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# RCM&E

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VOL.63 NO.1 JANUARY 2020



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# WELCOME

Editor: Kevin Crozier. MyTimeMedia Ltd. Suite 25S, Eden House, Enterprise Way, Edenbridge, Kent, TN8 6HF

Goodness me! The weather has been pretty awful for model flying lately. If it has not been raining then the local flying fields have either been like soggy sponges, incapable of taking the weight of my car or, at their worst, completely under water! That's what comes from flying from marshes close to the mighty Severn!

Of course, it's my own fault for not getting out there on the last good weekend flying day, but that was so long ago that I really can't recall when it actually happened! I do remember chastising myself though and giving myself a mental ticking off for being so lazy, muttering something along the lines of 'it could be weeks before you get the chance to fly again'. It's happened before, most often in recent years when the appeal of standing at the patch, often alone, on a cold, windswept autumn or winter's day has dulled the relentless enthusiasm that I used to have for model flying - and that, thankfully, I still have when the conditions are even marginally on my side. But all this water, either bucketing down or forming in big puddles over the fields, is another thing entirely; model boats, anyone?

All this wet talk has prompted me to dial up a new mug shot for this welcome page, just to remind me of the many long, warm flying days that we did enjoy in 2019. I have to admit to being a bit of a sucker for a nice pattern ship, hence the Sebart Wind 50S that I'm holding here on a rather nice day in late summer. Mind you, one thing about summer that I don't miss are those mini swarms of little flies hovering at head height, an annoying consequence of flying from cow and sheep fields. If you have any tips for dispersing them then do let me know in time for next year!

Some space on our 'All Write' letters pages has recently been given over to correspondence from readers championing the cause of 'real aeromodelling', i.e. the building and crafting of airframes from scratch. Such letters often contain a barbed comment about the perils of the dreaded foamies, with portents of doom over the potential demise of our beloved hobby should

they continue to be sold in the seemingly vast quantities that now adorn pit areas up and down the land.

However, I do detect a small but noticeable rise in comments from modellers who come at things from the opposite direction. For these often time-poor souls, a small squadron of foam models, maybe interwoven with an ARTF or two, provides the ability to continue model flying when the pressures of work and bringing up a family precludes them from getting out into their sheds and building a model from a plan upwards. That's if they have the room or spare funds to invest in a shed in the first place!

I have to admit to having sympathy with both sides of the argument as although I'd dearly love to make better use of my own workshop facilities, the demands of a busy job like editing a monthly model magazine mean that often (arguably too often!) I too have to rely on a prefabricated, aeroplane shaped piece of foam to calm my fidgety flying thumbs.

Ultimately, whichever way you enjoy taking part in aeromodelling should be applauded and hopefully respected, even if you've no particular desire to get a model airborne in either the slower, traditional way or by the faster, ready-made route. In our current all too divided society the last thing we need is to start pulling the hobby apart with our own internal divisions. Time for a group hug, methinks?

Due to the time-warped schedules involved in producing a monthly magazine such as RCM&E, the December issue is really much too early in which to wish all our dear readers and loyal advertisers our best wishes for the festive holidays. However, the January on-sale date is much more reasonable, coming out as it does on the 20th December.

So please forgive this seemingly late gesture and have yourself a truly wonderful and merry Christmas. I'll see you again in the New Year!

Happy flying!

*Kevin Crozier*



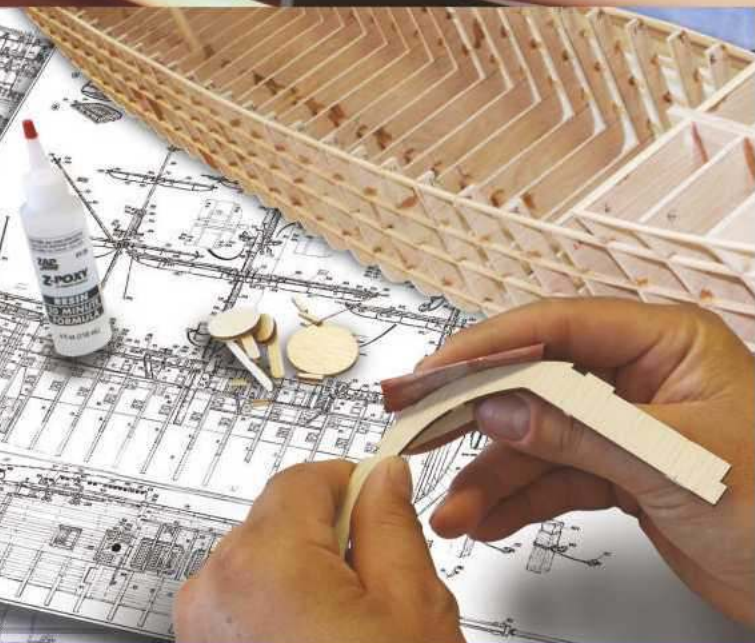


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## BMFA UPDATE ON UK REGULATIONS

Dave Phipps, CEO of the BMFA, has kindly provided RCM&E with a further update regarding registering with the CAA:

Following on from our regular updates throughout the year, the changes made to the Air Navigation Order (ANO) back in May 2018 (see CAA CAP1687 for full details) came into effect on November 30th with 'Operator' registration with the CAA and evidence of competency for 'Remote Pilots' becoming legal requirements. The CAA launched its Drone and Model Aircraft Registration and Education System (DMARES—formerly DRES) in early November.

Following the intervention by the Secretary of State for Transport (the Rt Hon Grant Shapps MP) into our battle with the DfT/CAA, an agreement was reached meaning that:

- BMFA members are exempt from registering as Operators by 30th November and can register as part of the BMFA membership renewal process.
- The proposed £16.50 annual fee for Operator registration was reduced to £9.
- Members can register as Operators and pay the CAA fee as part of the BMFA membership process.
- BMFA Achievements are accepted as evidence of competency (including our new BMFA Registration Competency Certificate) instead of the CAA test.
- Control line flyers are exempted (as are those who only operate rockets, balloons or indoor models).
- Whilst still the preferred option, external display of the Operator number is not mandatory. The Operator number can be carried in an easily accessible location within the aircraft instead.
- There is a written commitment from the DfT/CAA to work constructively with the model flying community towards implementation of the EU regulations by June 2020 (regardless of Brexit).

This was all agreed in October, which unfortunately left all parties with very little time to put everything in place for when the law changed on the 30th November. However, I am pleased to report that all parties have been working exceptionally hard with a renewed spirit of co-operation to make all this work.

### WHAT DOES THIS MEAN FOR BMFA MEMBERS?

In simple terms, for members with an existing Achievement, the only requirement is to pay the CAA's £9 registration fee when they renew their BMFA membership. It really is as simple as that!

For members without an existing Achievement, they will need to obtain one before they fly after the 30th November if they want to remain legal. They can then pay the CAA's £9 registration fee when they renew their BMFA membership. Again, it really is as simple as that.

For members without an existing Achievement, we have introduced the new BMFA Registration Competency Certificate, which provides a very simple (and quick) way to comply with the law. For full details of this new certificate, please visit [rcc.bmfa.uk](http://rcc.bmfa.uk)

### REGISTRATION WITH THE CAA AS AN OPERATOR THROUGH THE BMFA

Members registering with the CAA as an Operator as part of the BMFA Membership process must provide a valid date of birth and (wherever possible) an email address. Members must also agree to the CAA's privacy policy which you can find at [register-drones.caa.co.uk/privacy-notice](http://register-drones.caa.co.uk/privacy-notice)

If registering as an Operator through the BMFA (either directly as an individual member or via your Club), you will need to confirm that you have read it and give your consent.

### WHAT ABOUT MY OPERATOR NUMBER?

BMFA members are exempted from the requirement to display an Operator number until they receive one. For those members who register with the CAA through the BMFA membership process by the 31 st January, their information will be uploaded to the CAA's database in the first week of February. The CAA will then email members directly with their Operator number, which should be carried somewhere on/in their aircraft. For members without an email address the BMFA will communicate their Operator number to them.

### BMFA QUICK START GUIDE AND DEDICATED WEBSITE

The BMFA has produced a new 'Quick Start Guide' to the laws which apply to model flying and it also includes a summary of the new CAA Registration and Competency requirements.

The BMFA has also created a website to provide an information resource dedicated to lawful operation. It includes a summary of the law, provides links to the various CAA. Exemptions/Permissions currently in place, advice on BMFA insurance cover and access to the new Registration Competency test. Please see [www.be-lawful.bmfa.org](http://www.be-lawful.bmfa.org)

## AIRLINER MODELS

Static model collectors or scale modellers looking for extra reference material may be interested in 'Airliner Models'. Published by Crowood Press and written by Anthony J Lawlor, this book chronicles the use of professionally made airliner models in the marketing of air travel since 1919. The airliner type, maker's name, scale, approximate age and the materials used are detailed for each model illustrated. More information can be found at: [www.crowood.com](http://www.crowood.com)



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9781785006333

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10/10/2019

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Binding: Hardback

Size: 245x305 mm

Inside: 800 colour

photographs

RRP: £50.00





## A CHANGE FOR YOUR DIARY

Readers with an especially keen eye may have noticed a mistake in an advertisement in November's issue - Cambridge Gliding Centre's open day featured the wrong date. For those looking to attend, the correct date is Sunday 3rd May 2020.

If you happened to miss the advert, Richard Brickwood has kindly supplied some extra information:

*Cambridge Gliding Club is one of the largest in the country and is based on a 100-acre airfield, originally a WWII bomber base, at Gransden Lodge, 11 miles west of Cambridge. Both Lancasters and Mosquitos were operational there as part of the Pathfinder force.*

*CGC members have over 70 gliders on site, ranging from one of the oldest, 'Bluebell', a Slingsby T21, to some of the most modern cross country racing gliders, such as Antares, Discus 2c FES, Ventus 3 and Shark (both FES and Jet), and many other types in between, such as the club's K21s, Perchoz and Discus (just one of our four single seaters). There are a number from the pre-composite era including a Cirrus, Libelle and Olympus.*

*CGC also own two Robin DR400s which are used for aerotowing. Any would be perfect for your next scale model project!*

*On Sunday May 3rd CGC will be holding an Open Day. Due to the variety of types on site scale model enthusiasts are invited to seek inspiration for your next model or join in by bringing scale models of gliders (or tugs) to display on the flight line. If we are contacted in advance we will endeavour to arrange to rig and display a full-sized glider of your project or display one alongside your scale model. CGC will be offering an aerotow to 3,000' for an Introductory Gliding Lesson in a two seat-training glider behind a DR400 for the 'Best in Show' model!*

*For full details see [www.camgliding.uk](http://www.camgliding.uk), contact the office on-line at [office@camgliding.uk](mailto:office@camgliding.uk), or on 01767 677077 to book an introductory lesson.*



**Jacob Thomas and Daniel Howe receiving their prizes for 'Most Promising Pilot'**

## ATC AT BLUE SKY AEROMODELLERS

Colin Bernard, Secretary of Blue Sky Aeromodellers, has written to RCM&E to share what took place when his club invited the Clay Cross 2326 ATC squadron to try their hand at radio control flying at their new Beeley Moor flying site:

*We had been talking with the squadron for a while, one of our members being a civilian instructor there. A lot of interest had been generated in the idea of visiting the club and cadets trying their hand at radio control flying using the club trainers, guided by club instructors.*

*During a period of changeable weather, we were fortunate to wake to blue skies and so there was a good turn-out of both cadets and members.*

*Although the original plan was to intersperse the cadet sessions with demonstration flights by club members, the interest was such that we devoted the whole afternoon to cadet flying so that they got at least two flights each. As well as the actual flying, we also provided flight simulators, which were very popular. To give the cadets an idea of the different types of modelling available, members brought in a good selection of models, which seemed to get a lot of attention.*

*All the cadets seemed to thoroughly enjoy the experience and took their turns very seriously. Of course, such energy required replenishing, so members were kept busy manning the barbeque, providing some excellent burgers.*

*Throughout the afternoon the instructors were assessing the cadets for most promising flyer, with a prize for this being donated by the British Model Flying Association (Midland Area). In the end there were two cadets with equal promise, so the club matched the BMFA donation to allow two prizes to be awarded. These were presented to Cadets Daniel Howe and Jacob Thomas by civilian instructor (and Blue Sky member) David Bowdler.*

*At the end of the day, all agreed it had been a very successful event and thanks are due to all on both sides, especially the instructors and cooks who were kept busy all afternoon!*

*Blue Sky Aeromodellers are a long-established model club specialising in radio controlled fixed wing aircraft and helicopters. For people new to the hobby, club instructors and aircraft are available to take members through all levels of the national BMFA competency scheme.*

*For more information visit [bluesky.bmfa.org](http://bluesky.bmfa.org) or contact the secretary via [secretary@blueskyaeromodellers.org](mailto:secretary@blueskyaeromodellers.org)*



**Photo: Alex Whittaker**

## THE PURSUIT OF REALISM

Featured in this issue, Richard Crapp's magnificent Stampe SV4-E is fitted with a gyro, something that is becoming more commonplace in the world of scale modelling in order to help achieve smooth, realistic flight.

Dave Wilshire, owner of Motors & Rotors, has invited any readers wanting to know more to contact him. Dave says:

*"Motors & Rotors supplied Richard's gyros and helped him with his early questions. We did plenty of iGyro testing in various models and as a result we are in the perfect position to help people with questions and set ups. It's worth noting the Powerbox iGyro 3e has now been superseded by the iGyro 3xtra, which has even more features aimed at assisting control on a wider range of types."*

Dave can be contacted on 01923 270405 or at [motrot@aol.com](mailto:motrot@aol.com)

# COUNTERPOINT



## SAITO FG-73R5

£2059 | [www.macgregor.co.uk](http://www.macgregor.co.uk)

If you're looking for a large, petrol-fuelled radial, feast your eyes on this top-quality piece of four-stroke engineering from Saito. Weighing about 6.6 lb (3kg), including ignition and recommended for use with 22" x 10" - 23" x 10" props spinning at 1,200 - 7,000rpm, the 29mm bore, 22mm stroke 72.7cc FG-73R5 comes with legendary provenance. The perfect partner for that large scale build!



## DYNAM WACO PNP

€229 | [www.pichler-modellbau.de](http://www.pichler-modellbau.de)

The Waco remains a popular choice amongst aeromodellers, and this latest example from Pichler is bound to be well received. Made from tough EPO foam, this lovely 50" (1270mm) span biplane features a high level of scale detail and comes almost ready to fly complete with pre-installed servos (4 x 9g), 650kV brushless motor and 40A ESC; married to your choice of 4S 2200mAh LiPo this powertrain provides plenty of power for high speed passes and graceful aerobatics in true Waco style. An easy-access hatch allows for quick battery changes without having to remove the wings. 4-channel R/C required.



## LIGHTNING 50

£86 | [www.englishelectricmodels.co.uk](http://www.englishelectricmodels.co.uk)



Designed for 50mm EDF and 3-channel R/C this part kit from English Electric Models builds into a very near scale, 21.3" (541mm) span facsimile of the legendary British twin-jet interceptor. Of traditional balsa and ply construction, the model is built on a jig to ensure accurate assembly and the resulting airframe is very strong thanks to a pair of carbon tubes that run almost the full length of the fuselage, onto which the formers attach. The kit includes all the major and time-consuming components required, i.e. CNC-cut balsa and ply parts, carbon tube and rod, and a vac-formed canopy, plus detailed plans (spread over three Ao sheets) and a comprehensive instruction booklet with full build details and images. Fitted with a Wemotec Micro Fan Pro 4-Blade 50mm EDF / 6000kV 3S HET 240-15 motor, 30A ESC and a 3S 1600mAh LiPo the prototype delivers a great flying performance, the model's generous wing area enabling a very wide speed range and well-behaved landing characteristics.



## ARROWS MARLIN

£169.99 | [www.jperkins.com](http://www.jperkins.com)

If you've always fancied joining the jet set but have struggled to know where best to start, then take a look at this entry-level EDF jet from J. Perkins. Moulded in EPO the Marlin is powerful, precise and arrow-like in flight but remains stable, forgiving and confidence-inspiring, with a wide aerobatic envelope. From large, sky-eating loops to locked-in knife-edge flight, slow full-flap passes and everything in between, this very versatile aircraft can quickly become a Sunday favourite. Assembly is simplicity itself and with no glue required you can be airborne within an hour of opening the box. Just add a 4S 35C 2200 - 2700mAh 35C LiPo, 5-channel Tx and Rx, then go wake the angels!





### RANGER 1800

£249.99

[www.cmldistribution.co.uk](http://www.cmldistribution.co.uk)

Simple to assemble, stable & predictable in flight, the 71" (1.8m) span FMS Ranger 1800 from CML Distribution has all the hallmarks of the ideal trainer. These qualities, augmented by excellent STOL performance and the ability to fly from rough terrain thanks to oversize wheels, metal main U/C and a spring-cushioned nose leg means the Ranger would also make an ideal winter hack for the more experienced pilot. Functioning landing lights, nav lights and strobes enable the model to be seen well into dusk – just right for short winter days. Optional floats are available too. Made from EPO and supplied complete with seven servos, a 3541-750kV outrunner and 45A ESC, you'll need a 4S 3300 - 4000mAh LiPo, charger and 6-channel R/C to complete the model.



### HW-4 FLAMINGO

£22.50 – £219 | [www.sarikhobbies.com](http://www.sarikhobbies.com)

Featured as a free plan in last month's RCM&E, Chris Williams' superb 11.5ft. (3.5m) span 1/5 scale version of this one-off, elegant vintage gull wing sailplane is sure to grace the skies in fine fashion whether aerotowed or launched from the slope. Hot on the heels of the plan's publication, Sarik Hobbies have come up trumps with a canopy and wood packs that will help speed the build and make sure your HW-4 is ready in plenty of time ahead of the flying season. The canopy (order ref. CA2215CY) is priced at £22.50, with a set of laser-cut parts (WPRC2215) costing £143. Adding a further £57.50 to your order will buy an additional wood pack (AWPRC2215), which contains the rest of the wood required to complete the model. For all of the aforementioned wood order the £219 short kit (SETRC2215) – this doesn't include the canopy but does include a copy of the plan should you need it (also available separately for £26.50, order ref. RC2215).



### EME/DLE AUTO-STARTERS

£137.95 & £139.95 | [www.macgregor.co.uk](http://www.macgregor.co.uk)

Available in two sizes, these auto-starters from MacGregor bring safety and convenience to operators of large petrol engines, which can then be started remotely at the flick of a Tx switch rather than flicking the prop. Priced at £137.95, the 200z (560g) EME35 is fitted with a brushed 480 motor and suitable for 30 – 35cc engines (EME35, DLE, DLE35RA etc.). Driven by a 550 motor, the £139.95 EME60 weighs 190z (540g) and will serve 50 – 60cc engines (EME55, EME60, DL50, DLE55, DLA56, SE55 etc.). Both versions require a 3V – 15V power supply (3S LiPo recommended).



### RADIANT CONNECTORS

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J. Perkins has just added 140 colourful high-quality leads and connectors to its Radiant Electrical Accessories range. Of these, and particularly useful for anyone who hates soldering, is the updated series of adapter plugs featuring:

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- Deans (HCT) Male to EC3 Female
- XT90 Female to XT60 Male
- XT90 Male to XT60 Female
- MPX Male to XT60 Female

Available now from your local JP stockist.



*Richard Crapp, Lord of Scale, and a true gent with a wry sense of humour.*

*Pretty in the air. The Stampe flew out her maiden flight with minimal trim required.*

## Alex Whittaker stands in awe of an absolute feast of scale scratch-building

words & photos » Alex Whittaker

**M**ost modellers have a soft spot for the Stampe. Indeed, for some, this handsome biplane is often looked upon as the Belgian Tiger Moth. I even remember an old biplane rigger at Southport assuring me that the people at Stampe et Vertongen drew around a Tiger Moth with chalk on the hangar floor to get the proportions of their new SV.4 just right. Utter twaddle of course, because Belgians certainly know how to design their own exceptional aircraft. The SV.4 is one of those gracious airframes that always looks just right. True, to my eyes it always appears a little stiffer and a bit more linear than the Tiger Moth, but it's a true classic, nonetheless. If you look closer, you will soon note that the resemblance to the Moth is superficial, even though the use of the in-line, cowled Gypsy Major engine in the prototype did echo that of the Tiger.

### GEORGE IVANOV

The Stampe et Vertongen SV.4 two seat biplane trainer-cum-tourer was designed in 1933 by George Ivanov. Only 35 models were built before the company was closed during WWII. After the war a further 65 were built by Stampe et Reynard and these served as trainers in the Belgian Air Force until 1955. There were foreign-licensed versions, which took the total production to 1050 and many served as trainers while others found their way onto the civilian register as leisure aircraft, some finding their way across the channel to the UK.

### THE MODEL

We can all remember the well-loved 1/4 scale Stampe R/C kits of old. I particularly liked the Svenson kit with the enclosed winter canopy and the wonderfully stark penguin logo, and the bright yellow schemed versions too.

Precedent famously had a big Stampe as well. At the time such kits were well beyond my pay grade, but they formed part of the commercial vanguard of the early large scale model movement.

UK scale man, Richard Crapp, always liked SV.4s but fancied something a bit different. He just happens to be one of our most distinguished and internationally recognised scale modellers. He is best known, most recently perhaps, for his huge 1930s Westland Wessex twin; here, however, he changed gear and went for a very rare version of this much loved Belgian biplane.

In fact, his early researches unearthed a little-known modified version, amazingly fitted with a Lycoming horizontal twin engine. Necessarily, the new engine had demanded a complete rethink of the original airframe's front end. Out went the slim in-line cowling and in came a curvy engine enclosure. The effect is dramatic and instantly updates the SV.4's appearance.

After two visits to Belgium to see the original, and many hours tracking down manufacturer drawings and assessing over 2,400 photographs, plus many more studying the classic AAP Lloyd three-view, Richard was able to start drawing up his own plan.





Richard's scratch-built SV4-E is built to 1/3rd scale, spans 110" and weighs 32lbs.

# SOUPED UP STAMPE

This delivered a one-third scale model of 110" span, planned around a lesser-known 85cc East European petrol horizontal twin. His target weight was under 15kg, which he wryly told me demanded all his light-building nous!

Most interestingly he has, like a number of scale flyers, incorporated a gyro in this F4C class model. All completely legal but a bit of an eye-opener for many traditional scale die-hards.

## CONSTRUCTION

Richard has modelled the unique Lycoming engined version, sometimes called the SV.4-E. The model uses a built-up wooden structure, mostly balsa with very little plywood, which, for the most part uses traditional construction techniques. Such techniques deliver a faithful but light model, capable of absorbing the rough-and-tumble of scale competition, and flying in almost any weather.

With the use of a fully equipped workshop, he has also incorporated many more modern building and detailing techniques. These include 3D printing, wood lamination, laser-engraving, plus a range of home-made carbon and composite mouldings. The proof of the pudding is that on its first competitive



Richard's Stampe SV4-E is modelled on the unique Belgian Lycoming variant.





The new cowl means that the SV4 variant strikes a different pose.



Ailerons are on all four wing panels, complete with scale control runs.



Beautifully modelled upper wing tank, filler sight tube and tubing runs. Lovely!



The model flies very well and has no obvious vices.

outing the model placed fourth in the F4C Scale Class at the BMFA 2019 Scale National Championships. Not bad for a model that he freely admits isn't actually finished!

### POWERPLANT

Richard tracked down a Roto engine from the Czech Republic. It is an 85cc horizontal petrol twin using a 20oz tank from The Prop Guy and driving a 20 x 6" prop from either the Menz, Xoar or Biela brands. He's still experimenting with a six-bolt hub and his own carbon spinner. The exhaust is a commercial Valach item, with two chambers and twin outlets. It was originally made for a

120cc engine and delivers very quiet performance from the 85cc Roto. Frankly, on this prop and exhaust combination, she runs and sounds like a dream.

### ASPEN FUEL

It's interesting to note that Richard runs his engine on Aspen petrol fuel with a 40:1 mix. Aspen say that their fuel - Aspen alkylate petrol - is an extremely clean and effective motor fuel, which, compared to regular pump fuel, is virtually free from benzene, sulphur or other harmful substances. The actual alkylation process to produce Aspen is far more advanced and expensive than for road fuel.

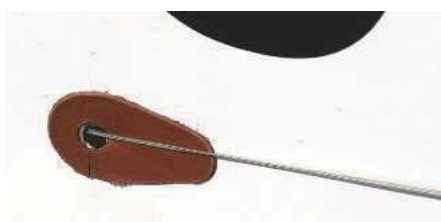
This fuel does indeed have an enthusiastic UK following, not just among the scale fraternity, but also with advanced 3D and aerobatic pilots. Five litres costs about £20 and you can even get it delivered.

### COWL

The most striking visual difference between this Lycoming engined Stampe and the original design is that fabulously curvy engine cowling. This took Richard three months to get right. First of all, some of the



Richard home 3D printed all the instruments. Watch hands are from ebay.



All the cable and wire exits have a pinked leather patch made on a laser engraver.

source data proved incorrect and since the cowl is unique, there are no drawings extant. A further batch of photos taken on a second visit to view the subject aircraft in Belgium proved that the supposed shape was all wrong. But he persevered and eventually got it right, but not without some heartache.





*It's hard to tell Richard's model from the full size.*



*Take a look at the cable terminations, the accurate hinges and the rib tapes.*



*The tail of any SV4 is the easiest distinguishing factor from a Tiger Moth.*



*Love the Stampe logo!*

*The full-size cowl housed a Lycoming; the model cowl houses a Roto 85cc twin.*

#### UNDERCARRIAGE

Richard has a lathe and milling machine in his shed, so this assembly is all home-machined and fabricated. It is built exactly to scale and incorporates hinge points milled from solid aluminium, with stainless struts sourced from Practical Scale. The articulated undercarriage incorporates two-stage springing, using springs and grease. The axles are made from M5 high-tension set screws and the homemade sponge tyres have Richard's DIY 3D printed scale covers.





## DATAFILE

<b>Scale:</b>	1:3
<b>Wingspan:</b>	110" (2700mm)
<b>Weight:</b>	32.8lbs (14.9kg)
<b>Engine:</b>	Roto 85cc twin petrol
<b>Prop:</b>	Menz 26" x 8"
<b>Exhaust:</b>	Valach twin chamber
<b>Radio:</b>	Multiplex Profi
<b>Gyro:</b>	PowerBox

*Right: Richard had a bit of heartache making the cowl, but it turned out fine.*

*Far right: The undercarriage was machined on Richard's lathe and milling machine.*



*If you look closely any semblance to the Tiger Moth is superficial.*

### COVERING AND FINISHING

The model is covered in Solartex, finished and fuel-proofed mostly with Klass Kote Epoxy and some Stits two-pack epoxy paint.

Due to the subject aircraft's age (the legends were hand-painted 30 years ago when it was restored at Booker by Personal Plane Services), Richard felt it was important to retain that authentic scale effect, so photos of the original were made into water slide decals and applied with Microset, then finished with Windsor & Newton satin varnish.

### SCALE DETAILS

This SV4-E version of the Stampe is considerably updated (blinged up, quoth Richard!) so all wing and tail fillets have lovely curves and the strut ends have a little fairing. Fairings and so forth are all secured with tiny opticians' screws. All the stitching

and taping is present and correct, although Richard points out that, as per the original, it does not show much. All the cable and wire exits have a pinked leather patch made on a laser engraver.

Windscreens are from 3mm thick acetate, heated, bent, fixed and screwed through metal and leather to wood with brass dome nuts. Richard 3D printed all the instruments. A useful scale tip is that the one-third scale hands on the instruments are actually watch-hands sourced from eBay. The crackle finish dash is also retained with opticians' screws.

All cockpit warning placards were homemade on his laser engraver. The seats are real black leather, very thin, set on blue foam formers. Doors are covered in litho-plate and are correctly hinged. Scale detail is still being added to this work-in-progress.

### FLYING NOTES

Making its public debut at last year's BMFA Scale Nationals, she attracted the gongoozlers like flies around honey. Many were not exactly sure what it was and a few only made the Stampe connection when they were close enough to read the logos. She has only made about 20 flights to date, including those Nats competition slots, but Richard says she flies very well, has no obvious vices and he declares himself pleased with her trim.

Needless to say, the sound is exquisite. The familiar appearance blended with that unfamiliar cowl delivers an intriguing sight in the air. Richard says that after seven years flying his stately twin Westland Wessex he now has to remember how to fly aerobatics! ✈️



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- CNC metal landing gear absorbs even the hardest landings
- Oversized wheels for all-terrain operations
- STOL capable flight characteristics and excellent low speed handling
- Realistic light set- Navigation lights, landing lights and strobes
- Screw-together assembly
- Optional floats
- Functional flaps
- Includes Reflex Stabilizer
- 1800mm wingspan

## Required to Complete

Lipo battery  
Transmitter & Receiver  
Charger

Build the 1800mm Ranger in as little as 3 minutes (for experienced pilots) - the screw-together assembly is very straight-forward and easy to put together.

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# THE INFINITY PROJECT

In the first of a short series on assembling and flying a high performance electric powered soarer, the Editor casts his eye over the stunning Infinity Evo airframe. words & photos » Kevin Crozier

I like to think that I'm fairly representative of a typical 'middle of the road' aeromodeller. I like to build model aeroplanes when I have the time (which is not that often these days!) but the mainstays of my flying fleet are film covered ARTFs and foamies. I'm also a 'jack of all trades' and have often said that if a model has wings or rotor blades, I'll happily give it a go. Over time I've accumulated some very nice models of varied types, be it aerobatic models, scale types, gliders, helicopters and more, but my wanderlust has prevented me from really specialising in a particular type of model or discipline. And so I've never really laid my hands on what could be considered a 'state of the art' model, probably because I've never had the inclination to take my hobby too seriously and to dabble in competition level aeromodelling, which is where some of the most innovative ideas and processes come from before they filter down to general modelling - if they ever do so at all!

Thermal soaring is a discipline that I've always enjoyed, and it comes pretty near the top of my own personal choices when I want to enjoy some relaxed sport flying. It is also

one of the disciplines that has benefited from some of the most innovative developments in terms of airframes and launch systems, including the widespread adoption of electric motors to boost today's high-performance gliders to great heights.

Imagine, then, my delight to find that one of the UK's leading suppliers of modern competition standard thermal soarers, Flighttech, was based in the nearby city of Worcester, just a short drive from home. My initial enquiry was to find out more about the King Max range of servos that Flighttech import and sell, but then I found out that the proprietor was Neil Jones, a friendly gent with whom I had made contact previously during my last stint as a magazine editor. Neil referred me to his website, [www.flighttech.co.uk](http://www.flighttech.co.uk), for more information on his range of King Max servos and it was while browsing there that I came across the Infinity range of gliders - and I was smitten!

What follows is a short series on an Average Joe's trip to modelling heaven as I assemble an Infinity Evo F5j glider. First, let me introduce you to this top-notch collection of moulded airframe parts...

## OVERVIEW

Infinity models are laid up using the latest composite techniques by Bohuslav Majerčík, who hails from Žilina Slovakia in Slovakia, close to the border with the Czech Republic and within a three-hour drive of Vienna in Austria. Bohuslav is a top F5j pilot on the European competition scene.

All the airframe components - wing and tail panels, and the fuselage - are supplied in separate padded bags. Hardware and accessories come in two zip-lock bags, which is a little low-tech when compared to how the rest of the model is presented and the high-price that these models command. A cardboard box to hold the accessories would have been nice at the price. Mind you, based on what I've seen so far, this minor point could well be the only negative comment I'll be able to make as the quality of this model is first class.

Infinity Evo is available in four versions, developed to satisfy the needs of the most demanding of competition pilots. Indeed, it's not unusual for keen F5j (and F3j) pilots to have a two or more variants to hand so that they can select the best type for the prevailing conditions, with the lightest versions used in calm, zephyr like conditions and heavier models reserved for when the wind really starts to blow!



**HERE'S THE INFINITY EVO LIST:**

**Ultra-Light FAI RTF 1100g:** made from 20g and 14g biaxial carbon fibre, with ballast fixed in the fuselage (150g maximum)

**Light RTF 1300g:** made from two layers of 20g biaxial carbon fibre, with wing mounted ballast (400g)

**Performance 1500g:** made from two layers of 30g biaxial carbon fibre, with wing mounted ballast (600g). The subject of this series

**Thunderstorm 1750g:** made from two layers of 40g biaxial carbon fibre, with wing mounted ballast (600g)

An additional decision also has to be taken regarding the tail configuration - V-tail or X-tail? This often depends on current trends, and in this regard the V-tail is definitely the preferred choice at the moment, according to Neil.

Since the vast majority of the review model's life will be spent sport flying, Neil recommended the Performance V-tail version. This has a good compromise between high performance in the air but still being able to take a bit of rough and tumble when landed on a less than smooth pasture, as typified by my local flying patch.

The difference in specifications concerns the tail areas, with the V-tail measuring 7.52 dm. sq., whilst the X-tail has an elevator area of 7.19 dm. sq., with a rudder area of 5.1 dm. sq.

**DEVELOPMENTS**

Infinity Evo is a development of the well-established Infinity glider design but offers the following developments:

- A new fuselage, with the front end optimised in conjunction with Georgi Mirov (a leading carbon fibre propeller maker - see [www.gmpropellers.com](http://www.gmpropellers.com)) for better propeller folding
- A longer tail boom for easier control over a wider range of weather conditions
- The new fuselage can be used with a 30 to 32mm diameter spinner
- Each wing panel is produced using double carbon technology for maximum strength at low weight
- The tail is made using full core technology for lighter weight but more strength.

**A CLOSER LOOK**

If you've not seen a modern moulded airframe up close before then you're in for a treat. Let's start with the wing panels. These are laid up using two layers of 30g biaxial carbon fibre, laid at 45 degrees to the length of each wing and at 90 degrees to each other. The fibres used are unidirectional, that is to say that they are non-woven, with nearly all the fibres running in a single, parallel direction. With this style of carbon fibre there are no gaps

between the fibres and all the fibres lay flat. There is no weave and hence the fibres are left 'uncrimped', as would happen with the classic woven pattern. Those crimps can cause the carbon fibres to lose strength and they also provide small areas at the weaves where resin can pool, further reducing strength and causing unwanted build up of weight from the excess resin. The overall appearance is one of sleek, glossy black hair running in one direction at 45 degrees to the wingspan. But tilt a wing under a light and you can just make out the other layer running at the opposite angle. Smooth, strong and very light!

