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MARCH 2016

# R/C MODEL WORLD

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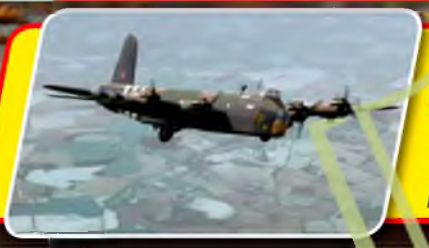

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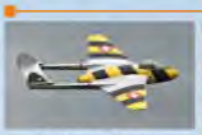

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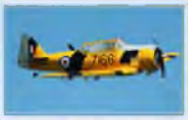

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# CONTENTS

RC MODEL WORLD
MARCH 2016 • ISSUE #386


## FRONT COVER

Freewing are manufacturers of some highly realistic R/C EDF jets. Brian Collins is a big fan (no pun intended!) and he has several of their models under his belt, including this gorgeous Typhoon, equipped with a 90 mm 12-blade metal cased ducted fan unit and which is now available in RAF livery. You can read Brian's review of this moulded foam beauty starting on page 56

## REGULARS



## REVIEWS



## FEATURES








# PRE-FLIGHT


**Kevin Crozier**
Editor | Radio Control Model World
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Traplet Publications Ltd
Willow End Park, Blackmore Park Rd,
Malvern, WR13 6NN. UK
or email: rcmw@traplet.com


Welcome to the March issue of RC Model World. Recently I have been enjoying reading a magazine, published by a much respected British corporation, which is packed full of lovely pictures and information about our glorious countryside. But very occasionally I have been surprised to find that an article stops prematurely and upon turning the page one is faced with advertisements instead of the end of the article.

Now I accept that we are not perfect here at RC Model World (as our recent rotary/radial engine error testifies!) but I do try my best to capture any obvious visual errors before the magazine goes to print. After initial sub-editing this involves reading the proofs of all articles and returning them to the design studio to correct any errors, followed by another visual check of the final pages before they go to the printer, at which time I sign off the magazine – and after which I do not expect it to be changed...

I was therefore apalled to be informed that the February issue of the magazine contained an article that had been cut off in its prime. I refer to Booster Roosters, which covered rocket gliders, the final half page of which had been replaced by a Traplet advertisement.

As Editor of the magazine it falls to me to apologise to our readers for cutting off the end of the article, and also to Stuart Lodge, the author of the piece that was so rudely interrupted. If you were enjoying Stuart's article and want to find out how it ends you can read it in full on Traplet's Hobby Hub website:

**http://thehobbyhub.com/air/features/booster-rooster#.Vp5fgVJhtqH**

And now please excuse me as I go in search of some hot coals and some rope to haul on... With that off my chest, let's see what awaits you inside this issue of RCMW.

We make a start by revealing the fabulous push-pull pylon-engine powered Savoia-Marchetti S.55 X seaplane, which Erick Marin built in memory of 24 Italian flying boats that took a formation flight from Italy to the USA and back again in 1933. Then it is on with Part Two of Phil Cooke's build article for the PSSA A-4 Skyhawk power scale soarer.

Another two-part Plan Feature kicks off this month in the form of Robin Fowler's 1:10 scale (118" span) electric powered Short Stirling bomber for four economy outrunner motors and six-function R/C. And to finish off the plans section our free pull-out plan this time is for the cute Mini Cavu, a 30" span high wing, vintage style model redesigned by Alan Wooster for Park 300 motors and three-function R/C.

Informative articles are supplied by Chris Williams, who begins a new series on Workshop Wheezes. And Mal Luff continues to provide much needed background information to those readers who are interested in 3D modelling, with the eventual aim of producing their own 3D printed plastic parts.

On review, Brian Collins tells us all about the Freewing Eurofighter EDF jet, and we put the XK Detect X380-C drone high in the sky to take some great pictures of the new Traplet offices with its twin-gimbal action camera.

There will also be a full report on all the latest new R/C model products on display at the annual Nuremberg Toy Fair. Right, I'm off to catch the train to Germany, so until next time...

Happy flying!

Kevin


RC MODEL WORLD

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# SLINGSBY KITE WOOD PACK

Our feature plan in the January issue was for Chris Williams' graceful Slingsby Kite 2a, a 4.7 metre wing-span vintage scale glider. At the time of going to press we were unable to give a price for the laser cut wood pack to complement the plan but we are now pleased to be able to confirm that the price will be £165.00.

Please note that all Traplet Laser Cut Wood Packs are intricate shaped parts only. No strip wood or sheet wood is included.
Here are the details:

Plan Name: Slingsby Kite 2a (MW3771)
Laser Cut Wood Pack Number: WP3771
Laser Cut Wood Pack Price: £165.00

Parts are subject to Postage and Packing charges at standard rates.
Copies of plan number MW3771 and wood pack WP3771 are available from RC Model World (Plans Service), Traplet Publications Limited, Traplet House, Willow End Park, Blackmore Park Road, Welland WR13 6NN, England, Telephone: + 44 (0) 1684 588599, Fax: + 44 (0) 1684 578558, Email: orders@traplet.com or order online at www.trapletshop.com

For more information on the Traplet Publications Plans Service see our advertisement in this issue.

# POLES APART

Barry Wayne writes:

*"I read with interest the article by Brian Collins explaining the availability and usage of the various plugs and sockets on the market. Unfortunately he forgot to mention you should always connect the female end to the battery to prevent accidental short circuits. If the male is connected it is very easy to cause a short by touching any metal tools, especially on Deans and other plugs which have open contacts on the male connector. I feel this should be pointed out to help beginners who have read the article.*

*In the meantime keep up the great work which makes RCMW such a good read."*

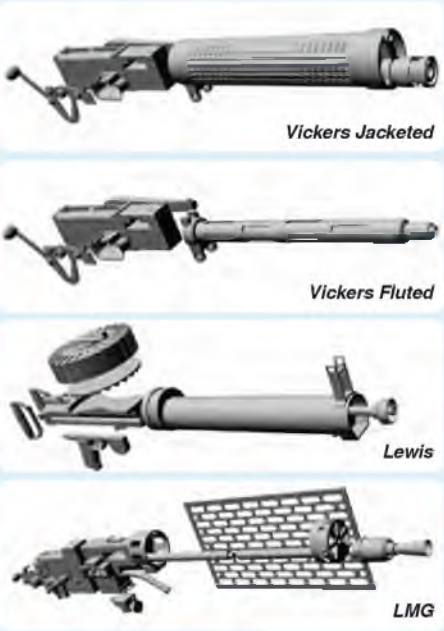
Thank you for your email, Barry. To be fair to Brian, he did mention this topic in the 'Poles Apart' section of his article, and also gave a pictorial example of bad practice in the last image of the feature. However, your advice to 'always connect the female end to the battery' is also a very clear way of delivering the message on how to wire up connectors safely, so thank you for sharing it.

# SARIK 3D PRINTED GUNS

These model guns are intended as accessories for scale model aircraft rather than as stand-alone display pieces. The models are supplied as a small number of parts that need to be assembled and painted. Your model will be supplied as it comes off the 3D printer and you'll probably need to do a little 'cleaning up' with small files to remove any swarf. The limitations of 3D printing mean that very fine details such as sights etc. are not included. But of course these can be added using other modelling methods if required.

There are currently four different WW1 era 3D printed model machine guns available for use as scale details on R/C model aircraft: Lewis, Vickers (jacketed barrel), Vickers (fluted barrel) and MG 08/15 'Spandau'. They are non-functional! Note that they are sold singly, but several aircraft types will need a pair to be mounted. Each gun comes in a choice of three scales – 1:4, 1:5 and 1:6 – priced at £19.95, £16.95 and £14.95 respectively.

A full list of applications relating to WW1 plans available from Traplet is available from our Customer Service department, or visit:
http://gb.trapletshop.com/3d-printed-scale-detail-machine-guns




# IT'S IN THE BAG

Peter Kraus, one of our regular Australian correspondents and also the author of the Australian Kittyhawks feature in this issue, has sent in the following from his workshop:

*"G'day Kevin,*

*I thought I'd send you the attached pictures. The first is me in my workshop. As you can see tidying the place up is a priority. I wanted the photo to update my Facebook page. The Fournier motor glider on the bench was bought as a kit when I was with the RAAF in Butterworth, Malaysia, in 1983. It was a very early electric kit and came with a small brushed motor. I knew nothing about electric models then, which wasn't a lot less than most people knew. After a few years I actually built it, discarding the brushed motor and putting in a small Hacker. It flew quite well but the tail feathers are rather fragile and it had lain dormant for a long time until I decided to dust it off and get it going again.*

*Now here's a workshop tip. I found that, possibly due to the repairs on the tail, it was a tad tail heavy. I had a rare flash of brilliance and using a bit of double - sided tape I attached a small zip lock bag, which had originally contained screws from an ARF kit, to the back of the firewall. I can now add or subtract small amounts of lead, in the form of small shot like fishing sinkers, to adjust the balance."*

Many thanks for the workshop picture, Peter (it is always interesting to see how other modellers go about their modelling). And thanks also for the simple but useful balancing tip, although we would suggest saving this one for non-aerobatic models as the bag may split if subjected to lots of banging about.

If using Peter's zip bag idea then we would also suggest covering the seal with a folded over strip of magic tape or similar removable tape as those little bags do sometimes pop open a bit. You will also need to make sure that there are no bolt ends or other sharp objects on the back of the firewall that could puncture the bag. Alternatively, cut a small rectangle of thin sheet foam the same size as the bag and tape that to the back of the bag to prevent punctures.

The LiPo in Peter's model stops the bag from moving around but if there is any space for the bag to move then a balsa cross member could be glued across the fuselage just behind the bag to stop it from flapping around.

# MINI FIGHTER MOTORS

From these pictures we can see that Shaun Mileson is very much a fan of small fun fighters. Shaun writes:

*"Hi Kevin*

*I have built Adrian Britton's Spitfire from the free plan in a previous magazine and have been flying it for almost a year now. I purchased the issue of RCMW recently with Adrian's ME 109 in it (November 2015) and even though I have built and almost finished the FW 190 in the pics attached (not Adrian's design but an old free flight plan I had from a kit; I built it with the same methods Adrian used), I thought I had to build the ME 109.*

*I built them both with the same power set up (I will do the same with the ME 109) and when I saw your piece on the brushless conversions for these planes I thought I had to share mine. I have attached a picture of the motor and ESC, which are run from a 3-cell 750 mAh battery.*

*These 1700 KV motors are from Hobbyking and are 'cheap as chips'. They spin a 6" x 6" prop comfortably and give more than enough thrust to power these small planes, so long as I keep the weight between 250-300 grams AUW.*

*As far as the mounting goes, I make a firewall in front or behind one of the formers, depending on the position. I then position tubes to the fuselage sides to guide an Allen key for removing the motor, if needs be.*

*I hope you find the conversion of interest to you and the readers of your great mag."*

Many thanks for this very useful information, Shaun. And we hope that the Focke Wulf and Messerschmitt fly as well as Adrian's Spitfire, and give you as much flying fun too!

# 2016 BMFA SCALE INDOOR FREE FLIGHT NATIONAL CHAMPIONSHIPS

If you fancy a change from all that hectic indoor R/C action why not slow things down a bit and take a visit to the Scale Indoor F/F Nats? Andy Sephton, PRO of the BMFA Scale Technical Committee, has sent the following information:

*"I'm emailing as a reminder that the BMFA Scale Indoor Free Flight Nationals will be held on Sunday May 1st at Wolverhampton University Gymnasium. Entries should be made in advance, the closing date is April 15th, and spectators are welcome.*

*There will be opportunities for trimming at two events planned at Bushfield Sports Centre, Peterborough on Saturday April 2nd (10.00 am to 2.00 pm) and Sunday April 10th (10.00 am to 4.00 pm).*

*SAM 35 will be hosting a new event at the Scale Indoor F/F Nats in that prizes will be awarded for the best SAM 35 legal Kit Scale model. Entry is free to SAM members but it will require a normal entry to BMFA Kit Scale."*

The 2016 BMFA Free Flight Scale Indoor National Championships will be held in the same venue as last year; the University of Wolverhampton Sports Centre, Gorway Road, Walsall, West Midlands, WS1 3BD. The Hall is about the same size as Nottingham and has a relatively smooth ceiling and good lighting.

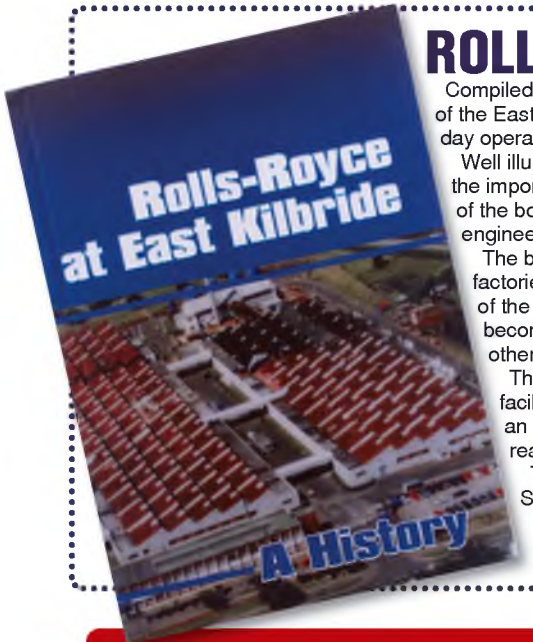
Official events will include free flight competitions for Open Rubber, CO2/Electric, Peanut, Pistachio, Kit Scale and the newly introduced Glider class. Pre-entry to the main events must be made by Friday 15th April 2016.

Unofficial competitions will be held for Air Race and Mass Launch. These are free entry on the day to competitors. There will be an additional £6.00 entry fee for non-competitors. Pre-entry for this is not required.

A raffle will be held for aviation and modelling related goodies – please help to make it successful by bringing and donating a prize. Access to the site and parking facilities are excellent, and there is a viewing gallery with a restaurant that will be open all day. Doors open at 8.00 am and will close at 6.00 pm.

Spectators: £6.00, Accompanied children and those under 18 years: free.

For more information please contact:
John Minchell: j.minchell@btinternet.com, tel: 07989 744251
Graham Banham: gray4990@yahoo.co.uk, tel: 07951 390473




# ROLLS-ROYCE AT EAST KILBRIDE – A HISTORY

Compiled by Rolls-Royce employees past and present, this book provides a full history and up-to-date account of the East Kilbride facilities, detailing activities from their opening at Hillington in 1939 to Rolls-Royce's modern day operation at the Inchinnan factory today.

Well illustrated throughout, with historical photographs and supporting documentation, the book explains the importance of Rolls-Royce's footprint in Scotland and the strategic relevance for their placement North of the border. It goes on to detail the East Kilbride factory development activities, its key milestones and its engineering achievements, of which there were many.

The book provides a good overview of the British Aviation industry and explains how the East Kilbride factories had to evolve to succeed throughout the turbulent 1960s and 70s. It details the operational history of the factories and plots their growth and development, explaining how by the 1980s East Kilbride had become Europe's largest Aero Engine Overhaul base, reworking a broader range of engine types than any other facility in the world.

The book's extensive Appendix lists the huge range of civil and military engine types supported by the facility over the years, with numerous rare photos of engines and airframes, which will please anyone with an interest in UK aviation heritage. The book is also provided with a DVD in the rear sleeve, giving the reader access to a much wider range of historical photographs and videos to support the written text.

The book is priced at £10 (plus £2 p&p) and is available direct from the Rolls-Royce Heritage Trust Secretary (Scottish Branch):
Email: jenni.thomson@hotmail.com
Phone: 01698 884264

**Reviewed by Phil Cooke**

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# SHOP WINDOW

## PARROT SPECIAL EDITION SKYCONTROLLER

Highlighted in our February column, the new Bebop Drone 2 can be controlled using a Smartphone or Tablet with a Wi-Fi range of 300 metres. But it can also be piloted using the exclusive new Black Parrot Special Edition Skycontroller, if you prefer. Providing a more precise response by using its two conventional control sticks, the piloting device is fixed on a shelf that will accommodate the vast majority of Smartphones and Tablets available on the market. The Skycontroller can operate the Bebop 2 with or without a Tablet, and extends the Wi-Fi range up to 2 kilometres (1.2 miles), subject to local regulations. Check out website for more information and user details.

Read our full review of the Parrot Bebop 2 and the Black Skycontroller in the April issue of RC Model World, and Issue 4 of RC Flight Camera Action magazine.

**www.flyingtoys.com**

## ARISM/SPARMAX COMPRESSOR KITS


We have already highlighted the new and well received Sparmax MAX-4 airbrush, ARISM and ARISM MINI compressors in RCMW, but now these items are available as great value kits! The kits include: An ARISM or ARISM MINI compressor, Sparmax MAX-4 airbrush (with 2 year warranty), 2 m braided hose and a Sparmax cleaning station.

Sparmax Arism Compressor Kit: SRP £180 inc. VAT

Sparmax Arism Mini Compressor Kit: SRP £150 inc. VAT

**www.airbrushes.com**

## SAITO FG-61TS

Saito have a new addition to their range of petrol (gas) four-stroke twin engines, the FG-61TS. Built to the same high quality we've come to expect from Saito the engine comes with the following specs:

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## PILOT-RC G650 JET


What is bound to be a popular model jet, the G650 is now available now from Pilot-RC. With a 98" wingspan the G650 comes Kit Only or as a Jet Kit with retracts, and also in a Jet Turbine Ready Version. The Jet Kit with retracts comes with a tail pipe, air trap and hardware, airbrake, air retract gear and electric valve, as well as a cylinder for the gear doors and air brake. It also has pre-installed LED lights and wing bags are included.

**www.macgregor.co.uk**

## ZENMUSE XT

Introducing the Zenmuse XT, a state-of-the-art aerial thermal imaging camera that brings together the industry-leading technologies of DJI's aerial platforms and FLIR's thermal imaging solutions – a perfect combination. It integrates FLIR's market-leading thermal camera, which can generate images up to a resolution of 640 x 512, with DJI's signature gimbal stabilisation and Lightbridge video-transmission technology. By using the same gimbal mount as DJI's Zenmuse X3, X5 and X5R cameras for film making the Zenmuse XT becomes fully compatible with the DJI's popular Inspire 1 and Matrice 100 aerial platforms.

**www.dji.com**

# New kits and accessories

## BLACK SERIES CONTROLLER



With their new BLACK controller series, uniLIGHT presents a lightweight and compact light control system that is available as 1 and 2-channel versions. These modules can produce sharper and more beautiful lighting effects with pre-programmed light schemes and include short-circuit, reverse polarity and deep discharge protection.

BLACK.1 is a reasonably priced controller for the simplest light tasks. Plug in the battery and go! Various switching, blinking or flash sequences can be selected manually and of course via the receiver.

BLACK.2 is for small light systems; one channel pre-programmed as a switching function for spotlights or navigation lights and the second with different flash sequences for ACL or Beacon.

**www.unilight.at**

## MAXFORD USA RUMPLER TAUBE

This model is about 1:9 in scale, has a 64" wingspan and a flying weight of around 5 lb. It comes with a full functioning wing and elevator warping feature, as well as shock absorbing landing gear. The Taube is designed for electric power but also can be converted to glow with Maxford's glow conversion kit. Included within the kit are just a few of the following: Pre-built and pre-covered airframe, pre-assembled control rigging for wing and horizontal tail-warping, twin cockpits and pre-assembled landing gear assembly.

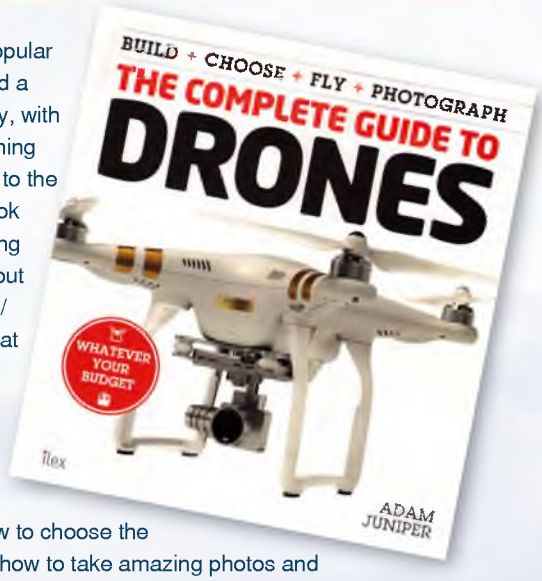
**www.macgregor.co.uk**

## LIEBER HAWK 280

This new 280 mm FPV Racing Mini Quadcopter uses an all-in-one flight control system, compatible with the mainstream transmitters, for example JR and Futaba, and is specifically chosen to run 2204-2150 KV motors with 6 inch propellers to reach exciting new speeds. Due to the use of extremely lightweight pure carbon fibre material and the all-in-one flight control system it allows the flight weight to be as light as 340-360 g (not including the battery). This means you will be able to accelerate quickly off the mark and the Hawk is claimed to be remarkably responsive and stable in flight. The thickness of the fuselage is a mere 1.5 mm, with pure carbon fibre supports for light weight but a strong structure, plus the arms all have a thickness of 3 mm and are also made from carbon fibre.

**Lieber-rc.com**

## THE COMPLETE GUIDE TO DRONES




Almost overnight popular drones have created a billion-dollar industry, with a foothold in everything from movie-making to the toy market. This book shows you everything there is to know about drones/multicopters/UAVs (including what really is the correct term for them!) in plain, jargon-free English. Find out how they work, how to fly them, how to choose the right drone for you, how to take amazing photos and videos from above and much more. The informative text is accompanied with clear illustrations and brand new photography, plus a complete step-by-step project to build your own modestly priced drone – great as a first step into the world of drones! This book is all you need to take to the skies!

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# SAVOIA-MARCHETTI S.55 X

***Franco Bugada relates the story behind Erick Marin's masterpiece of a seaplane, which he modelled in memory of 24 Italian flying boats that took a formation flight from Italy to the USA and back again in 1933. With additional images courtesy of Erick Marin and Giorgio Apostolo***

*Erick starts the rear engine. He is seriously thinking of substituting the engines with electric motors so that he can eliminate the silencers and avoiding any starting problems*

*On the water the model S 55 X looks just like the full scale I-NANN*

*Erick's S.55 X looks glorious flying over the lake and with snow-capped mountains in the background*

In 1923 the Italian Royal Air Force had been officially established. Ten years afterwards the Air Force's birth was celebrated by a huge squadron of twenty four S.55 'X' ('X' meaning the 'tenth') flying boats leaving Orbetello, close to Elba Island, and flying to Chicago on Lake Michigan.

## Flight History

***Gen. Italo Balbo (left) in the cockpit of his S.55 X, smiling after a good landing***

This long flight started on July 1st, 1933, after a period of bad weather conditions delayed the planned departure for more than one month. The flying boat was an improved version of the standard S.55, with enlarged hulls, streamlined nacelles fairing the motors, more sophisticated instrumentation and minor details like the karmans (fairings) between the horizontal tail and the booms. The motors were the Isotta Fraschini of 750 hp.

The organisation of the flight was quite long since the route was decided in order to be undertaken in acceptable safety conditions, like the possibility of landing on the lakes existing in Europe along the journey. One of the main difficulties was the Alps crossing because of the more than 10,000 feet high peaks, with clouds and turbulence among the mountains, and also the long distances when crossing the ocean.

Another difficulty was caused by the large number of planes and the necessity of flying close to each other, so the engines' rpm had to be continuously adjusted.

The first step was Orbetello to Amsterdam, via the alpine Splugen Pass, a seven hours flight with poor visibility over Germany. During landing an accident occurred to I-DINI, the S.55 X of Captain Baldini, which touched the shallow water and capsized. The reserve flying boat I–MARI substituted the damaged machine.

The following morning the formation left Holland, bound for Londonderry in Ireland. The flight was under the rain and clouds in the North Sea, and the seaplanes were forced to travel at very low level over the waves. The next stopping place was Reykjavik in Iceland after a flight of more than 900 miles. The second part of the flight was in fog, which was sometimes very thick. The squadron was forced to wait for some days in Reykjavik, again due to the poor weather.

Then came the longest part of the North Atlantic crossing, 1500 miles to Cartwright on the coast of Labrador. It was a 12 hour flight, the first part in the clouds. The next morning the huge formation left for Shediac Bay, New Brunswick, Canada, 750 miles away, then flew on to Montreal, a further 500 miles. It was very difficult for the pilots to land on the St. Lawrence, a very large river, due to the enormous quantity of boats awaiting the squadron's arrival. Only one night was spent in Montreal due to the weather forecast.

The flight to Chicago was finally accomplished, passing a welcoming message from Italy to the citizens of North America on the occasion of the Chicago World Fair. This last part of the journey, after crossing the Canadian border, was a fantastic flight, with a swarm of several other planes escorting the Italian squadron. Lake Michigan was the mooring for the twenty four S.55 X seaplanes. In Chicago 'Balbo Avenue' still exists and celebrates the name of the General who led the squadron.

The next flight reached New York, where the fantastic reception was even more impressive than the Chicago one! General Balbo received an invitation to have a lunch with the President of the United States, Franklin Delano Roosevelt and four hundred other people. The airmen received a great reception over five days and Balbo received a feathered hat from the Sioux people; he was given the Red Indian name of 'Great Chief Flying Eagle'.

On July 25th the return journey started from Shediac and then to Shoal Harbour, Newfoundland. Some small accidents occurred to the engines of three flying boats but everything was quickly repaired in order to continue the return flight. But the weather was impossible to arrange and the armada was forced to wait more than a week. Balbo took the decision to divert from the original planned route via Ireland and he decided to fly to the Azores islands by following better weather conditions.

Nine S.55 X landed in Horta and fifteen in Ponta Delgada. There was a gala dinner for the airmen called 'GLI ATLANTICI'. The morning after the armada suffered a second tragic accident. The machine I-RANI of Captain Ranieri capsized due to the waves and Lt. Squaglia died in the hospital. Twenty three flying boats reached Lisbon after 780 miles and no more trouble, but no celebration was made due to the tragedy.

The next part of the planned route was to Biscarrosse and Marseilles, but Balbo changed the flight path in order to get to Rome on August 12th. In Italy the celebrations began with the triumphant arrival of the twenty-three flying boats, escorted by fifty seaplanes of Regia Aeronautica, followed by a group landing on the Lido di Ostia.

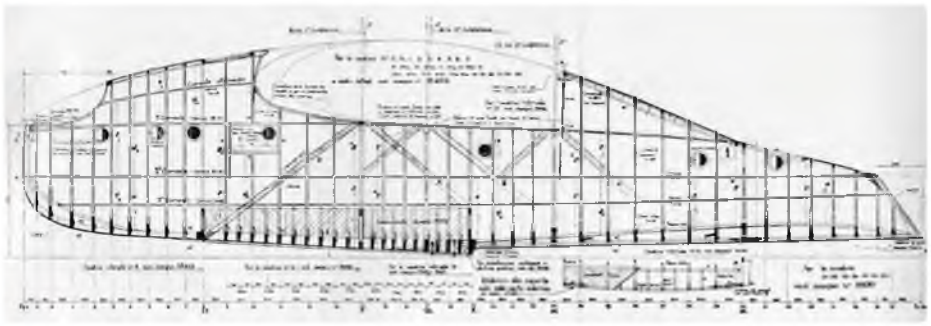
The aviators were received by the King and a procession moved through the streets of Rome, under the Constantine Arch and to the Coliseum. Balbo received the title of Italy Air Marshal. Afterwards he was designated Governor of Libya and went to live in Tripoli to organise the Italian colony.

After 1935 the war clouds began to appear. Balbo was against the war but he was forced to respect the government's decisions. In 1940, after a reconnaissance flight in his S.79, the Italian anti-air raid defence made a terrible mistake and brought down the plane. Balbo and his crew died in Tobruk.

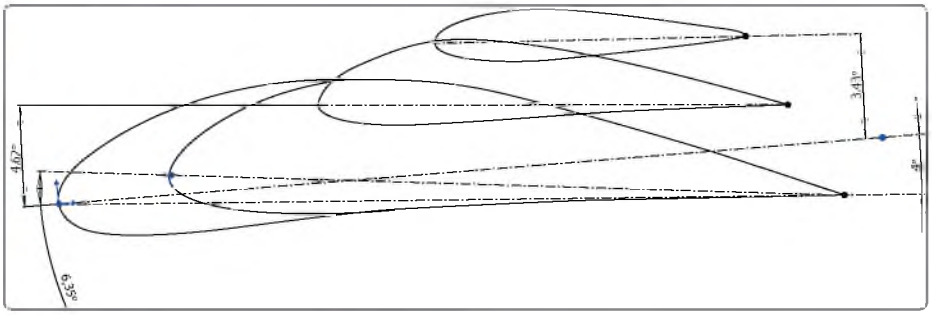
Some days after an Allied Air Force plane threw a wreath of flowers near Tobruk to honour the aviator who crossed the Atlantic Ocean twice with many seaplanes (South Atlantic in 1930 and the North Atlantic in 1933) and who was so popular all over the world.

***Tail fins at Orbetello! The S.55 X squadron is drawn up before the historic flight***

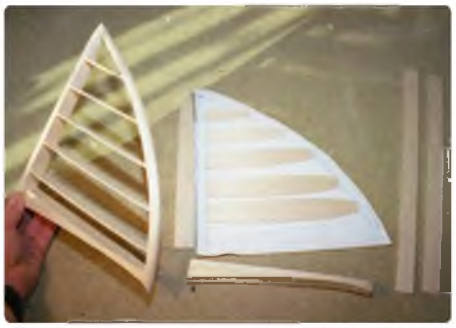
Erick Marin studies one of his construction drawings



Cutaway showing the details of the full size float structure, which is replicated in Erick's model




Drawing showing the various wing incidences



One fin and its structure

Horizontal tail, stabiliser and elevator

Rear part of a float, showing the metal eye used to connect it to the boom

The structure of one float, front view. All balsa, traditional construction

A float just covered with balsa

Wing construction

Float edges were strengthened with carbon strips

## The Model Of Erick Marin

Our friend Erick was fascinated by the history and by the configuration of the S.55 X flying boat. He decided to make a flying R/C replica of this plane and worked hard to find the necessary drawings, photos and information about the aircraft. Then he designed the model, arriving at a 3.5 m span in order to conceal as much as possible the engine cylinders and the big silencers within the nacelle. To help with designing the model and all the structural details, Erick asked for the assistance of some other experts, particularly Jean Claude Kaueuffling. This long period of preparation took practically one year.

The first point he considered was the general configuration. Erick installed the wings with the following incidences: +4° centre, +6.35° at the floats, +4.62° at the ailerons, +3.45° at the wingtip, and with the horizontal tail at +3° and the motor nacelle at +8.5°. They are practically the same as the full-scale aircraft.

Erick began to build the booms, using a sandwich of balsa and 3 mm plywood on the inside. The booms are covered in glass-fibre. After the booms Erick made the horizontal tail with the traditional system of ribs and spars. The ribs were drawn and cut independently and control cables were installed inside.

