACM No. 1 and No. 2 knife handles I was determined to source some new blades as I remembered them being more robust than the usual scalpel blade.

'Scalpels and Blades' at www.scalpelsandblades.co.uk is your on-line store for a wide range of Swann & Morton Blades and Handles for healthcare professionals, artists and modellers. ACM blades as well as scalpel blades are available in small or large quantities and conveniently may be purchased via PayPal.

Founded 1992 in Runcorn UK, StarLoc adhesives claim to be the world's premier specialist adhesives supplier. Their on-line retail department 'Shop4glue' may be found at www.shop4glue.com

These days when our hobby is becoming more diverse than ever, Shop4glue has all bases covered from their traditional Tissue Paste which dries clear and is waterproof to two heat-seal adhesives.

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Graves R/C Hobbies was founded by Bill Graves in 1991. Graves RC Hobbies boasts more than 27,000 different stock items, ranging from gliders to electric, rubber, glow fuel and gasoline-powered RC airplanes, helicopters, cars and boats. No matter what you're needing or looking for to meet your RC hobby needs, they're sure to have it on hand! Their stock of scale models is vast with product from many manufacturers such as Dumas with their 42inch span de Havilland DH-89 Dragon Rapide for electric power. Check it out at www.gravesrc.com

Nitrotek was founded in April 2004. The Nitrotek founders saw a gap in the hobby market and became the first online retail company to introduce high quality models at an affordable price in Europe. Featured on their website at www.rckit.co.uk is the Dynam Pitts Model 12 R/C plane that is a combination of modern technology and

beautiful classical design. The model looks realistic and is a fully capable aerobatics R/C plane. Thanks to its lightweight, sturdy construction (EPO foam), precision electronics and powerful KV650 brushless out-runner motor, it is able to perform a wide range of 3D aerobatics.

Austars Model at www.austars-model.com was established in 2007 and located in Sydney, Australia. They are a manufacturer and distributor of quality hobby products. They started in 2007 designing and manufacturing large scale sports and Cessna series planes. Their production is based in China and Thailand and their customers from worldwide. Featured on their website is the 98-inch span DHC Caribou. The de Havilland Canada (DHC) Caribou was the workhorse of the Australian military for more than forty years. Austars' version fully replicates the look and feel of the prototype.

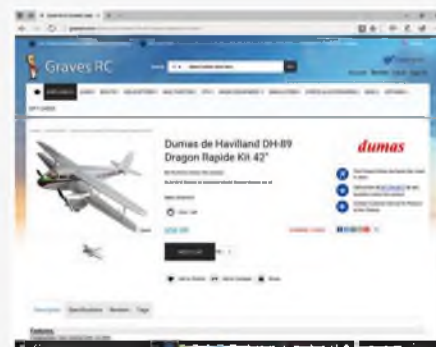
Outerzone is a listing of free vintage and old-timer flying model aircraft plans to download. The listing is free for everyone - you don't need to register or log in to download these plans. On their website at <http://outerzone.co.uk> you can view model



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The Dumas 42inch span de Havilland DH-89 Dragon Rapide for electric power.



The Dynam Pitts Model 12 is a combination of modern technology and classical design.



The de Havilland Canada (DHC) Caribou was the workhorse of the Australian military.



The plan of the 20in span Boeing F4B-4 for control line was designed by W. Barrett.

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plans by category tag (free flight, control line, radio control, scale, rubber, etc...) The plan of the 20in span Boeing F4B-4 for control line was designed by W. Barrett and was featured in 'Model Aircraft', September 1958 issue. Quote: - "A colourful replica of a famous US Navy fighter designed for control line flying and the construction of the model should present no difficulty to the average modeller."

I have a soft spot for the Model Shop at Cross Gates Leeds as some years ago I used to visit it regularly. Their website at www.modelshopleeds.co.uk reveals a superb Topflite R/C model kit of the Douglas DC3 in 1/14 scale. When the Douglas DC-3 debuted in 1935, it marked a milestone in commercial aviation. Suddenly, flying was popular and practical. Production ended just eleven years later, but the DC-3 lives on in this expertly engineered kit. If you've never built scale or flown a twin, it's a great introduction! It handles like an advanced sport plane, with large aileron, rudder and elevator surfaces for easier piloting. Each engine functions independently and is aligned to help keep the model controllable if one engine quits.