The wing configuration is polyhedral, with a flat inboard panel and raised tips. Some dihedral is imparted to the inboard panels by the wing joiner; two types are provided, each giving a different dihedral, one very shallow for use in windy conditions and the other being more angled for use in calm conditions.

When used in windy weather the flatter joiner makes the model more responsive in roll and gives slightly improved forward penetration. The Evo will also be less affected by sidewinds on landing. The higher angle wing joiner helps in lighter lift as it allows for slower and tighter thermal turns.

The inboard panels sport full length, broad flaps, whilst the tips have full span, tapered ailerons. The ailerons and flaps are the same width at the polyhedral joint. Each control surface is operated using pre-fitted Integrated Drive Systems from Servorahmen.de ([www.servorahmen.de/Integrated-Drive-System](http://www.servorahmen.de/Integrated-Drive-System)), which result in completely internalised control horns and pushrods - quite remarkable in such thin wings. The surfaces are bottom hinged along their full lengths and are gap free, whilst the top gap is shrouded using holographic tape, again along their full length.

Some much needed areas of bright colour are imparted to the otherwise natural black finish of the carbon fibre by laying in fluorescent orange and yellow bands across the wing tips during manufacture, with a graduated blend of the same colours being used to add the model's name and the Infinity logo to each flap. Very eye-catching! On the undersides two broad white stripes run across the chord of each panel to break up the lower wing surfaces for easier visibility when flying at high altitude.

At the wing root can be seen two holes for the metal incidence pegs, as well as a deep rectangular box for inserting the carbon fibre wing joiner. Just behind the joiner box is a

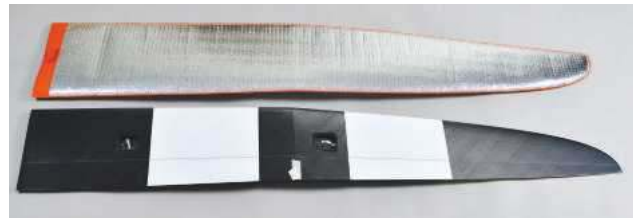


*This picture of a specially produced Infinity Evo for the 2019 F5J World Championships shows its size to good effect.*



Brightly coloured airframe parts.

The fuselage bag has two pockets for storing the wing joiners. Flat for use in wind, angled for calm conditions.



The long wing panels are supplied in padded bags. White bands on the undersides give improved visibility at altitude.



Above: Wing lay-up uses bi-axial unidirectional carbon for a smooth, strong finish. Controls are bottom hinged, with flexible holographic tape sealing the gap on top.



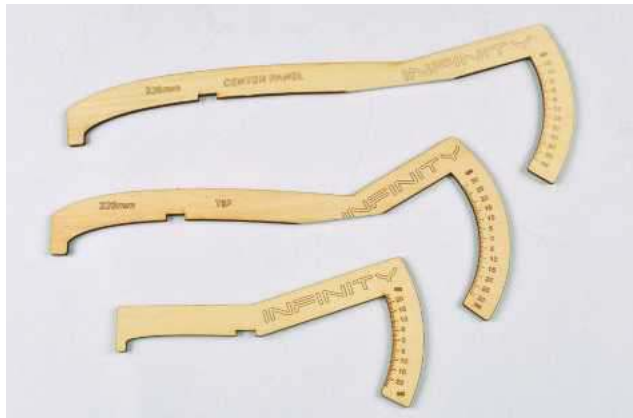
Far left: Aileron and flap servo extension leads are factory fitted. Just visible is the pushrod to activate the internal Integrated Drive System.



Left: Wing root detail showing the front joiner box, the rear ballast box and the bonded in Deans servo connector.



Far left: Two sizes of ballast weights are supplied. They can be used in pairs, either separately or together.



Left: These neat control throw gauges will come in handy come set-up time.

similar size rectangular hole where pairs of ballast bars can be inserted. Finally, to the rear of the front incidence hole, is a moulded-in red Deans four pin socket. Each socket is pre-wired to match the aileron and flap servo wiring leads that are included in the main accessory bag.

As previously mentioned, each wing panel comes in a padded, reflective foam bag, reinforced with orange cloth seams and root cuffs. I quickly discovered that these bags are a godsend when manoeuvring the near 70-inch long wing panels in the workshop, where they are invaluable in protecting the wingtips from being inadvertently prodded into the low ceiling!

A Velcro flap over each wing root stops the panels from sliding out of the bags when being handled or transported.

### TAIL HALVES

The two V-tail halves come in similarly padded bags, this time with just one Velcro strap over the roots. This is a wise move as it forces you to keep both tail halves together; you are unlikely to forget one of those huge wings when going flying, but it would be easy to leave a tail piece behind!

The tail halves are left natural black on the underside but are fully coated in fluorescent gel coat on top - bright yellow in the review model's case. You can have both sides

painted to special order, but it is not recommended as fluorescent coatings are heavy and too much at the rear can easily upset the Centre of Gravity of the Evo due to the long tail moment arm.

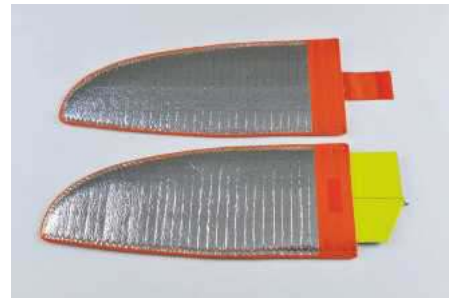
The tail is made using full core technology. Using a core in the composite laminate increases the tail's stiffness by thickening it with the low-density core material. This provides a dramatic increase in stiffness for very little additional weight.

The elevator area is very generous, accounting for almost half of the tail area. The elevators are hooked up to the wire pushrods using simple but high quality 90-degree metal horns.





Hardware supplied includes a carbon servo tray, servo hatch covers, motor mounts, pushrod ends and wing servo wiring leads.



The tail halves also come in protective bags.



A Velcro strap keeps the two halves safely together.



Small but perfectly formed - one of the elevator control horns.

### BODY TALK

Like the wings, the fuselage is a work of art, but this time it is laid up using Spread Tow Fabric (STF). This involves spreading tows of carbon fibre into thin and flat unidirectional tapes and then weaving the tapes into a broadly woven Spread Tow Fabric. This results in the chequerboard finish seen in the pictures nearby.

As with the bi-axial layup used for the wings, the near absence of crimps in the fibres, as would be caused by the tighter weaves of conventional carbon fibre fabrics, significantly reduces the accumulation of resin at the interwoven points and thereby reduces the weight of the finished fuselage. The use of STF also results in a smoother finish and less pronounced defects since a higher number of filaments are exposed whilst wetting out with resin.

Which is a long-winded way of saying that the fuselage looks great, feels smooth and weighs next to nothing!

Looking at the pictures you will notice that the front of the fuselage has a noticeable droop. This ensures the correct amount of down-thrust whilst making installation of the motor easy as any trimming when fitting the motor mount and spinner can be done at an even distance back from the supplied open end of the fuselage.



Droop snoot! The fuselage bends at the front to take up the correct down thrust.



The hatch is handed, so make sure to mark it inside to ensure a good fit.



Wing mount detail showing the incidence pegs and the holes for the wing joiner and servo connectors. Use of spread tow fabric results in a smart chequerboard finish.



The elevator halves simply slide onto a carbon rod and a short metal incidence peg. Note the rounded cut-outs to give clearance for the control horns.



*Next time we'll start putting this huge electric glider together!*



*Connecting up the pushrods using angle nosed pliers - it's much easier without a camera in the other hand!*



*Above: The fuselage bag opens out at the back end to allow the V-tail to be left in position.*

*Right: Without the tail fitted, Velcro straps can be pulled shut to fully enclose and protect the tail mount.*



Access to the radio bay and the 3S 1300mAh flight battery is via a pre-cut hatch, which pops into place using short, flat carbon strips. It doesn't look like it, but the hatch is handed so it's worth marking the front end with an arrow to ensure that it is fitted the correct way around.

Moving rearwards slightly takes us to the wing root area, with its pre-fitted rounded steel incidence pegs and rectangular openings for the wing joiner to pass through. Just forward of this is a hole for the matching half of the Deans servo connector to be bonded into place.

Much further back, at the end of the impressively long tail boom, are the V-tail mounts. These are factory fitted at the correct angles and consist of a thick carbon rod at the front, with a steel incidence peg at the rear.

Thin wire pushrods are supplied to operate the elevators, and these simply end in a short 90-degree bends that are coupled up to the control horns during assembly with angle nose pliers. The fuselage ends with two very

neatly moulded rounded cut-outs for each V-tail control horn to operate within.

To keep the finished fuselage in pristine condition during transport and storage it is supplied in a padded, fabric bag. A full-length zip opens to reveal the slender fuselage within. Two pockets are sewn into the side of the bag, providing storage for the two wing joiners supplied. This ensures that you don't forget to take the joiners along for the ride when packing the car for a flying session!

The rear of the fuselage bag is held together by long Velcro tapes. This allows the bag to be slipped over the bulk of the fuselage whilst allowing the tail to be left in position - useful in inclement weather to shield the front end or simply to provide protection to the fuselage during transit if you want to fit the tail and connect up those pushrods at home. Neil told me that connecting the control horns is quick and easy at the flying field, but it looks a mite fiddly to me. So, I'll probably hook the elevators up before I leave my house - at least until I've got used to things!

## DATAFILE

<b>Model:</b>	Infinity Evo V-tail
<b>Model type:</b>	F5J class electric glider
<b>UK importer:</b>	Flighttech - <a href="http://www.flighttech.co.uk">www.flighttech.co.uk</a>
<b>RRP:</b>	£1450.00
<b>Length:</b>	697mm
<b>Wingspan:</b>	3500mm
<b>Aspect ratio:</b>	16.4
<b>Airfoil:</b>	Dirk Pflug special
<b>Wing area:</b>	74.6 dm. sq.
<b>V-tail area:</b>	7.52 dm. sq.
<b>Functions:</b>	Ailerons (2), flaps (2), rudder (1), elevator (1)

### NEXT TIME

As you can see the individual airframe parts are very impressive in their own right. So now I'm very keen to bring them all together so I can enjoy some late winter or early spring thermal soaring!

In the next instalment I hope to make a good start by fitting the wing servos and bedding in the servo connectors to the fuselage sides. ✈



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## TOP LETTER



### CARTE D'OR SPATS

We share our moorland site with a large number of sheep, a combination that in wet and wintry conditions results in large amounts of mud and 'biologically processed' grass splattering the lower surfaces and sides of our pristine models. If not immediately removed on landing and allowed to dry this noxious mixture will remain stuck forever! The solution was to install spats or mudguards, and with my being an honorary Yorkshireman ('Ow much?!') this, of course, involved a visit to the recycling bin, which led to the creation of my 'Carte D'Or Tub' specials that I installed on my 1/4 scale Extra. They've proved very effective at keeping all the, err, detritus from spreading all over my model. They are green, effective and - most

importantly - very cheap. Some might appreciate the beauty of form and function that they represent, although of course less refined souls amongst the RCM&E readership may see nothing more than a chopped-up ice cream tub! Construction is self-explanatory, with the coat of black paint being required only for the executive version.

I wonder what other RCM&E readers have constructed from rubbish in pursuit of their hobby?

**Nigel Castle, [nigcastle@yahoo.com](mailto:nigcastle@yahoo.com)**

### MAMSELLE POWERTRAIN

I was intrigued by John Stone's letter in October's All Write requesting information about an electric drive system for the Mamselle as, nestling in my hangar amongst some 45 other models, is an electric-powered Mamselle that I built from a plan about three years ago!

I'm a strong believer in the 100W/lb rule, at least for vintage types, bearing in mind this is the power consumed by the motor, not necessarily the output claimed by the supplier. Electric motors are quite flexible in terms of the input voltage and consequently the prop size.

With an AUW of 16.5oz (468g), my Mamselle is fitted with a Turnigy 28/30-800kV motor, a 7" x 4" prop and a 3S 1300mAh LiPo, and flies around nicely at half throttle. Said motor is no longer available but HobbyKing do a prop drive version to the same spec. Some will say, 'well, this is a 250W plus motor...' But not with a 3S pack and a 7" x 4" prop it isn't! It fits nicely in the model, and with the battery positioned almost touching the motor there's no nose weight required.

**Stuart Crooks**

### SBUS ADVANTAGE

I heartily agree with David Ashby's comments in his recent article about using SBUS, configurations of which I've been using on my models for the past three years on a mixture of glider, vintage and aerobatic designs.

Adding to David's observations, using SBUS means that there's little advantage in locating the Rx near the servos, so in smaller aircraft or gliders locating the Rx in the wing rather than the fuselage provides a lot more space to position it with the antennae in the correct right angle configuration.

Also, SBUS provides ease of field rigging; with only one wire to connect the wing, the possibility for error is greatly reduced. It's even more evident if you're rigging a biplane with servos in both wings, or a single wing that includes aileron, flap and retracts.

My last point relates to using gyro stabilisers. If you have a stabiliser that's separate from the Rx then using SBUS to connect the two removes a lot of wiring. However, the tangle of wires from the stabiliser to the servos remains, as does the complication of connecting multiple wires when rigging the model at the field. If you take this a step further and use an Rx with a built-in stabiliser (such as the FrSky S8R) the SBUS will provide the stabilised signals and you're back to just one wire per wing.

**Mike Andrews**





## SAFE HXT CONNECT

Further to Mark Slade's 'Melting Point' letter in November's All Write, where he realised the inherent faults of the HXT connector (in so far that the battery and ESC connectors aren't handed and batteries can be connected together), I had a similar incident and came up with the following solution.

Simply place a short length of 8mm ID nylon tube over the larger tube of the HXT connector on the battery pack, but not the ESC connectors. The battery can then still connect to the ESC, but two battery packs that both have the extra sleeve can no longer be connected together. More details can be found on the Model Flying forum—search for 'A safer HXT connector and an incident leading to the invention'.

**Peter Farnell**

## ALIVE & KICKING

I regularly read in All Write about how traditional building and IC power is dead, and that foam models and their carefree pilots and flying are taking over. I'm sorry, but it's getting boring now! I'm a member of two clubs and I also attend an indoor meeting over the winter months, and I can honestly say that traditional building is absolutely alive.

I only fly electric foam ARTF but always do so with absolute respect and care for not only my models but also those belonging to others. I love seeing all types of models - every single style brings something positive to the party. I've seen a foam X-Wing fighter, a ducted fan foam Iron Man, a scratch-built balsa autogyro and everything else you can think of—it's the variety and acceptance of all flying machines that keeps our sport alive and brilliant.

**Steve Lester**

## BRIAN WINCH

I was truly shocked and saddened to learn about the loss of Brian Winch, especially as I'd been corresponding with him via email only a couple of weeks prior to his passing.

He always wrote at the end of his articles that we could email him with queries, so having been gifted a severely gummed up (and therefore stuck) engine that I couldn't get apart, I sought his advice. He very kindly sent me several emails and following that advice I was able to complete the job without damaging the engine. Brian will indeed be sorely missed.

**Colin Anderson**

## SPECIAL HELP

Having recently returned to aeromodeling after many decades I've been looking around for a book that can bring me up to date with current build materials and practices. When I last built a model (back in the days of 27MHz R/C) there were many full kits to choose from, often with comprehensive diagrams and decals included. I've tried a couple of 'build & fly R/C' books but found the text too chatty, and the recent editions seem to be essentially updates of the original 1970s publications.

The 2019 RCM&E Special issue is just what I've been looking for. Concise, up-to-date and with informative how-to articles on most aspects of building from plans. I now feel much more confident in tackling a substantial near-scale winter build project.

One area where I am having difficulty is locating information about how best to apply an airline livery, e.g. FlyBe, to a model aircraft. Perhaps this might be a topic for a future issue of RCM&E?

**Robert Woolley**

## FIT FOR PURPOSE

As a long-time modeller and RCM&E subscriber, I sometimes wonder if your well-intentioned contributors don't put off some people from attempting more involved finishing processes.

Casting my mind back to far-distant days when I was in the business of deep aircraft repair, in a drive to save time and materials we were exhorted to apply a policy of 'fit for purpose' rather than restore to 'as new'. Concentrating as I do on building scale models from plans, my greatest satisfaction is derived from producing an accurately built model that flies well rather than trying to achieve the best-looking machine. After all, how many of us still have unblemished models after half-a-dozen outings?

Perhaps it would be more helpful and encouraging if your experts made more effort to differentiate between the 'fit for purpose' finish and the 'perfect' finish required for competition. We don't all have the enormous patience, time, effort, tools and money required to achieve a textbook finish.

**Joe Collicutt**



*Coming soon! Peter's 'Moon Dancer 2' will shortly feature as a free pull-out plan in RCM&E. A good choice for a mass-build, says Piers Bowlan.*

## MASS BUILD ANYONE?

The annual 'mass build' subject always seems to attract plenty of interest on the Model Flying forum. Is there a particular design that's in the frame for 2020? Peter Miller's designs usually follow his tried and tested formulae that yield attractive, easy-build models that fly well. His latest, Moon Dancer 2, would be an excellent mass build choice, especially if presented as a free pro-plan in RCM&E, and the ranks of 'mass builders' would no doubt be swollen by a laser cut parts set being made available. There might even be time for Peter to incorporate a glow conversion to help those with that preference.

**Piers Bowlan**



*A contender for a winter hack? All moulded Hawk 3 is my go to windy weather model,*

# HACK WEATHER

David Ashby plays with 'the world's smallest battery charger', re-appraises his winter hacks and gets a new project underway. words & photos » David Ashby

I showed you iSDT's Q6 Lite charger a year or so ago. An extremely compact 200W/8A unit, many readers went out and got one and everyone I've spoken to since thinks it's a great bit of kit - small and pretty near perfect. Well, if you thought that was svelte then check out what ToolkitRC declares to be the world's smallest battery charger - the M6, a 150W/10A multi-function unit that's about two thirds the size of the Q6, yet with a few more tricks up its sleeve. It certainly squeezes a lot into its 68 x 49 x 26mm, 80g frame and handles all the usual cell chemistries including Pb and LiHV. Like the Q6 it'll balance packs, measure cell internal resistance and charge your phone too thanks to a 5V/2.1A USB port.

Power input can be from 7 to 28V - up to 6S in other words. On the output side the M6 auto-detects a Lithium cell count from 1 to 6S. A 1.8" colour screen and a small vertical row of touch sensitive icons form the user interface. A minimalist manual is included but a more substantial text can be downloaded. I bought mine at [www.electricwingman.com](http://www.electricwingman.com) for £24.95, where you'll also find the manual.

PWM, PPM and S.Bus signal monitoring form those new features thanks to a servo/universal socket. Select 'output', plug in a servo and the unit performs tester duties with a graph reflecting the signal and speed. It's not quite as quick and easy as a traditional tester, one with a big rotary dial, but the

feature is certainly nice to have, perhaps at the flying field or when you happen to be away from the workbench. Servo testers can be inaccurate too. A friend tells me his will centre servos differently at 4.8V and 6V, so the M6's display could be used to provide a more accurate reading when you're setting up a model.

That 150W power figure is stunningly large for such a small unit, the reason for the underside fan, yet in use it doesn't seem to get very warm. The fan is quiet too. Mine will have a home in my transmitter case alongside a few charging leads, with input power coming from either the small 12V Pb or 5500mAh 3S LiPo that I keep in the car to replenish my receiver packs at the slope or wherever I happen to be.





M6, 'the smallest charger in the world', says the maker.



Alongside the Q6, itself pretty darn small.



XT60 sockets are used for input and output. Note the servo and USB terminals too.



The underside fan is very quiet in operation.



The four main menus. Programming uses the touch-sensitive icons alongside.



Charging set-up. Popular charge set-ups can be stored.



Charging in progress. The display is self-explanatory.



As a winter hack, your typical hotliner has a lot going for it - easy set-up and maintenance for starters, and it'll slice through a breeze with ease.

## HACK WEATHER

There's always an unexpectedly cold late autumn flying session that comes as a surprise to remind you that winter approaches and adequate preparations need to be made. Freezing weather has never stopped me flying, but poor prep has; inadequate clothing, poor battery care or trying to fly models unsuited to the conditions. I can tick all those boxes.

Some clubs manage to maintain a decent enough grass surface through the winter so retracts or delicate undercarriages aren't troubled greatly, but others aren't so fortunate. So, already, the LiPos that power my summer models and hangar queens have been put through the charger's storage programme ready to sit out the cold months ahead.



*E-flite's Allusive is another that'll fly in a wide variety of conditions and from just about anywhere.*

Casting my eye around the workshop for a winter hack the other day led to the startling conclusion that I didn't have one, at least not in the traditional sense. You know, a rugged balsa sportster that's easy to repair, operate and maintain, the WOT 4 and Acrowot being the first that spring to mind.

Like many, I've a few foamies, most with retracts, but I like to keep mine in good nick for as long as I can and they're just too nice to risk when the field is frozen or muddy. With its incredible retracts the FMS Tigercat is a perfect example, so that'll stay in the warm until spring.

Last year I flew an electric hotliner and sport motor glider right through the cold spell. Both use a fibre glass fuselage so are tough enough and easy to clean down (especially after the farmer has let his sheep into the field). Now I come to think about it, they've flown pretty regularly for the last 12 months, at the flat field and from the slope. One is always in the car when I go flying and they have served as good back-up models for the times when I've left a hangar queen's wing joiner at home, forgotten the appropriate battery or some other essential.

E-flite's (now discontinued) Allusive is one and Staufenbiel's Hawk 3 the other. Released six years ago, my 2.2m span Allusive is a proper old multi-purpose machine that's flown just about everywhere. It's well made, smooth, pretty nippy, even on 3S and manages to sniff out the odd passing thermal. But the crisp response is what I really enjoy; it flies like a glider-style aerobat (if that makes sense), with a satisfying degree of agility. It's a pity they are no longer made. They do sometimes crop up in the classified listings, although there are plenty of newer alternatives. Robbe's 2019 glider range in particular is worth perusing if you're after something similar.

Hawk 3 is all moulded and easy to maintain, store and transport. It's agile, slippery and, with four cells, is fast enough to earn the hotliner badge. It's my windy weather model, lovely in calmer conditions, of course, but a machine that'll effortlessly slip through a 20-25mph breeze when the wooden WOTs are taking shelter. Hmm... on reflection, then, perhaps I don't need a traditional hack.



**Peter Mumford proudly holds his Class 1 Nats Fun Fly winner's trophy. John Ruck and Martin Bell gave him a good run for his money.**

## FUN FLY ERRATUM

My sincere apologies go to Peter Mumford, whose Class 1 Fun Fly victory I managed to mis-credit in my Nats report in the last issue. Peter won, flying his converted Limbo Dancer (new wing, bigger fin), in the process recording a staggering 55 Touch & Goes over the allotted two minutes. Pop his name into the YouTube search box and you'll find the impressive footage. It's one touch less than Dan Workman's record, a record that's likely to fall next year, so Peter reckons, weather permitting.

## MULTILOCKS

It's surprising how often someone queries something you assume to be pretty well known. Assembling a glider recently I mated the wing's MULTILocks with a click then found myself explaining why tape or some other method wasn't doing the job.

So, for those who've never come across them, MULTILocks are produced by Multiplex and designed to ensure that

wings - usually glider wings - stay put. They're neat, use very little space and, for smaller models, avoid the need for tape or other contraptions.

They're supplied as a set, for around £11, and are designed for use with models spanning up to 4m. A cylindrical female component (the lock) sits in the fuselage while a (male) peg is fitted to the wing root. In both cases strong epoxy does the trick. Three peg types are supplied, each designed for use with a correspondingly larger span. Sliding the wing into position engages the peg in the lock with a click. Separation is just a case of levering a little perpendicular pressure nearer the wing tip while gripping the fuselage. Either that or by using the wedge tool supplied to prise the wing away from the fuselage (taking care not to press the wedge into any servo leads or joiners).

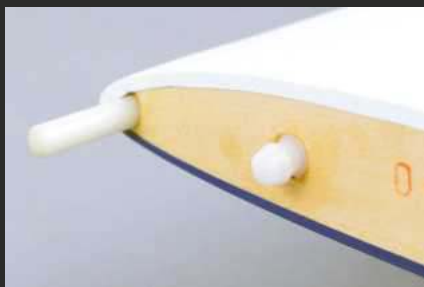


**MULTILocks, the best wing retention method you've probably never heard of.**



**A peg goes in the wing and the lock in the fuselage. The wedge can be used to separate them. Three peg types are supplied; bigger wings need more peg notches.**





A wing root peg. Needless to say, the root must be strong enough and, in some cases, may need strengthening.



The lock in situ. Same applies regarding strength.



Sometimes the lock can do its job too well, so a little petroleum jelly or grease can help when easing the sections apart.

It goes without saying that the model should have adequate strength at the wing root and fuselage, while very large models (exceeding 4m span) probably require two locks for each wing. If it's particularly windy or turbulent then, depending on the model (size, flying style etc.) you'll still see flyers adding tape or other fixings for extra security, just to be on the safe side.

It's a great system - almost too good. Like some others, I've found that wings can sometimes be difficult to separate but a tip from an experienced soarer helped - using a little grease or petroleum jelly smeared over the parts eases separation. It's not a system you see used with power models or extreme hillside aerobats, but for regular soarers it's simple and convenient. There, so now you know.

### BUFFER UP

Nik Harrison got in touch after I described my E-flite Viper Jet's errant nose leg retract - the one with a mind of its own that cycled in flight, amusing everyone at the field except your columnist on the sticks. Nik had experienced problems setting up his four-motor Airbus A400 built from the Tony Nijhuis plan and writes:

**Hurrah! The winter project is underway. This should keep me out of mischief for a while.**



"I decided to use a quad controller on the A400 (cheaper and more convenient) but the Rx was unable to drive the four control signals to the quad ESC. It could drive any two motors, but not four. Oscilloscope monitoring showed that the drive from the Rx was insufficient. It had worked in another model with four individual ESCs without a problem.

Experimentation showed that the Rx was only supplying around 1mA drive current, so my solution was to add my own-design unity gain buffer to improve the current drive. If you are not familiar with op amps, they have very low input current but, in unity gain mode, they will output the same voltage level as the input (within its parameter range). Therefore, they act as a perfect buffer and have the ability to drive up to 50mA. The result was the quad ESC now worked perfectly.

The next problem was when I connected the rudder servo and the nose electric retract via a y-lead. The rudder servo went mad. Individually there was no problem. The rudder servo was a digital type, with the electric retract being whatever that comes as. With my previous problem in my mind I used a dual buffer so that each servo had its own buffer and neither could influence the other. Again, no more problems. The op amp I used (TS358) is an 8 pin DIL device that I happened to have available. It is not a particularly special op amp so if a manufacturer was to use an equivalent surface mount device in a Y-lead then you would hardly know it was there, but it would remove this type of servo interference. I've now had dozens of flights with my A400 (really nice to fly) and the telemetry has always shown no loss of signal, with not a twitchy servo in sight. It also includes working cargo doors and a six parachute drop carousel, so there are some extra home-design electronics on board, but they've not caused any interference problems."

Or, as I did, you can always use a spare channel at the Rx, if you have one. Not that Nik had the luxury; his fix was for the channel-starved electronics experts among us, especially those with complex models like the A400. Incidentally, he bought it along to September's RCM&E Fly-In at BMFA Buckminster (see my report in last month's RCM&E) where it won the Tony Nijhuis Trophy, impressing everyone.



Laser cut wing and tail sheeting is beautifully done.



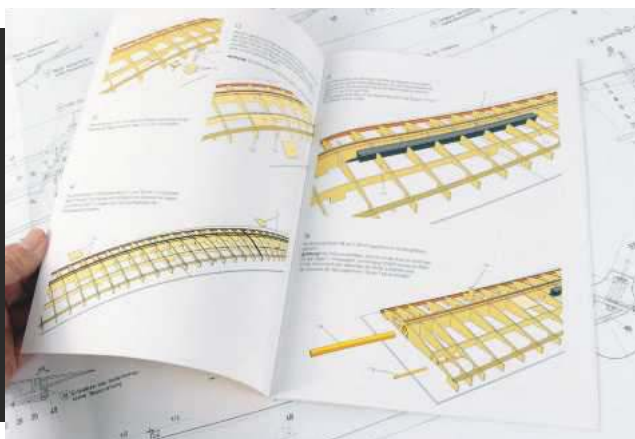
Mechanical wing spoilers are included.

### WINTER PROJECT

I've been casting around for a new project, one to while away the dark evenings and something a bit bigger and more challenging than the small sportsters I usually fall for. I've marvelled at the elegant vintage scale gliders flown at my local slope for many years now, most built from plans or part-kits. Deciding my time had come, I've settled on a full kit, one of a handful of larger subjects produced by Aero-Naut.

The German firm's kit, a 3.5m span Bergfalke, is one that's popular and flies well, but it was their 4m span SHK that caught my eye, particularly the model's classic, characterful design traits. I just like the fact that it's a little different to many machines you'll find flying, and at 1/4 scale it's big enough to create an impression, but not too big from the practical

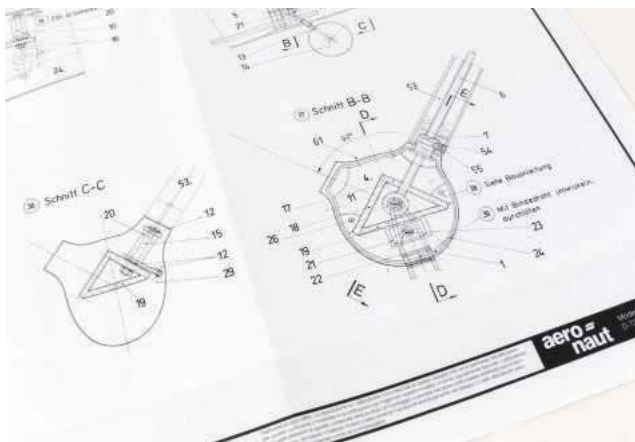




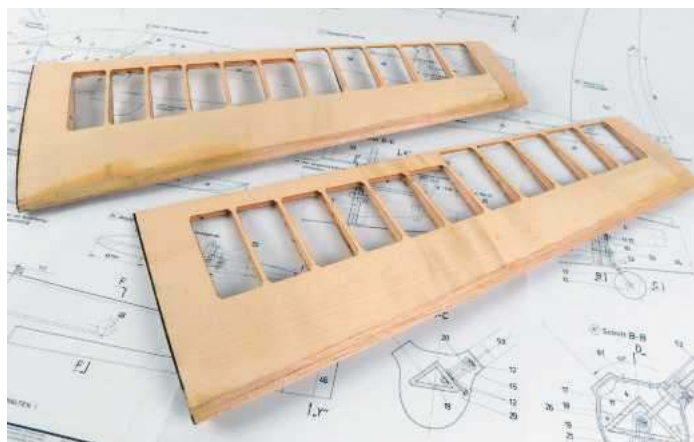
The manual is fine - as far as the wings are concerned... An English language version can be downloaded.



The gel-coated fuselage is moulded using glass fibre. The finish is excellent.



Fuselage tail section diagrams. Some study will be required.



I've started the tail feathers, just to ease myself in. Seen here before final sanding.

## “Deciding my time had come, I’ve settled on a full kit, one of a handful of larger subjects produced by Aero-Naut.”

perspectives of storage, transportation and launching. It's available in one of two versions; one comes with solid foam core wings, the other (cheaper) version using a built-up structure. Both employ a white gel-coated fibreglass fuselage.

I was the built-up wing for me, especially knowing how well Aero-Naut's laser-cut structures go together. I suppose you could argue that the solid wing would be a tad stronger, but the SHK is no dynamic soarer and, flown appropriately, the built-up structure will, I'm sure, be fine.

The full-size machine first flew in 1965 and was one of the last all-wood gliders made before glass fibre was widely adopted. It uses an all-moving V-tail arrangement with spoilers on the wing's top and underside. The model replicates both, although spoilers are on the top wing only. Some good mechanical spoilers are included in the kit and although a retracting main wheel isn't, that won't bother me as that's not a feature I'll

need when operating from the hill, where retracts need the sort of smooth uncluttered landing surface seldom found.

It's already here, spread all round the workshop, and I've made a tentative start by completing the V-tail sections. Both the wing and tail structures are built over laser-cut Depron jigs and finished with a laser-cut maple veneer sheet that's covered on the underside with a thin cotton fabric for extra strength. The sheet sections I've added so far fit perfectly.

You'll laugh but the sheer size is one aspect I hadn't quite appreciated; the wing is a two-piece affair, which means each is around 2m long, far longer than any single workbench I have. It has meant moving two benches together, checking alignment with a spirit level then bridging the small gap with the Depron sheet jig. I think it'll be fine, but I've made a mental note to look out for a larger building surface to accommodate future projects.

Aero-Naut's instructions are usually very good these days. Most of their latest kits come with a booklet full of three-dimensional exploded views that show all you need, to the extent that text is largely superfluous. The SHK has that for the wings and tail, but fuselage construction is described by some text supported with technical drawings - text that requires a re-read or three and drawings that require plenty of patient study. Some pictures would have been nice, of the V-tail mechanism in particular, but others have trodden this path and a quick Google has provided build blogs and photos that should see me through.

So far so good. As Alex Whittaker says, to hunker down with brew and glue takes some beating and I'll keep you posted as it comes together. I'm in no rush but it'll certainly be ready to fly by the Spring. If you've got one, then please do drop a line with a pic and your thoughts. As always, you'll find me at [justforfunrcme@gmail.com](mailto:justforfunrcme@gmail.com) ✈





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# HIROBO SHUTTLE



Nigel Cartwright assembles the latest version of a classic model helicopter in the form of the Hirobo Shuttle Plus 2 EP

words » Nigel Cartwright | photos » Nigel & Sally Cartwright

**W**hen Kevin first mooted reviewing the latest Hirobo Shuttle my first thought was, 'Are Hirobo still going?' And the second thought was, 'Well, I've already got one..!'

The very first Shuttle was introduced in 1985, according to the excellent website [www.vrhc.co.uk](http://www.vrhc.co.uk), while my ZX version arrived in 1989. It's worth remembering that while today the route into heli flying tends to be via small electric models, like a T-rex 450, when the Shuttle was introduced the standard training machine was a .32 glow powered model - there were no electric models and no indoor models.