The big floats are built by using the traditional system of 10 mm square stringers and formers, all in balsa wood. Each former was cut by leaving two reference 'pedestals' on the bottom, which were used to accurately align all of the structure on a perfectly flat plane. After gluing up all of the float's structure, they were cut off. The floats are sheeted with 3 mm balsa and the bottom of the hulls with 4 mm sheet. The front parts of the structures are shaped using a planking of 4 x 4 mm balsa.

After shaping using sandpaper and then covering, the hull edges were strengthened with carbon strips all around. The central part of the wing has to be considered the key part of any seaplane, as it is where all the pressure is focused, so it has to be rigid and strong. Erick placed the main spars in the same position where they were installed by Marchetti on the full-scale aircraft. The material is pine and the ribs are from balsa, with plywood used in some places. The wings are assembled using a 40 mm aluminium joiner. The centre section is sheeted with 2 mm balsa.

The engine nacelles are made with a sandwich of plywood, covered by balsa to obtain the correct shape. The nacelles are also covered with glass fibre and strengthened by aluminium parts at major stress points.

One issue was with the two-stroke engines, which were generating a lot of vibration. So the nacelle construction had to be accurate and strong. Obviously this trouble could have be lessened by using four-stroke engines or electric motors. Erick said he would like to install electric motors, to be able to turn the propellers at will when the seaplane is on the water. The electric solution is unfortunately too costly since the S.55 X is 24 kg in weight - but he is thinking about it!

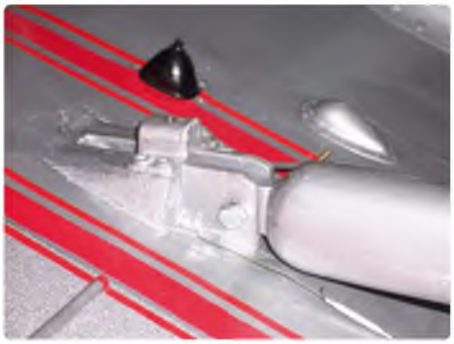
With an internal combustion engine system it is necessary to start the engines and then put the seaplane on the water, which requires some safety procedures to keep bodies and hands far from the propellers. A special trailer is used if a slipway exists to reach the water. Obviously this problem is avoided with amphibious planes, but a slipway is still necessary. Anyway, the S.55 X is a pure flying boat and even the full-scale aircraft used some special trucks for moving the plane on the ground.

Finishing of all the surfaces took hours, along with installation of small details like cleats, rings, levers and cables etc. The paint was sprayed on, with all the small details like the 'Savoia-Marchetti' logo printed on adhesive film. When everything was finished Erick sprayed the model with a final transparent layer of car laquer.

*First assembly of the model. At 3.5 m span it is a large model to be made from balsa using traditional construction*

*The full tail assembly before covering – a very artistic job!*

*The wing prior to covering*



*The boom connection with the wing*

*The cockpit was fully enclosed*


*The end of one boom. Note the control cables and the 'Savoia-Marchetti' marking*

*Close up of the nacelle and engines. The original plane had three bladed, metal propellers and black painting on the bottom hulls. A lot of literature confirms it was a green colour, but the Air Force Instruction Manual describes a special black painting based on bitumen, so Erick decided to make the correction*

*Erick (on the left) and his friend start and adjust the engines. Note the homemade silencers, another artisan job*

*The nacelle of Erick's model. A beautiful creation with plenty of scale details*

## Proving Flight

The 'proving test' on the water, when Erick was helped by two friends, was made at Lery-Pose where a surface area of 1.5 to 1 km was available. The model went easily onto the step by increasing the engine rpm. The take-off was no trouble and the flight was safe and sure. Erick was understandably very happy! The landing was a little difficult due to the position of the Centre of Gravity, which was originally too far forward. The model's tendency to pitch was corrected by sorting the C of G position. Also, flying on just one engine was tested and it was found to be possible.

***RCMW***

*The motor rpm is increased and the take-off begins*

*On the step, just before take-off*

*S.55 X in flight over the trees that line the lake*

| SPECIFICATIONS | |
|---|---|
| **LENGTH:** | 2.45 m |
| **HEIGHT:** | 0.73 m |
| **TOTAL WEIGHT:** | 24 kg |
| **MOTORS:** | 2 x Super Tigre 32.5 cc glow |
| **SERVOS:** | Stabiliser and elevator – GWS S04 BBM<br>Ailerons – Futaba 5 kg/cm |
| **TRANSMITTER:** | Thobois (self built – http://home.nordnet.fr/fthobois/) |
| **RECEIVER:** | Futaba FP R118F 40 MHz |

# A-4 SKYHAWK

Feature Plan

***Here is Part 2 of the 36" span PSSA Mass Build Project for 2016, a two-function R/C A-4 designed by Phil Cooke and Matt Jones. In this article Phil shows how to finish the Skyhawk and then describes the prototype's first flights***

## PART 2


Last month we followed the stages of the construction of the fuselage. This time we complete the model and test fly.

If you are building the PSS A-4 Skyhawk then it is likely you have reached this stage…

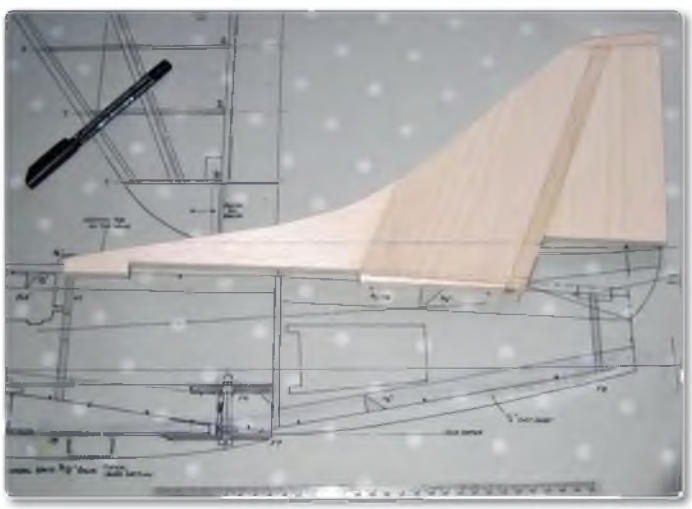
### Tailplane And Fin

Make up the tailplane from 3/8" balsa with the two strip Leading Edge (LE); note the grain direction on the tips. Once dry offer up a symmetrical 1½" Trailing Edge (TE) elevator stock and mark the tips to suit. Sand the tailplane to a symmetrical section with a rounded leading edge and the TE to suit the TE stock.

Make up the fin, taking note of the grain directions. Sand to a symmetrical section with a rounded LE and a feathered TE down to 3/16". Using the plan, mark the fin carefully with the required tailplane incidence and dry fit the tailplane onto the fin by sliding it on to the fin from the rear. Without gluing the tailplane position and glue the two 1/8" tailplane doublers to the fin. Again, if using film you may find it easier to cover these and the fin prior to gluing them on... Remove the tailplane by sliding it out to the rear along the 'channel' now formed by the 1/8" doublers.

Make up the little elevator actuator from bent M2 rod and 5 mm brass tubing as shown on


*Tailplane LE from medium 3/8"x 1/2" strip. Note the grain direction on other parts. The production plan was altered slightly to include wider elevator chord so production assembly will vary slightly at the tip*



*Fin assembly. The fin post is from hard 3/8" x 1/2" strip. Note grain direction on other components*

*Rear fuselage fitted with end cap F9 and sanded to section. Note the amount of rounding necessary – triangular stock is evident and acts as good guide when shaping. Moisturiser cream bottle top for tailpipe, diameter as per plan*

*Slots cut into rear top sheet for fin tabs. Fuselage tops are covered prior to fin fitting for ease*

*Fin and tailplane sanded to section. Cover prior to fitting. Fin doublers should be covered before fitting to fin also, aiding the covering process*

*Elevator actuator from lengths of M2 rod and 5 mm brass tube, fixed with solder or slow setting epoxy. Brass tube crimped and drilled to suit M2 clevis. Height of actuator is critical to suit the snake output so make sure it clears the fuselage*

the plan. Use solder or slow setting epoxy to bond, ensuring it is square. Drill the flattened section of the actuator to suit a M2 clevis pin.

Make up the two elevator halves, hinge and machine for the elevator actuator. You will need to relieve the centre section of the tailplane on the underside for the actuator to clear and enable the elevator to articulate downwards.

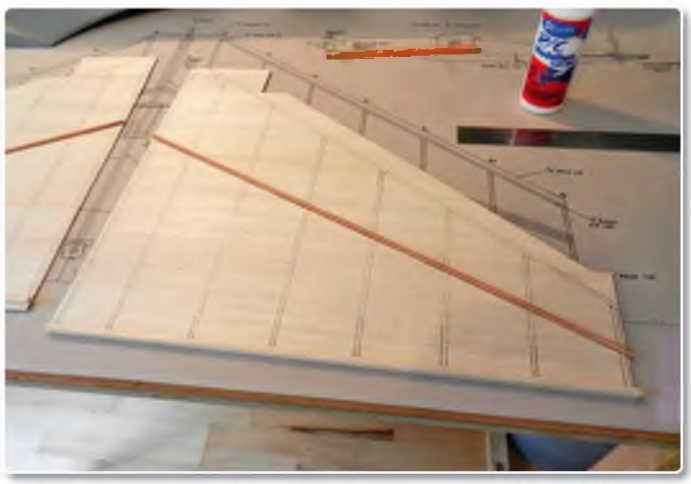
Position the fin accurately onto the fuselage centreline and mark the two holes required for the fin location tabs. Cut the holes and dry fit the fin. Ensure a good push fit is achieved. Ensure the fin can seat fully along its length to ensure the correct tailplane incidence is achieved and sand the fuselage profile as necessary. Remove the fin and tailplane, and cover separately for ease.

## Wing

Make up the 1/16" balsa skins, noting the grain directions vary top and bottom.

Once dry place the lower skin over the plan and mark up to show the bottom spar, Sub TE, Sub LE and rib positions. Glue and pin the 1/8" x 1/8" bottom spar to the skins. Glue and pin the 3/16" Sub TE to the bottom skins. The spar slots top and bottom in the 1/8" ribs

*Rear fuselage covered. Arrestor hook is made from 1/4" dowel length fitted between two ply hard-points, drilled and pinned into the fuselage under-skin; this has proven robust as the model does not touch down on this*



*Initial wing assembly with bottom skins marked up with positions of lower spars, LE, TE and ribs. Bottom spar and TE shown fitted. All ribs from 1/8" balsa to aid skin adhesion*

*1/16"shear webbing is added between the top and bottom spars; additional 1/8" webbing is added to the rear of the initial 1/16" webbing between ribs 2 and 3 to aid wing joiner assembly*

*Lower 1/4" balsa gusset fitted to wing panel*

*Top 1/4" balsa gussets fitted and sanded to rib profile with vertical slots cut to suit 1/16" ply wing joiner*

*Wing joiner dry fitted. Wing is built with 14 mm dihedral at Rib 8 at each panel tip. The servo box is built up prior to the removal of the central Rib 1 section*

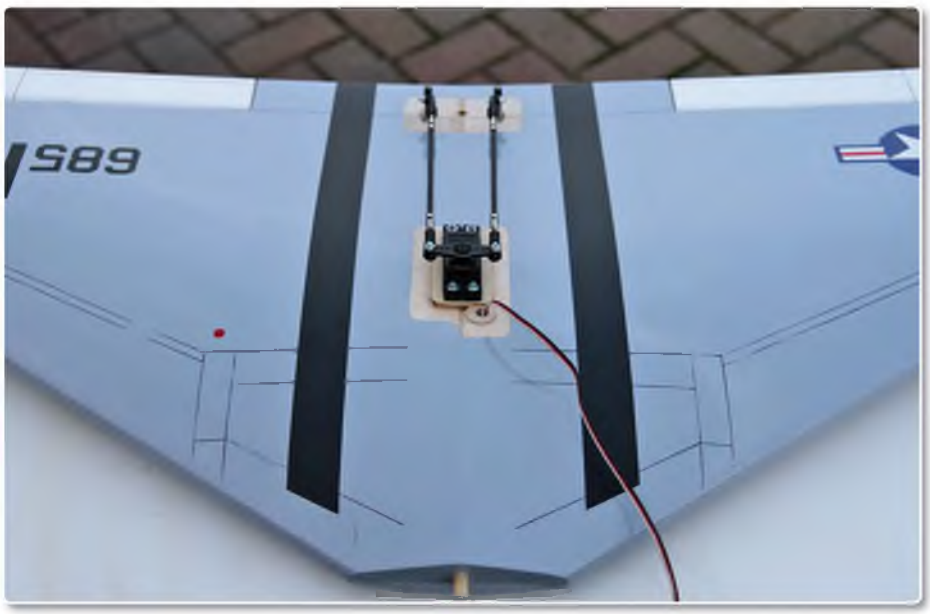
1 to 8 will require a little dressing to enable the swept spars to pass through the holes as cut. Once fettled to suit glue the ribs vertically onto the bottom spar in each panel, noting that Rib 1 is to be angled according to the template to enable the correct dihedral (2 degrees each side – equivalent to 14 mm under the tip rib). Note that Rib 1 needs to be laminated with the half rib – Rib 1A – and only R1 is slotted to accept the wing dowel.

Add the top spar to the ribs and add the 1/16" webbing in between the top and bottom spars, which are staggered. The webbing should have vertical grain. Add the sub LE to the front of the ribs. Once set remove the assembly from the board and chock the wing at the rear to enable the bottom skins to be 'rolled' along the underside profile of the front of the ribs and sub LE.

Make up the wing joiner supports first by adding the 1/8" additional webbing on rear face of the webbing between Ribs 2 and 3. Then add the front 1/4" balsa triangular gussets top and bottom. Saw a vertical slot through ribs 1 and 2 immediately rear of the front gussets. Dry fit the 1/16" ply wing joiner against the front gusset and glue the rear 1/4" gusset supports between the ribs. Remove the 1/16" ply joiner to create the slot. Sand the top surface of the upper gussets to match the curvature of the upper wing surface.

Make up the wing servo 'box' from 1/8" balsa and add in the balsa blocks to support the hinges.

*TWO degrees of washout is built into each panel at the tip by chocking the TE whilst the top skins are added. Note the fixed section of TE secures the aileron torque rods. Keep the torque rods less than 20 mm high to clear the wing bolt captive nut in former F6*

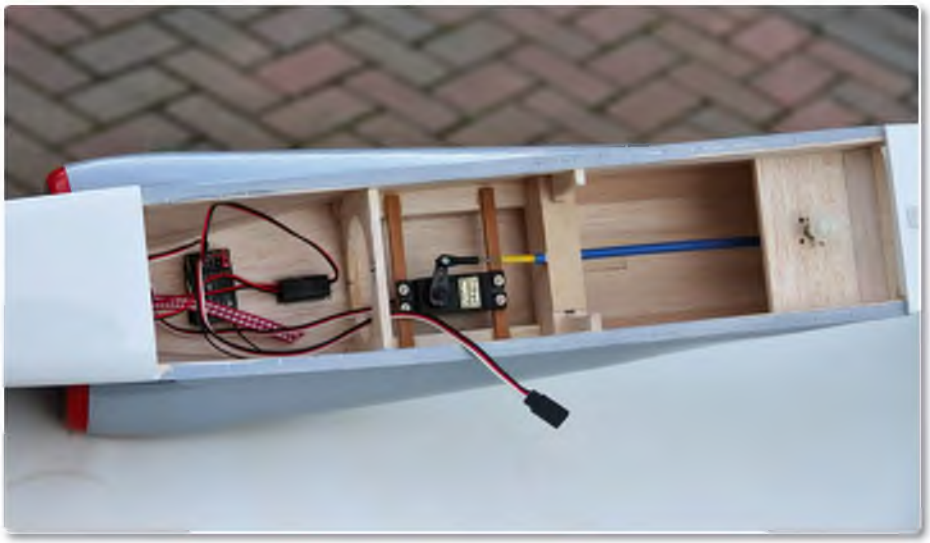



*General wing layout with single servo and torque rods*

*LE wing dowel and ply lined front face. The shape requires the chamfering of the fuselage wing root doublers to accommodate the wing fully*

*Wing servo arrangement. Standard size servos were used throughout, although two mini servos could easily be fitted to enable flaperons*

*Front of wing bay looking onto F3, faced with 1/16" ply and showing the battery tube (a ribbon is tied to the battery for ease of removal/adjustment) and the hole for the wing dowel*



*Entire wing bay front to back showing Rx and switch, standard size elevator servo, snake mounting and wing bolt captive nut in F6*

*F6 detail showing 1/8" ply and 1/8" balsa laminate. The captive nut is mounted from the rear side for the 6 mm nylon wing retaining bolt*

*Elevator horn connection with the shroud removed for clarity*

Dress the wing skins along the sub TE. It's now time to add the top sheeting, which sets the washout (2 degrees per panel at rib 8). Cut a balsa wedge from 1/4" balsa, which raises the sub TE of the wing by 3 mm at Rib 8, running out to zero by Rib 3. Affix this wedge firmly to the plan then pin the wing down onto it. Add the top skins and allow too set firm before the wing is removed from the board. The washout is now set into each panel.

Trim the wing skins top and bottom at the tip, root and along the sub LE. Add the true LE and sand to profile. Fit the aileron torque rods and secure with the fixed section of aileron stock to the centreline. Make up and hinge the ailerons. Dry fit to aid tip alignment. Make up the wing tips from balsa/ply/balsa laminate and glue onto the wings, ensuring the ply laminate matches the aileron TE when in the neutral position.

Re-cut the slot through the top and bottom skins to accept the 1/16" ply wing joiner. Use the dihedral chocks to raise each wing panel by 14 mm at Rib 8 each side from the board, then glue the mating faces of Rib 1 whilst inserting the 1/16" dihedral brace through the wing from top to bottom. Once dry trim the ply dihedral brace flush with the skins.

Add the 1/16" ply face to the front of the wing and add the 1/4" diameter wing dowel and fit the 1/8" liteply spreader plate to the underside, drilling the wing for the wing bolt on the centreline.

Offer up the wing and check for fit; you will have to chamfer in the 3/16" fuselage doublers from the maximum depth section to the LE to allow for the difference in depth of wing between F2 and F1. Add the solid balsa undercarriage fairings to the underside of the wing and epoxy into position.

With the wing in place, make up the little infill

*Underside of wing panel shows the extent and fit of the aileron and the wheel bay pontoon. This acts as a skid - ideal for those smooth landings!*


*Co-designer Matt Jones grips the Skyhawk ready for maiden launch off the slope*


fairing required between the front fuselage and the wing underside. Add the LE radius blends to the fuselage at this stage too, sand to blend smoothly into the wing LE.

## Finishing

Designed for slope use, the completed airframe is fully sheeted and lends itself ideally to a range of covering solutions – tissue and dope, glass and resin, film or 'tex. All could be used to good effect. Do bear in mind that if an iron on covering is used you will make the job far easier if certain parts of the model are pre-covered, prior to final fit. The front air-intakes, the fin, tailplane and tailplane doublers are all good examples where covering before final fixing will significantly help achieve a tidy, wrinkle-free finish.

The prototype airframe was finished in gloss film to represent a US Navy example; the top sides were covered in a pale grey Profilm, the undersides were covered in white Solarfilm, with some trim and self-adhesive vinyl decals applied to detail as flown.

## Flying

Online C of G calculators were used to establish the theoretical balance point, but initial test glides away from the slope proved this to be too far forward. The small amount of ballast initially fitted was removed from the nose and incrementally we moved the Rx battery rearward in its battery tube, resulting in the model flying completely un-ballasted.

The balance point shown on the plan was deemed optimised after minor adjustments over a series of flights. At this position the model flew with a solid feel, the controls are nicely harmonised and the stall, which you really have to work the elevator to achieve, is nothing more than a predictable, mushy wing drop. The dive test resulted in a gentle climb out as the airspeed increased and inverted flight was easily maintained with just a little forward stick.

Launching proved easy enough with a one handed grip ahead of the wing LE; the fuselage is very sturdy at this position around former F3. When a helper was on hand it proved easiest to launch with fingers and thumb wrapped around each Leading Edge for a double-handed, wings level overhead push. Some up elevator trim proved necessary on the prototype even with the corrected balance point and this has been accounted for in the plan as drawn with the tailplane incidence now tweaked relative to the datums.

The model has demonstrated some very pleasing flying characteristics. It penetrates well despite its relatively low weight and loading, and has a good range of speed. It

*Running in for another fast pass*

can be cruised around quite sedately, but dropping the nose soon has the model in an energised state and ready for some aeros. The A-4 loops just fine with sufficient entry speed and the rolls are a delight – very axial and crisp with full throw. Putting these together you'll soon get into the groove with large reversals and wingovers with axial rolls on each pass! The model looks best when flown in large arcing turns, typical of a vintage jet of this type.

The landing circuit and final approach even in blustery conditions proved very easy to manage; the model remains responsive and crisp on the controls even on finals into a good headwind when the relative forward speeds are low. The model lands out very nicely onto its underwing wheel bays, giving a little clearance between the airframe and the ground at touchdown. Even touch and goes were proven possible when flying at sites with short grass on top.

### In Summary

The A-4 Skyhawk model has no real vices. You will find it quite stable and predictable in the cruise, with the ability to up its game and become nippy and aerobatic when the mood takes you. ***RCMW***

## RC MODEL WORLD DETAILS

### MODEL SPECIFICATIONS

| | |
|---|---|
| **SCALE:** | 1:12 |
| **WINGSPAN:** | 36 in (915 mm) |
| **WING LOADING:** | 18 oz/sq ft |
| **LENGTH:** | 41.25 in (1022 mm) |
| **WEIGHT:** | 2 lb 8 oz |
| **RADIO FUNCTIONS:** | Ailerons, Elevator |
| **SERVOS:** | 2 x standard size |
| **BASIC CONSTRUCTION MATERIALS:** | Balsa, Ply |
| **COVERING MATERIAL:** | Heatshrink film |
| **CENTRE OF GRAVITY:** | 6.1" (155 mm) from Leading Edge |

**CONTROL THROWS:**
**AILERONS:** 40 mm up, 20 mm down
**ELEVATOR:** 45 mm up, 30 mm down

### CONTACTS

**Power Scale Soaring Association**
www.pssaonline.co.uk



## PLAN DETAILS

| | |
|---|---|
| **NAME:** | A-4 Skyhawk |
| **BUILD CATEGORY:** | Intermediate |
| **PLAN NUMBER:** | MW3775 |
| **PLAN PRICE:** | £16.99 ($28.99) |
| **CANOPY NUMBER:** | CA3775CY |
| **CANOPY PRICE:** | £6.99 ($11.99) |
| **LASER WOOD PACK NUMBER:** | WP3775 |
| **LASER WOOD PACK:** | £49.99 ($84.99) |

Plans and parts (if available) are subject to Postage and Packing charges at standard rates.
Copies of plan number MW3775 are available from RC Model World (Plans Service), Traplet Publications Limited, Traplet House, Willow End Park, Blackmore Park Road, Welland, WR13 6NN, England, Telephone: + 44 (0) 1684 588599, Fax: + 44 (0) 1684 578558, Email: orders@traplet.com or order online at www.trapletshop.com
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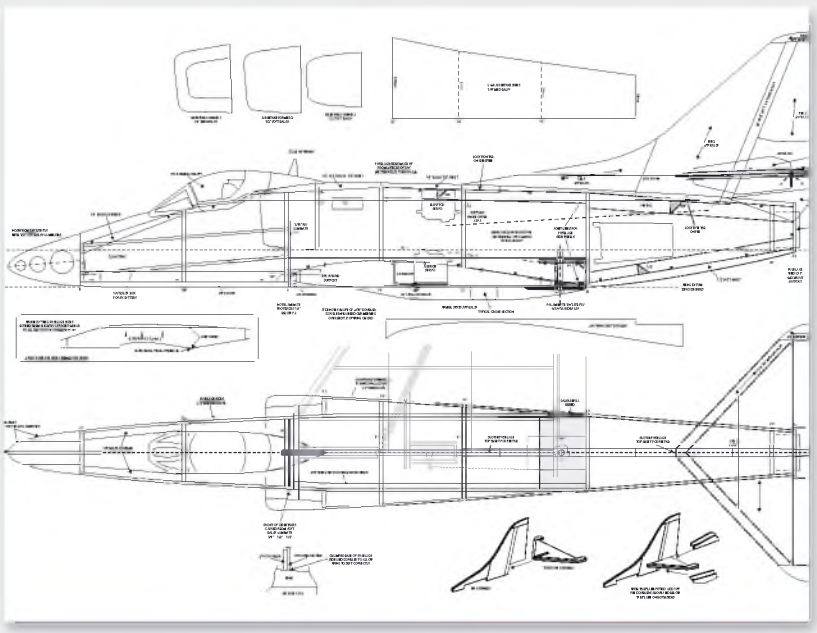

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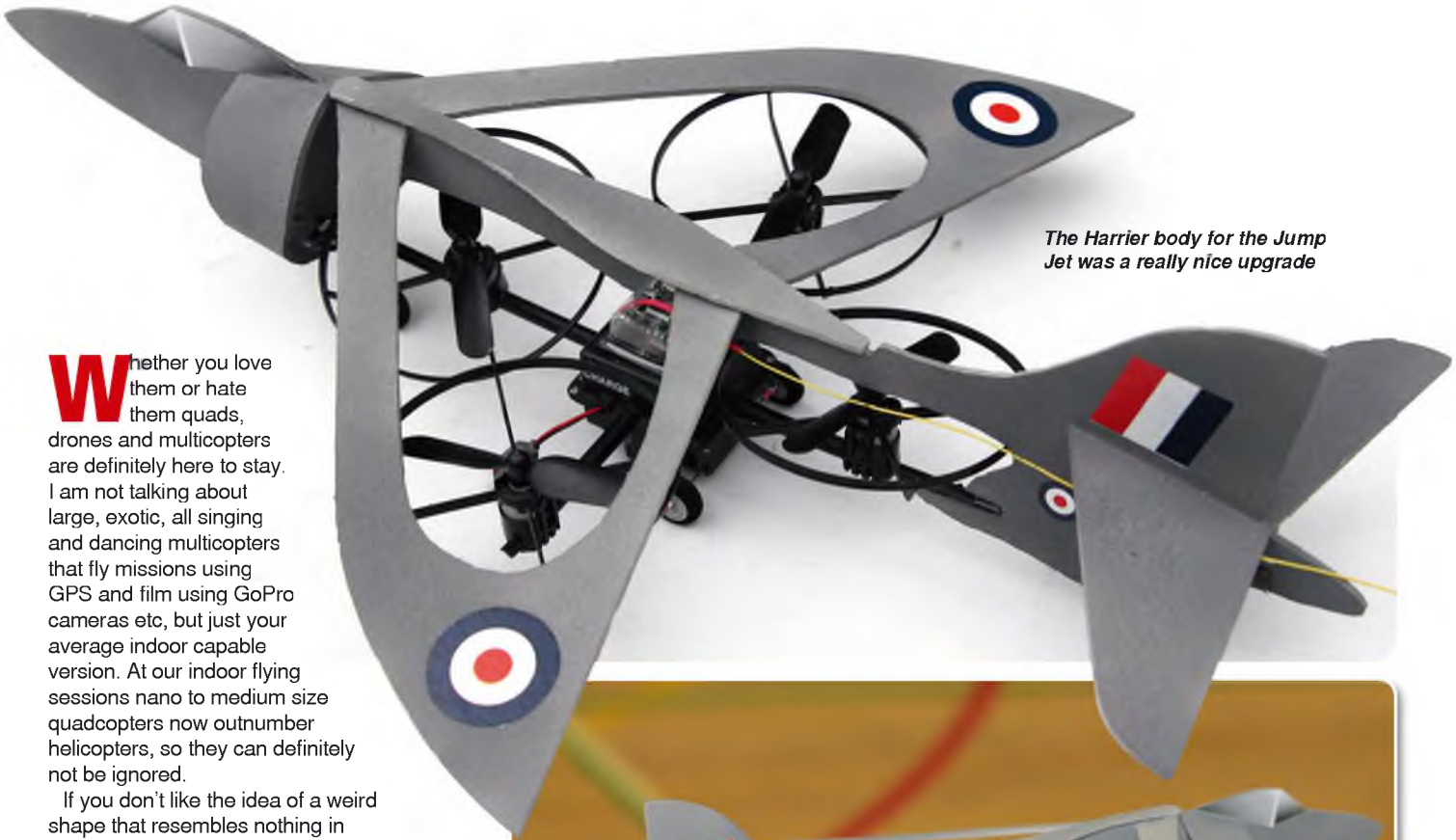
# QUAD JETS

***John Stennard shows how to morph your quadcopter into something that more resembles an aircraft***



*The Harrier body for the Jump Jet was a really nice upgrade*

Whether you love them or hate them quads, drones and multicopters are definitely here to stay. I am not talking about large, exotic, all singing and dancing multicopters that fly missions using GPS and film using GoPro cameras etc, but just your average indoor capable version. At our indoor flying sessions nano to medium size quadcopters now outnumber helicopters, so they can definitely not be ignored.

If you don't like the idea of a weird shape that resembles nothing in particular flying around, you can morph your quad into something resembling an aircraft. Remember there have also been plenty of weird looking aircraft! A bit of lateral thinking will enable you to see a quad in a new light. Think of it as a combination of a power source and a very stable airframe. Different, yes, but something you could transform into a VTOL aircraft.

Before looking forward let's take a step back to the origins of quads. Many modellers are surprised to find that quads have been around for some while. The Snelflight 'Jump Jet' was quite revolutionary when it was introduced around 2008. This quad was one of the first readily available in the UK and started with IR control before a 35 MHz version was introduced. In its day it was really revolutionary and was enhanced even further when a very neat Harrier body was marketed. This fitted easily and my 'Jump Jet Harrier' was the star of many indoor demos.

Snelflight also had some other very ingenious models, such as the Hoverfly and Chinook helicopters. These featured a unique system with blade tip mounted motors and power supplied via an umbilical cord. The Hoverfly was a really good indoor training helicopter and of course the direct power supply meant that the flight duration was only limited by the level of the pilot's concentration and interest span.

*It was a touch fragile but it hardly affected the performance of the basic quad*

*A younger version of me enjoying being a Harrier pilot!*

*The Snelflight Jump Jet was unique in its day*

*The IFO 5 was an early quad from Walkera*

*This RTF foam quad fighter flew reasonably well but lacked duration*

*The actual quad element has an integral 1S 120 LiPo charged via a USB lead*

*A bit tricky to fly as 6-axis stabilization was in its infancy*

Following the Jump Jet I had a Walkera IFO 8 and IFO 5; these date from 2009. These were not particularly easy to fly and were only on the brink of full stabilisation. I tried to add an aircraft type body similar to the Snelflight Harrier to both of these models to produce a VTOL aircraft but neither had any spare lifting capacity or enough stability.

