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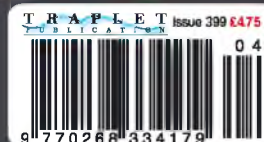


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APRIL 2017 • ISSUE #399



## FRONT COVER

Specialised model types come in cycles in the R/C hobby. The latest developments, hot on the heels of drones, are 'Vertical Take Off & Landing' aeroplanes. With the new E-flite Convergence, Horizon Hobby have developed a very practical and easy to fly VTOL model. Convergence combines jet-style good looks and nimble aerobatic capability, all wrapped up in a compact delta wing package. Read our full review, starting on page 16

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It is 16 years since David James last wrote about the Wessex Scale League. Last year marked the 44th anniversary of the WSL's foundation and much has changed since then, with plenty of electric powered entrants, although glow and petrol powered models still dominate – just!

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Bill Bowne has designed this stand-off scale model of the PT-19, which he simplified to save weight and reduce complexity. So whilst the aeroplane is recognisably a PT-19 it isn't a competition scale model but rather builds into an easy to fly 4-channel EP sport scale type



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In the first part of a short series, John Bristow from Deluxe Materials writes about the history and uses of popular types of model adhesives, starting with bone, hide and fish glues, then balsa cements, before moving on to modern synthetic adhesives for specialist applications



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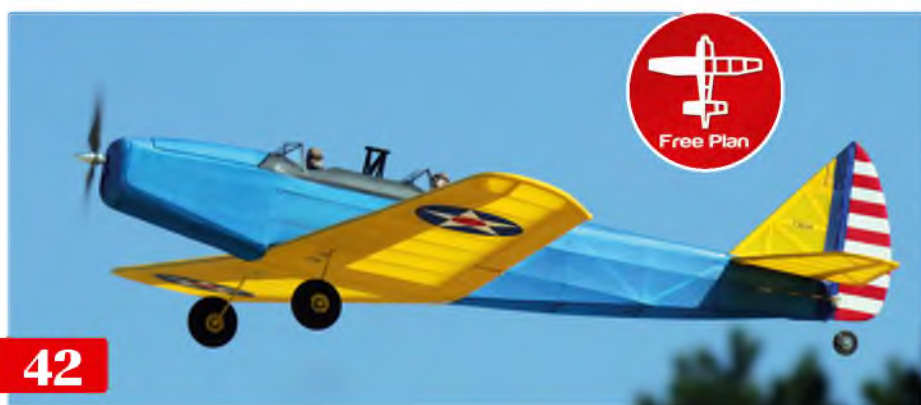
In recent years multirotors have dominated the R/C hobby halls at the famous Nuremberg Toy Fair, reducing its appeal to several well known model companies, who did not exhibit this year. Despite this there are many new model aeroplanes to show you – and a handful of drones too!



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# Pre-flight

**W**elcome to the April issue of RC Model World. A small team from Traplet have just returned from the Nuremberg Toy Fair and it's probably fair to say that this former 'must do' event in the R/C model hobby calendar has lost its appeal somewhat. It's still a massive event for the toy trade in general and one cannot help but be impressed by all the colourful and innovative products on display as you pass through several adjoining 'halls' on your way to the R/C model hobby area. But once there, as an R/C model aircraft enthusiast, your heart does sink a bit to see stand after stand of largely drone related products, with a fair smattering of empty stand space in between.

It didn't happen overnight of course and the trend towards multirotors has been developing for a number of years. But this year our team soon became aware of the absence of some regular exhibitors who have a great deal of influence on R/C aircraft products sold in the UK, and Europe too.

Mind you, we can't really blame players in the global R/C industry for wanting to get a slice of the drone market. According to the Federal Aviation Authority, the US equivalent of the Civil Aviation Authority, the combined total of drone sales for hobbyist and commercial use are expected to rise from 2.5 million in 2016 to 7 million in 2020! And that's just in the United States of America alone...! The global total must be truly staggering! (It also begs a question about the piloting abilities of some of the people that these aircraft are sold too, even if just a tiny fraction don't have their wits about them, but that's for another time...)

Personally, I have conflicted feelings about drones and all the issues that come with them. I've said often enough that I enjoy flying all types of R/C model, whether it's got wings or rotor blades, and that includes multirotors too. But fixed wing model aircraft are still my first love and it's worrying to see their once dominant status at such an important show as the Nuremberg Toy Fair being diminished to such a degree.

However, there will always be companies that are willing to buck the trend and it's most pleasing to see that one of the most long-lived and famous company's in R/C modelling is still willing to put on a big stand to display their new model aircraft kits – especially as they are British too! Kudos then to Ripmax for providing a focus for this year's Nuremberg show report, which you will find later in this month's magazine. Thanks to their new products, plus a selection of other new aircraft seen around the show, I've been pleasantly surprised at the number of aeroplanes that we've been able to find for our Toy Fair report. Please enjoy it as I'm not entirely sure that we will be repeating the exercise any time soon!

Other than the Nuremberg Toy Fair, what else have we got to offer you this month? Quite a lot as it happens, starting with a review of a new VTOL model from E-flite, the Convergence. (It's interesting to note that such models wouldn't be possible without drone technology, but let's not go down that route again...!) We also test out a new, crowd-funded safe charging box, the Bat-Safe, which should put your mind at rest a bit when putting some oomph back into your LiPo packs.

Our two scale mini-series come to an end this month as both the Cri-Cri and Druine Turbulent take to the skies. In their place we begin a new series on model adhesives, written by glue chemistry expert John Bristow, starting with a look back at the history of the glues that have been used for aeromodelling over past decades. Scale buffs still get a tasty treat though as we look back over the 2016 flying season with participants in the Wessex Scale League.

This month's free pull-out plan is for a sport scale version of the Fairchild PT-19. Designed for 3S battery packs it's just the right size for taking to the flying field for some relaxed flying in the summer months ahead. If e-soaring or slope soaring is more your thing then T-Bird, our feature plan, is sure to appeal, especially as it offers something a little bit different to the norm with its gull-wings and T-tail layout.

Plenty then, I hope, to keep you entertained for a wee while. So until next time...

Happy flying!

**Kevin**



## Kevin Crozier

Editor | Radio Control Model World

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# Take Off R/C News and Views

If you have any news or special interest announcements to make, or even a recently completed RCMW plan design, then why not drop RCMW a line or email [RCMW@traplet.com](mailto:RCMW@traplet.com)

## Super Lightning Mix-up



Colin Loveday writes in with a caption correction regarding the late Terry Westrop's article on classic aerobatic models in our January issue:

"Hi Kevin.

*The error occurs in the feature 'Aerobatics As It Once Was'. Due to the sad and untimely passing of the author, Terry Westrop, he can't be advised. However, I can advise you. At the top right hand corner of page 73 there is a photo of a Flair Super Lightning, base colour white with red and blue trim. The caption attributes the model to Paul Saxby, however this particular model was flown by my son, Adam Collins.*

*Paul did fly a Super Lightning but his was all blue and no photo of Paul's model appears in the feature.*

*I bought the airframe for Adam's model from eBay for £30. It was quite old and in bad shape, requiring much TLC to bring it back to life. The original all red covering was removed, repairs made and its new Solarfilm and Solartrim applied. The photo shows a fixed tail dragger undercarriage and power is from a .60 size ASP."*

Our sincere apologies to Adam, Paul and you too, Colin for the error in the Super Lightning caption. And congratulations for giving this great looking aeroplane another lease of life.

## Nought Percent Cri-Cri?

Stuart Crooks has written in with an environmental take on the Cri-Cri series we are currently running:

"Dear Kevin

*The feature on the Cri-Cri in the February RCMW was very interesting. I am a 100% electric convert and currently have about 40 models in my hangar. However, I must point out that electric models, or cars for that matter, are not 0% CO2. I know the press and I guess some ignorant politicians would have us believe they are but at least 50% of our electricity is still generated by burning fossil fuels such as gas and coal. The rest comprises nuclear 21%, renewables 25% and a little is imported. Burning fossil fuels generates carbon dioxide so when we charge our LiPos over 50% of the energy we use is associated with fossil fuel. I*

## Traplet Open Scale – Fabulous Fourth Year!

For the fourth year in a row the Traplet Open Scale competition will be running again in 2017 thanks to the help of Pontefract and District Aeromodellers in Yorkshire and new hosts, the Wirral Radio Control Flying Society near Birkenhead.

The Wirral event is part of their Alf Witherup Scale competition, which will be in its 10th year in 2017; Alf was a renowned scale enthusiast, builder and judge. As an added attraction catering will also be provided.

The rules are simple: you have to fly four compulsory, non-aerobatic manoeuvres (including take-off and landing), to be performed with further options from a choice of 18. Which means non-aerobatic models can compete on equal terms with aerobatic models.

A generous range of prizes, including Traplet magazine subscriptions, plans vouchers and a complete Traplet wood pack and plan for the overall winner are up for grabs, making it well worth the



effort of getting out of bed. The only requirement is that the plane is a recognisable version of a full size fixed-wing aircraft. There is no builder of the model rule and the winner will be the person who flies in the most authentic fashion.

All pilots must have a BMFA 'A'/SAA Bronze certificate. Pilots of models weighing over 7 kg need a BMFA 'B'/SAA Silver certificate to fly at either event.

The venues are Pontefract and District Aeromodellers site (WF8 4QD) on Sunday, May 14th and the Wirral RCFS (CH49 5LN) on Sunday, July 9th. Pontefract starts at 10 am and Wirral starts at 10.30 am. Flying schedules and further information for both events can be obtained by contacting Peter Maw at: [petermaw@outlook.com](mailto:petermaw@outlook.com)

## Bwlchfest 2017



Bwlchfest 2017 is a two day event being held over the 10th and 11th June, 2017 at the Bwlch, which is situated about a 15 minute drive north of J36 Sarn Services of the M4, and between Nantymoel and Treorchy in South Wales. It is a casual 'Fly for Fun' event for all types of slope glider, be they foamy, crunchie, mouldy, F3F, sport, scale, PSS etc.

Event organiser, Steve Houghton informs us that there has already been a lot of interest, with people coming from all over

the UK, as well as Germany and Slovenia. Each day's event will begin at 10 am with a welcome/safety chat and goes on until there isn't enough light to fly by. You can get a better idea of the event and its location by watching Steve's tongue in cheek trailer: [youtu.be/ACNMOS018GI](http://youtu.be/ACNMOS018GI)

Steve writes:

*"Information on Bwlchfest 2017 is available directly from myself (steve.houghton59@gmail.com) or the Facebook Group page 'Slope Soaring in Wales', for which an event has been set up, and also my blog at the link below."*

[A470soaring.blogspot.co.uk](http://A470soaring.blogspot.co.uk)

*believe in Scotland, where I live, whilst we have a lot of wind turbines, we are still building coal fired power stations and, of course, shutting down the nuclear ones. When it's too windy the government pays to shut down the turbines!*

*I like your magazine though but I do buy three others as well. They are my favourite reading matter."*

Thank you for your message, Stuart and we are glad that you are enjoying reading John Higgins' articles and support so many model magazines.

As he was building a true scale model he was a bit stuck with the 0% CO2 logos on the motor pods as they appear in this way on the full size machine. You can see them clearly on this video:

[www.youtube.com/watch?v=Zs4lpWv90L8](http://www.youtube.com/watch?v=Zs4lpWv90L8)

It's an interesting point that you make though, although I'm sure most modellers turn to electric power out of pure convenience and for keeping their models free from exhaust oils rather than any environmental considerations, rightly or wrongly.



# English Electric Models

EEM is a relatively new UK kit manufacturer. We asked John Simpson to let us know a little more about the company and its products:

*"English Electric Models is a small design house run by enthusiasts. As the name suggests we specialise in kits of classic jets of the 1950s and 60s for EDF, starting with our first part kit, the Canberra 50.*

*This is a Canberra B(1)8 sized for 50 mm EDF units. At 44" wingspan it has a generous wing area but still allows for a practical one piece model that goes in the back of the car.*

*We are putting a lot of effort into the precise design of components, which slot together to rapidly create a strong and accurate frame.*

*Construction is mainly balsa and ply with innovative use of jigging and carbon tube reinforcement to optimise strength and weight.*

*The result is an accurately aligned structure that is a pleasure to build and flies beautifully.*

*Comprehensive plans and instruction notes are included to guide you through every step of the build.*

*Canberra 50 will be followed soon by its bigger brother, Canberra 70, and other English Electric twins (and products of the occasional other full size manufacturer!), yet to be revealed."*

To order your own Canberra 50 please contact John at:

Web: [www.englishelectricmodels.co.uk](http://www.englishelectricmodels.co.uk)

Email: [englishelectricjets@gmail.com](mailto:englishelectricjets@gmail.com)



# Albert Ross



John Hancock has written in with pictures and details of a vintage style glider that takes its name from the giant seabird:

"Hello Kevin

*This pic was so atmospheric I wanted to share it. It was taken in Windsor Great Park one Sunday afternoon by my photo enthusiast son Philip. This ancient, semi-scale glider, now electrified, has been around my hangar for thirty odd years now and flies in a very stately fashion in calm weather.*

*I designed it circa 1986 because I have an interest in slope scale but live a long way from suitable terrain. The model needed to be bungee launch-able from the flat and therefore weighs only around 4 lb. It is 120 inches in wingspan with a real old fashioned, slightly under-cambered aerofoil. Just rudder/elevator, it is a fun, calm weather device but does look the part in the air.*

*Now electrified by an E-Max 2815/09, plus a 3S 3000 mAh battery, it can fly most of the afternoon on one charge. Quirky and of no interest to the competitive, but great if you are an aeroplane watcher."*

Thank you for sending details of your elegant glider, John. She looks very relaxing to fly. And thanks too to Philip for capturing her in flight.

We've asked John to consider putting together a plan feature for his aeroplane, so watch this space!

# Giving Bluebird Its Wings Back

This item may be about a boat, not an aeroplane, but it's such an iconic machine that we thought you would like to read some news about it:

Five decades on from an accident that left a treasure of British engineering seemingly lost forever a project to restore Bluebird to its former glory is well underway, with materials donated by thyssenkrupp playing a key role.

January 4th, 2017 marked the 50th anniversary of a world record attempt that went tragically wrong on Coniston Water in Cumbria. Donald Campbell CBE was bidding to break his own 276 mph water speed record piloting the Bluebird K7, a revolutionary jet-powered hydroplane that had already broken seven world records.

The newly remodelled Bluebird K7 was averaging almost 300 mph but as Campbell entered the measured kilometre the craft's high speed, combined with rough waters and an engine flame-out, caused Bluebird's nose to lift. The craft rose almost 50 ft out of the water, somersaulted and crashed back into the lake, splitting in half on impact. Campbell was killed instantly.



In August 2000 a team led by Bill Smith, an engineer and part-time diver, located the wreckage of Bluebird K7. What started out as a 'winter project' to find the wreck eventually became a large-scale recovery and restoration mission, with the blessing of Donald Campbell's daughter Gina.

*"Everyone was expecting it to have disintegrated into nothing but when we found it, it was in a good condition,"* Bill explains. *"The decision was made, after talking to Gina, to take it out and to recover Donald's body as well."*

Greg Buxton, a then-employee of thyssenkrupp, who knew Bill through their shared passion for diving, introduced his employers to the project. The first donations – strips of sheet aluminium – were made in 2006.

*"We've used virtually everything that came out of the lake but we've had to reshape what's available to use and replace some other parts,"* said Bill.



thyssenkrupp has continued to support the Bluebird Project over the years, supplying material, including sheet metal and 350 kg aluminium billets, for the reconstruction. Steady progress is being made. A Bristol Orpheus 101 engine, almost identical to the original engine, has been fitted and Bluebird roared to life in November for the first time since that fateful day in 1967. The Bluebird Project, as the restoration is known, will continue into 2017, with the aim of one day putting Campbell's machine back on the water.

thyssenkrupp strives to make high-quality, dependable materials available to everyone, from big businesses to independent engineers and hobbyists. It recently launched Materials 4 Me, offering a wide range of metals and craft ware to order online for home delivery.

For more information visit:

[www.materials4me.co.uk](http://www.materials4me.co.uk)

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[www.aerobel.ch](http://www.aerobel.ch)

### MESSERSCHMITT M35 ARF



This classic model replica is built entirely of balsa and plywood construction, and the light wooden parts are finished with printed foil. As a special feature weathering traces are applied in detail on the film. All wooden parts are laser cut and are sure to impress with their perfect accuracy. The spacious fuselage provides plenty of space for the installation of the motor and the R/C system. The cowl and wheel linings are made of GFK and are already painted. A pilot figure completes the perfect scale look of the Messerschmitt M35, resulting in a model that is sure to give you hours of flying pleasure.

[www.pichler.de](http://www.pichler.de)

### FMS DH-2 BEAVER 2000MM



The Beaver comes with standard landing gear, but has the option to fit floats too, so you can enjoy flying this giant model on both water and land. The wing comes with vortex generators to help improve lift and reduce stalls. The wing also has a specialised wiring connector that makes taking the wing off and putting it back on a breeze. There are no messy servo leads to connect and disconnect so transporting this giant scale aircraft to and from your flying location is easy and convenient. It also comes with LED lights so your flying experience can occur from early dawn to dusk. If you enjoy large scale aeroplanes this Beaver could be just what you are looking for. Please note: The floats are optional and would need to be purchased separately.



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

### MULTIPLEX LIPO SAVER 2 - 6S for M-LINK



The LiPo SAVER 2 - 6S monitors each cell of your LiPo battery individually and passes the voltage value for the lowest cell to your Multiplex M-LINK radio control system. The safety low voltage warning is triggered by a user variable warning threshold. Features include: Measurement of individual battery cell voltage, measures overall battery voltage, displays battery charge as a percentage after launching, low voltage warning via telemetry and it also gives an automatic warning if the battery is not fully charged.

[www.multiplex-rc.de](http://www.multiplex-rc.de)

## CARF MODELS GALLOPING GHOST



This is CARF Models' first of their planned range of Reno Racing Mustangs, based on a completely new design. The silver and light grey scheme is painted in the moulds and a complete decal

package is part of the kit. Clipped wings, an enlarged engine compartment and the omission of the main radiator makes it slick, fast and powerful. It can be powered by the biggest available multi cylinder in-line engines on the market today, but will also fly great with a single or twin two stroke engine of 80-120 cc. Length 225 cm, span 235 cm, weight 17-21 kg (21 kg with Kolm 230 engine).

CARF's models are sold through their website using the local countries rep (Motors & Rotors in the UK) and selected dealers. See their website for details.

[www.carf-models.com](http://www.carf-models.com)  
[www.motorsandrotors.co.uk](http://www.motorsandrotors.co.uk)

## PHOENIX MODEL PRODUCTS SNOWY



As part of their 'Build for Pleasure, Fly for Fun' programme, Phoenix Models have added Snowy and Snowy-E to their expanding kit range. With a wingspan of 63" both models are

attractive rudder/elevator slope trainers designed to give endless hours of relaxed flying pleasure. You also reap the enjoyment and pride of owning a self-built model.

[www.phoenixmp.com](http://www.phoenixmp.com)

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

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This 3D printed scale model kit of the Martin-Baker MK3H Ejection Seat was created after careful study of an operational full size seat to ensure that the model really captures the scale and proportions of these vital safety devices. The scales of these models - 1:6 and 1:11.5 - have been chosen to match Traplet's two popular Hawker Hunter R/C model

plans/wood packs. The model is easily assembled using the adhesive of your choice and it can be painted with normal modelling acrylics or enamels. It's modular design means that if you intend to install it into an R/C model, you can omit parts to save weight, if necessary. Suitable for installation in an R/C scale model aircraft, or just for static display, these ejection seats are sure to appeal to anyone with an interest in aviation.

[www.trapletshop.com](http://www.trapletshop.com)



GT PD606



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# Convergence

E-flite's take on the VTOL theme is put to the test by the Editor



Sitting in a tray within the colourful outer box, the airframe is supplied fully assembled

**S**pecialised model types seem to come in cycles in this hobby and one of the latest developments in the past two or three years, and hot on the heels of drones, are VTOL flying machines.

In the last issue we reviewed the 'Vertical Take Off & Landing' Swing, a futuristic X-wing from tech company Parrot. And just a few months ago we took a look at FlyZone's Convair CL-84. Ripmax and Graupner also have VTOL offerings, so as you can see the market is hotting up for such aircraft.

The lightweight Swing is super agile but looks nothing like a proper aeroplane, while the CL-84 has a strong resemblance to the Canadian tilt wing transport aircraft. But while it has scale looks, it eats up a lot airspace

when in aeroplane mode and you'd have to be a braver pilot than me to commit to any aerobatics (I did try!)

However, with the new E-flite Convergence, Horizon Hobby appear to have come up with a very practical VTOL model, with jet-style good looks and nimble aerobatic prowess, all in a compact delta wing package. It's pretty nippy too!

## All Square

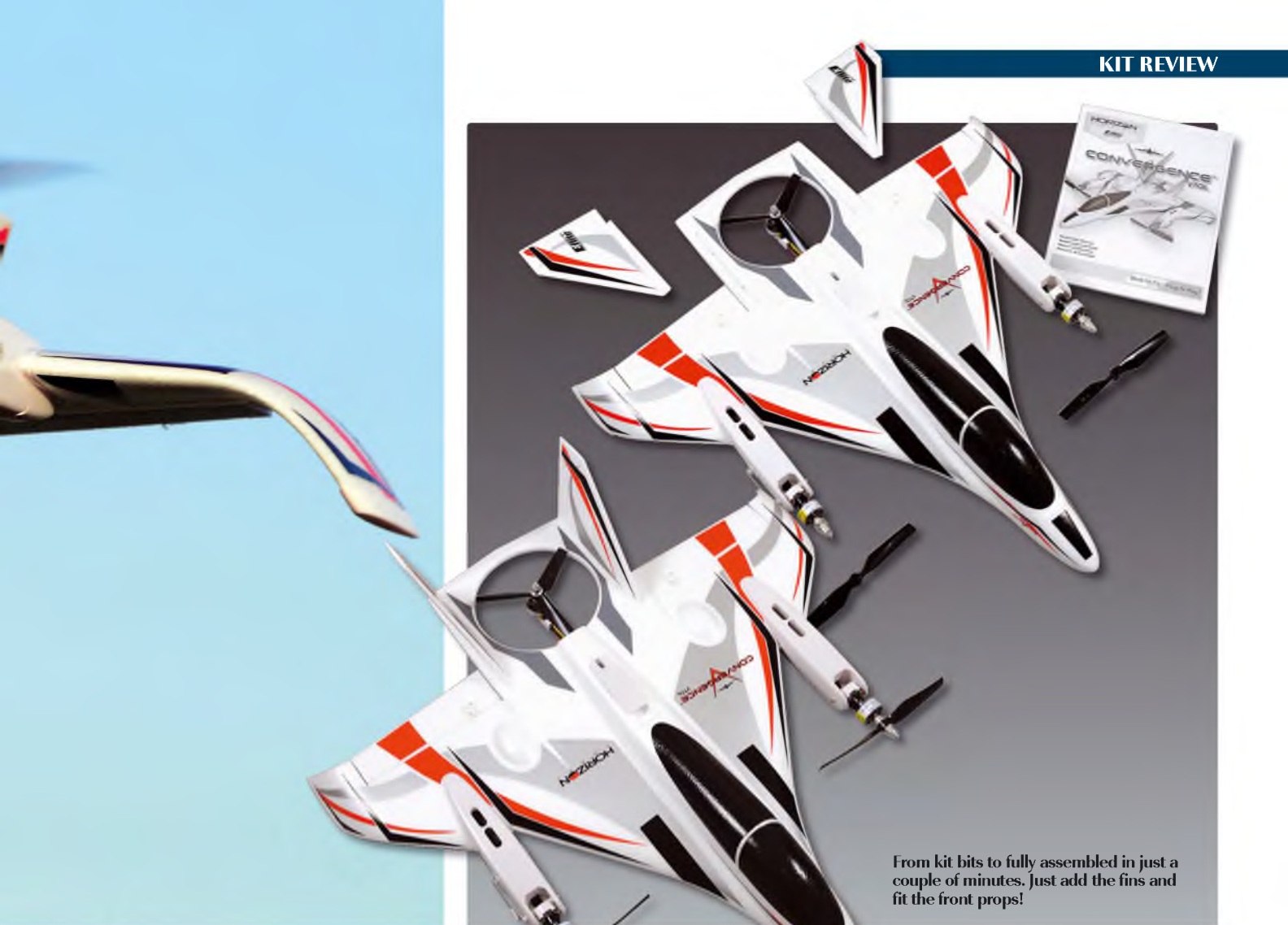
Convergence is supplied as a nearly completed model and it just requires the two fins to be fixed in place using two small screws on each side. Then fit the two main props and you're ready to fly!