I first flirted with model helicopters in the 1970s with a MicroMold Lark, and while it did see air under its skids the promise of great flying success always seemed to elude me. A lot of time was spent skating round the patch, hopping here and there and enduring a stream of rude comments from the fixed



*Who can't resist a new model heli!*

wing flyers. Aerial activities were shelved for a few years while I discovered motorbikes, girls and buying a house. I eventually married one of the aforementioned young ladies and while the models survived into married life, I'm afraid the motorbike was eventually swapped for a fridge!

Eventually thoughts turned to having another go at helicopters, so armed with

well-thumbed copies of Model Helicopter World and RCM&E, I found myself browsing Mike's Models in Birmingham, looking at the latest 'plastic fantasies', the Hirobo Shuttle and the Kyosho Concept 30. The Shuttle didn't look quite as racy as the Concept but something about the sturdy engineering of the Hirobo swung the deal. Fitted with an OS32H, JR radio and a Quest mechanical





Everything is well packed. The bags are labelled to match the manual.

gyro, rapid progress was made and within a few weeks I was flying gentle circuits, all self-taught.

This was the summer of 1995. I know the year as I remember my wife was expecting our first-born son. As he's now done his Masters and is over a year into his first job, I suddenly feel very old... And that Shuttle is still flying, rattling round the patch on high days and holidays when the sound, smell and smoke screen of a glow engine lures me back to my youth. Apart from a gyro upgrade and a few bits replaced following a couple of 'arrivals' it's still the same machine, which speaks volumes about the original design and build.

Hirobo has endured the ups and downs of life too... The company was founded in 1949, spinning yarn, and diversified into models in the 1970s. Hirobo were very successful in heli competitions, but the rise of the drone market led to a big scaling back of the hobby. They diversified into industrial machines, such as the HX-1, and the slightly bizarre single person BIT electric helicopter. But over the last five years Hirobo have been quietly updating their heli range. There are now flybarless and electric Shuttles, the new Gigas sport/3D range of helicopters and the new Eagle 4 F3C machine.

Hirobo have also recently confirmed that they will never leave the hobby side of the business. Their belief is that pilots need to learn to fly something before progressing into the industrial UAV business, therefore there will always be demand for model hobby products. They are also unique in being the only company to now offer a true beginner's helicopter in the Shuttle. Available as nitro, electric, flybar or flybarless, there have probably been more Shuttles sold in its 30+ year history than any other model ever - fixed wing and helicopter! Hirobo still offer spares support for models dating back over 20 years,

another aspect to be commended.

The Hirobo range is now being imported into the UK by Memflight, a new company led by Mark Christy. Some readers may remember him as a very successful Hirobo factory sponsored pilot in the 1990s. Mark started flying Hirobo again a few years ago and after increased contact with the factory and importing a few kits, Mark became an official UK importer in October 2018. After a few catch-up emails with Mark, a large parcel arrived on my doorstep containing a new flybarred electric Shuttle Plus 2 EP.

### LOOKS FAMILIAR!

The kit comes well packed in a sturdy box, with all the parts packed in numbered poly bags and the numbers coinciding with the build order in the excellent manual. Assembly starts with the hefty plastic side frames: insert the main shaft bearings and canopy latch, then close the frames with



Side frames bolted together with the elevator lever assembly. The frames are exactly the same as my 24-year old ZXX!



Servo tray and battery/radio mount.

The 8mm main shaft and main gear with the auto bearing.



Parts for the rotor head. Note the dual axial bearings and the damper rubbers.





*A view down the inside of one of the blade grips. Two screws hold the bearings in place.*

*The washout assembly. Note the plain bearings - no ball races here!*

*Flybar paddles are hollow, but weighted! The open areas are covered with film labels.*



*A new design swashplate is supplied, with a plastic lower half and metal upper.*



*The completed rotor-head.*

*The tail case is a new design; stronger than the original.*

long M3 bolts. The Shuttle was designed before the days of CPPM mixing so the three servos still sit in the original servo tray at the front of the frames, using a series of mechanical levers and arms to mix the servo outputs to the swashplate. These are soon assembled, along with a new metal and plastic radio/battery tray.

Like the original model there are no ball races in the control system, just plain bushes. And in a model intended for training this works just fine. This keep-it-simple philosophy applies to the rotor head; the blade grips are supported on dual axial bearings but there are no thrust bearings. The feathering spindle sits in a pair of fairly soft rubber dampers (a spray of dry silicone makes fitting these into the head block much easier). The rotor head goes together very quickly, as do the flybar and mixer assemblies. The paddles are the same as the original - hollow plastic blades with foil labels to cover the holes. In comparison to my old model the swashplate is now a much beefier design, with a plastic lower half and a metal upper.

## TAIL BOOM

The tail rotor is belt driven from a pinion on the motor shaft. Like the swashplate, the tail case has been upgraded to a beefier design, with a new design tail pitch lever. Both the tail pitch slider and the tail rotor spindle come ready assembled, in the spindle's case probably because the thrust races are fiddly to assemble in the right order. Simple plastic tail blades are provided, and care needs to be taken to ensure that the blades can swing freely in the grips.

Tail control is via a steel rod from the servo at the front of the chassis. This passes through a series of little hoops on the chassis side, then down to the tail through guides mounted on the boom and fixed in place with glue. I seem to remember one of the first upgrades I did on my old model was a boom mounted servo with a carbon rod pushrod. This gave more precise and friction-free control and eliminated the chances of the boom guides getting knocked out of alignment. We'll see how it goes!



*Hirobo supply the tail rotor spindle ready assembled.*

*The fully assembled tail rotor. The pitch change mechanism is very smooth.*







*Hirobo supply an 890kV brushless motor, shown fitted with its mounting frame and the clutch/pinion assembly.*

## IT'S GONE ELECTRIC

With the boom assembled it can be fed into the back of the chassis and the drive pinion and shaft installed. This assembly is the same as the IC version and includes the same clutch and top start socket. The brushless motor is a Hirobo branded 890kV Scorpion; this bolts to a simple aluminium bracket and the standard clutch is bolted on top. Slide the assembly into the frames, four bolts to do up and the power train is done. Glow engines were never this simple!

The undercarriage and the boom supports go on next and that's pretty much the main assembly done.

## ONTO THE RADIO

As mentioned, the servos are fitted into the tray on the chassis front, with roll, elevator and yaw on top and the collective pitch servo on its side, underneath. I used JR DS811 servos for roll, elevator and yaw, and an Align DS650 for the tail. A JR G770 gyro sits neatly on a small plate inside the chassis frames. The linkages are quickly made up from threaded rods and ball links, I found the balls quite tight to begin with but a few minutes hand working each one back and forth quickly freed them off.

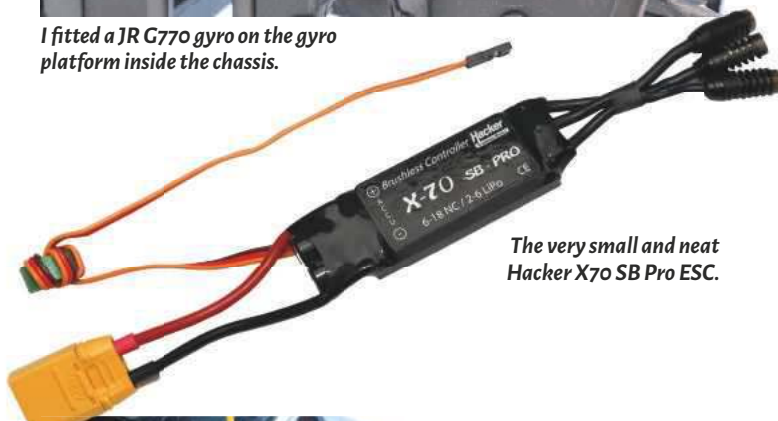
A minimum 60-amp ESC is needed. I had a Hacker 70-amp ESC to hand, so this was strapped to the inside of the chassis. A Jeti Rex 7 receiver was fitted to the front of the radio platform. I always seem to find that servo leads are either too long or too short, and as the



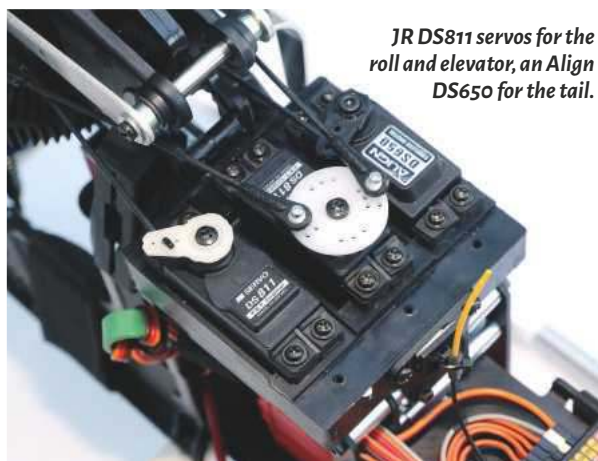
*Another JR DS811 fits under the servo tray, working the collective pitch lever.*



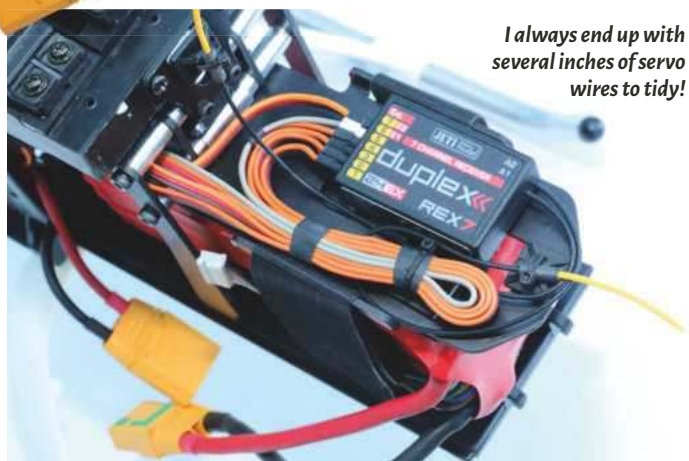
*I fitted a JR G770 gyro on the gyro platform inside the chassis.*



*The very small and neat Hacker X70 SB Pro ESC.*



*JR DS811 servos for the roll and elevator, an Align DS650 for the tail.*



*I always end up with several inches of servo wires to tidy!*





receiver is right next to the servos, I had several inches of wiring to lose in quite a small space. A neat snake of wires was formed round to the Rx sockets; the order of the plugs doesn't matter as I could assign the channels on the Jeti transmitter. Hopefully, neat wiring is reliable wiring...

## SETTING UP

Perhaps slightly odd for a model aimed at beginners, no main rotor blades are included with the kit. So, I had a look through the blade box and found a new set of suitably 'old' 550mm NHP carbon blades. I even had a set of the plastic coloured blade tips to push in the open ends. All to no avail, as although the blade box says, 'suitable for Hirobo Shuttle', I couldn't fit them as Hirobo have updated the blade bolts to 4mm from the 3mm on my original version! I eventually sourced a pair of MS Composite blades with 4mm holes and these fit perfectly.

There are several pages of setup information in the manual and it's well worth working through these carefully to avoid any surprises on the first flight. Full information on blade pitch ranges and throttle and pitch curves are provided. I used these as a baseline, tweaking to suit once the model was in the air.

The manual recommends up to a 6S 4000mAh LiPo pack to provide the oomph. I had several Kokam 3600mAh packs to hand so these were used, freshened up with XT90 spark-free connectors - slightly under the top limit, but also slightly lighter, so hopefully the flight time will be fine. The pack slides neatly into the chassis, held in place with Velcro strips and straps.

The final job is the canopy. It's still the same injection moulding, just updated with some fresh stickers. I did find it tricky to slide on and off but a spray of dry silicone on the runners soon had it sorted.

I popped the Shuttle on the scales - 3kg ready to fly with the 3600mAh battery. Compare that with 3kg for my old IC version with half a tank of fuel!



## POWERING UP

By now I was running out of excuses, so after waiting for a suitable break in the rain and wind, I set off for the field, with my aforementioned and long-suffering wife in tow to take some photos. Up into the hover for a while to make sure nothing is going to fall off, and I take a moment to check the tracking. A few clicks of trim and the Shuttle sits still like it's in a vice. The tail is a bit sensitive, so I dial the rates down on that, but the cyclics are fine. The first thing that hits me is the noise - or lack of it! Shuttles make a noise, usually a teeth-grating scream from an OS32, but this one just hums. As my friend Mark said, it's like it's in a permanent autorotation!

I remember now why this was such a good trainer; the confidence gained from having a model that will stay still, while moving gently to user input is immense. The Shuttle is quite stable - poke the cyclic and it'll move, but without that feeling that it's going to scuttle off towards the edge of the field like some models do. With the settings from the book it feels just right for a beginner; perhaps just dial some more expo in to soften the stick centres as desired.

Moving off into the circuit is a non-event, again giving just a feeling of stability and solidity. I've always found that the bigger the heli, the easier they are to fly, and the Shuttle is no exception. Everything seems to

*Above: In the circuit the electric Shuttle is very stable and easy to fly.*

*Left: The book setup proved to be just about perfect; I just reduced the tail rates. Tracking was spot on.*

happen slowly and gently, perhaps too slowly for some. But those that want to turn the wick up a bit can do so if they want. It's great fun just to run the Shuttle up and down the strip, with huge wingovers or stall turns at each end. The Hacker ESC is programmed to reduce power when the LiPo voltages drop to 3.2V, so when that happens, I land and check the timer. Normally, that's at 8 minutes, so while you don't get the duration of the glow powered machine it's more than enough time to have some fun.

Whether starting from scratch or stepping up from something like a 450, the Shuttle is the perfect (if not the only!) sensible introduction to 'full size' model helicopters. It's fantastic to see that Hirobo have kept the Shuttle in production for so long. Considering that the original was released in 1985, that's 34 years! I'm struggling to think of any model, fixed or rotary wing that's been in production for so long. The fact that such a lot of the original design and parts are still the same is a testament to Hirobo getting it right in the first place. As the saying goes, 'If it ain't broke, don't fix it!'

The Hirobo Shuttle Plus 2 EP is available from Midland Helicopters ([www.modelhelicopters.co.uk](http://www.modelhelicopters.co.uk)) or direct from Memflight ([www.memflight.co.uk](http://www.memflight.co.uk)) for £400.00, including VAT. ✈





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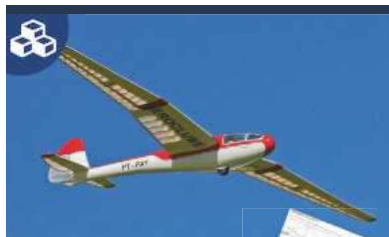
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Rollason Turbulent	SET3440	63"	40-60	<b>£128.00</b>
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# POWERBOX CORE



The Editor unboxes a premium pro-class radio control system

words & photos » Kevin Crozier

In this issue I've started a short series on building an Infinity Evo glider kit aimed at club level modellers (of which I'm one!), who may be interested in taking a step up in the quality of their models, in this case for thermal soaring. Upon picking the airframe up from FlighTech, my mentor for the build, Neil Jones, gave me advice on suitable radios due to the high carbon fibre content of such models.

Unfortunately, following this chat it became clear to me that none of my current R/C collection was really up to the task. Usually, for my higher value models, I would default immediately to JR Propo. But with their demise and the need to update my aging collection of JR receivers, I realised that I would be unable to equip the Evo with the standard of R/C system that it required.

However, just prior to starting my adventure

with the Evo, I had a chat with Dave Wilshire on his Motors & Rotors stand at the Nationals. Dave was busy promoting the virtues of the PowerBox CORE R/C system, saying how easy it was to program for more advanced models. It seemed to be the ideal choice for my new high performance glider project, plus I am hoping that it will future proof me for a while now that supplies of my previous 'first choice' R/C products from JR are sure to become more difficult to acquire as time moves on.

Hence, in this sister series to the Infinity Project, I will be taking a close look at the pro-class PowerBox CORE transmitter and the matching PBR series of receivers, concluding with some of the PBS series of sensors. That's quite a range of things to discuss, so I'm going to ease myself in with a general overview of the gorgeous CORE transmitter.

## A THING OF BEAUTY

The CORE is certainly eye-catching, with its large full-colour display panel prominently positioned above the stick units. It features a capacitive touch screen, which is the same as on any modern smartphone, so interacting with it using touch and swipe gestures is immediately comfortable and reassuring. It is also high contrast, so stands out well even in bright, sunny conditions.

The screen housing also acts as a carry handle, with a broad, angled lip along the top edge giving a firm handhold when picking the Tx up or extracting it from its deep, black painted carry case. There is no external aerial, the system's patch antennas being carried in the hand grip as well.



*The screen case acts as both a carry handle and a location for the patch antennae. No stick out aerials to get broken on this one!*



*Alcantara leather handgrips are very eye-catching and add a touch of class. Washable, too!*



*Back corner view showing the semi-circular finger grips and one of the high-quality side sliders.*





*The neck-strap is nicely padded. The clasp is a bit small compared to other Tx straps I own but seems to be strong enough.*

Speaking of antenna's, a strong point of the CORE is claimed to be its security and functional stability. It is said to be extremely secure against interference and uses a genuinely redundant 2.4GHz method of transmission. I was interested to discover that at its core (excuse the pun!) is the well proven frequency hopping process developed by Weatronic, which was highly regarded by the jet community, and which offers excellent interference rejection and long range. Also, thanks to its Weatronic heritage the CORE's radio link offers redundancy, which is monitored by the receiver, warning the user of any issues via telemetry.

The next items to catch the eye are the wonderfully soft Alcantara leather hand grips. Stitched together using strong red thread, which contribute greatly to the premium aesthetic (rather like the interior of an Italian sports car!) they are not only beautiful to look at but are functional too, providing a good level of grip to help you keep hold of your substantial investment. This is greatly aided by the material used on the rear case, which has a velvet like texture, and two semi-circular finger rests on the back; these fall naturally between your index and middle fingers, which instinctively act as loose clamps to help keep the Tx in the correct position.

If you're wondering, like I did, that having those Alcantara handgrips is all very nice and well, but how practical would they be, especially if you fly petrol or glow powered models, then fear not because they are easily removed for cleaning by undoing the plastic feet on each side. Despite the feel, Alcantara is not real leather but a micro-fibre material so the grips can be washed in warm water and washing up liquid. Obviously, it's very important to let them dry completely before putting them back on the Tx to avoid any moisture from getting inside the case and causing any corrosion.

The overall feel of the CORE is excellent, being both comfortable and secure. While it's not especially light weight, tipping the scales at just over a kilogram, it's certainly not the heaviest transmitter that I've held. The weight is well distributed and the Tx balances nicely, if maybe a touch forward. I'd be happy to fly using it without any support, if needs be, but since it comes with a nicely made and padded neck-strap it seems daft not to use it.

## TWO UP

PowerBox is perhaps best known for its power supply products, including those offering redundancy where two battery packs are used and the PowerBox automatically switches over to an alternative pack should it detect any problems with the power supply. A similar system is used in the CORE, which uses two separate Li-ion packs, each rated at 3400mAh/7.2V. Further redundancy is built into the power supply by using duplicate power regulation circuits.

The system's operating time is around 10 hours, more than enough for even the most active of model aviators!

## STICKS AND SWITCHES

When you order a CORE radio system you will be asked to fill in a form where you can note down any switch and stick configurations that you favour. The standard layout is based on the switch layout most commonly used by other high-end transmitters and so I accepted all the suggested switch positions/functions to ensure that everything was where I expected it to be. As standard the CORE is fitted with eight toggle switches; the bottom pair are two-position and all the others are three-position switches.

There are also a pair of momentary switches on the side corners of the case, adjacent to the main sticks. These can be used to control functions such as wheel brakes and electric self-starters etc.

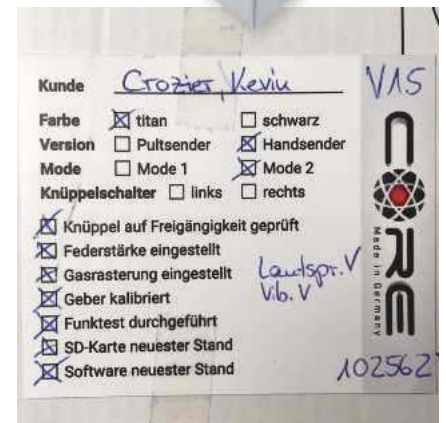
The stick units themselves are machined from solid metal and are fitted with 16-bit resolution Hall sensors, as are the slider controls. Each stick gimbal is fitted with quadruple ball-races.

PowerBox are keen to emphasise how adaptable the CORE can be and how easy it is to change switch configurations should you need to do so in the future, say if you take up a new flying discipline. They even supply a handy red anodised switch tool to assemble new switches or to tighten up any that may come loose.

Another thing to write down on the order form is your preferred style of transmitter. This radio can be supplied in either handheld (as reviewed) or tray versions. The latter is supplied with broad Alcantara leather covered hand-rests. If you buy the handheld



*Inside view showing the internal layout and the two separate Li-ion battery packs. More redundancy is built in by using duplicate power regulation circuits. Photo: PowerBox*



*The outer carton includes data from the order form that the factory uses to personalise the Tx to your preferred layout.*

**“The overall feel of the CORE is excellent, being both comfortable and secure.”**



Left hand stick unit and switch positions.



Right hand stick unit and switch positions.



This top corner view shows one of the momentary switches fitted to the edges of the carbon effect case.

Neat conversion tool for replacing switches or just tightening up the ones the factory has already fitted!



The sticker set includes these switch naming pads.



Main sticks units are machined from solid metal, with fully adjustable sticks and ball-raced gimbals.

version, then it is possible to purchase a Conversion Set that enables you to retrofit the hand-rests at a later date.

### TELEMETRY

Like many forward-thinking radio manufacturers PowerBox have invested heavily in developing the telemetry capabilities of the CORE. Current telemetry technology in some systems restricts the number of sensor values and/or the data transmission speed, which is reduced as the number of sensors connected within a model rises. However, PowerBox say that up to a whopping 240 sensors can be fitted using their bi-directional P2-BUS and it is capable of transmitting up to 800 x 16-bit values per second.

That sounds enough for a full-size aircraft, let alone a model one!

### LINUX AT THE CORE

At the heart of the CORE Tx is a high-performance Linux PC that is controlled using the touchscreen. The Linux computer features OpenGL support, which will enable PowerBox to keep it updated well into the future. One area that they seem keen to expand on is the graphics. Mind you, coming from the monochrome displays offered by my current transmitters, the array of graphics already embedded into this radio is already pretty impressive!

Other impressive features include internal data transmission via a CAN-BUS (Controller Area Network), as employed in the car and aviation industries, integral GPS and a nine-axis motion sensor.

Flip up a panel below the power button and you'll find USB-A and Micro USB sockets, uses for which include updating the system's software.



Booting up the pro-class CORE for the first time.



Loading the current model memory as the Linux systems boots up. It takes around 25 seconds to complete.



Flip up panel below the power button reveals a series of sockets and ports.



Receivers can also be updated, but wirelessly using the radio link, so there's no need to remove them from your models.

This hidden panel also features a headphone socket for listening to sensor announcements, a charge status LED and charging socket, plus a microphone input. There is also a servo tester/PPM outlet.

## POWER UP

Although this first article is just intended as an initial overview, I couldn't resist pushing the power button to see what happened. The first surprise is that powering up is a two-stage process. You need to press it once, wait for the power button to light up red and then confirm with a second press. The Linux system will then boot up, which takes a few seconds. So, no switching on and chucking a model into the air with this one!

The two stage process guards against accidental switching on and draining of the battery packs; if you press it just once and leave it the light extinguishes and the set switches back off.

Whilst the Linux system is booting up it will load the current model and the relevant display will be shown on the screen. To access the main menu and sub menus there are no extra buttons to push, just swipe down. Everything is done using the touch screen, via swipes, light touches and a row of smart keys located along the bottom edge of the screen. As I said previously, it's just like using a smartphone.

## ACCESSORIES

In the next instalment we will start looking at some of the menus, concentrating on those that will be most familiar with club pilots. But for now, I'll just wrap up this introductory article with a quick mention of the accessories and bit and bobs that are included with the CORE.

As mentioned previously, the Tx is supplied in a very smart, lockable hard-shell case with a flip top. The CORE is inserted and extracted vertically from the protective foam insert using its screen case/carry handle.

Inside the case can be found a padded neck-strap, a screen cleaning cloth, a mains charging adapter, receivers, a switch conversion tool, large and small CORE stickers for putting on your models or flight-box, putting naming stickers and a slim manual. You even receive a smart PowerBox T-shirt, the size of which you are asked for on the order form.

The manual is just 27 pages long, which seems a bit on the slim size for a radio of this complexity. However, having started to read Dave Wilshire's CORE set up thread on RC Universe, he mentions that using the radio is meant to be intuitive to program, which it certainly appears to be so far. You can read Dave's experiences with this mighty piece of R/C tech here: [www.rcuniverse.com/forum/rc-jets-120/11660334-powerbox-core-radio-set-up-thread-2.html](http://www.rcuniverse.com/forum/rc-jets-120/11660334-powerbox-core-radio-set-up-thread-2.html)



Swiping down from the top edge of the screen reveals the set-up menus.



A light touch on the left hand set up menu reveals a host of further options.



A sample set of set up pages. We'll take a closer look at some of them next time.



The servo monitor operates in real time, with no delay.



As when switching on, you need to press the power button twice to turn the system off. The PowerBox logo appears, to confirm that the Tx is shutting down.



The hard-shell case flips open to reveal the Tx's large carry handle/antennae holder/screen case.

I've run out of my self-imposed space allocation now (must have a word with the Ed!), so if you want to learn more about the PowerBox CORE the do gen up on Dave's thread - I certainly will! ✈

## DATAFILE

<b>Name:</b>	Radio System CORE
<b>Product type:</b>	Pro-class radio control system
<b>Manufactured by:</b>	PowerBox Systems <a href="http://www.powerbox-systems.com">www.powerbox-systems.com</a>
<b>UK distributors:</b>	Motors & Rotors <a href="http://www.motorsandrotors.co">www.motorsandrotors.co</a> Nexus Modelling Supplies <a href="http://www.nexusmodels.co.uk">www.nexusmodels.co.uk</a>
<b>RRP:</b>	From 2,490 Euros
<b>Power supply:</b>	Li-Ion
<b>Channels:</b>	26
<b>Servo signal resolution:</b>	4096 Steps
<b>Screen:</b>	TFT - Touch
<b>Weight:</b>	1190g
<b>Temperature:</b>	-30°C to +85°C



*Accessories provided include a neck-strap, stickers and a screen cleaning cloth. You even get a T-shirt!*

*A final look at the PowerBox Core. Just one word - gorgeous!*



*The manual is on the slim side. However, the CORE is meant to be intuitive to use.*

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### SET CONTENTS

- PowerBox CORE
- 1x PBR-9D
- 2x PBR-8E (only in limited Early-bird-Edition)
- case
- padded neck strap
- main adapter
- conversion tool
- sticker set
- screen cleaning cloth
- exclusive Shirt "CORE", navy
- instruction manual in german and english



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Jan 2020

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# LAST MINUTE TECH

Lee Schofield checks out some of the latest and greatest gear that's sure to tempt the festive wallet

words & photos » Lee Schofield

There's been some impressive new technology appear on my desk over the past few months - FPV goggles, test equipment, radios and a camera have all made an appearance. For many R/C retailers the run-up to the festive season is the busiest time of year, so releasing new products during the period is a smart move. If you're stumped for a suitable last-minute Christmas present to buy the aeromodeller in your life, maybe something from the following list of new, technologically advanced products will get you out of trouble.



Expect to pay  
**£20 & £40**



## SMART TOOLS

GET IT FROM: [www.banggood.com](http://www.banggood.com)

It would seem that ToolKitRC are committed to supplying the smartest tools on the bench. Two of the very latest on the scene are their ST8 servo tester (priced around £40) and the WM150 watt meter (£20), both of which have clear colour displays and lots of features. The WM150 has all of the qualities you'd expect from a modern device but it's the ST8 that impresses me. Powered directly from a battery you can select the voltage to run the servo at, the update frequency and how you want to test it. Move the servo using the control on the side and as it moves the current draw is instantly visible. Exercise a servo and the ST8 will not only record the current the servo pulls but also how long the it takes to make its maximum movement. The instructions aren't great, so put twenty minutes aside to explore the menu - it's worth the effort.







Expect  
to pay  
**£96**

## RUNCAM HYBRID CAMERA

GET IT FROM: [www.quadcopters.co.uk](http://www.quadcopters.co.uk)

The first split-style camera from RunCam came about because another vendor didn't like the fact that their excellent RunCam 3 action camera was a similar size to theirs. As a result RunCam took the internals from the RunCam 3 and created the first RunCam Split – a camera that can not only output the signal to be viewed via FPV but also record in HD onto an SD card inside the model. This latest version uses two cameras: one dedicated to providing a super low latency image for FPV, the other (larger) lens being solely for HD recording. This arrangement allows for each lens and camera system to be designed specifically for the task in order to achieve excellent results, rather than one lens producing lesser-quality results for both. A bit more room is needed in your model to mount it, but if you want beautiful 4K HD recording of the pilot's eye view, this is a good choice. Just make sure that the power supply to the camera is good, otherwise you can get a little interference in the image.



## T12 RADIO

GET IT FROM: [www.banggood.com](http://www.banggood.com)

If you fly models with one of the PixHawk family of flight controller and ArduPilot, this may be right up your street. Traditionally many pilots operate such models with one connection for R/C control, a second for telemetry (back to a PC or laptop) and a third for a live image feed from an onboard camera – this can be bulky and time-consuming to set up. Until recently this fully featured version of the SkyDroid T12, which does all of the above in one unit, was available only to those building these larger types of UAV on a professional basis. Add a phone or tablet to the screen holder and you can view the flight telemetry, FPV image and control the model without the need for lots of extra modules and equipment. If you've been pondering an all-in-one solution for a more professional PixHawk powered UAV then this may be worth a look - it's a lot cheaper than other all-in-one systems, such as the Herelink.

Expect  
to pay  
**£277**





Expect  
to pay  
**£48**

## M8S MULTI-FUNCTION CHARGER/SIGNAL CHECKER

GET IT FROM: [www.banggood.com](http://www.banggood.com)

This is an update to one of my favourite little tools. I like the idea of having one device that can do multiple things rather than a collection of individual boxes that each do only thing. The M8S is a 400W charger, signal checker for PWM, PPM & SBus and can also create signals like a super servo tester for PWM, PPM and SBus. The original version of this product has been on the side of my workbench since it turned up and has saved my bacon many times when troubleshooting a problem. Maybe you need to see if there's an SBus signal present, or that a servo isn't damaged, or generate a signal to test something out - no problem, the M8S will do it. The main changes over the original are an increase in power output to 400W and the addition of a colour screen that makes navigation and detail easier to see. One of the really nice features at the field is the ability to discharge a battery back into the power source; if you use a larger battery at the field to top-up your flight batteries, the unused power from finished packs can be drawn back into the source battery to make that power available to charge other flight batteries.



Expect  
to pay  
**£47** kit  
**£104**  
RTF

## SUB-250g MODELS

GET IT FROM: **ZOHD stockists**

Flying something weighing less than 250g is subject to a lot less legislation nowadays and vendors finally seem to have woken up to this fact. Lightweight multirotors have been around for a while now and some pilots have managed to get fixed wing models below that weight, complete with battery and FPV system, but it's not easy. Some vendors – ZOHD being a prime example - are marketing models designed specifically for this sub-250g class that are super-easy to transport. Don't write these models off as toys; they're scaled down versions of larger designs that perform extremely well, have wide speed envelopes and are very efficient – perfect to keep in the back of the car for an impromptu flight. As with all smaller models they're more susceptible to windy conditions so don't expect to fly on days when the treetops are swaying. Adding a stabiliser to these diminutive models is a must to help combat any buffeting wind.





## TBS FUSION FPV MODULE

**GET IT FROM:** [www.quadcopters.co.uk](http://www.quadcopters.co.uk)

In the past few months there have been a few new FPV goggle modules appear on the market. Some (e.g. the Furious FPV True-D V4.0) are standard diversity that switch over to the best signal from either antenna. The new TBS Fusion module is a lot smarter, however; it listens to the signal from both antennas all the time and recreates the video, frame-by-frame, from the best parts of each signal. This new module includes WiFi, allowing it to connect to other WiFi devices such as the excellent long-range TBS Crossfire system. Could that allow them to talk and share data? If so, then when fully released this could open up a range of new and exciting possibilities for a far smarter, connected FPV and R/C control system unlike anything currently available. One to watch!



Expect  
to pay  
**£109**



## FATSHARK HDO2 GOGGLES

**GET IT FROM:** [www.hobbyrc.co.uk](http://www.hobbyrc.co.uk)

The latest FPV goggles from the best-known name in FPV, Fatshark's HDO2 goggles are a definite step forward from the previous HDO version. The OLED screen is larger, with a resolution of 1280 x 960 pixels, and the field of view has increased from 37° to 46°. The enclosure has changed, too, despite looking identical to the original. The case is wider, allowing for pilots with a wider brow to wear them more comfortably, and the IPD (Inter-Pupillary Distance) is now a huge 54mm x 74mm - an extra 10mm of travel, making them easier to use for many. Sadly, the DVR is the same as on all the previous versions. The really big news is the inclusion of focus controls for each eye. Rather than rely on dioptre inserts for sight correction, small controls on the bottom of the glasses correct for sight problems from +2 to -6. Hands down, these are the best FPV goggles I've used to date. The ability to get both screens focussed individually means less eye strain and the larger FPV with those clear, bright OLED panels means that in use the HDO2's melt away and you forget you're wearing them! They are expensive, but if you love flying FPV these goggles are the best of the crop right now.

Expect  
to pay  
**£456**



# ROOKIE ROUND UP

John Morse reports on a fun filled one-model competition hosted by the Nene Valley Aeromodellers to honour their much-missed club President - David Boddington.

words » John Morse | photos » Steve Thom

**N**ene Valley Aeromodellers (NVA) was formed in the sixties and early seventies, with its origins in the area around Wellingborough and Rushden, Northamptonshire. The club's website includes a comprehensive summary of those early years written by some current members who were there at the beginning ([www.flynva.org/nva\\_history.html](http://www.flynva.org/nva_history.html)). Amongst them were such notable names as Charles and David Boddington; in fact, David (aka Boddo), was president of NVA right up until his passing in 2010.