Over my quad years I have tried fitting plane bodies to several other quads with disappointing results. These were early second-generation quads with only a small lifting capacity. I had more success with my Santa Clause and Starship Enterprise quads, which were based on smaller Walkera quads. These were sort of third generation (heaven knows what generation we are on now!) with a bit more lifting capacity. These both still fly well and always create interest.

The latest generation of quads, even the nano and micro size ones, have much more lifting capacity and a mini size one with an F-22 fighter body has been around for some while. When I saw a really small micro/nano size quad-plane on the Banggood website I ended up with two of the three different styles available, an F-22 and Su-27. In fact they are the same body with different colour schemes.

The quad part is really very small and has an integral 1S LiPo, which is charged via a USB connection. The body is made from extremely light and flexible foam, which although quite tough in itself, has a very obvious weak point. The quad is positioned in diamond format so that the wings can be suitably swept, but unfortunately there is then a point on the wings where the foam is very narrow and lacks strength.

After a period of flying and handling something had to be done before the nose area broke off. I glued some very thin CF strip under the wings to support the weak area and this has worked perfectly. The Tx is the tiny midget size type but at least it is available in Mode 1. I did my usual conversion, removing the knobs on the sticks and inserting two lengths of CF rod. I still find the small physical size of the Tx uncomfortable but at least I feel happier with the longer sticks.

The quad-planes are quite easy to pilot but their small size means that close in flying is the best option. At 5 to 10 m distance they begin to look very small and without the coloured LED display they would be hard to orientate. They do have a slightly different flying style than a normal quad of the same size and the body, although extremely light, does affect the flight pattern, most noticeably in forward flight.

So the new nano/micro quad-planes do offer a new and interesting quad experience and with a couple in the air together they are even more interesting. We had a lot of fun tail chasing each other! The only snag is that they are grounded while the integral flight LiPo is charging but, of course, this does allow cooling time for the hardworking motors.

*These nano size quad jets are a clever design*

*The small size of the model can be appreciated with my fingers for scale*


*The nano quad jets can be flown in a very small area but the flight duration is short*

***The Blade 200 QX makes an ideal basis for a quad jet with plenty of surplus lifting capacity***

These quad jets inspired me to make a jet body to fit on my Blade QX 200 quad, which has ample spare lifting capacity and uses a 2S 800 LiPo flight pack. Once a plan had been made of the layout of the four props a card template was made with four slightly larger than prop size holes so that this could be used in planning the wing shape. Since the quad is designed to fly in a square rather than diamond format this does affect the wing shape. Basically, I wanted the smallest and lightest wing shape and a curved leading edge delta proved to be the best design.

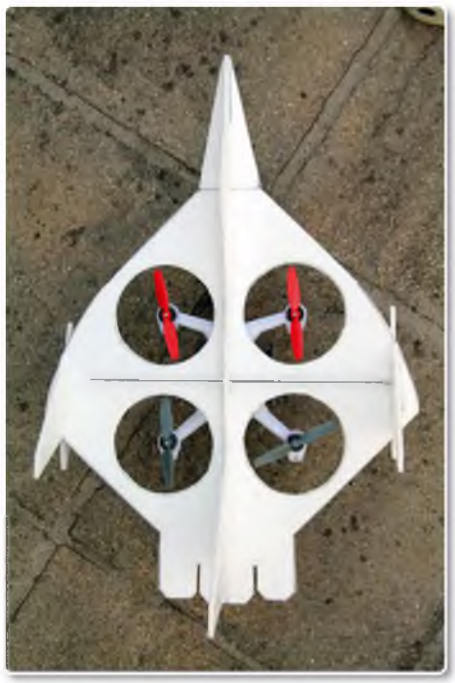
With this positioned on the quad with Velcro a simple body was designed and the quad jet was test flown. As anticipated the quad hardly noticed the extra weight so fins, drop tanks and tailpipes were added. Again flight tests showed that the quad flew fine with the extra weight so some colour was added using Humbrol acrylic spray and some red stars. Subsequently I added some of the flashing LED light units taken from the special shuttlecocks that are very inexpensive on eBay.

The finished add-on airframe weighs 60 g (2.1 oz). The quad-jet proved to fly well and was perfectly balanced. And of course it is very stable. I did find that tight turns at slow speed using a roll input could upset the stability but that can happen with a quad without an additional body. It just seems more dramatic when the quad looks like a plane.

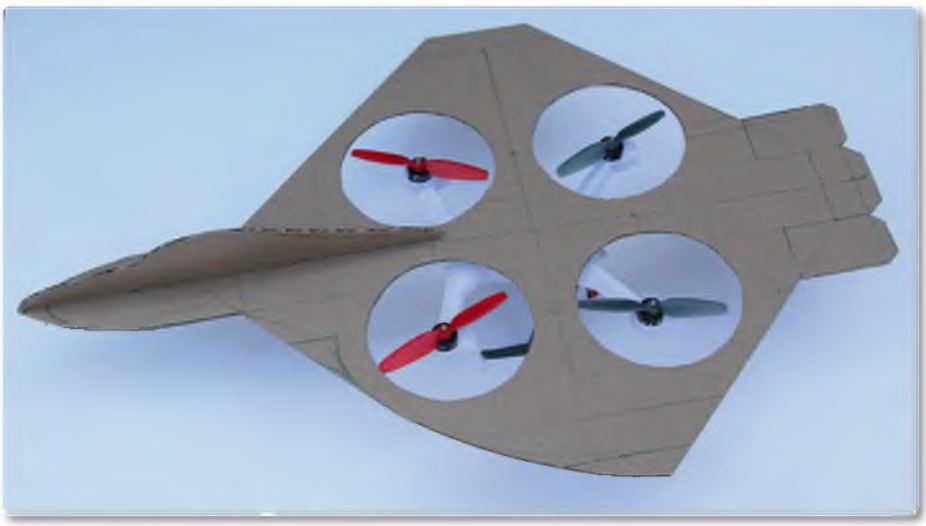
After a few flights I took off the skids, as they slightly spoilt the overall appearance when the model was flying. It would not be too difficult to add a wheeled UC.

I wondered if it would be possible to make the four prop holes less obvious by putting a grill mesh over them. An eBay search found 'bonsai plastic mesh' and once it arrived I quickly cut out four circles slightly bigger than the holes in the wing. This was a 4 mm square hole mesh and very lightweight, so there was virtually no weight penalty. Unfortunately the mesh seemed to have a big effect on the thrust from the props and the quad jet would not fly properly. I assumed that the mesh interfered badly with the airflow. It was a good idea but didn't work, so the mesh had to be removed.

However, I liked the appearance of the mesh and wondered if a bigger mesh would make any difference. I ordered some 10 mm plastic



***After initial wing only flights other parts were added***



***The square layout of the rotors dictates some wing design factors***

*Lights and a few extra details, and with the skids removed the Quad Jet in its final form*

*The quad jet retains the excellent original Blade 200 QX stability*

modelling mesh and with this covering the holes the quad jet flew well and looked more 'solid'. There is definitely plenty of scope for producing a quad jet type model and I find it more satisfying to fly indoors than in its standard quad form.

## Inductrix

I now cast my eyes towards the very neat and compact Blade Inductrix. I reckoned that this could be a good basis for a micro Harrier. Thinking back to the Snelflight Harrier, I decided to convert one of the nano quad jets into a Harrier as a proof of concept before looking at a slightly larger version for the Inductrix. A downloaded 3-view plan was enlarged enough to allow for four circular cut-outs in the wing to accommodate the quad props, and the required parts were then made from 1 mm Depron.

The Harrier conversion flew and showed that this was a feasible idea. The additional weight reduced the flight time so I replaced the 1S 120 LiPo with a connector so that I could use a standard size 1S 150 E-flite type cell. Fitting a replaceable battery also allows for more flights as you are not waiting for the integral flight LiPo to charge. Encouraged by the result I further enlarged the plan so that I could fit a Harrier body to the Inductrix.

Sadly this proved to be a failure for two reasons. Firstly the Inductrix had only just enough power to fly with the Harrier airframe and secondly the stability was totally lost. As the four motors/props are very close together the quad lacked the stability provided by more

*The 3 mm square mesh covering the props was a nice idea but didn't work*

widely spaced motors/props. Normally it is incredibly stable but with the Harrier airframe attached it was completely unstable. This was a disappointment but I then spotted my Blade Nano 3D quad on the shelf and I thought, 'Maybe, just maybe...'

The QX 3D has the props positioned under the quad so the hole positions in the wing are not quite so critical. After a slight modification I found that the Harrier body would fit on the QX 3D and there was enough power to fly the model, although the duration was reduced. I also found that a hand launch was a more economical use of the battery power.

*Sadly even with 4-blade impellers there was not enough power to fly with the Harrier body in place*

*The Blade QX 3D seemed like a good base as it has the props underneath*

*A Harrier body for the nano quad jet was partially successful*

*A similar Harrier body for the Blade Inductrix looked good*

*The body from the Inductrix fitted, but the holes were well out of line*

*Even with the wrongly positioned holes the Harrier flew well*

The Harrier flew surprisingly well seeing that the wing holes were way off the prop centres and too small. A final experiment was to make an F-35 airframe using the correct hole spacing; this is also slightly lighter than the Harrier. Again this flies well and also benefits from a hand launch.

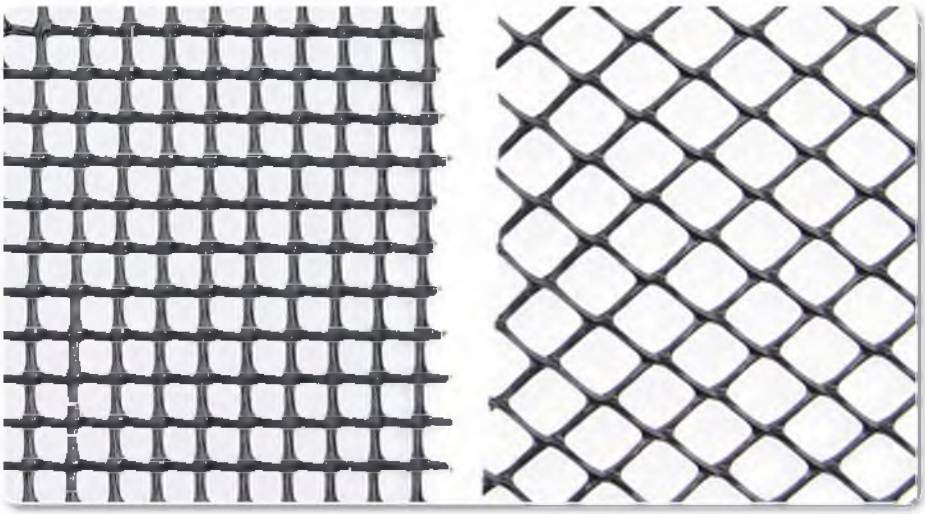
## Onward And Upward

A fellow club member also fancied converting his mini size quad and produced an ultra simple design. He experimented to get the best wing hole size and his quad jet performs well. Like mine, Doug has found his quad jet needs slightly different flying techniques but he is enjoying the different piloting style.

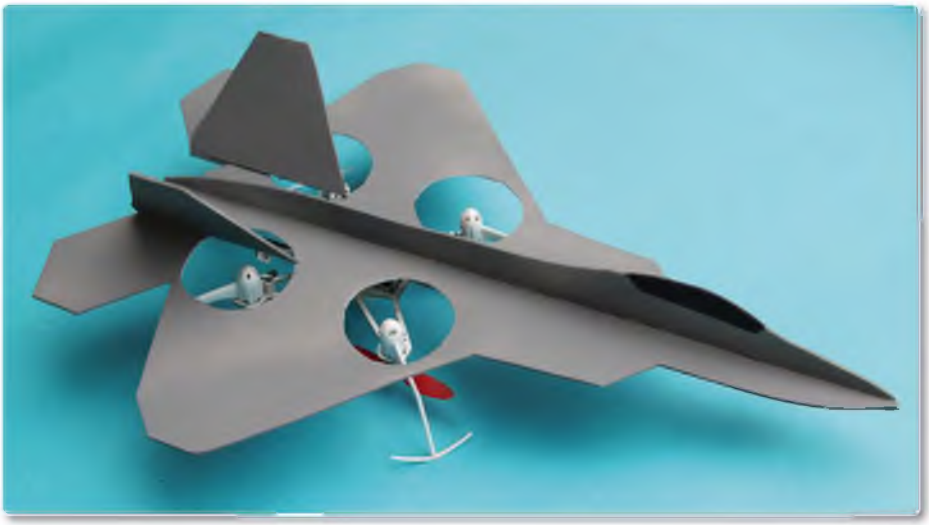
While the nano and micro size VTOL quad jet project has been successful there has been a definite trade off between weight and duration. The Blade 200 QX size model has proved to be an ideal size of quad for quad-jet experiments. It has plenty of lifting capacity and the skids can be removed very easily if they are not required. The weight/duration trade off is very small so the flight time is only slightly reduced.

The use of a basic quad for this conversion allows you to come up with some really interesting ideas for detachable airframes and one could always dip into space for ideas. I'm thinking Star Wars, Star Trek and lots of others! So why not 'go boldly where no man...' etc. and have fun with foam?

Let's see what wonders you can work with a sheet of 6 mm EPP! **RCMW**



*The 4 mm mesh was changed for 10 mm mesh*



*An F-35 airframe for the QX 3D quad with correctly positioned holes*

*Doug's 'pop on' body has worked well*

*The F-22 also flew well but both models suffered from poor duration*

*This photo shows the simplicity of the airframe mounting system*

*Sadly the 10 mm mesh was also unsuccessful and had to be abandoned*

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# WORKSHOP WHEEZES

*To make use of these top tips from Chris Williams all you need is some 'sticky backed plastic' and then let the essence of Blue Peter roam free in your modelling den!*


*MG19a Steinadler with matching decals – see 'Servo Hatches'*

There was a snail farmer, who, upon leaving a tortoise in charge of a field of snails, came back to find the gate open and the snails gone.

'What's going on?' he enquired of the tortoise.

'Dunno, it all happened so fast', came the reply. And one day last summer I knew how the tortoise felt.

It happened thus: I was flying my recently completed two-seat Minimoa on one of my local slopes and I was lining her up for a landing. There are two choices open to the owner of a large-ish scale glider on this particular site – to land crosswind with plenty of room or to land into wind and face the task of avoiding the combined hedge and fence on the approach.

Having performed this task more or less successfully for the last thirty years or so (apart from that one time... no, I can't talk about it!) I had no qualms this time around. But events conspired to see the Minimoa landing with a bit more velocity that was ideal. It would not have been a problem had the port wing not established intimate contact with an errant clump of nettles, whereupon, with a speed that would have seemed familiar to the tortoise, the model flipped upside down and came to rest.

I peered at the result, aghast, for the damage seemed far out of proportion to the misdeed, and I felt that the Gods of Aeronautics had been rather unkind.

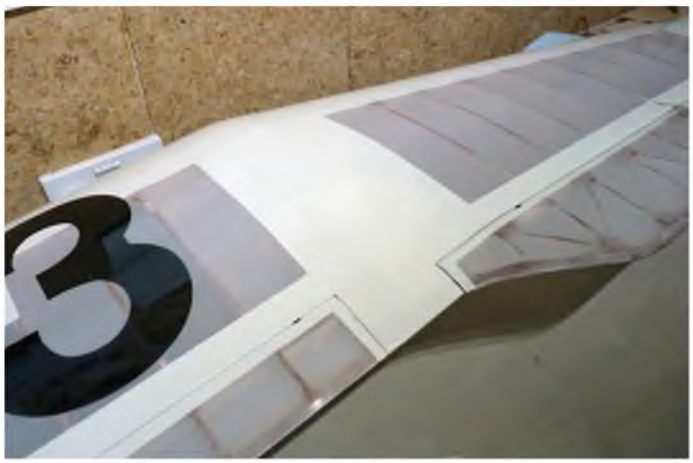
Here's the list:

- The starboard wing suffered some shock flexing, which split the Solartex and loosened a few joints
- The rudder had been forced into the tailplane, thus splitting fabric
- The starboard wing had crushed the front of the wing root into the fuselage

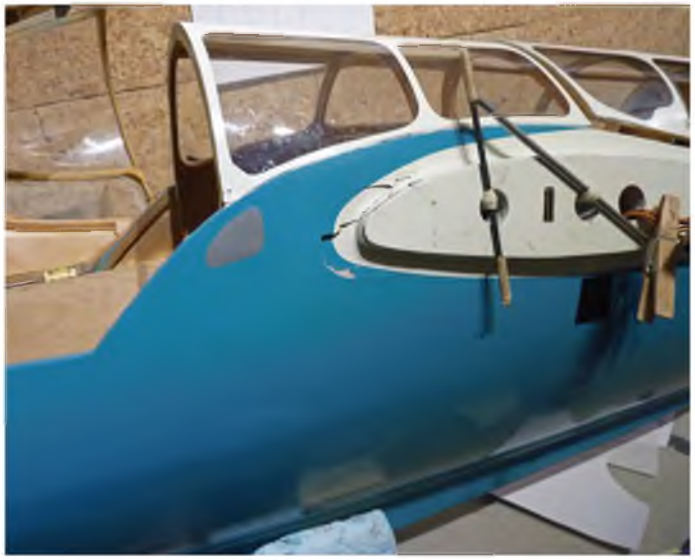
So, no huge structural defects but the paintwork had taken a bit of a hammering.

I don't know how it is for you but for me the least enjoyable part of a build lies in the painting of the model at the end. This means clearing out the hangar and secreting sixteen or so large airframes around the house in order to create a paint shop. This is a tedious and time-consuming affair, including, as it does, a certain marital tension too... It seemed a good idea then to come up with a wheeze whereupon, should repairs become necessary, they could be carried out without having to resort to bothering the spray guns. So, here it is...

*Damage to the Minimoa's starboard wing*



*The after shot*



*Nasty repair to the fuselage*

*The magic of painted vinyl. The join is barely visible*

## Fabulous Fablon

Back in the sixties housewives used to line their kitchen drawers with something called 'Fablon'. This was a decorated vinyl sheet that was sticky on one side and although I haven't seen that name in a long time you can still get the equivalent today from outlets here in the UK, like Homebase etc.

The Minimoa has a two colour livery and here's what I did. Whilst spraying the airframe I also sprayed two pieces of vinyl using the colours in the gun, blue and white. The squares of Fablon (I still call it that) were flatted with some red Scotchbrite (an equivalent to wire wool) to key up the surface and improve adhesion, and then taped to a piece of cardboard. A quick clean up with some thinners and they were ready for painting.

Some months later, with the repaired Minimoa airframe on the bench, appropriate pieces were cut out, the backing peeled off, and they were stuck to the airframe – a job of tortoise-confusing speed. I was especially pleased with the job at the wing root. Obviously the shape here was not suitable for this material but after repairs the wing root fairing was painted white by means of a brush.

This left a rough patch running into the blue. After carefully cutting a template that would allow the vinyl to follow the line of the original masking this was used to cut out the necessary shape. And, bingo, good as new. Well almost.

Compared to ironing on a piece of Solartex to cover the repair and then brushing or spraying it, the vinyl method has the obvious advantages of speed and simplicity.

*Nice rip in the Solartex on the rudder*

*The after shot*


*Using the cut out to line up the decals*

## Servo Hatches

Another wheeze concerns the business of making hatch covers for wing servos. Rather than engaging in the tedious task of making up a hard cover that will need be screwed into place, you can make up a vinyl cover in just a few minutes that can be removed at will should it become necessary.

To make the slot a neat affair you just need to make two adjacent holes in the vinyl with a sharpened metal tube in a drill. And then make two cuts to join the holes together to form a neat slot. The vinyl will have already been painted the correct colour, so you will have a perfect match. If you are making a hatch for a wing covered in white Profilm, or similar, then the standard white colour of vinyl will give a close enough match without the need for any painting.

There is one more advantage to this system. Let's say you have a scale colour scheme whereby the registration letters are the same colour as the livery, but your favourite vinyl cutter can't match the colour. When it comes to large letters it has never been simpler to cut your own.

First, print out the letters and numbers to the correct size using your A4 desktop printer. Usually either a standard or bold version of the Arial font will do the job. Now tape your pre-sprayed vinyl onto a hard surface – an old mirror is excellent for the job – and tape the A4 template on top. Now, use a straight edge and a sharp blade to cut along the outlines of the letters and numerals, and then the job is done.

Don't throw away the hollowed A4 sheet yet though as you can use it to line up your new decals on the airframe.

The moral of the foregoing is this: it's better to be the Hare than to be the Tortoise!... ***RCMW***

*A patch of vinyl with a slot cut into it makes an excellent servo hatch cover*

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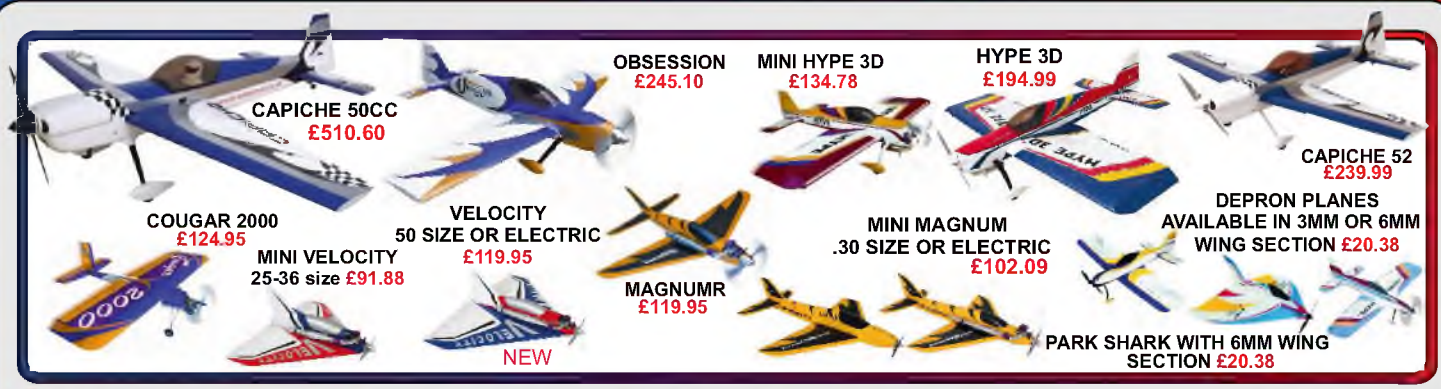




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# THE LIGHT FANTASTIC

***Chris Golds moderates another batch of electric models submitted by Q&EFI and RCMW readers***

Lauri was reading a book called 'H is for Hawk' by Helen McDonald, enjoying the sun once more in our sun lounge. And I was studying 'The Fairest In The Land', a super book about the making of Walt Disney's Snow White and the Seven Dwarfs.

Lauri asked me, "What was a U2?", as the Hawk book mentioned that type of spy-plane. I told her as much as I could remember about U2s and the TR1a, and then said, "...and I knew a real U2 driver when I was at DFCS (Flight Commander School) in 1961. He had a racing car and he let me drive it around the peri-track at West Raynham." BLING!

## Two-Stroke Lust!

The car was a DKW Monza, a single seat with a very high-revving two-stroke engine (as were all DKW motors) of only three cylinders. 'Taff' Taylor was one of the DFCS instructors and he was mad keen to get – eventually – into Formula One racing. To begin he bought himself the Monza and was club racing at Snetterton in order to get his 'ticket' to allow him to race at more circuits around the UK.

He had bought a pair of new rear tyres, which he needed to scrub-in before his next race at Snetterton. Chatting with him in the Mess bar on Friday evening I suggested that he 'ran them in' around our airfield (R.A.F. West Raynham in Norfolk) the very next morning, the airfield being closed at weekends. We agreed to meet at 09.00 hours outside Air Traffic Control and my task would be to 'lift and carry' to help him.

The next day, a Saturday in March 1961, was bright and cheerful, and I spent at least ten minutes huffing and puffing whilst pushing him in his DKW in order to start a very recalcitrant three cylinder two-stroke. "Try second gear!", I shouted as I pushed further and harder. Suddenly, BLAM! The shattering roar only diminished slightly as Taff blasted away down the pan and onto the airfield perimeter track. The noise was staggering and very high-pitched as the two-stroke was turning at over 12,000 rpm. Success!

He got all the way round the airfield and back to where I was standing, deafened but cheering! No helmets and no ear defenders, so when Taff motioned me into the tiny cockpit for my 'go' I was overjoyed! After all, I was a fighter pilot and a student at Flight Commander School, so why not? He pushed me and after about thirty yards she fired and almost took off!

I eventually got together with the crash gearbox (my first car only three years before had been a crash-box Porsche 1,300 Damen) despite it being in a gated box. The noise of the tuned exhaust pipe just eighteen inches behind my left ear was quite staggering but very thrilling as I double-declutched my way around the peri-track at about eighty-five knots average – and mostly sideways too!

There was no speed indicator, just a huge rev-counter dial about eight inches in diameter about the steering column, on a meagre instrument panel with just cylinder-head temperature (she was water-cooled) and oil pressure gauges to enlighten the driver.

Eventually, I drifted (yes, drifted) my way back to ATC, where Taff was waiting nervously for his beloved car. A few more beers that night were deriguer and the next Saturday I accompanied Taff as his 'ground crew' to Snetterton for his next race.

Unfortunately he managed to loop the DKW and somewhat altered its shape after spinning off on the far side of the track. It took us all day to recover the wreckage and trailer it back to base where a most disconsolate instructor contemplated his misdoings. I soon finished the DFCS course and I returned to my base in Scotland before he had repaired the lovely little mono-posto DWK Monza, and I never saw him again. And for the life of me I cannot remember the colour of the little racing car!

## A New Home

So, here I am with the second Light Fantastic written for my new Editor, Kevin Crozier – and RCMW. This one is number 213 and it will be similar in content to that written for EFI and Q&EFI, so please send me photos and details of your E-models and I hope we can provide as good a column as before. If I am new to you and your electric models, simply email me with your photos and details. Photo quality has to be very high resolution for modern magazines, so be extremely 'picky' as to photo quality and focus. So, let's go racing!

## Short Kit Meteor

Roy Thompson has a love affair with 'Martin Baker' aircraft and he shows us first his Meteor T7½, which I saw when I spoke with him at the Middle Wallop Bob Mahoney Memorial E-Fly during the summer of 2015. She is from a T & J Models laser-cut short kit, is 51.6 inches span and 61.5 inches long and powered by two HK Lander metal EDF units driven by two MEGA 16/15/3 motors from two 4S 3200 LiPos. All up weight is 110 ounces and wing loading just 24 ounces per square foot to provide a fine flying performance. Why T7½? Well the front end is a MkT7 and the back end is from an F Mk8.

Roy's other photo is of a Tony Nijhuis Dakota model flying in Martin Baker colours. Thanks Roy, please keep in touch with me here at RCMW.

Roy Hunter has produced some beautiful Depron electric-powered scale models in the past (his Buccaneer especially) and here he shows us his latest DEP model, which is a D.H. Mosquito. We hope to get details when we see flying photos of this splendid looking model. I have at last started down the Depron trail but I doubt mine will be as beautiful as this one. Details and flying photos please, Roy.

Arnaldo Correia is an indoor E specialist living in Lisbon in Portugal and he has shown models in Light Fantastic many times before now. This time he shows us a UMX Carbon Cub belonging to his friend and 'guru' Paulo

*Roy Thompson's Martin Baker T Mk 7½*

*Roy's Meatbox on take-off from grass*

'Chispas' which is fitted with slats AND Gurney flaps to experiment with flying more slowly indoors.

We also see Paulo's E-flite UMX B-17 of 26 inches span and a wing loading of just 4.8 ounces per square foot! I just love the shot of the B-17G after a one wheel-up landing – obviously flak damage! Thanks Arnaldo and please keep your Portuguese adventures coming to RCMW.

Now we hear from Mike Brown who has just finished his RBC KITS Tiger Moth in a very well known Swedish colour scheme. Of 47 inches span she should fly splendidly and we look forwards to flying photos when this windy weather (mid December) lets up. Mike says that the pilot – with a realistic look of terror – is a computer 3D print by 'Real Model Pilots', so let's hope he can keep it straight on take-off! Cheers, Mike.

*A Martin Baker Dakota trundles past*

*Smooth D.H. lines in Depron!*

*Roy Hunter with his latest, a Depron Mossie*


*From Arnaldo Correia, a flapped and slatted Cub*

*Chispas' UMX B-17G*

*The indoor B-17G off on a mission*

*A crash landing after flak damage*

*Mike Brown's RBC KITS Tiger Moth*

*Real Model Pilots' 3D Tiger Driver*


*The real TIGGIE SE-CWG*

## 'Arm Waver's' Appreciation Society

Mike Sparrow describes himself as a 'fellow arm waver', i.e. Royal Air Force pilot, who flew Shakletons, Vulcans and Jet Provosts as a Q.F.I. (instructor). He describes his latest creation as part of 'La Belle Epoque' as it is made from pine, bamboo and Kooboo cane (do not ask what that is!), features a flat (not lifting section) tailplane and flies beautifully! We see it flying at the Cotswolds Radio Control Society Club site at Aston Down last summer. Thanks Mike; sorry you had to be a QFI! Did I tell you that I was an IRE, FCL, DFCS, PAI and FR? Ah well! Cheers.

Sandy Tough has done a Twin Pin before at 110 inches span but he describes it as "having had a VERY short life"! So he has started again, this time at 1/12th scale and 76½ inches span. Well, Sandy, my Twin Pin (which should be a MW plan come the summer of 2016) flies wonderfully and slowly, rather like a very elderly lady pushing a shopping trolley with wobbly wheels up a steep hill! So you have got lots to look forward to. Cheers.

Bob Partington (he of the Colerne E-Fly each year) shows us another first-class photo of his D.H.2 pusher fighter. It is fitted with a Guardian 3D Inertial Stabilizer, which acts as a full gyro stab set and provides immaculate flying whatever the conditions. I saw the model fly many times last year and I was so amazed that I bought a Guardian for my own use but I have yet to try it out. I will let you all know when I do. Thanks Bob and especially thanks for Colerne 2015. When is the 2016 date for the show?

Anthony Ahl from Chester is ex-R.A.F. and therefore gets free tea and biscuits all day long! His latest escapade is a Max Holste 152, from a plan by Colin Reade in the Aeromodeller of July 1955. Built from Depron (there it goes again!) he says that it flies beautifully. Well done, Tony. More models from you please, with details next time – or no free Ts & Bs!

Dave Appleton is a long-time LF contributor and he is now producing – slowly, because he is a fireman with many duties – an Orlik and he shows us one of the wings with a beautiful turned-down (I think) wingtip in laminated balsa. Thanks Dave; flying photos soon? Please!


*Mike Sparrow's delightful O.D. Period Bird*


*What a delicious shape in the sky*

Bob Partington's D.H.2 climbs away

Sandy Tough's 76.5 inch Twin Pin in build

Tony Ahl's Max Holste 152

Dave Appleton's Orlik wingtip

## Personal Projects

And just what have my fairies been achieving lately? I show you two photos of my Boeing P-26A (soon to be a Traplet plan) taken by Richard Tambling at the Pitney Scale Day last summer. Thank you very much Richard.