It comes in a square box, of a style that

will be familiar to anyone with one of the company's smaller AS3X micro models. The one-piece delta wing and jet-style fuselage is taped to a moulded foam tray to keep it safe during transport. Even though the model will not fit back into the box once the fins have been fitted I'd recommend keeping it so that you can whip the fins off to store the Convergence safely if you ever decide to give it a rest after flying it for a while.

The version supplied for review is a 'Bind-N-Fly Basic', which comes complete with two factory fitted 2210-1450 KV main motors and a 2730-1550 KV tail motor. It also includes three 20 amp ESCs, two 9 g elevon servos and two 9 g metal gear nacelle servos to tilt the main motors. The tail motor is fixed





From kit bits to fully assembled in just a couple of minutes. Just add the fins and fit the front props!



Front motor in its raised multirotor position



Same motor facing forward for aeroplane flight

and sits in a shallow shroud at the back of the aircraft. The BNF version also includes a factory set Spektrum Quad Race Serial Receiver w/Diversity (no, not the dance group!).

To get the Convergence into the air you need to supply a 3S 2200 mAh 30C LiPo, a matching charger and a full range six channel DSMX transmitter. I used a DX6, which worked a treat.

You can also buy the Convergence as a 'Plug-N-Play' kit, without the Serial Receiver, should you wish to use a conventional, full range 6-channel receiver. The receiver bay is accessed through the bottom cover, which is secured to the underneath of the fuselage with a single screw.

#### FPV, Anyone?

The bottom cover also acts as a housing for an optional FPV camera, not covered in this review. You'll also need to fit a video transmitter (VTX) and a mushroom antenna in a dedicated compartment just behind the battery bay. Full details of the equipment required and how to fit it all into the model are given in the instruction book.

While I can imagine hovering the Convergence under FPV guidance and performing slow figures of eight etc. in multirotor mode, it makes my head spin to think of piloting such a model in fast forward flight...! For brave pilots only, I should think!

#### Quick Start

The multi-language EU instruction book starts with an English section that begins with an easy to follow set-up table for popular Spektrum transmitters. Like most modellers, I suspect, my knowledge of VTOL set-ups is practically non-existent, so I was happy to put my faith in the settings written in the book. Just a few steps are required, although I reversed the multirotor/aeroplane transition switch so that it followed my usual practice of having all switches pushed backwards for take-off.

If you follow the book setting the transition switch is pulled forward to place the model in quad mode ready for hovering; this model has to take-off and land as a multirotor as it



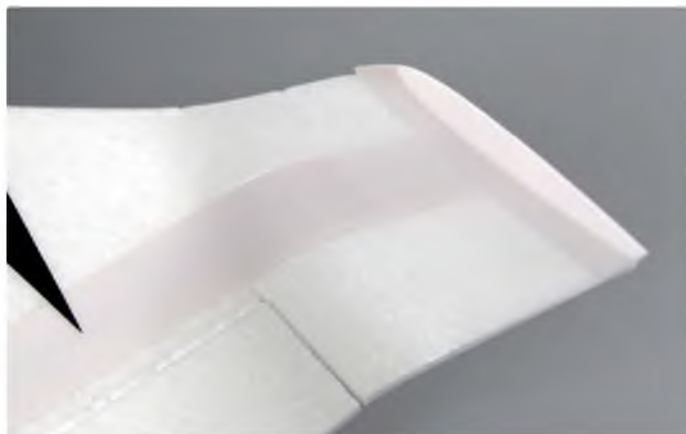
The rear fan is mounted on a fixed carbon boom



Flexible gaiters support the motor wires when bending backwards and forwards during transitions



View of the serial receiver and flight controller. A standard 6-channel Rx can be used if you buy the PNP version instead



Wingtip detail, shown inverted. Plastic covers protect the tips when the model is sitting on the ground



Besides acting as a central landing skid, the bottom cover also houses the optional FPV camera



does not have a conventional undercarriage (probably to save unnecessary weight).

After fitting the fins and the two main propellers (the 3-bladed tail prop is factory fitted) it's time to pull off the canopy hatch and slide in your 3S LiPo for a balance check. With a brand new Overlander 2200 pack locked in place at its most rearward position, using the wide hook and loop strap ready fitted in the battery bay, our Convergence balanced nicely within the recommended Centre of Gravity range. I used a thin black marker pen to make small indicators of where the balance point should be. It is important to perform the balance check with the motors in the upright (multirotor) position.

The battery can then be plugged in, using

an EC3 connector, to bind the transmitter and receiver together. You may want to remove the main props temporarily before doing this so that they cannot inadvertently spin up while you are performing the all important control checks. Even so, it's wise to keep any long hair or loose clothing out of the way of the motor cans too!

In aeroplane mode, Convergence is guided using elevons and it also has a stabilisation system. To check that stability mode is working correctly a clear diagram shows how the elevons should respond as you tilt the model in pitch and roll.

A two position switch is used to switch between Stability and Acro modes. Stability mode can be switched on for either multirotor or aeroplane flight, during which

it will limit the bank angles and self-level the Convergence. In multirotor mode it also restricts pitch changes and is thus the default setting for taking-off and landing. In Acro mode the system removes the limits on bank angles and does not self-level the aircraft, allowing it to perform a wide range of aerobatics.

**At The Patch**

After taking a few static photos a fresh 3S-2200 LiPo was loaded up and the Convergence was placed in the middle of the patch. I made sure that the transition switch was in the multirotor position (with the front motors swivelled upwards) and that stability mode was switched on. The model sits low on the ground, resting on the camera cover



First flight and Convergence settles into a stable hover



Exploring the multirotor flight envelope



Convergence in fast forward flight. It is a nimble little machine!



Entering the transition. The tail fan is still static as the main rotors start to lift



The tail fan starts up



With all three motors now running and supporting the weight of the aircraft, Convergence settles into a high hover. That was easy!

and with the wings supported by their swept down tips.

Advancing the throttle soon had the Convergence sitting in a nice stable hover at chest height, following which the low speed handling was explored by performing a series of wide figure eights. No trims were required and confidence soon built to the point where it was decided to go for aeroplane flight. I must say that having prior experience of transitioning with the CL-84 helped greatly here as I had an inkling of what to expect!

With the model pushed out from the flight-line and at a decent height, the transition switch was selected and the Convergence pulled away swiftly into fast forward flight, with barely any wing rock or other divergence from her flight path as the front motors

swivelled to their forward positions – very reassuring.

With the model accelerating away and nearing the far end of the field, I initiated a left turn, at which time the motors seemed to cut out! For a brief moment I thought that the failsafe had kicked in, but the Convergence was still flying well and heading back towards the runway under full control. As she flashed past I realised that the sound we had heard (or lack of!) was the tail motor being cut as the front motors reached their fully forward position.

Even with stability switched on the Convergence is no slouch and I never really felt that my ability to turn her was constrained too much. She whipped around the circuit with a remarkable turn of speed. However,

with the winter light levels fading fast, I decided to play safe and save any aerobatics for another day.

A high approach was made and I slowed the slippery model down as best I could, bearing in mind that the self-levelling in stability mode meant that I could not use the delta planform to introduce much in the way of high alpha braking. It still seemed pretty easy to fly though and the model remained fully controllable at lower airspeeds. As the model passed us at 'two mistakes high' I flicked the transition switch, after which the Convergence settled into a high hover, again exhibiting little in the way of wing rock as she did so. After easing her down onto the patch it was time to switch off and have a well earned cuppa before setting off home.

**Note The Switch Settings!**

On our second outing, I handed the model over to my son, James, so that I could take some flying pictures (I don't know why I bother as he is much better at that than me!).

Just one problem – neither of us could remember which switches did what...! I finally remembered which one operated the transition, but which way did the the stability switch go? We took a punt – and got it wrong...

We didn't notice this when he was hovering the aircraft, it was only after I urged him to make the transition into forward flight that we noticed that the Convergence had transformed from a pussycat into a bit of a lynx! Thankfully James is an experienced quadcopter pilot and he coped well in the circumstances, as I ran back to my car to put the camera down, intending to take the transmitter from him. But while my back was turned he had calmed things down nicely and had managed to get the plane back into the hover, from which he safely landed.

I was kicking myself for not bringing the manual, but James soon had it downloaded from the Horizon website onto his phone. With the correct switches identified and their operation refreshed in our minds, it was my turn. Now correctly set up in stability mode, all was sweetness and light, as per the first

flight. After a couple of circuits I flicked the stability switch into Acro Mode and started to explore the flight envelope.

I have to say that I didn't notice much difference in the overall handling in level flight, just that the model was now a lot more manoeuvrable in turns, which gave me the confidence to try some aerobatics. Needless to say, the Convergence pulled easily through all the looping and rolling manoeuvres that I asked of her.

Writing this review, and being able to refer to the manual whilst doing so, makes me realise that with this jet-style model, fitted with rudderless fins, I had subconsciously avoided any yawing manoeuvres. But I notice now that, courtesy of the motor mixing provided for multirotor flight, the Convergence should be capable of some interesting stunts such as stall turns and wing-overs – anyway, it will be fun to try!

James and I put notes about the switches on our phones and he was itching to have another go. So I have now handed the model over to him to review in Traplet's drone magazine, Flight Camera Action, which he edits. With the knowledge we've gained of starting things off in stability mode BEFORE switching into Acro mode, he's now finding the Convergence a real pleasure to fly.

**RCMW**

**RC MODEL WORLD**

**MODEL INFORMATION**

<b>NAME:</b>	Convergence VTOL
<b>MANUFACTURER:</b>	E-flite
<b>DISTRIBUTOR:</b>	Horizon Hobby UK
<b>PRICE:</b>	BNF Basic, £274.99 (RRP). PNP, £254.99 (RRP)
<b>WEBSITE:</b>	www.horizonhobby.co.uk (search efl11050)
<b>MODEL TYPE:</b>	VTOL sports model
<b>CONSTRUCTION:</b>	Moulded foam
<b>PARTS SUPPLIED:</b>	Airframe, brushless motors, 3 x ESC, 9 g servos, Spektrum Quad Race Serial Receiver w/Diversity
<b>PARTS REQUIRED:</b>	2200-3000 mAh 3S LiPo

**MODEL SPECIFICATIONS**

<b>WINGSPAN:</b>	650 mm (25.6 in)
<b>LENGTH:</b>	680 mm (26.9 in)
<b>WING AREA:</b>	1883 sq cm (291 sq in)
<b>FLYING WEIGHT:</b>	771g (1.7 lb)



A final view of the well developed VTOL model aircraft. Nice one, Horizon!

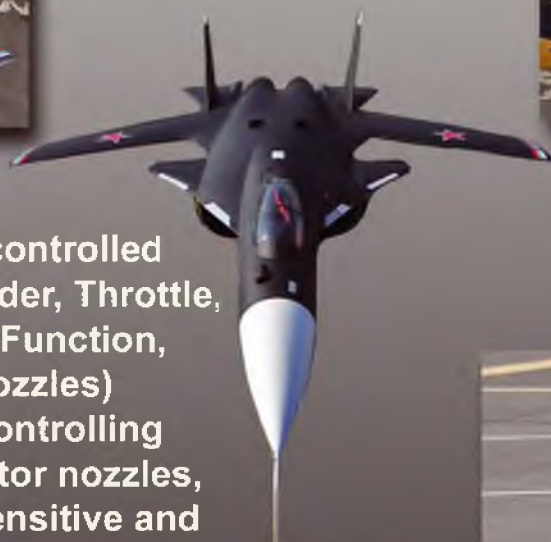
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# T-Bird

This 71 inch T-tail electric glider by Tim Marsh stands out from the crowd by virtue of its two piece gull wing. It is easy to build, being of straightforward built up balsa construction



## MODEL WORLD AT A GLANCE

Want to build something a little different? T-Bird makes an interesting and distinctive shape in the air

As an aeromodeller who grew up long before the internet, satellite TV, mobile phones and ARTF models, for me the main appeal of this great hobby has always been the rewards it delivers through the application and honing of skills, from building, experimenting with and flying one's own creations.

The model forming the subject of this article an expression of the art of the possible. The model has gull wings inspired by soaring birds that share my local flying field. It has a dihedral swept T-tail because I like the look of it and it is the best configuration for belly landing on top of a hill and eases removal so that the model can be stowed away safely in a box.

The fuselage is curved and rounded because I dislike the use of elongated boxes as fuselages when a little imagination, a few grams more of balsa and a small slice of time can deliver a much more attractive shape. The servos are mounted in the fin because it provides a stable solution to the challenge of an all moving tailplane.

Finally, the model is held together with rubber bands because, along with other crash resistant features, this helps to ensure that it will survive the rigours of landing in rough conditions. T-Bird thus originates from the same place in this multi-faceted, infinitely varied hobby of ours where, for me, the greatest rewards are to be gained, just as they were when I created and flew my first flying model back in 1972.

<b>WINGSPAN:</b>	71" (1803 mm)
<b>WING AREA:</b>	500 sq in
<b>WING LOADING:</b>	15 oz/sq ft
<b>LENGTH:</b>	46" (1168 mm)
<b>WEIGHT:</b>	56 oz (1588 g)
<b>RADIO FUNCTIONS:</b>	Throttle, ailerons, elevator, rudder and flaps
<b>SERVOs:</b>	9 g metal geared
<b>BASIC CONSTRUCTION MATERIALS:</b>	Balsa and ply
<b>COVERING MATERIAL:</b>	Solarspan

**CENTRE OF GRAVITY:** 3/4" - 3/4" from Leading Edge at inner root

### CONTROL THROWS:

Ailerons: 3/8"-5/8"  
Elevator: 5/16" at TE  
Rudder: 1 3/8"

**MOTOR:** 1250 KV brushless

**PROP:** 10" x 4" folding

**ESC:** 30 A BEC

**BATTERY:** 3000 mAh 30C LiPo



With my Zephyr in 1978



Me and my Zephyr, 30 years later!

### Back Story

The story behind this unusual model dates back to the summer of 1978, when as a 13 year old boy, inspired and aided by my airline pilot father's aeromodelling prowess\*, I decided to design and build a glider that would fly from nearby Watership Down, whilst also being capable of being bungee launched from a large field opposite my childhood home. It also had to fit in a box because I wanted to be able to carry it on my back whilst riding a bicycle.

*(\*As a 17 year old boy in 1953 my Dad, Chris Marsh, won a Gold Cup at the Nationals with his own design open power free flight duration model. And twenty years later his design for a twin engined flying boat, the 'Snow Goose', was published in Radio Modeller magazine. It is still available from the Traplet Shop website, plan number RM186.)*

To cut a long story short, the model I built that summer all those years ago, which I named 'Zephyr', flew successfully as a slope soarer. After repairs following a wing snapping bungee launch, and then fitting an OS 10 glow engine on a power-pod, I put the model into its box in 1981, where it has survived for the past 35 years. Although far from perfect, very occasionally it still flies sedately and gracefully on a light breeze at St Agnes Head in Cornwall where I now live.

A distinctive feature of the Zephyr is its all moving T-tail, the design for which has been utilised and refined in three subsequent models that I have designed and built over the past few years, all of which fit into a bespoke box, just as the Zephyr does.

Whilst my Zephyr sat ageing in its box and its tissue covering turned crispy, I got on with life, only dipping back into aeromodelling for a couple of years in the mid-nineties. It was not until 2008 that I dusted off the Zephyr, re-covered the flying surfaces in Solarfilm and re-sprayed the fuselage. Five years later I made a new e-power two piece fuselage using Correx, modified the wings to accommodate ailerons and flaps, and fitted it all into a smaller box. I renamed the model 'Zephyr 2'.

Unlike the original Zephyr, which used a long snake to move the tailplane (mini servos were not available in the 1970s!) the Mk 2 has servos mounted in the fin. Enthused with the concept of gull-wings following experimentation with a slope soaring seagull a few years earlier, and using my now favoured method of construction for a strong, shapely and relatively light fuselage, at about that time I modified and re-covered the much used and abused built up wings from my 90" span Wik Models Salto and created T-Bird's prototype, a gull wing T-tail design that I named 'Chuff' after the famous Cornish seabird.

I first constructed Chuff as a slope soarer and it performed incredibly well, especially in the smooth strong lift at St Agnes Head.

After the success with 'Chuff' I attached a removable e-power pod so I could fly it from a field behind my home. As I had not drawn up any plans and had only a few photos of Chuff under construction I decided to draw up a decent plan and make a Mk 2 built from scratch for e-power, and so T-Bird was born – a two piece gull winged, all moving T-tail design with a lineage dating back nearly forty years.

Although an unusual and, I hope you will agree, attractive shape, the model is relatively straightforward to build, although I would not recommend anyone attempts it without at least some experience of building from plans.

### Construction

Before you start, gather together the various radio and e-power components so that you have them all to hand to check their fit when constructing the model. It is best to make the wings and fin first because you need to shape the fuselage with the hatches and fairing as one piece so as to ensure a nice fit. Whilst making the wings it is also a good time to make the tailplane.



Zephyr 2 with plastic Correx inner fuselage



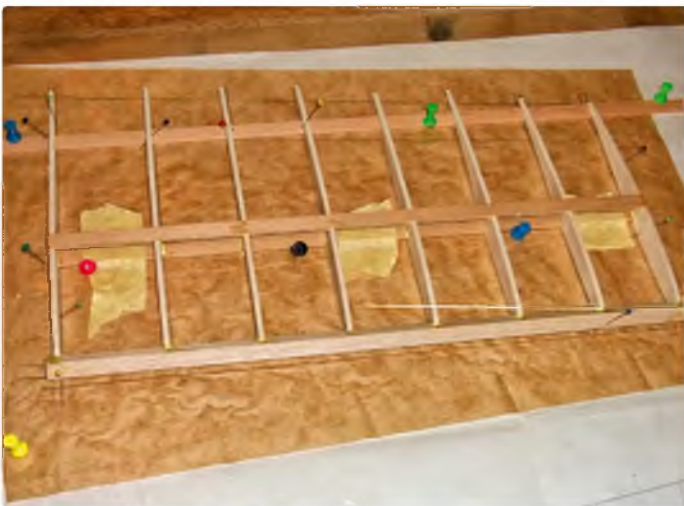
T-Bird's predecessor, a gull wing T-tail design that I named 'Chuff' after the famous Cornish seabird



Chuff in flight at St Agnes Head



My experimental seagull shaped slope soarer



Basic structure of an inner wing panel



Cutting out the ailerons



Making an inner wing panel frame

**Wings**

Construction of the all built up wings requires preparation and planning as it comprises of four different panels, each only partially built before they are connected to form a complete wing to a tapered GR15 section. The inner framework of each panel is built initially over the plan and then remaining parts are added to the structure according to the sequence described so as to enable the fitting of the anhedral braces, servos and leads before joining the panels together.

It is advisable to commence with the starboard inner panel, then the port outer, followed by the starboard outer and finally the port inner. Building in this sequence enables you to progress with one wing and, whilst it is gluing at various stages, work on the other if you so wish.

Start by cutting out the plywood templates for the ribs and, using the sandwich method, fabricate a port and starboard set of inner (R1-R8) and outer (R9-R19) ribs. Whilst you are at it cut out the anhedral braces (A1 & A2).

Work on the inner panels start with gluing of the ribs to the lower main spar, making sure that you have pinned the packing strip to the board so as to raise the trailing edge of the ribs into the desired position and have cranked R8 to allow for the anhedral at the join with the tip. Pin and glue the 5/8" square leading edge in a diamond orientation onto the front of the ribs, then attach the upper main spar.

Once set, cut out the top front 1/16" sheet and attach it by its front edge to the

upstanding part of the leading edge, making sure that it is attached also to the front part of the ribs, whilst avoiding blobs of glue. These will prevent you from rolling and gluing it smoothly to the remainder of the ribs and the main spar later on.

It is also a good idea to cut the sheeting slightly oversized at the outer end of the panel at R8 so as to allow for trimming to shape later. The top sheeting for the trailing edge can now also be glued into position.

Once the structure has set attach the remainder of the front sheet into position, using pins and masking tape between the ribs to secure it to the spar. Now you need to cut the slots in the top of R1-R4 to accommodate the upper rear spar, which requires care to avoid damaging the ribs. But provided you have a good sharp knife it is not difficult.

The upper rear spar, capping strips and remainder of the top sheeting can now be added and the assembly lifted from the board when set. Repeat the above sequence for the port inner panel but do not add anything more to the outer panels at this stage.

The initial construction sequence for the outer panels is similar to that for the inners, the main differences being, firstly, the need to build in the washout by packing the ribs and leading edge in accordance with the illustration and in the positions shown on the plan.

The second main difference is the leading edge, which is made from profiled balsa strip different to that on the inner panels. It is also attached to the ribs using a butt joint

as opposed to a diamond shaped join, an arrangement which facilitates the tapering of the leading edge on the outer panels. Other significant differences are provisions for the later cutting out of the ailerons and space for the servos, which involves the addition of longitudinal capping strips in front of the trailing edge sheet and the addition of 1/16" 'floors' for the servos.

The four incomplete panels now need to be worked on largely from the underneath. Placing them on the board inverted, make up the solid balsa inserts between R1 and R2, R7 and R8, and R8 and R9, working on each insert individually until you are happy with the fit, allowing for the later addition of the underside sheeting and the provision of channels for the servo leads.

The 1/4" strips between each rib are then added, along with the servo packing, all gussets and balsa in-fills, plus the trailing edge sheeting. Before working on the wing joints take the opportunity to fabricate the servo mounting hatches etc. because this is easier when working on just an outer wing panel as opposed to a whole wing. The ailerons can now be cut out, ribs trimmed and strips added to provide for their hinged edge to move within the cut out.

The wing panels can now be prepared for joining, firstly by trimming the excess top sheeting from the relevant panel ends, followed by trial fitting of the anhedral braces and the short carbon joining rods. If the braces and rods are a less than a perfect fit then use an easily sanded expanding foam glue – but not yet.



After making sure that the top of the panels meet in a nice joint and that you have built the two halves with provision for identical and opposite anhedral in each wing, you are ready to join the inner and outer panels together one at a time. Offer up the second wing once the first has been glued together to ensure they are the same before holding the joint in the second wing together whilst the fast setting epoxy used for the joint goes off. Once it has, the braces and short joining rods can be glued into place.

Now is the time to insert the servo extension leads before the lower sheeting is finally added, starting with the outer panels, again paying attention to the join and chamfering the end of the sheet to ensure a clean fit when it is attached to the frame. The front lower sheeting is added in two stages as per that used for the top sheeting. All of the remaining sheeting and capping strips can now be added. Once set, sand the leading edges to accommodate the taper and achieve a smooth joint with the front sheeting, also smoothing out any imperfections in all the sheeting joints, taking care at the underside anhedral joint to avoid excessive sanding of the adjacent panel.

The outer tip sheeting is now trimmed prior to making the wingtips and gluing them to R19 before final profiling. The housing for the servo is constructed from 1/4" sheet before making the hatches from 1/32" ply. All four servos are mounted in the same way by sticking them to a ply hatch, with 1/16" thick double-sided sticky foam tape cut to size, with the servo then sitting snugly into a balsa housing in the main structure.

The trick with installing the self-tapping screws to attach the hatches is to first drill out a hole about 3/32" diameter, then fill that hole with epoxy before drilling a pilot hole into the set glue for the small, self-tapping screw to bite into.

A recess is now cut out for the carbon rods before they are glued to the inner leading edge, and the 1/32" ply doublers to the inner trailing edge. These measures prevent crushing of the structure by the elastic bands and give extra strength to a vulnerable part of the wing in the event of any mishaps on landing.

After sanding the outer faces of R1 to the correct angle carefully mark the position for the wing joining rods, then drill the holes out with a suitably long drill, making sure not to drill into the spars. Then trial fit the wings

together after cutting and bending the rods. If you drill out the holes to that of the rods first then if you are less than perfect with the positioning of the holes you can drill oversize holes for the tubes so as to compensate for any inaccuracies.

Next coat the rods in petroleum jelly, making sure not to get any on the outer part of the tubes, then smear a thin film of epoxy around the outer surface of the roughened tubes and insert them into the holes you have drilled in the wings. In order to avoid the wings sticking together around the rods place some non-stick Perspex sheet between the ribs (with a hole drilled for the rods). Once the tubes are glued separate the wings and fabricate some 1/32 ply faces to R1 before drilling them out and gluing them in place. The wing structure is now complete.