The first name adopted by this very early group was 'The Monks', since one of the flying sites they had was in the grounds of an old abbey. This later became Wellingborough MAC until the group formally changed its name to the Nene Valley Aeromodellers on 1st September 1972. Around 1980 the club was affiliated to the SMAE, which was later renamed the BMFA.

After losing several flying sites, some to gravel quarrying, an arrangement was made with a local farmer near Olney to rent the site that the club now occupies. This later came under the management of Compton Estates and the club now has a formal agreement based on a renewable three-year lease.

The greatest number of members the club had in those years was around 160, with an extensive programme of competitions and displays. Around the year 2000 the club acquired another site near Wellingborough. This split the membership into two groups and eventually resulted in the Wellingborough group breaking away to form their own club. The current membership of NVA stands at around 60, with capacity for some additional members. Thus, enquiries from potential members are always welcome.

## ROOKIE EVENT

The extensive competition and flying display programme we once enjoyed is far more modest these days. The programme now includes fun-fly, electric glider and aerobatic events. NVA also stages what is probably a unique competition for one of Boddo's designs, the 'Rookie' glider. This involves fitting a regulation 7.5 ml fuel tank to the engine pod. The objective is that the flight should be exactly 10 minutes long. Points are deducted if the flight is under or over the ten minutes. A bonus can be earned for landing on the mown strip.

The favourite combination is the standard Rookie with a 1 cc diesel engine. Flick starting and the smell of diesel fuel and exhaust is evocative of the past for many of the older members (that's most of us!)

This event, held over two Sundays, involves a lot of activity, with launchers and timers, as well as the pilots, intent on giving the tank a last top-up before a good hard chuck! The average engine run is about three minutes, then it's time to look for the Red Kites to show you where the thermals are.

## MIND THE TREES!

NVA still attends a few local static shows but the last flying display was in 2010 at the Castle Ashby Country Fair, which is no more. Sadly, the future for such displays does not look good with all the health and safety issues to consider.

The NVA flying site consists of a fenced strip and pits, which generally keep sheep out, although we have had a few with Olympic high-jump skills pay us a visit in the past! (Have you ever tried to catch a sheep at full gallop!?) There is a very large outfield, but the site is not without challenges. In the far distance and directly behind the pits lies a forest; there are also a few trees in the outfield. It is not unknown for models to land in a tree. In fact, some say that the trees have a magnetic attraction to their models! Those pilots that land their plane in a tree are awarded a sticker for their flight box to commemorate the event.

The site is kept in pristine condition by a dedicated few who give generously of their time (and the use of a digger). This includes a year-round car park constructed over the past two years. Also, there is a link to a panoramic video of the site and surroundings on the club's website.

To minimise tree landings and other mishaps the club offers training to all those new to model flying and a BMFA A certificate is required before unsupervised flying is allowed. This has resulted in a high standard of proficiency amongst the membership. Many members have also gained a B-certificate and have become instructors or examiners.

Like all clubs, NVA has rules and almost all are safety related. NVA offers a friendly atmosphere where members are serious enough about their flying without being over officious. There is always room for a few more members. For more information visit the club's website at [www.flynva.org](http://www.flynva.org)



1 With its engine on song a Rookie is ready for the off. 2 A launcher gets his final instruction. 3 The pits are very hectic on competition days. 4 A timer waits to start his stopwatch the second the Rookie leaves the launcher's hand. 5 A last-minute top up for the regulation 7.5ml tank. 6 A Rookie gets an enthusiastic two-handed launch!



# WIN A PSSA F-86 SABRE KIT!

Check out past Mass Build reports on the PSSA website to be in with a chance to win a G&M Models Sabre short kit



*F-86 Sabre is the subject of the PSSA Mass Build in 2020.*



*Gordon Studley and Martin Gay with their prototype Sabre soarers.*



On June 13th & 14th 2020 the Power Scale Soaring Association are planning to stage another 'Mass Build' flying event following the success

and popularity of previous builds.

The Association hopes to get as many participants as possible building over the winter months, with the aim of flying their new F-86 Sabre models at a 'Fly for Fun' event upon the Great Orme, Llandudno in June 2020. For anyone wanting to take part who's not currently a PSSA member, please email [webmaster@pssaonline.co.uk](mailto:webmaster@pssaonline.co.uk) and join the PSSA. It won't cost you anything as Association membership is FREE!

The PSSA's latest 'Mass Build' project is the North American F-86 Sabre. Spanning 45", with a target flying weight of 4lb, this 1/10th scale vintage jet is a conventionally

built-up PSS model for two to four channel R/C.

The Association is offering one CNC cut Sabre short kit and plan from G&M Models, the subject of the build article in the December issue of RCM&E, as a competition prize. Please note that additional balsa sheeting and strip stock will be required to finish the airframe ready for covering.

One lucky reader will win the kit, by answering this question: "What was the aircraft that was the subject of the inaugural PSSA mass build event in 2014?"

(A helpful hint - the answer can be found on the association website [www.pssaonline.co.uk](http://www.pssaonline.co.uk))

To enter please send your answer to [webmaster@pssaonline.co.uk](mailto:webmaster@pssaonline.co.uk) before the competition closes at midnight on 17th January 2020.

The answer and the winner's name will be revealed in the March issue of RCM&E, on sale 14th February 2020.





Scale maestro Graham Buchanan with his Big Dora. More details soon.

# GLORIOUS GAYDON

Alex Whittaker joins the big boys for the LMA's highly regarded autumn indoor event

words & photos » Alex Whittaker

I think it's fair to say that the Large Model Association views our hobby as having two distinct modes: Indoor and Outdoor. The LMA is as much about building as flying, and every autumn the Association celebrates this fact at the British Motor Museum located at Gaydon, Warwickshire, hosting an event that gives traditional modellers a chance to recharge their creative batteries. Handily, this takes place just before the building season gets into full swing. At Gaydon not only can one can admire the shedly achievements of fellow builders, there's also the priceless opportunity of engaging directly with them, one-to-one, in a barrier-free environment that provides a friendly, laid-back atmosphere. It matters not whether your latest scale model is a 60" clubman model or a thousand-hour 20-foot behemoth - the LMA is a broad church and at Gaydon you'll feel at home. Let's take a look at some Gaydon jewellery.







**Harold Dowbekin's scratch built Pischoff Bicyclette.**  
Almost 1:1 scale.

### BISCHOFF BICYCLETTE

Every now and again a modelling project comes along that blows your socks off. My dear mate, Harold Dowbekin has now completed most of the airframe of his latest inspirational masterpiece, a hugely appealing, almost full-size replica of the quirky Pischoff Bicyclette biplane of 1922. This scratch-built Gallic marvel, which spans 14' 6" (4.4m) and is powered by a meaty 3W 160cc four-cylinder boxer petrol engine, uses aluminium tube where the original used welded steel. Clearly, Harold's project lacks neither daring nor ambition (mind you, I've visited Harold's combined Research Faculty/Home Workshop in Lancashire and it would shame NASA!) The Bischoff's projected weight is around the 50 - 55lb (22.7 - 25kg) mark. A truly exceptional large model, and the largest of scale in the history of the LMA, I believe. I'll bring you further photos and flying shots once she's completed. Certainly, one to look forward to next season.

**Pat Cuss' scratch-built, 1/2 scale 14' 3" (4.3m) span Blériot - astounding!**



### BLERIOT CHANNEL CROSSER

Pat Cuss is indisputably one of our very best large-scale scratch builders, so it comes as no surprise that his latest masterpiece, a 1/2 scale, 14' 3" (4.3m) span Blériot is of truly exceptional quality. The fit and finish is exemplary; it just looks so real, only a bit smaller. The woodwork and metalwork are exquisite, a real feast for the eye, and a great encouragement to those of us in the cheap seats. Pat is infectiously enthusiastic too, so if you get a chance to chat to him next year be sure to do so; you'll gain true enlightenment. If all this quality wasn't enough, the stunning Blériot is to be powered by a replica 415cc Anzani 3-cylinder engine, a similarly demanding scratch-built project being constructed by engine wizard Andy Johnstone (you may recall that I featured his sublime Bentley radial aero engine here a while back). So, another world-class model to look forward to for the 2020 LMA season. As with the Bischoff, I'll get some more photos in due course.



**Andy Craddock's scratch-built, 1/3 scale, 98" (2.5m) span Bristol Scout Type D.**

### BRISTOL TYPE D SCOUT

The LMA possesses own design and self-build strength in depth. The airframe of Andy Craddock's magisterial scratch-built 1/3 scale, 98" (2.5m) span Type D is nearing completion and looks about ready for covering. In one sense this is a shame since the visible detailing is utterly uplifting. Power is a Zenoah 38 petrol engine, fitted with a Schlundt reduction gearbox. I can't wait to see her on patrol next year.



**Guiseppe Cannella's latest experiment with 3D printing - an astounding F-86 Sabre.**

### 3D PRINTED JET

The LMA embraces all building technologies, not just traditional, and it was fascinating to see Guiseppe Cannella's latest experiment with 3D printing, an astounding F-86 Sabre, my favourite early jet. Powered by a 90mm fan and 6S 4400mAh LiPo, the model is 3D printed from a plan using Labprint software. The project took about 1.5 weeks to print and is glued together with thick cyano. She has flown, flies well and lands really well with flaps and air brakes. Flight duration is in the region of 3.5 - 4 minutes, depending on throttle usage. "What's good about it is that if you break something, you just print another part", says Guiseppe. Good indeed!





**John Rickett's DH Dragon 84** spans 11' 10" (3.6m) and is fitted with two Laser 155 engines.

### DH 84 DRAGON

John Rickett's new project, like all those that came from his shed before, is a beautifully realised model of a scale classic. This time we're talking about a DH Dragon 84, in the colours of Hillman's Airways. This 1/4 scale model spans 11' 10" (3.6m), weighs 36 lb (16.3kg) and is fitted with Laser 155 engines. Of all traditional construction using balsa, ply and cyparis, she's covered in Sig Koverall heatshrink fabric and features folding wings. I'm looking forward to getting a full outdoor walk-around, plus flying shots, of this elegant biplane.

**Paul Williams' 1/3 scale Avro 504**, covered and ready for detailing.



### AVRO 504

I love seeing a mate's scale model progressing and Paul Williams' 1/4 scale Avro 504 is coming along very nicely. Covered and ready for final detailing, she looked very impressive. I look forward to seeing her next season as part of the Dawn Patrol Flying Circus.

**Ian Redshaw and his 1/3 scale Albatros CII**, destined for Dawn Patrol duty.



### ALBATROS CII

Famed scale man, Dawn Patroller, and sometime marionette maker, Ian Redshaw has almost completed his wonderfully detailed 1/3 scale Albatros CII. The 'fish scale' patterning is a delight, as are the metal panels.



**David Butt's 1:4.2 scale CT-114 Tutor** from the CARF kit. Great weathering.

### CANADAIR CT-114 TUTOR

As usual, the Jet Hall was unmissable. I have seen this model before, but David Butt's 1:4.2 scale, 8' 2" (2.5m) span CT-114 Tutor from the CARF kit always impresses. Powered by a Jetcat 180 gas turbine, she's a real honey. I loved the weathering.

**Jamie Cuff's Westbury Kits/Jetline Models DH 108 Swallow**. A JetCat P80 provides the necessary thrust.



**Lovely 9' 4" (2.85m) span, 1/4 scale CARF Savoia Marchetti S260.**





**Harry Curzon's sensational Lightning is 1/7 scale, weighs 30lb (13.6kg) and is powered by a Wren 160 gas turbine.**

### EE LIGHTNING

Probably my favourite jet, Harry Curzon's sensational F1.A from the famous Mick Reeves kit oozes character and just looks right. Built to 1/7 scale, she weighs 30lb (13.6kg) and is powered by a Wren 160 gas turbine. Sporting a glassfibre fuselage and trad-built wings, she's covered in 'Flite-Metal' aluminium sheet, which really does her justice. No fewer than 17 servos are on board and she even has a drogue parachute. Spot on!



**Morris of Morris Mini Motors with some of his extensive range.**

**RCGF 30cc petrol with Walbro carb from Morris Motors: £396.95**



### MORRIS MINI MOTORS

Further to the news about Morris' new motors in my recent Nats report, Morris is now also dealing in a number of new singles and twins from RCGF Stinger. Retailing at £396.95 the RCGF 30cc petrol with Walbro carb looks a winner. Morris' website is always worth look if you're in the market for larger engine.

### TRADE PRESENCE

As always LMA Gaydon 2019 attracted a healthy trade presence, including the SLEC tabernacle. I wandered around the Trade Hall with my re-usable, eco-friendly poly bag, clutching my carefully constructed list of building goodies in one hand and my debit card in the other. Of course, almost all of the modelling items on offer apply to any size of model, not just larger examples. However, the engines and electric motors on sale did tend to reflect the higher horsepower need to fly LMA aircraft. In my opinion this just made these engines even more attractive. If you're looking for a powerplant for larger model, from a number of manufacturers, Gaydon is good bet. It's always much nicer to see such items in the metal, heft them in your hand, and maybe take one home with you.



**The SLEC tabernacle: a place of pilgrimage for Trad Brit Modellers.**



**New Airmark Cassutt Racer kit from the Cambrian Model Company.**

### CASSUTT RACER

The first traditional kit that caught my eye was a nifty new clubman sized Airmark Cassutt Racer on the Cambrian Model Co. stand. A quick build, with veneered foam wings, canopy and two-piece cowl, this little smasher was keenly priced at £119. The built example on display was really cute. With a target AUV of 7lb 12oz (3.5kg) and designed for .61 two-stroke power (this is a racer, after all) or electric equivalent, this 47" (1.14m) delight will chuck in the back of most cars. If you're after a clubman size Cassutt kit this baby might just be the one.



The new Cambrian Model Company Pinocchio vintage biplane kit. Cute.



### PINOCCHIO BIPE

Cambrian Model Co. also had their new and very nice Pinocchio vintage biplane kit on offer at a very reasonable £54.95. Being laser cut it should go together accurately and quickly. This very pretty 24" (610mm) span model is designed for a 1.5cc diesel or electric power, the recommended electric set-up being a C20 2050kV motor, 12A ESC, 2S LiPo and 7" x 4" prop.



### GIANT ELECTRIC MOTOR

Looking for a substantial electric motor? How about the new Dualsky GA series 'Giant Airplane' GA6000 motor I spotted on the MacGregor stand? This direct drive 28 pole/90mm diameter/centrifugal fan brushless motor is designed as a direct replacement for 50 - 60cc IC engines and requires a 10S or 12S LiPo. Designed for conventional scale or sports models in the 37.5lb (17kg) range, it can also fly a 10kg 3D model! Cost is from £198.95.



New from Prop Guy and Steve Kasch Aircraft Designs, the Frenzy.



### R35 FRENZY AIR RACER

This new model is a collaborative venture led by The Prop Guy (using the EME 35cc petrol engine) with Steve Kasch Aircraft Designs and The Flyboyz Display Team. Suitable for 20 - 40cc engines, the 12.1lb (5.5kg), 90" (2.3m) span Frenzy is a Golden Age Air Racer that conveniently breaks down for transport. The individual sections are no longer than 45" (1.1m). There's a choice of either single seat or two seat versions and it is available in 'ready to cover' form for £495, with the built and covered version retailing at £695. I hope to test fly one soon, so watch this space.

New 1/5 scale, 101" (2.6m) span, 50 - 90 cc Texan kit from Limited Edition Models.



Right: Inwood were selling 5m rolls of EasyCoat for a tenner. Below: RCM&E contributor, Jim Newberry (of Nuviation) also has a great range of kits.







*Limited Edition Models 1/6 scale, 71" (1.8m) span Sabre kit for 60-100 gas turbine power.*



*Jeti UK's DC-24 Duplex System Tx with a transparent back.*

### JETI RADIO

Admiring new radios is one of the joys of our hobby and the cleverer the radio, the better we seem to like it. The Jeti UK stand had examples of their frontline radios, fitted with nifty clear acrylic backs. Studying the internals on the Jeti DC-24 Duplex system Tx, I was astounded to see the motherboard accompanied by at least six substantial subsidiary PCBs, plus a further twelve smaller boards! In these days of surface-mount components, PICs, CANbus networks and Very Large Scale Integration, we tend to think of monolithic PCBs, but this is clearly not always the case. Once you get the back off such a high-end gem you can visibly appreciate the value built into the product.

### VERDICT

LMA Gaydon 2019 was well attended, bustling all day and provided the perfect opportunity to mingle and strike up conversations with complete strangers about an engine you might be considering or a kit you'd just bought. For me, it was a delight to meet and chat with so many keen RCM&E readers. As usual the JMA Jet Hall was superb and the Trade Hall was chock-full of goodies and remained busy until I left. I noted that there was a steady stream of happy modelling ants tracking back to their cars with big boxes; some had delightfully heavy little parcels, too! LMA Gaydon is a great venue and, having the bonus of free access to the truly superb British Motor Museum, it's a great family day out. Highly recommended. ✈️



*Motors & Rotors have the new Powerbox Core Tx in stock.*

### POWERBOX CORE

Dave Wilshire, head honcho of Motors & Rotors, showed me the new top-end Powerbox Core 2.4GHz Tx. Core radios have a committed following in the UK and are produced to very high standards. This model is an advanced 26-channel design with a feature set that includes Powerbox power redundancy, full telemetry and it runs a version of the Linux operating system. Being such a high-end piece of kit, it comes with an appropriately high-end price tag of £2,350. But, as Dave wryly pointed out, you do get a free T-shirt!



### British Motor Museum

Located just off the M40 at Banbury Rd., Gaydon, Warwickshire, CV35 0BJ, this is an absolutely first-rate museum. There's a huge amount of free parking, as well as a cafe and gift shop. It's open seven days a week from 10am - 7pm, except for dates over Christmas.



*Proof of the pud. The author's near 10kg Minimoa gets a tow.*

# LETTING GO

Chris Williams provides a brief guide to the lesser-known art of aerotowing. words & photos » Chris Williams

**T**he most likely answer to the most common question fielded from an aerotow newbie, 'What sort of tow release do I need?' is usually 'One that works!' Failure to release is one of the common causes of mishap during an aerotow launch. Towing a glider into the air is statistically very safe and mishaps are, thankfully, the exception rather than the rule. So, what sort of contraption do you really need in the nose of your glider?

First of all, let's look at the first rule of aerotowing, that states that you will always go home with fewer tow release cable loops than you had at the start of the day. How it works is like this: the tug pilot supplies a length of towline, typically 30 metres, at the end of which is a quick release. The glider pilot has a tow loop already secured in his glider, which is then hooked up to the tug's towline and off you go into the blue yonder. The tug then lands with your loop still attached to the line, and some kind soul puts it into the dedicated towline bucket. You land your glider, flushed with the success of your flight, forget all about your loop, and toddle off for a congratulatory coffee.

When aerotowing came of age the tow release of choice was of the trapped ball-link variety, as supplied by Flair Models. The tow

link was a wire with a loop on one end and a small ball on the other. The ball was trapped inside the release cylinder by a piston pushed into place by the release servo. I used this system for many years and found it to be less than reliable unless perfectly set up. The biggest downside though, relates to that first rule of aerotowing, because the link was difficult to make yourself, so money had to pass hands to secure a replacement.

At around the same time the cam-in-a-tube became a useful alternative and was the release of choice on the Continent. This consists of a cam arm, with a recess cut out in it, which rotates inside a cylinder. The release servo pushes it into the open position, whereby the loop is attached. The cam is then rotated into the closed position and you are ready for flight. These units are not really all that cheap, being around £15-20, but are usually very reliable and represent but a small cost relative to the glider.

My current favourite is the rod and pin type as typified by the little unit made by Multiplex and costing around £8. A thin rod passes through a cylinder and emerges underneath a pin fitted crosswise to the cylinder. The tow loop passes around the pin and over the rod, which prevents the rod from bending under load.



*Multiplex pin-and-rod unit (left) and the cam-in-a-tube unit (right).*

I will mention in passing the Smallpiece Super Separator, which my pal, Smallpiece, produced to overcome the problem of towing up a model with an electric motor in front that, naturally, could get in the way. This is, essentially, a sideways version of the Multiplex release fitted to one side of the fuselage. It causes the glider to position itself slightly off centre on the tow, although that doesn't become a problem.

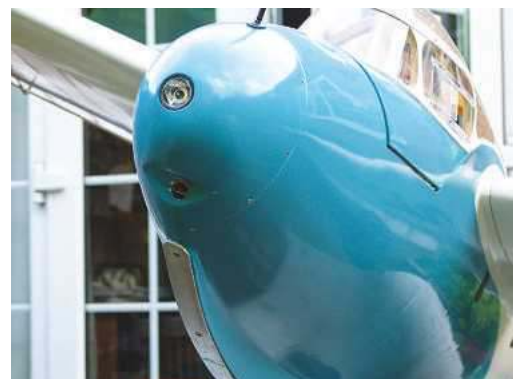
I have fitted the MPX release to models of up to 10kg, a weight it seems to handle with ease. For heavier models the cam-in-a-tube version is probably the best bet. The MPX comes with two rings around the cylinder, presumably to enhance its grip, but I prefer to grind the rings off, drill out a 10mm hole in the glider's solid nose, and epoxy the unit in place.





*Super Separator unit in the author's Super Javelot, low down at the front.*

*Chris' near 10kg two-seat Minimoo with the MPX release installed*



But what about servos? One of the big advantages of the MPX style unit is that only a small movement is required to make the release work, so the rod can be attached to the inner hole of the servo arm, thus maximising the available torque. So, a standard unit is my servo of choice and to date I've not had an MPX unit fail to release. I have also found a standard servo adequate for cam releases in my larger models, although there are some flyers that might quibble with that.

In conclusion, with reference to the beginning of this short piece, pull-test your release under tension before flying it for the first time. At the very least, it should release with the equivalent weight of the glider and this simple test will save you from embarrassment - or worse. ✈️



*One of the more minor consequences of a non-functioning release - a trailing tow line and embarrassment for the glider's pilot!*



*Simple braided wire crimped loop and MPX releases, including one with the rings ground off.*

*The Smallpiece Super Separator (designed by Barry Cole.)*

*Author's preferred welding wire loops for the cam units, although most prefer nylon loops.*

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# HAWKER HUNTER

Round three in  
Tony Nijhuis' series of  
classic mini jet free plans  
words & photos » Tony Nijhuis  
flying photos » Graham & David Ashby



*Tony walks back after another sortie with his Hunter fun jet.*

So, this is the third model in the Mini Jet series and if I'm honest this is probably the best flyer out of the three so far. The full-size Hawker Hunter was indeed a superb and well-mannered aircraft, and it operated in strike, bomber and reconnaissance roles. It entered service in 1954 with the RAF but also became the frontline choice for many other air forces throughout the world. Amazingly it

was still in service with the Lebanese Air force until 2014 - an incredible 60 years' service span! It's therefore not surprising that in modelling a subject of such great pedigree it will perform better than the rest...

The Jet Provost and the recently featured Gnat (see the November 2019 issue of RCM&E) really did hit the sweet spot. Not to put too fine a point on it, they have been a resounding success, and both have sold like hot cakes!

I think the reason for this, and hopefully it will transpire for the Hunter too, was down to the small handy size and the frugal cost to build one of these models. With a cheap EDF unit, economy servos, a 30C LiPo and a 40 Amp speed controller it really is maximum fun for minimal bucks.

All of these new mini jets have been tested using the 3S FMS 50mm fan unit, which gives around 600g of thrust. A few builders of the Provost and Gnat have gone with the 4S FMS and the 4S PowerFun fan unit available from 4-max.co.uk. These units will give another 100g or so thrust over the 3S versions. There really isn't a downside to installing a 4S fan unit except that the ESC may be a little bigger and the batteries will not be the

ubiquitous 3S 2200 mAh, which most modellers will have kicking around their workshop in their droves. For the 4S fan units you will need an 1800 mAh 4S LiPo pack or something similar. These models are quite small so the key here is to avoid adding too much weight when moving up to a 4S setup.

One final point regarding EDF units. If you have an old 50mm fan unit kicking around in a box of bits from a couple of years ago, please don't use it in this model. It won't work and you will be disappointed.

So, after the Provost and Gnat, we now have the Hawker Hunter. The last remaining model we have lined up for you is the F4 Phantom, which will appear in the March 2020 issue of RCM&E.

You may have noticed a theme amongst the colour schemes and the fact they are highly visible. These models are small so having a strong colour, especially yellow, is a great help, especially if your eyes are not as good as they use to be!

I also wanted to use a standard Solarfilm type covering rather than a painted camouflage finish. The Gnat Yellow jacket was a great scheme and so easy to see in the



*Running in for another low pass.*



air, so I decided to see if there was a scale yellow scheme for the Hunter. Sure enough, there was 'Yello Summer' out of Thunder City in South Africa. In fact, there are so many vibrant Hunter colour schemes to choose from the difficulty will be which one to choose!

As we have already launched the Hunter on the Tony Nijhuis Designs website ([www.tonymijhuisdesigns.co.uk](http://www.tonymijhuisdesigns.co.uk)), I have a good feeling this model is going to be just as successful as the Jet Provost and the Gnat.

To assist the builder, I have once again made available a canopy. And to complete the package a CNC wood pack is also available for those who wish to make the building process a little easier and quicker. These parts will ONLY be available through Tony Nijhuis Designs Ltd. (TND). The plan itself will only be available in this edition of the magazine with future copies again only being available through TND Ltd.

A few other points to note; the FMS fan units can be sourced from either Banggood (in China) or from 4-max.co.uk in the UK. The battery was a 3S 2200 mAh 30C LiPo and servos were cheap and cheerful 6g 0.85kg/cm torque nano servos. For the ESC buy a cheap 40-amp 4S unit as it will be lighter and hopefully have none of the unnecessary programming features; you want a simple switch on and go.

Lastly, and possibly most importantly, a photographic build log is available as a free download to print out from [www.tonymijhuisdesigns.co.uk](http://www.tonymijhuisdesigns.co.uk). These photos will be invaluable, and I would suggest downloading these so you can familiarise yourself with the build before you start.

## WINGS

The wing parts are made from 6.5mm (1/4") medium density balsa sheet and each wing panel is made of three parts. Weigh the individual parts and interchange them in order to achieve an equal balanced wing. Now glue the wing parts together to form a left and right-hand panel.



*The prototype colour scheme was based on 'Yello Summer', one of the full-size Hunters operated by Thunder City in South Africa.*



Where indicated on the plan highlight, using a pen, the location of the area of balsa to be profiled. An indicative guide to shaping the wing is shown on the plan. With the wing panels flat on the building board use a razor plane to profile the wing panels to the first stage of completion, as shown on the plan. Now either continue with a plane or with a sanding block and begin the second stage of profiling the wing into a smooth flowing section. Turn the wing over and repeat the process exactly so the wing is fully symmetrical. Use one of the fuselage sides to make sure the profile is correct at the wing root. When happy use a medium grade abrasive paper to finish both wings panels to a smooth flowing profile.

Now cut out the ailerons, remembering to mark which one fits to which wing. You may have gathered that as the wings are shaped fully symmetrically it doesn't matter which one is the left or right.

The wings can now be joined together and the 3mm birch ply wing spar fitted.

To finish use fine abrasive paper to round off the leading edge and the wingtips, and the wings are done!

## FUSELAGE

Begin cutting out the mid fuselage side pieces 5 and all formers 6 through to 10. Note that the elevator tubes and the wiring holes should be drilled into former 6 as shown on the plan.

Mark the location of the formers onto the left and right-hand side of each fuselage side.

Tack glue 6A to 6 in order to make a complete former. This former is made in two parts just in case the fan should ever need replacing.

Check that the fan fits correctly through the hole in 6/6A. For the 50mm Funjet EDF unit the opening in the former will have to be slightly larger than that for the FMS unit.

Now fit the formers 6/6A and 7 to one side of the fuselage, then add the other fuselage side. After this add the remaining formers 8, 9 and 10.

Make up the thrust tube while the fan unit is out of the model. I have shown on the plan a cut outline of the thrust tube before it is rolled. The tube is made from 140 micron (0.14mm) thick acetate. You will be able to source A4 sheets of this on eBay or from a stationery store; it's basically the thin clear plastic used on report covers. The easiest way to make the tube is to roll the end of the acetate around the fan unit as tight as you can, making it as a straight tube. Then secure with a small piece of Scotch tape across the joint, at the fan.

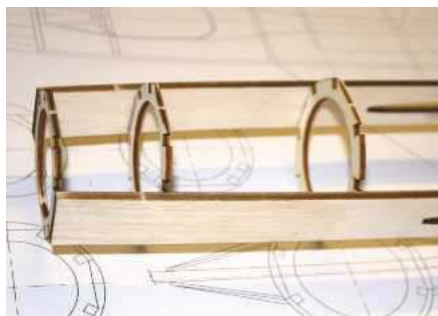
The fan should now be installed. As suggested on the plan, I used a couple of dabs of hot glue and silicone to secure the fan casing to 6/6A.

Now slide the rolled thrust tube in from the rear of former 9. You will have to fold the tube in on itself but as it slides through it should pop round again. Gently ease the tube over the fan unit by 12mm or so, making

sure the motor wires are exiting smoothly through the slot you have made in the tube. Position the wiring slot in the tube edge so the tube seam runs along the top of the open fuselage. Finally, run a piece of tape along the joint length, making sure the tube is pressed hard against the inside edge of former 9. Use a couple of dabs of hot glue, one on the top and one on the bottom, to secure the thrust tube to the fan casing and two dabs against former 9. It doesn't need any more glue than that!

I would suggest at this point that you loosely fit the ESC and check that the motor rotation is okay. The 5mm square fuselage stringers can now be fitted. Sheet the top and bottom sides of the fuselage with 2.4mm soft balsa sheet. You may need to wet the outer surface of the sheeting to assist with bending.

When finished trim the top and bottom fuselage edge sheeting flush with the top and bottom stringers. After this sheet the top and



*Fit the formers to one side of the fuselage, then add the other fuselage side.*



*Bevel the edges of the side sheeting before adding the top and bottom pieces.*



*There is a lot of shaping around the nose and the balsa is there to be cut into to create the smooth curves of the Hunter.*

bottom of the fuselage with 5mm sheet balsa.

Now make up the nose cowl using laminates of 6.5mm balsa from the sheet wing stock or 12.5mm balsa. The cowl corners are lined with 9.5mm triangle.

The nose block is made from laminates of 12.5mm sheet. Make sure you cut to the side profile as shown on the plan. Position and glue this on to the front of the cowl.

Now for the 'shaping' exercise, so make sure your razor plane has a new blade in it! Please remember that there is a lot of shaping around the nose and the triangular balsa is there to be cut into to create the smooth radius curves of the Hunter, so don't scrimp on the shaping. Use a razor plane to profile the square edges of the fuselage and then progress on to using a sanding block along the complete length of the fuselage.

Now install the elevator control cable outers. I would suggest using 3mm orange tubes from SLEC Ltd and I used 20swg piano wire for the pushrod. Mark out the fin slot and cut this out in the top fuselage sheeting.

## FIN AND TAILPLANE

To make up the fin use parts 16 to 17 and glue them together. Profile the fin leading edge, put the fin aside and only glue it into position once the model is nearing completion.

Now, make up the tailplane using parts 13 and 14. Round off the tailplane leading edges and chamfer the elevator, part 15, leading edges ready for the hinges to be fitted.



*Test fit of the tailplane and fin before shaping.*

## FINISHING OFF

The wings can now be glued into position. They will need to be slid through from one side. A little fettling may be needed to get them to fit properly. The tailplane can now be glued into the fin, making sure they are parallel. Finally, glue the fin into position.

The razor back pieces (12) can be made using three laminates of 6.5mm balsa. This should be shaped to feather into the fin and, at the front, to match the profile of the rear of the canopy. Glue this into position.

Cut out the intake openings in the fuselage sides, above and below the wing.

The distinctive Hunter wing fairings can now be made by cutting out triangles from 1.6mm sheet balsa. You will need to make top and bottom pairs of these. The bottom pair will be slightly shorter than the top pair to take account of the aileron servos. Glue these



*The wings will need to be slid into position from one side. A little fettling may be needed to get them to fit properly.*



*Intake openings are cut in the fuselage sides above and below the wing.*



*Intake edges are lined with 3mm square scraps of lite ply to strengthen the intake lips.*



*Tidy up at the back by adding the rear wing fillets.*



*Sink the aileron servos into the fuselage sides under the wing.*

into position and line the intake edge with 3mm square scraps of lite ply; this will strengthen the intake lip.

The fuselage access hatch can now be marked and cut out. Use a small hacksaw blade to cut through the top sheeting to the depth shown on the plans. Then, using a straight edge, cut through the side sheeting on each side to release the hatch.

To retain this hatch, I used one of the small brass spring catches from SLEC at the rear of the hatch, just to the side of 12. Use a retaining tongue glued to the front of the hatch to keep the front of the hatch secure, as shown on the plans.

Now mark out the locations of the aileron servos and 'sink' these into the fuselage sides, under the wing.

The final and most important of all is the large cheat air intake hole in the underside of the fuselage. Make sure you chamfer and smooth the entry leading edge of the opening and don't be tempted to reduce the size of the opening. It needs to be the size shown on the plan as a minimum.

I have also shown two finger holes on the sides of the fuselage at the C of G position to give a hand grip for launching.

## COVERING

The prototype was covered using Cub yellow Oracover from J Perkins. The lettering/danger signs decals were supplied by [www.becc.co.uk](http://www.becc.co.uk) (found on eBay) and the roundels were made from blue, white and red Oratrim. Fit all the control surfaces with flat flock hinges (from SLEC) and secure with glue. Fit all the servos and then all the control horns. For the control horns, I made these out of

1mm birch ply and slotted them into the control surfaces.

The C of G position should be achieved with just the positioning of a 3S 2200mAh LiPo. Do not be tempted to move the C of G back from the stated position! You will have to chamfer the wing leading edge, inside the fuselage, to allow the battery to slide past and into the front of the fuselage. The battery is secured using self-adhesive Velcro.