And lastly, for our regular 'Mystery Model' slot, I have made a start in Depron with lots of help from Anthony Bennet (author of the how-to articles in the final issues of Q&EFI) and Roy Hunter (of Buccaneer fame). I chose a very long-time 'must-do' from my youthful past. My Hero flew it past me at Farnborough in 1952 and I tried flying a model many years ago using Jetex in a Keil Kraft 'scale' kit for free flight. It is 77 inches long and will be powered by a WeMoTec 90 mm MIDI-FAN on 6S LiPo power.

So, can you email me with your suspicions? The identification has to include the airframe number (famous to pilots of my vintage and type) and the colour scheme.

I hope this has set us off to a good start with our new home in RCMW. Remember, Light Fantastic is your column, so 'letsbeavinue' with E-models photos and details.

FLY SAFE! ***RCMW***

My latest mystery model. Have a guess what it is


My Boeing P-26A on take-off from Pitney, courtesy of Richard Tambling


Peashooter head-on with lots of cylinders. Image by Richard Tambling

**Chris Golds**
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**Tel: 01271 850456**

# HELICOPTER FLOAT FLYING

*Floats used to be used as training aids, but why not use them as intended? Gunther and Frederick Winkle explain*

*Floats on a Twister 3D Storm make it a 'Sea Storm'*

With a float-equipped helicopter landings on water are easy. Just make a normal approach and slowly set the model down on the surface. Once on the water the helicopter can be taxied ashore using careful cyclic inputs. The only thing that needs a good deal of attention is to keep the water away from the electronic equipment – particularly from the battery!

Taking-off from water is a little bit more demanding, as during the start up sequence, when the rotor speed is low, the tail rotor may not have enough rpm to counteract the main rotor torque. In practice the pilot has to expect that the helicopter will perform at least one 360 degree rotation on the water before it will be fully under control. However, by ensuring the model has enough clearance from the shore this should be not a serious problem.

In our experience it's best to use a fast start up while holding full tail rotor against the main rotor torque. And then as the rotor rpm increases the tail rotor pitch must be appropriately reduced. After reaching flight idle a well-trimmed helicopter will be pretty stable on the water and it should take-off very smoothly. It is a good idea to take-off quite quickly as if you are too timid one float could break free of the water before the other, in which case the helicopter could roll over.

Flying around with floats takes some getting used to because the helicopter not only has to lift the additional weight but will also be a little less responsive around the roll axis as the floats add quite a bit of pendulum effect. You can of course increase the roll rate to compensate for this, although remember this when you remove them!

Afterwards, nothing will be give you as much of a kick as big water fun with your float-equipped helicopter... So dig out those floats and give it go! **RCMW**

*Approaching the water for a landing is easy and requires no special skills*

*If the helicopter remains at flight idle after touch down a take-off is pretty easy. But spinning up on the water is a little bit tricky because the tail rotor will not have enough power until it reaches full rpm. So be ready for a pirouette!*

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# AUSTRALIAN KITTYHAWKS

***Peter Kraus relates how Rob Knox transformed a crashed foam P-40 into a model fit to celebrate a war hero***


*The aircraft in its new paint scheme with RAAF decals*

Normal mortals like me, who also happen to be aeromodellers, are awestruck at the sheer quality of the scale models seen at the top contests. It almost puts one off scale modelling! But there is a facet to scale modelling, other than producing these magnificent miniature renditions of full size aircraft, and which we can all do.

What type of aircraft is your favourite? Thanks to aeromodelling you can own and operate one. Does an individual aircraft press your buttons? Thanks to aeromodelling it can be yours. And this can be very meaningful, even with a model that may not make it into the Top Gun competition or win scale at the Nationals. Here's what my friend Rob Knox did.

*Demo pilot John Knox and Patricia Jackson with the P-40E dedicated to her father's memory*

The FMS P-40 in its factory colour scheme following its first flight after being repaired

Patricia Jackson poses with Rob Knox, who restored the model to replicate the P-40 flown by Squadron Leader John Jackson

A wartime picture of the real Kittyhawk

## Crashed And Repaired

Rob is a bit of a whizz at repairing foam models so when a friend of his crashed and damaged his FMS P-40E he gave it to Rob to repair and keep. Well, Rob being Rob, had the plane fixed and in the air within a day of starting the repairs. He flew it a few times then hung it from his ceiling and tried to sell it. But there were no takers so he had to work out what to do.

In the meantime Rob read a book, 'A Lot To Fight For', compiled by brother and sister, Patricia and Arthur Jackson from the wartime diaries and letters home of their late father, Squadron Leader John Jackson, who was killed in action in PNG while CO of 75 Squadron, RAAF. Rob refinished the FMS P-40 as John Jackson's aircraft, then was able to contact S/L Jackson's daughter Patricia and arranged for her to see the model and watch it fly. (Arthur lives some distance away and wasn't able to be there.) This was an emotive moment for them all.

Rob, who is no mean pilot, nevertheless got his brother John to do the demonstration flight. I'll let Rob tell the story in his words:

*"I was pretty excited and my brother and I phoned a couple of people who we thought should also be there. Brian Fooks, a former fast jet pilot in 75 SQN from the 60s and 70s and Jack Lynch, MBE, a fast jet pilot from around the same period as Brian.*

*We arrived at the club at about 7 am and gave the model a good shake down flight before our guest of honour arrived.*

*At about 9.15 am, Patricia Jackson arrived at the club field and we met, introductions to all others were made, and my brother flew the model for her.*

*Patricia was ever so pleased to see her Dad's plane fly. She stayed for a good two hours and chatted with us all, and then watched as I flew the model. Then my brother flew his big model Zero for her as well.*

*The little girl who lost her father to the war when she was only three finally got to see him fly, in spirit, some 73 years later."*

Curtis electric prop decals were added when the model was resprayed

## Buster Brown

I have a small idea of how they felt. Years ago, when I was in Rotary, I had the privilege of serving with the late Bruce 'Buster' Brown, also late of 75 and 77 Squadrons, RAAF and I got to take him for a flight in the Piper Comanche that I part owned at the time. We climbed to altitude and did a stall, much to Bruce's delight. "I haven't done that for over 40 years!", he exclaimed.

Bruce's plane is now displayed in the Australian War Memorial in Canberra and is another good subject for anyone modelling a P-40E. For more information Google 'Bruce Buster Brown'. **RCMW**

Bruce Brown's P-40 in the Australian War Memorial, Canberra

www.3squadron.org.au/subpages/jackson2

The freshly painted model comes in for a smooth landing

# SHORT STIRLING

Feature Plan

***Build this large 1:10 scale (118" span) electric powered WW2 bomber from Robin Fowler's plans for four economy outrunner motors and six-function R/C***

## AT A GLANCE

**WINGSPAN:** 118" (3 m)
**LENGTH:** 101½" (2.58 m)
**MOTORS:** Four TowerPro TP 3520 670 KV brushless outrunners
**ESC:** Four 40 A ESC
**RX REGULATOR:** One 8 A UBEC
**FLIGHT BATTERY:** Two 3S 4000 mAh LiPo
**PROPS:** Four 15" x 8" 3-bladed wooden props
**WEIGHT:** 20 lb (9 kg) approx.)
**CONSTRUCTION:** Balsa and liteply


*The author gives scale to the Stirling, designated S 29 by Shorts*

### A Brief History

Due to the size and complexity of the Stirling design it was decided to build a 50% model powered by Pobjoy radial engines to test out the basics and it was decided from the experience gained that the undercarriage needed to be lengthened. Hence the design incorporated in the resultant full-scale aircraft. The stated reason was the improvement of landing and take-off distances.

The first Stirling prototype (L7600) flew in May of 1939 but was destroyed on its maiden flight when it crashed due to the brakes locking on landing. The second (L7605) followed it in December of that year and development was carried out on that aircraft. The first production Stirling from the Rochester factory flew in May 1940 and Shorts Belfast factory produced its first production aircraft in October that year, by which time the first squadron (no.7) had received its Stirlings.

Unlike the later Halifax and Lancaster, which were developments of twin-engined types, the Stirling was designed from the outset as a four-engined aircraft, but its service life was affected by two design features. One was the Air Ministry's requirement that the wing span be limited to under 100 feet so as to be accommodated in the hangars then available – this despite the availability of some 124 foot wide hangars. This severely limited the Stirling's service ceiling, which was stated as 17,000 feet, although a fully loaded Stirling would be hard-pressed to reach that altitude.

The second limitation was that the bomb carrying arrangement was compartmentalised, with the result that as the war progressed and bombs of increasing size became common the largest a Stirling could carry was the 4,000 pound 'Cookie'.

Unescorted daylight raids were carried out in early 1941, during which the Stirling's manoeuvrability and defensive armament was used to good effect against defending fighters (four of six attacking Ju88s being shot down on one notable occasion) and they also took part in the 'circuses' intended to bring the Luftwaffe fighters up to battle.

Night raids were also carried out by Stirlings, with the first Berlin raid in April 1941.

Stirlings operated in all the 1,000 bomber raids of 1942 when the Mk III was first being brought into service, but the type's front line service days were numbered and it was then being sent to less well-defended targets.

As D-Day approached the Mk IV (basically a Mk III without dorsal and nose turrets) was brought into service as a tug, mainly for Airspeed Horsa gliders. 450 Stirlings of this type were produced and used additionally for supply dropping services. It was one of these (LK171), the personal aircraft of Grp. Capt. W.E. Surplice, that I chose to represent with my model.

*Some of the parts for the first main wheel leg*

*The system assembled for trials*

## Why A Model Stirling?

As the RAF's first four-engined monoplane bomber it holds a special place in history. A good enough reason of itself.

So why not? Two reasons readily present themselves and probably explain why there are so few models of the Stirling. They are the Gouge flaps and the complicated retract system, both of which, with my general preference for building less well known aircraft types, I turn into good reasons FOR modelling the Stirling.

After all, if I can produce an inexpensive method of building an undercarriage like that and the sliding flaps to go with it without any special engineering skills or equipment then I could remove the obstacles for others to build their own Stirlings and get back some semblance of proportion on the flying field!

Since there is not even a single example of a Stirling in the world, not even a non-flying example in some forgotten corner, just a few bits (some of which are being gathered together by the Stirling Society as they valiantly piece together a cockpit section, with some hopes of perhaps more to come) there probably never will be now. So isn't it rather up to us modellers to represent the Stirling and its brave crews? 2,383 built – number left 0. After all that history? All those brave crewmen? Those heroic deeds? Come on guys – let's cause the 'forgotten bomber' to be remembered!

## Getting Started

The first thing I must point out is that the plan comes with a CD that contains a full build instruction manual with construction photos, and also includes video clips of the undercarriage and flaps. Due to space in a magazine there is only a limited amount that can be said and shown, so referral to the CD for building is essential!

A preliminary task before getting down to the undercarriage was checking that I could get the parts for a model at 1:10 scale into my little van. Actually I had rather hoped to build it at 1:8 scale to make a REAL impression, but it wouldn't fit and the cost of changing to a bigger van was prohibitive. So 1:10 scale (118 inches, or 3 metres in wingspan) it was.

Bigger models fly so much better than small ones and if they are also of lighter construction they fly much closer to visual scale speeds and are much more impressive both on the ground and in the air. These characteristics are in my opinion worth a few sacrifices to achieve.

I designed the model Stirling to take apart in four pieces, the longest of which (the tail) is 72 inches. But the tailplane is 47 inches in span so you may wish to adapt my design to have yours plug in. The wings join on the centre line so are 59 inches long and the nose, well that's nothing by comparison... a mere makeweight! So if you too have a small van or a medium-sized saloon with a passenger seat, the back of which folds down, you should have no problems transporting your own Stirling to the field.

The construction methods I have developed start from the outside and work in. They are closer to full size practice than most are used to but those of you who have built my designs before will find nothing unexpected in the Stirling's build. Minimalist or 'Stressed Skin' probably explains it – though I have good reason to believe that my designs could be lightened further.

I always start a build by going straight in at the deep end so I made up the undercarriage first, my philosophy being that if I fail to do the tricky bits at least I don't have an almost complete model waiting around for parts that will never materialise. Having got what I thought was a workable design I then needed the wing to fix it in, so I built that. Then the other wing, the tail section and last of all the nose.

## Undercarriage First

The retracting undercarriage is designed (of necessity) to be simple to build. Whatever metalwork I have to do is done with woodworking tools so if I can't cut it with a hacksaw, bash it to shape with a hammer and solder or glue it then I can't make it!

Fortunately the K&S stand at the local model shop supplies all the sheet and tube required to build the gear and then it's cutting of piano wire, fitting of lengths of tube, hammering flats on the ends and drilling for the joint to the next part until suddenly all the parts are there to assemble.

Full descriptions and a suggested simplest-first sequence are included in the instructions on the CD that accompanies the plan, but for here and now if I can do it then any scratch builder can do it. And having done it I can look back on all the testing and failures along the way and wonder why I thought it was such a huge challenge when I started. I never expected it to be easy... or I wouldn't have bothered.

There is only one thing that I needed to call in a friend (who owns and is adept with a lathe) to produce and that was the worm drive shafts that operate the gear. But at a pinch I might have tried drilling the ends of the stud to take the motor shaft... and even had some success.

For those with Internet access and enough interest to fancy building your own Stirling, take a look at my YouTube channel (see Contacts or scan the QR Code to the right).

*Stirlings in formation. It is surprising how often photos show the tailwheels left down for serviceability reasons; they've even removed the doors as well!*

*A good thing this plane has yellow under-surfaces. It's easier to see what's going on in the dark*

*More info on what goes on in the dark recesses of the gear bay. Don't know what the lads think they're doing though...*

*More invaluable information*

*(My thanks go to the gents at the Short Stirling and RAF Bomber Command forum for these photos, and access to many more)*

*How the wing starts. Lay down sheet, add lower spars and give sheet shape by adding underside formers*

*Top surface formers added, then top spars and webbing. Front spar next then engine bearers*

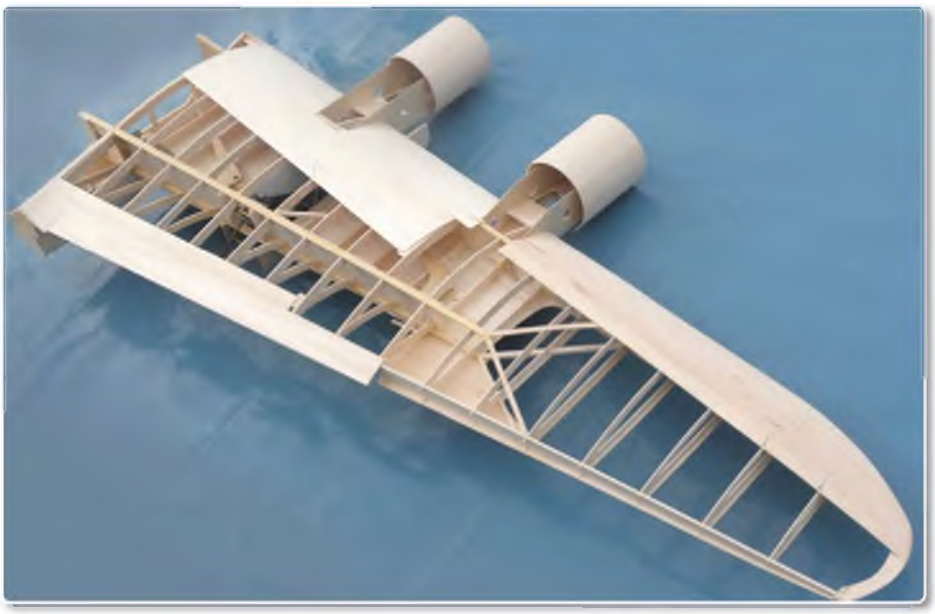
## Tips For Selecting Materials

To achieve the lightness needed for a model to fly slowly enough at scale speed there are some important points to take on board: I prefer not to buy stock strip from the model store because that stuff is cut from the hardest and heaviest grades; always cut your own strip from medium weight sheet. ALWAYS use the lightest balsa sheet you can get your hands on and use it wherever you can. Except for plywood, I NEVER cut out lightening holes in balsa ribs and such; it is far lighter not to put the material there in the first place!

In short pay attention to what material you are putting where. My mini-waste wing rib system will save you a load of money as well! A sketch and description is on Sheet 4 of the drawings.

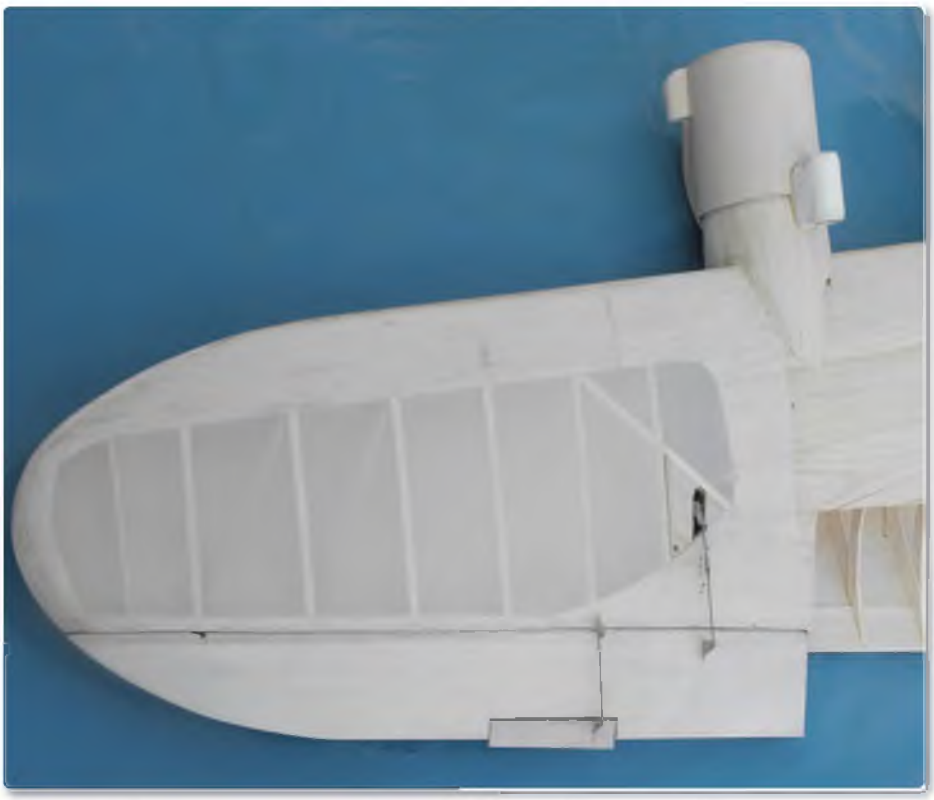
And talking of money, the scale wheel size of the Stirling is seven inch diameter and there is at present only one wheel that will be satisfactory for this 20 pound model and that is the Balonova pneumatic offering. Accept nothing less. I only found them after I had bought a pair of Dubro 6 inch pneumatics and built my retracts around them. All the others are foam filled and have virtually no cushioning properties at all.

The trouble is all the big scale boys have been building their models so heavy they would destroy the sort of tyre we need for a light model so we can't even get those nice soft foam wheels we had when foam wheels first came on the market; hard foam is all you can get, being light, but with very little give and not kind on the airframe!

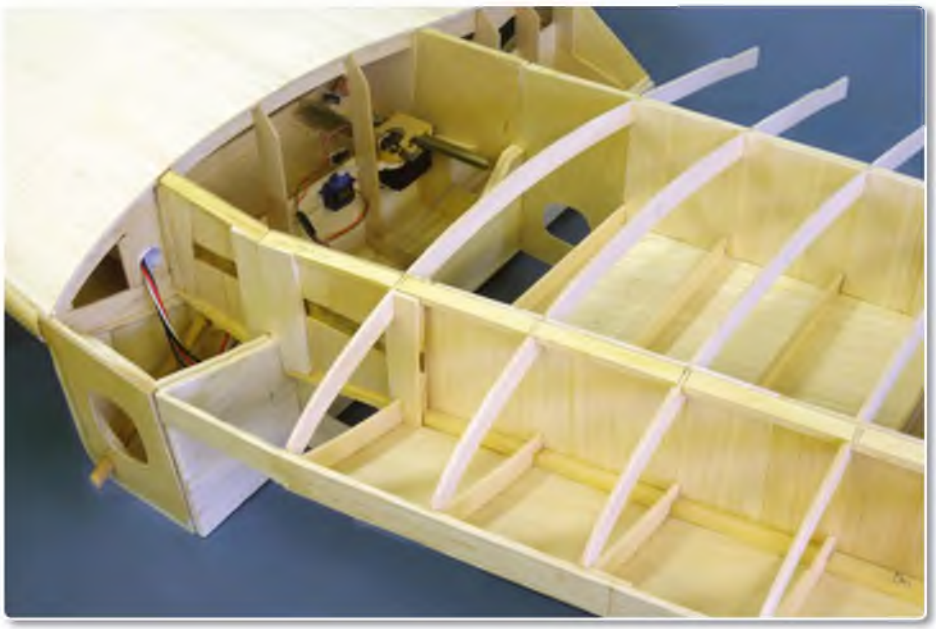


*Wing outer panel added, top skinning started and nacelles going on*

*Half of the fuselage underside being built onto the wing root*



*Diatex covering on outer panel and aileron, with servo-assist tab fitted viewed from below*



*Building the port wing onto the starboard wing*

*Building the nose on*

*Giving the nose its shape*

it is tied into another loop awaiting it. These faceplates are left positioned on the model while their remaining structure is built on.

The Stirling has no externally visible fixings and no parts such as screws to fumble with on a cold day or lose in the long grass, and all the electrics connect automatically as the sections go together so you can't forget to plug an aileron in or plug servos in the wrong way round.

## Covering Tips

The covering of the model is done with Diatex 1000 with wood glue used at the edges and fast-dried by careful application of the iron, which is also used once the glue had grabbed to shrink the covering. For those of you who have not met Diatex before it is the basic material Solartex is made from – but without the glue and colour – and currently costs about £2.60 per square yard. Dope can be used to stick the covering to the balsa but thinned wood glue is cheaper. I used emulsion paint in sample pots to add the camouflage and of course nothing more is required as the power source is electric.

## Construction Tips

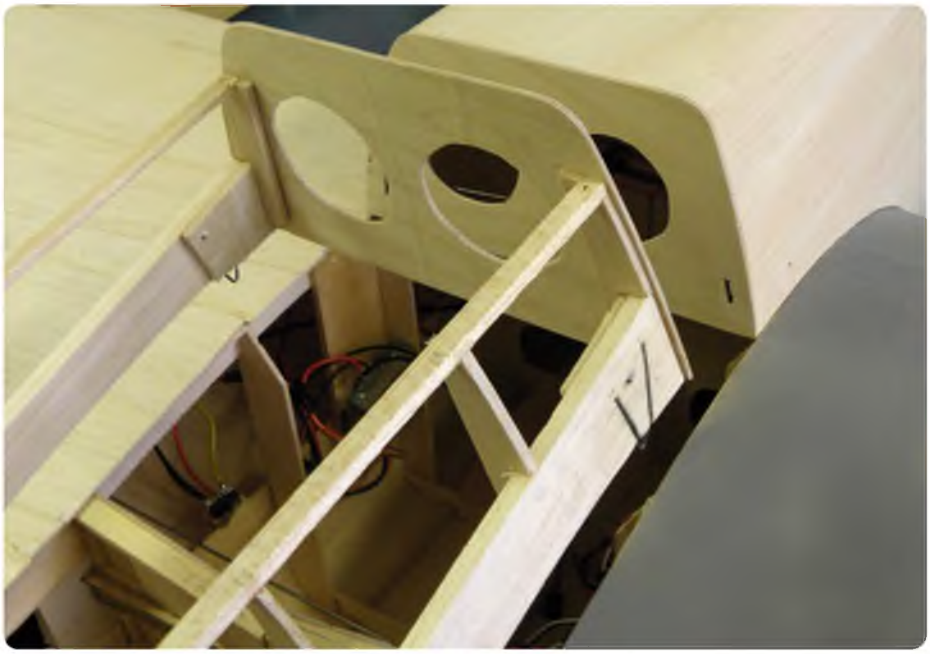
The Stirling construction is reasonably simple in principle and the pictures describe it well enough. I include DIN plugs in all major junctions where servos need connecting and this shares the 1.5 mm ply faceplates with the pin and loop fixing system, which is my low-cost and easy to produce method of holding the parts together.

There are two types, a 'dumb' one with dowel peg location, and an active one with the loop and pin fixings. The loops that project from one part through a couple of holes in a ply faceplate have tails bent at right angles embedded in solid balsa and sandwiched by another bit of sheet.

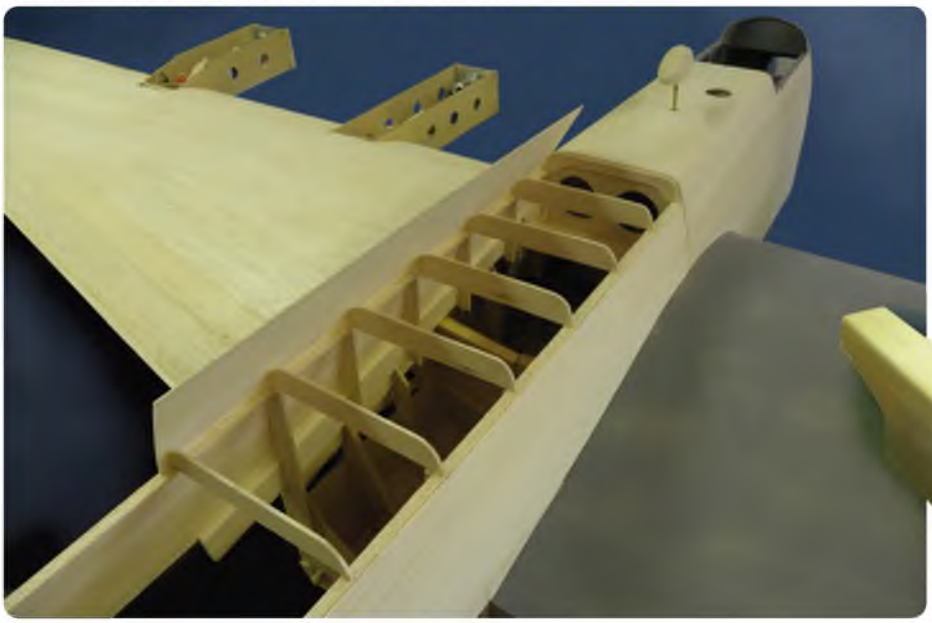
The same wood glue already in use for the main airframe fixes them really well.

These loops insert in a slot in the opposite faceplate behind which a pin is shot so that

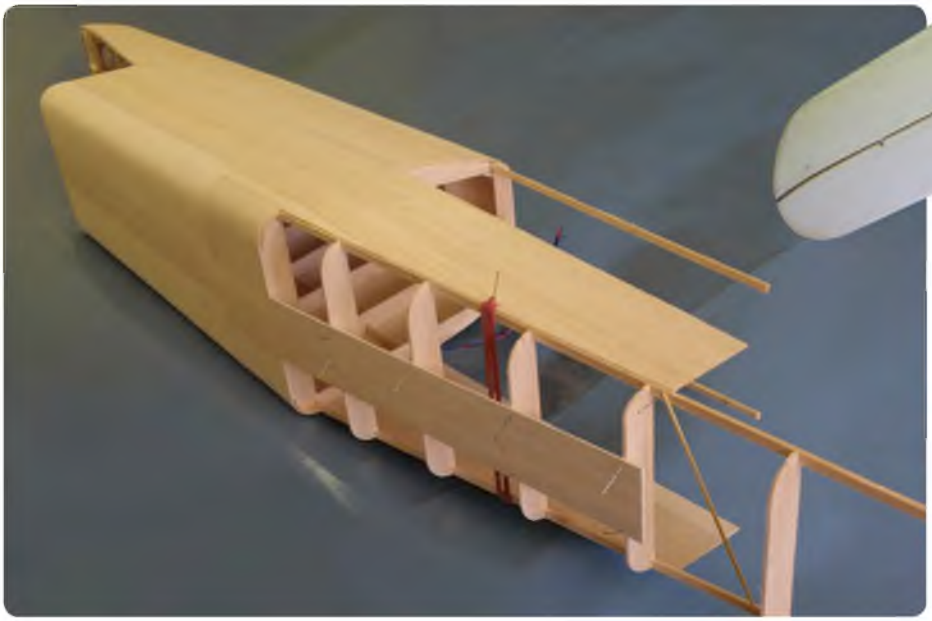
*Tail construction begins*



The wire loops are vertical to connect to the wing roots



It was at this stage I first saw a reliable fuselage cross-section, which showed me I was making it altogether too boxy. The drawings have been corrected!



Once the skinning of the first length is done the next length of sheet can be added

The fin and tailplane operating systems in place

## Final Notes

In the interest of providing rock-steady flying to air the scale appearance, I added an inexpensive 3-axis stabiliser after a couple of flights. As all of my six channels were in use it had to be constantly in operation, but I count it a real boon as it takes the weather out of the picture and allows me to fly in more of a breeze than I would otherwise feel happy to tackle.

At this point it is only right to give credit to the members of the Short Stirling and RAF Bomber Command forum for their invaluable assistance throughout the design and build process. For permission to use photos posted on that forum I also render thanks.