Probuild at www.probuild-uk.co.uk was born out of the desire to establish a high-quality service to British F3A fliers. All kits Probuild stocks are ones only they have tested & would fly themselves, they stock a full range of ARTF kits available for next day or same day collection. Their YAK54 is a delight and the staff have been having great fun flying this model, power can be any of the 50/60cc petrol engines on the market today. They currently fly this model with a five-cylinder glow four-stroke, great sound & scale power! NICE!

Scale Soaring is a web presence at www.scalesoaring.co.uk compiled by a group of people with interest in Radio Control Large Scale Sailplanes and Tugs. If you have interest in the following, then why not join in with their discussions on the forum. Maybe you can even help others with your views and ideas. The website has much to offer including good detail on prototypes both vintage and modern such as the Hütter 17. This was a light high-quality training glider for the Salzburg mountain area, evolved using a GO 535 wing profile.

West Wings at <http://westwings.co.uk> claim to be the largest manufacturer of

small, balsa model aircraft kits in the UK. They manufacture all of the West Wings kits in their factory in West Cornwall.

Their aim is to provide you, the modeller, with a range of kits that will excite you and keep you coming back for more. The West Wings Spitfire is a great model that has undoubtedly 'Spitfire' presence and combines that with superb flying performance. The West Wings 'Spit' has it all, even down to radiators, cam cover bulges, carburettor scoop and accurate spinner outline.

Vario have several thousand products for you to view at www.vario-helicopter.biz/uk For the summer of 2016 Vario gave the Chinook fuselage a total face lift. The new fuselage is now the same GRP quality as other fuselages produced since 2014. The fuselage has more external detail especially around the upper domes and transmission tunnel. All fuselage mouldings including the doors have been completely revised and to further complement the new fuselage a set of smart bubble windows are now included. Like the full size you can equip the Chinook with contra rotating dome covers. ■



A superb 'Topflite' R/C model kit of the Douglas DC3 in 1/14 scale from Model Shop Leeds.



Probuild's YAK54 is a delight and the staff have been having great fun flying this model.



Scale Soaring is compiled by a group of people with interest in Scale Sailplanes and Tugs.



The West Wings Spitfire is a great model that has undoubtedly 'Spitfire' presence.



For the summer of 2016 Vario gave the Chinook fuselage a total face lift.



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

mikeevatt@hotmail.com



Over the previous few months we've looked at structures for electric flight, rubber-power-to-electric radio control conversions and suitable motor replacements for older designs that had been designed to use the brushed motors, then currently used. All of that may have been a bit confusing for anyone who is thinking of trying electric flight (other than in RTF form) but doesn't really have a clue about what's involved, and how much it is going to cost them.

So, with that being the case, maybe it's time for another of my periodic 'back-to-basics' type efforts. Sorry to all you experienced electrolites, but we all have to start somewhere and I recall (from the dim and distant past) just how grateful I was for any help I could get when I first tried electric power in my models.

In those days it was all very hit-and-miss (more miss than hit if the truth be told) and it was only by constant reading that success finally came. So, experienced electric flyers might want to give this particular edition of the column a miss, but you'll be catered for in future editions. This time around we're giving the novices our full attention.

VERY BASIC

Obviously, the bigger the model you want to equip, the more it's going to cost you. However, I'm assuming that most of us won't want to risk (either the model or the

OKAY THEN, HERE WE GO THEN, ANOTHER MEANDERING EPISODE OF ELECTRIC FLIGHT NONSENSE. WELL, HOPEFULLY NOT TOTAL NONSENSE, BUT SINCE I STILL HAVE NO IDEA WHAT TO WRITE ABOUT JUST YET, YOU NEVER CAN TELL.



That Eastbourne Monoplane mentioned in the text. This model required just a whiff of power for scale-like flight in calm weather. Cheap to set up too.

expense) experimenting with an unknown power system on a quarter scale model. Probably not even on a one sixth scale model, although that needn't cost anything like as much as for larger models. In fact, depending on the type of model, and just exactly what it's a 1/6th scale model of, it can be done reasonably cheaply. Just bear in mind that when I say cheap you're still going to be spending more than just a few quid to get this model into the air successfully.