The canopy can either be fitted before or after covering. I prefer to detail the cockpit, fit the canopy and then cover the model around the canopy, but it's up to you. Finding a couple of small 1/15th scale pilots will be difficult, so if you are not having any luck ask Real Pilots to make you some 3D printed ones. The ones I used were an ultralight park flyer sport pilot from HobbyKing.

## FLYING

The first thing to note with these mini jets is that the wing loading is quite low at only 21 ounces per square inch, so hand launching them is very easy. You will need a firm throw and make sure it is straight and level. I suggest, for its maiden flight, that you get a trusted helper to launch the model for you. The model is remarkable strong and if you don't get it away first time she should survive.

Once the hand launch is mastered and the model trimmed for flight it will get away with little fuss and very little control input. On calmer days expect to hold in some up elevator for a second or so after hand launching.

When you get the model airborne, and assuming you have cut in the fan breather holes, you will notice how nippy the model is. Once the initial climb out has been executed



*The prototype was covered using Cub yellow Oracover.*





“Once the hand launch is mastered and the model trimmed for flight it will get away with little fuss and very little control input.”



*Above: Once the Hunter is fully trimmed you can pull back the throttle to halfstick and enjoy the scale flying performance.*

*Left: Hand launching these mini jets is very easy. You will need a firm throw and make sure it is straight and level - well almost!*



*On a calm day the Hunter quickly gets into the groove and flies as if on rails.*

A last look at the little yellow Hawker Hunter. Go on, treat yourself!



Landings are straightforward and you will normally run out of elevator control before the model will stall.

and the model is fully trimmed out you can easily pull back the throttle to half stick position and enjoy what is a very scale flying performance.

You'll find the model simply grooves and flies on rails, especially on a calm day. However, if you fly on a windy day the model will be thrown around a little so be prepared to fly with more throttle.

All the classic jet manoeuvres can be done with this model, but you will need full throttle and speed on some as the model doesn't have the momentum to carry through manoeuvres such as big loops etc. Just remember to keep the routine smooth and keep what little momentum it has going.

Landings are very straightforward and generally you will run out of elevator control before the model will stall.

Don't be tempted to adjust the C of G; these models have been thoroughly tested and where it is shown on the plan is exactly where it needs to be!

The little 3S 11 bladed FMS fan units do give an amazing punch but if you want more power the 4S FMS and PowerFun EDF versions should satisfy those speed freaks amongst you. Flight times are surprisingly good, so expect a good 5-7 minutes depending on throttle use.

So, all in all the Hunter is a cracking little model and flies very well. The ethos was to put the fun back into aeromodelling at a budget that hopefully all will be able to afford; a cheap model that could be made from what you have in the scrap box, a £30 fan unit, a £15 ESC, a £20 battery, a few £4 servos and you instantly have big fun for small bucks. Enjoy! ✈️

“You’ll find the model simply grooves and flies on rails, especially on a calm day.”

## DATAFILE

<b>Scale:</b>	Hawker Hunter
<b>Model type:</b>	EDF mini jet
<b>Designed by:</b>	Tony Nijhuis
<b>Wingspan:</b>	25" (634mm)
<b>Fuselage length:</b>	28" (710mm)
<b>Wing area:</b>	1.07sq. ft. (0.1sq. m)
<b>All-up weight:</b>	22oz (0.63kg)
<b>Wing loading:</b>	21oz/sq. ft. (6.3kg/sq. m)
<b>Powertrain used:</b>	50mm FMS 11-blade fan, 5400kV outrunner, 40A ESC, 3S 2200mAh LiPo
<b>Funcitons (servos):</b>	Aileron (2); elevator (1); throttle (via ESC)

### CONTACTS

Additional plans, canopies, combined CNC/ wood packs are available from:  
 Website: [www.tonymijhuisdesigns.co.uk](http://www.tonymijhuisdesigns.co.uk)  
 Email: [sales@tonymijhuisdesigns.co.uk](mailto:sales@tonymijhuisdesigns.co.uk)  
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## Performance EDF's at Affordable Prices

These EDF units are a new generation of performance EDF units at an affordable price. The prices include a brushless outrunner specifically designed and developed to work with these units. All of the fans are dynamically balanced at the factory and are therefore vibration free and very efficient. All fans have either 11 or 12 blades which gives them a great "turbine" like sound which adds to the experience of owning a "jet" model.

Diameter	Part Number	Thrust	Price
50mm	FMS 5400kv (3S LiPo - 358W)	620g	£36.99
50mm	PowerFun 4900kv (3S LiPo - 318W)	605g	£28.99
50mm	PowerFun 4430kv (4S LiPo - 458W)	765g	£28.99
50mm	FMS 4500kv (4S LiPo - 486W)	1,086g	£36.99
64mm	PowerFun 3900kv (3S LiPo - 434W)	872g	£32.99
64mm	PowerFun 3500kv (4S LiPo - 541W)	1,072g	£32.99
70mm	FMS 2750kv (4S LiPo - 740W)	1,253g	£64.99
70mm	PowerFun 3400kv (4S LiPo - 776W)	1,435g	£39.99
70mm	PowerFun 2300kv (6S LiPo - 1148W)	1,816g	£39.99
90mm	PowerFun 1450kv (6S LiPo - 1561W)	2,924g	£79.99
90mm	PowerFun 1450kv (8S LiPo - 1528W)	3,360g	£79.99



## Complete Electrical Setup For The Tony Nijhuis Hawker Hunter



Part No.	Description	RRP
FMS 50mm EDF	Complete 50mm Fan and 3S Motor 620g of Thrust	£36.99
PF 50mm EDF	Complete 50mm Fan and 3S Motor 605g of Thrust	£28.99
4M-ESC40A and 4M-PROGCARD	40A Brushless Speed Controller and Programming Card	£38.45
3x 4M-045DH-005	3x Sub Micro Digital Servos	£11.97
Hatch Latch	Hatch Latch /Canopy Latch	£1.99
Snake	1000mm Light Weight Snake	£1.99
PPL-40C3S-2200	11.1V, 40C, 3S, 2200mAh LiPo	£19.99

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## Hawker Hunter Price List

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VAC formed Canopy	£14.00
CNC Pack (Fuselage structure, wing and tail parts.)	£46.00
Wood Pack (Sheet stock & strip) to complete the model	Price Inc in CNC pack
<b>Complete Pack above (Save £5)</b>	<b>£69.00</b>



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VAC Set	£51.00
CNC Pack	£78.00
Wood Pack	£45.00
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VAC Set	£60.00
CNC Pack	£81.00
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0.65 IC or Electric

Plans	£25.00
Canopy	£14.00
CNC Pack	£86.00
Wood Pack	£61.00
<b>Complete Pack</b>	<b>£178.00</b>



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Hawker Hunter



# Nijhuis Designs'

**Our New EDF Hawker Hunter  
Featured in RCM&E January 2020**

*Designed by Aero Modellers  
For Aero Modellers*

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Length- 28" (710mm)  
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Wing area- 1sq' (0.1 m<sup>2</sup>)  
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Power- 50mm 3s /4s EDF (600-750g thrust)  
Battery- 3s 2200mah or 4s1800 Lipo  
Radio- 3 channel micro radio

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PPL-40C3S-1800	40C/80C, 3S (11.1V) 1800mAh	£16.99
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	4M-094DMGB-014	Digital Metal Geared Ballraced Wing Servo. Just 8mm Thick	1.4Kg @ 4.8V - 0.12sec/60° 1.9Kg @ 6.0V - 0.10sec/60°	1pcs £10.99ea 5pcs £9.89ea
	4M-090AH-017	Micro	1.7Kg @ 4.8V - 0.09sec/60° 1.9Kg @ 6.0V - 0.07sec/60°	1pcs £2.69ea 5pcs £2.42ea
	4M-100AMG-022	Micro Metal Geared	2.2Kg @ 4.8V - 0.12sec/60° 2.5Kg @ 6.0V - 0.10sec/60°	1pcs £4.99ea 5pcs £4.49ea
	4M-100DMG-022	Digital Micro Metal Geared	2.2Kg @ 4.8V - 0.12sec/60° 2.5Kg @ 6.0V - 0.10sec/60°	1pcs £6.49ea 5pcs £5.84ea
	4M-160AH-027	Mini	2.7Kg @ 4.8V - 0.13sec/60° 3.0Kg @ 6.0V - 0.11sec/60°	1pcs £5.99ea 5pcs £5.39ea
	4M-175DMG-030	Mini Digital Metal Geared	3.0Kg @ 4.8V - 0.13sec/60° 3.5Kg @ 6.0V - 0.11sec/60°	1pcs £7.49ea 5pcs £6.74ea
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70mm	4M-70SPIN-COOL-*	36g	£11.99
75mm	4M-75SPIN-COOL-*	43g	£13.99
83mm	4M-83SPIN-COOL-*	48g	£15.49

These ultra light weight spinners for electric motors are supplied with a specially cut aluminium backplate which pulls cooling air through the nose of the spinner and then forces it out of the back and in to the motor, helping keep the motor cool even on a hot day. Available in 6 sizes and 5 colours.



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# SSSSHHWEPT

Shaun Garrity returns to the Galloping Ghost era with a tough swept wing design for 2.5cc engines or equivalent e-power

words & photos » Shaun Garrity



*Sssshhwept featured in RCM&E, May 1969, along with another great single-channel model that we've previously covered, the X-Kraft for aileron only.*

Geoff Dallimer may or may not be a name that you are familiar with. An avid Wakefield competition flyer, he had previously dabbled with R/C prior to, in his words, "advancing to free flight". So how did Sssshhwept come to into being?

Well, the story goes, it was after a two-hour fruitless search for a lost Wakefield model that, on the walk back to the patch, Geoff thought about the application of R/C to free flight events. However, "after watching the single channel flyers and the issues they were having penetrating in the breezy conditions I realised something a little different was required to give a lively performance on a limited budget."

Geoff fully appreciated the advantages of having proportional control for rudder and elevator, having dabbled back in the late 1950s with pulse proportional radio systems, especially as things had now improved with the availability of the Rand actuator that also offered progressive throttle control.

So, the brief was there - inexpensive Galloping Ghost for control, lightweight but robust airframe so it could be adequately powered without spending a fortune and an out of the rut design. Sssshhwept was born.

Geoff designed a few other models after the Sssshhwept; in early 1970 the 92" wingspan Thermal Rider, then Das Kleine Bipe, a sporty 36" span sportster for channel channel propo.

An interesting observation by him in the Das Kleine Bipe article write up was his concern about the increasing dominance of ARTF and Quick Build models and the dilution of traditional modelling skills, and he wasn't wrong. It just took longer than

surmised. In June 1972 his 120" span Thermal Hopper arrived. I'm sure he penned more, but they are the only ones I can recall.

The prototype Sssshhwept weighed in at 28oz and this was complete with a 500 DKZ DEAC (essentially an early rechargeable NiCad battery). The airborne radio consisted of a home-built receiver and the aforementioned Rand actuator. He had included some out of the box thinking in the design of the model. Noticeable is the swept wing and this was, in Geoff's words, "adopted in an endeavour to smooth out any tendency to 'gallop' by increasing longitudinal stability, whilst vortex tips can be claimed to be advantageous in fast circuits."

Due to the controls flapping all the time because of the Galloping Ghost system, models using this type of radio, if not carefully designed, could exhibit up and down movement (pitching) or gallop, as it was referred to, in flight. Obviously, this doesn't happen with modern proportional radio gear, so you could increase the elevator area by 20% to liven up the model if wanted.

Back in the 1960s radio equipment wasn't cheap, unlike today where many modellers rarely give a second thought to fully kitting out every model with servos etc. as they are so inexpensive by comparison.

A method Dave Boddington promoted was to mount the actuator, receiver, switch etc. on

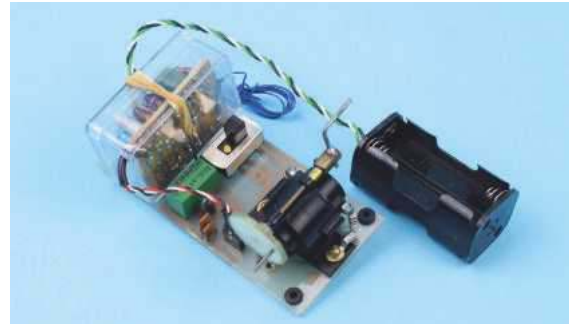




*Above: This is the only, and very old photo, of Geoff that I have with his prototype model. Right: As mentioned in the article radio gear was relatively expensive in the early days so swapping gear from model to model was common. Boddo came up with this all in one, easily changed, 'brick' style unit.*



*A couple of examples of popular Galloping Ghost transmitters - the US manufactured Controilaire on the left and a good old British MacGregor on the right.*



a PCB (printed circuit board), all pre-wired so it could easily be moved from model to model. The board was simply screwed to mounting rails fixed on the fuselage sides that were generally located in the wing bay area.

In the testing phase Sssshwpt had a high-speed impact with good old mother earth and essentially survived to fly another day. This was caused due to the swept wing design, as experienced by the late Squadron Leader John Derry when test flying the DH108 and attempting to break the sound barrier.

Like the DH108, Sssshwpt can also potentially get into an uncontrollable dive, with the dive steepening as airspeed increases. However, if you find yourself in this rare and unfortunate position just throttle back and all is well.

Sssshwpt, although fairly easy to construct, is a little more involved than many Galloping Ghost and single channel models of the era, but is a truly satisfying build, especially the 'vortex' wingtips carved from block; proper aeromodelling.

The reason it's taken me so long to revisit this great model is that there was no plan in the RCM&E archive. It was originally presented as a build feature but with no free plan, so I used a scale-up of the 1/7th one in the article. Obviously, this created one or two issues with accuracy, and we had to go all Sherlock Holmes in deciphering wood sizes etc. as some of the descriptive detail was blurred.

Sarik Hobbies cut the kit for me, doing a great job. However, during the build a couple of drafting errors became obvious; these have been corrected but be aware you may still need to tweak the odd part as I built from the original plan not the updated one. The plane is great looking and worth the effort though, so this minor inconvenience didn't even

feature on my radar. You can see the available wood packs and parts here: [www.sarikhobbies.com/product/sssshwpt-44](http://www.sarikhobbies.com/product/sssshwpt-44)

I decided to update the Sssshwpt to electric and a quick call to George at 4-Max sorted out a suitable motor and ESC combo. The modifications for e-power are also shown on the plan if you opt to go down this route and are very similar to the approach used for the Wagtail featured earlier in the year.

### FUSELAGE

If you haven't used the Sarik wood kit, then it's time to start cutting balsa. Begin with the fuselage sides and doublers then glue them together, remembering as always to make a pair. If going down the electric route, before gluing in the formers you need to decide what size LiPo will be used.

Our models balanced correctly using a 1500mAh 3S battery, but if you opt for a 2200mAh battery then you'll need to modify former F3 so the battery can slide into the wing bay; I would do this before bonding it in place unless you like a challenge! Also, F2 will need trimming down in width and height as

it's moved forward to get the prop driver correctly positioned and additionally to make space for the LiPo.

For IC glue in F2 to F5 at 90 degrees to the fuselage sides, not forgetting the engine bearers; for electric it's F3 to F5, as F2 is glued in later. I wouldn't bother with the additional bearers shown in the wing bay, which were originally for the Rand actuator mounting plate. The fuselage is strong enough to not require them, plus it gives more space to locate the servos – have a look at my installation.

Also needing a decision is whether you want to use pushrods (16 SWG piano wire on the original) or tube in tube. The holes in the formers were a little on the tight side for traditional pushrods (using hard wood dowel) so I would open them up a bit. For tube in tube the fuselage is short enough to just have the tubeouters glued at the exit points and on F5; no slop was evident in my set up.

If you look at the relevant images you can see how I did the install on mine, using a combination of a Sullivan Gold-N-Rod for rudder and a plastic outer with a piano wire



*Although basically a box fuselage, Sssshwpt involves a little more work to construct than simpler trainers of the day.*



*There's no shortage of space for 9g servos. As always ensure that the linkages are as direct as possible, especially if using piano wire pushrods.*



*Although a Dural undercarriage is shown on the plan one could easily be fashioned from piano wire, or even dispensed with for rough field use.*



*The Dural undercarriage is simply banded on, but for a piano wire alternative I would use saddle clamps.*

inner for elevator. Add the other fuselage side, checking everything is square, then when dry pull the rear together on the tail-post – no banana shapes, please! Then glue in F6 and F7.

For electric powered versions now glue in F2 and the nose ring, checking that the right and down thrust is correct. Add any remaining top and bottom sheeting etc., sand smooth and the fuselage is finished except for the cowl for the IC version. Originally this was fashioned by carving a balsa plug, sanded smooth, and finished by sealing with polyurethane varnish, then wax polished.

Make a mould using chopped mat and resin, coat with release agent then make your cowl. Or you could take the easy route, making one from thin ply and balsa, lithoplate or even 3D print one if you have the skill. Here's where the electric version wins out as it's all balsa and not a cowl, just a hatch.

The original undercarriage was fabricated from Dural; for mine I used a new, but old stock MK item. Alternatively, you could fashion one from piano wire and use saddle clamps to fix it in place as an alternative to the rubber bands and dowel system detailed on the plan. Also shown

are wheel pants that look great, but unless you fly from tarmac or a bowling green strip then they could cause problems. In fact, there's no reason why you just can't dispense with the undercarriage and hand launch Sssshhwept. Geoff's prototype testing was mostly done like this.

## WINGS AND THINGS

Again, if not using Sarik's laser cut parts then you'll need to make your ribs. As the wing is tapered the easiest way is the good old sandwich method. For each wing panel put the required number of balsa blanks between a root and tip rib, made preferably from 1/16" ply, then carve and sand to shape, notching out for the two spars (this is detailed on the plan). When building the wing the front of each rib will need a slight sanding so that the maximum gluing area onto the leading edge is achieved.

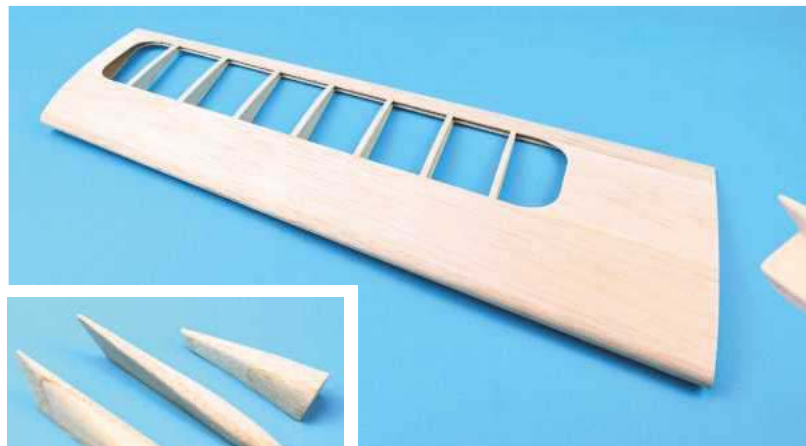
If you've not built a wing like this before here are a few tips:

Building a panel at a time, pin down the trailing edge as shown. Put a piece of 1/16" sheet where the lower spar goes, then pin said spar in position; not through the wood as it can weaken it. Glue the ribs with aliphatic or PVA, checking they are vertical (except for the root ribs that need angling to achieve the correct dihedral) and align on the plan.

Next job is to glue on the leading-edge piece (you'll need to pack this up to the correct height), then the top spar and shear webbing. Add the top sheeting, trailing edge sheet and cap strips. Once dry flip over and glue the lower sheeting and cap strips in place. Sand the leading edge to the profile shown on the plan, then carve and sand the 'vortex tips' from soft balsa block or laminated 1/4" sheet and glue in place.

A final overall sand and you're ready to join the wing, but make sure you don't introduce any twist. As the wing panels butt-join together and do not use dihedral braces to reinforce things, Geoff recommended wrapping the centre join with fibre glass bandage impregnated with glass fibre resin or epoxy. I used finishing cloth with thin cyano worked through the weave using an old credit card but do this in a well-ventilated area that's not damp as it can cause fuming.

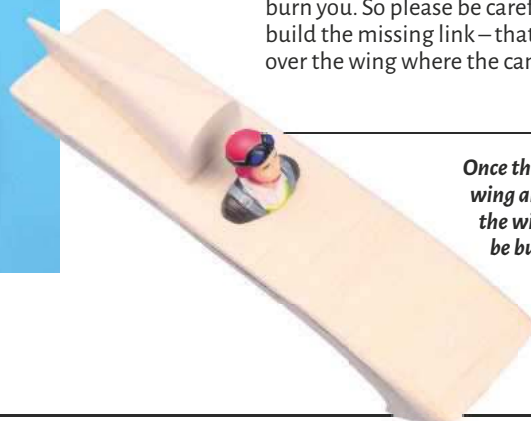
Also, when used on fibreglass (or carbon) cloth a powerful and rapid exothermic reaction can occur, creating enough heat to burn you. So please be careful. You can now build the missing link – that's the fairing over the wing where the canopy fits.



*The wing is well designed and results in a rigid structure, so film covering works well.*



*Vortex tips and cowl fairing are carved from balsa block. A bit of proper aeromodelling!*



*Once the fuselage and wing are constructed the wing fairing can be built in place for accuracy.*



SSSSHWEPT

Designed by

G.W. Dallimer

8/6

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ALL WOODS BALSAS UNLESS OTHERWISE STATED

# A 44 1/2" SPAN GALLOPING GHOST SPORTS MODEL ORIGINALLY DESIGNED BY G. W. DALLIMER



# SSSSHWEPT

## TAIL AND FIN

Medium-light balsa is the order of the day for the fin and tailplane. Standard 1" x 3/16" trailing edge stock can be utilised for the rudder and elevator to save carving and sanding. Note the grain direction on the elevator tips as it imparts significant strength and warp resistance.

One very important point - don't miss out the slot shown in the tailplane otherwise it will be impossible to get the pushrod positioned as shown.

For hinges, I always prefer stitched ones but as the wood used for the tail group is 3/16" thick, Mylar or even pin hinges would work. Carve the cockpit fairing from soft block to blend into the fin as detailed on the plan. And when you get around to fixing the canopy in place, I would recommend using canopy glue, not super glue.



*Tail and fin are simple sheet items but don't forget the slot in the tailplane otherwise you will have great difficulty fitting the elevator pushrod.*

*Right: I replicated the elevator connection shown on the plan. A quick link was used at the servo end to adjust things. Stitched hinges are retro, inexpensive and, when done correctly, bind free. Far right: Due to the angled rudder hinge I decided to use a ball joint to accommodate any twisting motion in the linkage when actuated.*



*After a quick phone call to 4-Max, George recommended this motor and speed controller as suitable for the Sssshhwept.*

## POWER TRAIN

As mentioned above, a quick call to 4-Max sorted out the motive power for Sssshhwept, after giving George the details of the original model. The motor recommended was a 2830–1350kV, with a 30A ESC. I also bought the programming card as this makes life so much easier than working through the never ending and sometimes very frustrating sequence of beeps.

With an 8.5" x 6" wooden prop and a 3S LiPo I achieved 240 watts; a 1500mAh pack gives ample flight time. You would get a similar result with an APC 8" x 4" e-propeller but slightly better acceleration.



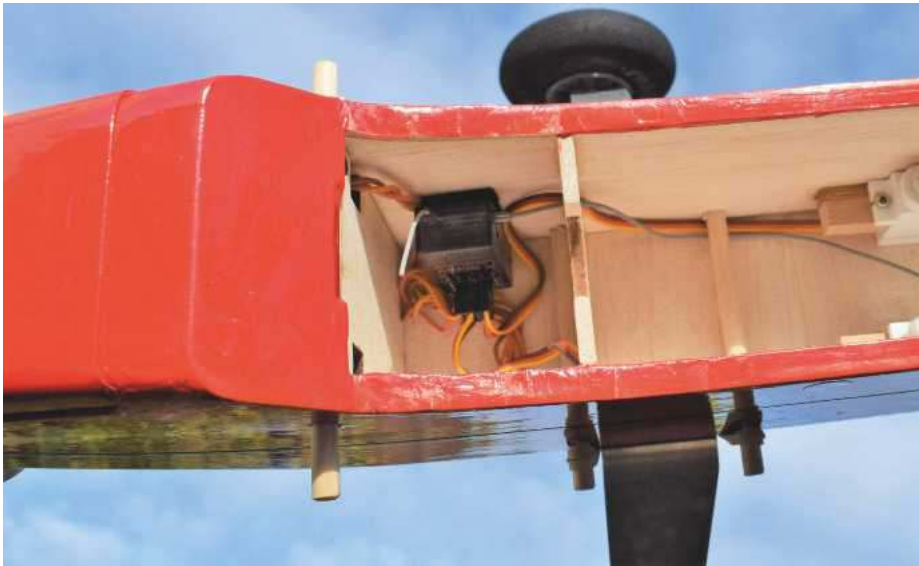
*F2 will need repositioning to get the prop driver in the correct position when going electric. No changes are required for IC using the motor shown.*



**“The plane is great looking and worth the effort...”**

*The speed controller can be simply mounted with Velcro or servo tape on the fuselage side. Make sure it doesn't impede the insertion and removal of your flight battery.*





### COVERING UP

Geoff's original model used doped nylon for the wings, lightweight tissue doped on the fuselage and tail group, with Monokote providing the trim, all sealed with polyurethane varnish to fuel proof. That's one of the reasons it most likely survived the crash mentioned in the intro because the model was so well designed, the wing in particular being rigid even when uncovered. So, I went the easy route and used heat shrink film.

I must thank my mate Carl for building the airframe, and the reason I chose transparent film for the wings was it would have been a crime to cover up the excellent job he made of the woodwork - his building is exceptional! To finish it off cut vinyl decals were applied.

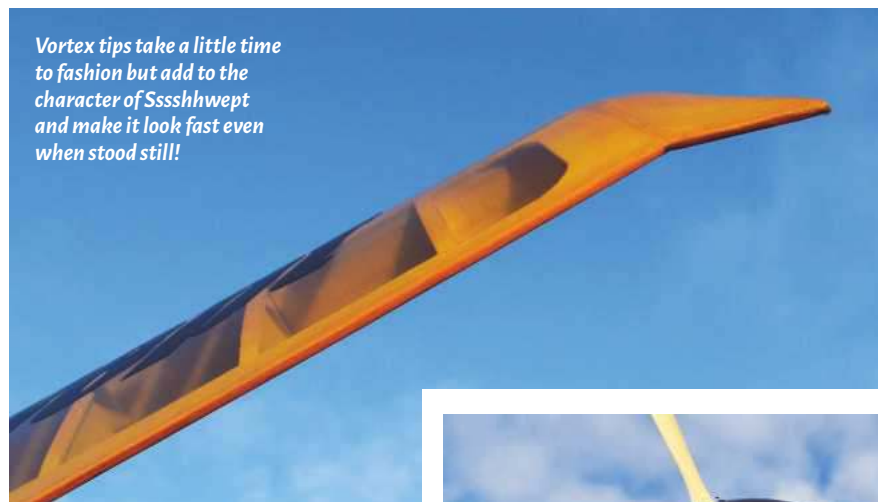
*The receiver can mount wherever is convenient.*

### RADIO

Originally the model was designed for a Rand Galloping Ghost actuator, but I realise this will be a less popular option. So, I installed a couple of 9g servos for the review model. When I've got the time, I'll build another fuselage and install one of the modern 3D printed Rands designed by my mate, Tobe using re-coder electronics from Phil Green for a total retro experience.

To keep the LiPo in place use Velcro; this has proved more than adequate to stop it rattling about. The ESC was positioned as shown with good quality, double-sided tape. I sealed the wood where the tape is located using cyano to achieve maximum adhesion, with the Rx mounted at the front of the wing bay. Ensure the linkages are free and not binding, and because the rudder hinge line is angled, I used a ball link to accommodate the twisting.

*Vortex tips take a little time to fashion but add to the character of Sssshhwept and make it look fast even when stood still!*



*Above: An old 'new in box' Keil Kraft spinner was dug out to finish the nose. It must be at least 50 years old, but the plastic was in perfect condition.*

*Left: Sssshhwept has been on my bucket build list for many years. I wish it had been constructed much sooner as it's a great looking model.*





**TIME TO FLY**

Check all the usual things - failsafe set, G of G correct, controls waggle as expected without binding, control surfaces are centred at neutral stick on the transmitter, throws correct and, for electric motors, that the ESC has been ranged (see panel). Little will be gained from a test glide, so if the model is warp free and accurately built just go for it. If you get into trouble just throttle back and the model will become docile and predictable. Check how it behaves on the glide, trimming on the transmitter if required, then see what happens on power to establish that the down and side thrust is correct.

## DATAFILE



<b>Model name:</b>	Sssshhwept
<b>Designed by:</b>	Geoff Dallimer
<b>Wingspan:</b>	44 in
<b>Wing area:</b>	287 sq. in
<b>Fuselage length:</b>	32 in
<b>All-up weight:</b>	25 oz
<b>Power system:</b>	2.5cc (0.15 cu in) or 200W-300W motor, 3S 1500mAh, LiPo, 20-30A ESC
<b>Funcitons (servos):</b>	Rudder (1), Elevator (1), Throttle (ESC for e-power or 1 servo for IC)



When safely back on terra firma make any required trim changes by adjusting the quick links so that the transmitter trims can be neutralised.

I hope you enjoy this model as much as I have and please send photos of your Sssshhwept to [thatbloke@garritys.net](mailto:thatbloke@garritys.net) ✈

*Top: Carl has really gone to town on the finishing of his Sssshhwept. By coincidence, we both chose translucent orange for the wings. The only difference being Carl's was HobbyKing film and mine is 40-year old Solarfilm. Above: Another shot of Carl's model. It's hard to believe this model was designed over 50 years ago and still looks current.*

**ESCRANGING**

ESC's need ranging to ensure they operate at full 'throw'. You normally plug them in with the throttle stick at max, listen for the beeps then drop the throttle to low, but the procedure can vary with different manufacturers. Many aircraft modellers don't do this and wonder why an identical set up delivers more power. Make sure you remove the propeller before ranging.



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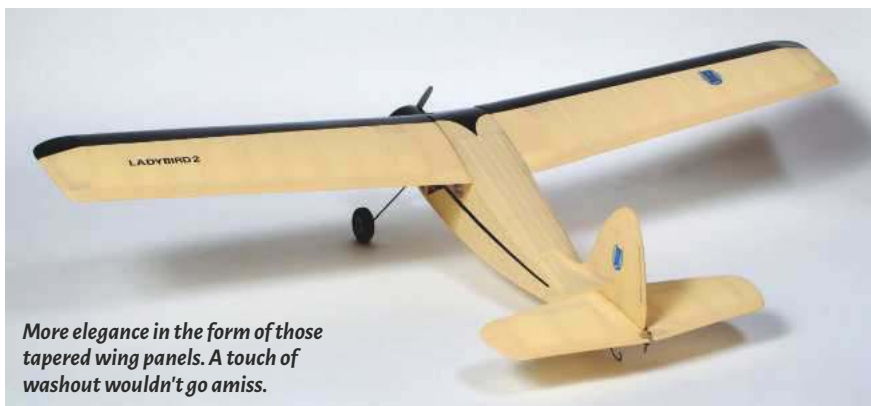


*The elegant Ladybird, ready for flight testing. Can anybody else see a trace of Wilga in there, or is it just me?*

# LADYBIRD ON THE WING

Tim Hooper flight tests his replacement Keil Kraft free-flight model

words & photos » Tim Hooper



*More elegance in the form of those tapered wing panels. A touch of washout wouldn't go amiss.*

**Y**ou might recall in our last instalment that I was having a second bite at converting an old Keil Kraft Ladybird free-flyer to electric power. My first model came to an unnatural demise in a car accident, so the current Ladybird was sourced as a replacement from the mighty swap-meet at last year's Nationals at Barkston Heath.

So far, we've sorted out the wings, the adjustable thrust line and power train,

and deftly lightened the overbuilt fin assembly. With the power system sorted, it was time to have a ponder about the tailplane and its adjustment to fine-tune the model's performance during its glide phase of the flight.

Now, my research shows that the tails of most free-flight models sit on a flat platform at the rear of the fuselage. If the tail is elastic banded on, then shims can be added to alter the tail's incidence. If the tail

is glued in place, then a little bendable piece of plastic or aluminium can be added to the trailing edge as a trim tab to help out.

However, the Ladybird's tailplane is different. It's an all-flying device, mounted on a pivot at around a third of its chord, and then little ply tongues on the trailing edge engage with a slot in the rear of the fin to finalise its incidence. All well and good, but that doesn't allow for any means of convenient adjustment at the field.

It seemed sensible to find the approximate correct incidence of the tailplane first, and so I clamped a flexible ruler to the fuselage as a datum, parallel with the bottom of the wing seat and then pencilled a line on the fin structure to align the tail to. In practice, because of the wing's rounded leading edge, it sits at a degree or so positive to the wing seat, so initially setting the tail to the pencil line should result in the wing maintaining that positive incidence in flight.

Encouraged by the potential success of the adjustable motor mount system, it seemed a good plan to try to emulate this idea of using a sprung screw-jack assembly to move the tailplane - as long as it was kept light in weight, of course.





*Using a steel rule level with the underside of the wing gives a vague clue to the incidence of the all-flying tail. Its pivot point can be seen on the lower fin.*

In practice, I fitted over-lapping ply tongues to the inboard end on each half of the tailplane's trailing edge (two on the one half, to sandwich the single tongue on the other half), after which I drilled straight through them with a 2mm drill bit. Rummaging about in the scraps box, I found a little sliver of brass shim stock and drilled a 3mm hole near one end. The fiddly bit was then soldering a 2mm brass nut, centred over the 3mm hole, in place.

This little assembly was then CA'd into a sawn slot in the trailing edge of the fin, some 6mm below the tailplane. The final part of the trick was to install the halves of the tailplane, pass a 2mm bolt through the rear tongues, fit a lower nut, slide on a light spring, before finally screwing the bolt into the brass lower mount.

With an appropriate fanfare of celestial trumpets, I was then able to adjust the tail's incidence simply by screwing the little bolt in or out as necessary, giving an infinite degree of adjustment. Let's hope it all holds together in the air.

The cabin glazing was added, piece-by-piece from model shop 'acetate', held by pins whilst the canopy glue dried. The shape of the curved front screen was determined by using a paper template.