## Next Month

In Part 2 we tell you all about the flying, with all the ups and downs. ***RCMW***

Almost complete now, with a rudimentary representation of the Frazer-Nash turret in position

## CONTACTS

**Robin Fowler**
robinfowler@talktalk.net

**YouTube**
www.youtube.com/channel/UCcYpQjqXyi3k9T7R4wQe47Q

**Website forum**
http://sas.raf38group.org/forum/viewforum.php?f=4


*Roll out day. Doesn't that look nice?*

## PLAN DETAILS

| | |
|---|---|
| **NAME:** | Short Sterling |
| **BUILD CATEGORY:** | Advanced |
| **PLAN NUMBER:** | MW3772 |
| **PLAN PRICE:** | £ 39.99 ($67.99) |
| (includes construction CD - | MW3772CD) |
| ***LASER WOOD PACK** | £ 49.99 REF: WP3772 |
| **CANOPY/TURRET SET** | £ 6.99 REF: CA3772SET |

Plans and parts are subject to Postage & Packing charges at standard rates.
*NOTE: All Laser Wood Packs are intricate shaped parts only. No strip wood or sheet wood is included.
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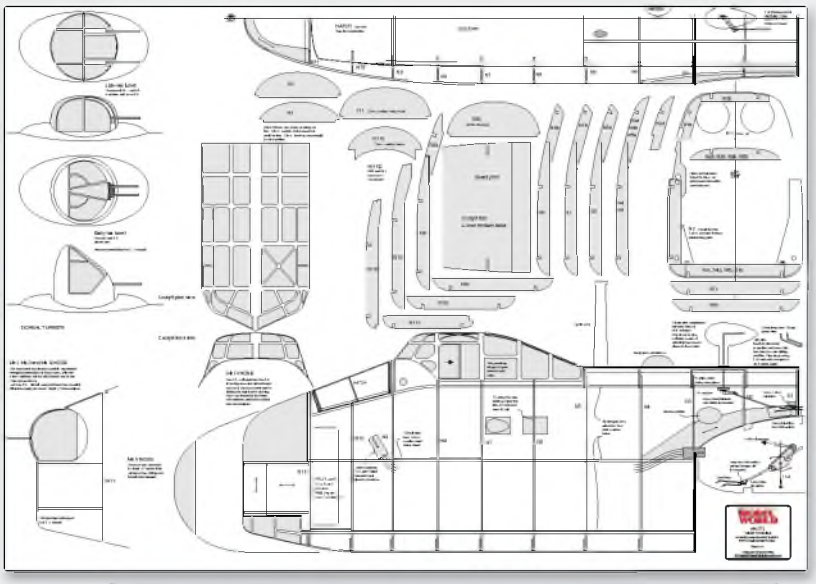

*Composite picture showing what 'Shooting Stars' would have looked like in bomber formation*

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# EUROFIGHTER TYPHOON

*EDF jet enthusiast Brian Collins puts the new V2 Freewing Eurofighter 90 mm Typhoon through its paces. Additional photography by Dave Hurrell and Tony Whiteley*

The Eurofighter Typhoon is a twin-engine, canard/delta wing jet designed and manufactured by a consortium of companies including BAE Systems and Airbus; a truly multinational collaboration between the UK, Germany, Italy and Spain. The name of the aircraft, Typhoon, was formally adopted in September 1998.

Following the development of Lithium batteries and brushless motors, EDF (Electric Ducted Fan) models have come a long way since early days. The additional power modern components provide allows model aircraft to carry more and more equipment, producing a very scale flying experience.

## The Model

The Freewing Eurofighter V2 is a single 90 mm EDF jet with excellent scale features including: tricycle retractable undercarriage with all metal shock-absorbing struts, synchronised gear doors, LED lighting package including navigation lights, flashing beacons, strobes and anti-collision lights. Also installed is a 100 A Hobby-Wing brushless ESC, separate 8 Amp SBEC, a 12-blade fan with metal housing powered by a large 3748-1450 KV Brushless motor, which produces over seven pounds of thrust on the recommended 6S (22.2 V) LiPo battery. The 12-blades also help create a very distinctive 'Whoosh' sound. All flight surfaces are controlled with 9 g Metal Gear servos, which are factory fitted.

Adding to the scale looks is a very detailed cockpit with pilot figure, moulded panel lines, fully functioning canards, elevon and rudder control surfaces with a full 360 degree twin thrust vectoring system, which whilst not being scale certainly adds another dimension to the model's flying capabilities.

Until recently the Freewing Eurofighter was only available in the German livery, however Simon Redmond of Reds Radio Control (the UK importers) told me that after speaking to the RAF to gain permission he persuaded Freewing to produce the model with RAF markings – nice one!

*You'd be hard pressed to know that the Eurofighter is constructed from foam. It looks stunning in the air, as we are sure you'll agree*


*Colourful box with specs and picture of the goodies inside!*

*The author provides scale to the Freewing Eurofighter Typhoon*

## Unboxing

The model is supplied in a large coloured box with Styrofoam packing, which offers excellent protection for all parts – not that there are many! This model can certainly be classed as Almost Ready to Fly! Both wings and the large tail are secured to the fuselage with screws making both assembly and disassembly easier.

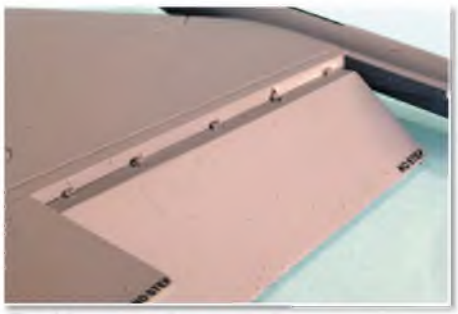
The black and white instruction manual seems to have been written in 'Chinglish' and covers some topics not required as the model is factory built, only requiring final assembly. But the manual is easy to understand thanks to the diagrams and pictures with important things like control surface movements and throws clearly stated, as is the Centre of Gravity.

## Assembly

To help keep weight down Freewing have constructed the model from Styrofoam, offering a strong yet lightweight airframe. But sharp objects (like long fingernails) can mark the foam. Also, you must ensure that 'foam friendly' glue is used for repairs should a mishap occur. Use standard cyanoacrylate and your model will 'melt' before your very eyes!

All the metal geared servos are factory installed, as are the elevons, which utilise five hinges each. Some models use the foam itself to hinge the surface, which can tear off under high 'g' manoeuvres. This is not the case here and it is nice to see.


*Large battery bay allows for a 5000 mAh 6S (22.2 V) battery to be fitted with ease*



*Five hinges used on each elevon equals a very secure fitting!*

*There are a lot of extension leads to connect. Use of a 10-channel receiver reduced the need for 'Y' leads*

*Small part count accessory pack. Nose cone is delicate but spares are available*

Each wing is held in position with three screws. Two strong spars keep the wings from flexing. Retract and elevon servo extension leads need to be plugged into the corresponding female servo connectors in the fuselage. The tail section is secured into position with four screws. The servo leads for the rudder servo (mounted in the tail) and anti-collision LED light need to be plugged in before screwing the tail into position. Once this is done a small section of the top fuselage is glued into position.

The nose cone is then meant to be glued into position. However, I decided to use magnets to hold it in position so I can remove it, allowing the model to stand on its nose without causing damage. As I have to handle all my models from a wheelchair I find this an easier storage method.

With the wings and tail surfaces completed the airframe is complete as far as assembly is concerned.

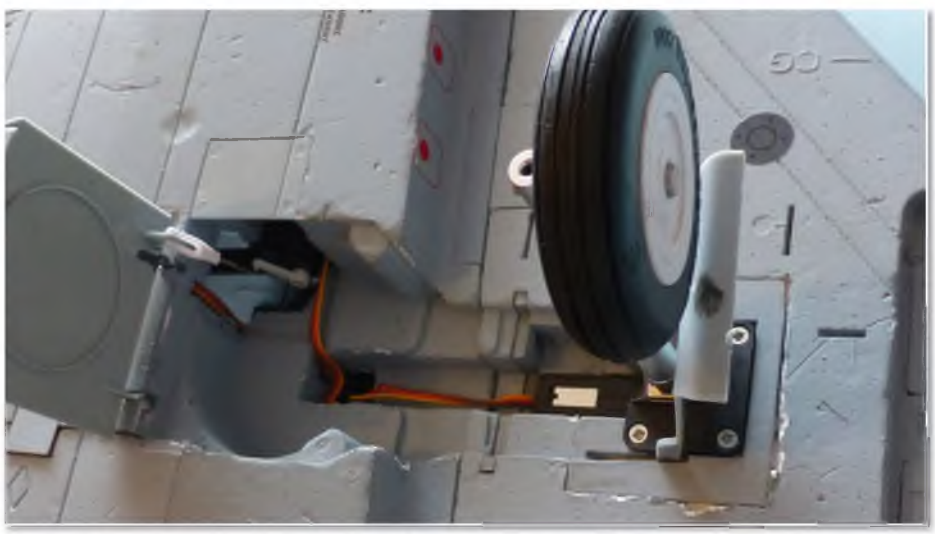
## Wiring

The most time consuming process of assembly I encountered was sorting out the multi-channel servo wiring to the receiver. You will need a seven-channel receiver as a minimum; I used a Lemon DSMX 10 channel unit so I could eliminate as many 'Y' leads as possible. This process is not covered in the manual however as various receivers use different channels for different control surfaces making it impossible for a kit manufacturer to cover each radio installation.

As well as connecting the ailerons and elevator (via an elevon mix) one also has to mix the port and starboard canards,

*Really nice detailed cockpit and accompanying pilot figure. Even a HUD is included!*

*The tail section is also screwed into position. Note the hinges used in the rudder control surface*



*A retract ripped out after hitting pothole, but was simply 'epoxied' back into position. Note the Centre of Gravity line marked on the wing (top right of picture)*

retractable undercarriage (with steering nose wheel), rudder and, of course, the 360 degree thrust vectoring system. After a while of adding mixes and dual rates set up as per the manual I was ready to balance the Eurofighter prior for its maiden flight.

## Super Sound

The modern multi-blade EDF units seen these days create a nice 'jet like' sound, which electric jet enthusiasts love to hear. However they do draw more current than a four or five blade EDF unit so it is important to use a good quality flight battery pack. After a conversation with the very helpful Andy Hinton-Lever of Optipower fame, I decided to use an Optipower 5000 mAh 6S (22.2 V) pack in the Eurofighter as the 50C current rating will easily handle the high amp draw the Eurofighter produces at full throttle.

Indeed on testing the EDF unit in the workshop I recorded a staggering 2225 watts with a current draw of some 97 amps, hence the need for a good quality battery pack! The fan ran perfectly smooth throughout the rev rage with no vibration whatsoever. This current draw will unload a little in flight but even so it is close to the ESC's maximum rating so throttle management is required.

The Optipower 6S pack weighs in at some 840 g and I was a little concerned I would need to add some weight to the tail in order to achieve the correct Centre of Gravity but to my surprise it balanced just about 'spot on'. I did need to remove a small amount of foam from the battery bay to position the Optipower pack to achieve the exact Centre of Gravity but this only took minutes. There are two Centre of Gravity lines moulded into each wing's leading edge to show the correct C of G and subsequent flights proved this is ideal as I did not have to deviate from the marked point.

With the Optipower 5000 6S battery installed the AUW came in at 3221 g (7.1 lb), which is heavy for a foam model.

## Fighter Flying

As per usual Northumberland's weather dictated we had to wait a while for a suitable flying opportunity. And even then it was a rather dark grey sky that presented itself, non cloudy blue skies being somewhat of a rarity 'Up North', even in summer! (They seem pretty rare 'Down South' these days too! – KC)

So with battery packs and camera fully charged off we went...

The temperature was 17 degrees C but the wind speed was 12 mph gusting to 15 mph for the maiden flight, which if I'm honest was playing on my mind a little as I prefer to conduct maiden flights in calmer conditions. But with all checks completed, ground photo shots taken and the model facing into the wind it was time to fly.

I did a couple of short taxi runs to check ground handling and noted that the Eurofighter pulled to the left slightly. So an adjustment was made to the nose wheel. Lined up again into wind, the throttle was opened, which saw the Typhoon shoot off like the proverbial rat up a drainpipe! There is no shortage of acceleration that's for sure! The model rotated and climbed out at a very high angle and kept climbing at an astonishing rate. The model weighs some 3.3 kg with flight battery but the sheer power of the EDF unit makes it feels like you are flying a parkflyer!

Climbing high to conduct stall tests took just seconds. The stall itself was a total non-event as the nose simply nodded forward with no drop of a wing, which was reassuring as at this point I had no inclination of knowing the landing speed required. I had set the timer on the maiden flight to four minutes as I wanted to ensure that I had plenty of battery capacity to 'go round' if needs be.

General flying with the Typhoon is a dream. I needed three clicks of right trim and noted she was flying slightly nose high so I made a mental note to adjust the canards for future flights. As far as performance goes there is no shortage of power; the 7 pounds of thrust the 12-blade EDF unit produces is capable of launching the jet vertical.

The Eurofighter flies as well inverted as it does normal way up, with only a tiny amount of 'down' needed. Rolls are brisk (especially on high rates) and axial. With so much thrust available loops can be massive! Fast low passes are particularly impressive, as is the pull out afterwards as the loud 'whoosh' noise of that 12-blade fan unit hits your ears! It is certainly a very life-like turbine sound that had everyone commenting on how realistic it sounds. On one particular flight I performed a low pass 'for the camera' at about 12 inches off the ground at full throttle – not a good idea for the longevity of such a wonderful model!

All too quickly the timer sounded so with the transmitter vibrating in my hands it was time to land. I lined up on finals directly into the stiff breeze and noted the glide rate was shallow, so she came in for a nice smooth 'three pointer'. However, when slowing down from the landing she lurched to the left somewhat and came to a rather abrupt halt. No major damage was done apart from some grazing to the paint on the underside but it became apparent something had gone wrong. It turned out that the retract unit in the port wing had been ripped out of the foam, probably as a result of hitting a pothole on our runway. I epoxied it back into place and have had no further issues.

## Summing Up

After logging several additional flights with the Freewing Eurofighter Typhoon I have

*Low shot of the Eurofighter. Twin air intakes allow plenty of air into the 12-blade fan unit*

*Head on the Eurofighter looks aggressive. You can see the metal sprung oleos clearly. Rubber tyres are used*

*Lined up into a stiff breeze ready for take-off. The Eurofighter accelerates very quickly indeed*

*Wheel down 'dirty' pass. Slow speed handing is very stable*

to say I am very happy with it. The sheer presence in the air, the power and, of course, the tremendous turbine sounding EDF is particularly impressive.

If I was to pick a fault, personally I don't think the thrust vectoring is required (the full size does not possess it) and it may not be true 360 degree motion. But with the effect of the mixing it's akin to the transmitter's joystick being moveable through a 360 degree turning motion. The result is vectored thrust in both yaw and pitch (or a combination of both), however I guess it's down to the individual whether you like it or not. There is no doubt that it adds to the manoeuvrability of the aircraft but for people who wish to fly in a scale manner, with long smooth manoeuvres, it is not really required.

Also, high Alpha passes and the like look good but will eat through your flight battery quicker than you can say 'time to land'!

## Final Thoughts

Some might say that paying £359 for a model constructed of foam is a poor investment. But take a moment to consider the components included – the metal geared servos, tricycle retracts with sprung legs, gear door sequencer, the 100 A ESC, 8 Amp SBEC, 12-blade metal housed EDF, a powerful 2000 W plus brushless motor, the LED light system and the sheer attention to scale details. Once this is taken into account it may seem like money well spent.

One thing's for sure, the Freewing Eurofighter V2 turns heads on the ground and in the air! **RCMW**

*A pass with the drop tanks fitted. This is a very scale looking EDF jet*

*Full speed low pass close to 100 mph at an altitude 12 inches certainly got the heart rate up! Any lower and you would need a driving licence...*

*OUCH! A heavy nose bounce on tarmac but no damage whatsoever thanks to the shock absorbing nose wheel*

*Let's try that again! A shallow glide angle, ending with a small flare prior to a perfect 'three pointer'. Very satisfying indeed*

*Inverted flight requires the slightest bit of 'down' to fly nice and level*

## MODEL WORLD DETAILS

### MODEL INFORMATION

| | |
|---|---|
| **NAME:** | Eurofighter Typhoon V2 |
| **MANUFACTURER:** | Freewing |
| **DISTRIBUTOR:** | Reds Radio Control |
| **PRICE UK:** | £359.00 |
| **MODEL TYPE:** | 90 mm EDF jet |
| **MOTOR:** | 3748-1450 KV Brushless motor |
| **ESC:** | HobbyWing 100 A ESC with separate 8 amp SBEC |
| **BATTERY:** | 5000 6S LiPo. Optipower 5000 mAh 50C used in review model |
| **PROP:** | 12-blade metal housed EDF unit |
| **CONSTRUCTION:** | Compressed Styrofoam |

### R/C FUNCTIONS

1: Elevons (aileron)
2: Elevons (elevator)
3: Throttle
4: Rudder
5: Landing Gear
6: 360 Degree Thrust Vectoring (mixed to elevons & rudder)
7: Canards (mixed to elevons)
8: LED lighting package

### SPECIFICATIONS

| | |
|---|---|
| **WINGSPAN:** | 960 mm (37.8 in) |
| **LENGTH:** | 1400 mm (55.11 in) |
| **TARGET WEIGHT:** | 3050 g (6.7 lb) |
| **REVIEW WEIGHT:** | 3266 g (7.2 lb) |

### DISLIKES

Build manual not the best.
Thrust vectoring not really needed

### LIKES

Scale looks • Amazing performance
True jet-like sound • Attention to detail

### CONTACTS

**Brian Collins**
email: bc002d1835@gmail.com
**Freewing**
www.sz-freewing.com
**Optipower**
www.optipower.co.uk
**Reds Radio Control**
www.redsradiocontrol.com

# MINI CAVU

Free Plan

***Here is a 30 inch span high wing vintage style model redesigned by Alan Wooster for Park 300 motors and three-function R/C***

## AT A GLANCE

**MODEL TYPE:** Vintage style sports
**CONSTRUCTION:** Balsa and Depron
**WINGSPAN:** 30" (762 mm)
**WING AREA:** 135 sq in
**LENGTH:** 20½" (546 mm)
**WEIGHT:** 6.7 oz (190 g) without battery
**MOTOR:** Park 300 1080 KV brushless outrunner
**ESC:** 10 Amp
**BATTERY:** 2S 500 mAh 20-30C LiPo
**PROP:** 6" x 3" APC-E-prop

Some years ago RCMW published plans for my take on one of my favourite model designs, Cavu, which was originally designed back in the 1930s by the late Ken Willard, a very accomplished and prolific aircraft modeller from USA. That model was powered with a .25 glow plug engine and performed well.

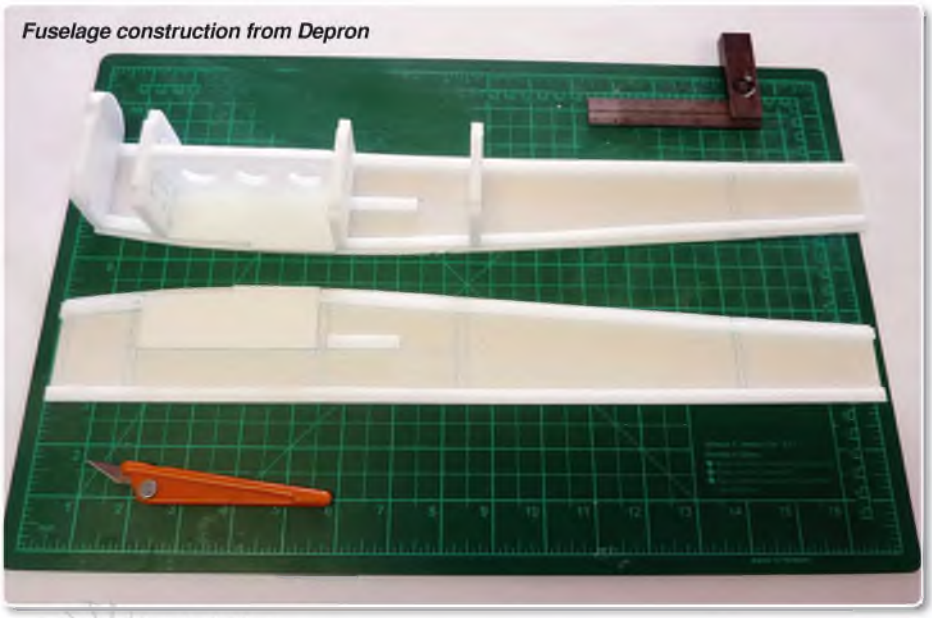
Cavu still appeals to me as an attractive and rather unique vintage-looking design. And as I have been involved with small electric parkflyer models in recent times it occurred to me to revisit this one from this current angle.

Mini Cavu detailed here is the result. Construction comprises both 3 mm and 6 mm Depron for the fuselage and tailplane components, combined with a wing built up from balsa and film, and covered in regular fashion. In the interests of simplicity and lightness I took the easy way out and built this one around the (inexpensive) radio gear and avoided the need for any complicated access hatches. The gear, excluding the LiPo battery, is captive in there for the life of the model.

Although it is small, low-cost and easy to build, it still appeals to me as an attractive little model. I haven't had the opportunity to try flying it indoors as yet and it is not really a suitable model for the newbie to this hobby.

### About The Adhesives

Following some trial and error I am currently using Weldbond universal adhesive on foam in general. This is a white water based product that works well and dries clear. For general balsa and woodwork I use Titebond Original aliphatic (red pack), which is also a water clean-up adhesive. Ensure that any cyano used is foam safe. A 5-minute epoxy works well for me also.



*Fuselage construction from Depron*

## Fuselage And Tailplane

I traced the fuselage sides shape onto a piece card (old manilla folder) and drew around this pattern with a fine point 'Uniball' spirit pen to transfer the shape to the 3 mm Depron foam. Glue formers F1, F2, F3 and F4 vertically to the RH fuselage side, as shown in one of the photos. Include the 3 mm foam reinforcment to each side of the battery bay and also the 6 mm horizontal panel that forms the top of the battery bay.

Chamfer the inside of each side at the rear and glue the sides together here, being careful to maintain an even curve aft of the cockpit. Fix the motor to its plywood mounting plate, which can now be glued (epoxy) to the front of F1. Likewise, the undercarriage wire can be bent to shape and both sewn and glued (epoxy) to F2.

The two servos are hot glued to the 6 mm servo tray, which can now be installed. I used a servo checker to ensure the output arms were set up at neutral and the cheap servos did in fact work before gluing the assembly in place. Plot and install the outer tubes for the 1 mm (18 SWG) diameter piano-wire rudder and elevator pushrods.

Bend up the pair of parasol wing brackets. I used 6 mm x 2 mm flat aluminium bar, and bolt on the two upper rubber band fixing rails to form the assembly. This assembly is screw-fixed and glued to the 1/16" horizontal plywood plate, and the complete assembly is epoxied in place. Ensure the top of the assembly aligns with the fuselage top edge (datum line).

I installed the remaining radio gear at this stage and checked it all worked okay before proceeding to close off the fuselage.

The fuselage top and turtledeck are applied in two pieces, formed from rolled 3 mm Depron. I made cardboard patterns for these items. To arrive at the curved shape I experimented with scoring the inside surfaces and gently folding them over a piece of old broom handle dowel. I also massaged and wrapped the assembly with an old towel dampened with hot water. It all worked out well.

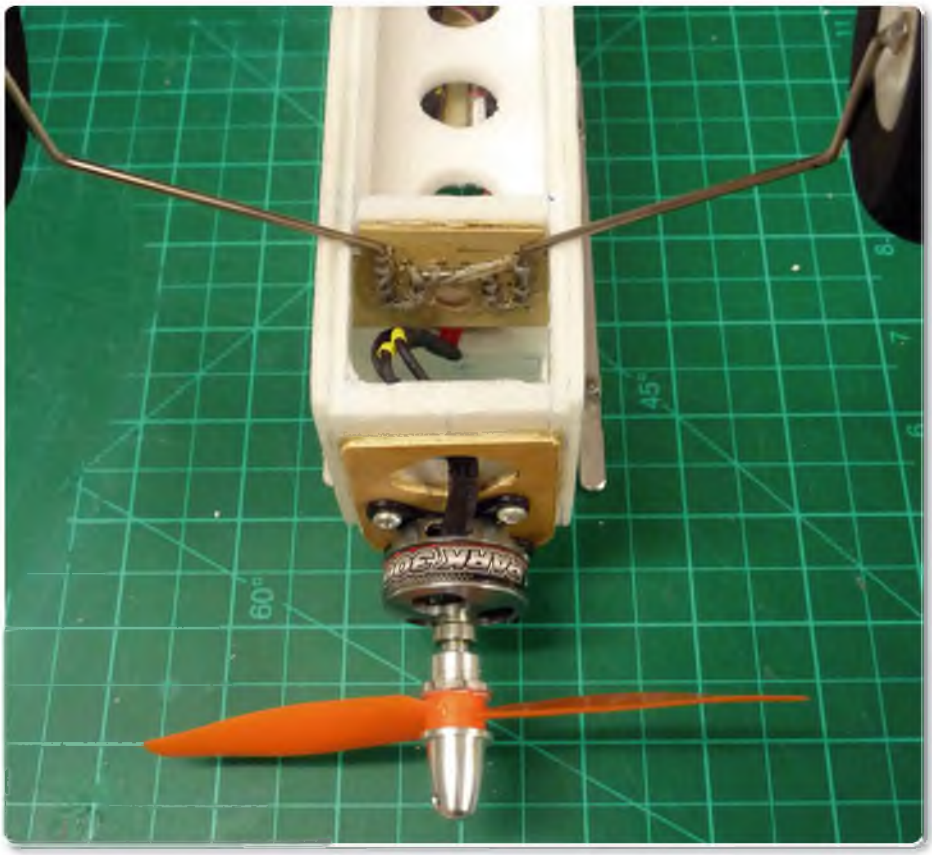
The fuselage bottom panels are fitted up between the fuselage sides. I take this option to return a neater finish when the lower edges are eventually sanded as the glue joint is hidden.

The tailplane items are cut from 6 mm Depron. I generally use flat hinges cut from light Mylar for these small models. Slip the hinges into a slot cut with the balsa knife and fix with a drop of foam-safe cyano from both sides. This appeals to me as being neater than using tape and I've never had a failure with them yet.

## Wing

The wing is built in three pieces and is quite straightforward. I cut the full number of ribs, bolt them all together and finish them to the same size in one block. The centre-section, root and tip ribs are re-cut to suit when placed later.

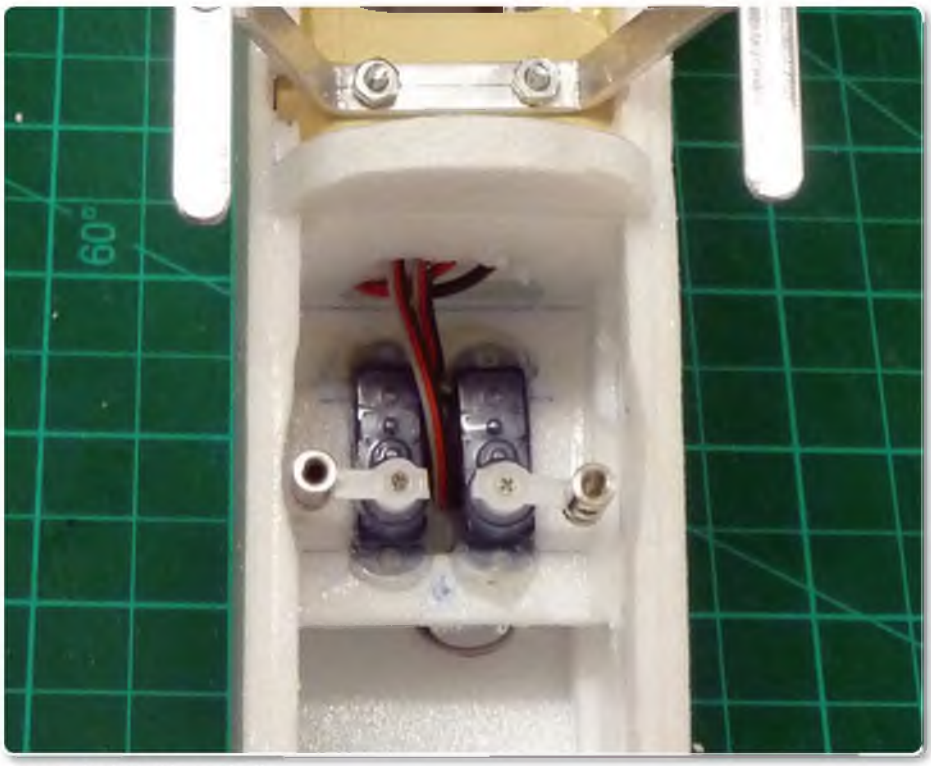
The mainspar is cut full depth from hard 1/8" balsa. Plot and cut the notches from the top to accept all the ribs. Cut matching notches to the front edge of the pre-formed trailing edge (TE). Fix the wing perimeter items over the plan, pin the mainspar in position and drop the ribs into place. Don't forget to cant the root ribs to cater for the dihedral.



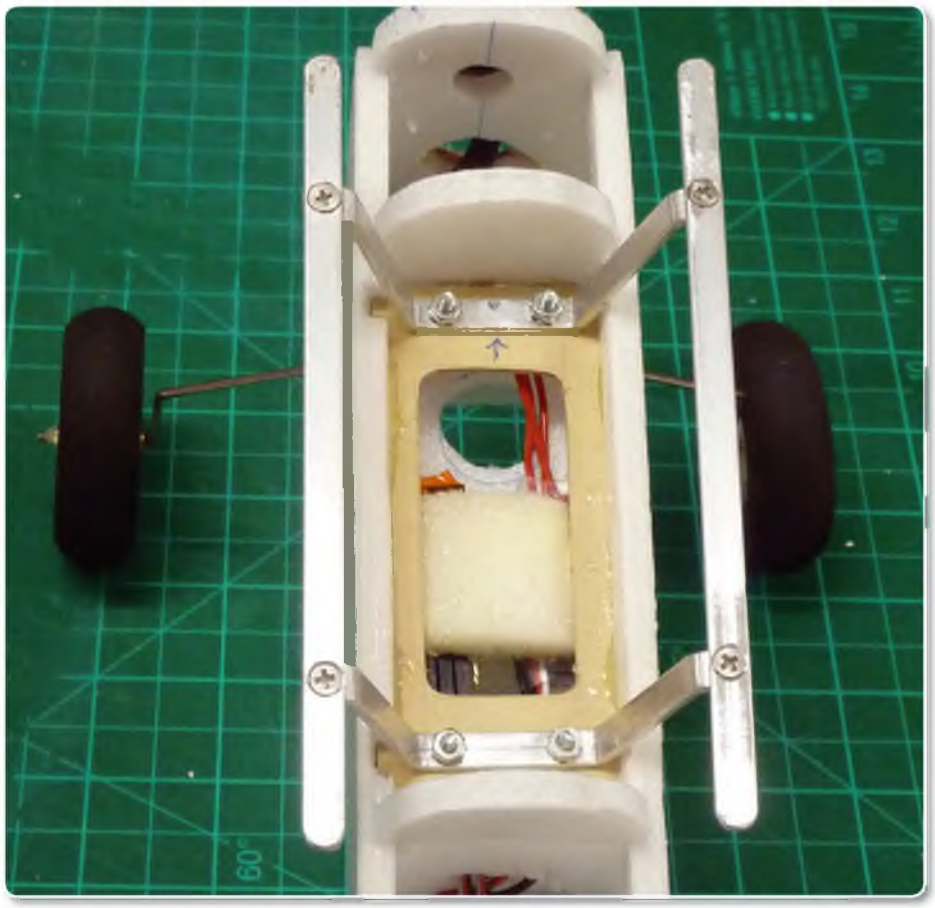
*Fuselage assembly showing motor and undercarriage mounting*

The short connecting TE piece between the root rib and main TE is laminated from scrap balsa to obtain the required tapered thickness. I suggest building in a hint of washout under the wingtips on this model (reference the detail on the plan).

Trim the centre-section ribs back 1/16" top and bottom to cater for the 1/16" balsa sheeting. The plywood dihedral brace is cut to suit the resultant dihedral following the three-piece wing assembly, so leave the lower 1/16" balsa sheeting clear at the mainspar location until after the brace is installed. Cut a full-depth slot through the centre-section and root ribs immediately adjacent to the rear face of the mainspar, then cut and install the 1/16" plywood doubler from the resultant pattern.