Joining an inner and outer panel

### Fin And Rudder

The fin and rudder are constructed from a 1/2" balsa strip frame, with the fin accommodating both the elevator and rudder servos, which are attached to a single large hatch laminated using 1/32" ply with a 1/32" balsa outer face. When constructing the fin frame position the cross members to enable the optimum positioning of your servos, using the space between the elevator servo at the top of the fin and that for the rudder servo at the bottom to accommodate the plugs at the end of the extension leads and any excess lengths of servo leads.

Pre-shape the top part of the fin where the cradle sits, tapering it to match the top of the rudder. After trial fitting the fin to the fuselage, cut out and fit the carbon reinforcing rod to the leading edge, then add the 1/16" balsa sheeting, leaving out the space for the servo hatch on the port side.

The rudder is triangular in profile with a 1/2" rounded leading edge tapering to a 1/32" thick trailing edge. This is achieved by building the rudder over the plan flat after cutting out and gluing the 1/8" ribs to suit. The leading edge is shaped to form a tapered profile with the remainder of the structure after lifting the frame from the plan.



Building the fin and showing the servo locations

### Tailplane

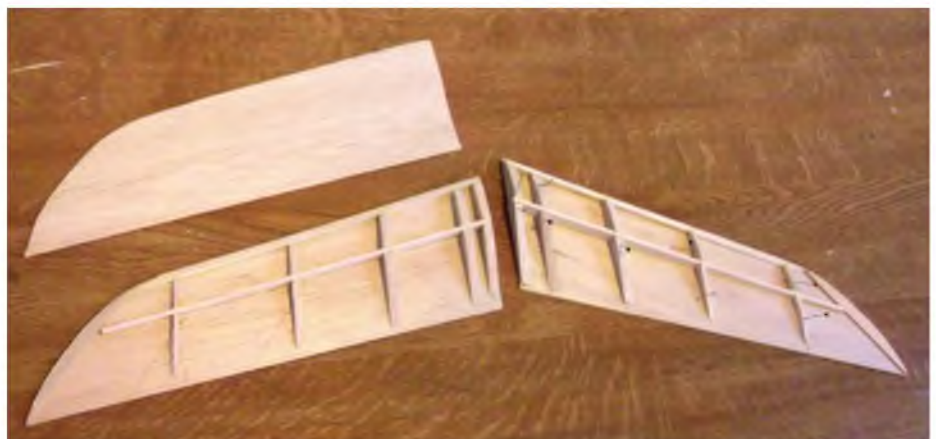
Cut out the tailplane lower sheeting using the first half as a template for the second, flipping over to create a handed pair. Cut out and shape the tapered leading edge and 1/8" spars, again making a handed pair. Cut out the two templates for the tailplane ribs and, using the sandwich method, make a left and a right handed set of T1-T5 ribs.

Cut out and shape the tips (T6) from 1/16" balsa sheet. You now need to cut all of the ribs into two so as to allow for the 1/8" spar (numbering each piece from T1 Front Right, T1 Rear Right, T1 Front Left, T1 Rear left etc.) ending up with 20 numbered bespoke pieces. The tailplane frame can now be glued to the bottom sheet in positions that are marked onto the balsa from the plan.

Prepare the top 1/16" sheeting for each half, making sure it is sufficiently sized to cover the inner frame by laying an oversized piece of 1/16" sheet over it, then marking

and cutting to size before sanding the inner trailing edge to fit nicely on top of the lower sheet. Glue the rear edges of the sheeting

together and attach to the frame as far as the spar and leave to set, then glue the remainder and sand to shape.



Building the tailplane

**Fuselage**

After making all the formers cut the 1/32" ply inner sides and PVA them to a sheet of 3/16" balsa, weighting them while they glue together then cut out the two main sides that form the basic box from which the fuselage is built up before you eventually sand it to shape.

Make and carefully position F4 and F5 then glue one former to one inner side and one former to the other inner side then once dry glue them together using a suitably weighty object to hold them in position. Next carefully glue the tail end of the two sides together making sure that the structure is straight and leave it to set. Then make and add F6 and F3, holding them in place with bands while they set.

The next stage is a bit tricky but if you are methodical and take your time you should not have any problems. Carefully mount your brushless motor to F2, making sure that you have allowed enough space back from F1 (positioned with 2 degrees of down-thrust as shown on the plan) to enable it to turn freely, then glue it in place with the motor attached.

Make sure that you have cut a slot/hole for the leads leading to the speed controller before you do this. Once F2 is firmly in place you need to steam the remaining front part of the fuselage sides to bring them closer together before gluing circular F1 in place in front of the motor. Next, glue in place the single, central 1/4" square longeron to

the bottom of the formers, followed by the planking, carefully cutting and pinning each plank together with PVA to complete the curved underside of the fuselage. Once the planking is in place cut out and shape the balsa fillets and glue them in place inside of the fuselage either side of the joint between the planking and the fuselage sides.

Ensure that you have cut a slot in the upper rear sheet before gluing to accommodate the leading edge to the fin and that you have installed the servo extension leads. Or, as I did, fit a plastic tube that you can tape the leads to, to later to pull them through, just so long as you have made the holes big enough because if you forget to do this you will have to cut open the fuselage to install them! Trial fitting the fin at this stage will also aid with alignment of the wings and keeping the fuselage nice and straight.

The upper 1/2" plus front (including hatch) and rear decking blocks can now be cut out approximately before being sanded back enough to accommodate some 1/16" sacrificial spacers. These allow for subsequent separation and clearance of the hatches. Do not attempt to shape them too precisely at this stage but shave off enough wood so as to reduce the need for unnecessary sanding once the basic fuselage is complete.

Make sure also that you have hollowed the front block enough to allow the motor to turn freely and that the front hatch is pre-cut

and tacked in place with the 1/16" spacers. Use only enough glue to secure them when sanding, and not so much as to require that you need to hack things about when removing it once the fuselage has been shaped as a single piece.

At this point glue on the additional sheeting to the fuselage sides, trimming them to an approximate and oversized profile. Now you need to place the wings onto the incomplete fuselage and gradually trim the part of the fuselage sides that the wings will sit on.

Once you are happy with the alignment and seating of the wings add some sacrificial wing seating tape that will need removing once the upper fairing pieces have been cut and glued together. Now drill the holes, loose fit the wing retaining dowels and attach the wings with medium sized rubber bands.

To fabricate the upper fuselage fairing cut out a series of oversize pieces of 1/4" sheet, positioning them above the wings as they sit temporarily in place. Whilst the outer pieces of the fairing require care to get right, the central pieces are less critical, but make sure each 1/4" piece is sufficiently oversized to allow it to be sanded to shape later. Once you are happy with the fit, glue the pieces together and leave them to set, then remove the wings, dowels and seating tape.

Just as you did for the front hatch, lightly glue the oversized top fairing in place and attach a sacrificial spinner of the right size to the motor, otherwise you will scratch the



Attaching F4 and F5 to the inner fuselage sides



Adding the lower longeron. Note that the motor is fixed in place from this point



Attaching the underside planking



Attaching the outer fuselage sides and cheeks

actual spinner when shaping the fuselage.

Now you are ready to get carving and sanding the fuselage into shape. This is a very rewarding process, provided that you are not over-zealous with the initial trimming of the surplus balsa and keep checking the profile as you sand the whole thing into a nice, rounded tear-drop shape.

Now thread the extension leads through the fuselage and into the fin. Check you have a good fit then glue the fin to the fuselage with aliphatic resin.

For a conventional model you would now have all the main components for trial assembly. However, for the T-Bird there is one final critical component that needs

to be fabricated, which is the cradle that the distinctive all moving, swept dihedral tailplane sits on.

The cradle is simple to make, and is strong and effective, provided that it is made accurately. Start by cutting out the three main components, which are the two sides and upper surface, all from 1/16" ply. Drill out the pivot holes in the sides at the same time whilst laying them on top of each other.

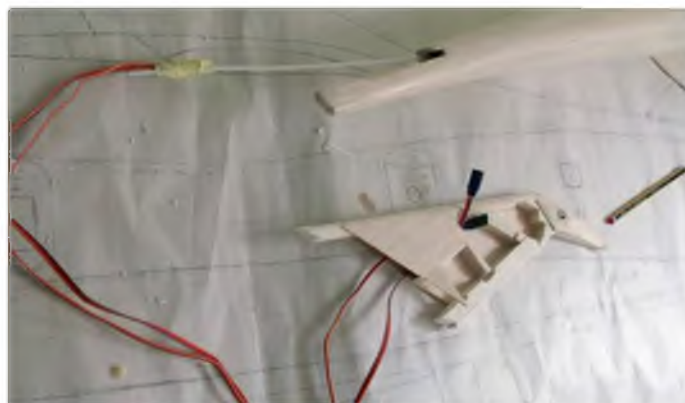
The cradle sides now need to be temporarily attached to the top of the fin with the bolt, hinges and nut all in place and tightened to light torque to prevent slippage whilst allowing adjustment before gluing. Now, making sure that everything is aligned,

epoxy the upper cradle sheet into position on top of the cradle sides. After the packing strips to accommodate the dihedral in the tailplane have been cut out and sanded they should be sat on the cradle top temporarily to enable their correct fitting before then gluing them to the top of the cradle.

Once set remove the cradle from the fin and, using a generous amount of epoxy, glue the carbon dowels in place. The balsa cheeks can now be shaped to fit and glued, followed by a small amount of filler if needed before sanding the cradle to shape. The model is now complete and ready for finishing.



The fuselage is shaped as one piece, ready for cutting out the hatches and the installation of the fin



Preparing to attach the fin to the fuselage. Note the snake being used to pull the servo leads through



Cradle main components



Attaching the cradle top to the cradle sides

**Finishing**

The fuselage shape is not conducive to covering with Solarfilm, although I am sure you could. However, there is no doubt in my mind that the best way to achieve a good finish is with light filler, followed by sanding sealer, cellulose primer and finally cellulose spray paint.

The key ingredient missing from this list is sanding, at each stage and after each coat. The finish I achieved took some light filler to smooth out a few imperfections and to contour in the fin, two coats of sanding sealer, one brushed primer cellulose layer, three sprayed primer layers and two sprayed colour coats of Mercedes metallic dark blue.

You will need to mask up the servos when you spray the hatches.

I used metallic silver Solarspan to cover the wings, tail and rudder, with Solartrim for the yellow, red and dark blue pin striping.



Completed T-Bird airframe, ready for covering



All the components finished and ready for radio installation

## T-BIRD

### E-Power And Radio Installation

You will have established by now that the 1250 KV brushless outrunner motor cannot be removed. However, should you need to remove it then it could be achieved easily enough by cutting the very front of the fuselage off just in front of F2, then either glue the nose back and refinish that part of the fuselage or, as I did with my Zephyr 2, simply create a detachable nose.

Provided that you don't fly the model into the ground, with the quality of modern brushless motors there should not be any reason to remove the motor. Just avoid over propping the motor to avoid burning it out and cut a couple of small rectangular holes at the bottom very front of the nose to provide a bit of cooling. This seems to work fine as I have not had any overheating issues after several hours of use.

With a 3000 mAh, 3-cell LiPo battery the C of G should be 3.5" from the leading edge. If not add a little lead to get it right. I used a 2200 mAh, 3-cell LiPo initially with about an ounce of lead and the 1250 KV motor gives enough power for a very rapid and steep climb. The LiPo is mounted as forward as possible by slotting it through F3 and holding it in place with soft foam.

Since the fin and wing hatches are made with the servos attached the remaining radio installation is easy. Simply connect a 30 A BEC speed controller to the battery and attach it with some Velcro tape within the front hatched area of the fuselage. It is then simply a matter of connecting the receiver and programming your transmitter to provide the control movements shown on the plan, with the ailerons operating on a switch as flaps.

If you chose this option you will definitely need to mix the rudder with the ailerons to give you the directional control when the ailerons are deployed as flaps. In any event mixing of the rudder and ailerons is recommended.



Wing servo hatch



Wing servos are attached to ply plates



Pin-striping added



Cooling holes for the motor



Radio and battery installation

### Flying

I first flew T-Bird on a breezy spring day, uncovered and unfinished, and using wide Sellotape to cover the gaps between the ribs on the wings and rudder. As can be seen from the photos I had also set the model up with significant forward sweep in the wings using a profiled triangular balsa insert between the wing joining rods. Although the model climbed away nicely it was virtually uncontrollable in pitch and I only just managed to get it back to terra firma in one piece. Thinking that the issue lay with an incorrect C of G position and/or too much travel on the all moving tailplane, I made some adjustments and then the weather turned.

Pleased that the model had survived its first test flight and thinking that adjusting the C of G and reducing the elevator travel would do the trick, I proceeded to cover and paint the model and waited for the weather to improve. One early summer's evening I launched T-Bird into a light breeze and she climbed away nicely, but again I had virtually no control in pitch, just as before, and this time it ended up in a hedge at the side of my flying field. This incident tested out the crash proofing I had designed in, as the result of which damage was confined to a hole in the front of the fuselage, a dent in the leading



Pilot and faithful friend await the ideal conditions for a hand launch

edge of the port wingtip and several broken elastic bands.

After a re-think, a little bit of research and a discussion with my 'all things aviation expert' father it revealed that the lack of control/stability in pitch characteristic is an inherent problem with forward swept wings,

and it turns out especially so with a gull wing tapered shape! In light of this I made up some new wing joining rods, this time without the insert for the forward sweep and tried again.

This time T-Bird climbed away beautifully and she flew fine, responding well to all

controls. The distinctive bird inspired shape stood out nicely against the evening sky as the prop folded and I entered the glide with a dab of down elevator. Time to slow things up a bit, which was fine until I approached the stall. Suddenly T-Bird tipped stalled quite violently to starboard. Fortunately I had enough height to recover and with plenty of airspeed I flew around for another 10 minutes, feeling my way around the flight envelope, including loops, stall turns and

rolls, all carried out with plenty of airspeed before landing successfully into the long grass.

Although I had set up the build of the wingtips to include a couple of degrees of washout to prevent the tip-stalling I had just experienced, owing to the tapered design and the wing section this resulted in pretty much zero washout with the wings as first constructed. After playing around with a neutral position, with both ailerons above

centre about 1/8" to compensate for this, which appeared to work, I removed some of the covering to the wingtips and warped in some more washout, carefully ensuring that both wings had the same amount.

Thus, after the excitement of the early test flights, I got T-Bird flying as well as the Chuff, and the model now performs superbly, with a nice gentle stall, an extremely high rate of climb and a respectable glide angle.

Although it will thermal on a suitable day, T-Bird's wing loading of 15 oz/sq ft means that flat field performance is akin to that of a slope soarer, not a thermal soarer. The latter was never my intention with the design, which has proved to be great for slope soaring owing to its ability to penetrate all but the stiffest of breezes whilst remaining remarkably stable.

It also makes a great fun model to fly, although you will need to hone your skills at flying tight low circuits to get it down on smaller sized flying sites, such as the field I fly from behind my house. This is on quite a steep slope, bounded by trees and a little more than 100 metres square in size, which, when the wind is onto the slope, makes landings interesting – just like the model I designed with which to fly from it!

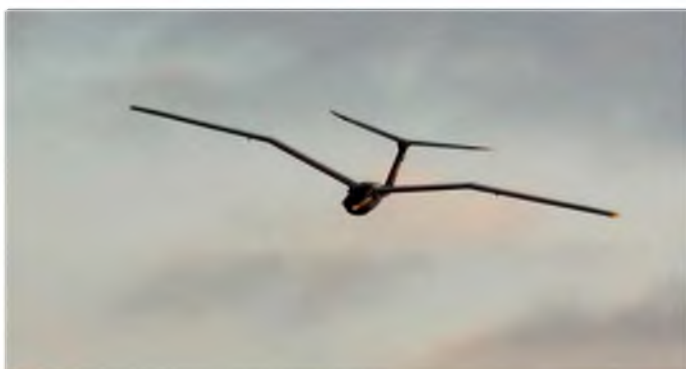
T-Bird's design thus includes the ability to withstand belly landings on uneven terrain, with any less than perfect landing forces absorbed by the moving of the flying surfaces under their rubber bands rather than the breaking of wing bolts and balsa!

I hope that this article has inspired you to make a T-Bird from my plan and that if you do so that you go on to enjoy building and flying yours as much as I have mine. If you do decide to build one I would be happy to help with any queries, and please send me some pictures of your project. Good luck!

RCMW



T-Bird gets airborne for another flight



The distinctive bird inspired shape stands out nicely against the evening sky



A final view of the finished T-Bird

## PLAN DETAILS

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T-Bird

**PLAN NUMBER:**

MW3803

**PLAN PRICE:**

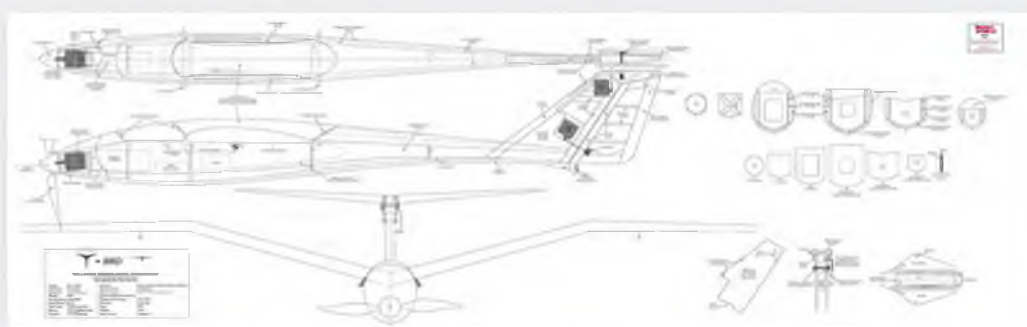
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# Cri-Cri Capers

In the concluding part of his articles describing the construction of his own design scale model of an electric powered Cri-Cri twin, John Higgins heads to the flying field

**W**ith only the final finishing to do the end was truly in sight but, as many of us will testify, final finishing takes a lot longer than we all think! At this juncture I was faced with yet another dilemma. You see, the painting has to be done in the warmer weather but the model still had one or two final bits missing, namely the front spat and the two distinctively shaped spinners, which would have to be specially moulded. The cockpit interior – such a feature under that goldfish bowl of a canopy – was totally lacking too.

If I spent time on the missing bits my window for painting would close and it would be another year before the model could take to its natural element. I decided to finish the surface details, paint the model and see it, hopefully, take to the skies. The missing bits and the cockpit interior would form an enjoyable start to the winter building season.

With the mission resolved I set about adding the rivets to the fuselage. (The full size Cri-Cri fuselage is formed from riveted alloy panels, whereas the alloy wing skins are glue bonded.) At 47% scale the domed rivets are a very noticeable feature and cannot be left off the model – and there are an awful lot of them!

Such rivets are usually modelled by using PVA and a syringe. Pro-skin needs no primer and PVA does not stick to the bare Pro-skin. A bit of experimenting was called for. This is what I finally came up with. The rivet positions were carefully marked out with tiny black dots from a very fine marker pen. Then a mixture of finishing resin and ultra-fine fairing compound was applied with a cocktail stick. The consistency of the mixture needs to be, as Goldilocks would say, 'just right', if the correct size and shape of rivet is to be produced. The resultant rivets stuck

extremely well to the Pro-skin – they could be sanded off but they couldn't be prised off with a knife. Once I got into the rhythm, adding rivets became like a form of therapy – very soothing and strangely satisfying!

As luck would have it, a club mate had access to a vinyl cutter so we managed to get the majority of the lettering sorted after a few short hours. Logos were sourced from the internet and their production was organised. As I reached for my spray gun I could almost see the light at the end of the tunnel. The painted model looked rather nice in its plain, white finish and looked all the better when the blue bits were added to the fin and the red bits added to the ends of the flying surfaces. Painting done, I was able to get on with fitting the model out and, as July approached her end, my Cri-Cri was almost ready for her big adventure.



Test piece to get the rivet mixture 'just right'



Close loop exit guides – and rivets!





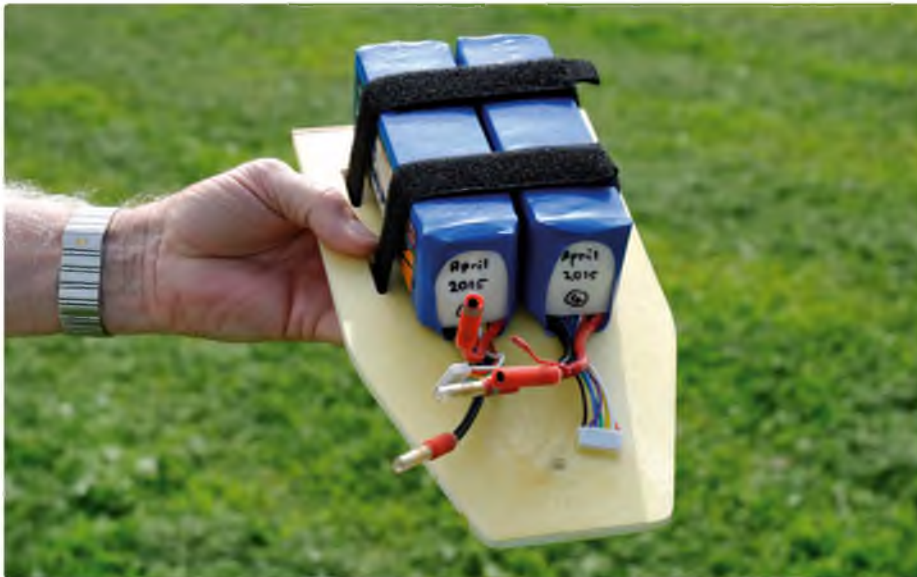
Lightweight balsa wingtips, with more (flush this time) rivets!



Paint and vinyl decals are a good colour match



The removable tail end is necessary to fit the rudder



Energy on a tray! The 6S LiPos ready for insertion into the model



Meaty speed controllers, conservatively rated



### Exultation And Trepidation

The choice of the motors, ESCs and batteries had been made long ago, at the very start of the project, as the motor pods and wiring arrangements had to be an integral part of the design and construction. In theory the power system should match the model perfectly; the motor KV's match the LiPos and the choice of props... Theory is one thing, however, and practice can be quite another.

It was on a fine day in August that I took the fuselage into the garden for the model's first power runs. The model was well restrained, the ESCs had been programmed and set up for the correct rotations (the props rotate in opposite directions) and the failsafe had been set. So, there I stood, transmitter in hand, wattmeter connected and fire extinguisher at the ready (you can't be too careful!) The ESCs each have high current capability BECs, designed to cope with the demands of aerobic helicopters, and my set-up uses both BECs (I thought long and hard over this choice and canvassed lots of opinion, but I have used this configuration on a twin before and had experienced no problems). Each motor was connected in turn and the voltages checked, via telemetry, on the transmitter screen. Separately, each 'side' showed 5.7 V and together, the same 5.7 V registered. So far, so good!

One difficulty with twins is getting the motors to synchronise throughout their rev range, I would imagine that this would be far from easy to achieve with petrol engines but should prove easier with modern electrics. I had thought that I might have to resort to independent throttle curves on the two motors but I didn't have to; both motors started up together, speeded up together (with no evidence of 'beats') and topped out together with the two motors agreeing to within 9 rpm, as recorded on the rev counter. To say that I was pleased would be an understatement!

Even on a pair of 6S LiPos that had seen better days the motors were producing 1.3 kW each and the 13 x 8 props were turning at a little over 10,000 rpm. The combined thrust seemed considerable, with the resultant draught testing the rooted strength of the bedding plants! Theory and practice: it's nice when they agree. After unplugging, the motors and ESCs had their temperatures taken with the Mark One British Finger and all was well.



Plastic spoons make excellent air scoops to cool the ESCs



The scoops look good once painted



A 4 mm, high tensile 'Jesus' bolt is the tailplane pivot



Scale aerial from bits of soldered brass and plastic tube



Depron rear canopy stiffeners



A man and his model

The big bug-bear of scale models is the fact that they usually turn out to be tail heavy and thus require considerable quantities of church roof in the nose to bring their C of G's to a flyable position. My Cri-Cri was turning out to be exactly the opposite; it was nose-heavy. When one looks at the side view of a Cri-Cri the nose-heaviness can be better appreciated; the motors are a long way out in front and the batteries are in front of the C of G position, too.

By contrast, the tail end of the model is lightly constructed. I had no alternative but to add lead to the tail end. My original estimate, as to the finished weight of the model, was in the region of 16 pounds, but my Cri-Cri was tipping the scales at night on 21 pounds! The wing-loading now nudged 40 oz/sq ft. Still, there was nothing that could be done to shed weight and club mates, used to flying jets, pooch-pooched my concerns. I decided to put my trepidation to one side and trust in Reynolds and his magic numbers.