A light drubbing over with a sanding block saw the Ladybird pretty much ready for covering. Cream Litespan was the media of choice, with black Solarfilm accents on the nose and leading edge. I've never been particularly clever when it comes to covering a model and, if you couple this shoddy work ethic with the Ladybird's compound, concave rear fuselage and Litespan's less than stellar approach to adhesion, you'll sympathise with the finished result, I hope.

In practice, once the flying surfaces had been covered and put aside, the fuselage was tackled in relatively small pieces of Litespan, all held in place with the dreaded Balsaloc - my iron-clogger of choice. Balsaloc loves a hot iron, and then loves to be transferred to anything the iron

subsequently touches, so frequent cleaning of the sole plate with a pan scrubber was the order of the day.

The re-assembled model had the little 2S 800mAh LiPo installed as far forwards as possible, but still hung slightly tail down when balanced on my fingertips. So, a 10-gram weight was glued to the motor plate to help out the C of G a bit. The completed model tipped the scales at 12.4 oz. There's no AUW stated on the plan, but this figure must be lighter than if the specified .75cc diesel had been fitted up front, surely?



*The halves of the tailplane are locked together by a 2mm bolt, passing through those ply tongues aft of the fin.*



*Beneath the tailplane, the 2mm bolt passes through a matching nut that's secured to the fin. The little spring prevents it all from shaking loose in use.*



*The ply plates on the TE of the tailplane sandwich together to keep them in place.*



*Here's the side glazing being attached to the fuselage. Canopy glue and lots of pins are my preferred method. I left the central panel open to allow access to the internal wiring.*



*A scrap of paper becomes a template for the curved windscreen. I like templates, I do!*



*Starting with the trickiest bit to cover, cream Litespan was bullied into adhering to that concave area at the base of the fin. Makes the rest of the model seem very easy!*





*The motor's arming switch and control circuitry are easily reached just prior to hand launching. The three adjustment pots do their jobs very well.*



*The completed Ladybird's graceful lines are particularly evident at the rear end. Something of the Fairchild Argus, perhaps?*



*A free-flight model in its natural habitat! The Ladybird gets intimate with the cherry blossom during testing in the back garden. Neither party sustained any damage as a result of the encounter.*

## LADYBIRD TAKES FLIGHT

The following Saturday was bright and sunny, so the Ladybird was glide tested on the back lawn at home. Initially launched from a kneeling position to minimise any possible damage, it looked as though my estimated tail incidence was close to the money, as the model sailed away from a steady push of a launch, climbing gently and then stalling and descending to the ground. That wasn't bad, so the tail was adjusted slightly to increase its 'down' effect, and the model launched repeatedly, and from increasing heights too! The little rudder trim tab seemed happy to be in a central position, so it was left well alone for the time being.

To be fair, the radial cowled Ladybird is not the cleanest of airframes, so there was no point in expecting a prolonged, flat glide. I settled for launching it level with my ear and seeing it travel 10 metres or so before it contacted the ground, bouncing in the air again as the wire undercarriage did its stuff. Good enough.

The next stage involved taking it to the flying field and, after confirming its glide pattern all over again, tentatively introducing a little bit of motor power for a

couple of seconds or so to see what happened. Don't forget that a free flight model's flight path should be adjusted by fine-tuning the motor's thrust line alone, as I understand it.

As an aside, if this were an IC powered model then the un-throttled engine could be induced to run at a lower power output than optimum by richening the fuel mixture and/or reducing the compression to give that 4-stroke burp, burp sound so beloved by diesel freaks. The propeller, too, can be fiddled with by removing it, flipping it over and then replacing it back on the engine so that the camber of the blades is effectively reversed. No, this won't result in a model that tries to fly backwards, but it will result in a far less powerful propwash.

If anyone doubts the efficacy of this technique, then reversing the prop on your most-flown sports hack will reveal just how effective this is.

As the test session wore on a slightly nose-down arrival saw my carefully contrived motor mount system fail where the bottom ball joint meets the firewall, and so it was jury-rigged to allow us to continue. Sadly, by now the breeze was increasing to the point of no return so the Ladybird was

put back into the hangar for the time being.

The Ladybird will live to fight another day, that's certain. As a building exercise, although it may seem that I've devoted an inordinate amount of time and effort to a 'simple' free-flyer, it's been an ideal opportunity for some lateral thinking, to end up with a model that allows easy adjustment to its trim via a turn of a screwdriver.

I'll keep you posted as and when the Ladybird makes her proper, powered debut in the near future.

## SUPER SCORPION

When I returned to this ridiculous hobby in the year 2000, I really wanted a flagship model for my growing fleet, powered by something other than a S400 tin can motor and the seven little NiCad cells that were all the rage at the time.

I found myself spending no less than a princely £150 on an Astro 15G, which was the American epitome of brushed elegance. Not only did the golden anodised motor have carbon brushes, it also featured a built-in gearbox too. So, sparks and gear noise as well -what's not to like?

The motor was designed to run on at least 12 cells, swinging an 11 x 7 prop. A 12-cell pack of big NiMH cells gave over 14 volts at full charge but weighed around 1.1/2 lb all by itself. At the time, us rebel e-flyers thought this was an absolutely marvellous advance in electric technology, whilst our IC orientated club mates thought we were all absolutely barking! They had a point it has to be said.

Anyway, what I needed was a model with enough wing area to carry all that weight without too much complaint, so a big vintage jobbie looked to be the way to go. The decision was quite easy, as I was already flying a pre-loved 44" Scorpion cabin model. The little Scorp had a bigger brother, in the shape of the 65" Super Scorpion and so the plans were purchased from the Ben Buckle company.

Problem was, my sole transport at the time was a two-seater kit car and there was no way that a model of this size would fit in the car without some serious modification.





*Rigged and ready. My old Super Scorpion is a bit patched in places, it's true. That big sub-fin precludes any taxiing manoeuvres - it just goes in a straight line!*



*My venerable old 64" Super Scorpion all-ready for field assembly. That mess of bubble wrap and sticky tape contains all of the flying surfaces, all snug and secure.*



*The height of technology at the turn of the century, an Astro15G no less. Lots of gear noise and carbon dust. The yellowed windscreen is a collector's item these days.*



*Concealed linkages. The rudder plugs into the yellow servo arm, whilst the elevator hooks onto the protruding bit of piano wire, so there are no external horns on the tail surfaces to get caught in their travel bag. It all makes sense, eventually.*



*Phil Neale's blue Scorpion provides a perfect colour contrast to the red scheme of mine. Purely coincidental, I promise!*

So, the one-piece wing was split into two halves, with an aluminium joiner taking the in-flight loads. The tailplane and fin were both removable, with threaded rods that protruded from the bottom of the fin passing through the tailplane and into the rear fuselage, to re-emerge beneath the lower tail fin.

A bit of jiggery pokery with the control linkages meant that as the tail surfaces were fitted to the fuselage the control surfaces automatically connected with their respective linkages, so no faffing about with clives and the like.

The Super Scorp's elegant, elliptical airframe was covered in crimson Solarfilm and cream Litespan, complete with some natty looking scalloping on the wings and tail. The final touch was the fabrication of a

sort of wing bag that would hold all the flying surfaces in bubble-wrapped comfort when not in use.

Given that it weighed in at a comparatively hefty 4.1/2lb the big Scorp flew reasonably well, even catching a thermal whilst on a summer visit to Old Warden. But it flew just a shade too fast to be called graceful.

For a couple of years, I campaigned the Scorp on calm, sunny days and it picked up its share of superficial battle scars along the way, as you'd expect. Inevitably though, that big 12 cell battery pack lost its urge and gently faded away, leaving the powerless Super Scorpion as nothing more than a forlorn hangar queen for a decade or so.

However, times change! Skip forwards several years and witness the introduction







*The joy of a built-up structure allied to a translucent covering medium. The Super Scorpion isn't a beginner's build by any means but is very rewarding all the same.*



*A pair of old duffers out on a jolly. Phil and I get to pose a little bit.*

of the new, cheap, LiPo battery packs. Now, I was a bit slow on the uptake, and it's only recently that my dear old Scorpion has been dusted off, patched up and converted to accept a 3S 4000 mAh pack. Predictably, given the model's shortness of nose, the battery has to be placed as far forwards as physically possible to achieve the proper point of balance.

As a result, the model's AUW was lighter by over a pound and the rejuvenated model flew noticeably better (i.e. slower) as a consequence. Mind you, the 3S pack yielded a lower voltage and less grunt than the old sub-C pack, even when the original 11 x 7 prop was swapped for a deeper pitched 11 x 8.5 APC. So, whilst the glide was improved, the climb out was a little on the 'stately' side.

It was only very recently that I made the obvious mental leap to add another cell and switch to a 4S 4000mAh pack. A suitable battery was crowbarred into the space directly below the motor, with a correspondingly dramatic improvement in performance. The Super Scorp fairly leaps off the strip now with a 45° climb out. Mind you, that geared motor is a noisy old thing, so it may soon be ousted in favour of something a bit quieter. Or maybe not...

By coincidence, my clubmate Phil had also acquired a part-built Super Scorpion at around about the same time as my own model was being resurrected and he elected to power his Scorp with a 30-year-old OS 35, which he'd rebuilt himself as a sort of mini project in its own right. His model is covered in doped Airspan, a fragile medium, as I can attest, as I managed to punch two holes in the covering just by my own innate clumsiness!

The upshot is that the pair of Super Scorpions made their debuts in each other's company recently, on a perfect autumn Sunday afternoon in October. The almost setting sun illuminated the models perfectly against the deepening blue of the sky. Predictably, both of the Scorpions flew beautifully – relaxed and unhurried. Phil's vintage two-stroke buzzed cheerfully at part throttle, whilst the Astro's gearbox in my model whines like a knackered turbocharger.

Lensman Barry Lewis was on hand to record the event for posterity. It's afternoons like this that make this hobby so worthwhile. ✈



*Baz captures the red Scorpion in a banking turn. Those trees are further away than they look.*



*The Super Scorp's fuselage is a tall, skinny affair. A bit like a fish really.*



*Phil's 35 MHz controlled model shows off the OS 35 very nicely indeed.*



*The doped Airspan, although fragile, reflects the afternoon sun in a way that the matt Litespan on my model never can.*





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# L-39 ALBATROS

Can Freewing's stunning version of Aero's high-performance jet trainer change Simon Cocker's views on EPO and EDF?

words & photos » Simon Cocker

Graham Ashby has reviewed a number of scale models from the Freewing range here in the past and when chatting to him he's been genuinely passionate about his collection of foam warbirds. He convinced me that with care they can be kept pristine, being structurally sound enough to absorb a degree of knocking about and able to withstand some aerial abuse, with flight performances providing the real scale effect of the type. His positivity warmed me to the whole concept of an EPO-based RTF, which opened the door to ticking off an item on my bucket list.

For many years I've harboured the desire to fly an L-39, be it jet-powered or a big PSS, and with Freewing's EDF version purporting to offer sport-style performance in a scale package it seemed just the ticket, particularly as it will take off from short-grass runways, which is all I have at my disposal. With a collection of 6S LiPos already to hand I decided to take the plunge, the PNP version reviewed here arriving complete with EDF unit, ESC and servos, and requiring a six-channel Tx and Rx, LiPo and charger to complete.

## OPEN UP

I was delighted to open the superbly packed box to find all the components in perfect condition, sitting neatly in their negative shells so they couldn't rattle around in transit. Feeling and examining the individual components quickly gave the assurance that I was handling a beautifully designed and engineered product where love and attention to detail had been lavished without restraint. It invites respect from the word 'go' thanks to the perfection of its presentation, level of finish and consideration to scale fidelity.

The solid feel of the airframe parts belies the EPO label that I previously disliked so vehemently. Beautifully spray-painted outer surfaces disguise the foam to provide a crisp, even surface finish that's smooth and solid in texture, with clean, sharp lines between the different colours – quite superb.

With the supplied bag of screws and control linkages the airframe assembles within an absorbing hour or so, which includes connecting the multi-function control box that provides power to the lighting system and accommodates the

wiring harness that links to the wings, picking up the aileron, flap and mains retract servos, and tip tank lighting wires. Rigging the model is therefore a painless and speedy process, although at 41.5" (1054mm) span the L-39 sits comfortably in my car fully assembled.

Eight good quality 9g servos are supplied, one for each individual flying surface, with three screw jack motors operating the retracts. A tube of foam-friendly glue is supplied to secure the rear fuselage section and the plastic nose cone.

## DEEPER DETAIL

Opening the bags continued to reveal more detailed parts, including under-wing fuel tanks that slip on securely and are secured by strong magnets, along with scale wing guns that glide into their l.e. housings and can be instantly removed. A scale cannon housing clips on the underside of the fuselage behind the nose leg bay.

Two plastic antennae are supplied, one of which is glued into the tip of the fin and the other under the front of the nose – it's little fussy bits like this that really help achieve a true scale effect.





*Four minutes is all you can expect with careful throttle management but, wow, it seems like just two!*



*Building and programming the model proved to be fool-proof and enjoyable.*



*Cockpit is all finished and sealed with two pilot figures of the correct size.*

The detail of the tip tanks is excellent, with a working headlight bulb and navigation lights. The cockpit arrives complete with the interior details and two pilot figures fitted, the whole arrangement fitting securely to the fuselage with strong locating magnets and a spring latch pin.

Neat, embedded nylon knuckle hinges are fitted to all the control surfaces, ensuring strength and longevity. The foam material is still intact, too, so an aerodynamic seal of the hinge line is also preserved.

#### LANDING GEAR

The retracting U/C is sturdy and beautifully made, with trailing link sprung legs that help to make landings a joy. The nose leg is operated by a dedicated direct-linked servo for accurate steering and it has a scale retracting door. A built-in five-second delay helps prevent inadvertent switch-knocking from straining the retracts when the aircraft isn't posed for their use. Smooth and with scale speed deployment, tucking the retracts away immediately after take-off looks so right, adding wonderfully to the piloting experience.

#### POWER AND SETUP

Recommended for a 6S 4000 - 5000mAh LiPo, delivering power through the 100A ESC (c/w 5A BEC), the 12-blade, 80mm diameter fan is a powerhouse of a unit, delivering ample thrust from the pre-fitted and factory-balanced 3530/1850kV brushless motor.

Setting up the L-39 is intended to be very simple and indeed it was. Using a six-channel Jeti Rx, the model was flight-ready after just 20 minutes of programming. The flap setting has two positions, half deflection for take-off and full deployment for landing, while I employed the rate switches to offer two control options for aileron and elevator, i.e. positive exponential of 30% on full control surface deflections and 20% at reduced rate settings.

Thus far my L-39 experience had been nothing but a pleasure. Assembling and programming the model proved to be absolutely fool-proof and enjoyable. Time, then, to see whether the same rang true with its airborne activity!

#### STUCK DOWN

At my club's grass-topped airstrip I pre-flighted the aircraft one more time and lined

her up at the furthest point to provide room for a long, scale take-off. Power came on impressively and with the L-39 hurrying down the strip I hauled back on elevator... but there was no rotation before the runway expired, despite using take-off flap, full power and a boot full of pitch coaxing!

My next try was at the lovely strip at Middlewich, where my good friend Tom Doyle had invited me to conduct the flight trials. I was nervous about the menacing trees that border the end of the runway and the crosswind that was threatening to push the model in that direction, so I decided to quit while I was ahead.

I then attempted to take off from Jim Glasgow's club site at Kilton, where the perfectly smooth grass strip should have offered the ideal take-off venue, but the L-39 ran off the end of the strip into the long grass, damaging the nose leg and breaking off the gear door, two items that I was able to replace very quickly thanks to RC Motion's speedy internet service. Although the airframe took quite a serious wallop in this incident it was reassuring to see that it could absorb the shock of such an arrival without damage.



*"I simply gun the throttle...  
heave back on the stick  
and the L-39 detaches  
every time with no argument"*

*It has a stunning performance, combined  
with that scale sit in the air - awesome!*



*Cheater ingress helps feed the powerful EDF but  
is well disguised in flight.*



*Check out the scale surface detailing. It all adds  
to the scale effect.*



*Take off takes full elevator at V2, then she climbs a little  
steeply at first but is soon adjusted.*



*There is loads of room for the chunky 6S  
Optipower pack; 50c did the trick and  
unleashed the full power of the EDF.*

### **C RATE CRITICAL**

Scratching my head, I researched EDF LiPo specifications to discover that the battery's C rating is critical to achieving full fan performance. So, I invested in new 6S 5000mAh cells from three different manufacturers to investigate:



1 x 50C from Optipower, 2 x 60C Turnigy Heavy Duty from HobbyKing and 1 x 40C from Robotbirds.

### **THIRD TIME LUCKY**

The third sortie was undertaken back at my club's freshly mown grass strip. Fitted with the new Optipower pack the L-39 felt like its afterburner had been lit and the aircraft was eager to reach for the skies. As the model tracked purposefully, I progressively applied more elevator until the wheels finally left terra firma.

Although the detachment was sudden and not very pretty, once the U/C and flaps were tucked away the rate of climb was excellent. At a safe height the L-39 cruised around happily on just over half throttle whilst I adapted to the model's feel and trimmed the controls a tiny amount.



*Above left: Mains are very strong and have stood up well to  
some spirited arrivals.*

*Above: Neat sealed control surfaces are fitted with strong  
nylon hinges underneath.*



*Paula Carr gives scale to the L-39.*





*This could be a full-size L-39 on approach. The model is solid all the way down to the runway, making for marvellous landings!*

I felt immediately at one with this lovely-looking jet, which was proving to be both stable and groovy. Being a PSS enthusiast (and wannabee jet jockey) I'm used to fast, low passes and here the L-39 is very keen to oblige. In a dive the model picks up speed instantly with power and, better still, the airframe's mass enables retention of aerial energy into scale climb-outs and reversals. I was thrilled to finally be flying a truly punchy EDF model that sounds realistic, too. The multi-blade fan provides a jet-like sound on low passes that's enhanced by the Doppler effect of its departure back up to cruise height - wicked fun!

Roll response proved to be very good, with perfect four-point rolls and lovely, crisp split-S manoeuvres, whilst the elevator was powerful without being grabby. Flaps proved delightful too, as they deploy in either mode without any pitch change once the model's speed is reduced. Inverted flight is very comfortable, while the stall is benign and predictable and is only discovered if provoked by carelessness.

### KILTON REVISITED

Armed with my new, powerful LiPos I returned to the Kilton club, where a tricky crosswind tested not only the L-39 but also my piloting ability. The model coped admirably, and it tracked as straight as a die before taking off perfectly well, although it took some coaxing to rotate due to the draggy grass. The C of G is positioned at approximately 20% chord, which is much further forward than the position of the main U/C legs and with the trailing links the wheel axle position is slightly further rearward still; the net result is that the nose leg becomes loaded, so the elevator has to work hard to combat this loading and allow rotation. Now I understand this to be the case, I simply gun the throttle at the outset, heave back on the stick and the L-39 detaches every time with no argument.

I'm certain that on a hard-surface runway the aircraft would transition smoothly, as it

did so neatly on the beautifully prepared close-cut grass strip at Buckminster at the RCM&E fun fly weekend. The important point is that there's now safety in airspeed with the correctly C-rated LiPos delivering that all-important essential thrust boost.

I quickly learned that EDF flights are short but glorious; four minutes is all you can expect from a 5000mAh LiPo so there's not a great deal of reserve power in the tank for a go-around. It's also imperative that the LiPos aren't consumed below 30% of their capacity under load in order to preserve their longevity - they're fragile items, both physically and emotionally! If you mistreat them, they'll puff-up and their internal resistance will greatly diminish, and their cycle life can be compromised.

When flying PSS jets such as the B-52 or Canberra the timer rings when I hit the default one-hour setting, so when flying the L-39 you can imagine my surprise when the ringer blares at me after just four minutes! I'm only just getting into the groove after two minutes, so it acts as a fun spoiler alert and is very irritating.

I enjoy performing scale landing approaches with the L-39 on full flap and with that lovely scale U/C hanging in the breeze, landing lights on. The tip pods show up well too, so this is a joyous manoeuvre. It's just as well this is so satisfying because with EDF there are plenty of take-offs and landings, and, of course, a number of LiPo packs are needed if you want to keep that greedy little power system fed. Once a flight's been concluded the adrenaline is flowing and there's an overwhelming urge to repeat the experience because it's so exhilarating and addictive.

The HobbyKing LiPos have proved to be robust under load and are relatively inexpensive. Tim Mackay recommended them to me having been using them for some time in his Freewing Avanti, a model he uses as his regular fix, and they've stood up to considerable use without complaint so far.

The Optipower LiPo provides just a smidgeon more power and (I'm told) should live longer than the HK packs.

At full chat the powertrain draws 85A, so it's imperative to reserve this for bursts at critical points in flight, particularly as the model is quick enough in the down lines using just half power. I checked the decalage of the airframe, which shows just 1.5 degrees of positive incidence on the tailplane, enabling a safe margin of stability and minimum drag.

### EPO AND EDF OK!

My EDF experience so far has been a revelation and most rewarding. I love the jet-style feel and looks of the L-39, the outstanding finish and quality of which gives that essential pride of ownership that ensures it's a keeper. That it easily fits into the car without derigging is a bonus; the model is always ready for action subject to a LiPo being dropped into the fuselage.

Operating an EDF is so easy and thanks to Freewing all the hardware invested into the model is robust enough to provide a long life of trouble-free fun. When you tot up the cost of the individual components separately the £360 price tag becomes comprehensible and fair value. Should the airframe be destroyed there's a strong possibility that most of these components could be reused as the entire airframe will then act as an active foam crumple zone!

I've finally come to accept that EPO works as an airframe material and this has encouraged me to invest in other foam airframes from Motion RC where I can use my stock of 6S LiPos - their A10 Warthog and the larger of the two Spitfires look particularly appealing.

The L-39 has proved to me that EDF has finally come of age, thanks to years of development and the embracement of new technology. This is a truly fine product with a pedigree performance that will get your pulse racing and possibly set you on a path



# DATAFILE

<b>Name:</b>	L-39 Albatros PNP
<b>Model type:</b>	EDF jet
<b>Manufactured by:</b>	Freewing
<b>Available from:</b>	Motion RC www.motionrc.eu
<b>RRP:</b>	£360
<b>Wingspan:</b>	41.5" (1054mm)
<b>Fuselage length:</b>	53.2" (1351mm)
<b>Weight:</b>	4.85 lb (2.2kg) w/o battery
<b>Thrust:</b>	7.4 lb (3.35kg)
<b>Powertrain (supplied):</b>	12-blade, 80mm dia. EDF c/w 3530/1850kV outrunner, 100A ESC c/w 5A BEC
<b>Rec'd LiPo:</b>	6S 4000 - 6000mAh
<b>Functions (servos):</b>	Aileron (2); elevator (2); rudder (1); flap (2); nose leg steering (1); throttle (via ESC)



*Keeping the approach to the runway threshold steep and controlled on the flaps, using minimum throttle.*



*Full flaps for landing are a great help to slow the model safely.*



towards the greater goal of owning a Jet A1-burning turbine at some point in the future.

One of the redeeming features of all EDF models is that they don't require any support kit to attain a flying thrill. It's a simple and quick route to jet-style adrenaline-pumping fun and I whole-heartedly recommend this little L-39 - for experienced pilots only, mind!

Crashing foam airframes isn't an option as although repairs are possible provided the damage isn't too serious, the end result won't be pretty. A replacement L-39 fuselage will set you back around £92, a new wing is about £55. The comprehensive spares list does cover most eventualities, which is comforting to have as back-up.

For budding Jet Jockeys, then, the L-39 is the way to go. Rest assured that in exchange for your hard-earned you'll receive a top-quality model that flies beautifully and will deliver an endorphin fix on each and every flight. Be sure to use good quality 50C rated LiPo packs and you may well be hooked for evermore on the range of foam models offered by Motion RC. Buckle up, don your Ray Ban aviator shades and go grab your share of the Top Gun experience! ✈️



*Far left: That nose leg can only take so much hammer, as I found out when running off the strip!*

*Left: The landing lights ping on when the landing gear is deployed. Neat!*

*Below: If high-power EDF is new to you the performance is adrenalin pumping. I just love it!*





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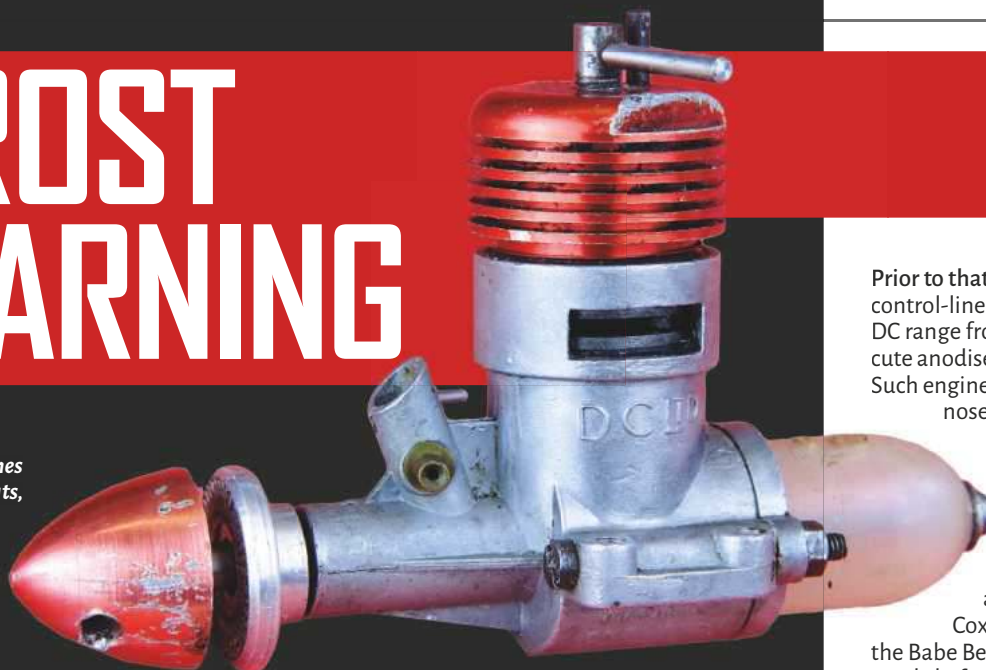
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# FROST WARNING

*DC diesel engines had spinner nuts, since they had threaded crankshafts.*



Snug in his shed at last, Whittaker gets down to the stuff that really matters

words & photos » Alex Whittaker

The light is soft, and frost lies on the hedgerows. The moon is full, the nights are drawing in. I'm in my shed standing in the glow of the two-bar heater. Mingled with the coffee aroma is the first roasted balsa dust of the new building season. The traditional radio modeller's life now begins to change gear. Apart from happily grabbed days up at the field, the trend is now towards the winter projects. In my shed, I'm engaged in getting back up to speed with last year's unfinished airframes.

Except for hasty repairs, I've hardly been in the shed for months. However, there is a deeply satisfying surge of optimism. From now on I will spend an increasing number of happy hours avoiding the siren-call of the central heating, the sheafs of final demands and the drab diet of mind-numbing TV shows. I will be back in my sanctuary, surrounded by my treasures. I pat the lathe as I pass by, noting the competing tangs at that far end of the shed; dope, balsa wood, meths, diesel fuel and solly-olly. It is a moment to savour - deep contentment and nothing to do with commercial dross.

## PROP NUTS, COVER NUTS AND SPINNERS

When I began radio flying many modellers never bothered with spinners or the like, leaving the bare threaded crankshaft to protrude. Obviously, this was a safety hazard and the SMAE (BMFA) introduced the concept of a minimum prop nut radius. From memory, I seem to remember this was something like 'not less than a radius of 7.2mm' and we all began to think a bit more seriously about safety.



*Cox engines anticipated the modern trend of internally threaded crankshafts.*



*Threaded crankshafts cannot be left with just a prop nut!*



*Plastic spinners can be variable in quality. Nylon is better, but not best.*

Prior to that, in my teenage years as a control-liner, many British engines, like the DC range from the Isle of Man, came with a cute anodised metal prop spinner in the box. Such engines also had a threaded crankshaft nose, so it was easy to screw the spinner on, then nip it up tight to retain the prop. If you looked closely you could observe that the conical spinner had an axial hole to take a miniature tommy bar and tighten it up against the prop.

Cox engines were the exception, like the Babe Bee, which had internally threaded crankshaft ends and a screw to fix the prop. When I began flying with slightly bigger glow engines many radio modellers used the early plastic propeller spinners. These were variable in quality, could be brittle and were retained by two small self-tapper screws, which could distort the cone. I don't know about you, but the idea of one of those small screws being thrown off into my face at 10,000 RPM never appealed. I have that same dread with modern multi-bolt hubs on big petrol engines, but that's another story. Better nylon spinners came along and, providing you didn't over-tighten the retaining screws and strip the backplate, they were usually fine and also very handy for the new electric starters that were beginning to appear.

## METAL SPINNERS

Companies like Veco marketed metal spinners for glow engines as long ago as the 1960s. Few of my mates could afford these impressive objects, so they were rare indeed. Gradually, more affordable highly polished spinners started arriving and were generally of serviceable quality. Again, ideal for electric starters.

Many contemporary aluminium spinners are superb but usually come with just two brass shaft adapters of differing internal diameters. These make the backplate concentric with the spinner backplate and the engine crankshaft. I usually have to turn up my own shaft adapters on the lathe since the two in the box rarely seem to fit my motley collection of engines. I also often have to make threaded adapters from hex aluminium bar to match spinner bolts to engine crankshafts, but that's also another story. Making these useful items on your lathe is a doddle and any lathe will do, even a tiny EMCO. Furthermore, you can make DIY shaft adapters to a very snug fit around the crankshaft nose, which greatly assists prop and spinner balance, and thus efficiency and safety.





*Veco were early adopters of aluminium spinners. Note the fixing arrangements.*



*Modern spinners are a great solution. Note, there's only two brass shaft adapters.*



*These oily shaft adapters are home made. The shiny ones didn't fit my engines!*



*Sometimes you need to make a spinner adapter from ye rough-hewn hex bar.*

*DIY adapter, threaded this end for the crankshaft and the other end for the spinner.*



*Turning a spinner adapter is a doddle on any lathe. You can tap any size, too.*



*Home-brew heavy dome nuts and an early ali spinner from my lathe.*



*Rough-hewn brass 'heavy hubs' made on an EMCO SL many moons ago.*

### DOMED HEX NUTS

Over the years many have also used simple DIY metal domed nuts. These were usually made of aluminium and often could be used with the glow engine's prop washer. I've made many on my lathe. With care, they can be driven with the engine starter if you flip the rubber drive cup.

A domed nut is another great little project for the new lathe owner. You can make them out of round or hexagonal stock - whatever you have to hand. Generally, as with the diesel spinners, if you make them out of round stock then you have to drill a hole through the nose of the dome to admit a tommy bar that tightens the nut up. An alternative is to turn-up the dome nut from aluminium hex bar stock. This means you can use a spanner to torque up your new dome nut or mini spinner, which is really convenient.

All well and good, but when I made my first hex dome nut, I should have polished the length of hex stock first with some emery cloth, then finished off with Solvol Autosol motorcycle polish. I forgot, and whilst I could get a great finish on the domed bit by polishing it in the lathe, the flats remained dull. Trust me, it takes a lot more effort to polish each flat individually than when they're part of the parent bar! Another great thing about making your own is that you make it match the hub of

your prop exactly and give the nut any crankshaft special thread required using your own set of taps. If you have a lathe and some taps, 'funnies' and one-offs hold no fear.

### HEAVY NUTS

Hand-crafted models can leave the bench a bit heavy. Some will require a bit of nose ballast to get the model's Centre of Gravity to the right place. But modellers hate adding unnecessary weight. Yonks ago a brave modeller decided to fit a heavy spinner nut to get the C of G forward. Reputedly this was Harry Higley in the US, but I've seen DIY versions in the UK since the late 1960s. This heavy prop nut concept killed three birds with one stone:

- The prop was retained by a neater spinner nut
- A domed spinner nut was a good bit safer than a bare crankshaft nose
- The model balanced in the right place.

Obviously, the amount of weight you can pack into a domed nut is finite, but often such a heavy nut would do the trick. These were even marketed in the States by Harry as 2oz Heavy Hubs; superb Yankee marketing. I've always loved US modelling accessories like these, especially from 'mom & pop' businesses, which sometimes grew into mighty modelling empires.





Spinners for four-stroke engines need to accommodate such lock nuts.



Two of Nick Banks' designed early four stroke cover nuts from bar stock and hex.



Round stock hollow dome spinner. Note the clearance for the lock nuts.



Hex stock hollow dome spinner. Note the thread for the retaining set screw or bolt.



Big petrols and four strokes often have internally threaded crankshafts.

### HOLLOW DOME COVER NUTS

When four-stroke engines came along they usually had two retaining nuts - one to lock the other - so our DIY spinners and dome nuts needed a re-think. This was because the two factory-supplied securing nuts tended to take up most of the available male thread left on the crankshaft, leaving insufficient thread for a dome nut to cover it all. A friend, Nick Banks, dealt with the problem about twelve years ago with his nifty cover nuts. They were hollow inside the dome, which delivered sufficient clearance to allow his cover nut to go over the factory hex nuts.

### INTERNAL THREAD CRANKSHAFT

Nick's original solution works well with protruding crankshafts, which are threaded. However, some modern designs, especially bigger petrol engines and four-strokes, have internal female threads in the end of the crankshaft and therefore demand a different approach. In their case there is a set screw or bolt which screws into the female threaded end of the crankshaft to retain the prop.

The spinner issue then becomes a bit more complicated. You can fit and torque-up the prop retaining bolt, but how do you attach the spinner-cum-cover nut with no protruding thread to mate to? Nick's solution was both simple and elegant. He devised a hollow dome nut-cum-spinner with a clever separate backplate.

Essentially, the spinner backplate has a clearance hole for the shank of the factory prop retaining nut. The thickness of the backplate is chosen to allow any shaft adapter to be enclosed without protruding through the backplate. Now here is the really cunning bit - he machined the backplate from solid steel, so it has a substantial wide-bore externally threaded boss. Inside that threaded boss is a rebated hole. Fiendishly, this is just big enough to admit a normal socket to tighten the factory crankshaft bolt/set-screw. Thus, you can torque this backplate right up



Nick Banks' elegant spinner solution for internally threaded crankshafts.

against the prop (whist dialling in the torque if you wish). Then, you simply screw the internally threaded cover nut over the backplate, tighten that up to the steel backplate with a tommy bar through the nose and you're ready to fly.