*Servos installed in cockpit*



*Fuselage part built showing parasol wing mount framing on a plywood anchor plate*

## Finishing

The wings are sanded and covered with your favourite film; In this instance I used Solarflim Polyester Lite. The fuselage is lightly sanded and finished to suit. I am still experimenting with painting foam models. In this instance I consciously avoided extensive masking as paint 'creep' under the masking can be difficult to prevent.

Water-based paints seem to be the norm for painting foamies but I have been using Tamiya spray cans on recent models and I am reasonably happy with the results to date. I have heard that some Tamiya paints will 'eat' foam but my approach is to use the 'TS' cans and apply as thin a coat as you can get away with. So far, so good!

## Cowling

I have been using lightweight moulded cowlings where appropriate for several years now. The cowling here is probably the smallest yet but the process is much the same. The alternative for this model is to carve one from balsa but the pantyhose method described here is not as daunting as it may seem.

A skeleton for the plug is cut from 3 mm MDF board or similar. This skeleton frame comprises three items: the basic cowling shape at the model centreline, a pattern from the first former and a nose ring. The central former is cut over length to cater for trimming the finished moulding to length at the rear.

In this instance I used a suitable size washer as the nose-ring. A block of urethane or similar easy-sandable foam is glued each side of the central former. Cut and sand the filler foam to the required shape. This is probably quicker and easier than it sounds. The plug should be slightly tapered or parallel in overall form to enable the resultant moulding to be slipped forward off the plug.

The finished plug is wrapped with kitchen cling film as a release agent. The film can be applied in pieces if desired and a few wrinkles here and there will not affect the finished article. The leg of the stocking is cut into suitable size tubes and four layers of the nylon are separately drawn over the plug. For a larger cowling the open ends are twisted and tied off (masking tape will do) at both ends of the plug.

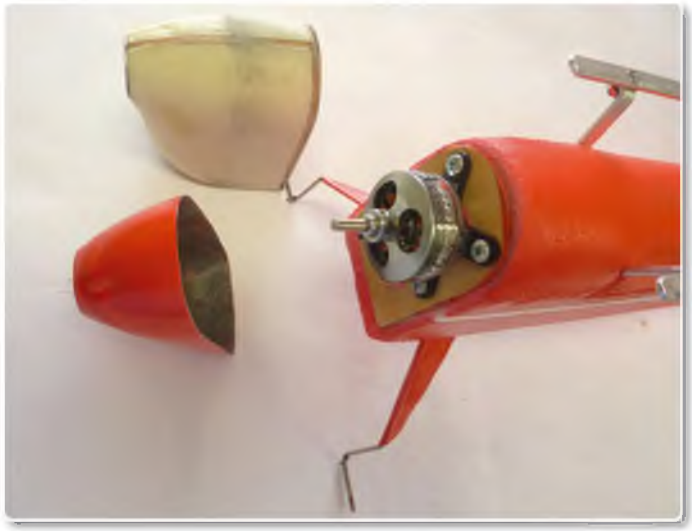
In this instance it is quite easy to manoeuvre the nylon tube so it requires tying off at the rear end only. The beauty of using pantyhose material instead of glass cloth is that the nylon will easily stretch to the desired shape and hold itself in place.

The resin is now applied. I use two pot Pacer 'Z-Poxy Finishing Resin' here. I apply this with a 'dibber stick' made from a short length of scrap of hardwood spar with an inch wide strip of thin foam rubber wrapped around the end and fixed with masking tape – low cost and disposable. Make sure the resin is well worked through the nylon cladding and leave it to dry.

In this instance where the front of the cowling is undercut (à la de Havilland), I pushed the front of the cowling into an inflated round party balloon placed in an old plastic plant pot and wedged it into place to dry (see photo).

When properly dried the moulding is removed from the plug. Cut the twitched rear from the plug and if necessary cut a small hole at the front in order to carefully drive it off with a suitable drift. Cut and fit the moulding to final shape. I apply two coats of sanding sealer over the finished item, well sanding between coats, then a reasonably thick primer coat, further sanding and then finishing with paint.

For a larger cowling you may want to reinforce it by applying patches of glass-cloth around the inside but for a small cowling as used here that is not required. The finished article is neat and very lightweight. In this instance I simply glued it into place with four drops of Weldbond adhesive.



*Fuselage front end showing moulded cowling and plug*

*Fuselage completed*


Rib stack and wingtip items

Wings under construction

Model completed and ready to go

A perfect choice for drifting around on still summer evenings

Alan proudly displays the petite Mini Cavu

## Flying

This is another small sport park flyer model and once trimmed it is a reasonably gentle performer. The prototype wanted to climb so I reduced the wing incidence with a small 1/16" balsa packing strip under the wing TE, which cured that. With 2S battery power it will loop and produce a markedly barrelly roll.

I intend to up the power to 3S at some stage to make it a little more lively, but I will need to change the battery connections to achieve that.

All-in-all it is a pretty little model, sort of replicated from an earlier era, and with a rather gentle performance to match. ***RCMW***

*Prototype model in flight*

*The pylon mounted wing adds plenty of character*

## PLAN DETAILS

| | |
|---|---|
| **PLAN NAME:** | Mini Cavu |
| **BUILD CATEGORY:** | Intermediate |
| **PLAN NUMBER:** | MW3783 |
| **PLAN PRICE:** | £11.99 ($20.99) |

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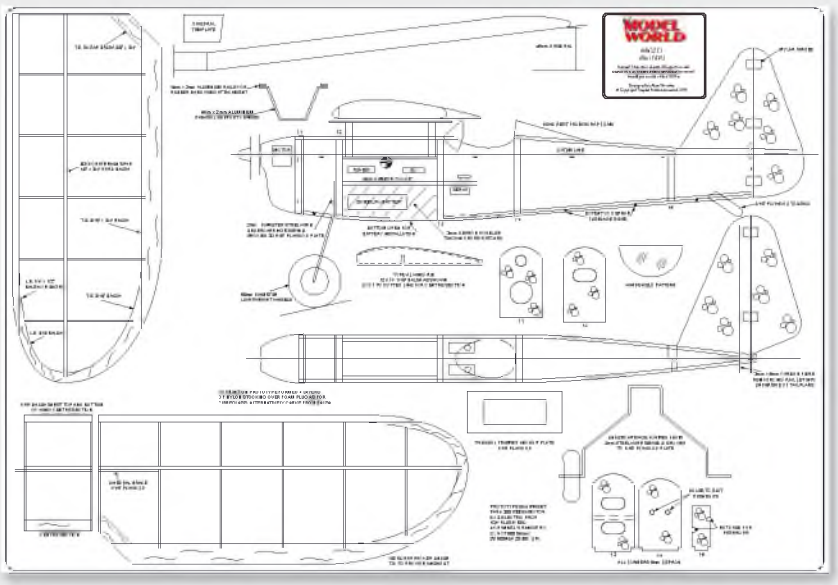

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LMMAS_RCMWJAN16

# BADLY BALANCED BLANIK

*'What's wrong with this picture?', asks Dave Goodenough in his latest treatise from his French flying field*


*2.3m Blanik foamie ARTF kit, found by Kevin during an internet search*

*A trembly-kneed Kevin assembles the Blanik for its first ever flight, unaware of the terror to come!*

Early in July 2015 as I tap this epistle,'Kit Killer Kevin' arrived at our military runway piste with only a couple of models in his van. A rare occurrence, as his normal rate of model attrition is high and he's been known to modify (read crash!) up to three on any given Sunday afternoon. He reasoned that, as he had a brand new electric glider to try/fly several flights would be needed to make friends with it. The 2.3m Blanik 'foamie' he'd found online was plonked on the pit-side bench and assembled. I just had to 'black my nose' and see what he'd bought, and what his new toy was like. But first some background…

## Incredibly Popular

The 16.2 m wingspan, 2-seat, L-13 Blanik has been floating around (sorry, I just had to get that in) since 1956 and has become the most numerous and widely used glider in the world. This Czech designed and manufactured device is even used as a mainstay in the American Air Force Academy for early flight training.

It was the first all-metal glider to use laminar flow wing profiles, the high efficiency helping it to become a favourite aeroplane for not only cross-country flying, but also aerobatics.

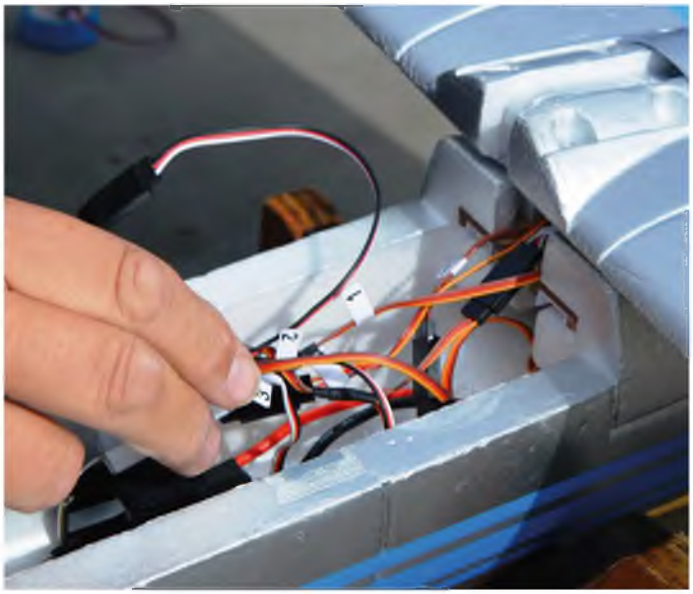
It has won a reputation for being tough and simple to operate, qualities that have allowed the original and variants to reach a production total of greater than 3000 over nearly 60 years. With its swept-forward and tapered wings, and 'torpedo' wingtips, it is instantly recognisable and has even been produced in an L-13M version, with a motor fitted to an over-fuselage twin pylon, just rear of the cockpit, just like we used to power 'converted' model gliders years ago; in fact some still do, even now.

One thing is certain, that Kevin's motor-glider design was taken from a plane with an illustrious history. Would some of the superb handling of the original transfer to the model? We shall see.

## Panic Under Power!

With the model assembled and the Centre of Gravity checked against the instruction sheet – 42 mm back from the centre section leading edge (more of this later!), Kev asked me to launch for him as he wanted to keep his fingers on the sticks at all times during the launch. Always obliging, I did the deed and gave the model a heave after Kev powered-up the outrunner and gave me the nod to release. With that big prop at the front churning a huge amount of air, and despite a level launch, the model climbed almost vertically at first.

Only seconds into the flight, Kevin started to shout that he barely had control and that he hadn't got a clue how to tame it! I told him to cut most of the power as it was already at 'two mistakes high'; the flight characteristics changed, now being uncontrollable on the glide rather than under power. Stalling, diving, wallowing – you name it, the model was doing



*'Knit one, purl two, drop all!' Kev fiddles with the connections – there's loads of space in there*

*Wing mounting system is a peg at the trailing edge and this four-screwed shaped plastic clamp plate at the front. A change from 'normal', but it works*

it and Kev was having little or any effect on the flight envelope!

He tried small amounts of power, full power, even bursts of power, but nothing worked. In the end he cut the motor and hung on to the sticks as best he could, until the model 'arrived', somewhat clumsily. Kevin initially stood there having a full-body tremble – he reckons he's never been so scared when flying!

We wandered over to view the corpse, but other than a non-critical crack in the wing root foam the model survived the tumble very well and we retired, confused, to the pits for a ponder. You're already there aren't you – the C of G was too far back, despite being dead on the manufacturer's recommendation.

With the Blanik still flyable, Kev slid the big 3000 mAh 4S battery as far forward as possible, secured it and rechecked the balance – it was 10 mm further forward. Another trudge to the long grass, a big heave and it was a repeat of the first flight! Kevin was frantic, trying to keep the model flying but having little effect. Being a little bit wiser at this point, he cut the power and hung on to the glide all the way down to another rough, but level landing. Almost twitching with tension our lad swore repeatedly in several languages, before asking, "Just what the (expletive deleted) is wrong with the (second expletive) thing?!"

## When In Doubt, Calculate!

Obviously the C of G was still well to the rear of a safe position, yet 10 mm in front of the one specified, so what was going on? There was only one option, calculate the correct balance – but how? For all you hoary old hands out there the answer is simple – balance the model at 25% chord. For you out there who've never heard of it, or don't know, the wing chord is, simply speaking, the distance from the leading edge of the wing to the trailing edge. 25% chord means 1/4 of the wing, measured back from the leading edge. It's a good, safe position to balance a 'normal' model for the first flights and can be changed incrementally by moving batteries, or adding/removing ballast, to 'improve' the final flying characteristics of any plane.

Our Kevin said, "It's impossible – the wing is tapered and sweeps forward!"

"Well, it's easy, said I, just watch and we can do it simply before we try the model again."

With the Blanik settled on the bench we whipped out his tape rule and measured from the wing root (centre section) to the wingtip, then stuck a patch of sticky tape at the halfway position – on both wings. At that point the wing chord is the exact average of the root and tip on a tapered wing and is the point at which to mark the 25% Centre of Gravity position, again, on both wings.

For a swept wing, whether forward like the Blanik, or swept back like a jet fighter, you then take a straight line between the two marked points and where that line passes over the fuselage centre THAT is your Centre of Gravity. It's a rough-and-ready calculation, yet it works every time – trust me, I'm an engineer!

Kevin watched mesmerised as I stuck bits of electrical tape all over his model, then marked the 'true' C of G on the wing, at the fuselage centre-line – it was only 8 mm back from the leading edge! The real shocker is that the half-wing 25% chord measurement was 42 mm, the same measurement given by the manufacturer as the root chord balance. As Star Trek's 'Bones' would say, "Unbelievable!"


*First flight and almost level. Kev fights to keep the Blanik airborne. It tested everything he had in his 'keep it up' arsenal!*

*Made it! Despite an 'untidy' arrival, the Blanik rests, LiPo panting, waiting for another flight*

*Oops! The result of our Kev's rufty-tufty landing in the weeds. Non-critical, a dab of cyano fixed it in seconds*

*See the gap between the two patches of tape over the wing centre section? That's the calculated centre of gravity. The manufacturer's point was over 34 mm further back, way too much for safety!*

## Once More Unto The Breach!

With the newly calculated Centre of Gravity marked it was simple to add weight to the nose until the model balanced at the new point. There's lots of space under that big canopy and a total of 200 g was needed. I don't think Kevin was completely convinced with the 'rough and ready' reworking of the Blanik balance but at least he was convinced to, as he said, "…give it one last try".

We foregathered once again at the runway's edge. Kev muttered something unintelligible, ramped-up the power and then said disconsolately, "Bung it up then". Away went the Blanik into a fast steady climb, as straight as a die! Our lad was at first silent, but his true nature soon surfaced and he started to chunter about how the model was completely transformed and that he could now trust it to actually follow his stick instructions.

Before the launch we had realigned all the disparate trim settings that Kev had tapped into his transmitter in the few seconds his fingers were not flying or fumbling on the controls during the first two flight attempts – all were re-set at neutral. Whilst feeling-out the new, safe, flight pattern our pilot only needed a few corrective taps on the trims – a little up elevator, some right rudder and a tap of left aileron.

In fact the newly calmed Kevin flew the Blanik until the battery cried 'enough' and the ESC cut the motor, whereupon he stretched the glide as long as possible, before landing flat and under full control, slithering through the off-piste grass to a stop. A few more expletives coloured the air, but at least they were used to indicate his pleasure this time. He was quite literally hopping from foot to foot, ecstatic that the glider was, "…a real pussycat to fly now!"

With the big LiPo needing a long charge and having no spare, Kev decided not to fly the Blanik again. He'd rather bask in the memory of a good flight for a while and try it again during the next visit to the runway.

## Manufacturers' Mistakes?

So what do we take away from this flying session 'tale of woe'? Well it's obvious that the manufacturer made a right ricket with the Centre of Gravity on this model, then compounded the error by putting it in print for all to take as gospel. It is actually more than a silly mistake; it could almost be considered criminally negligent since such a large model, flying out of any real control is a very dangerous device indeed. But then this is not the only time I've seen this mistake perpetrated; several of the ARTF addicted guys in our club have reported the same problem and crashed models on first flight attempts – in fact even destroyed them!

My big 2.4 m Bowers Fly Baby was also a victim, needing over 500 g of nose weight to balance correctly after almost coming to grief on the first flight. I had used the manufacturer's given C of G and, for safety's sake, had moved the balance forward by 10 mm, to theoretically 'soften' the first flight attempt. It took off somewhat excitedly and proceeded to buck all over the sky before I managed to find the throttle stick and bring it back for a safe, but heavy landing.

I carried out the same field check on the model's balance, finding that the safe 25% chord point needed me to move the C of G forward by another 30 mm! Considering that this was a model of some 8 kg with a 30 cc petrol engine up front, I was shocked.

I know that you wiser (after the fact?) mortals will shake your heads and say, "You should have known better." Or, "Why didn't you check it before you flew?", but who are we to trust if not the manufacturer?

One of the latest victims was Jean-Michel and his Pitts Python biplane, an expensive ARTF in France, and J-M's first built-up-and-film-covered device. Like the rest of us he'd trusted the given C of G, prepared the model thoroughly and was on tenterhooks as he opened the throttle to power-up the big outrunner motor. It hared away, leaped into the air and then performed several uncommanded stunts before his manic transmitter stick movements finally had some effect. The model smote the runway hard, leaving bits of fuselage behind before grating to a stop. The 'flight' had lasted only 20 seconds or so.

Some weeks later the rebuilt model was returned for flight testing and Jean-Michel mentioned that, "The damned balance was out!" He had used the position given in the printed instructions but after calculating a 'safe' position he found the manufacturer's given point to be 20 mm too far rearward.


*With the C of G adjusted, Kev wafts the Blanik past under full control. It even managed to 'hook' a thermal!*

*Almost flight ready, the English Electric Wren sits awaiting the 'taxi' to the piste pits*

*Proud Dad with his big silver baby! The Wren glistens before the first flight test*

## What To Do?

It's obvious – double check the manufacturer's Centre of Gravity position. I have personally seen and suffered so many bad flights and have been told by other flyers that have emailed me that they too have been caught out by this state of affairs. Trust your own calculation – you'll be glad you did. Ok, rant over!

## Coming Attraction...

It's a few years off and still a little over the horizon, but did you know that the first ever British 'Ultralight' design and flight competition was at Lympne (spoken as Limm), way back in 1923, only a few short months after the first ever competition of its type in the world over here in France. The centenary of this remarkable event is a mere eight years off. The aircraft entered in that competition ranged from the thoroughly practical (one or two), to the faintly ridiculous (some), yet all were capable of flight. But most were let down by poor, mechanically fragile engines.

I've long held a fascination for these aviation oddities, understanding that their 1920's tentative 'toe dipping' in the aviation pool have eventually led to today's burgeoning Ultralight/ ULM movement, via a few side-tracks along the way. I've built the first of these genteel aircraft, one of several that I intend to construct over the next few years. The English Electric Wren has long fascinated me and at last I've found the time to build one from the Jeremy Collins' plan.

At the 1923 Lympne trials it was the winner, managing an astounding 80+ miles to the official measured gallon. At over 2.2 metres and a bare 2 kg ready for flight and complete with its 300 g LiPo battery, it is just like the original – an Ultralight. Several photos taken at Old Warden (yes, one flying example still exists there!) have helped me to reproduce the somewhat scrofulous, well-worn and 'constructed for minimal service life' look of the original – basically I'm not too good at covering with Silver Solartex, so it was a happy accident!

By the time you get to read this I will have flown the model and with luck, and very little wind, you'll get to see the result here. If you have your own aviation 'itch to scratch', why not tell me – and add some photos too!

***RCMW***

**CONTACTS**

**Dave Goodenough:**
dizzy3@sfr.fr

# DETECT X380-C

***You know what they say about quadcopters with big feet? No, we don't either! But the X380 from XK Innovations certainly has some mighty large paws. It's also a pretty capable camera drone too, as we found out when we borrowed one from CML Distribution***

Ok, let's go in feet first, as we made a big thing of them (literally!) in our introduction. Although of conventional configuration for a medium size quadcopter the XK Detect X380 does indeed sport generously sized round feet on the end of each telescopic style leg. We say telescopic style as the legs are in fact moulded in one-piece and do not have any internal shock absorbers, as their appearance would suggest. The feet do however have soft foam rings underneath them to cushion landing shocks and to help prevent the aircraft slipping off smooth surfaces, such as the picnic table that we use as a pit bench. The only drawback to this is that the foam rings do a good job of soaking up any water when placed on wet ground, but those large pads do at least mean that the weight of the model is well spread if you want to fly from sodden ground, such as we have here in the UK at the moment.

## A Proper Look

Large flip top boxes are all the rage at the moment and the black cube that the Detect is supplied in is no exception. Inside is a polystyrene cage that offers good support to the ready to fly drone and its accompanying 2.4 GHz transmitter. The Tx is of familiar R/C styling and is powered by six AA batteries. There is no warning against using rechargeable cells, so we used our favourite NiMH's in the tight fitting battery box at the rear of the unit – there's no danger of the batteries coming loose in this one!


***Above:** A big black carry box will bring the Detect X380-C safely to your door*

***Once the props are on it will not fit in the outer box. But the inner tray is useful to carry the drone and its transmitter around***

The transmitter is supplied in Mode 2 stick configuration but there is a Stick Mode button if you want to change it to an alternative mode. But Mode 2 is our preferred way to fly R/C models so we were happy to use it straight from the box. It should also be noted that the Tx is pre-bound to the drone at the factory.

The model is supplied without its propellers being fitted so once they have been bolted in place it is not possible to put the drone back in its box. You can however still use the lower half of the polystyrene cage to support the aircraft whilst in transit and storage. It also provides a handy place to store the transmitter when not in use.

In the top section of the polystyrene packaging you will find the four propellers (unusually for a drone no spares are supplied), together with a set of instructions and a package of accessories.

The accessories include a small cross headed screwdriver, a spanner and a couple of small Allen keys, which will aid maintenance of the quad; you will also need to use the spanner to fit the propellers. A USB card reader is also supplied to enable you to download pictures and videos from the 4 GB micro SD card supplied with the 12 MP resolution/1080p, 30 FPS action camera that

*Mains power supply and LiPo charger, complete with UK plug adapter*


*The 3S 5400 mAh has conventional modelling type power and balance connectors. It proved very economical in use, giving ample flight times*

*Accessories include two USB leads, a micro SD card reader and various tools. The Y-lead is for the optional FPV set*

*Detect X380-C straight out of the box*

comes pre-fitted to the two-axis brushless gimbal mount. A micro USB lead is also included for downloading to devices that only have a micro USB connector, such as a tablet.

An additional micro USB lead is also supplied and after a bit of head scratching we realised that this was for recharging the 900 mAh lithium pack that powers the camera. This sounds quite a lot but the camera did seem to be quite power hungry so we would recommend recharging the camera between flying sessions.

A strange Y-lead caused another bout of head scratching, but CML, the UK distributor for XK, tell us that this is for use with the optional FPV system, which we hope to test next time.

## All Propped Up

The only assembly job needed with the Detect X380 is to fit the four propellers. But before we did this we put the LiPo flight battery on charge. The 11.1 V (3S) 5400 mAh 20C pack is fitted with an XH style balance lead and an XT60 power connector. The use of such common connectors means that it will be easy to charge it using a wide range of fast chargers and balance boards. To be honest we were very tempted just to charge it using our usual set up, but XK include an AC100-240 V to DC12 V power supply, complete with UK 3-pin plug adapter, and a 12 V 2S/3S balance charger, so for the sake of completeness of this review we decided to use their charging package to see how well it performed.

And it worked very well, charging the three cells in a very evenly balanced manner from a 50% storage charge. The charge current is 1550 mA and the claimed balance accuracy is to within 10 mV. Charging is via a 3S balance lead port on the side of the charger; a 2S port is also supplied for charging two cell packs for use in other models.

Back to the propellers, you can see from the pictures that the front motor arms are colour coded with two white stripes, whilst the rear arms have red stripes. Naturally the red and white propellers are fitted to the relevant coloured arms, but it should also be noted that each pair rotate in alternate directions.

A close look at the end of each motor arm reveals a circular shaped arrow that shows the direction of rotation of that particular motor; a similar arrow is moulded on the propeller blades, close to the hub of each prop. It is important that the two arrows match before the propeller is tightened up.

You will also notice that the motor shafts are fitted with chrome and black painted spinners on opposing sides. The chrome ones have a conventional right hand thread, whilst the black ones have a left hand thread. This is so the threads work in the same direction as the direction of each motor, otherwise the spinners would have a tendency to unscrew when spun up to flying speeds.

When you fit the props you need to be aware that the propshafts feature two flat sides that match up with corresponding flats moulded inside the propeller hubs. It is important to make sure that these flat areas line up so that the propellers can be pushed down fully onto the propshafts. It is possible to force the props down with the flats misaligned whilst tightening up the spinners, but it is highly likely that the props will not be fully secure. The flat areas also help key the props to the motor shafts, thus ensuring that there is no prop-slip.

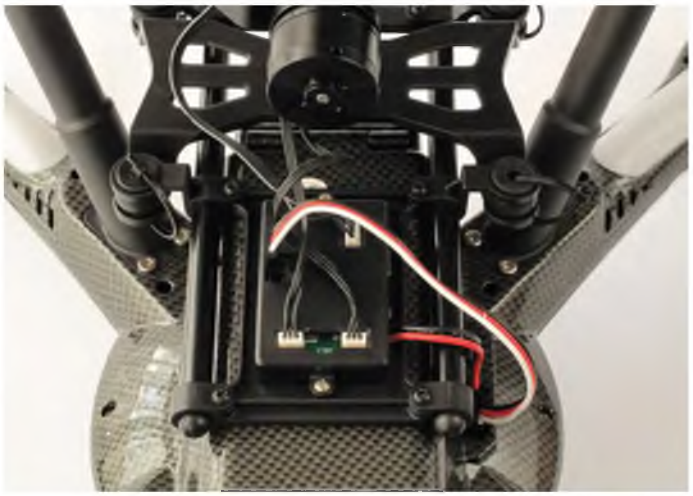
*Under-boom lights, front headlights, coloured props and a flashing rear indicator all help with orientation of this all-black quadcopter*

*A view of one of the big round feet!*

*The dual axis gimbal is soft mounted and restrained with tie-wraps for added security*


*The camera sits at an angle when at rest but soon straightens up when power is applied to the drone*

*Twin headlights give the X380 an almost jumping spider-like appearance*



*Belly up view showing the gimbal connections to the central control board*

*The two brushless gimbal motors provide a smooth and level camera platform*

## All Action Camera

The camera is supported on a dual gyro gimbal mount, which it is fixed to using a thin metal strap. The cameras on previous versions of the X380 could be actuated by pressing the large dial at the bottom right hand side of the transmitter, using a short press to take a picture and a long press to start filming video. But this is of limited use if you do not have FPV feedback and you can see what the camera is pointing at. So the X380-C takes a different approach and uses the photo dial, now renamed FAP (Fly Around Point) to set the drone up to fly in circles, either facing inwards towards a target on the ground, or outwards to take a series of pictures in a 360 degree panorama.

The camera cannot be operated once it is in the air, but this is no real hardship as you either set the video running just before take-off or set it to take time-lapse pictures at set intervals; we chose the 5 second interval setting. This does of course mean that you get to see a lot of meaningless pictures as the model takes-off and is flown into position, but these can be quickly grouped together when viewing the thumbnails on a computer and deleted, leaving just the decent shots to edit. Likewise the videos can be quickly topped and tailed to edit out the take-off and landings.

To be honest we quite like not having to worry about operating the camera as it lets us concentrate on piloting the drone and making sure that it is pointing at the correct targets that we want to film.

The only slight niggle is that the dual gimbal mount does cover up the side controls of the camera, which you will need to access to the set up menu, so you need to remove the camera whenever you want to change any settings. The menu is quite extensive and it is obvious that this camera has many other uses, such as using its motion detect function to trigger shots of the wildlife in your garden – removed from the drone, of course!

The gyro assisted gimbals do a great job of stabilising the footage from the camera, although a slight wiggle is noticeable if you

*Battery access is through a flap at the front. There is plenty of room to tuck the wiring and balance lead inside*

*The propellers are secured using domed prop nuts*

*Arrows on the prop blades near to the hubs need to match the arrows moulded onto the ends of each motor arm*

*Clockwise rotating motors are marked using black prop nuts. Note how the prop and boom arrows are reversed in this picture*

really look hard. We hoped that activating the camera's anti-shake function would eliminate this but it had little effect. But this may not be caused by vibration and could simply be the result of minor strobe effects from the two front propellers. Pointing the camera downwards should help eliminate this.

Talking of which, camera tilt is provided courtesy of the FAP dial, both upwards and downwards. But be careful not to go wild with this as it is difficult to see what angle the camera is moving to when the drone is up high; after getting 'dial happy' on our first flight we landed and were amazed to see the camera pointing vertically downwards! This is an unexpected bonus as it is possible to set the camera up to take truly vertical coverage. It may be worth sticking a thin strip of fluorescent tape to the side of the camera so that the tilt angle can be seen at greater distances.

The simplest way to pan the camera is to yaw the drone in flight. But the Detect X380-C has a couple of neat tricks up its sleeve and this is where the FAP (Fly Around Point) dial comes in. If you press it until the LED indicator at the back of the model turns solid green and then release the sticks the drone will start to slowly rotate above the same spot. This allows it to take a series of shots or video in a 360 degree (or more!) circle until you press the FAP button to retake control.

Alternatively you can press the FAP button, wait until the light turns green, and then drive the drone forward to a distance of your choosing. Then release the sticks and after a couple of seconds the X-380 will turn around by itself and start flying in circles around the central point where it started from. This means that you can hover the drone over a target of interest, initiate FAP and then get a series of pictures or video of the target from all sides; it takes around 40 seconds to do one orbit. It works really well and is fun to watch. We always find it is easier to stop the FAP when the rear indicator light is pointing back towards us, which means that the drone is facing forwards once more.

## All Lit Up

Once airborne the stripes on the motor arms and the coloured props become less visible so the light strips under the motor arms, the two forward facing headlights and the rear indicator light become the main ways of making sure the drone is pointing in the right direction. The rear light especially is very bright and it flashes green when it has acquired a GPS signal. If it slowly flashes green and red then it means that it has either lost GPS or is getting a poor GPS signal, which will affect its ability to return home or maintain heading lock.

It also acts as a low battery indicator, flashing red twice as an initial warning, then flashing red constantly to indicate that the drone needs to be landed immediately.

## Other Functions

The Detect X380-C can either be taken off manually, starting the motors by pulling the sticks into opposite corners of their gimbals, or you can press and hold the Take Off button for two seconds, after which the motors will start and the drone will climb and hover at two metres altitude. The Detect does not counteract any drift whilst performing a so-called 'one key' take - off, so it still needs to be kept straight and level using the other flight controls.