### To The Flying Field!

There comes a time when every model must leave the cosy safety of the workshop and venture forth to feel air under its wings. For my Cri-Cri that day was the 15th of September 2016, almost three years to the day from when I first sharpened my pencil at the start of the project.

The day itself was perfect for test flying. The wind was but a light zephyr, blowing almost straight down our strip, and the mowing contractor had just cut the grass on the previous day. What was more, my expert photographer, Peter Cathrow, was available and itching to work his magic with his lens and camera.

Different folk have differing approaches to first flights and the feelings experienced depend on the model being tested. A commercial ARTF, providing the manufacturer's instructions have been followed, should present few problems, whereas scratch-built own designs are a bit more of an unknown quantity.

The Cri-Cri certainly falls into the 'unknown quantity' category. The 'T' tail means that there is no prop wash over the tailplane, so that the model, as with jets, is likely to need a high ground speed before rotation. What's more, I had no experience of models with Junkers style flaperons. Should the C of G be fixed relative to the wing or relative to the wing, plus flaperons? Will the mass balancing in the tailplane be sufficient to prevent the dreaded tailplane flutter? Fortunately, I have never had a problem with first flight nerves; I'm quite happy to do all the pre-flight checks, then taxi out and take-off.

The Cri-Cri was taxied out to the end of the runway and lined up into wind. As the throttle was eased forward the motors sounded a determined note and, to the clicking of Peter's shutter, the model accelerated down the strip. The contra-rotating props meant that there was not the usually-to-be-expected pull to the left: the Cri-Cri tracked dead straight, eager to embrace her destiny. A touch of up elevator saw the weight come off the nose wheel and the Cri-Cri left the planet for the first time.

The first flight was spent in adjusting the trims and checking out the slow-speed handling; the model appeared to have no vices. All too soon the transmitter bleeped, signalling that a landing was required. So it



Rotation...



... And take-off! The Cri-Cri feels air under her wings for the first time



The motors are a long way out in front



Cruising over the Lancashire countryside



On finals



Taxiing back after the first flight

was into the landing circuit, with a 30 degree bank onto the base leg, level the wings and adjust the descent rate. Then a 15 degree bank, allowing the nose to drop a little to keep the airspeed well away from the stall, and she was on finals.

With no flap used on this first flight, touch-down was a little fast and the model needed all the runway to stop! Back in the pits, post-flight checks proved that nothing had come loose or fallen off and (importantly for electric models) nothing was unduly hot. The batteries had 32% capacity remaining too.

I had another two flights that day, where the flap settings were evaluated and the model's stall characteristics checked out. There would still need to be a good amount of transmitter programming before the flight test phase would be ended but it was obvious that the Cri-Cri was showing herself to be a sweet-flying aeroplane. By the time I arrived home my face ached as a result of holding an ear to ear grin!

Early the following week a second flying opportunity presented itself and the Cri-Cri, once again, found itself on the strip and lined up for take-off. Since the previous outing, the model had been scrupulously checked out in the workshop, just in case anything had worked loose or showed any sign of impending failure, and no points of concern were apparent. The first and subsequent flights, the previous week, had established the basic trim settings but the model needed a little more finesse if it was to fly to its full potential. To this end, separate flight conditions had been added to enable the trim to be finely set for the various flap positions.

So, as the model accelerated, it was with the intention of fine trimming, exploring the model's spin and spin recovery traits and its ability to loop and roll. The full size is aerobatic in a mild sort of way but it is not an Extra 300. The model will always be operated in a respectful manner and will never be flown like a Wot 4!

I'm pleased to say that the Cri-Cri sailed through all its tests and after three flights, I found myself heading for home wearing yet another idiot's grin. There will be many more flights to come before everything about the Cri-Cri is totally to my liking, but initial impressions have proved more than pleasing.

So, there we have it. The Cri-Cri has provided three years of satisfaction (and not a little frustration). In the workshop, it has enabled me to try out, and develop, new techniques and materials whilst holding out the promise of many happy hours in the air. All I have to do now that the building season is with us once more is furnish the cockpit interior, manufacture the front wheel spat, mould the scale spinners and source a 47% scale pilot... With modelling the fun just goes on and on! **RCMW**

## THE MODEL WORLD

### CRICRI SPECIFICATION

<b>WINGSPAN:</b>	2.3 m (91")
<b>OVERALL LENGTH:</b>	183 cm (72")
<b>WEIGHT:</b>	21 lb
<b>WING LOADING:</b>	40 oz/sq ft
<b>MOTORS:</b>	580 KV
<b>POWER:</b>	2 x 1.4 kW
<b>POWER LOADING:</b>	133 watts/lb

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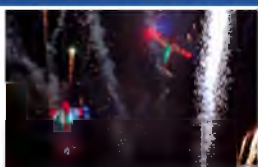
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It is 16 years since David James last wrote an article about the Wessex Scale League. So a brief update is well overdue. With additional photography by John Perry, Steve Fish and Martin Stirling

# Wessex Scale League In Middle Age



The one to beat, with a look that says it all: Steve Fish and Top Gun Spitfire (71 inch span, 12.5 pounds, Laser 150)

Last year marked the 44th anniversary of the Wessex Scale League's foundation and much has changed to models, personnel, and rules since then. One thing remains a firm constant however, and that is the camaraderie between those who participate in these very laid-back competitions. It is always good to be among friends who share the same passion for scale aeromodelling, even though it is usually necessary to put up with a fair amount of cheerful banter.

Sadly, a few good mates have passed away since 2000, notably Alan Sims of the Warminster Club. In recognition of Alan's unflinching support it was decided to dedicate a permanent trophy to his memory. This is awarded each year to the competitor who has built the best scale model, as judged by the vote of his peers. Paradoxically, fewer and fewer competitors qualify for this award because the rules have been changed to encourage ARTF models.

Competition for the main trophies is now based on flying only, the 'WSL Cup' going to the highest placed Club and the 'Banshee Trophy' being awarded to the individual who has accumulated the most points during the year. It is in this element of Club competition

that the WSL differs from its Northern equivalent, the 'Traplet Scale' competitions that take place in Lancashire and Yorkshire and are often referred to as the 'War of the Roses'. In most other respects the format appears to be about the same, with flying

manoeuvres being based on BMFA scale competition rules.

Other changes have taken place over the last 16 years, with more electric-powered entrants, although glow and petrol powered models still predominate – just!



The essential ingredients of the scale competition: judges, competitor (Derek Burvill), model (PT-19 Cornell) and venue (Smeatharpe)

## Heroes Of Old

The 'ones to beat' have also changed. It seems to go in cycles of around five years where one particular competitor dominates most events. In the late 90s it was Gordon Nicholls with his very large models. Then Tom Airey took over with his Airey Fairey Topsy Junior built from a Dennis Tapsfield plan. Then it was Ashley Anderson's turn to show how accurately and beautifully a scale Spitfire could be flown. The current supremo is Steve Fish, who seems able to fly anything

into first place, whether it be a Corsair, Spitfire or a Typhoon. Interestingly, Steve has informed me that he doesn't intend to enter WSL events in 2017 so that he can spend more time finishing his Brian Taylor P-47. I think it is a pity but it should open things up a bit.

The League is blessed (or cursed) with other members who have distinguished themselves in national competition. We all bask in the reflected glory of stalwarts such as Dave Gibbs, Dave Cossins and John

Thomas, as well as Steve. They keep us on our toes as far as standards are concerned and, on the very rare occasions when we are lucky enough to beat one of them, we can easily convince ourselves that we too could win the Nationals if we really wanted to!

## Geography Is Changing Too

The area covered by the WSL corresponds to roughly that of the ancient kingdom of Wessex, comprising Devon, Somerset, Dorset, Hampshire, Wiltshire and Gloucestershire.



Winner of the Alan Sims Trophy for home-built models (static judging only) was won by the author with his Bf-110 built from Chris Golds' Traplet Plan, MW3489. 28 pounds, 120 inch span, electric twin with sound system, lights and bomb drop

At the time of my last article competitions regularly took place in all of these counties. Nowadays, participating clubs hail from a much smaller area covering Somerset and the Eastern edge of Devon. Likewise the number of competitors at each event has shrunk from 20 to 30 to around 10 to 15, despite the rule relaxation to allow ARTFs and eliminate static judging.

**Why The Decline?**

It seems that aeromodellers are losing the urge to compete – in scale competitions at least. We no longer rule the skies in international competitions and interest is waning at national and club levels too. The gradual increase in the average age of scale modellers must be a factor. There is less

inclination to make long trips at weekends along busy motorways and with no guarantee that the weather will be clement when arriving at the competition site. It is much more attractive to pop down to the club field for a spot of instant gratification with an electric import and a 'Grumpy Old Men' session with one's mates.

**A Year In The Life Of The WSL**

In 2016 our year began with the AGM in April. Trophies were awarded to last year's successful competitors and clubs, and the programme for 2016 was agreed.

The first competition took place on 29th May at Smeatharpe in Devon, hosted by the Blackdown Club on a glorious sunny day with skylarks in full song above the old WWII airfield. Sunny it may have been but it was also quite cold in the strong wind that

blew straight across the runway. Most of the 12 competitors would probably not have flown their precious models at their local fields under such conditions but competition encourages participation and we all enjoyed exhilarating flights.

None more so than Vicky Young, who bravely flew her scratch-built Morane Saulnier Bullet. The lightly loaded aircraft took-off almost vertically, with a startling variation in speed as it hurtled downwind,

then clawed its way back towards the take-off area. Vicky's landing would have made a Harrier pilot envious!

In the end the individual honours were taken by Steve Fish (Spitfire), followed by Martin Stirling (Stampe) and Dave Cossins (Hellcat). The Ilminster Club topped the League table, with Woodspring Wings second and Pitney third. A pattern was beginning to emerge that would continue, more-or-less, for the rest of the season.



**Left:** Vicky Young presents her Morane Saulnier Bullet, but she also campaigned a Sopwith 1½ Strutter. Both models are a bit small to compete with heavier metal so Chris Golds is designing, especially for her, a relatively large Fieseler Storch

**Right:** Martin Stirling is a skilled flyer who always turns in a good performance with his models. His Stampe is built from the Precedent kit: 1/4 scale, weight 10.5 pounds, ASP 1.20 FS



**Pitney**

The Pitney club hosted the next event, on 19th June, at Pitney International Airfield on top of the Polden Hills that lie around Sedgemoor. The site is 'interesting' in that the ground on the far side of the runway drops down a steep escarpment onto the Somerset levels. When a westerly wind hits the ridge it can catch out the unwary flyer with a vicious curl-over, especially near a stand of trees that lies at the top end of the runway.

It certainly caught me out whilst flying my Bf-110. I had just flown over the trees on the penultimate (crosswind) leg of my landing circuit when the aircraft suddenly dropped out of sight behind a hedge near the runway threshold. I mentally wrote it off but kept twiddling the sticks in the vain hope that something good might happen. Miraculously, a wingtip appeared, and then the whole fuselage. We were back in business! I got a small cheer for that!

I also finished second behind Steve Fish (again), with Dave Cossins third. The League standings were unchanged. Vicky campaigned her Sopwith 1½ Strutter this time and put in a very creditable flight under

conditions that were far from ideal for such a small model. We only managed one round of flying as rain set in after the lunch break.



If Steve flew a wheelbarrow he would probably win with it! This is his Black Horse Corsair (90 inch span, 20 pounds, DA 50 petrol engine) with which he won the Woodspring Wings and Pitney competitions



Tim Young campaigned all season with his E-flite P-51D Mustang. Tim improved the model with his own metallic chrome finish, rivets and markings. The small model copes well with strong winds



Peter Fell put in some good flights with his Piper Cub. Unfortunately, this model suffered the only crash of the four events



Jeremy Wilkinson's A6M Zero has a span of 55 inches, features split flaps and uses a 38 mm brushless motor, plus a 4S 3.2 Ah LiPo

### Woodspring Wings

Now to Woodspring Wings for the third event, on 24th July. The grey, damp and windy conditions were not conducive to accurate flying but two rounds were completed and, once more, SF emerged victorious, with his Corsair this time. Local man, Martin Stirling came a close second flying his Stampe. I came third and the League placings remained unchanged.

Yet again, the wind dominated the final event at Smeatharpe on 11th September. Unusually, the Ilminster Club hosted this event, even though it was at Smeatharpe (at the kind invitation of the Blackdown Club), because their superb airfield at Merryfield is no longer available for competitions.

Only seven entrants took part, the strong crosswind deterring others. I was not able to attend but two rounds were flown, with Steve in front again, having gone back to his Spitfire. Martin Stirling was second and Dave Cossins third. Tim Young flew his small but beautifully finished Mustang very competitively against much larger models that will always carry an advantage in strong winds due to their inherent stability.

So when the dust (or should it be wind) finally settled at the conclusion of the Wessex Scale League year, the Ilminster Club were top of the League, Steve Fish had won the Banshee Trophy and I won the Alan Sims Trophy.

On looking back over this article I realise that the repetitious nature of the results makes it seem rather predictable and boring but it really

isn't like that. Every single flight is an event in itself, being full of excitement and challenge as you fly in conditions that are often less than ideal. Even if you stand little chance of winning you can measure your performance against your own standards and, hopefully, see a gradual improvement over the years.



Dave Browne of Pitney seen here with his Wild Hare Extra 300, powered by a DLE 55 with an EME autostart

### Competition Improves The Breed

That statement is as true today as it ever was, for builders and flyers alike. So if you want to improve, start competing. Develop your potential by learning to fly disciplined circuits and manoeuvres that replicate those of the full size aircraft on which your model is based. Have them judged by well-informed and friendly judges who are always happy to justify their marking and offer suggestions for improvement. Quite often these judges

have first-hand experience of flying full size aircraft, so they know what they are talking about.

I would love to see more scale events hosted by individual Clubs, as well as inter-club competitions like the WSL and Traplet Scale. Perhaps a national event could be arranged, involving both leagues, somewhere on neutral turf in Mid-Mercia? Maybe it would attract some East Angles, too! **RCMW**



Martin Stirling's 'other' model is a beautifully constructed and finished Comper Swift from the Dennis Bryant plan (Traplet MW3445). Six foot span, 1/4 scale, 8.5 pounds and sounds superb with its Laser .61. burbling away, disguised by a very realistic dummy radial



2016 was Gordon Hill's first season in the WSL. His Great Planes Ultimate Bipe is 65" span, weighs 16 pounds and is powered by a DLE 55 with an EME electric autostart

### CONTACT

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**Right:** I used to compete with my O/D Seamew (50 pounds, 120 inch span) until it caught me out whilst attempting a touch-and-go at Pitney. The residual thrust from the turboprop gave it a glide slope almost identical to the downward slope of the runway! At the next AGM it was decided to eliminate the touch-and-go from the list of obligatory manoeuvres – not my suggestion, honest!





**Pilatus Turbo Porter XF**

Wingspan 890mm  
Weight >185g  
**HC 1384**



**Master Stick**

Wingspan 1200mm  
Weight >700g  
**HC 1390**



**HoWing 1000**

Wingspan 1000mm  
Weight >320g  
**HC 1329**



**Vagabond**

Wingspan 1510mm  
Weight >480g  
**HC 1220**



**EDGE 540 V3 Toxic**

Wingspan 812mm  
Weight >145g  
**HC 1381**



**Fun Master**

Wingspan 1300mm  
Weight >700g  
**HC 1391**



**HoWing 1200**

Wingspan 1000mm  
Weight >330g  
**HC 1330**



**Bergfalke II/55**

Wingspan 2000mm  
Weight >780g  
**HC 1229**



**MX2 Toxic**

Wingspan 812mm  
Weight >145g  
**HC 1382**



**Cool Master**

Wingspan 1650mm  
Weight >1950g  
**HC 1392**



**P 51-D Mustang**

Wingspan 840mm  
Weight >340g  
**HC 1308**



**Blanik**

Wingspan 2000mm  
Weight >780g  
**HC 1225**



**MXs-804 Vector**

Wingspan 804mm  
Weight >210g  
**HC 1361**



**Bellanca Super Decathlon (elektro)**

Wingspan 2000mm  
Weight >3950g  
**HC 1008**



**Focke-Wulf FW 190D**

Wingspan 840mm  
Weight >340g  
**HC 1307**



**Luňák**

Wingspan 2000mm  
Weight >780g  
**HC 1226**



**EDGE 540 v3**

Wingspan 1000mm  
Weight >390g  
**HC 1702**



**MX2**

Wingspan 1200mm  
Weight >950g  
**HC 1339**



**Mitsubishi AGM2 Zero**

Wingspan 840mm  
Weight >340g  
**HC 1310**



**FOX**

Wingspan 2000mm  
Weight >780g  
**HC 1227**



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# Fairchild PT-19

Bill Bowne has designed this sport scale model of the PT-19, which he has simplified to save weight and reduce complexity. It builds into an easy to fly four channel model for a 1400 KV motor, with an 18 A ESC and a 3S 1000 mAh LiPo



## MODEL WORLD

### At A Glance

<b>WINGSPAN:</b>	45" (1143 mm)
<b>WING AREA:</b>	288 sq in (18.58 sq dm)
<b>WING LOADING:</b>	10 oz/sq ft
<b>LENGTH:</b>	32.5" (826 mm)
<b>WEIGHT:</b>	20 oz (567 g)
<b>RADIO FUNCTIONS:</b>	Throttle, Ailerons, Elevator, Rudder
<b>SERVOs:</b>	Hitec HS-55 (3)
<b>BASIC CONSTRUCTION</b>	
<b>MATERIALS:</b>	Balsa, Ply, Spruce, Bass, Lite-Ply
<b>COVERING</b>	
<b>MATERIAL:</b>	Litespan/Coverlite and tissue
<b>MOTOR USED:</b>	Turnigy D2826/10, 1400 KV
<b>PROPELLER:</b>	APC 6 x 4 or Graupner 6 x 5
<b>ESC:</b>	Castle Thunderbird 18 amp
<b>BATTERY:</b>	3S 1000 mAh, 25-35C LiPo
<b>C OF G:</b>	2.75" back from LE at centre section (i.e. under the main spar)
<b>RUDDER:</b>	+/- 1/2 inch
<b>ELEVATOR:</b>	+/- 3/8 inch
<b>AILERONS:</b>	up 1/4 inch, down 3/16 inch
<b>CAR MIXING:</b>	25% rudder with aileron

Litespan with gift-shop tissue trim brings back fond memories of the gummy-band models of my youth, but the PT-19 flies much better than my rubber-band models did!

Thousands of WWII US and Commonwealth pilots started their careers flying Fairchild's PT (Primary Trainer)-19. Despite structural issues with their wooden wings, nearly a hundred of those PT-19s still fly, many dressed in variations of the early war US Army blue and yellow colours. Those cheerful colours made it easier for student pilots to see other novices as they trundled around their training fields. Now, those same bright colours aid those of us with 'mature' vision. So when I looked for a new building project the PT-19 came to mind.

Like many of us I built tissue-covered rubber-band models when I was younger. I've always been fond of the look of tissue so I decided to do this model along those lines. But, I chose to 'cheat' and use Litespan, trimmed with doped gift-store tissue paper. Much easier, yet it still looks like Silkspan.

This is a stand-off scale model, simplified to save weight and reduce complexity (like those rubber-band models of my youth). I've left off the wing fillets and, to fit an inexpensive brushless outrunner, I've widened the cowling. Whilst the model is recognisably a PT-19 it isn't a competition scale model.

Construction is a bit more complex than the usual slab-sided model and benefits from using jigs. Those jigs are well-worth the effort, providing a light, straight structure that the Litespan covering shows off.

We'll start by deciding whether to build the wing one panel at a time (one right and one left, please!) or (as I did it) all at once on a hinged building board. I'll try to describe the 'one panel at a time method' but be advised I haven't built a wing that way in over 20 years!

Once that choice is made it's time to start cutting and gluing balsa.

**Wing**

Build the undercarriage/landing gear (LG) blocks as sub-assemblies. Slot the trailing edges (TE) for the wing rib aft ends (two hacksaw blades taped together make a 1/16" slot). Laminate the wing tips and rudder from layers of 1/16" balsa. Glue R2 to R2a and R3a to R3 (make a right and a left-handed version of each). Glue the 1/8" x 1/4" hardwood strips under the servo trays.

Pin down bottom spar and TE. Criss-cross the spar with pins – sticking pins through a spar weakens it.

Cut bottom sheeting to fit the LG blocks. Leave it a bit long in front of the blocks to accommodate the aerofoil underside near the leading edge (LE) and glue it the spar and TE. Leave that extra under the LE loose, for now. Glue the LG blocks and ribs R2-R4 to the spar and sheeting, then add the rest of the ribs. If building one wing panel at a time use the dihedral guides when gluing on F1.

Glue 1/4" sq balsa LE to the fronts of the

ribs, add the 1/16" shear webbing and 1/16" ply dihedral brace; the shear webbing grain is vertical. When dry, sand the webbing tops to match the spar slots (a bit of old spar stock with sandpaper glued to it works well), then glue on the top spar, the wing tip laminations and support gussets.

Glue the wing sheeting to the 1/4" sq LE and let it dry thoroughly before the next step.

Moisten the TOP of the wing sheeting with ordinary tap water (a damp paper towel is fine). Spread slow-drying glue on the spar and rib tops, then bend the sheeting down over the spars. Secure it to the spar with clothes pegs or bulldog clamps and pin it to the rib tops.

Trim the sheeting excess along the spar. If doing both wing panels at once, glue and clamp down one side, then bend the other down and cut both along the centre rib. Pin and clamp down both sides and let dry. Sheet the top centre-section. Cut out for, and glue on, the aileron servo mount.

Run a strip of plastic sandwich wrap between the 1/8" balsa TE base and the rear spar. Glue the aileron LE, blocks and 'ribs' to the base. Pin the aileron/TE sandwich to the rear spar and the work board.

Protect the rear spar with masking tape and set the TE thickness with a length of 1/8" music wire, then sand the assembly to a taper.

Cut the ailerons loose from the rest of the TE and bevel their LE's to a shallow 'V'. Slot the centre-section TE for the torque rods (and their plastic tubing bearings), notch the centre section and rear spar, to allow the torque rods wiggle room, then glue on the TE bits (trapping the torque rods).

Remove the wing from the board, finish the bottom front sheeting, and add the bottom spar extension at the wingtips. Remove all the pins, clothes pegs and other clamps. Apply balsa filler (as needed), then sand, sand, sand! Now, set the wing aside and get started on the tail feathers.



Wing panels can be built as two, separate panels...



...Or the whole wing can be built in one process, using a hinged building board



Sandpaper glued to a scrap of old spar material of the same width makes a handy tool to ensure the shear webs are level and the spar slots line up



When sheeting the wing LE glue the sheet to the LE first and let it dry



Moisten the sheet's outside, run a bead of slow-drying glue along the top of the ribs and the top spar, then bend the sheet down over it. Do one side, then the other and cut through both along the centre line. Remove the excess wood, then clamp the sheet down to dry thoroughly



Sand the TE and ailerons to a smooth taper using a strip of masking tape to protect the rear spar and 1/8" music wire to set the TE thickness



Groove the centre-section TE for the aileron torque rods, then glue it onto the rear spar

**Laminations**

Make the forms from corrugated cardboard. Glue the layers together with a glue stick, alternating the corrugation direction, making the composite about 1.5 times the thickness of the desired piece. So, for a 1/8" piece, the form should be at least 3/16" thick. If doing two parts at once, such as the wingtips,

make the form 1.5 times the thickness of BOTH pieces, in this case at least 3/8". Saw and sand the cardboard just as you'd saw and sand balsa block, leaving around 1/2" extra on each end of the form for easy handling. Then wrap tape around the edges of the forms, followed by a protective layer of plastic sandwich wrap.

Soak the wood strips in very hot (nearly boiling) water. Ammonia is NOT needed! One at a time, dry the strips, apply a thin layer of carpenter's glue and wrap the strips around the form. Hold the wood strips in place with tape and rubber bands and let dry thoroughly.