In order to keep things simple, and remain with easily obtainable components that don't have to cost the earth, I'll assume that you will be using a LiPo pack as your power source. To charge it you'll need a dedicated LiPo charger and to connect it to the motor/receiver you'll need a speed controller. Still with me so far? Oh good, we'll take a look at these individual items as I ramble on, and probably leave you even more confused than you were to begin with. However, before we get that far, let's take a look at the sort of power our individual models will require.

Before I finally managed to determine what power arrangement I needed to get my models to fly, I read all I could about what other people were using to get the type, and size, model I wanted to fly successfully. Nothing much has changed in that respect, it's still an excellent way to get an indication of what your particular model will require by way of motor and battery size.

That said, I have my own little formula for sorting out power levels for the different types of model, but it does involve some simple arithmetic. Don't panic, it really is very simple, just a matter of working out how many Watts of power your potential set-up will provide. I'm sure you'll recall from your basic science lessons that:- volts x Amps = Watts .



Not actually a scale model, but pretty close. This model was way over powered at almost 100 Watts/lb.



This 45" span biplane is typical of the type of model that does well on just three cells and an inexpensive motor.

“ Before I finally managed to determine what power arrangement I needed to get my models to fly, I read all I could about what other people were using to get the type, and size, model I wanted to fly successfully ”

So, look at the specs of the motor you are considering (yes, yet more reading I'm afraid) and see how many amps the motor draws on a given cell count. This will vary slightly depending on what prop you fit, but puts us in the right general area. Since we know that a single LiPo cell has a nominal voltage of 3.7 volts it isn't rocket science to come up with the voltage of a two, three or even four-cell pack. Multiply that by the number of Amps the motor can be expected to draw at that voltage and you have the power in Watts.

You only need to know that because my system relies on Watts-per-pound of model in it's ready-to-fly state (everything on board that needs to be there). It's quite simple really, small, slow flying and lightly loaded models are perfectly happy with around 30 Watts-per-pound available, WW1 types and cabin monoplanes fly well on 50-60 Watts per pound and WW2 warbirds and aerobatic types need 90-100 Watts-per-pound of model. Although these are very general ratings, they do result in a model that will fly in the manner intended. You won't need all that power for most of



Even floatplanes are viable electric models - as long as you keep the wet stuff out of the motor and electrics.



A geared, brushed motor and an old Astro geared inrunner complete with its' dedicated ESC. Believe me, that gearbox is HEAVY!!!

the time, but it will ensure that your model isn't struggling to stay in the air through lack of power.

Lack of pilot skill is another matter entirely and well beyond the remit of this article, so pick a model type you know you can fly easily for your test model. At least then you'll be sure it isn't you causing any issues.

A model that is a good example of this was my 45" span Eastbourne Monoplane - actually my first brushless/LiPo powered model. It used a dirt-cheap (under £20) 'bell' style motor and 18 Amp speed controller sold as a pair. On a two-cell LiPo pack the motor was putting out around 80 Watts for this 20 ounce model. As you can

see, in the region of 65 Watts/lb. Slightly more than I quoted above, but not excessively so.

The first take-off, at around 3/4 throttle, took all of about 15 feet for the wheels to clear and for the model to climb easily away. Less than half throttle would maintain height and, in slightly more breezy conditions a nudge of extra throttle had the model penetrating well. So you see, you don't need masses of power, or expensive equipment.

Now, starting from the front, let's take a closer look at the basics of the individual items in the power train.

MOTOR

Okay then, harking back to what I said over the last couple of months, very few people use brushed motors these days except in the very small, indoor type of model (and many small RTF foamie types). No, for proper, built-up models brushless is THE way to go these days. A fact made obvious by how few brushed speed controllers there are available now.