Likewise pressing and holding the Take Off button with the drone in a low hover will cause it land automatically, but you still need to use the other controls to keep it level.

If you prefer a truly automatic landing then you can use the Go Home function (right hand shoulder switch) but this needs a strong GPS signal. When activated the rear light turns solid red and provided that the drone is above 20 metres it will return to hover above the point where the battery was connected (so make sure you do this away from people, buildings or vehicles, including your own car!). It will then hover for around 20 seconds before automatically descending and make a landing, after which it switches the motors off. During the return home phase the X-380 will keep pointing the camera in the same direction, so if you want to film the approach to a target, followed by a slow descent, then this is a good way of getting such footage.

This is an example of Heading Lock, which can also be selected in flight using the Head Lock switch mounted on the left shoulder of the transmitter. With this selected the drone will maintain its heading whilst still being free to fly backwards or forwards, or left and right. This is useful when you want to film a sideways pan, or maybe perform a climbing take-off and track towards a distant target, such as a building or landscape feature in the distance.

*The 2.4 GHz R/C transmitter has clean and modern styling*


*The FAP dial can be used to tilt the camera up or down. And when pressed it initiates the Fly Around Point function*


*Buttons on the other side of the screen change the stick mode and initiate 'one-key' take-offs and landings*

## End Results?

We found the Detect X380-C easy to fly. In gentle breezes it displayed very low drift and even in higher winds any movement was easily held without having to resort to dialling it out with the digital trims on the transmitter. The model did have a tendency to tilt during one-key take-offs and we came close to having blade strikes with the ground a couple of times, so we prefer to keep full control of the throttle during take-offs.

Landing are a different story though and we are more than happy to use the Go Home function to bring the model back to the take-off point without having to touch the sticks. So far it has performed all auto landings safely and very close to the take-off point.

Heading Lock also worked well, but most of all we are very taken with the Fly Around Point functions, which provide a well regulated way of getting a series of still pictures or video footage from all around the aircraft.

The dual gyro gimbal mount works well, dampening out most vibrations and ensuring straight horizons. And we are very pleased with the results from the camera, which appear sharp, well focused and with good colour results. Mono and sepia effects are available too! Most on target shots were more than usable, although like most aerial pictures they benefit from a small amount of post-processing with basic photo editing software.

The only additional thing that we would like to see is an FPV view from the drone, but CML tell us that a matching package is available. We hope to test this soon and we will report back in due course. **RCMW**


*Use the Head Lock switch to keep the camera pointing in the same direction to provide a panning shot whilst you sweep the drone sideways*


*Provided you have a good GPS signal the Go Home switch can be used to bring the drone back to the take-off point for an automatic landing*

*Rubber covers presumably allow access to stick tension screws (there's no mention in the instructions), although we were happy fly the X-380C as supplied*

*The Tx battery bay takes six AA size cells*


With the lights turned down you can see the main power indicator and the screen display without any distracting reflections

X380 is very stable in the hover in gentle breezes

The author takes an inadvertent selfie after switching the camera on in five second time-lapse mode!

First flight and the rain rolled in over the Malvern hills...

Second flight on an overcast day. At least you get a better view of the Malverns now!

Standard shot of Traplet Towers for comparison with other camera drones that have been reviewed

A lake situated at one of the imaginary two thirds lines gives a nice bit of foreground interest

Using the Fly Around Point function allows a series of pictures to be taken as the drone circles over the flying field. They can then be stitched together with photo editing software to provide a complete 360 degree panorama if you so wish

## RC MODEL WORLD DETAILS

### MODEL INFORMATION

| | |
|---|---|
| **NAME:** | Detect X380-C |
| **MANUFACTURER:** | XK Innovations |
| **DISTRIBUTOR:** | CML Distribution |
| **WEBSITE:** | www.cmldistribution.co.uk |
| **PRICE:** | £499.99 |
| **MODEL TYPE:** | Quadcopter with camera and dual gimbal brushless mount |
| **PARTS SUPPLIED:** | Airframe, 2.4 GHz transmitter, 2-axis gimbal mount, HD 1080p camera, 4 GB micro SD card, USB card reader, 11.1 V 5400 mAh 20C LiPo and charger |
| **PARTS REQUIRED:** | 6 x AA batteries to power the transmitter |

### PRODUCT SPECIFICATIONS

| | |
|---|---|
| **WIDTH:** | 305 mm |
| **HEIGHT:** | 210 mm |
| **LENGTH:** | 305 mm |
| **BATTERY:** | 11.1 V 5400 mAh 20C LiPo |
| **MOTORS:** | 2212 950 KV Brushless |
| **FLYING WEIGHT:** | 1180 g (approx.) |

### DISLIKES

None

### LIKES

Easy to set up and fly • Good results from the camera • Fly Around Point function adds interest • Go Home function is reliable and works well • Auto landings in Go Home mode

# TOP TIPS

***Bill Bowne offers up another pair of building ideas from the workshop***

## Simple Fuselage Jig

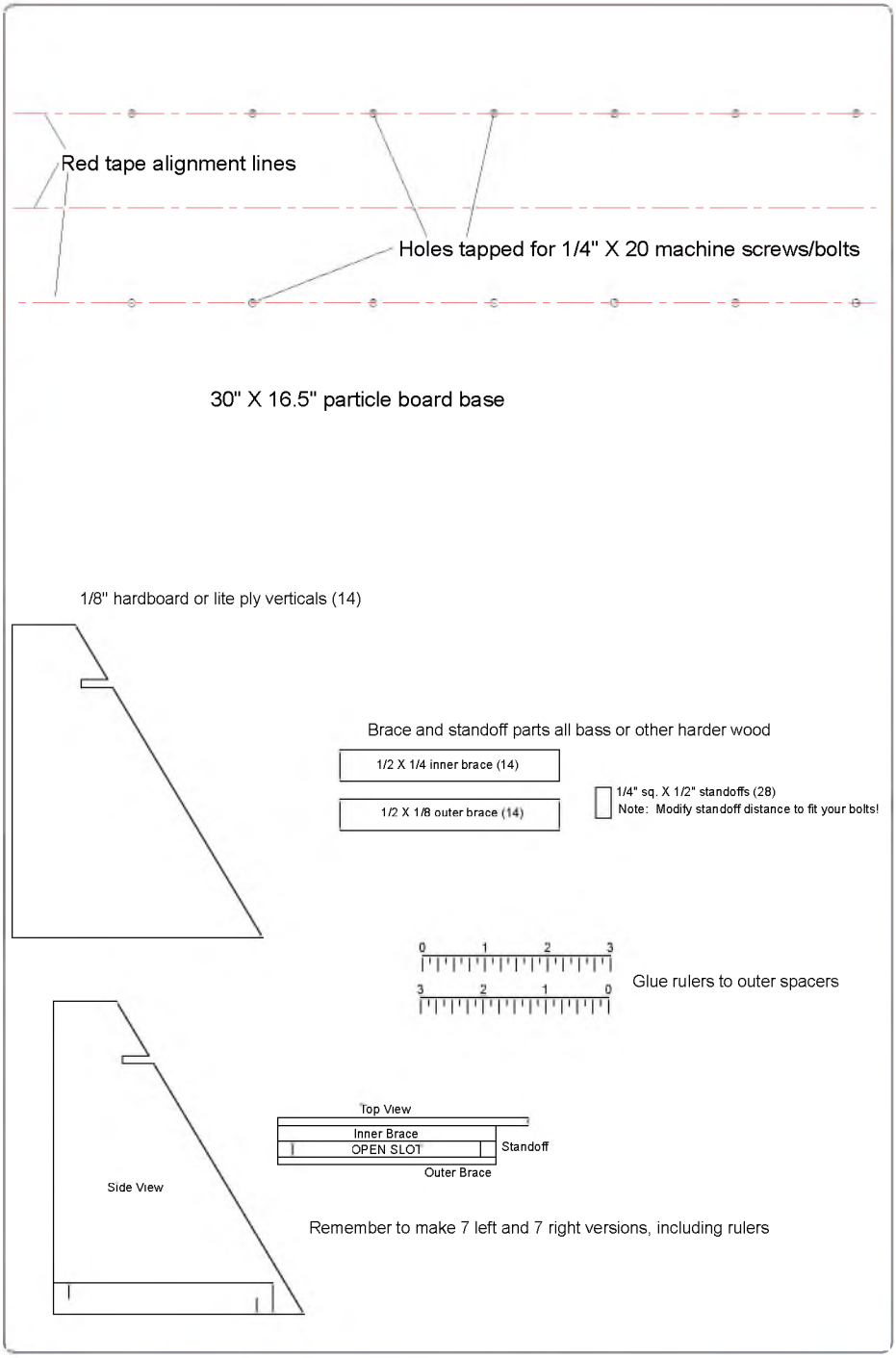
Bananas are great when they're the yellow fruity kind, sliced up and added to breakfast cereal. But they aren't very nice when they're made of balsa and ply… as in a new fuselage! So to avoid banana-fuselages I use a fuselage jig.

When designing my jig I looked at several other folks' designs. I was considering using long, wooden sleeves and carriage bolts for the jig stations when it struck me that the bolts didn't have to go through each entire jig station. Plus, rather than mill long slots in the baseboard (to let the jig stations be adjustable), I could use threaded holes in the baseboard and build up the slots in the stations. Much easier! (Especially since I don't have a router!)

So here's my take on a fuselage jig. Exact dimensions aren't critical. For example, I used 1/4 x 20 nylon bolts to hold the stations in place, necessitating 1/4" wide slots; if your available hardware is metric just replace the stand-offs in the station bottoms with wood wide enough for your bolts. Or, if you want to scale the jig down (or up), scale the slots likewise.

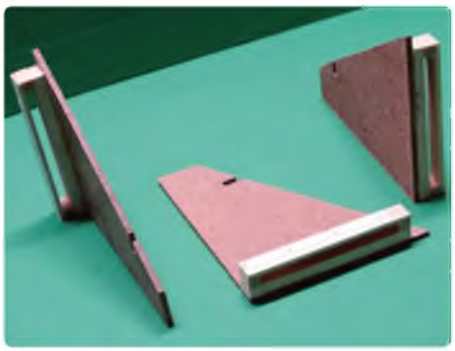
Construction is very simple. Make your jig stations in pairs, so the stations can be exactly lined up on opposite sides of the fuselage. Take extra care with rulers and corner squares to ensure all lines are accurate. Ordinary hardboard (I used 1/8" 'Masonite') is fine for the verticals; light ply and bass or spruce is fine for the 'slots'. Use the 'handed' rulers shown on the plans to help keep things symmetrical.

For the jig surface find the flattest, truest particle board you can. Mark off a STRAIGHT centre line (some trim tape works well, but make sure you give it a coat of clear varnish to protect it). Use a square to mark the lines for each jig station. Drill and tap each hole (see Drilling & Tapping), and then screw each station to the jig base with slotted-head screws.




***CAD drawing. Not a lot of parts to this simple fuselage jig***

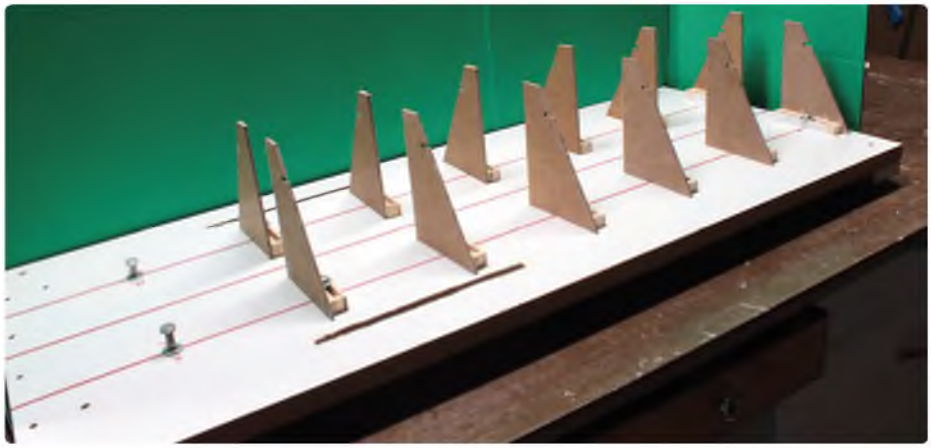
***Building right and left handed jig stations makes aligning the fuselage sides easier, as does having bold guidelines down the centre and on each side. Yes, I forgot to make mirror-imaged 'rulers' for the opposite side triangles, hence the hand-drawn numbers!***



***Five parts to each jig station: Back plate, two horizontals and two spacers. Slots in angled side of jib backbones are for optional elastic bands***

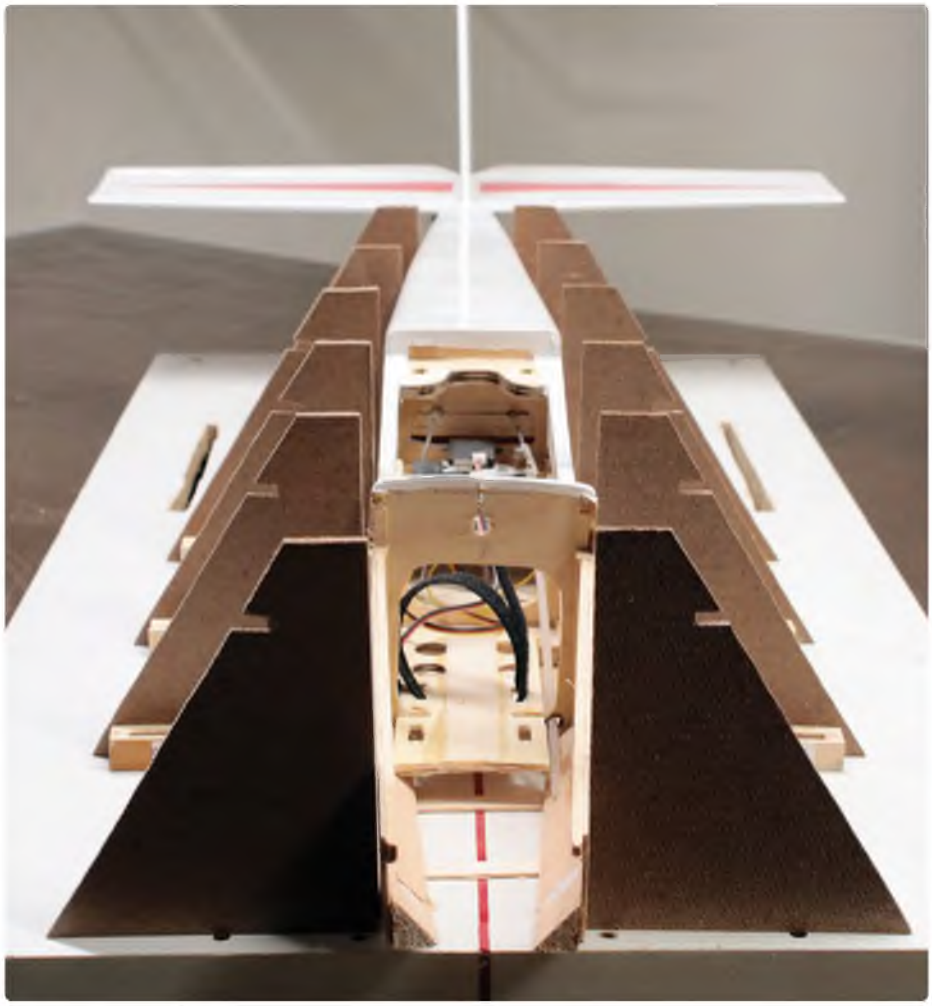
## Drilling And Tapping

When drilling and tapping wood start by drilling the pilot hole. Now tap it and then dribble some thin cyano in the hole. Let the cyano cure, then re-tap the hole. The CYA hardens the wood and protects the threads, whilst the second tapping clears glue and wood chips out of the threads.



*Note the red trim tape guidelines to either side of the centre line. All are protected with a coat of polyurethane varnish. Bolts in station seven holes are hex-head because I ran out of slotted head screws during home repairs and haven't been to the DIY store to replace them*

*My Shrike needed a nose job (please, don't ask why!), so into the jig she went. Viewing angle only makes the front jig station look backwards (as proven by the location of the slot in the station backbone)*



*No bananas here!*

## Simple Wing Bolt Keeper

My wife's new ARF Cub came with small metal wing and strut retaining machine screws. I knew that any of those screws that got dropped in the grass at our flying field would probably be lost forever so I made these simple retainers. Being made of soft plastic they'll stay on the screw, yet the machine screw can be tightened securely. One caveat – please, make sure any retainers added to your wing bolts don't alter the wing's incidence!

*Flexible plastic retainers are easy to make. Shown here is one for Micki's Cub, used to keep the strut machine screws from being lost*

*Step 1: Using a soft plastic lid (yes, I like raisins in my breakfast oatmeal!) and drill a series of holes slightly smaller in diameter than your machine screws' thickness*

*Step 2: Use a hole punch to punch out a disc of plastic containing the hole (it's much easier if you look at the opposite end of the punch rather than the view shown here!)*

*Step 3: Work the retainer onto the machine screw*

Check our website for a full list of events
**www.rcmodelworld.com**

# Diary Dates

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 Traplet Publications Ltd. are unable to take responsibility for event cancellations. Check before you go.

## INDOOR

**20th Feb '16, 19th Mar '16**
**Indoor R/C Meets**, in the Main Hall at Fleming Park Leisure Centre, Passfield Avenue, Eastleigh, Hants SO50 9NL. From 7 pm to 10 pm. No free-flight models. £8 for flyers, £1 for spectators, proof of insurance required. 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

**23rd Feb, 29th Mar, 26th Apr, 31st May, 28th Jun**
**Indoor R/C Small Models Meets**, in the Main Hall at Wickham Community Centre, Mill Lane, Wickham, Hants PO17 5AL. All meetings will run from 7.00 pm to 9.30 pm. Models to be flown at these meetings are to be limited to a maximum weight of 95 grams (3.5 ounces) for fixed wing aircraft, in flight trim, 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 on the evening. Admission to the meetings will be £4 for flyers and £1 for 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

**5th Mar, 2nd Apr, 7th May, 4th Jun, 2nd Jul, 1st Oct, 5th Nov, 3rd Dec '16**
**Fun Flying at Potters Bar**, at Furzefield Sports Centre, Mutton Lane, Potters Bar, Herts. EN6 3BW. From 6 pm until 10 pm, flyers £9, spectators £2. Small rubber free flight and small electric models, wingspan will be limited to 20". All enquiries to Mike Quille, Tel: 020 8500 3549, Email: mp.quille@live.co.uk

**5th Mar '16**
**Indoor R/C Meets**, in the Main Hall at Havant Leisure Centre, Civic Centre Road, Havant PO9 2AY. From 7 pm to 10 pm. No free-flight models. £7 for flyers, £1 for spectators, proof of insurance required. 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

**12th Mar, 9th Apr, 8th Oct, 12th Nov, 10th Dec**
**North London MFC Indoor R/C Meetings**, at Furzefield Sports Centre, Potters Bar, Herts. EN6 3BW (Junction 24/M25), 6 pm-10 pm. All up weight limit for fixed wing 225g, 36 inch span, Helicopters 400 g. BMFA insurance required. Admission: flyers £9, spectators £2.50. For more information contact Peter Elliott on 01707 336982

## GENERAL

**19th to 21st Feb '16**
**Brighton Modelworld**, at the Brighton Exhibition Centre, Kings Road, Brighton, East Sussex BN1 2GR. General model show with boats, planes, cars, trains etc. Contact Exhibition Manager: Alex Tombling, Tel: 0845 2241823/07789 913584.
Email: alex@brightonmodelworld.com

**28th Feb '16**
**Beverley and District Model Aircraft Club Spring Swapmeet**, 9 am till 12 noon at Tickton Village Hall, near Beverley, HU17 9RZ. Entry £1.00, Tables £5.00. Contact Brian Jenkins, Email: 2bee.jays@live.com, 07970 959875 or www.badmac.btck.co.uk

**28th Feb '16**
**Bedworth Aeromodellers Swap Meet**, at Bulkington Working Mens Club, Chequer Street, Bulkington, Bedworth, Warwickshire CV12 9NH, 10 am to 2 pm. Table set up time 9.30 am. Cost £5 per table, tables must be booked in advance. Entrance fee £2. Ample parking on site. Hot food, tea/coffee available in the Club. Contact: Eric Heathcote on 07914 382930

**5th Mar '16**
**Brightlingsea MFC Swapmeet**, at the Village Hall, Clacton Road, St Osyth, Essex CO16 8PE, from 9.30 – 11.30 am. Entrance £2, Tables (set up from 9 am): Small £3, Large £4. Have your breakfast with us! Contact Bob Goodenough for information and pre-booking tables (essential), Tel: 01206 303749, www.forjac.co.uk

**6th Mar 2016**
**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 www.hmfa.hampshire.org.uk for more details

**12th Mar '16**
**Long Eaton Model Aero Club Swap Meet**, at Trowell Parish Hall (postcode NG9 3QA) Note, new venue with large car park. Tables cost £5 for sellers which includes one seller, additional helpers £2. Doors open at 9 am for sellers and 9.30 am for buyers. Entry cost for buyers £2. Finish 12 noon. Contacts: John Wright 01159 394448, Email: janwright27@btinternet.com, Barry Parkinson 01159 731954

**18th Mar '16**
**DADMAC Auction**, the Dumbarton and District Model Aircraft Club Bring and Buy/ Auction takes 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/Snacks available. Auction forms available on website www.dadmac.org.uk Contact Maurice Irvine 01475 689711 for more information

**19th & 20th Mar, 23rd & 24th Apr, 21st & 22nd May, 25th & 26th Jun, 24th & 25th Sep '16**
**Waterplanes at Ullswater** (Windermere Model Waterplane Flyers), Contacts: George Carpenter 01524 782272, Email: gcarpenter@btinternet.com, Colin Smith 01524 762282, Email: badgerswood@waitrose.com Insurance essential, please check website www.wmwf.co.uk nearer date for confirmation

**25th Mar '16**
**Watton Radio Model Club Bring & Buy**, Hingham Social Club, Watton Road, Hingham NR9 4HB. Sellers from 5.30 pm. £5 per table, additional helpers £1. Doors open 6 pm, entry £1. Bar open with refreshments available. Contact Martin Pawsey on 01953 883892 or Email: martin.pawsey@btinternet.com

**26th & 27th Mar '16**
**South Australia State Scale Championships**, taking place at the Constellation Model Aircraft Club, Brooks Road Virginia, South Australia. Any further details please contact Email: trevorwoolfitt@virginbroadband.com.au

**16th & 17th Apr '16**
**PSSA 'Fly for Fun'**, 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

**17th Apr '16**
**F3A. BMFA 1st GBR Team Selection Event.** Stansted MFC. FAI 'P' and 'F' schedules. Also GBR/CAA League competition. All Schedules. See 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

**23rd & 24th Apr '16**
**Spalding Model Engineering & Hobby Show**, 9.30 am Saturday until Sunday 4.30 pm, at the Springfield Centre, Camelgate, Spalding, Lincs. PE12 6ET 3. Halls exhibiting R/C trucks/ plant in extensive working diorama, model boating pool, indoor flying area, alongside traditional engineering, Gauge 1 railway layout, 5" live steam railway rides, live steam outside, R/C tank demonstrations, trade stands, catering & much more. Fun for the R/C enthusiast and all the family. Show adjacent to large shopping outlet and acres of gardens to enjoy.
Email: spaldingshow@gmail.com,
Tel: 07443 524260 www.spaldingshow.com

**23rd & 24th Apr '16**
**Nye Jets 2**, the Second Nye Jets Kero Burn will take place at Throckmorton Airfield, Long Lane, Throckmorton, Worcestershire WR10 2JH. Absolutely no entry after the cut-off date of April 15th. The event will be fly for fun for jet models only (no pulse jets, prop jobs or helicopters). Pilots must be current BMFA/LMA/SAA members and B certificate qualified as a minimum (including both pilots if a buddy-box system is in use). No insurance & no B certificate = no flying. Models weighing over 20 kg and subject to the LMA large model scheme certification are to be made known to Jamie Cuff (see email), certificates will be required as proof of scheme compliance before the model(s) are allowed to fly. It is the pilot's responsibility to make the event organiser aware of any over 20 kg models. All models will be scrutinised and flying will take place from 10:00 through until 18:00. There will be LMA scheme flight witnesses available over the weekend if required. Entry fees are as follows: pilots: £16 per day, others £6 per day. For more detailed information and an entry form email: nyejets@yahoo.co.uk

**1st May '16**
**F3A. BMFA 2nd GBR Team Selection Event**, Hurley. FAI 'P' and 'F' schedules. Also GBR/CAA League competition. All Schedules. See 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, Adrian Harrison on 07976 244004 for details

**7th May '16**
**GBR/CAA F3A League competition**, Skelbrooke. All schedules. See gbrcaa.org – then forum 'Competition News' for details and 'Competition Entry Form' for fees and payment. Visitors welcome but please contact Contest Director, Bob Rowland on 07969 456441 for details

**21st & 22nd May '16**
**PSSA 'Fly for Fun'**, The Blwch, Bridgend, South Wales. Meet at the 'Ice-Cream' car park for 10 am each day. Open to non-PSSA members. Proof of insurance required. For more information contact Steve Houghton on 07762 256126 or Email: Steve.houghton59@gmail.com Further information at a470soaring.blogspot.co.uk

**21st & 22nd May '16**
**LMA Swapmeet,** at the Tibenham model event, this popular addition to the flying programme does not need to be booked but tables will be allocated on a first come first served basis. Table will cost £10 for 2 days or part thereof. All money raised will be donated to the Vulcan charity. Further details can be obtained from Steve Ogden 01782 853883, Email: topgun@modelpilot.co.uk

**22nd May '16**
**GBR/CAA F3A League competition**, Deeside. All schedules. See gbrcaa.org – then forum 'Competition News' for details and 'Competition Entry Form' for fees and payment. Visitors welcome but please contact Contest Director, Brian Hoare on 07962 358470 for details

**28th & 29th May '16**
**F3A World Cup League Event**, Criterium International du Hainaut Grandrieu, Belgium. Please contact Ashley Hoyland on 0114 2873432 for details

**5th Jun '16**
**F3A. 3rd BMFA GBR Team Selection Event,** Ashbourne, Derbyshire. FAI 'P' and 'F' schedules. Also GBR/CAA League competition, all schedules. See 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, please contact Contest Director, Adrian Harrison on 07976 244004 for details

**10th, 11th & 12th Jun '16**
**UK F3A World Cup League Event**, Near Ashford, Kent. International entry. Visitors welcome. See www.gbrcaa.org/World Cup/ or contact Contest Director Matt Hoyland on 0773 9840498 or Ashley Hoyland on 0114 2873432 for more details.

**11th & 12th Jun '16**
**PSSA Fly-In and Clwyd SA Ray Jones Memorial PSS 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 More details for Sunday's memorial event on the CSA website or Email Matt Jones at mattjonesgte88@hotmail.co.uk

**17th to 19th Jun '16**
**Weston Park International Model Air Show**, at Weston Park, Weston-under-Lizard, Nr. Shifnal, Shropshire TF11 8LE. Celebrating their 25th anniversary the show starts at 10 am (gates open at 8 am), includes model aircraft displays, on road and circuit model car racing, full size displays, model boats, Quad Fair helifest. On-site camping available. Adults £12, Children £6, Family £28. For more information check out www.westonparkmodelairshow.co.uk Tel: 01952 587298, Mobile 07758 895068

**17th, 18th & 19th Jun '16**
**F3A World Cup League Event**, France. Please contact Ashley Hoyland on 0114 2873432 for details

**25th & 26th Jun '16**
**F3A World Cup League Event**, Netherlands. Please contact Ashley Hoyland on 0114 2873432 for details

**25th & 26th Jun '16**
**30th Wings & Wheels Model Spectacular**, at North Weald Airfield, Epping, Essex CM16 6AR. 9.30 am-5.30 pm. R/C displays of all kinds, trade, Bring & Buy, Boat Pool and lots more. Weekend camping. All enquiries:
Email: admin@wingsnwheels.net or
Tel: 01242 604126, www.wingsnwheels.net

**2nd Jul '16**
**GBR/CAA F3A League competition**, Skelbrooke. All schedules. See gbrcaa.org – then forum 'Competition News' for details and 'Competition Entry Form' for fees and payment. Visitors welcome but please contact Contest Director, Bob Rowland on 07969 456441 for details

**10th Jul '16**
**F3A. 4th BMFA GBR Team Selection Event,** Oxford. FAI 'P' and 'F' schedules. Also GBR/CAA League competition, all schedules. See 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, Peter Brett on 07795 061145 for details

**16th & 17th Jul '16**
**LMA Swap Meet, at the Cosford show**, this popular addition to the flying programme does not need to be booked but tables will be allocated on a first come first served basis. Table will cost £10 for 2 days or part thereof. All money raised will be donated to the Vulcan charity. Further details can be obtained from Steve Ogden 01782 853883, Email: topgun@modelpilot.co.uk

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# WELCOME TO NUREMBERG

*Join us on our annual tour of the model hobby halls at Europe's top toy fair*


Immediately after Christmas and the New Year our thoughts turn to preparing to visit the world famous Nuremberg Toy Fair to see the latest R/C products being exhibited by the world's leading model manufacturers and distributors. This annual event, held just outside the picturesque German city in a huge exhibition complex, took place this year from the 27th January until 1st February, moving forward by about a week from its traditional calendar slot in early February.

In recent years the R/C model halls have witnessed the huge growth in the market for drones, starting with small sport quadcopters, then camera multicopters, with FPV racing quads coming to the fore in 2015. This year saw a new breed of quadcopter being displayed in the form of 3D capable aerobatic machines that are sure to be a big hit with 3D R/C helicopter addicts, for whom the relatively sedate characteristics of highly stabilised camera drones hold little appeal. Every other large stand seemingly had their own netted off flying arena in which these agile aircraft were being put through their paces.