**Left:** Criss-cross the corrugations to stiffen the lamination forms, then wrap with plastic sandwich wrap. Shown are wingtip and rudder forms

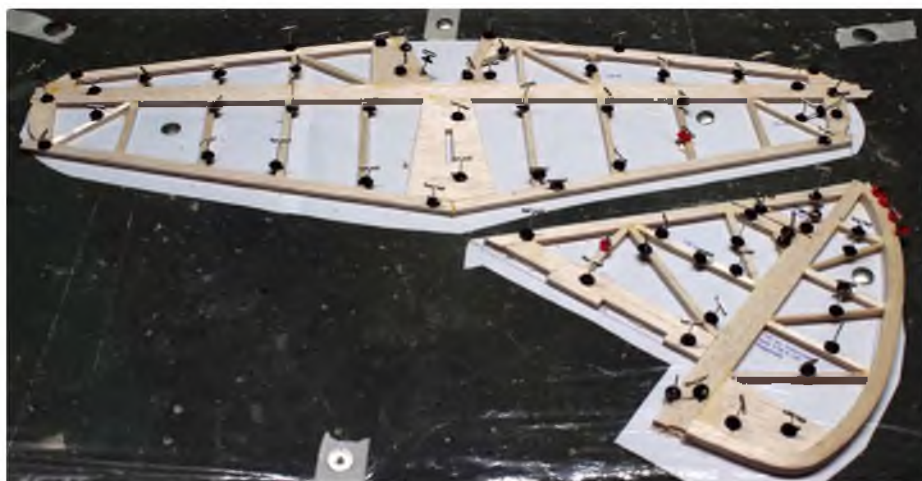


**Right:** Making both wingtips at once, then separating them with a balsa stripper is an easy way to ensure they match

**Tail Surfaces**

Make the tail surfaces as two single units, separating the control surfaces later. Start by pinning down the lettered pieces (i.e. 'S1', 'V1'), then fit and glue on the straight perimeter bits from hard 1/8" x 1/4" balsa. Fit and glue on the rudder lamination. Now, do the 1/8" sq and 1/8" x 1/16" 'ribs' and gussets for the fin and tailplane.

When dry, separate the rudder from the fin (including the aerodynamic balance) and separate the elevators from the tailplane. Sand the hinged areas to a 'V' (gently round the rudder balance LE). Drill and fit (but don't glue in!) the music wire elevator joiner.



Plastic sandwich wrap keeps the tail feathers from being glued to the ceiling tile building board

**Fuselage**

Prepare by gluing F4a to F4b and the temporary 1/8" sq balsa braces to F5 and F6. Pin the 1/32" balsa forward fuselage side and the 1/32" aft fuselage sheet to the plans. Note that the aft sheet grain is vertical. Glue the 1/8" sq upper and lower side longerons to the sheet, followed by the 1/4" sq stabiliser brace and the wing saddle.

Mark the locations of the bulkheads on the fuselage sides, then glue the diagonals and the corner gussets aft of the wing in place.

Use the bulkheads as spacers, but don't accidentally glue them in yet.

Glue bulkheads F4a/b, F5, F6, F7 and the wing bolt plate to one fuselage side and keep them perpendicular to the side until the glue dries. Glue the opposite side to the first and keep it aligned until the glue is dry. It will be rather 'floppy' so please handle the sides carefully.

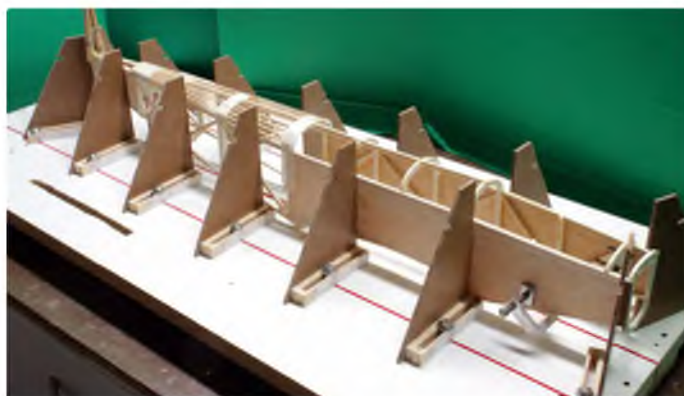
Unpin the fuselage from the board and align it over the top view. Time for another jig, this one for the fuselage. Sand a bevel in

the aft fuselage, join it at the tail and add in all the remaining bulkheads and F11. Before gluing in the firewall make sure you've drilled it out for your motor and that the blind nuts are firmly set in the firewall's rear.

With the fuselage upright add diagonals between the top longerons aft of F7, then the 1/8" sq top centre longeron from F4 to F10, followed by the top 1/16" sq bass longerons between F7 and F10 and the 1/16" sq anchors between F4 and F7. When dry, sand the front half of the stringers, leaving a 1/32" lip.



A good way to avoid making two of the same fuselage side is by laying out both sides at the same time, top to top



The 1/16" bass side longerons and cheek doublers aren't added until the fuselage is removed from the jig

Add the 1/16" sq sheet anchors then sheet between F3 and F7 with 1/32" balsa.

Moisten the outside of the wood and spread slow-drying glue along the bulkheads and the centre longeron. Now, carefully wrap one side in place, then wrap the second side over it. If you can't see the centre longeron on both ends mark the wood being wrapped.

Holding both in place, use a straight edge to cut through BOTH sections, down to the centre longeron. You may find an extra set of hands helpful at this point – just don't cut their fingers! Let the bits unwrap, remove the excess, then press the sheets back into place. You should have a neat joint that

runs right down the centre longeron. Wrap with masking tape and let dry, then trim the excess.

Turn the fuselage over and add the bottom aft longerons.

Centre the fuselage on the wing, sanding off the wing TE at the centre section. Drill through F4 into the wing centre ribs, then install the 3/16" dowel in the wing. Remove the wing and round off the front of the dowel.

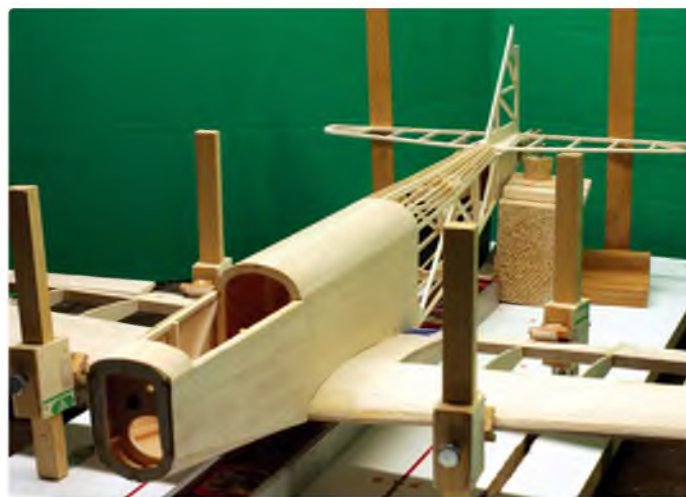
Square the wing with the fuselage, then drill and tap for two 8-32 nylon bolts. Add the 1/32" ply wing bolt reinforcement plate, then epoxy a 1/2" strip of fibreglass tape around the wing centre section.

Add the bottom forward centre longeron and 1/16" sq braces, then sheet under the nose with 1/32" balsa in the same manner as you did for the fuselage top. Glue on the 'cheek' reinforcements. Save the 1/16" bass side longerons until the tail is on.

Bolt on the wing, then add the tailplane and fin, aligning the tailplane with the bottom of the wing. With the Clark Y-ish wing section on the PT-19, having the aerofoil's flat bottom section parallel to the horizontal stabiliser/ tailplane automatically generates the right angle of attack.



Fuselage underside longerons. The tail wheel strut is sewn to ply plate with Kevlar fishing line and thin CA. Note that the aft side sheet is fitted between the longerons and the grain is vertical



Yes, the Frankenjig has many uses! The tailplane and fin are glued to the aft fuselage with an epoxy/micro-balloon slurry. A masking tape 'dam' keeps excess slurry from escaping

### Battery Hatch

Place plastic sandwich wrap over the battery bay opening. Sticking pins in from the outside of the fuselage, pin lengths of 1/8" sq balsa between F2, F3, and F4. Keep the tops of these strips even with the tops of the fuselage side longerons. Now, glue the 1/16" balsa sheet hatch base to those strips, letting the sandwich wrap keep you from gluing the sheet to the fuselage. Remove the pins and verify the assembly can be removed before proceeding. CA glue can be sneaky!

Build up your hatch with blocks and strips of softwood. I used some 1/2" triangle stock at the rear of the hatch, with a matching piece in front of F4, making for an instant 45 degree joint. Keep using that sandwich wrap, to avoid making the hatch one with the fuselage!

Drill through F1 to get to F2 and the hatch, making a hole for the 1/8" hatch front dowel. CA some super-magnets into the top hatch magnet plate, then CA the bottom plate UNDER the side longerons. Now, add the top hatch magnet plate and the dowel.

Put bits of tape, sticky side up on the magnets and press the hatch in place. Remove the hatch and screw flat-head screws through the tape; make sure the screws are ones that the magnets will stick to!

With the hatch firmly held down by magnets and dowel, sand it to shape.

Gently probe with a pin through the fuselage top to ensure you're clear of the bulkheads. Use a glue stick to hold the cockpit opening template in place, then cut out the cockpit and crash pylon openings with a sharp hobby knife.

Install the servo tray then tape the rudder and elevators to the fin and tailplane, noting which side has the elevator control horn plate. Then install your pushrods. I used .032" (.81 mm) music wire, for the PT-19, with a 'Z' bend at the servo end and a threaded connector soldered to the control surface end. This leaves the clevis easily

accessible, plus it adds some stiffness to the pushrod beyond the plastic housing tube. Brace the pushrod housing at F7, F8 and F9, to keep the pushrod from bending under stress.

Glue 1/32" balsa floors to the two cockpits, leaving room in the front for battery and ESC cooling air to exhaust.



Scrap balsa block hatch has 1/8" square alignment guides on the bottom and a 1/8" dowel retaining pin in front. Magnets at the rear latch onto two flat-headed screws. If the hatch won't 'click' satisfactorily replace one (or both) screws with more magnets



Notched balsa strips hold the plastic pushrod tubes at F7, F8 and F9, ensuring that the pushrods won't bend – even under those panic pull-outs!

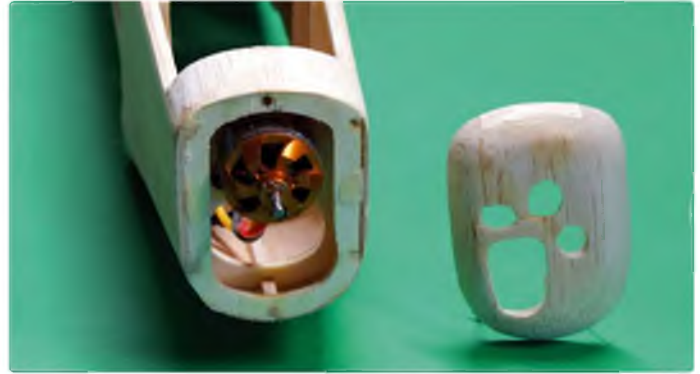
**Final Assembly And Covering**

Cover the nose bowl separately from the rest of the fuselage, then glue it on over the motor AFTER you add washers for down and right thrust. You may be popping the bowl off to service the motor, so don't glue it down too securely!

All of the white, medium blue, dark green and yellow 'tissue' was done with Coverlite (or use Litespan), whilst the red, black and dark blue trim was done with ordinary coloured tissue paper.

The crash pylon was built from some old plastic tubing and a bit of bass, and the pilots were carved from blue foam.

Finished weight came out at 20 ounces. A 1400 KV Turnigy outrunner on an older 3S 1000 LiPo turned an APC 6 x 4 E-prop, generating approximately 90 watts at 10 amps for a power to weight ratio of about 70 watts/lb. Since my ESC was only rated at 18 amps, I wanted to ensure a comfortable buffer for the maiden flight.



Motor installed and nose bowl carved. Note inset cross-piece in nose bowl, a strengthening separator between the largest opening and the roundish holes above it



Lightly glue the nose bowl in place after covering but leave a seam so it can be removed for motor servicing or adjusting the down and side thrust



Overturn pylon is made from scrap plastic tubing and bass bits, whilst the pilots are carved and painted blue foam. Weight is virtually nil but somebody's got to be in the cockpits!

**First Flights**

Came the day of the maiden the wind was right down the runway, albeit it a very short, but very wide runway – in other words it was a 90 degree crosswind! Happily it was also a light crosswind but one thing I learned from my previous PT-19 models was how much that big tail made them want to weathercock into the wind!

Rudder control turned out to be strong enough to keep the PT-19 close to the centre-line during the take-off roll. Acceleration was good, but it was clear that more thrust would be nice. I can't say the model flew 'off the board' as I had to put in quite a few clicks of aileron, elevator and rudder. The stall was pretty tame but rolls required full aileron and rudder combined.

After stooging around until the nice Spektrum lady said 'Time Expired', I made an uneventful landing and took a look at the transmitter. Gee, I'd put in a lot of right

aileron, down elevator and left rudder trim... Wait a minute – RIGHT aileron and LEFT rudder? No wonder the rolls were so bad! Once I zeroed out the rudder trim the model flew a lot more nicely, with a decent, more axial roll.

For the next flight I replaced the APC 7 x 4 E with an ancient Graupner 6 x 5. The top speed didn't increase that much but the model pulled through loops a lot more steadily. Plus, it only pulled a few more amps, bringing the power up to 100 watts total (79 watts/lb).

So, she's a pretty model, especially during those low, slow (and surprisingly steady) passes, with the sun shining through her covering. She's rapidly become our favourite for those quiet summer evening flying sessions.

Plus, it's a lot easier to change batteries than it was to wind up those darned rubber motors! **RCMW**



Mixing a bit of rudder into the ailerons makes for smoother, easier turns. I used 25%



Translucent covering shows off the PT-19's structure quite nicely



Those are dwarf pines, reaching barely 25-30 feet tall. In other words, they're a lot closer than they seem!

Wide landing gear stance helps with smooth landings, even on our rough, gravelly runway

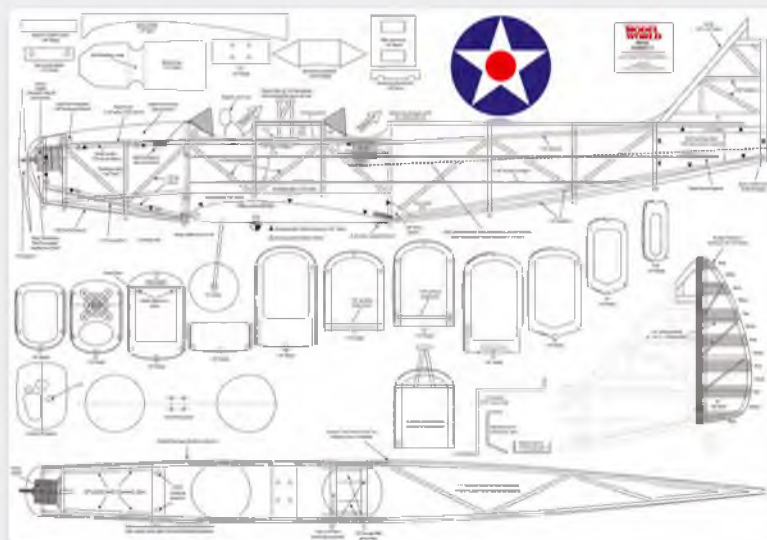
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# The Dark Flight

James Crozier takes a look at the Bat-Safe, a newly developed LiPo charging box that is being distributed by MacGregor Industries



Store and charge your LiPos in their own bat cave!



The lid filters the sooty smoke released during a battery fire and releases it through the holes. It also safely releases the energy from any pent up gases inside



A strong latch keeps everything sealed inside. Our first question was why not fit two, but if you look at the Bat-Safe Kickstarter page then you'll see that this product underwent extensive testing



The rubber bung that seals the wire-way is tough to pull out but it needs to be a good seal in the event of a battery fire. Best way is to pull on the long tongues on the inside of the box, while pushing down on the flat side on the outer skin. It's in two pieces so that you can sandwich the charge and balance leads between the two halves. To re-insert push it through from the top, pulling on the tongues as you go

**T**he importance of safety and good practise can't be understated when dealing with Lithium Polymer batteries (or as we all refer to them, LiPos), which are unanimously the most popular type these days.

Most of us, no matter how long we have been enjoying the hobby, will have witnessed what a LiPo fire can do to its surroundings, whether first hand or from pictures or videos online – not fun at all!

Here at RC Model World (and in Traplet's

other modelling publications) we always advocate the charging of LiPo batteries outside or, if this isn't possible, at least in an outhouse or shed next to an unlocked door or window where a pack showing signs of distress during charging can be quickly taken outside and away from people, pets and property. Placing your LiPo on large ceramic tile during charging provides an easy to pick up 'tray' in such an event.

So, it's great to see products such as the Bat-Safe making an appearance and adding

an extra layer of security when charging that should hopefully give you more peace of mind and allow you to charge your packs knowing that any issues will be contained within the sealed box.

## First Impressions

The Bat-Safe looks very striking, with its glossy white exterior covered in bat silhouettes. It's of a flip-top design, with the upper section featuring a grid of ventilation holes that will filter out any nasty substances





A strong, webbed handle makes for easy carrying



Well riveted hinges help maintain a good seal if the worst should happen inside the Bat-Safe



Charge and balance leads sandwiched between the two halves of the wireway bung. Keep your hands clear of the filter when pulling it through – those holes would make a good cheese grater!



Apart from charging one or two LiPo packs the Bat-Safe can be used to store several packs. Here's a session's worth of 3S packs and it's not even half full



Bat-Safe can be used to transport a healthy number of 6S packs, with room on top for some smaller LiPos too



A metal bracket is provided that slots into the vent holes and which can be used to support a small charger

should something go wrong inside while the LiPo is charging.

The bottom section is where the main weight of the Bat-Safe is concentrated, because it is here that the extremely thick 'walls' of the box are located that will help to contain a LiPo fire.

These two sections are locked in place with a latch-style mechanism, similar to something you will find on a hard transmitter case, which makes sure that the whole thing is firmly secure. There is also a handle on the side of the bottom section to allow you to carry the box when you are finished charging or taking pre-charged packs to the flying field.

**Riddle Solved**

The main feature to note, aside from the Bat Safe being able to contain fires with its thick walls and its ability to filter soot and smoke whilst releasing pent up gases, is that it boasts a fireproof 'wire way'. This means that you can safely run your charging cables through the lid of the box and then use the bracket supplied to set up your charger on top.

So, you won't need to compromise on safety by having to prop open the box slightly to run your wires inside – it's all contained.

Further to this, as the Bat-Safe comes with a metal holder for your charger to sit on, you won't have to have it sliding about loosely on top to be potentially knocked off. This all makes for a great little package! *(It also stops the charger from covering up the vent holes - KC)*

**Final Thoughts**

After spending a bit of time checking out the Bat-Safe, I can highly recommend it. Whether you fly fixed wing models, helis or drones this would be a very wise purchase. A box like this is much cheaper to replace than the whole interior of your house!

It's well designed and not only is it made to contain hazardous LiPo fires, it also keep everything associated with them confined inside, although I would still charge your packs outside if you can, even with the Bat-Safe.

An essential piece of kit for the serious electric modeller! **RCMW**

**MODEL WORLD**

**PRODUCT INFORMATION**

<b>NAME:</b>	Bat-Safe
<b>MANUFACTURER:</b>	Bat-Safe LLC
<b>DISTRIBUTOR:</b>	MacGregor Industries Ltd.
<b>PRICE:</b>	RRP £54.95
<b>WEBSITE:</b>	<a href="http://www.macgregor.co.uk/batsafe/batsafe.htm">www.macgregor.co.uk/batsafe/batsafe.htm</a>

**PRODUCT FEATURES**

- Fire proof wire way
- Latches provide a firm seal
- Handle and low weight allows for easy transportation
- Bracket for charger

**PRODUCT SPECIFICATIONS**

<b>OUTER DIMENSIONS:</b>	305 x 228 x 178 mm
<b>INNER DIMENSIONS:</b>	242 x 165 x 102 mm (can fit 2 x 6S 5000 mAh for charging)
<b>WEIGHT:</b>	1.82 kg

# Soarers' Slot

Mike Proctor has the need to put his 'lost model procedure' into practice, reports from a post Christmas gliding comp and compares thermal soarers old and new



Wetlands Winter comp was flown in flat calm, if cool, weather. Clearly family Haley was keen to escape being force-fed turkey for a third day and took to the skies en masse!

## Vanishing Procedure

I reported some time ago about the disappearance of models into cloud. At that time it concerned a hole, more like up a tunnel actually, forming very rapidly within a cloud that looked some distance away, yet it happened on the climb! All but one model escaped back to earth and that has not been seen to this day.

It struck me at the time that a distinct 'lost model procedure' would be a good thing to have implanted in the old grey matter, should this ever happen in the future. It has turned out to be handy, not only for myself but for knowing what to shout at other people, who have got into such difficulties and entered 'rabbit in the headlights' mode!

My problem happened on the most pleasant of days when flying my 2M Sapphire. It was flat calm and the sky was almost completely blue, not the best for seeing particularly small models against. About to launch for another flight, I noticed a small, wispy cloud had appeared low down but perfectly positioned to provide a handy background to climb against and so it did, until at 160 m the model vanished! This was something of a shock because I could have sworn the cloud was quite a long way away and being wispy, I would have expected some warning of reducing visibility – wrong! One second it was visible, the next it had gone, so I adopted the prepared procedure:

1 - Turn off the motor! I saw two models lost last year when the owners failed to turn off and concentrated on 'flying' something they could not see. It is worth shouting 'Turn off!' if you see this situation developing.

2 - Immediately apply and hold some 'up' elevator. About a quarter to a half will do, the aim being to stop the model heading



2M models featured a lot during 2016 and do so twice in this issue. This is a Miles, built by Phil Brandreth from CNC parts, taking advantage of some of the good, light weather in 2016. Of course, being small they are more difficult to see (see text)

earthwards, which they always do if left alone and also to start it stalling. Once stalling you get an occasional plan view; a much better and slower, target to see than an edgeways hurtling model. Remember that from 500 feet your model has only 11 secs, diving at 30 mph, before the ground gets in the way and many models will go much faster!

3 - If you have not spotted the model within 5-10 seconds of the above, keep the 'up' elevator on and try a very short motor 'on'; not for power but to create a noise to redefine your search direction. Models can move a long way when left to their own devices.

4 - If the model has not been sighted within these few seconds, the final weapon is to put the brakes on. That should ensure that you now have longer time to search and that at least a slow arrival on the ground might ensue.

In my own case, I had got to phase 3 and had just turned the motor 'on' when I spotted it. The most important thing is to act quickly, as time is short in these circumstances. My Sapphire lost 125 feet in the 10 seconds between the motor being turned 'off' and when I did the restart for direction.



Orange and big mole hills were in last season. Barry Flude just managed to fly his Kappa 2 in two events during 2016, whilst Richard Brown (left) flew his Euphoria in quite a few



Hazy blue sky generally demands large contrasting blocks of colour for good visibility, as on this 3.5m Xplorer at Wetlands

**Cracking Christmas Comp**

Having decided at the last 2016 Northern eSoaring League event that we would like to try, once again, to have a Soaring competition between Christmas and the New Year, much searching of weather forecasts was done in late December. Remembering the rain of the previous year and the wind before that, I was surprised to see that December 27th looked promising, courtesy of a developing high pressure system. So the word was put out and thirteen brave souls entered.

To say we had a good day would put it mildly; hardly a breath of wind all day and a watery sun to keep things just above freezing. Although no actual gain in height was seen all day, conditions were extremely kind and the right spots could be found to give a slow enough descent to score a 10 minute maximum. Landings were critical with such high scoring and indeed the top four places, all Open class models, had only a 19 point spread! Fifth placing John Cuthbert scored very well with a 2 metre model and Chris Gollings, new to 2M eSoaring but not to model flying, finished seventh.

The inevitable odd things happened. My AVA battery decided it was too cold to run for more than a few seconds on the first launch, the moral being not to load everything into the car the night before, if a frost is forecast and even if it is in a garage! I put it on charge for the next slot just to warm it up, which it did, only adding 180 mAh for a full charge. This is one disadvantage of only having a motor on a switch; you can't run it at low throttle for a few seconds to warm the battery before leaving the pits. Needless to say, the AVA now has throttle trim available!

One model just clipped a tree on the edge of the field and was seen to fall down into a lower bush, and its owner set off to retrieve it. Realising that he had not returned after half an hour a search party quickly found his model but not himself! Eventually he reappeared and the model was successfully shaken loose.

A new prize system is emerging, with people bringing surplus Christmas things to add to the fund. Steve Haley got the first pick!



For those who wonder how much flap is used for accurate landings, this shot should answer the question – a lot! You can just about make out that there is quite a bit of down elevator compensation there as well. Despite being well nose down, forward speed is low

**Gripping News**

Flying in cold conditions is bad news for the fingers! In our club the amount of people who fly with gloves is about 50%; how the other half manage I cannot imagine! At the slightest hint of a flight ending with cold digits, I reach for my trusty, one-size-fits-all, stretch gloves. These are made for children and I originally purloined them some years ago when they (the children) were smaller than me and I had forgotten mine.