### LET'S MAKE ONE

As soon as Nick's prototype arrived, I knew I wanted to have a go myself. Before we continue, just bear in mind that his was made in direct response to a request from Tony Richardson, a Canadian reader, who wrote to enlist Nick's help and, as always, Nick rose to the challenge.

His spinner is a prototype, developed in response to the need for a spinner for larger petrol engines where the manufacturer's prop-fixing methods can't be used. The method of using a large diameter fine thread integral to the prop washer (which has at its centre a feature to accommodate the manufacturer's fixing method) has been employed previously by Nick with 1/4 and 1/3-scale Tiger Moth spinners.

The washer is machined from good quality mild steel. All machining was carried out on a 5" centre height manual lathe with no digital readout and could easily be made on a hobbyist's machine. The nut is made from 6000 series aluminium (free machining) and all internal machining was carried out manually, but the outside finish was done on a CNC lathe. However, the external machining could easily be done on a manual lathe with the use of a radius turning attachment.



Nick's clever spinner concept has two main components.



A Banks new cover nut from mild steel baseplate with its 6000 series aluminium dome.





*The mild steel baseplate has a recess in the boss to accept a standard socket - sweet!*



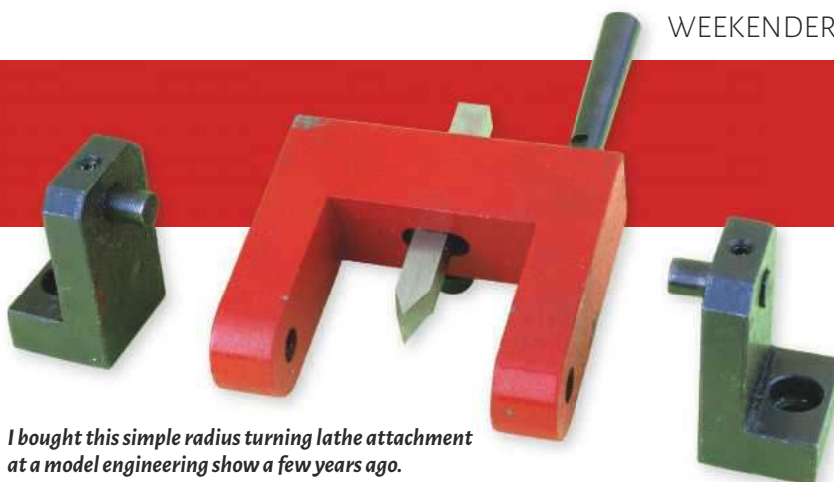
*Over the years Nick has made all these items at the behest of RCM&E readers.*

### RADIUS TURNING ATTACHMENT

Don't let the need for a radius turning attachment put you off. In the past I have just cut small steps approximate to a dome and then tried a freehand twist of the wheels to rub out the high points. I followed that with the use of a file (aarrgggh!) and various grades of emery to get it about right, then polished with emery and Solvol Autosol in the lathe.

A man on his galloping horse will never see any imperfections in a home-crafted spinner, although I bought a very simple radius turning lathe attachment from ARC Euro Trade at a model engineering show a few years ago. This was relatively inexpensive and very effective. Mine was actually designed for a Mini-Lathe but I bodged it onto the saddle of my much larger and my infamous Winkie W\*nk machine.

Essentially, the radius fitting is a simple tool carrier with a lever attached, that swings in an arc over the end of your spinning work. The dome emerges under the tool as if by magic. I'm always astounded how good a finish it gives, since it is hand operated. Also, if you experiment with the geometry and size of the tool arc you can actually produce a more cone-like shape. It's great fun and very easy to use after an hour's happy messing about on scrap rod ends.



*I bought this simple radius turning lathe attachment at a model engineering show a few years ago.*

### SPINNER CONTACT

If you want Nick to make you a spinner then contact him via [ian.warhurst@lineone.net](mailto:ian.warhurst@lineone.net) who handles the orders. The one in the photo will cost less than thirty-five quid, including UK postage. Sadly, due to current restrictions, Nick cannot meet orders from Canada and the US. Fear not, I shall be writing directly to Tony in Canada forthwith.

### GWARB RETIRES

If you are a Hobby Konger life is simple. You buy it, fly it, crash it, buy another and are ecstatically happy. There aren't any particular personalities or people of repute in that particular world but that is fine. It is all about product, flashing the plastic and instant gratification. Now, of course, this is all very modern and entirely okay. It's the modelling equivalent of fast food and the occasional burger will do you no harm.

In this increasingly busy world Hobby Konging only requires a calibrated effort and, after all, we are a toy aeroplane hobby, not a fitness regime. However, many Trad Brit Modellers have other ideas, priorities and desires. We like the models and engines that grew out of our own build-it yourself culture. Principally from both sides of the Atlantic, but also certainly from Europe, Australasia, East Africa and especially Japan. The Aeromodeller was our Old Testament, RCM&E was our New Testament and the Plans Handbook was our atlas. We continue to revere the classic designs, classic kits and classic power plants. We practice ancestor worship and know who Boddo was, what Shigeo Ogawa did, and revered the Beatific Saint Mooney. We like to honour those greats who are very much still with us; Sir Mick Reeves, Lord Peter Miller and whippersnappers like old man Nijhius.

If you are new to radio modelling, or a born-again returner, even after just a short while in the traditional side of our hobby, you will begin to realise that individual people - and not commercial hobby companies - really made it all happen. Our heroes are not overpaid fake-tanned YouTube wannabes with impossibly white dentition. We applaud decent lads in their shed and honour creativity in all its modelling forms.

What's Whittaker on about? Well, I was recently reminded that we have our own heroes, often unsung. After many decades of loyal service to the Free Flight Scale and R/C Scale communities, Gordon Warburton, FSMAE has decided to pawn his stopwatch and hang up his spreadsheets. You may not know the compact pensioner powerhouse personally, but if you have any interest at all in scale you will have benefitted from his tireless work behind the scenes. He has been there for aeons, beaver away at the Scale Nats and other regional scale meetings, indoors and out. Gordon ('Gwarb') has been sending me his official BMFA results for decades, promptly on the Tuesday morning, scant hours after the comp. Famously modest, he's probably the most pleasant, even-tempered bloke I've ever met. He's also very amusing - not a quality one normally associates with Yorkshiremen. (*That's torn it!* - KC) I'd wish dear Gordon a long and happy retirement, but he has been an old age pensioner for as long as I can remember. I'd buy him a bottle of whisky, but he's a Methodist. ✈



*Whittaker's infamous and well used Winkie W\*nk machine.*



*Gordon Warburton is probably the most pleasant and even-tempered bloke I've ever met.*

# TANK TIPS

Since fuel tanks are often fit-and-forget items buried deep inside the fuselage, they need to be assembled correctly to avoid leaks and engine running problems. Here's how...

words & photos » Alex Whittaker



**1** With your SLEC tank you'll find a length of small bore silicon tubing, a rubber grommet, a hex brass tank bung and a hollow chromed brass clunk weight. The flexible small bore tubing ensures that the weighted clunk (fuel pick up) can always find the fuel in flight.



**2** The first task is to trial assemble the components of the clunk line to determine the finished length of the silicon tubing. If the tubing is left too long the clunk weight will foul the back of the tank in flight, starving the engine of fuel.



**3** When sure of the correct length, cut the silicon tubing. A neat square cut is required with no tears or nicks which might open up in flight and cause erratic running. Push the silicon tubing firmly over the barb on the hex brass bung.



**4** The clunk line assembly is fed through the threaded hole in the tank (remembering to add the O-ring) and finger-tightened. Now shake the tank to check that the clunk doesn't foul the rear wall. When satisfied, gently nip up the bung with a box spanner.



**5** The SLEC tank has an optional 'sight tube' facility, which allows you to see the amount of fuel in the tank at a glance. There are two sight tube nipples let into the front right face of the tank. Use a 2mm drill, twisted by hand, to break the holes through the two nipples.



**6** Cut a spare length of normal silicon fuel tubing to link the two holes to form the sight tube. You may want to use a longer loop of tubing than shown, particularly if you wish to bring the sight tube through the fuselage wall so as to be visible outside the model. The two extruded tubes (top centre) of the tank are the fuel filler and air vent connections.

## YOU WILL NEED:

1. A SLEC clunk tank kit
2. Silicon fuel tubing
3. A 2mm drill
4. An 8mm box spanner

## DID YOU KNOW?

Once installed, your tank's centreline should be in line with the engine's needle valve, to ensure even running and to avoid flooding the carburettor... On SLEC fuel tanks it doesn't matter which way around the fuel filler and vent pipes are connected, it matters only that they're both employed since in order for fuel to get into the tank, air must have a free path out. Typically, after refuelling, the air vent will be connected to the pressure nipple of the silencer. This supports reliable running in flight by applying positive pressure to the head of fuel in the tank. The fuel filler tube is normally blocked off with a small bung immediately after fuelling... It's also a good idea to pressure test a fuel tank prior to fitting it deep in a fuselage.





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# FMS EDGE 540

The Editor shakes a fully formed mini air racer out of its box and delights in its agile performance

words & kit photos » Kevin Crozier | flying & static photos » Dave Vickers



*The little Edge has a fair turn of speed.*

The full name of this sleek little model is the FMS 750mm Edge 540, which is a bit of a mouthful. But those already familiar with the FMS range of Almost Ready To Fly foam models will instantly recognise it as the smaller sibling to the firm's already established 1300mm span Edge 540.

## KEEP THE BOX?

These days ARTF's invariably come well packed in generous boxes with colourful cardboard covers and with the airframe parts carefully stored in expanded polystyrene trays. And this little lady is no exception.

I guess that most of us consign such packaging straight into our rubbish bins. But while the cardboard is recyclable the polystyrene is not, and it should go in general waste. Which is a shame really as the FMS



*It's truly ready to fly - just fit the wing, Rx and flight controller (orange unit) and slot in the U/C.*

packaging gurus have done a fine job of presenting the small Edge as a truly 'ready to fly' model, with the tail group being factory fitted to the fuselage. All that's required is to attach the undercarriage and to bolt on the wing, then fit a receiver and LiPo, and you're ready to go. So, if you have

the space, why not hang on to the box for a bit and if you find that you're not flying the Edge as much as you used to then you can tuck her back into the box for safe storage - just undo the four wing screws, pull off the U/C and she'll go back in for a well-earned rest.



### SHORT BUILD

But that's for way in the future. Right now, there's plenty of flying ahead for this mini aerobat. From the picture nearby you can see how prefabricated this model is. Assembly is limited to attaching the wings with the four screws provided and pushing the pre-formed undercarriage into its slot.

The wing screws are long and thin, with fine threads. They are screws, not bolts, so sourcing some more if you lose any may be a bit difficult. But a spare screw set is listed in the manual, so the UK distributor, CML Distribution, is the obvious place to ask should you need some more for whatever reason.

The front two screws nipped up after plenty of turns of the screwdriver, but the rear ones went tight after only a couple of turns, which left me wondering if they were all that secure. So, I removed the wing and started again, this time at the back whilst carefully making sure the screws were located in their mounting holes in the fuselage. The result was the same, but after some pretty extensive flight testing without the wing coming loose, I can only conclude that the rear wing fixtures are doing a good job.

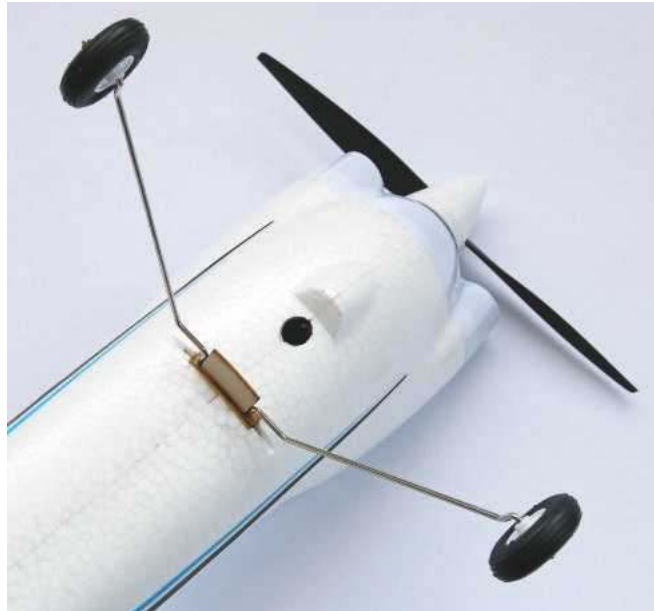
The only other assembly job is to slot the undercarriage in place and then glue it in using the wooden insert provided. However, rather than glue it in, I wanted to be able to break the model down with an eye to future storage. So, after pressing the insert home dry, I then used some thick, clear greenhouse tape to keep it in position. This has worked well and there has been no sign of the U/C working loose after several flying sessions.

### RADIO AND LIPO

FMS recommend using a 2S 1300mAh LiPo to power the Edge and CML kindly provided two Voltz packs for flight testing. This was greatly appreciated, the only problem being that Voltz packs come with Deans connectors, whilst the 20A ESC in the Edge is fitted with a mini XT-30 plug. A quick Google revealed that LiPos fitted with such connectors are few and far between, whilst Deans and EC-3 types are much more commonplace. So, chances are that you may have to change the ESC plug before you can fly this model, which is what I did. A Deans socket was quickly soldered in place, although care has to be taken not to touch the fuselage sides with a hot soldering iron.

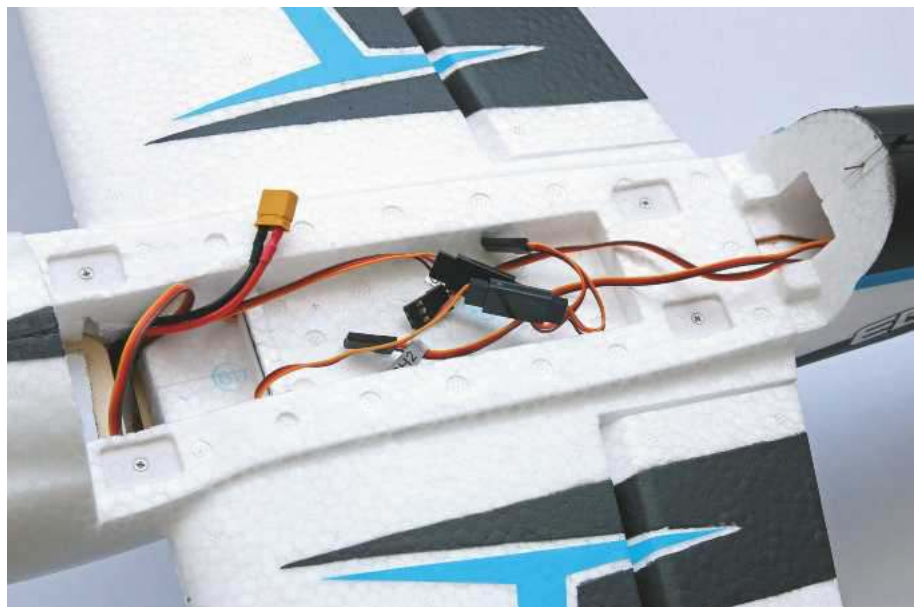
In hindsight, I regret that I could not use XT-30 connectors as they have a smaller footprint than either Deans or EC-3 types. Also, the Voltz packs come with quite chunky wires, so bundling the cables and connectors, plus the balance socket, beneath the canopy hatch is quite a squeeze. I would have preferred to leave the XT connector on the ESC and to retrofit XT-30s to the LiPos for a more streamlined fit under the canopy.

Although I fitted the smallest Spektrum receiver I could find in my radio spares box, the wiring issue was compounded by the provision of a small Reflex flight control



*Left: This wooden insert is meant to be glued in to secure the undercart, but a square of greenhouse tape holds it securely if you want a less permanent solution.*

*Below: The front wing screws have more bite than the rear ones, but it's holding together fine so far!*



system, which provides electronic stabilisation to the ailerons, elevator and rudder. Even though the Reflex module is quite compact, it means that another bunch of wires need to be catered for in the already tight confines under the canopy. To work properly the Reflex unit must be centred horizontally and vertically in the fuselage and a handy addendum sheet is provided to show exactly where that is in the Edge's fuselage. A second sheet provides information about how to set-up and use the stabiliser, so I fitted it and hoped it was 'plug and play', which proved to be correct.

### SET UP

When setting up my DX6 transmitter I copied across a model memory from a previous FMS model that also features flight stabilisation. After removing any sub-trims and reducing the rates to make sure I wasn't going to over-cook the control throws, I was pleased to see that the assigned switches were working as per the older model, with three Flight Modes available via the short



*Each servo is connected by an angled short pushrod. After test flying, trim by increasing/decreasing the angle of the bend to suit.*



**Hoorah! This is the first foam model I've assembled where the tailplane lines up with the wing without needing any packing.**

right shoulder switch and the Reflex unit operated using the long round switch above the left stick. Pushing the switch fully forwards engages fully stabilised mode, which is aimed at tyro pilots and so is not required for this model; the middle position turns the gyros off, whilst the forwards position provides 'optimised' mode to assist experienced pilots with the promise that, '... even small aircraft will fly with the confidence of something much larger!'

After centring all the controls, checking that they operated in the correct direction and that the upper and lower Flight Mode switch positions gave the recommended control throws, it was time to check the Centre of Gravity. (Incidentally, I couldn't get near to the maximum aileron throws shown in the manual, but what movement I did have looked plenty to me and so it proved in flight testing.)

The C.G. position is given as 50 - 60mm back from the leading edge. However, even with a Voltz pack as far forward in the nose

as possible, the Edge balanced on the rear marks, giving no option for starting the test flights with a slightly forward balance point, which is my preference when flight testing small and potentially twitchy airframes. But at least it was within limits, so I called it a day and pronounced the FMS 750mm Edge 540 to be flight ready.

#### AT THE FIELD

The next morning saw us gathered at the local flying field, with my photography buddy, Dave on my left and clubmate Norman on the right, who hoisted the Edge up to shoulder height ready for a range check (many thanks for the reminder, Norman!) The Spektrum gear easily passed the test, so after cycling the power on both the Tx and Rx, the throttle was advanced, and Norman gave the petite racer a firm throw into the air.

The Edge 540 sped away with little deviation to the side, but my guess as to the neutral elevator position was obviously quite a way off as she headed skywards at quite an angle.

*Fancy emulating your favourite Red Bull racing pilot?*



**Underside view showing those graceful swept tips to good effect.**



**Dave, the photographer, did well to capture this small, nippy model.**



**Over the top to complete another pleasing loop.**





*It's a sleek little thing and very eye-catching in black and blue trim.*

*If you buy one, then use this as a good reference shot for neutral elevator - I over did it and she headed skywards after the first hand-launch!*



After several clicks of down elevator, I could relax on the sticks and start to enjoy throwing the model around. Even on low rates she offers quite a fast roll rate and the elevator is nicely set for generous loops, which the Edge tracked through cleanly without pulling sideways by a noticeable amount - not perfect but perfectly acceptable for a first flight prior to any serious flight trimming. Flicking the Flight Mode switch fully forwards to engage high rates didn't harm the model's easy to handle characteristics in any way, but the rolls were now of the twinkle variety despite being no-where near the max setting shown in the manual. I don't think I'll be asking her for any more in this department!

Whilst all this aggressive stuff is enjoyable, and there's no doubt of the Edge 540's capabilities in this regard, I prefer my aerobatics to be of the larger, smoother variety and for such a small model the Edge does an admirable job in this respect.

### REFLEX REFLECTIONS

With time marching on my thoughts turned towards landing, but not before a quick test of the Reflex gyro system to see if it had any a noticeable effect on the already benign flight handling. Gaining height quickly, thanks to the punchy 2250kV motor, I levelled her out and pulled the long toggle switch fully forwards to engage Optimised mode - and I couldn't detect much difference! It was quite a breezy day, with the odd bumpy gust, but I found that the FMS Edge remained quite easy to handle even with the gyros turned off. By turning them on I was expecting to see a noticeable smoothing of the flight envelope, but I couldn't detect it, even though ground testing had shown the surfaces being deflected when the model was rotated through the three axes.

However, after several more flights I'm now certain that the Reflex is worth fitting. The difference in handling is subtle, but the little Edge does seem smoother when the

stabiliser is engaged. Without it she's still easy to fly but a bit more twitchy, a characteristic that all but disappears when the Reflex is switched in.

I can only conclude that the Reflex flight controller must be helping to iron things out, but this little Edge is so well mannered anyway that it's not really the best platform to showcase such a system's capabilities. But never one to 'look a gift horse in the mouth', I'm happy to leave it switched on in the belief that any help flying wise is gratefully received.

### FURTHER FLIGHTS

The next sortie was one for the camera, which gave me the chance to try out the model's knife edge capabilities. Sadly, I did find her a bit wanting in this respect, either with the gyros on or off, and fully banked passes proved to be elusive so some further trimming will be necessary to get her locked in when travelling across the horizon. The rudder has plenty of kick though for



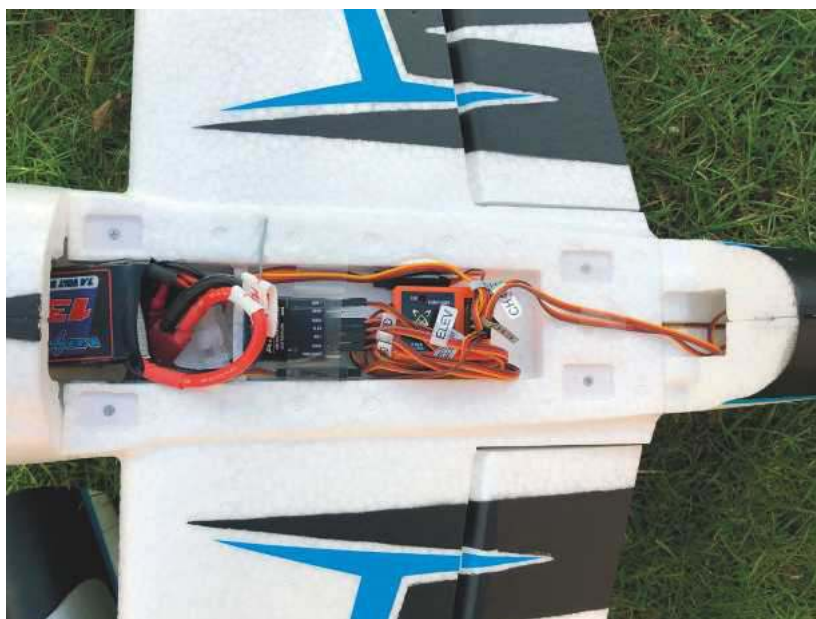
*Edge 540 maintains her benign handling on the approach and right down to the flare.*



*Caught during a slow fly-by, this shot shows the canopy bulging after not enough care was taken when installing a LiPo. A strong latch keeps the canopy firmly in place - no weak magnets here!*

## DATAFILE

<b>Name:</b>	750mm Edge 540 with Reflex stabiliser
<b>Model type:</b>	Ready-to-fly small aerobat
<b>Manufactured by:</b>	FMS
<b>UK distributor:</b>	CML Distribution www.cmldistribution.co.uk
<b>RRP:</b>	£129.99
<b>Wingspan:</b>	750mm (29.5")
<b>Fuselage length:</b>	702mm (27.6")
<b>Flying weight:</b>	390g (13.76oz)
<b>Wing area:</b>	11.8dm sq (182.8sq in)
<b>Wing loading:</b>	33g/dm sq (0.07oz/sq in)
<b>Power system:</b>	2212 2250KV outrunner, 20A ESC
<b>Functions (servos):</b>	Ailerons (2), rudder (1), elevator (1), via Reflex flight stabiliser
<b>Connector type:</b>	XT-30
<b>Required to fly:</b>	Mini receiver, 2S 1300mAh 30C LiPo



*Fully wired up and with the Reflex stabiliser in its recommended position. It's tight in there!*

stall turns and neat multi point rolls are also possible.

At height, testing the stall found more evidence of her benign handling, with just a graceful nod before resuming straight and level flight. Further stalls preceded spin trials, which the Edge performs with ease at the high rate settings.

### IN THE MIRE

I won't bore you with our flying group's recent trials regarding our usual flying site, but suffice to say that the pristine patch that you may have seen behind me in my Welcome piece in the October issue was temporarily replaced by a far less manicured cow field whilst a herd of sheep munched their way across our patch, fertilising it liberally as they went!

So, the landing options for the Edge's first flights were quite restricted and each one resulted in a nose over in the long grass. But the small model took all this abuse in her stride and no damage was done. What I can say is that the approach and flare on each occasion was nice and predictable, so with a closely mown sod to land on some neat

three pointers should be on the cards.

Two further things that I wanted to check were solo hand launches and ROG take-offs. My preferred way of launching small models is to give them a firm underhand lob. The Edge has quite a short nose, so there's not as much fuselage to grip as I would normally like, but even so she powers away from a low throw with ease.

With those small wheels taking off from all but the shortest mown grass is inviting a nose-over, so an underhand launch is sure to be my chosen method of departure. However, in the interests of performing as much flight testing as I could I laid two hardboard panels over the cow grass to form a short strip and took the Edge off from there. No drama, as a recent TV ad would say!

### EDGING IT

I don't think any experienced club pilot will get bored when flying this little treasure. It's also the perfect size to carry in the back of the car as a reserve model when out flying one or two larger aircraft.

I'm in two minds as to the worth of the Reflex flight controller in this particular



*CML's Voltz 2S 1300mAh LiPos are a good match for the Edge but you'll need to change connectors.*

aircraft as it is so easy to handle anyway without any additional help. But, hey, if it's presented as part of the package then it would be silly not to use it. And unlike some other flight controllers that I have come across it's not built in so you can remove it and perhaps install it in another model where gyro stabilisation would be more appreciated.

All-in-all the FMS 750mm Edge 540 does exactly what it says on the tin (I've definitely been watching too much telly!) If you're looking for a small, nippy aerobat for some close in flying fun then this one is very worthy of your consideration. ✈





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*Vintage gliders can be vibrant too! John Minshell (left) and Mike Evans both love their colourful LO100 soarers.*



# MICK MOORE MEMORIAL FLY-IN

Simon Cocker motors to the top of the Long Mynd for another day of fine scale soaring

words & photos » Simon Cocker

**T**he Long Mynd in Shropshire delivered a perfect day to enable all scale sailplane enthusiasts to celebrate the long life of one of our own by flying heartily in his fond memory. The Mick Moore Memorial Fly-In was held on September 1st, 2019.

Mick, at the tender age of 79, finally ascended through the bubbling Cumulus Clouds on his final thermal in 2003 but his legacy lives on in his sailplane designs.

Mick's sailplane designs were all 1:5 scale and mostly based on an unusual German design or just quirky full size Eastern European subjects, which despite their diminutive size provided big fun and surprisingly effective performance.

Take the example of his IS-B Komar, which was a 1930s Polish single seat glider and bursting with character. The type was made famous in 1949 when Stanislaw Wielgus established a world record duration flight of 35 hours 14 minutes. I am certain there would have been stocks of Schnapps on board to keep him fortified!

Mick's prototype models still exist to this day and four of them were present, proudly flown by their worthy owners in Mick's memory, including the Helios and Rheinland, as you will see in the photos.

Mick was always a fun and witty personality, distinguishable on the slope in his dapper attire, a true gentleman and an upstanding character. His pilot figures were self-made using papier-mâché or 'bog paper' as he used to refer to them! They were distinctive cartoon style little fellas, always with a cigar hanging at a jaunty angle from the side of their mouths. Dick Dastardly and Mutley usually come to mind when I see these fine characters and I snigger to myself with the appropriate pronounced shoulder shrugs!

If you are fortunate enough at some point in your sailplane journey to own one of Mick's models you will find an inscription on the back of the canopy frame showing the date of the model's maiden flight and that of the full size first foray, which in the

case of the Rheinland owned by Mark Richards is 1936 and 1991 respectively.

I enjoyed flying with Mick on occasion when I was fresh to the scene and where Pole Cottage at the Mynd was the epicentre of all their soaring sorties. The late Dave Jones of QFI days was also a close friend of Mick's and I remember him speaking fondly of their collaboration through his wonderful magazine, sadly also long expired.

The emphasis of the day was to enjoy a tranny full of flying time and to thoroughly let our hair down to have fun indulging in the delights of silent soaring. Due to the perfect weather forecast Mick's event was blessed with a strong following, despite most of the model aviators having not the faintest idea who he was! By the end of the day the legacy of his pioneering contribution to the scale scene had filtered through to everyone, particularly when we all witnessed how well his sailplanes coped with the conditions.





All of these are Mick Moore built originals: Mark Richards with the Rheinland, Phil Smith with the quirky Helios and Pete Dutfield presenting the Komar.



Mick's Lunak in the foreground, back in the day when it was all pioneering stuff...



Mick Moore from an ancient photo in John Slater's archives. He looks stern, which he never was when flying.

## SIX UP

At times I thought that it may have been a little too buoyant for these lightweight airframes, but they were not to be confounded and soared on relentlessly. The lift was plentiful so there was always a scramble from the eagerly waiting group of model aviators to grab a flying slot the moment one of the aircraft already aloft announced a landing approach.

An essential safety protocol that we impose, even in the vastness of the flying arena of the Mynd lift basin, is a cap of just six models at any one time to minimise collision risks. Additionally, the pilots are encouraged to huddle together so that it is clear where to prescribe the space for crosswind passes and aerobatic manoeuvres. As all six model aviators were standing close and within easy ear shot the etiquette of announcing intended aerial manoeuvres could be clearly communicated before their execution. The airspace was, by this simple method, clearly allocated ahead

of time so that everyone knew each other's intentions and shifted their aircraft to a safe and clear spot out of the way. This worked perfectly all day, enabling high energy slope side displays from all types of sailplanes in both vintage and modern classes.

## MODEL HIGHLIGHTS

Rich Barley was campaigning his new Polish 5m span Orlik from 'Old Gliders', resplendent in its fresh red and white livery which conducted more low passes and rolls than the rest of the aircraft put together.

Mike Evans' all moulded 4.66m span 1:3.5 scale Pilatus B-4 from the KV Modellbau Company in CZ enjoyed himself immensely, cavorting around the lift fuelled skies with gay abandon. This lovely aircraft has proved to be a top-class performer in all but the most extreme conditions and has captivated Mike, one of the most discerning model pilots I know; to find him completely satisfied by a single sailplane design is a very rare occurrence indeed!



Rich Barley beams with delight after another stupendous flight and perfect landing with the Orlik.



Orlik is magic personified! Rich Barley enjoyed hours of sorties with this attractive 5m span glider.







**Stunning livery on the Pilatus B4 by Mike Evans. He flies it like he stole it, too!**



**35 Meg is still about and safer than ever due to 2.4 taking over.**



**Frank Skilbeck and Dave Keen with the enigmatic Sproule Camel that was like launching a coffin.**



**John Slater's LO150 just a second before it was released and not pushed aloft with enough power to make it fly. Workshop time is needed to make repairs.**

Frank Skilbeck and Dave Keen enjoyed a super day flying their array of aircraft, including the Spoule Camel, a tricky aircraft for those volunteered to launch the cumbersome machine. This boxy sailplane flies remarkably well at a constant airspeed. Dave also sported his HP-18, an ancient Pat Teakle rendition, which continues to deliver many happy soaring hours.

Father and son team, Les and John Hey, brought along their beautifully self-crafted

1:5 scale collection, which included a Skylark 2B, Swallow and a Bergfalke, which all flew well throughout the day.

The Clwyd Club was represented by the roving duo of Dave Worron and John Minshell, both avid supporters of the scale sailplane scene. Dave flew his Roedel KA-6 frequently, while John used the day to converse, interspersed with a flight or two with his lovely H-Modell DG-600 and colourful LO-100. John Slater brought along



**The Camel gets plenty of launch speed - VNE reached on release!**



**John Hey and his father Les with their lovely Skylark.**



**John Price lavished all his love on this Pat Teakle PIK 20.**

his scratch built LO-150, a stretched wingspan version of the type and which I keep offering to purchase as I find it so enigmatic. Unfortunately, I witnessed a launch calamity that rendered this special glider inoperative for the day and destined instead for some more love in the workshop.

Colin Waite and Neil Trickets were thrashing their Genesis almost tailless gliders, which are beautifully made using all the skill and talent that these gentlemen possess. It was a revelation to see the top end of their performance proving they are just as capable of high energy aeres as any conventionally designed sailplane.

John Price journeyed up from Reading to soak up the northern hospitality and he made a valid contribution to the proceedings with his exemplary example of a Pat Teakle original kit of the PIK 20. John had lavished his time and patience to produce an all-glassed finish, which was simply brilliant. Servos were neatly installed in the wings to offer crow braking so that Schemp Hirth scissor style airbrakes could be omitted. The light-weight airframe has proved to be most versatile, providing John with a very attractive all-round sailplane.





*John Hey alights the stunning PIK 20 flown by John Price, an ancient aircraft that looks brand new.*



*My mighty ASW15 passes by, loaded with energy. At 6m and 19kg she looks just like a real one.*



*Gull 3 is gently alighted by Pete Dutfield so Robbie Bridson can enjoy a calm thermal flight for an hour.*



*Keith Poulton enjoyed his Minimoa. They look so lovely in the sky too.*



*Busy pits was bustling with all types and eras of scale sailplanes - silent flight heaven!*



*Bob Aston with his new Valenta ASW20. His first fully moulded airframe and he loves it - a lot!*

Bob Aston joined the throng from deepest Abingdon in Oxfordshire, a delightfully warming character who has recently sold many of his beloved collection of Pat Teakle models to upgrade to an all moulded Valenta ASW-20. Close friend Andy Gough now enjoys Bob's ASW-20 and ASW-17, in addition to his own unique Vega, complete with its cheeky animated pilot figure, Vincent.

Bob spent the day test flying his virginal mouldie whilst tweaking his set up until his beaming face spoke volumes. We agreed that the Valenta Salto and the ASW-20 both require ballast provision to liven up their performance for the bigger air days. At the close of the day, when we had the sky entirely to ourselves, the ASW-20 was given a final test flight using the fully refined programme, which proved the model's exhilarating performance, convincing Bob of the outstanding pedigree of the design and his worthwhile investment.