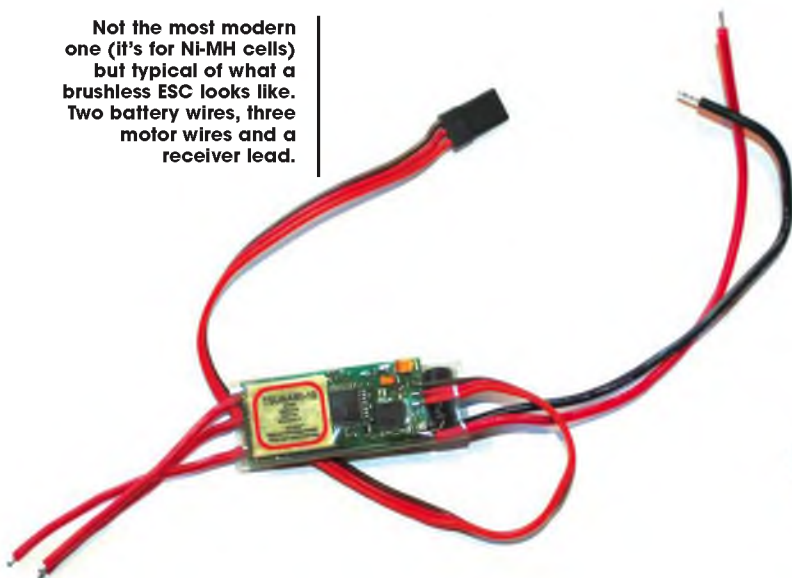
Brushless motors come in two basic types - inrunner and outrunner. Yes, I know they are silly sounding descriptions but there is a strange sort of logic to it. An inrunner looks and behaves pretty much like a brushed motor - except that there are three wires instead of the normal two of a brushed motor. The 'can', with magnets attached, stays still and the armature and shaft rotate within it. As I said, just like a brushed motor.

The other point they have in common with brushed motors is that they are fairly high revving per volt of power, which makes them only really of use with a small propeller or fitted to a gearbox. That, by the way will be listed in the specs as the Kv rating of the motor and refers to 1,000 revs per volt. Unless you really want to use a gearbox, avoid these motors for slow flying (scale speeds rather than thrashing around on a tiny prop) scale models.

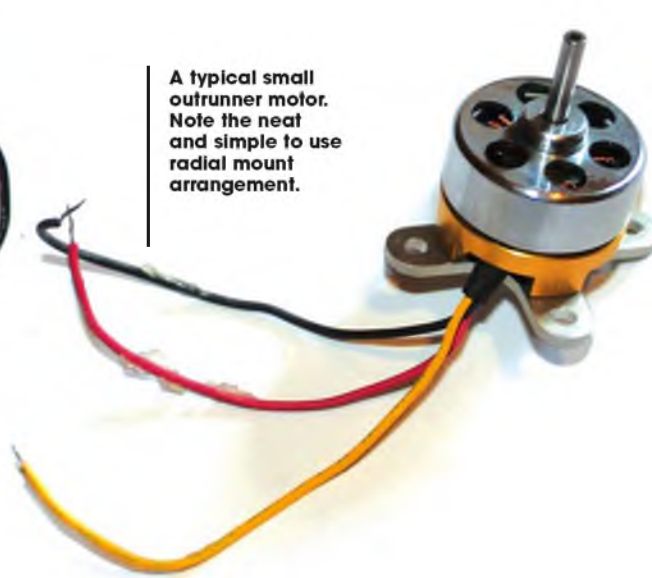
Outrunner motors, by comparison, will appear slightly strange at first glance. Not really what you'd expect an electric motor to look like. For a start they're shorter and of greater diameter than inrunner motors, but that's only where the differences begin. They work in a completely different way too. In this case the shaft is attached to the outer 'can' (I can't think of any other term for it, but it isn't a can in the same sense it is with an inrunner.) and that whole assemble rotates around the fixed armature. They have a much lower Kv rating than inrunner motors, but don't be fooled into thinking they are less powerful. It's just that they deliver that power in a totally different way. They have far more torque available and will swing a much larger prop without the need of a gearbox.

Think of it along the lines of the difference between two-stroke and four-stroke engines. One delivers a lot of revs to a relatively small prop and is admirably suited to fast flying models, whereas the other has lots of low down 'grunt' and swings much larger, coarser pitch props to haul fairly

Not the most modern one (it's for Ni-MH cells) but typical of what a brushless ESC looks like. Two battery wires, three motor wires and a receiver lead.