Finding them a snug fit, with no wrinkles to catch trim levers and just enough to keep

me warm on a flat field (I doubt they would on a slope), I bought a load more and put a pair in all the jackets I was likely to wear when flying. If this sounds wildly extravagant, I should mention that they were two pairs for 50p on York market!

The trouble with these gloves is that they are less grippy than your fingers, when trying to launch a glider and as fuselages have got progressively smaller in cross-section over the years there is less to grip anyway. If the classic grip position at the C of G is limited,

I prefer to hold ahead of the wing so that my fingers are around the fuselage, affording a good grip, especially in a breeze.

However, for those of you who prefer to hold in the classic position help is at hand. Passing a £1 Shop the other day, I was attracted by the glove selection and found that the stretch gloves now come with tiny plastic bobbles to give a good grip. Not surprisingly they are called 'Gripper Gloves' and they work very well in both warming and launching departments!



'Gripper Gloves' from a £1 Shop are a good investment for cold weather flying. One size fits all, and comfort and launching is much improved. If you must hold at the C of G when launching the Gripper gloves are a big advantage



The general tendency is to launch any model from the C of G for good balance, but slim gliders can be very difficult to handle in turbulence. Holding ahead of the wing, where possible, gives more to grip and keeps the nose down

**Time Flies**

I had the opportunity the other day to have a look at a fuselage from a bygone age and I naturally started to compare it with today's models and equipment, as the pictures show.

The model in question was built by Bill Haley at a time when flapped tow line gliders were just beginning to appear on the competition scene. The differences between then and now are very obvious and can be seen in practically every design and constructional detail.

The design follows the then classic 'fish' shape and in this case provision is made in the shape of an over-wing hatch, for access to connect the flap servos to the angled

wire drives. The rudder and elevator servos are in the usual position in the nose, along with the receiver and flight battery, plus of course some lead nose weight. Since radio gear, especially servos, was much larger than today the fuselage cross-section is much bigger than a modern model. Most models nowadays have only two servos in the fuselage, the rest (four usually) have slimmed down a lot and have migrated to the wing.

The wing joiners are interesting. Usually they were made from two pieces of piano wire and were prone to bending excessively on the tow line. To combat this Bill added a third one. Later still Graupner produced

spring steel flat blade joiners in 10 x 1 mm section and with a brass 'box' extrusion to fit. This could be easily incorporated in spar construction and greatly reduced wing flapping! Strangely, carbon technology has caused a massive increase in the cross-section of wing joiners but at about the same weight penalty as the tiny Graupner blade.

Construction uses wood throughout; much of the fuselage is made by rolling thin ply into a 'U' shape, the rest is from balsa. As you can see there was plenty of space within the fuselage to accommodate the equipment. A modern 'wing servo' sits behind a 'standard servo' of today and shows just how small one is in comparison to its older brother.

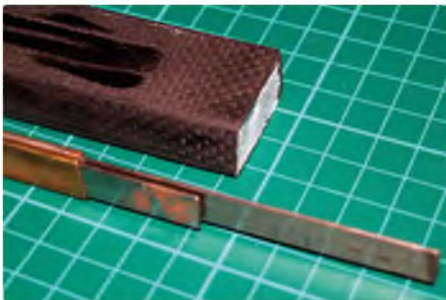
Not only smaller but having metal gears and considerably more power, they have transformed our modern gliders into lighter, slimmer and more efficient machines.

Speaking of weight, the old 'empty' fuselage weighs 760 g. For comparison, the latest Xplorer F5J carbon fuselage pictured alongside weighs 610 g but it contains all the radio gear, a battery, motor and speed controller... Times certainly have changed!

**RCMW**



**Left:** Look back in amazement. Were models this large and did they really contain so many wire bits? Yes! This old tow line glider recently surfaced and shows just how far some things have reduced in size and complexity over time. Note the three round wing dowels used, at a time when two were the norm. Also the large hatches to give access to the big servo/flaperon connections and for adding ballast



Continuing the evolution of wing dowels. When the Graupner 10 x 1 mm flat blade joiner became available it provided a much stiffer and more compact solution for wing joining. The latest wing joiners, in carbon fibre, have certainly turned around the term 'compact'!



The nose area on old soarers was nothing like as constricted as today. A 'standard servo' of the time takes up the space of at least two modern 'wing servos', which have much more power and metal gears to deliver it!



A close-up of the wing mounting area shows how many more skills were required to build and install equipment in soarers of yesteryear, when compared to kitting out a modern moulded equivalent



The most telling indication of how things have evolved over the years, as equipment and materials have improved to enable slim, strong and highly efficient models to be constructed, is shown in this comparison of old and new



Fuselage and nose weight total 753 g. A modern electric soarer fuselage with all its equipment can achieve a total of 600 g reasonably easily



I noticed this corrosion starting on a LiPo balance lead the other day. It had not yet progressed to the inner part of the plug where the actual electrical contact is made and was quickly cleaned off, but clearly this is another area which needs monitoring on our models

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# Druine Turbulent DR1

In the third article in his series on building a scratch built Druine Turbulent, Chris Bowler's new scale model makes its maiden flight

## The Turbulent, fully rigged and ready for its maiden flight

If you have been following the various stages of the Druine Turbulent I have been building, you will be aware that it has taken a few unexpected twists and turns. However, on a glorious August evening the weather gods were kind and another attempt could be made. But before that...



Taxying to the take-off point

### If At First...

Several attempts were made to launch the Turbulent but on three occasions gremlins seemed to be getting the upper hand. Engine problems manifested themselves when the motor refused to run and, after a fruitless search for the cause, drastic action was needed. It seemed to be starved of fuel as it would run with a bit of choke and then die.

I changed all the plumbing, fitted a new spark plug and all seemed well. But still no joy! By this time unprintable mutterings were heard and I decided to check out the carburettor. Nothing seemed amiss but I decided to change all the gaskets and fit a new diaphragm. Oh, and a new Tx controlled ignition switch scrounged from Roger Evans, when we tried to run it at his place... (I will replace it, honest!)

Resigned to the fact that it would refuse to start, I securely tethered the model in my back yard, safe in the knowledge that the neighbours would remain undisturbed!

### Noise To Some, Music To Me

I suppose there is a certain irony in the fact that I assumed another failure. But after a few flicks with the ignition off to prime it,

switch on, one flick and away it went. It was a bit rough but certainly running. Success! Sort of... I couldn't keep it going in the yard as, if I were a neighbour, even I would possibly find it a tad irksome. So time to switch on the quiet!

Next time it would be on the airfield and a successful flying sortie. Not!

### Same Old, But New

Encouraged by the back yard success, hopes were high, Roger and designated test pilot Martin Evans were on hand for the start up. The engine ran well with the cowl off, but throttling was not to our liking and was adjusted. With the cowl on it seemed to perform fine and we decided to move from the car park to the flying site.

It seemed that that the old gremlins had gone, but no! Towing it out backwards one of the undercarriage legs popped out of its seating.

Once again, de-rig and back to the workshop to check. And this time check everything. I am reluctant to admit this but mistakes and oversights can happen!

Said undercarriage leg had been 'improved' but not completed. A soldered joint had never



After some minor trimming she looks very realistic on a flypast



The final full size paint scheme will have the wing scallops painted



A full profile shot as she flies by

been soldered! It was an avoidable oversight, so I double checked all soldered joints and decided to replace the adjustable drag strut ends with a more secure soldered end. All was soldered and muscular brawn tugged and pulled at it to make sure the beast was well and truly anchored. All we had to do now was wait for the weather! And wait...

#### And Finally, Well Almost!

Now on to that balmy August evening – perfection, with clear blue skies and no-one else on site! Perfect for a test flight.

The model was assembled and all linkages were checked and secure. The engine was run, cowl off, minor adjustments made and the cowl put back on. Now you might suggest that the first flight could have been made without the cowl but it houses the 3D printed VW engine produced by Mal Luff at Traplet and it is essential to keep the model balanced, as it has no ballast.

The NGH 38 cc engine modified for rear exhaust was fired up and take-off called. After a reasonable check on ground handling the Turbulent was lined up into wind and the throttle was eased open. With my camera ready and understandably a bit nervous, I

watched as Martin opened the throttle and took off. The Turbulent lifted off on about three quarters throttle and climbed steadily. Martin backed off to cruise speed and checked the trim; a little right aileron and ditto down elevator, and it flew hands off.

Yes, I know! You've heard it all before but it really did.

On the first flight a couple of cautious higher circuits were flown, just in case things went awry, and then it was time for some camera passes. Once this was done Martin checked out the flight pattern with high and low throttle settings and discovered that if the throttle was reduced to a low level the Turbulent would quite happily fall out of the sky!

I had warned him because Sid King had red flagged the tendency when he said:

*"You have to fly it onto the runway for landing – it certainly won't glide well!"*

'Nuff said from the guru-in-chief.

A long circular approach was made and the Turbulent was flown in as per Sid's instructions and a good landing was made. Due to the slight power-on landing it rolled a fair bit down the runway and, as the wind was slightly across, space rapidly dwindled

and it came to a halt on the grass fringe. But it was all safe.

Martin's grin said it all, but he exclaimed, *"I could have done with a bit more rudder, after landing."*

*"Well, you could have switched in high rates?"*, I suggested.

To which the retort was, *"Well you could have told me you'd programmed that in, before I landed!"*

Oh well, no harm done. Communication is everything!

#### Definitely Finally

Photographs taken, I had to take the tranny and fly the beast. I was very nervous as I had just totalled a model a couple of days before and was yet to be in therapy!

With the engine running sweetly, a full tank and the knowledge that it did fly well, the throttle was gradually increased and I enjoyed a leisurely ten minute flight. I was encouraged to test the stall and, yes, it did, very gently dropping the nose but it was very easy to recover. The landing was fine and I kept it on the tarmac, having sneakily switched the rudder to high rates!



Underside view as the Turbulent trundles overhead in the clear blue sky



Well, he didn't seem too bothered! Pilot head by Sid King, body scrounged from Nick Blackwell and VW engine by Mal Luff

## DRUINE TURBULENT DRT1

All in all a fine model that flies well and looks the part. On the news the day before was a Turbulent ditching in the sea. Now, I saw that as a portent of doom but I needn't have worried! It was a long project due to certain circumstances that meant the build was way over time, but it was worth the effort.

My thanks go to Sid King for agreeing to take part in the whole concept, to owner of the full size David Huck and his assistant Nick Blackwell, plus those who have taken an interest and not badgered me too much to get it finished.

And finally, to test pilot Martin and his dad Roger for their help and encouragement during the whole process.

### Postscript

The full size restoration is progressing well. My car was recently filled with the tailplane, ailerons and rudder and off we went to the spray barn! The wings travel next and it will be resplendent in its new colours and flying again at a yet to be set date. Remember David Huck's mantra, "There is no deadline to finish the project."

I can concur now that I have finished the model in less than record time. **RCMW**

### PPS

The model colour scheme was chosen as a possible one for the full size. That, however, will now be in the same red but on the whole fuselage, with the registration outlined, and the wings with the leading edge the same colour but with the wing scallops also painted.

I decided to fit a better fuelling system, so the cowl was removed and a lot of oil was discovered within it! On checking, the silencer had separated from the engine. This problem had occurred in another model and I had already done a mod using a stud and lock-nuts

That obviously failed so I contacted Just Engines for advice and to order new gaskets. The ever helpful Andrew suggested abandoning said gaskets and use long setting Araldite to bond to the manifold and also the two silencer halves.

Hexagonal head bolts were then used to fit the silencer to the manifold, tightening well with a good glue seal. Tab washers were used under the bolt heads in an attempt to keep the bit in place without working loose. Time will tell as I have yet to test run the engine.



Right: Well done, sir! Builder Chris Bowler with test pilot Martin Evans (right). The smiles say it all!

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# Light Flight

John Stennard takes a look at indoor scale and tests out Parrot's new X-wing



Guillow's Stearman is stick and tissue perfection



This view shows the 1.7 g linear servos used for the ailerons



The Stearman is amazingly realistic, but where's the driver?



My Carley Racer rubber power conversion was kept really light by not covering the undersides of the wing

We are almost at the end of our indoor season but with a late Easter this year we have managed to fit in 14 sessions since Christmas. With an average of 25 members attending, peaking at 33, they have been very busy events. An increasing number of flyers now have a model to suit every one of the 10 minute slots. So it can be Vapors, often 10-12 in the air, straight into Quads, then on to large 'foamies' before drawing breath and joining in Airbug hovercraft mayhem – and that's just the first 40 minutes!

The Airbugs, as many as 15 at a time, use all the sports hall floor space and still manage to be involved in spectacular pile ups. It's all great fun and the indoor sessions have really drawn the club members together. A bonus is that the piloting skill level in all genres has improved dramatically, which has to be a beneficial thing.

In Light Flight I try to use my own personal experience with small indoor and outdoor electrics, plus information gleaned from the venues I attend, to pass on useful information, alongside looking at interesting commercial and 'homebuilt' models.

The next Light Flight will be in the June issue and I will show how I've developed an outdoor 'cargo' version of the Nutball type model. Yes, really! In this month's feature I'm looking at some models that lead us from the indoor environment into the great outdoors.

## Guillows Conversion

The wide range of Guillows rubber powered models from the USA is well known and covers WWI and WWII military, a range of civilian aircraft, twin engine aircraft and even some modern jets. These models are expertly designed, use high quality balsa and can look really beautiful when built correctly.

However, with this quality comes a quite high price tag and something like a Cessna Skyhawk 172, a 32 in span model, costs around £52, a 24 in span SE5-A around £46 and a Series 800 model of a 35 in DC-3 £67. These 'stick and tissue' kits are a long way from the much beloved KK Flying Scale models of one's youth. I seem to remember paying around 2/6d, still a week's pocket money though, and building them in the kitchen with no one complaining about the heady aroma of balsa cement and dope! Of course life in general was a bit more aromatic then anyway!

## LIGHT FLIGHT

The Guillows models lend themselves to micro R/C conversion and brushed geared and brushless direct drive power plants can easily be fitted. Using a micro Rx and 1.7 g servos the radio payload is minimal. I was really interested when Tom turned up at an indoor meeting with a lovely Guillows P-17 of 28 in wingspan. He had made a superb job of building, tissue covering and finishing this model.

Tom used a small brushless motor for power and 1.7 g linear servos for all the controls. The model flew beautifully and looked very realistic in the air. A real

masterpiece and there is no way foam can compete with the appearance of a stick and tissue model like this.

The Aerographics range of rubber powered models also includes some aircraft that could easily be converted to R/C. For very small models the Spektrum Rx module from the Mini Vapor is ideal. Over the years I've built a number of rubber powered models specifically to convert to micro R/C. As the original models were designed to be intrinsically stable the conversions usually work really well.

The cheapest way to do this is to work from a plan and this enables the design to be easily modified to take micro R/C gear at an early stage. I built a Carley Racer designed for rubber power years ago and this continues to fly well. This model uses a micro Rx, a micro brushless motor with a 3 A ESC, a 2S 150 LiPo and two 2 g rotary servos. A weight saving technique used with this model was to cover only the top of the under-cambered wing. This model is covered in lightweight heat shrink film.

## Parrot Magic

Parrot certainly never stand still and continue to build on their reputation as innovators in the field of model aviation. Two new quadcopters are now available and a Disco FPV flying wing, and while the wing is well out of my price range at £1149.99, I'm comfortable with the price tags on the two quads which are now in my hangar.

The new quads are the Swing and the Mambo and both are very specialised in their own way. The new quads use the very successful mini drone as the basis of their design. The Swing is actually a combined plane/quad as it takes the form of an X-wing and can both hover and fly horizontally, hence the name Swing.

The Mambo is the same size as a

mini drone quad but has two additional detachable functioning features. One is a clutching finger grab on the underside that can hold and release lightweight objects and the other is a 6-shot top mounted cannon. I'll be featuring the Mambo next time as in this feature I'm just taking a brief look at the amazing Swing X-wing, which was reviewed in the last issue.

A starting point for both models is the really neat new Parrot Flypad. This is a gamepad style high precision controller that gives an increased range with the added precision achieved by using sticks rather than finger swiping and tip/tilt control. A special bracket is provided with the Flypad so that a smartphone can be mounted to provide an in-flight camera view. The Swing can be

controlled using a smartphone or tablet if required. The control link is via Bluetooth and the Flypad has an integral battery pack changed via USB. In addition to the control stick the Flypad has a number of special function button switches.

The Swing instructions say it can be flown in 'flight or quadcopter mode'. The powerful autopilot ensures absolute stability and certainly the mini drone has always had incredible stability. The Swing is designed for vertical take-off and hovering and in this position can be flown like a quad. The model can then be swung using a pre-set button switch into three different angles of attack from vertical to almost horizontal. The forward speed increases as the Swing leans more towards the horizontal and a maximum forward speed of 30 km/h (19 mph) is quoted.

There is also a 'near vertical' setting and when a button is pressed the Swing moves off the vertical and into a moderate forward speed. It can then be flown comfortably at this setting and returned to the vertical hovering position by pressing the button again.

In appearance the Swing look like it's a mini drone that has sprouted wings, which I suppose is what has happened! The foam wings make it look quite large for the span of 325 mm (12.8 in). The flying weight with the standard mini drone flight pack is 75 g (2.65 oz) and the flight time quoted as 7 minutes. Horizontal flight will of course use less battery power than hovering flight.

The Swing X-wing is certainly an eye catching little model and the construction is very clever; the motor angles are something to ponder on!

Having charged the Flypad I could not wait for the next indoor flying season so tried a take-off in the garage. The mini drone pedigree was apparent as the Swing took off and hovered rock solid one metre off the floor. I then had fun flying it in quad mode where I found the Flypad easy to use and the



The Parrot Swing - now this really is something different!



Once tipped forward (or backwards!) the Swing turns into a surprisingly speedy plane



An X-wing for sure!



Stable and precise control makes the Swing ideal for indoor flying



The Flypad makes all the difference when piloting the new Parrot models

The versatile Parrot Mambo with its 6-shot cannon – more next time...

model responsive and easy to control. The yaw and pitch are comfortably responsive but the roll is quite fierce and has to be handled with care. A press on the 'land' button and the Swing did just that - all quite amazing.

The flight angle change is done by using two buttons which introduces an extra load on the pilot and required a bigger space than my garage. Every time the left button is pressed the angle changes in three stages; the right button is then pressed in the same way to return to the vertical 'hover' position. A fine day with a light wind saw me outdoors ready to be amazed and I certainly was! I was able to experiment with all the different wing angles and had a ball.

The Swing really is great fun to fly and is surprisingly agile. Once in 'aircraft' mode a combination of roll and yaw gave a smooth flying experience. Considering the wind strength it performed really well and perfect spot landings can be made as when the 'land' button is pressed the slow descent can be directionally controlled with the Flypad.

In our indoor venue I was keen to try out all the functions of the Swing in a non-wind environment. Again it flew really well, although the 19 mph speed in the horizontal angle does make for some exciting piloting moments! Seriously, this is faster than one would normally fly indoors and the unusual profile and black colour mean you have to

stay focused. However, you always know that at the flick of a switch the Swing can be stopped in its tracks and will enter a perfectly stable hover. The 'near vertical' setting is also good as the Swing flies forward at a slow fixed rate and you can concentrate on the height and steering. A great little innovative machine that has plenty of indoor and outdoor fun flying potential.

The Swing uses the standard Mini Drone LiPo pack and on the internet I found a neat four pack charger, which came with four flight packs – a great asset.

The latest download for the Swing provides three programmed aerobatic manoeuvres. These use the four buttons of the Flypad and pressing these gives a left or right half barrel roll, a half loop and a full loop. The Swing has to be in the fully horizontal mode for these. Testing these manoeuvres left me even more amazed!

Once happy with the model's height it can be switched to horizontal mode and you can concentrate on steering. A button press gave a very smooth half roll, a second press can either then complete the roll or roll back to upright using the opposite direction. The half loop was also very smooth and a great way of changing direction very quickly. The Swing can then be either half looped back to upright or half rolled to upright. When inverted the controls stay in upright mode.



This four cell charger has been a very worthwhile purchase

The loop is very smooth and quite tight. I wondered if you could loop from inverted after either half rolling or half looping and you can, in essence doing an inverted loop. With practice you can stay quite close and perform interesting sequences of manoeuvres.

A couple of times early on I exceeded the Bluetooth range and found that the Swing simply goes into hover mode until the signal is regained. All very clever and an interesting route forward for specialised micro VTOL models like the Swing.

**Tail End**

Not so sure about the name, Convergence, but I've been delighted with the performance of this VTOL model. The hover mode and transitions add to the flying experience and you will not get bored with this model. I could not resist a photo of my Horizon Hobby UMX B-25; what a lovely little plane this is and she flies so well.

Information and photos are always welcome. Please send to: john@stennard.orangehome.co.uk

I am available for talk/demos on flight/indoor R/C within a 50 mile range of Bristol and, as the BMFA Western Area Education Co-ordinator, I am also happy to talk to school pupils and youth groups in the region. **RCMW**



Above: The B-25 Mitchell, from E-flite, is shown here without the undercarriage for added realism

Left: E-flite's Convergence is extremely satisfying to fly once you appreciate its flight parameters

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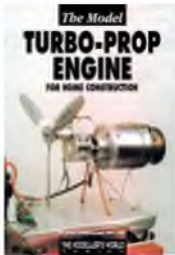
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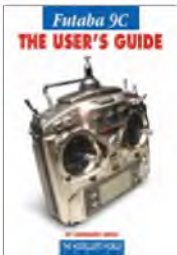
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# The Strength Inside Your Model

John Bristow from Deluxe Materials writes about the history and uses of popular types of model adhesives



A selection of popular aeromodelling adhesives manufactured by Deluxe Materials



Aerolite was used to assemble wooden Airspeed Horseshoe troop carrying gliders and the de Havilland Mosquito bombers in WW2. The models shown here were built from plans, available from the Traplet Plans Service using the following order codes: Horseshoe – SF522, Mosquito – MW3345

Almost unbelievable advances in adhesives technology over the past years have benefited aeromodelling. In the early days, products like Croid, Ambroid, Duco, Comet, and Siment cements were probably the only types available to modellers. They all had a strong, unpleasant odour, dried slowly (compared with cyanoacrylate, ca) and became brittle with age. Then along came balsa cement that was stronger than balsa wood; its bond could be released with acetone and it probably became the cause for the term 'glue sniffing'. Two part glues came much later, the first of which was Aerolite from the aircraft industry.

But glues have their origins dating back to as long ago as 4000 BC. They came into being when ancient tribes discovered that a sticky material (collagen) could be extracted from bones, hides and skin. These types of starting materials, along with other animal scraps, were processed to produce a glue liquor, which was thickened and to which other chemicals would have been added. With these same basic processes bone glue, hide or skin glue and fish glue are produced.

Plants have also been used to produce vegetable glue, such as gum Arabic from the acacia. Archaeologists excavating burial sites from 4000 BC have discovered clay pots repaired with glue made from tree sap. Ancient Greeks developed adhesives for use in carpentry and created recipes for glue from egg whites, blood, bones, milk, cheese, vegetables and grains. The Romans used tar and beeswax for glue.

Around 1750 the first glue or adhesive patent was issued in Britain. The glue was made from fish. Patents were then rapidly issued for adhesives using natural rubber, animal bones, fish and starch.

These days adhesive is a general term, which includes products formulated from polymers produced in a modern chemical plant. These are often called synthetic 'resins', so named after the gooey substance found in pine trees and which was one of the first widely used adhesives. Glues may also be, as we have seen, natural adhesive products made from animal parts. Leicester Lovell in Leicester used to sell such a protein based glue under the 'Casco' trade name.

The first two part adhesive, Aerolite, a two-part urea formaldehyde glue, was developed by Aero Research Limited in 1934 in their quest to find a glue that would resist bacteria and moisture. This was the first adhesive of

its type to be invented and manufactured in Britain, and it was used in resin-bonded plywood. Cascamite glue, another urea formaldehyde, might be known to some of us. (*Popular with model boat builders – KC*)

When World War II broke out, Aerolite was used to assemble the wooden Airspeed Horsa troop carrying gliders and the de Havilland Mosquito bomber, and its waterproof qualities were ideal for naval launches and patrol boats.

It was WW2 that accelerated chemical industry research, e.g. for natural rubber alternatives for making tyres. Cyanoacrylates were discovered by accident in 1942 in the search for a material to make plastic gun sights.

**Key Dates**

4000 BC	Collagen based glues first used by cavemen
1750	First glue patent
1912	PVAc, Polyvinyl Acetate produced on an industrial scale after discovery in Germany
1920s	Polymerisation technology developed, bringing the first PVA polymer
1936	First epoxy resins synthesised in USA and Switzerland
1942	Discovery of cyanoacrylate glue
1951	Re-discovery of cyano and its application as an adhesive

**How Do Adhesives Work?**

The definition of an adhesive is 'any substance applied to the surfaces of materials that binds them together and resists separation'. So how do they work?