I was delighted to launch my stunning rendition of the pretty ASW-15 that I have permanently bonded with. I thank John Hey for piloting my models while I take the responsibility of launching the asset, and for capturing some of the photos seen in these pages. At 40% scale and 19.5kg in mass, with a chunky disposition on its well loaded 6m wings, the Austrian made, all glassed ASW-15 is reassuringly sturdy, which ensures an unmissable presence in the skies. The way this model drives through the air is purposeful, yet unhurried, so it belies the quantity of energy it has amassed in its passing. This only becomes apparent when the model rises to the top of a vertical ascent and pivots effortlessly at the zenith of a huge stall turn. On the return journey back down the model reclaims its energy to drive low past the spectators before entering a corresponding stall turn at the opposite end of the slope edge, following which I announced 'clear' to my adjacent pilot friends, as the model vacated the airspace and traversed back out over the valley below to make way for the next display.







Up, up and away for the ASK-18 flown by Paul Renkovic, a model from the LCS CNC stable.

The advantage of size with mass in a scale model provides the opportunity to present a performance that is commensurate with its full-size counterpart and this in turn resonates with the scale purists who will be watching with a critical eye for fidelity and realism. It is also a completely compelling piloting experience to enjoy flying in this sympathetic scale style with a model that is so capable of the task. Yes, it is most definitely true that bigger is better!

Mark Richards and Phil Smith, with support from his Wolves Soaring Club mates, ran the low-key event in the usual format, where all attendees voted collectively for the best model in the modern and vintage classes. On this occasion a specially engraved glass had been made to commemorate Mick, with a plan sketch of the Helios neatly etched diagonally across half of its side area. On behalf of all of us who supported the event we applaud and thank the fine gentlemen from the Wolves Club for staging this wonderfully satisfying and fun day out for us all.

#### Modern Class Votes

1st	Colin Waite	Genesis 2
2nd	Simon Cocker	ASW 15
3rd	Paul Renkovic	Salto
4th	Mike Evans	Pilatus B4

#### Vintage Class Votes

1st	Richard Barley	Orlik 2
2nd	Robbie Bridson	Gull 3
3rd	Dave Worron	KA6
4th	Pete Dufield	Komar

#### NOGGIN END METALS

This company frequent the Cosford LMA show, amongst others, and I have browsed their staggering range of metals each time I have seen their displays of materials, wondering when I will need this resource.

Just recently, I bent the 16mm steel wing joiner bar that supports the wings of the mighty X-Models Stingray. After an afternoon of dynamic soaring at our usual slope in the Peak District, I came to derig the aircraft to find that the steel was reluctant to withdraw from the fuselage. There was a small degree of dihedral hindering the smooth use of the steel bar.

I decided to go for an upgrade in the tensional strength of the bar from what appears to be tool steel to silver steel, which contains higher carbon content. I appreciate that a degree of brittleness rather than flexing is the trade off between the two materials, however it is unlikely that a 16mm diameter bar is likely to snap on a 2.9m wingspan model. I appreciate that the brutality of the 'G forces' of dynamic soaring push the wing loading and torsion load on the joiner bar well beyond the original design parameters.

I ordered a new bar from Mike and Annette, together with a 20mm diameter stainless steel bar for a 6m span ASG-29 for a fraction of the cost of purchasing the items from the original manufacturers.

I had a close shave with a failing carbon wing joiner, which Topmodel CZ supply with their lovely Flip aerobatic electric powered glider. I bought this model recently through the BMFA classifieds, as it has always been on my list to try one someday.

The 8mm carbon wing joiner seemed a little puny, but the wings are quite slim. I figured that as the item was glued inside the fuselage joiner tube and the 2m span model is so light, I would just go with the flow.

The carbon rod had been degrading where it exits the side of the fuselage, an obvious position where the bending forces from the wings focus the loading stresses. The slithers of carbon inside of the core of the rod had fractured and this damage was spreading outwards, at which point a catastrophic failure would have unfolded. Luckily, I noticed the Flip had a wonky port wing angle shortly into the flight and before I began the usual array of aerobatics.

**8mm stainless steel upgrade - imperative if you have a TopModell Flip.**



Sure enough, the carbon was letting go at the wing root, with just half of the rod area working to retain the wing. I drilled out the remaining carbon and replaced it with an 8mm length of stainless steel from Noggin Ends, which is a stock item. The wings are now considerably more rigid, and I believe they will break now before I can manage to bend the steel bar. I would suggest, if you own this model, that you consider this simple and inexpensive upgrade. Mike will supply a replacement steel wing joiner for £3.75.

Do check carbon wing joiners regularly, particularly if they have been subjected to a shock loading or a crash. If in any doubt I would advise you to replace the item in steel from [www.NogginEnd.com](http://www.NogginEnd.com) rather than suffer the final injustice when it's all far too late.

For those of you having difficulty sourcing ballast tubes and slugs of round or square brass, you will be relieved to know Mike can make up a set for you at a realistic cost. The slugs will be roughly sawn rather than machined on a lathe, but they looked neat enough for my purposes.

A final thought on the subject of ballast for the many owners of the Valenta ASW-20 and Salto. I recall that I strapped several brass rectangular sections to the underside of the wing joiner box in the fuselage of the Salto as there is no wing mounted provision for any extra weight. Perhaps the rectangular carbon girder of a wing joiner could be replicated with steel box sections to the required dimensions and laminated to 1/16 ply spacers to make up the precise width? The hollow steel sections could then be filled with brass slugs to offer a range of weight to suit the wind strengths on offer. The ASW-20 requires an additional steel joiner bar to replace the carbon item and a ballast box installation to address this performance enhancing modification. Both these sailplanes then come alive on big air days and thanks to Valenta's generous wing structures a new level of performance for both aircraft can be fully exploited. *(Please note that if you try such modifications then you do so at your own risk - KC)*

Give Mike a call to discuss your needs on 01782 865428. You will find his knowledge and expertise a great asset.



Mike measures up his stock at Noggin End Metals.





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# GOING PLACES

## Diary dates for the coming season

### NOVEMBER 2019

**December 21 Indoor Flying** at Sutton St. Helens at Elton Head Road, WA9 5AU. From 1pm - 4pm. £12 per session on the day. Shockies not allowed, helis/quadcopters small 1S only. Any questions contact Eric Strefford on 07711 268699 or email [ericstrefford@gmail.com](mailto:ericstrefford@gmail.com)

**December 21 Tonbridge Cassers and Rubber Fanciers Indoor Flying** at King's Rochester Sports Centre, 601 Maidstone Road, Rochester, Kent, ME1 3QJ. From 6:30pm until 10pm – free flight and lightweight R/C timed flying sessions throughout the evening. Contact Steve on 0208 942 5000 or Eric on 01622 737814.

**December 22 Aberdeen and District Soarers Indoor Flying** at Jesmond Centre, Jesmond Drive, Bridge of Don, Aberdeen, AB22 8UR. Fixed and rotary wing. From 3pm - 5pm. All welcome, £5 to fly per session. See you there! Contact Chris Harper on 07786 428 735 for more details or visit [www.fly-ads.co.uk](http://www.fly-ads.co.uk)

**December 22 Indoor Flying** in the sports hall attached to Carre's Grammar School, Sleaford, Lincs, NG34 7DD (also known as Northgate Sports Hall). From 2pm - 4pm. Free car park, tables and chairs provided, lots of charging sockets - £5 per session. Proof of BMFA insurance required please. For more info contact Colin at [sleafordindoorflyers@gmail.com](mailto:sleafordindoorflyers@gmail.com)

### JANUARY 2020

**January 4 Fun Flying** at Chigwell School Sports Hall, High Road, Chigwell, London, IG7 6QF. For small models, all types, maximum wingspan 20". Flyers £10, spectators £2. For details contact Mike Quille on 0208 500 3549 or email [mp.quille@live.co.uk](mailto:mp.quille@live.co.uk)

**January 5 Indoor Flying** in the sports hall attached to Carre's Grammar School, Sleaford, Lincs, NG34 7DD (also known as Northgate Sports Hall). From 2pm - 4pm. Free car park, tables and chairs provided, lots of charging sockets - £5 per session. Proof of BMFA insurance required please. For more info contact Colin at [sleafordindoorflyers@gmail.com](mailto:sleafordindoorflyers@gmail.com)

**January 11 Waltham Chase Aeromodellers Indoor R/C Meeting** in the Main Hall at Havant Leisure Centre, Civic Centre Road, Havant, Hants PO9 2AY. From 7pm to 10pm. Admission £7 for fliers, £1 for spectators, junior fliers, accompanied children admitted free. Flyers will be required to show proof of insurance. Event supported by the BMFA Southern Area. For further details please contact Alan Wallington on 01489 895157 or email [WCAero@outlook.com](mailto:WCAero@outlook.com)

**January 11 Indoor Flying** At Sutton St. Helens, Elton Head Rd, WA9 5AU, Merseyside. From 1pm - 4pm. Cost £80 for September - April is payable in advance or £13 per session on the day. Shockies not allowed, helis and quadcopters small 1S only. Any questions contact Eric Strefford on 07711 268699 or email [ericstrefford@gmail.com](mailto:ericstrefford@gmail.com)

**January 12 Aberdeen and District Soarers Indoor Flying** at Jesmond Centre, Jesmond Drive, Bridge of Don, Aberdeen, AB22 8UR. Fixed wing and rotary wing. From 3pm - 5pm. All welcome, £5 to fly per session. See you there! Contact Chris Harper on 07786 428 735 for more details or visit [www.fly-ads.co.uk](http://www.fly-ads.co.uk)

**January 12 BMFA South West Area Indoor Flying** at Saints Health & Fitness Centre at St Austell Rugby Club, Tregorrick Park, St Austell, Cornwall, PL26 7FH. From 12noon to 4pm. Free flight and micro R/C. Contact David Powis on 01579 362951 or [dave\\_powis@hotmail.com](mailto:dave_powis@hotmail.com)

**January 14 Waltham Chase Aeromodellers Indoor FPV Meeting** in the Meon Room at Wickham Community Centre, Mill Lane, Wickham, Hants, PO17 5AL. From 7pm to 9.30pm. Admission £4 for fliers and £1 for spectators, accompanied children free. Junior fliers charged as adult spectators. Flyers will be required to show proof of insurance. Multicopters limited to a maximum weight of 95g in flight trim, including battery (not to exceed 2S LiPo) and a motor to motor diameter not exceeding 6". Helicopters and fixed-wing models may not be flown. For further details please contact Alan Wallington on 01489 895157.

**January 17-19 The London Model Engineering Exhibition 2020** at Alexandra Palace, London. Over 50 clubs and societies displaying their members work and competing to win the prestigious Society Shield. In total, nearly 2000 models will be on display. Organisers expect to welcome the return of the British Model Flying Association, Tamiya Trucking Group, Brickish, The Imagineering Foundation and the Polly Owners Group who provide passenger rides behind the 5" gauge steam locomotives within the Great Hall. Open 10am - 5pm Friday and Saturday and 10am - 4.30pm Sunday. Last entry is 4pm Friday and Saturday and 3pm Sunday. For full details visit [www.londonmodelengineering.co.uk](http://www.londonmodelengineering.co.uk)

**January 18 Tonbridge Cassers and Rubber Fanciers Indoor Flying** at King's Rochester Sports Centre, 601 Maidstone Road, Rochester, Kent, ME1 3QJ. From 6:30pm until 10pm – free flight and lightweight R/C timed flying sessions throughout the evening. Contact Steve on 0208 942 5000 or Eric on 01622 737814.

**January 19 Indoor Flying** in the sports hall attached to Carre's Grammar School, Sleaford, Lincs, NG34 7DD (also known as Northgate Sports Hall). From 2pm - 4pm. Free car park, tables and chairs provided, lots of charging sockets - £5 per session. Proof of BMFA insurance required please. For more info contact Colin at [sleafordindoorflyers@gmail.com](mailto:sleafordindoorflyers@gmail.com)

**January 25 NW Area Scale R/C Indoor Taster/Teach-in** at Sutton St. Helens, Elton Head Rd, WA9 5AU, Merseyside. Indoor R/C flying, RTF and scratch-built models only. To help indoor R/C fliers to get the best out of flying indoors including comp advice. £10 fee. A team of experienced Indoor R/C Scale competitors on hand to give advice on flying in a scale-like manner. If you have thought about entering Indoor R/C Scale Nationals but think it is beyond your capabilities, then come along have a go before making a decision. From 1pm - 4pm. Any questions contact Eric Strefford on 07711 268699 or email [ericstrefford@gmail.com](mailto:ericstrefford@gmail.com)

**January 26 Aberdeen and District Soarers Indoor Flying** at Jesmond Centre, Jesmond Drive, Bridge of Don, Aberdeen, AB22 8UR. Fixed wing and rotary wing. From 3pm - 5pm. All welcome, £5 to fly per session. Contact Chris Harper on 07786 428 735 for more details or visit [www.fly-ads.co.uk](http://www.fly-ads.co.uk)

**January 28 Waltham Chase Aeromodellers Indoor R/C Small Models Meeting**, Main Hall at Wickham Community Centre, Mill Lane, Wickham, Hants PO17 5AL. From 7pm to 9.30pm. Models limited to a max weight of 95g for fixed wing aircraft in flight trim, including battery (not to exceed 2S LiPo). Helicopters limited to a rotor diameter of 12". Admission £5 for fliers, £1 for spectators and junior fliers, accompanied children free. Flyers will be required to show proof of insurance. For further details please contact Alan Wallington on 01489 895157 or email [WCAero@outlook.com](mailto:WCAero@outlook.com)



**January 31** **We Fly Indoors**, at the Weatherly Centre, Eagle Farm Road, Biggleswade, Bedfordshire, SG18 8JH. From 6.30pm till 10pm, door open at 6.15pm. Free flight - Hangar Rat, Gyminnie, Easy Bee or similar. Electric fixed wing - Vapor, lightweight slo-fly style. Heli's - MSR style etc. max rotor 410mm, quads max overall 200mm diagonal. Shockies 500mm max size. All models at organiser's discretion. Flying in approx 10-15 minute sessions. BMFA insurance to be shown. Admission £5, spectators 50p; includes tea/coffee and biscuits. Good access from north and south on A1, venue is next to Stratton Upper School, good parking by venue. Queries to Andrew on 07974 800463 or email andrewleftwich@virginmedia.com

## FEBRUARY 2020

**February 1** **Fun Flying** at Chigwell School Sports Hall, High Road, Chigwell, London, IG7 6QF. For small models, all types, maximum wingspan 20". Flyers £10, spectators £2. For details contact Mike Quille on 0208 500 3549 or email mp.quille@live.co.uk

**February 2** **Indoor Flying** in the sports hall attached to Carre's Grammar School, Sleaford, Lincs, NG34 7DD (also known as Northgate Sports Hall). From 2pm - 4pm. Free car park, tables and chairs provided, lots of charging sockets - £5 per session. Proof of BMFA insurance required please. For more info contact Colin at sleafordindoorflyers@gmail.com

**February 8** **Indoor Flying** At Sutton St. Helens, Elton Head Rd, WA9 5AU, Merseyside. From 1pm - 4pm. £13 per session on the day. Shockies not allowed, helis and quadcopters small 1S only. Any questions contact Eric Strefford on 07711 268699 or email ericstrefford@gmail.com

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## MARCH 2020

**March 1** **Indoor Flying** in the sports hall attached to Carre's Grammar School, Sleaford, Lincs, NG34 7DD (also known as Northgate Sports Hall). From 2pm - 4pm. Free car park, tables and chairs provided, lots of charging sockets - £5 per session. Proof of BMFA insurance required please. For more info contact Colin at sleafordindoorflyers@gmail.com

**March 7** **Fun Flying** at Chigwell School Sports Hall, High Road, Chigwell, London, IG7 6QF. For small models, all types, maximum wingspan 20". Flyers £10, spectators £2. For details contact Mike Quille on 0208 500 3549 or email mp.quille@live.co.uk

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# INVADER OUTDOORS

Arnaldo Correia equips his newly-electrified vintage towline glider with a full-time tailplane and explores the great outdoors

words » Arnaldo Correia | photos » Arnaldo & Bruno Correia



*Pre-launch, before dispatching Invader into the ether.*



*The light wind was coming from the small wooded hill in the background, which increased the turbulence.*



*Invader climbs away.*

In the November 2019 issue of RCM&E, I described my conversion of Keil Kraft's Invader towline glider to electric power. With the weather refusing to yield, test-flights were made in the still air of a handball gym using a rudder/elevator tailplane mock-up built from 3mm and 6mm Depron after my desire to use tailerons had failed. The model flew beautifully, being both well-mannered and responsive, giving me the confidence to build the definitive tailplane using the laser-cut balsa parts supplied with the kit as much as possible.

## BACK TO BALSA

I didn't like the building method proposed in the instructions, as it seemed prone to inducing warps. I could have raised the leading L.E. and T.E. on scrap balsa to help overcome this but preferred instead to use a trick I learned when building wings with a symmetrical wing section. The ribs are cut in two lengthwise and then built as a flat-bottomed sub-assembly. This is then lifted from the building board and the cut pieces carefully glued back in place to finish. This is easier to do than it sounds, and the resulting structure should be dead straight.

In my eagerness to take the pictures, I made a mistake. Rather than adding them later, it would have been easier if I'd incorporated the false T.E.'s while the tailplane was still on the bench. If you intend to make a similar conversion, building the tailplane flat, add the false T.E.'s whilst the assembly's still on the bench, then add the previously cut-off rib sections, plus another, thinner strip to complete the T.E. after lifting the tailplane halves from the bench. It will be easier that way.

Rather than make built-up structures I prefer to cut elevators from sheet balsa, as they seem to be less prone to warp. Also, I feared that the

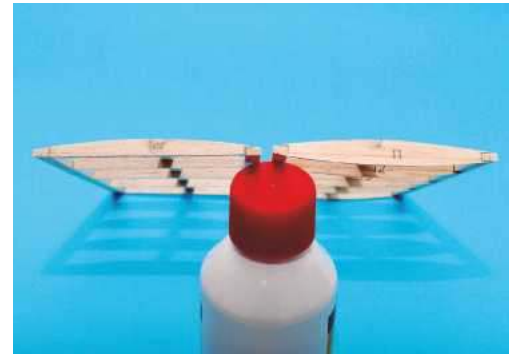




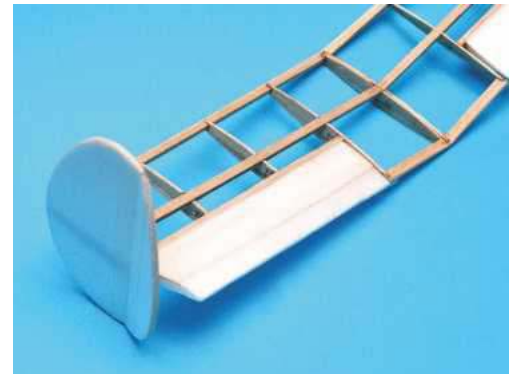
**“The model flew beautifully, being both well-mannered and responsive”**

Invader's 1.5mm balsa rudders might twist in the slipstream. To save weight I used Depron for both, carving the elevators from a 10mm thick block, and the fins and rudders from 3mm sheet. Even so the built-up tailplane ended up weighing 0.17oz (4.9g) more than the Depron mock-up when finished.

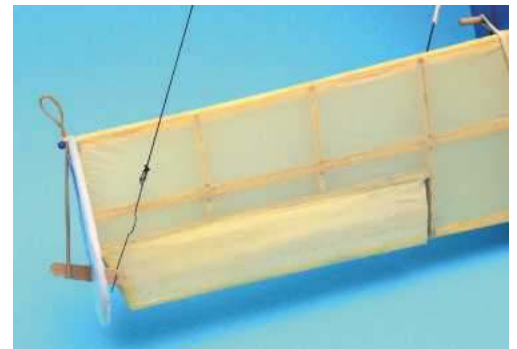
The control surfaces were hinged using 3M Magic Tape, the stabiliser being covered with Litespan after the elevators had been hinged. The rudders are 1" (25mm) wide at their widest part, the elevators being 1-1/4" (32mm) wide nearer the fuselage and 1-1/8" (28mm) wide near the tip.



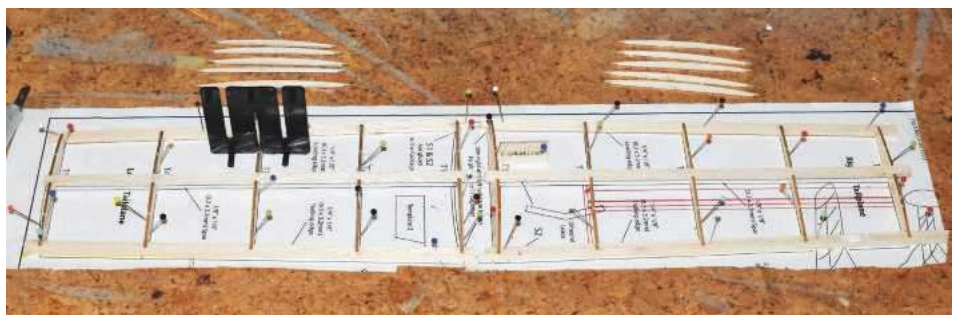
*On the right half, the cut off lower ribs have been glued back in place.*



*Uncovered tailplane with fins and rudders temporarily added for the photo. Control surfaces are hinged with 3M Magic Tape.*



*Rudder pull-pull system. A 0.3mm piano wire spring can be used instead of the rubber band, if preferred.*



*To ease construction, I cut the tailplane ribs in two lengthwise, effectively turning them into flat-bottom sections. It's best to add the false T.E.'s at this stage.*

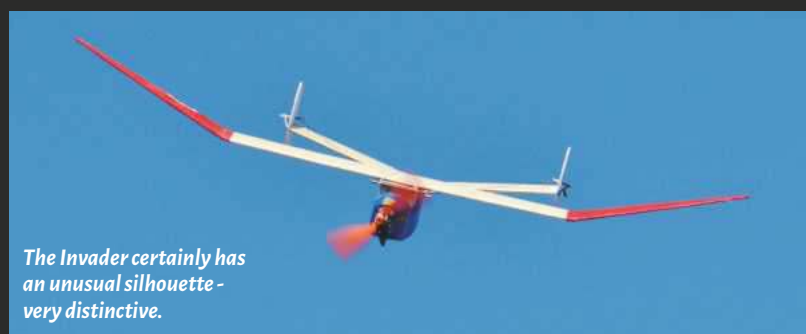
“If you like Old Timer models this kit is definitely worth considering.”



*Searching for thermals as the sun shines through the translucent covering.*



*It's definitely a fair-weather flyer!*



*The Invader certainly has an unusual silhouette - very distinctive.*

Regarding the rudders, if you don't like the rubber band tensioners idea, you can use another old A1 glider trick. Instead of rubber bands, make a torsion bar spring from 0.3mm piano wire (as used to make flying cables for C/L team racing and speed). The rubber bands will need regular replacing while the springs should outlast the model. I would have preferred to use torsion bars but despite having some 0.3mm wire somewhere, I couldn't find it... Rubber bands it is, then!

Talking of rubber bands, although I used some to secure the tailplane I did smear a little UHU POR between part S2 and the fuselage, just enough to keep the tailplane from moving sideways. The rubber bands are still needed to secure it in place, and should you need to separate the tailplane from the fuselage freeing the glue joint shouldn't be too difficult to do. Although the rubber bands are okay on their own for free flight, with R/C the last thing you need is a wandering neutral!

#### WEIGHING UP

Compensating for the heavier tailplane meant adding 0.35oz (10g) of ballast in the nose, the model's AUW increasing from the previous 5.5oz (0.15kg) with the 2S 500mAh battery to 6.1oz (0.17kg), for a wing loading of 5.7oz/sq. ft. (1.7kg/sq. m.)

#### OUT AND ABOUT

The wind eventually subsided enough to fly the Invader outdoors in what seemed to be a steady, light wind. However, the weather was

hot, and the small wood covered hill upwind meant there was plenty of turbulence about. Like any other lightly loaded model the Invader likes to be flown in calm air, but it rode the turbulence well enough.

The model thermals easily. My son pointed out a couple of what looked like red kites circling high overhead, so I put Invader into the same rising air, and it started to climb. But I quit this powerful thermal well before the Invader reached the birds' altitude as I didn't wish to upset them! On the way down I tried a loop, which due to the turbulence wouldn't have got any judges very excited - but, more importantly, the wing held in place!

While the 8° down-thrust suggested in the last article is okay for flying at half-throttle more is required for full throttle and, in windy conditions, more throttle is needed so that the model can penetrate. Consequently, a couple of degrees of additional down-thrust are required, or a down-trim mix with throttle to compensate (I went the latter route).

#### GO GET

If you like Old Timer models this kit is definitely worth considering. For a small investment you'll get a very distinctive model that will give a lot of pleasure, both when building and flying.

At 40" (1016mm) span the Invader's not huge and it is light, too, so it's definitely a fair-weather flyer. It will handle some wind, but really looks its best flying in little-to-no wind situations, searching for thermals as the sun shines through translucent covering,

reliving the days of youth when we were fit enough to chase a free-flight model like this one all over the place. But now, thanks to lightweight R/C, those flights need not finish up in the next field - or beyond! ✈



*If you intend using full power on a regular basis you may want to increase down-thrust beyond the initially suggested 8°.*



*Landing in my summertime grass stubble flying field shows the reason why I'm so fond of Solarfilm Litespan!*



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# NEXT ISSUE

## RAZORBACK

Brian Wood is a noted scale modeller who impresses every year at the BMFA Scale Nats. His superb Thunderbolt spans 92" and is powered by a Saito FG 90 R3 radial engine. Brian scaled up the famous Brian Taylor Thunderbolt plan by 25% to arrive at his choice of 1.53:1. Alex Whittaker takes a close look at the big Jug, which took 18 months to complete.



## FREE PULLOUT PLAN!

### TWIZZLE

One of two free pull-out Pro-Plans in the next issue, Twizzle is a 950mm (37.4") span sports aerobatic electric model with a distinctive shape. Designed by Mike Freeman it provides a traditional and enjoyable build from balsa and ply, which assembles into a small, compact model to stash away in the car for impromptu trips to the patch or for taking on holidays.



### CURTISS HS-2L

Having spent a couple of months searching for a new scratch-build subject, Jon Harper finally settled on the Curtiss HS-2L, which initially served as a sub hunter during WWI. A number of the surviving aircraft were sold to Lauretide and took on the role of Canada's first bush planes, landing deep in inaccessible back country and flying from lake to lake.



### SLOPE SOARING SABRE

In the first PSSA F-86 article in the December issue we looked at the main part of the Sabre's construction, up to the point where it was almost ready for covering. Gordon Studley takes over from Martin Gay to complete their construction blog by finishing the jet style glider and describing the Sabre's flying characteristics.

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# PARTING SHOT



## CRUMPLE ZONE

Alex Whittaker sent in this dramatic shot of the final moments of a large scale aerobatic model. Alex told us that, thankfully, no-one was nearby. He was the closest, but it must have been a bit of a shock seeing this poor model disintegrate through his viewfinder!

**Photo:** Alex Whittaker

**Camera:** Canon EOS-1D X

**Aperture:** f/14

**Focal Length:** 170mm

**Shutter Speed:** 1/1328

**Lens:** Canon EF100-400mm

f/4.5-5.6L IS II

**ISO:** 2500

### P-47D THUNDERBOLT 'TARHEEL HAL'

NEW  
.46 SIZE



VQA142DT

Wingspan: 1500mm (59in)

Length: 1215mm (47.8in)

GLOW/NITRO ELECTRIC

£179.95

### JUNKERS JU-52 'OLYMPIA'

.20 SIZE



VQA113

Wingspan: 1630mm (64.1in)

Length: 1070mm (42.1in)

ELECTRIC

£164.95

### HAWKER HURRICANE (SEA HURRICANE)

.46 SIZE



VQA041-G

Wingspan: 1486mm (58.5in)

Length: 1148mm (45.2in)

GLOW/NITRO ELECTRIC

£159.95

### YAK-9 (SOVIET)

.46 SIZE



VQA055

Wingspan: 1520mm (59.8in)

Length: 1237mm (48.7in)

GLOW/NITRO ELECTRIC

£159.95

### PIPER PA-18 SUPER CUB

.46 SIZE



VQA0831

Wingspan: 1620mm (63.7in)

Length: 1250mm (49.2in)

GLOW/NITRO ELECTRIC

£149.95

### SUPERMARINE SPITFIRE

NEW  
.46 SIZE



VQA158

Wingspan: 1540mm (60.6in)

Length: 1230mm (48.4in)

GLOW/NITRO ELECTRIC

£199.95

### DOUGLAS DC-3 'LUFTHANSA'

.25-.35 SIZE



VQA129

Wingspan: 1800mm (70.8in)

Length: 1200mm (47.2in)

GLOW/NITRO ELECTRIC

£199.95

### P-51B MUSTANG 'BERLIN EXPRESS'

NEW  
.46 SIZE



VQA06BEX

Wingspan: 1524mm (60in)

Length: 1189mm (46.8in)

GLOW/NITRO ELECTRIC

£169.95

### BEECHCRAFT BARON (US)

.30 SIZE



VQA157US

Wingspan: 1760mm (69.2in)

Length: 1210mm (47.6in)

GLOW/NITRO ELECTRIC

£219.95

### FOCKE-WULF FW-190D9

.46 SIZE



VQA0452

Wingspan: 1500mm (59in)

Length: 1092mm (43in)

GLOW/NITRO ELECTRIC

£149.95

### TIGER MOTH DH-82 (CAMO)

.46 SIZE



VQA139CA

Wingspan: 1400mm (55.1in)

Length: 1180mm (46.4in)

GLOW/NITRO ELECTRIC

£186.95

### PIPER PA-22 TRI-PACER

.46 SIZE



VQA089

Wingspan: 1620mm (63in)

Length: 1210mm (47.6in)

GLOW/NITRO ELECTRIC

£149.95

### TIGER MOTH DH-82 (YELLOW)

NEW  
.46 SIZE



VQA139Y

Wingspan: 1400mm (55.1in)

Length: 1180mm (46.4in)

GLOW/NITRO ELECTRIC

£196.95

### P-39 AIRACOBRA

.46 SIZE



VQA09

Wingspan: 1580mm (62in)

Length: 1160mm (45.6in)

GLOW/NITRO ELECTRIC

£159.95

### AT-6 TEXAN (BLACK)

.46 SIZE



VQA02

Wingspan: 1540mm (60.5in)

Length: 1030mm (40in)

GLOW/NITRO ELECTRIC

£149.95

### TIGER MOTH DH-82 (RED)

.46 SIZE



VQA139R

Wingspan: 1400mm (55.1in)

Length: 1180mm (46.4in)

GLOW/NITRO ELECTRIC

£186.95

### P-38 LIGHTNING (OLIVE)

.46 SIZE



VQA026

Wingspan: 2100mm (82.6in)

Length: 1460mm (57.4in)

GLOW/NITRO ELECTRIC

£579.95

### SBD-5 DAUNTLESS

.46 SIZE



VQA120

Wingspan: 1540mm (60.6in)

Length: 1060mm (41.7in)

GAS/PETROL ELECTRIC

£174.95

### DHC-2 BEAVER 'KENMORE AIR'

.46 SIZE



VQA064

Wingspan: 1618mm (63.7in)

Length: 1115mm (43.9in)

GLOW/NITRO ELECTRIC

£159.95

### P-47D THUNDERBOLT (CAMO)

.46 SIZE



VQA142DC

Wingspan: 1500mm (59in)

Length: 1215mm (47.8in)

GLOW/NITRO ELECTRIC

£179.95

### TOMHAWK

.46 SIZE



VQA023

Wingspan: 1370mm (54in)

Length: 1520mm (60in)

GLOW/NITRO ELECTRIC

£159.95

### ZLIN 526 ACROBAT (RED/BLUE)

.46 SIZE



VQA153SW

Wingspan: 1610mm (63.4in)

Length: 1190mm (46.8in)

GLOW/NITRO ELECTRIC

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## F6F HELLCAT

.46 SIZE



VQA121

**Wingspan:** 1600mm (60.4in)

**Length:** 1130mm (44.5in)

**GAS/PETROL** **ELECTRIC**

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## T-34C TURBO MENTOR

.46 SIZE



VQA137R

**Wingspan:** 1560mm (61.4in)

**Length:** 1170mm (46in)

**GAS/PETROL** **ELECTRIC**

**£164.95**

## GIANT STICK

(RED)

.60-.90 SIZE



VQA061R

**Wingspan:** 1940mm (76.3in)

**Length:** 1460mm (57.4in)

**GLOW/NITRO** **ELECTRIC**

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## SIAM MARCHETTI

SF-260 (GERMAN)

.60-.90 SIZE



VQA143GE

**Wingspan:** 1640mm (64.5in)

**Length:** 1200mm (47.2in)

**GLOW/NITRO** **ELECTRIC**

**£199.95**

## HAWKER HURRICANE

'BATTLE OF BRITAIN'

.60-.90 SIZE



VQA040-N

**Wingspan:** 1610mm (63in)

**Length:** 1290mm (50in)

**GLOW/NITRO** **ELECTRIC**

**£199.95**

## FOCKE-WULF FW-190A

.60-.90 SIZE



VQA051

**Wingspan:** 1610mm (63in)

**Length:** 1220mm (48in)

**GLOW/NITRO** **ELECTRIC**

**£199.95**

## PIPER PA-18 SUPER CUB

(AUSTRIA)

30CC



VQA085

**Wingspan:** 2710mm (106.6in)

**Length:** 1720mm (40in)

**GAS/PETROL** **ELECTRIC**

**£374.95**

## SBD-5 DAUNTLESS

30CC



VQA132

**Wingspan:** 2060mm (81in)

**Length:** 1450mm (57in)

**GAS/PETROL** **ELECTRIC**

**£499.95**

## PILATUS PC-6 PORTER

(BIRD)

30CC



VQA124

**Wingspan:** 2170mm (85in)

**Length:** 1560mm (61.4in)

**GAS/PETROL** **ELECTRIC**

**£254.95**

## F8F RARE BEAR

30CC



VQA135RB

**Wingspan:** 2020mm (79.5in)

**Length:** 1540mm (60.6in)

**GAS/PETROL** **ELECTRIC**

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