A typical small outrunner motor. Note the neat and simple to use radial mount arrangement.



A 30" span model that is extremely cheap to equip with a tiny outrunner, low Amp ESC and two cell LiPo.



draggy models around the sky with authority using far fewer revs to do so. These are the motors best suited to scale models.

SPEED CONTROLLER

Or, to use it's usual designation ESC (Electronic Speed Controller). These also fall into two different, basic types; those with BEC and those without. Aha, now that caught you, didn't it? BEC stands for Battery Eliminator Circuit and simply means that you don't need a separate receiver battery with this type of ESC. It takes power from the flight pack and diverts a portion of it to the receiver.

However, since there's no such thing as a free lunch, that doesn't come without a certain cost. Not financial cost, simply that this type of ESC is usually restricted to two or three cell battery packs and running more than four servos can cause problems. They have a low voltage cut off so you can't suddenly find yourself with a totally flat battery and a free-flight glider. Once the voltage drops to a certain level the ESC detects that voltage state and cuts power to the motor, but continues to supply the receiver. Usually, if you shut the throttle first you'll then get about a further 30 seconds of power to get you back to the strip. However, it's far better to land as soon as you detect a drop off in available power.

When buying an ESC of this type, just make sure what it's actually capable of and how the BEC works. Some will state not to use more than three servos if using more than two cells. Also, check how you set the number of cells it's to be used with - 2 or 3. Some are programmable between the two options while many cheaper units rely on a tiny jumper plug to change between

the options.

I mention this because it's really quite important that you don't use a three-cell pack with a ESC set up for two cells. It's unlikely to cause damage to the ESC but may well kill off your three-cell pack because the low voltage cut out is set to operate at a voltage below what might prove fatal for your pack. LiPo cells don't like to be run below a certain voltage (usually around 3.1 volts) so LVC on a two-cell pack will be a little over 6.2 volts. Great for two-cells, not so kind to a three-cell pack that really won't like going as low as 2.1 volts per cell.

Conversely, if the ESC is set for three cells and you're only using two, you might find your flights to be pretty short (if they happen at all) because even fully charged the pack barely reaches the ESC's LVC point. So, I'm afraid there's nothing else for it but reading the instructions and setting it up according to the cell count you'll be using.

From personal choice, and because I don't fly models that require more than three cells and four servos; this is the type of ESC I use in all my models. Not only does it make installation simpler, but I just like the security of knowing I'm making EVERY flight with a fully charged receiver battery. Believe me, I've seen far too many models (not mine I hasten to add) come to an untimely end just because the receiver battery went down for some reason.

If using more than three cells, or lots of servos, you'll need an ESC without a BEC built into it, but also use a stand alone BEC to supply power to the receiver. Never actually having used one, I'm afraid I can't say much more about them. I do know, however, that the reason for the stand

alone BEC in situations where there are lots of servos involved, especially if these are working hard, is that the servo drain can be the final straw that trips the LVC on an ESC with built-in BEC.

It may only be a momentary thing but, when combined with the load that the motor is already placing on the system, the voltage is pulled down just enough for the ESC to register a low battery and shut down the motor. As you can imagine, this could prove not only inconvenient, but downright terminal if you happen to be in the middle of some manoeuvre when it happens.

Whilst on the subject, you'll notice that ESCs are rated in Amps. That doesn't mean that if your motor pulls 30 Amps you need a 30 Amp ESC. It's simply that 30 Amps is the maximum it will handle. Always use an ESC rated well above what your motor is likely to pull. Failure to do so is only too often terminal for the model.

Another point about brushless ESCs is that each motor requires its own ESC. I know some say that with a little effort, you can operate more than one motor on a single ESC, but that isn't something I'd recommend you to attempt until you have a much better idea of what you're doing. It's much simpler to use one per motor and avoid having to worry about getting both motors in synch with a single ESC. After all, when first starting out in electric flight, the fewer complications there are, the better.

Oh well, as is often the case, I've rambled sufficiently to have run out of room long before I'd finished. So, it looks as if I'll have to detail batteries, chargers and more general stuff next time. In the meantime, if you want to contact me you'll find me at the usual place - PETERAKE@aol.com ■

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