Essentially, like many things in the world, it is all about forces. The two key forces at work in a joint between two surfaces are both adhesive and cohesive – see Fig 1. Let's say you want to stick together two bits of wood, A and B, with an adhesive called C. You need three different forces here: adhesive forces to hold A to C, adhesive forces to stick C to B, and cohesive forces to hold the adhesive, C together.

If that's not obvious, think about sticking a training shoe to the ceiling. The glue clearly has to stick both to the training shoe and to the ceiling. But if the glue itself is weak, it doesn't matter how well it sticks to the shoe or the ceiling because it will simply break apart in the middle.

**Adhesive forces**

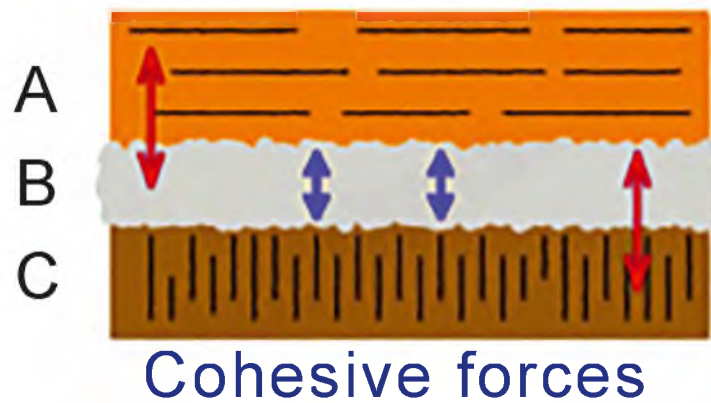


Fig. 1 – Adhesive and cohesive forces

**Cohesive Forces (Acting Within An Adhesive)**

These come from three main areas: Electrical or electrostatic attraction between molecules. Like a magnet, opposite charges attract and this creates a network structure of molecules in the adhesive that help to 'hold' it together. This type of force is relatively weak.

A mechanical force caused by the entanglement of the molecules. This is particularly the case with PVA type glue that has a long chain complex molecule – see Fig 2.

Chemical reaction between the adhesive molecules in the joint (rather than just physical entanglement). This helps to explain why adhesives such as epoxies produce great strength across gaps – see Fig 3.

A new generation of PVA glues has appeared that feature cross-linked bonds between individual polymers. The cross-linking reaction is a slower process (compared with epoxy glue curing) but imparts improved properties, including:

1. Greater cohesive strength
2. Water resistance
3. Joint stability

**Adhesive Forces (Acting At The Surfaces)**

The adhesive forces at the surface are generated in a similar way and come from two sources: within the adhesive molecule itself (the red arrows in Fig 1) and between the adhesive and the surface to which it is applied.

In addition, we have the concepts of:

1. Physical bonding or Adsorption (surface wetting)
2. Chemical bonding or Chemisorption

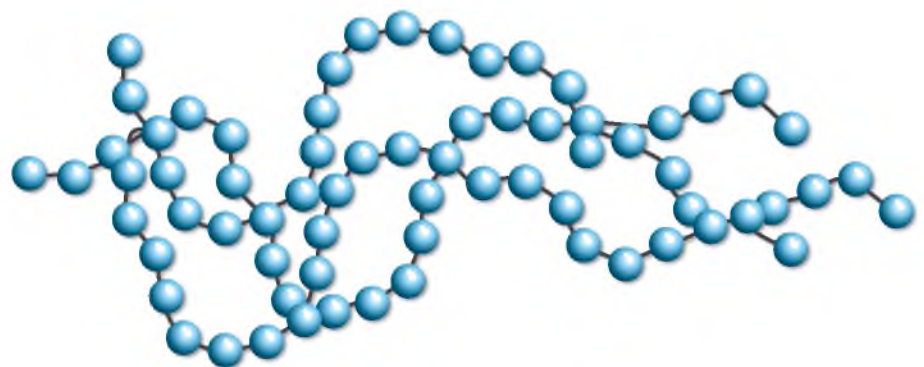


Fig. 2 – Example of a long chain complex molecule

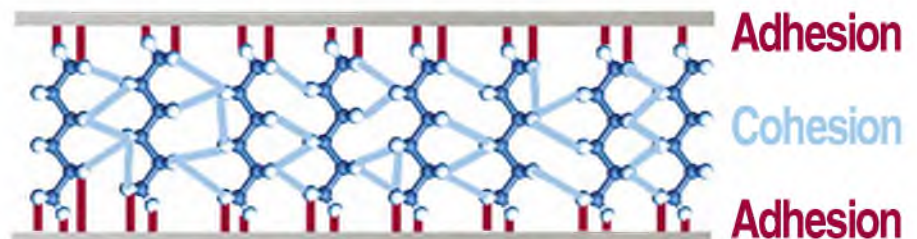


Fig. 3 – Chemical reactions between adhesive molecules in a joint allow epoxies to produce great strength across gaps

**Physical Bonding Or Adsorption**

Here the adhesive must 'wet' the surface to which it is applied – see Fig 4. Again weak electrostatic forces between the glue molecules and the molecules on the surface come into play.

For adhesives to work well like this, they have to spread and wet the surfaces very well. If the adhesive beads up, it means that the adhesive has a greater affinity for itself rather than the surface to which it is being bonded. Silicone glue is one example of an adhesive with that will bond low energy surfaces.

To explain the concept of surface energy, this is a measure of the attraction that individual molecules (e.g. of glue) have for other molecules, and also for themselves. So, if the glue molecules have a low surface energy they will have a higher attraction to the molecules on the surface being bonded than to themselves and they will spread onto the surface, forming a strong glue joint.

Conversely, if the molecules have a higher surface energy than the surface, they are more attractive to themselves and will bead up and remain as a droplet. The surface energy or 'bond ability' of various materials is shown in Fig 5.

With physical bonding, there's no actual chemical bond between the adhesive and the surface it's sticking to, just a huge number of tiny attractive forces that also carry it into the microscopic voids thus increasing the adhesive force. This process is called adsorption - see Fig 6. The analogy I would use is that the glue can seep into those voids and grip, like a climber's fingers anchoring into holes in a rock face.

Our Super 'Phatic! glue not only has low viscosity to penetrate porous surfaces but it also has low surface energy, so unlike PVA it has an affinity to foam and plastics, making it ideal for gluing hinges, plastic to wood, carbon to foam etc. See the hinge picture nearby.

Tricks or techniques can be played with both adhesives and surfaces to allow improved bonding. These include:

Surface modification – chemical etching, surface roughening, flame treatment, solvent cleaning.

Surface primers – allow low energy plastics to be bonded with cyano glue. An example is Tricky Stick, shown in a nearby picture. This increases the surface energy above that of the cyano glue, allowing it to be bonded in seconds.

Another 'trick' is used with Aerot<ch, one of our specialist epoxy glues designed to bond epoxy composites. Instead of modifying the composite surface we have modified the epoxy glue, lowering the surface energy to below that of the composite, thus allowing it to wet the surface and set up a strong physical (and chemical) bond. There is more on this product in Part 2 next month.

**Chemical Bonds Or Chemisorption**

In some cases adhesives can make much stronger chemical bonds with the materials they touch through a very strong chemical connection, when they effectively form a new chemical compound at the join (shown as the red bonds in Fig 3). That process is called chemisorption. Epoxy glues have many reactive sites where strong bonds can form with high-energy metals, glasses, ceramics etc. The combination of great adhesive and cohesive strength makes epoxy an exceptionally strong adhesive, especially where there are gaps to fill. **RCMW**



Super 'Phatic! glue has an affinity to foam and plastics, making it ideal for gluing hinges



Fig. 4 – For adhesives to work well they have to spread and wet the surface. If the adhesive beads up it has a greater affinity for itself rather than the surface to which it is being bonded

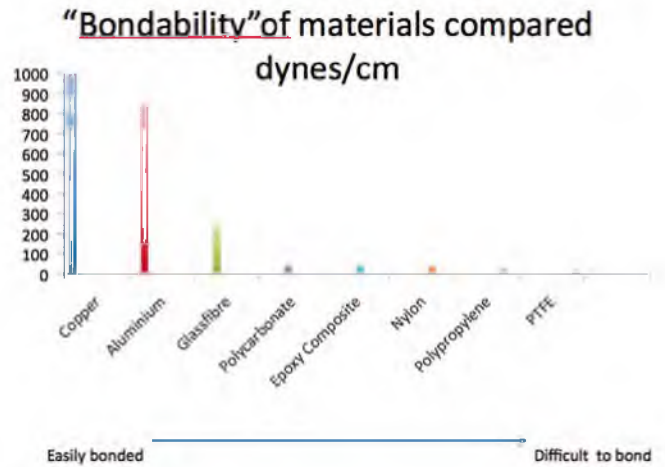


Fig. 5 – Showing the surface energy or 'bond ability' of various materials

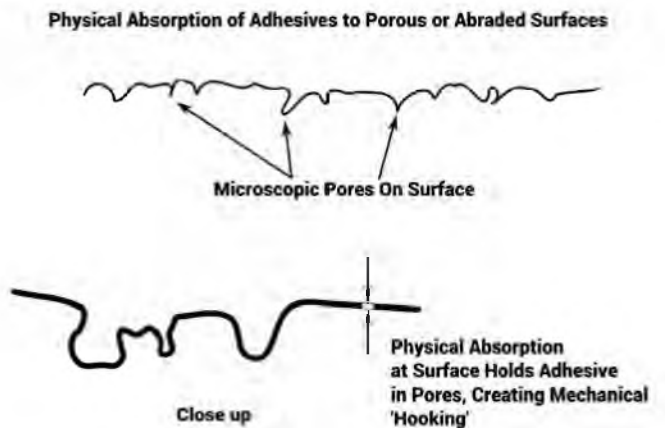


Fig. 6 – Adsorption occurs when tiny attractive forces carry the adhesive into microscopic voids, thus increasing the adhesive force



Tricky Stick is a surface primer that allows shiny plastic and foam parts to be bonded with cyanoacrylate



# FISHER DELTA 3D PRINTER

IMAGINE PRINTING YOUR OWN PARTS AND ACCESSORIES  
AS AND WHEN YOU NEED THEM

At **£399** the Fisher Delta makes  
quality 3D printers affordable

Includes free roll of white filament so that you can begin printing straight away using one of the many free software packages online. This amazing printer is designed in the UK so quality and durability are guaranteed and upgrades and UK support are readily available. Traplet also gives you access to free video download of instructional information on building your printer and guidance on beginning to print. Get a taste of what your printer can do by visiting [www.trapletshop.com](http://www.trapletshop.com) and click on our '3D Printing' tab - there are five fascinating videos to watch before you buy.

Printing your own 3D objects, parts and components is easier than you might think - if you can imagine it, chances are you can print it! Make your model as detailed as possible, without having to search for those elusive and expensive parts. Replace those broken parts without having to send your item back to the manufacturer, or pay a fortune for components.

**So versatile you will wonder  
how you managed without it!**

#### Assembly

The Fisher Delta is supplied in kit form with component parts which are quick and easy to assemble by following the comprehensive online instructions, requiring only a few basic tools. All electronics are supplied ready to use with pre-made wiring harnesses - no soldering is required. Also available as a fully assembled unit at an extra cost.

The complete printer fits neatly into a corner of your desk or workbench, is quiet and odour free in operation and requires only a standard mains socket for power. An Ethernet port on the printer provides control via an easy to use website interface.

#### Parts

Parts printed from the supplied roll of PLA filament are very light and extremely strong, perfect for all modelling applications; whether structural or decorative.



#### SPECIFICATIONS

##### Firmware

- Calibration: automatic bed levelling and machine calibration routine
- Layer resolution: 0.3mm 0.05mm
- Build surface: Removable bed, uncooled Buildtak print surface (For printing with PLA) Heated aluminium plate available as an upgrade, (allows printing with ABS, PETG, PC, HIPS, and many more).
- Print speed: 0.4mm nozzle, up to 16mm3/s
- Motion: Up to 250mm/s, 4000mm/s<sup>2</sup> acceleration, segmentation free real time delta movement
- Nozzle: 0.4mm diameter, maximum operating temperature 300°C, warm up time ~ 60secs.
- Power adapter: 100V/240V, 60W.
- Software: Machine control: On board web interface available via ethernet, USB control, also available
- Standalone printing from onboard microSD card

##### Software

- 3D model processing: Slic3r open source software (free download - no license required) can generate G Codes for the Fisher Delta from .stl or .obj 3D model files.
- Supported platforms: Windows/Mac/Linux
- Prints G Code files generated by Slic3r and other open source slicing software

##### Materials

- Standard 175mm diameter filament (PLA Plastic)



3D printing is the perfect way to make bespoke scale details for all types of models. The builder of this big 1:3 scale RC model of a Druine D-31 Turbulent aircraft needed to represent the parts of the VW engine that protrude

from the side of the cowling. He was able to supply reference photos and drawings of the full-size engine, so creating a 3D printable model was fairly straightforward. He'll need to do some sanding/filling/finishing before painting and detailing it, but it should look just right when installed in the model.

For more information or for technical support please email [info@traplet.com](mailto:info@traplet.com)

To order visit [www.trapletshop.com](http://www.trapletshop.com) or

telephone our friendly Customer Services team on: **01684 588599**

All orders are plus postage and packing.

# Nuremberg Toy Fair 2017

In recent years multirotors have dominated the R/C model hobby halls at the famous Spielwarenmesse (Toy Fair), held in a massive exhibition complex on the outskirts of Nuremberg. The trend continued this year, but is the bubble about to burst? Some well known model companies did not exhibit this year, including a high profile firm with its own well developed line-up of drones. Despite this there were still quite a few new model aeroplanes and related products, which we will show in this report. Next month, just for balance, we will show you some of the latest drones too. Pictures by Barry Atkinson

**RIPMAX**  
www.ripmax.com



Ripmax earn the lion's share of coverage this year by being virtually the only major UK distributor still exhibiting at the Toy Fair. Colin Straus had lots of Chris Foss designs to show us, starting with the diminutive 670 mm span Mini Wot 4 for 2S-650 mAh LiPo packs



Designed for 120 mm Electric Ducted Fans, the 1238 mm span EF-2000 Typhoon from Black Horse is sure to thrill when powered by twin 6S-5500 mAh LiPo packs



Air racing fans will adore the new Black Horse MXS. This great looking 1620 mm span aerobate suits .75 to .95 cu in glow engines or 15 cc petrol motors. If electric is your thing then fit a Quantum II 61 brushless for punchy vertical performance from a 6S-4500-5500 mAh LiPo



**Left:** Wot 4 Mk2 Pro boasts an ultra lightweight structure and enlarged control surfaces to give pilots an 'uncompromised version' of this classic model aircraft. The 1334 mm wingspan kit even includes a special edition Irvine .39 FunFly glow engine to provide the perfect power to weight ratio for the model



**Right:** Chris Foss' highly regarded Wot Trainer has also been updated to suit both EP and IC power. The 1710 mm training aircraft suits .40-.46 two-stroke glow engines. For electric, Ripmax recommend a Quantum II 40 motor and 60 A ESC, powered by a 4S-4500 mAh pack



Keil Kraft are back! A welcome sight for all modellers of a certain age were these display boards showing relaunched versions of the Caprice glider and Ajax rubber model. No more squashed die-cut sheets though! These little beauties come with CAD drawn plans and laser cut balsa sheets



Building on the success of the original Black Horse Stuka, Ripmax requested this 2.3 metre version for their customers. Designed for 50 cc class petrol power the Ju-87 B2 features balsa and ply construction, with a GRP cowl and other finely moulded parts, such as the distinctive undercarriage spats and fairings

**HACKER MODEL PRODUCTION**

[www.hacker-model.com](http://www.hacker-model.com)



Hacker Model Production are well known for their profile EPP aerobatic models, but the new 1200 mm span MX2 features a built up form of foam construction, with a box structure fuselage. The wing is removable and the two-piece landing gear is bolted to the plywood centre wing structure. As usual from Hacker the model is fully colour printed. For a 3S 1500-2500 mAh LiPo



The Bellanca Super Decathlon ARTF is one of Hacker's most long lived kits and this new 2M Elektro version is sure to widen its appeal even further. Easy to fly, it is aerobatic and the provision of flaps makes it suitable for towing gliders. For a 5 or 6S 3300-4250 mAh LiPo and matching Hacker M-Force motor sets



Bergfalke II joins Hacker's SKG (Simple Known Glider) series of EPP foam soarers. It can slope soar or it can be fitted with a tow release for aerotowing. Alternatively, the 2 metre span model can be made as an electric glider and fitted with one of Hacker's M-Force motors



This 890 mm span Pilatus Turbo Porter XF features an interesting X-shaped fuselage made from 5 mm EPP foam sheets with carbon reinforcements. The model's livery is inspired by aircraft used for skydiving in Australia and Spain. For sport flying Hacker recommend a 2S-260 mAh LiPo 2S, or for aerobatics fit a 3S-260 mAh pack and a 7" x 3.5" prop

**AERONAUT**

[www.aero-naut.de](http://www.aero-naut.de)



aero-naut's SHK glider is based on the single-seat aerobatic Standard Austria, which was redesigned in the Schempp-Hirth factory in Kirchheim (S-H-K). It is to 1:4.25 scale and comes with a GRP fuselage, a vac formed canopy and parts for the cockpit interior. The wing section is a modified S 4233 and the model is available with either obechi sheeted foam wings or laser cut parts for making built up wings and the V-tail

**Right:** aero-naut's 1.6 metre span model of the Lucombe Silvaire has a balsa monocoque fuselage and the wings connect to the fuselage using carbon rods. All parts are laser cut and feature interlocking construction. Requires a 350 watt motor and a 4S-3000 mAh LiPo



Triple' is a three in one glider combo that allows you to buy a glider kit that is best suited to your needs and then purchase additional wing kits to suit other gliding formats. Based around a built up V-tail fuselage, with an option for E-power, powerful magnets hold the wings in place and let you change the set-up quickly without tools. The Triple Speed wing (green, in background) has a span of 178 cm, single dihedral, long ailerons and is ideal for aerobatics. Triple r.e.s (red) spans 199 cm and is controlled using rudder, elevator and spoilers. Finally, Triple Thermic (blue) has a wingspan of 255 cm and is equipped with ailerons and spoilers, and is optimised for thermal soaring. If built for E-power the fuselage accepts a 28 mm outrunner and a 3S-2500 mAh LiPo. All three versions are all-wood designs; the fuselage is built up of balsa and light-ply, and the wings use conventional ribs and spars



Thorsten Rechthaler was our guide around the aero-naut stand, which was one of the few companies with a healthy number of new model aeroplanes on display

**PICHLER**  
www.pichler.de



Pichler Modellbau use this hefty stand to show off their new aeroplanes each year. New developments include a Twin Otter of 1875 mm wingspan in yellow or Swiss schemes, which can be fitted with an optional float kit. Also of note is the Extron branded Messerschmitt M35, which replicates the 1930s aerobatic aircraft and has a wingspan of 2220 mm

**MULTIPLEX**  
www.multiplex-rc.de  
jperkins.com



Multiplex's EasyGlider 4 is the fourth generation version of the company's quick build 1.8 metre span electric glider. Made from moulded Elapor foam the wings are very light and reinforced with a GRP square bar. The fuselage is also stiffened using Multiplex's M-Space technology. For 3S LiPo packs



This Ready to Run (RR) Extra 330 SC spans 1150 mm. It just requires a receiver and a 3S pack, and minor assembly to be flight ready. The model is a reduced scale Elapor version of the freestyle model flown by aerobatic champion, Gernot Bruckmann. It is fitted with a powerful brushless motor, a 55A-S-BEC controller and four Hitec HS-82MG servos

**ANNER FACTORY**  
www.annerfactory.com



Despite the prevalence of drones at the Toy Fair some new model aircraft companies do still show up. Anner Factory is a new name to us and they were exhibiting a range of laser cut, built up aeroplanes



That's a neat idea! This simple wing fixing method was shown to us using one of Anner's gliders

**DELUXE MATERIALS**  
www.deluxematerials.co.uk



John and Vivienne Bristow (left) are regular exhibitors at the Toy Fair, where they give hands on demonstrations of the latest Deluxe Materials adhesives to visitors. John is holding 'Fix N Flex', a single part, clear, flexible glue whose gap filling formula is great for repairing areas of foam models where strength is a priority

**GRAUPNER**  
www.graupner.com



Being a German show, the exhibitors mostly favour tray type transmitters. Graupner's mc-28 HoTT is a typical of this type of radio and is aimed at advanced model pilots. 16 functions, 120 model memories, integrated telemetry and voice messages, plus fast and reliable bi-directional transmission using Graupner's HoTT 2.4 GHz technology

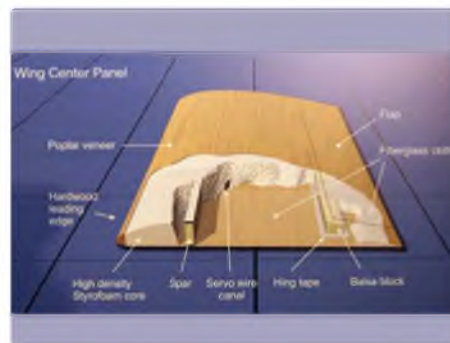
**PHOENIX MODELS**  
[phoenixmodel.com](http://phoenixmodel.com)



Phoenix Models have been associated with quite a few distributors/importers in the UK in recent years, although their relationship with their German partners, D-Power looks more stable. These two airframes caught our eye; the Westland Lysander is available in 1.9 metre (1/8 scale) and 3.3 metre (just under 1/5 scale) sizes, whilst the A-26 Invader measures up at 2.3 metres, which is just over 1/9 scale and suits .46 glow engines or equivalent electric power

**ART HOBBY**  
[gliders.arthobby.pl](http://gliders.arthobby.pl)

Long gone are the days when the Nuremberg show was the place to see the latest in continental gliding technology, although some companies maintain a solid presence. A stalwart exhibitor is Art Hobby from Poland, whose beautiful soarers feature veneered foam wings with moulded in carbon/glass composite spars. The black poplar veneer is bonded to the foam with aircraft industry grade epoxy in high pressure moulds, resulting in a super strong wing. Shown here is the Avatar 3.4M, an 80% RTF, high performance, ultra lightweight electric glider for Limited Motor Run flying (F5J- ALES)



**SAIL PROPELLERS**  
[www.sailpropeller.com](http://www.sailpropeller.com)



Sail Aviation Propeller Audio Supplies Company Limited (phew!) design and manufacture various types of propellers for air sports, including a large range of model aircraft props made from Beech wood

**SIMPROP**  
[www.shesto.co.uk](http://www.shesto.co.uk)



Simprop Electronic chose to put this neat Junkers CL.1 on prominent display. The 1750 mm wingspan model of the WW1 German observation aircraft is for five channel R/C and suits 1.20 cu in size four-stroke engines. A Saito FA-115 is quoted as the ideal power plant

**HACKER MOTOR**  
[www.hacker-motor-shop.com](http://www.hacker-motor-shop.com)



Hacker Motor were displaying their new range of Q100 motors for large models. The Q100-5L shown here is ideal for 3D and aerobatic models up to 55 lb and scale models up to 77 lb. And if things start running a little hot up front why not water cool your motor? Hence the 'fuel' tanks and tubing seen behind the motor on its display stand

**SEB ART**  
[www.sebart.it](http://www.sebart.it)



Italian ARTF manufacturer Seb Art were once again sharing space on the Hacker Motor stand. It's always good to catch up with the latest models from this premier model manufacturer and we were quickly drawn to the Prometheus F3A biplane. This advanced F3A design spans just under 74 inches and is powered with a SebArt/Hacker Contra Drive System G50-12XL, driven from a 10S-4400 mAh LiPo via a Jeti SPIN 125 A ESC



Also new was this 50 class Ultimate for 6S battery packs. Wingspan is 150 cm (59 inches). For Hacker A50-16S motor sets or similar

**SHESTO**

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



**Left:** Another British company that exhibits on a regular basis at the Toy Fair is Shesto, who supply hobby related tools, equipment and materials. Here is their new 'see through' stackable organiser with removable storage containers and lids. It has a locking system to keep your most used modelling bits and bobs safe and secure in one place

**Right:** Modelcraft StyroSten is a 3 in 1 tool comprising a hot wire cutter, hot knife and stencil burner. The cutter is perfect for cutting polystyrene and foam parts for models, while the knife is for detailed work and interior cuts outs, such as making servo and wheel wells in foam wings. The stencil burner can be used to quickly create bespoke painting stencils for adding a touch of individuality to any R/C model



**RIPMAX**

[www.ripmax.com](http://www.ripmax.com)

That just about wraps up the model aeroplane coverage at the Toy Fair. But before we take a look at just a few of the drones on display next month, here's another selection of new products from Ripmax. They were by far the exhibitor with the most models of interest to RGMW readers.



A recent addition to the Ripmax range are Super Flying Model kits. Piper Cubs are a speciality of SFM, with five different ARTF Cubs to choose from! Here's the 25% Clipped Wing version; 2.33 metre wingspan for 26-30 cc petrol power

**Right:** If you prefer to build your own Piper Cub then Super Flying Model can provide a kit for you too! This 1.72 metre version has a fully built up, laser cut airframe and suits .40-.70 four-stroke glows or electric. Ripmax recommend their Quantum II 40 brushless motor with 60 A ESC



**Left:** Also available as a laser cut builder's kit, the P-51D spans 1426 mm (56.2") and suits the same Quantum II 40 brushless motor set, running from a 4S-3200 mAh LiPo

**Right:** Mini Excalibur E is a reduced size, 1310 mm wingspan version of the Jet Sport Models' Excalibur for gas turbine (jet) engines. The inlets have been increased in area and the ducting modified to better suit a 90 mm Electric Ducted Fan unit running on 8S (2 x 4S) 4500 mAh LiPo packs



Check our website for a full list of events [www.rcmodelworld.com](http://www.rcmodelworld.com)

# Diary Dates

## INDOOR

### 18th Mar '17

**Waltham Chase Aeromodellers Indoor R/C Meetings**, at Fleming Park Leisure Centre, Passfield Avenue, Eastleigh, Hants SO50 9NL. Each event will run from 7 pm to 10 pm. The Main Hall is a ten badminton court size sports hall and is particularly suitable for lightweight indoor R/C models. Free-flight models may not be flown at this meeting. Admission to each meeting will be £8 for flyers and £1 for spectators, whilst accompanied children will be admitted free. Junior flyers will be charged as adult spectators. Flyers will be required to show proof of insurance. For further details please contact: Alan Wallington, 'Wrenbeck', Bull Lane, Waltham Chase, Southampton, Hants. Tel. 01489 895157, or see our website: [www.wcaero.co.uk](http://www.wcaero.co.uk)

### 28th Mar, 25th Apr, 30th May, 27th Jun '17

**Waltham Chase Aeromodellers Small Indoor R/C Model Meeting**, at the Main Hall at Wickham Community Centre, Mill Lane, Wickham, Hants PO17 5AL. All meetings will run from 7 pm to 9.30 pm. The hall is not large enough for conventional shock flyers, but has proved suitable for smaller indoor R/C models. Models are limited to a maximum weight of 95 g (3.5 ounces) for fixed wing aircraft, including battery (not to exceed a 2-cell LiPo pack). Helicopters are to be limited to a rotor diameter of 12" (305 mm). All models will be weighed before flight, and will be judged on their suitability for the venue. Admission to the meetings will be £4 for flyers and £1 for spectators, whilst accompanied children will be admitted free. Junior flyers will be charged as adult spectators. Flyers will be required to show proof of insurance. For further details please contact: Alan Wallington, 'Wrenbeck', Bull Lane, Waltham Chase, Southampton, Hants. Tel. 01489 895157, or see our website: [www.wcaero.co.uk](http://www.wcaero.co.uk)

### 1st Apr, 6th May, 3rd Jun, 1st Jul, 7th Oct, 4th Nov, 2nd Dec '17

**Indoor Flying at Furzefield**, Furzefield Sports Centre, Mutton Lane, Potters Bar, Herts, EN6 3BW. Times will be from 6 pm until 8 pm, flyers £9 and spectators £2. Rubber, free flight and small electric models only, wingspan will be limited to 20 inches. Enquiries to Mike Quille, 020 8500 3549, Email [mp.quille@live.co.uk](mailto:mp.quille@live.co.uk)

### 8th April, 14th Oct, 11th Nov, 9th Dec '17

**North London MFC Indoor meeting**, at Furzefield Sports Centre, Potters Bar, Hertfordshire EN6 3BW. From 6 pm until 9 pm. All up weight limited for fixed wing 225 g, 36 inch span, helicopter 400 g. BMFA insurance required. Contact Peter Elliott, Email: [ianelliott56@btinternet.com](mailto:ianelliott56@btinternet.com)

### 11th Apr, 9th May, 13th Jun, 12th Sep, 10th Oct, 14th Nov, 12th Dec '17

**Waltham Chase Aeromodellers Indoor R/C FPV Meeting**, at the Main Hall at Wickham Community Centre, Mill Lane, Wickham, Hants PO17 5AL. All meetings will run from 7 pm to 9.30 pm. Admission £4 for flyers and £1 for spectators, accompanied children free. Junior flyers will be charged as adult spectators. Flyers will be required to show proof of insurance. Models to be limited to a max weight of 95 g (3.5 oz) including battery (not to exceed a 2-cell LiPo pack). Helicopters are to be limited to a rotor diameter of 6" (152 mm). Multicopters are to have a motor to motor diameter not exceeding 6" (152 mm). All models should be 25 mW, 5.8 GHz or Wi-Fi FPV equipped. Each pilot will be allocated a video operating band and to guarantee frequency

separation a max of four pilots will be permitted to transmit at any one time. For further details please contact: Alan Wallington, 'Wrenbeck', Bull Lane, Waltham Chase, Southampton, Hants. Tel. 01489 895157, or see our website: [www.wcaero.co.uk](http://www.wcaero.co.uk)

## GENERAL

### 17th Mar '17

**DADMAC Auction**, hosted by the Dumbarton and District Model Aircraft Club, this Bring & Buy Auction will take place in the Chivas Community Suite of Dumbarton Football Club, Castle Road, Dumbarton. Book-in items from 5.30 pm, Auction kicks off at 8 pm. Entry fee, but no commission on sales. Bar and food available. Auction forms available on website: [www.dadmac.org.uk](http://www.dadmac.org.uk), contact Maurice Irvine on 01475 689711 for more details

### 19th Mar '17

**LMA Haydock Park 2017**, at Haydock Park Racecourse, Warrington Road, Newton le willows, St Helens WA12 0HQ. A new event that gives the chance to see those new winter projects up close and personal and to chat to the designers before the start of the new flying season. Doors open at 10 am, cost is £5.00, under 16's free (when accompanied by paying adult). LMA members with valid card £3. There is free car parking on site. A Bring and Buy will also be hosted and is £10.00 per table plus entrance fee.

### 19th Mar '17

**The Great Southern Model Auction**, at Mountbatten School, Romsey, Hampshire SO51 5SY. The doors open at 9 am, auction starts at 11 am. Entry £5, under 16s free. Refreshments available. Minimum lot £10. Pre-booking of auction lots is strongly recommended, contact Paul on 07500 175897. See at [hmfa.bmfa.org/](http://hmfa.bmfa.org/) for more details

### 1st & 2nd Apr '17

**Hobby Corner April Fool Fly-In**, hosted by the Wrexham Model Aircraft Club, situated midway between Wrexham and Ruthin (Postcode (nearest) LL11 3BB. OS map reference SJ167500, latitude 53.04155 and longitude 3.2434105. At what will probably be the first fly-in of the year we aim to give the novice flyer the confidence to go to other fly-ins during the 2017 season. Slots will be arranged throughout the day for different ability levels. No A-cert, no problem Instructors on hand. Possible A tests on the day (strictly by appointment). Well kept grass strips and a portalo, but no water or electricity. Fresh (drinking) water will be available both days. No fee for flying, though camping and caravan charges are £2 per night and £10 per night respectively. The Club strictly observes BMFA rules and recommendations. Good quality hot food both days. Please contact for further details and register for Go/No go weather updates 5 days and 24 hours before the event: [bob.davis.design@gmail.com](mailto:bob.davis.design@gmail.com) or 01490 413276

### 2nd Apr, 7th May, 4th Jun, 2nd Jul, 6th Aug, 3rd Sep, 1st Oct, 5th Nov, 3rd Dec '17

**Wessex Soaring Association Monthly Slope Fly-In**, for unpowered gliders and e-soarers. Saturday or Sunday, wind dependent. Slopes located in south Wiltshire, approx. 5 miles east of Shaftesbury. All welcome. Contact Pete Carpenter for details: [pete.carpenter12@gmail.com](mailto:pete.carpenter12@gmail.com) or tel: 07919 903742

A FREE service, advertise your club's event, show, fly-in, bring and fly, swapmeet, sale or whatever. Simply send in the details to: 'Diary Dates', RC Model World, Traplet Publications Ltd., Traplet House, Willow End Park, Blackmore Park Road, Malvern, WR13 6NN, UK. Or Email to [RCMW@traplet.co.uk](mailto:RCMW@traplet.co.uk) Traplet Publications Ltd. are unable to take responsibility for event cancellations. Check before you go.

### 8th Apr '17

**GBR/CAA F3A League competition**. Skelbrooke. All schedules. See [gbrcaa.org](http://gbrcaa.org) then forum 'Competition News' for details and 'Competition Entry Form' for fees and payment. Visitors welcome but please contact Contest Director, Ashley Hoyland on 0114 2873432 for details

### 8th & 9th Apr '17

**PSSA 'Fly for Fun' event**, The Great Orme, Llandudno, North Wales. Meet at the 'Tank Track' car park for 10 am each day. Open to non-PSSA members. Proof of insurance required. For more information contact Phil Cooke on 07772 224719 or Email: [webmaster@pssaonline.co.uk](mailto:webmaster@pssaonline.co.uk)

### 9th Apr '17

**Frome Model Flying Club Easter Swapmeet**, at The Conygre Hall, North Road, Timsbury, Bath BA2 0JQ. From 9 am – 12.30 pm. Tea, coffee and bacon rolls will be available. Entry is £1 per person and tables are free. Pre-booking required for tables, and entry from 8.30 for sellers. For more information and booking please contact Rob Buckley 07791 278292, Email: [rob@rwbuckley.co.uk](mailto:rob@rwbuckley.co.uk)

### 14th Apr '17

**Watton Radio Model Club Bring & Buy**, at Hingham Sport/Social Club, Watton Road, Hingham NR94HB. Sellers from 5.30 pm. £5 per table additional helpers £1. Doors open 6 pm, entry £1. Bar open refreshments available. Further details contact Martin Pawsey, 01953 883892, Email: [martin.pawsey@btinternet.com](mailto:martin.pawsey@btinternet.com)

### 16th Apr, 21st May, 2nd Jul, 17th Sep '17

**White Sheet Scale Fly-ins**, to be held at the White Sheet Club slopes near Mere, Wiltshire. No competition, just a friendly fly-in. Further information, directions and backup dates for each date from the calendar page of the SSUK website: [www.scalesoaring.co.uk](http://www.scalesoaring.co.uk) or Email: [c\\_williams30@sky.com](mailto:c_williams30@sky.com)

### 23rd April '17

**F3A. BMFA 1st GBR Team Selection Event**. Stansted MFC. FAI 'P' and 'F' schedules. Also GBR/CAA League competition. All Schedules. See [gbrcaa.org](http://gbrcaa.org) then forum 'Competition News' for details and 'Competition Entry Form' for fees and payment. Team Selection competitors have priority entry if competition is over subscribed. Visitors welcome but please contact Contest Director, Mark Pearce on 01279 505798 or mobile 07764 681116 for details.

### 28th to 30th Apr '17

**The ProWing International Trade Fair** will take place at the airfield in Soest/Bad Sassendorf (40 km East of Dortmund/Germany). 9 am to 6 pm (9 am to 5 pm Sunday). Admission is €8.00 (children up to 13 years free). More than 100 exhibitors will be presenting their products including engine powered planes, gliders, helicopters, jets, gas and electric engines, turbines, electronics and equipment for R/C models. Accommodation is available close to the airfield; you also can use the camping area directly at the airfield endowed with electricity and restrooms. For further information and details on camping accommodation check out the website at [www.prowing.de](http://www.prowing.de)

### 7th May '17

**GBR/CAA F3A League competition**. Ashbourne. All schedules. See [gbrcaa.org](http://gbrcaa.org) then forum 'Competition News' for details and 'Competition Entry Form' for fees and payment. Visitors welcome but please contact Contest Director, Adrian Harrison on 07976 244004 for details

# The Sport Channel

Another bunch of diverse sport model topics is put under the spotlight by Gray

“Make big plans – aim high!”  
(Lita Bane)



## This Month's Wise Words

Our annual appeal to see the results of readers' building efforts through the UK's winter months always brings in a few surprise choices for projects. I had to smile when we heard from regular contributor Chris Freeman from South Africa, as I was familiar with the design he'd picked.

The 'Super Murgatroid' began as a small, cute and curvy, vintage style F/F or R/C sport model for .75 cc power, designed by Joost Bakker, best known for his very popular 'Bugaboo'.

I would never have imagined the little Murgatroid in any kind of enlarged form, but Chris evidently had other ideas! He wrote: "A few months ago I received a call from my flying buddy and he told me that I needed to check the local model website. I logged on and found that I had been challenged to experience the joys of diesel power, as my flying buddy loves his diesels and does not fancy my electric motors. I was offered a Webra 2.5 or a Paw 2.5 with a carb for the build.

I am not the type to turn down a challenge so we discussed possible airframes and size for the motor. My son Byron posted a picture of the 'Super Murgatroid' as a possible candidate and soon someone posted links to RC Groups that had a build blog and a plan for the aircraft.

I printed the plan and we enlarged it to 1.6 metre wingspan. I changed a few aspects of the design to include tabulator spars and rib lets in the wing, and also the rear fuselage was lengthened to reduce the amount of the fin that was not supported by the fuselage.

I made a kit of the parts so I could build the airframe whilst we visited my mother in law. The airframe was built on the coffee table in the lounge, suitably protected with my own pine board that is used for building.

When we returned home I decided to cover the fuselage in silk as this would be more fuel resistant than other coverings, as I know that a diesel is a great distributor of burnt oil.

The wings and tail surfaces were covered in plastic film; the green is 30 year old Monokote. The silk covering was a challenge as it has been many years since I had used it but eventually it was done in an acceptable way. The green trim is Humbrol and then the entire fuselage was sprayed with 2K clear.

All radio equipment was installed as far forward as possible as the nose is quite short and the tail surfaces are large. No additional weight was required and the all up weight is 990 grams, which is good for this size of aircraft.



From South Africa, regular contributor Chris Freeman shows us his latest creation, the 'Super Murgatroid'. Scaled up to 1.6 m span, from a free flight design by Joost Bakker. Chris' enlargement is his first diesel powered model



The test flight was done early morning just before Christmas, which was just over three weeks from the time I started to build it. My flying buddy could not make it to the test flight but he did supply the fuel as this is very scarce in South Africa.

The Webra took a while to get going and we needed to find the correct settings. Luckily Byron had recently finished a Super 60 with an ED Hunter so I had gained some diesel experience. Once we got the motor running I hand launched it and Byron did the test flight, which required very little trimming.

Flight performance is great, with plenty of power and the design is very stable but it can be looped and rolled as the controls are very powerful with the large control surfaces.

Byron and I had five flights and huge grins on our faces afterwards, even though we had to clean the mess off the airframe. I later discovered that my shorts were full of oil marks and they will now be my attire for diesel flying!

This was a very worthwhile project as I have never owned and flown a diesel in all my 45+ years of modelling. So thanks

to Sybrand for his very generous offer/ challenge."

And thanks to Chris and Byron for sharing such an appealing and inspiring project with us. In anticipation of the interest that I just know is going to be shown in this design, I can offer readers a free download of the original, small Super Murgatroid plan on the usual condition that if you build a model from it, you supply us with photos. Do we have a deal?



Chris looks very pleased with his Super Murgatroid, which flew 'off the board'. In keeping with its status as a modern vintage style model it features a suitably mixed-media finish, incorporating doped silk, iron-on film and paint trim



The business end of the Super Murgatroid, showing off its Webra 2.5 cc diesel. Your author fondly remembers being in awe of the power of this engine during his earliest club days!

### Rabolini è Morto...

After a brief starring role here a few issues ago, even attracting its own fan mail, SC's favourite industrial robot, the mighty Rabolini 'Imperia' die cutting press is no more.

A contact at the factory where the Rabolini was employed told me that it began to exhibit worrying symptoms soon after we wrote about it. It seems that on two consecutive occasions, it seized catastrophically in the middle of major production runs, stamping out plastic 'mop trays', the item from which it chiefly made its living.

Once tweaked and rebooted, all seemed well. But not long after the Rabolini disgraced itself once more by popping first all its own circuit breakers, then those of the entire factory! Apparently, management and tech support inspected the mysteries of the Rabolini's inner workings for days on end, trying to make sense of its convoluted electrical, hydraulic and pneumatic systems.

It turned out that the machine was just coming up to its twentieth year and in that time it had been working tirelessly without so much as a service. My contact told me that the factory didn't even have an operator's manual for it! They truly don't make 'em like that any more. The final prognosis was not good though and it was decided to decommission the Italian colossus and sell it for scrap.

To the readers who enquired in all seriousness where they might obtain a Rabolini, all I can suggest is trawling the

Internet for websites dealing in second-hand factory production equipment.

Quite what the average modeller would do with one I can't begin to imagine. If you're contemplating acquiring one for a model

business, I would suggest that it would probably represent massive overkill in these days of CNC cutting and 3D printing. That said, it would still be the coolest thing in your workshop.



Ah, fame can be fickle and short-lived. We said goodbye to a stalwart piece of industrial history recently when our robot pal, the Rabolini Imperia die-cutting platen press, which we had the pleasure of operating last year, seized up fatally in mid-production run and is no more. Our final pic shows 'Error' messages flashing everywhere!

**1950s UFO Retrieval**

I agree, it does sound like the title of one of those amateur CGI hoax videos on YouTube... Our earlier items on UFO's and UFO-inspired models have certainly revealed a unforeseen level of interest in the whole field of Aerial Phenomena amongst SC's readership. I do thank everyone who kindly sent in some of their own anecdotes on

the subject, a couple of which have been genuinely mind-boggling.

You may recall that I offered to tell the story of my late modelling friend's UFO encounter if readers happened to bump into me during the flying season. The flaws in this plan were pointed out by readers outside the UK who were naturally unlikely to do so. To employ the correct Fortean terminology: "Duhhh!"



Photos this fuzzy, grainy and out of focus usually don't make it into print, but where UFOs are concerned we think they are wholly appropriate! Published in 1955, the 'UFO' by prolific designer and in-demand model draughtsman Paul del Gatto is a wild .049 free flight sportster that reflects the mania for all things extraterrestrial of the time. Upon reverse-engineering the plan, we determined that it's a triplane, ducted fan delta! That must surely appeal to SC readers. We have plans!

I therefore intend to type it up (along with another intriguing little story I collected) and will make it free for readers to download shortly.

Speaking of which, we can still supply, as downloads, plans for several highly entertaining UFO-styled models by such masters of the eccentric and offbeat as Ray Malmström and Roy Clough. Start your space fleet now, drop me an email.

While compiling this particular collection, I stumbled across a pseudo-UFO design so bizarre that I just knew that SC readers would queue up to get hold of a copy. Published in 1955, the 'UFO' by the talented prolific designer and model press draughtsman Paul del Gatto is basically a sport free flight model with a Cox .049. But all connection to normality ends roughly there.

The heart of the model is an all-sheet delta wing with assorted fins and winglets emerging freely at various points. On top of this sits a cavernous duct in which the Cox, with a regular-size flying prop, runs. This is said to replicate the anti-gravity drive of the 'full size' (still following this?)

As if this were not enough, 'P.D.G.' ramps up the absurd B-movie appeal of his UFO by adding not one but two smaller wings! So, I ask you, when was the last time you built a triplane delta ducted fan model? Exactly.

The only photo of this model that I could retrieve to show you is of suitably grainy, low-res quality that it looks like 'real' 1950s UFO shot. That alone ought to be incentive enough to get one built. Can you imagine one of these with micro R/C and an EDF unit? I rather thought you might. Again, just drop me an email.

**Krupka-Bauer Gleitflügel**

1930

Der Wiener Ing. Josef Krupka beschäftigte sich mit Freizeitsportgeräten und Ende 1929 entwarf ihm der Flugzeugkonstrukteur Ing. Leopold Bauer, ehemals bei den Lohner-Werken tätig, Gleitflügel, die mittels

**Dangerous Sports Update**

At the time of writing we've just had what I hope will be the UK's final snow warning for this time of year. Just as our flying field was drying out too...

Our piece a while back, supplied by Warwickshire friend Simon Rogers, on the history of skiing with small wings, enabling the skier to actually lift off and fly from the mountainside piste, caused some amusement. From the fanciful magazine cover we showed to the real-life, present day 'sail-wings', it was generally agreed that the concept cleverly combined the dangers of several already hazardous sports, thus providing 'something for everyone'.

Simon has been in touch again with an update that takes the origins of kite-skiing back to the 1930s. A photo and drawing for the 'Krupka-Bauer Gleitflügel' show a skier on wings, apparently as a viable proposition. We can't help but wonder how it flew.

Simon notes: "I assume that there must be a spar running across those wings because there's no way a man could hold them out straight in flight for more than a few seconds!"

Contributions, please to The Sport Channel, c/o the Traplet Publications address. All email correspondence to: [gray\\_rcmag@hotmail.com](mailto:gray_rcmag@hotmail.com) **RCMW**



Left: We've already featured something like this so you know it's probably not a good idea to try and emulate it... Skiing with wings apparently dates back to the 1930s, as demonstrated by the 'Krupka-Bauer Gleitflügel' seen in full flight here

THIS MONTH WE FEATURE WORLD CLASS DESIGNERS

## DAVID VAUGHAN AND DAVID BODDINGTON

### DAVID VAUGHAN



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[www.servoshop.co.uk](http://www.servoshop.co.uk)  
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Most major credit cards

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[www.rceverything.com](http://www.rceverything.com)  
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We will print your prepaid classified advertisement in the next available issue of R/C Model World. Classified adverts received after copy date may be held over the following issue. We advise you to type or print clearly (capital letters preferred) the text of your advert on the coupon provided and clearly indicate whether the goods referred to are 'wanted' or 'for sale'. No responsibility will be accepted for misprints. Trade Description Act. Attention should be paid to the requirements of the Act when giving detailed descriptions of all goods offered for sale. The Business Advertisements (Disclosures) Order 1977 requires that persons attempting to sell goods in the course of business must make that fact clear. Consumers should know whether an advert relates to a sale by a trader or private seller.

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# Next Issue

**DON'T MISS  
OUR MAY  
2017 ISSUE!**



## Celebrating Our 400th Issue!



### Gardan JB-01 Minicab



Join us as we celebrate the 400th issue of RC Model World by taking a peek back in time at some milestone issues of your favourite R/C model aircraft magazine. We begin with the 'First Edition' of RCMW in January 1984 and then hop forward to subsequent centennial editions to see how the magazine, and the R/C model flying hobby, has evolved over the past three and a bit decades. It's been quite a journey!

To toast the publication of our 400th issue we are going to wind back the clock and reprint a revised version of RC Model World's very first Plan Feature! Designed by Dave Womersley, this highly detailed 1:4 scale model of the Minicab has beautiful lines and has proved to be an excellent subject for scale over the past thirty-plus years. With a 75 inch wingspan and drawn on three large sheets, Dave's plan originally appeared in the April 1984 issue, rather than the first edition back in January of that year. However, we thought that our 400th issue was the perfect opportunity to shine a spotlight on this attractive aeroplane once again. For four function radio, plus flaps, the Minicab plan shows details for a .60-.90 size two-stroke glow engine, but the chunky fuselage is ripe for an electric conversion (not detailed).

## MAY 2017 ISSUE ON SALE THURSDAY 20TH APRIL

### Pick Your Own Plan – 400th Issue Special!

To wrap up our anniversary celebrations we are putting together a very special Pick Your Own Plan offer, which you will find in the centre of next month's magazine. Incidentally, as this issue nears completion things have become clearer regarding the pagination for the magazine going forward. It will not have escaped your attention that the total number of pages in this issue is 84 and this will be the new page count whenever we include a pull-out plan in the centre of the magazine. However, in alternate months, when we feature the Pick Your Own Plan offer instead, the total pagination will return to 100 pages. But please don't hold our 'feet to the fire' because, as we always say in the one line disclaimer at the end of Next Issue every month\*, all contents are subject to change without notice – and that includes the number of pages too.

**PLUS...**

*More features, columns and reviews from across the complete spectrum of the R/C model-flying hobby*

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