Despite the popularity of drones of all sizes and types there were still a good number of traditional model aircraft on display, although a new trend can be seen to be developing with these aircraft too, with many sporting camera pods on their noses or bolted beneath wings. Peering through our proverbial crystal ball, a new era of relatively cheap, fully autonomous, camera carrying fixed wing drones cannot be too far away... ***RCMW***

*Visitors were greeted by a host of friendly door attendants*


*This year's report is in alphabetical order, although please forgive us if some stands are shown out of sync due to page design limitations. First up is a visit to the aero-naut stand... www.aero-naut.de/en/home/*

*This neat uncovered sailplane was used to show the capabilities of several Trotec laser cutting machines, which aero-naut were demonstrating at the Toy Fair*


*One of our favourite new models was the aero-naut Jodel D.9, a 1:3 scale model for 20 cc plus engines or 8S electric power. 2.4 m wingspan for four function R/C*


*Art Hobby from Poland are regular exhibitors and they always display an extensive range of high performance thermal and electric powered gliders*
*www.arthobby.com/*


*Well, you either like having your picture taken – or not! Tida-E 1.5 metre electric pusher from Art Hobby looks like it should be efficient and strong thanks to the Poplar veneered Styrofoam wings with carbon-reinforced spar*

***Left:*** *Say 'Cheese!' X-Star from Autel Robotics sports a 4K UHD camera stabilised on a 3-axis gimbal mount. Should be easy to keep an eye on in this colour!*
*www.autelrobotics.com/*

***Right:*** *Autel's Kestrel UAS offers VTOL capability and has a large storage compartment in the nose for payloads up to 2 kg (4.4 lb). The 62 mile range allows it to be used for humanitarian aid and disaster relief from areas where a conventional take-off is not possible*


*New products from Deluxe Materials include a new formula Tissue Paste that allows tissue to be repositioned on an airframe whilst giving good hold without discolouring the covering. Water shrinkable, it is compatible with cellulose dopes and Eze Dope, and dries to give a wrinkle free finish. Also shown is the Plastic Magic and Twin Brush set. Plastic Magic is a super thin adhesive that bonds a wide range of popular modelling plastics, while the choice of two brush sizes allow it to be applied with precision and for jobs that require a long reach. Also shown are a pack of three spare Glue Brushes, which would be useful for other tasks requiring the application of small amounts of liquid*


*John and Vivienne Bristow fly the flag for Great Britain on the Deluxe Materials stand at the International Toy Fair*
*www.deluxematerials.co.uk/en/*

***Left:*** *Eye-catching quadcopter captured on the DJI stand. Arguably the most well known of the multicopter manufacturers, the famous brand is celebrating its 10th year of making drone tech*
*www.dji.com/*

*This Ehang Ghostdrone 2.0 was set up to fly autonomously and in syncronisation to music supplied by the operator's smartphone. Primarily designed to be flown by tilting and rotating a smart device, the Ghost can also be flown using VR goggles and a head tracking gimbal system so that you can see exactly what you are filming*
*www.ehang.com/*


Bob Petrie from J. Perkins was our guide around the Firelands stand. Of main interest to RCMW readers was the large display of Ares products
www.jperkins.com/
www.ares-rc.com/


A new introduction at Nuremberg was the Hitec Red series of radio systems. The Ares and Ikonnik brand transmitters and associated 'Pair To Fly' (PTF) models now use the Hitec Minima 2.4 GHz protocol. Any current Hitec radio can also be paired with a Hitec Red equipped model


Ikonnik is the new Hitec Red enabled radio that is supplied with Gamma V2 and Gamma Pro V2 models. In the Pro V2 the radio has Natural Flight Progression (NFP), which is a three-stage flight assist function. Stage 1 gives reduced control response, coupled aileron/rudder and gyro stabilisation, while Stage 2 offers more response, reduced gyro stabilisation and coupled aileron/rudder for making smooth turns. With NFP turned off there is no stabilisation and you get full control response

New style Gamma V2 is equipped with a brushed motor set for a 2S LiPo and spots a new style cowl and trim, as well as a toughened undercarriage. 'Nav' lights are built into the wingtips and under the fuselage

Gamma Pro V2 has similar styling enhancements but uses a brushless 3S set up and features ailerons for more advanced aerobatics. Seen here with the optional float set that can also be fitted to the V2. Both models are 775 mm wingspan

Alara is Firelands' new take on the 'pusher glider with swept up wingtips' style of sport/beginner model. As with all new Ares models it comes ready to 'Pair To Fly' with Hitec Red radios


Graupner's stand basks in the late afternoon sun. Graupner products are distributed in the UK by Logic RC
www.graupner.de/en/
www.logicrc.com/

Frenzied flying displays by this 3D Alpha 300Q quadcopter drew appreciative audiences throughout the duration of the Fair. Highly agile machine spans 30 x 30 cm and weighs 460 g


V-Venture is a good-looking V-tail pylon pusher glider. Wingspan is 1350 mm

**Left:** You had to look hard for signs of internal combustion engines but they were there. Great Power Engines from Taiwan had a series of single cylinder and twin petrol engines on display
www.gpme.com.tw/


**Right:** GP-61 is specified with an output of 6.5 hp, an rpm range of 1600 – 8900 (7100 with a Falcon 24 x 9) and weighs 1576 g without muffler but including the ignition system


Father and son team of Karel and Ondrej Hacker showed us around the packed Hacker Model Production stand
www.zoomport.eu/shop/Index.aspx?lang=en

Shake is a 'shock style' indoor ARF for precision F3P aerobatics. Spanning 840 mm it is CNC cut from 4 mm EPP and is claimed to be almost unbreakable – a perfect practice plane! Available in three colour schemes


View of the wing fences and trailing edge dive brakes fitted to the Shake

Cool Master must be the largest EPP model that we've seen! Spanning a mighty 1.65 metres it makes a great lightweight trainer, as well as a club aerotow tug to release gliders using the optional tow hook. Large flaps give the Cool Master excellent slow speed handling

Want a high wing sports model that stands out from the crowd? The 1200 mm span Fun Master, with its fast-fit wingtip extensions and chunky tyres, does just that. A perfect towplane for the Hacker SKG series of semi-scale gliders

Hanging from the HEPF Modelbau stand was this distinctive gull-wing Musger Mg 19 by GB – Models. The scale vintage glider weighs 5 kg and has a wingspan of 4 metres
www.hepf.at/der-erste-segler-in-der-gb-models-familie-die-musger-mg-19/

This Jeti DS-6 transmitter was developed as an inexpensive R/C transmitter with the features of a Jeti Duplex EX radio at a more affordable price, so beginners can start with a Jeti system and avoid a costly transition from another brand. It offers six channels and 10 model memories, plus telemetry, which can be read via an attachable Jetibox. Paired receivers and sensors can be programmed via the Jetibox
http://www.hepf.at/jeti-duplex-ex-computersender-ds-6/


Geronimo electric glider for the F5J-100 competition class from Horejší Model. Wingspan is 2540 mm and the sleek glider weighs just over 500 g without R/C or LiPo
www.horejsi.cz/

Adding the radio and LiPo brings the ready to fly weight to around 780 g

*Pride of place at the front of the Hobbico stand went to this neat moulded 'AeroCell' foam replica of a DHC-2 Beaver. With a wingspan of just over 1.5 metres the 3S LiPo powered Beaver comes in an authentic 'Lady Esther' red and silver trim, and is supplied with 'tundra' wheels and a matching float set*

*Voltage 500 3D is a fully assembled aerobatic quadcopter that lets you perform all the same type of stunts that are possible with a 3D helicopter, including loops, flips, tic-tocs, funnels and globes. For less experienced (or rusty!) pilots there is also a familiar quadcopter stability mode, with automatic pitch limiting so that you can get accustomed to the agile flight characteristics of this 3D quadcopter easily and safely. Requires a 3S/4S 2200 mAh LiPo or higher*

*Avistar is a 30 cc class high wing trainer/sports model that can be flown from land or off water using the optional float set. Choose between a 30-35 cc engine for power, or fit an 8-10 cell LiPo brushless motor set. The 2.3 m span wing has flaps and ailerons*

*We like the unusual colour scheme on this Flyzone Extra 300 SX but it could be a bit tricky to see on a dull winter's day! The 1055 mm span aerobat comes with factory fitted servos, brushless motor and ESC. Suits 3S-1800 LiPo packs*


*Hobbico had one of the largest stands in the model hobby halls*
*www.hobbico.de/index.php?lang=en*
*www.hobbico.com/home.php*

***Left:** Hobbico have pulled of quite a coup in the photography world by becoming a distributor of Lowepro drone carry bags. Now you can carry your favourite camera drone to those hard to reach scenic places, along with tools, a transmitter, battery packs and spare parts*

***Left:** This neat Teczone E-Xcalibur 110 has a span of just over one metre and suits 1200 mAh 3S LiPo packs. Servos are installed but it requires a four-channel R/C system*

*Supplied just in time for the start of the Toy Fair, this neat scale sailplane has swept up wingtips, airbrakes and a pop up motor system*


*At the rear of Horizon Hobby's maze like stand we found a selection of new aircraft. Here is the E-flite F-4U-4 fitted with flaps and 90 degree rotating electric retracts. 1.2 m span BNF model has a 850 KV motor and suits 3S-2200 packs*
*www.horizonhobby.co.uk/*

*Hangar 9 Carbon Cub 15 cc is finished in UltraCote and features plug-in wings and a shock-absorbing undercarriage for flying off less than perfect strips. Or fly off water using optional floats. Evolution 15 cc is the perfect engine for this 2.28 m span scale beauty*

*Several versions of Chroma camera drones were on display*

*This display of Chroma Add-Ons includes the new Chroma Wizard controller that condenses all the flight and camera gimbal controls into a TV remote style unit. Such controllers were displayed by many drone manufacturers as they are more convenient than a traditional R/C transmitter when flying a drone in remote locations, say when hiking or mountain biking and especially when using a drone backpack*

*'Blondie' from E-flite is their latest 1.2 m span BNF P-51D Mustang and comes fitted with AS3X stabilisation. Features include retracts, flaps and removable drop tanks. Requires a 3S-2200 LiPo*

*E-flite's P2 Prometheus looks stunning even when sitting still. Designed by Mike McConville the 1219 mm span model is based on the full size aerobatic biplane and uses Carbon-Z to give a high power to weight ratio to the large foam airframe without losing rigidity. Available as PNP or BNF, Prometheus requires a 6S-4400 LiPo*

*Spektrum's popular DX8 transmitter returns in G2 (second generation) format and now comes with a whopping 250 model memory and multirotor programming, as well as the more traditional aero, heli and glider set-ups. Also has voice alerts and wireless trainer functions*

*'BLING!', as our new columnist Chris Golds would say... Shiny new DX20 has all the bells and whistles you would expect from a state-of-the-art 20-channel Tx, including machined aluminium quad-bearing gimbals, a carbon fibre front case and a large 4000 mAh battery*

*Latest addition to the micro-scale UMX fleet is this sweet J-3 Cub. Looks great on the optional float set too! Of 670 mm wingspan, it requires a 2S 180-280 mAh LiPo to power the BL180 2500 KV motor fitted in the nose*


*Left: Retro style cameras are storming the photography market right now so JR Propo may be on to a winner with this pair of 1970s style transmitters. Colt is 6-channel, while Mercury is 14-channel*
*www.jrpropo.co.jp/english/*
*www.macgregor.co.uk/jrpropo.htm*


*Left: Despite the dearth of new R/C helicopters on display around the show JR's Forza 550 (shown here) and Forza 700 Speed show the company's continued resolve to develop new machines for die-hard helicopter enthusiasts. Beautiful quality, as we have come to expect from this leading Japanese manufacturer*


*Behind the retro styling the Colt and Mercury systems benefit from JR's thoroughly modern 2.4 GHz DMSS protocol, with an LCD screen and menu scroll bar hidden beneath the flip up panel beneath the stick units*

*Here's a bit of fun in the shape of Lieber's Batman 500. There's a FPV camera drone underneath the eye-catching body, including GPS positioning, hold and return home functions*
*www.lieber-rc.com/?lang=en*


*Left: Here's something to get your teeth into! Nine Eagles have named their series of drones MOLA. Shown here is the Mola X 1.0, which folds up into a sleek structure that resembles a long smartphone. Ideal for carrying on long walks or bike rides it is controlled by a phone or tablet and features GPS functions and a 12 MP camera with 1080p HD video*
*www.nineeagle.com/en.php/category/mola-brand*


*Left: In recent years Multiplex have been responsible for some of the most innovative and stylish radio control systems available today. The Cockpit SX 7/9 follows this trend with its intriguing wedge shaped case and square touch-screen interface. Simple programming is promised via an intuitive Model Assistant using smart phone style gestures*
*www.multiplex-rc.de/en.html*
*www.jperkins.com/*


*WINGSTABI is a freely programmable 3-axis gyro system for all R/C fixed wing model aircraft, which works with most current radio systems. Available with seven or nine servo outputs*

*Latest incarnation of Multiplex's top selling twin foamie is the Twin-Star BL with bright surf style livery. 1420 mm span model can be flown from land or water (using the optional float set)*


*FUNCUB XL is a chunky 1.7 metre span rendition of the famous lightplane. Additional fun elements include flaps and options such as an aerotow release, a payload dropping bay, and navigation and landing lights*


Andy and Len take advantage of a calm spell to catch up on emails at the OptiPower stand
www.optipower.co.uk/

OptiPower have added to their range of UAV/Drone packs with a new range of Quad Racing LiPo packs that have been specifically tailored to serve the needs of the growing quad racing community. 50C packs are available in 1300 4S, 1800 4S, 2300 4S and 1000 6S configurations, as well as a 1600 3S 35C pack

This charming Waco F5C was spotted on the stand of the German importer for Phoenix Models. At just over 1:5 scale it spans 1.6 m and suits .91 (15 cc) engines or equivalent EP
www.phoenixmodel.com/


Also from Phoenix is this 1537 mm span Shoestring for .46-.55 size glow engines

Staying with the racing theme, Phoenix also displayed this Strega. At 1:6.5 scale, the modified Mustang has a wingspan of 1750 mm and suits 20-30 cc engines or equivalent electric power

Pichler Models can always be relied on to show off a few new models but they are often stacked on a hefty stand that makes photographing them a bit tricky. So apologies for the clutter. First up is this neat Volksplane VP-1 of 1630 mm wingspan
www.pichler.de/pichlerwp/


Available with a matching sound system, this Klemm L25 spans 2200 mm and suits 3500 – 4500 mAh 3S LiPo packs
www.pichler.de/extronwp/


Pichler's 2150 mm wingspan Pilatus Porter is available in two eye-catching colour schemes. Shown here is the 'Skydive Marche' version with its distinctive Tiger motifs


Revell Control were exhibiting the clever concept of RC Advent Calendars in drone and car formats. Upon opening each flap on the lead up to Christmas a new part of the model is revealed, which can then be assembled into a working quadcopter. Perfect for boys and girls of all ages and healthier than chocolate!


It was great to see a UK based model company doing so well in Europe. As witness to their position in that huge marketplace, Ripmax had one of the largest stands at the show and possibly the one with the most new aeroplanes on display. The centrepiece was this Black Horse P-40 Tomahawk; 2275 mm wingspan for 60 cc engines and nine function R/C www2.ripmax.net/index.aspx

**Left:** JSM Mini Xcalibur is a compact 1310 mm wingspan, easy to fly, fully aerobatic sport jet for turbines of between 20 Newtons (2 kg) and 35 Newtons (3.5 kg). Low speed handling is said to be outstanding, particularly when the central flap is deployed, allowing operation out of smaller sites. Also available in red


Big Sky Leaf is part of the range of Futaba range of models aimed at the German market. This large aerobatic model spans 2.3 m and suits 60 cc engines such as the OS GT 60

Skyleaf Samba (far left) is a 122 cm span EPP aerobat whilst the SkyLeaf BP below is a 1524 mm biplane of more traditional construction. Both are expensive Futaba models aimed at the German market. But you can buy the Foam-E Wots Wot now in UK model shops and at a much more affordable price!

You'll easily keep track of this brightly coloured Bucker Bu 131 Jungmann during aeros. This 1.8 m span scale biplane from Black Horse suits 1.20 cu in glow or 20 – 30 cc petrol engines. Alternatively fly it with a 1800 – 2300W 450 KV brushless outrunner and a 6S 4000 – 5000 mAh LiPo


The B.A. Eagle dates from 1934 and became the Eagle II in 1935. This is the basis for the Black Horse version in its red and silver livery. The 1790 mm wing is equipped with flaps and this attractive monoplane can either be powered by a .61 glow engine or a 1200 – 2200W 650 KV brushless motor and a 6S 4000 – 5000 mAh LiPo

With those wings it has got to be a Heinkel! The He112B competed to be the Luftwaffe's new fighter in the 1930s but lost out to the Bf 109. Provision is made for electric retracts (not included) in the 1550 mm span wing, but sprung oleo legs are supplied. Suits a 15 cc petrol engine, a .91 four-stroke or a 1200 – 2200W 650 KV brushless motor and 6S 4000 – 5000 mAh LiPo

This OS GGT-10 uses the latest model engine technology. It is a petrol engine that uses a special G5 glowplug and runs on a 33:1 ratio petrol/oil mix via a pumped fuelling system and a specially designed carburettor. The GGT-10 is designed to be used in place of a .40-.55 engine and fits in the same mounting space as an OS 46AX and 55AX


**Left:** OS bring the same attention to detail and high quality components for their brushless motors as they do for their IC engines. On display were a pair of new 700-800 class aerobatic helicopter motors. The 520 KV version shown here is best suited to 3D flying, while a 490 KV version better suits sport and F3C style flying to maximise torque when using 12-cell battery packs


**Right:** Ripmax continue to expand their own brand of Quartz brushless servos. They feature metal central cases, ball races, metal gears and digital amplifiers, all at very reasonable prices

It's always a pleasure to view any new models on the combined Hacker Motor/Seb Art stand. Here we see the new Siai Marchetti SF260 TP, a 50 class ARTF of 168 cm wingspan for 6S-5000 set ups. The Hacker A50-16S is the recommended motor, controlled by a Hacker Master Basic 90A
www.sebart.it/index.html

Seb Art have now brought their distinctive styling to bear on the Edge series of aerobatic monoplanes. This is the new Edge 540 that uses the same power set as the SF260. 160 cm wingspan


Full line up of new Ditex servos developed by Hacker to perform at the highest levels of precision, safety, strength and speed. They are fully programmable to suit individual models and the pilot's needs via a computer interface. The exposed cases of the mini and micro versions allow maximum size motors to be used for more power and torque
www.ditex-servo.com/en/

**Left:** Best known for their R/C cars and monster trucks, Traxxas have entered the multirotor market with the modular Aton, which they call a 'Personal Video Assistant'. Three flight modes cover full stability for filming using an action camera, a sport mode for higher agility and an all-out expert mode with an amazing airbrake function
https://traxxas.com/products/landing/Aton/

The Aton is distributed in the UK by Logic RC. Here we see Drew and Elliot from Logic RC holding the camera and standard versions respectively


Yuneec are a drone company that seem to be on a roll. Working in partnership with Intel, a modified version of this Typhoon H multirotor was the star of the show at the recent CES exhibition in Las Vegas where it was able to detect and avoid falling objects
http://yuneec.uk/

This sturdy backpack allows you to take your Typhoon for a stroll and keep it safe during transit and storage

Yuneec are keen to make their drones as user-friendly as possible to people who are not used to R/C style transmitters. This Wizard controller is much easier to carry when using a drone in remote locations and it takes up much less storage space too

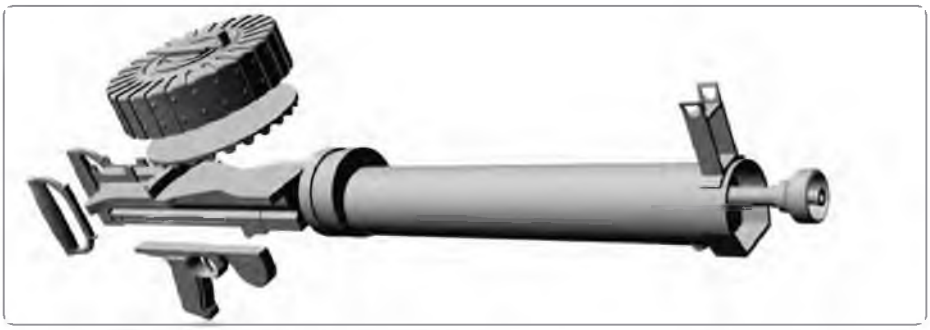
A big shout out to Paul Arthy for his enthusiasm and willingness to show us the Yuneec products at the Toy Fair. Here Paul shows us the Proaction hand rig that allows gimbal stabilised action to be filmed using the drone's camera for those all important ground shots to accompany professional aerial footage

# 3D MODELLING

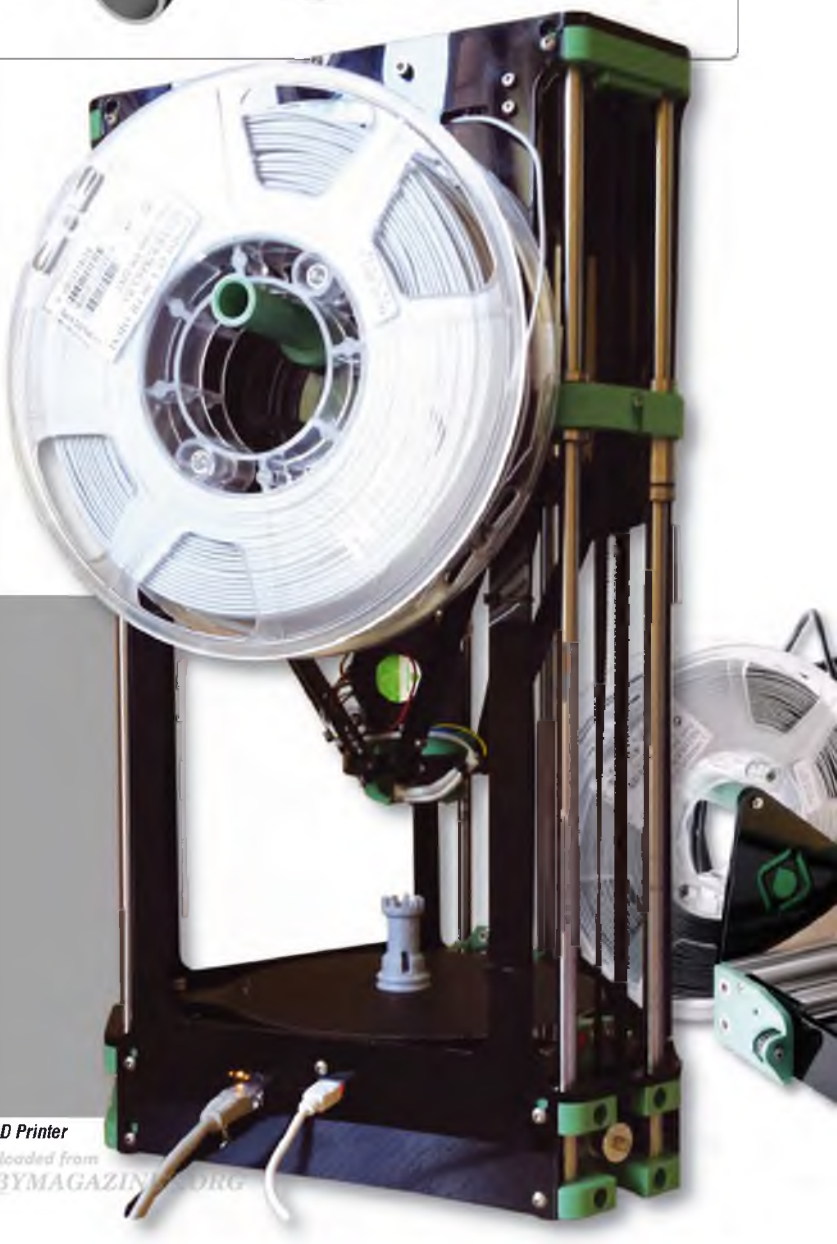
***Mal Luff's report on the RepRapPro 3D printer in the November issue garnered a lot of interest. So we asked him to write another article to explain a little more about this emerging technology. In this feature Mal introduces the basic concepts of 3D modelling***

3D printers are now easily available to model-makers and hobbyists, and whenever I've demonstrated them to people who've never seen one working before they're always fascinated by the process and by seeing a solid object appear before their eyes. But once I've explained how the machine works the comment that comes up most often is something like, "Yes, very interesting, but where do I get the 3D model that I want to print?"

I've got a lot of sympathy with the question because it goes to the heart of the reason of owning one. In truth they are just another output device like an ordinary inkjet printer, and what use would one of those be if you couldn't create photographs or documents to print? In this article I hope to explain the basics of how to make your own 3D models.







***Right:*** *Fisher Delta 3D Printer*

## Overview

Firstly, let's just take a quick look at the process of 3D printing, just to put into context the four distinct stages that have to be completed in sequence:

**1.** Obtain a 3D model or mesh. This is normally done in 3D modelling software but there are 3D scanners available and even software that can make a 3D model from a series of still photographs. You can also download printable 3D models from various websites.

**2.** Convert the model to a file type that's compatible with the slicing software you use, usually .stl or .obj.

**3.** Load the converted model into the slicing software. This software is usually a free download and is where you apply the pre-sets appropriate for your particular printer, and set things like wall thickness, infill pattern and density, layer height and many other parameters to get the result you want.

**4.** Export a G-Code. This file contains all the information the printer needs and is sent to the printer for the printing process to begin.

All this may seem a bit complicated, but once you're used to it there's no problem and steps 2 – 4 are routine. It all comes back to step 1 – making a 3D model – and in my opinion that's the most enjoyable and interesting part of the whole process. Leaving aside 3D scanners and other methods, I want to describe techniques for 3D modelling using 3D modelling software packages.

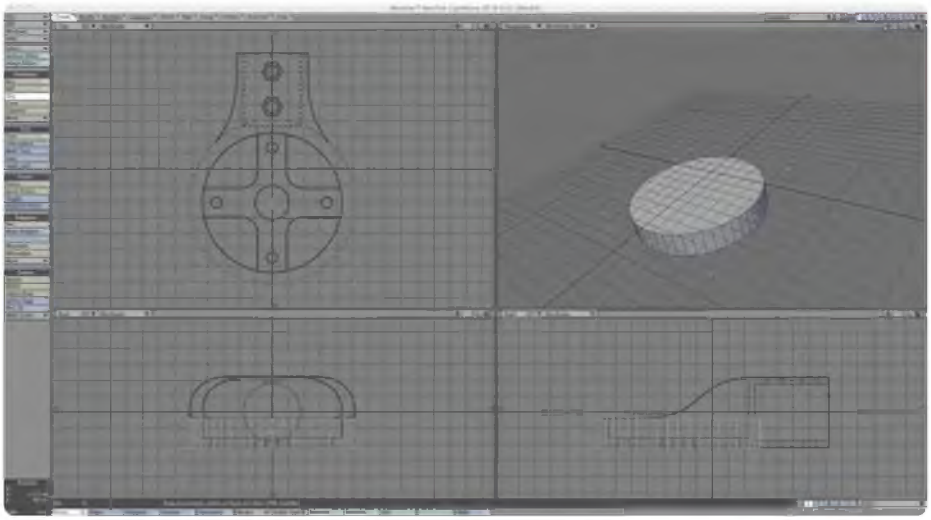


*Fig 1 - Top, end and side view drawings of a motor mount have been loaded into the viewports, and are used as guides when making the 3D model*

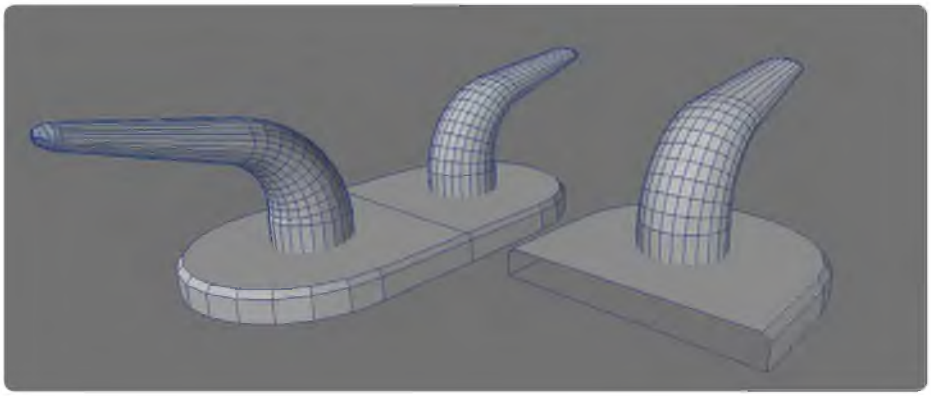


*Fig 2 - You only have to model half of symmetrical objects, then mirror it to create the whole model*

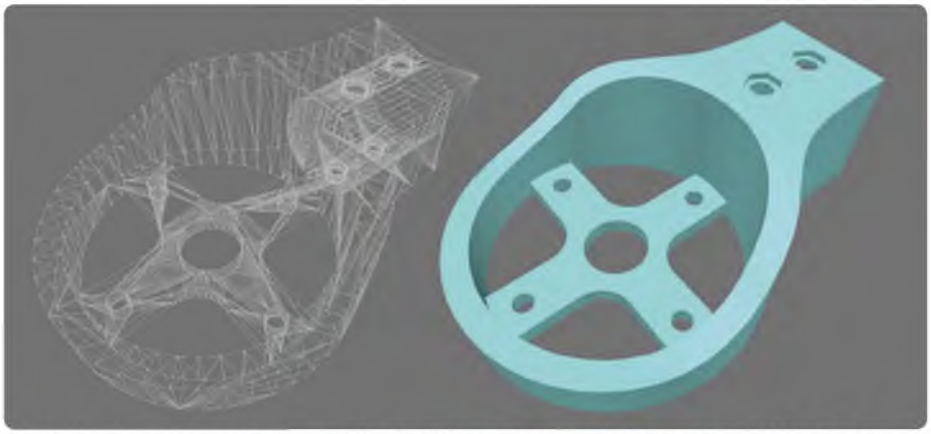
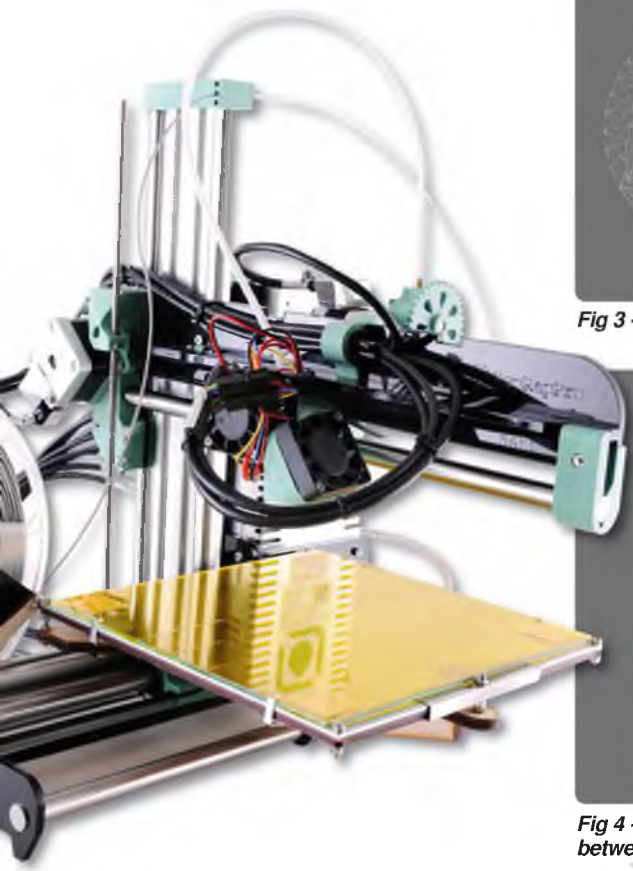


*Fig 3 - Mesh and Shade views of a 3D printable motor mount. This mesh has 1232 points, 2508 polygons and 3762 edges*



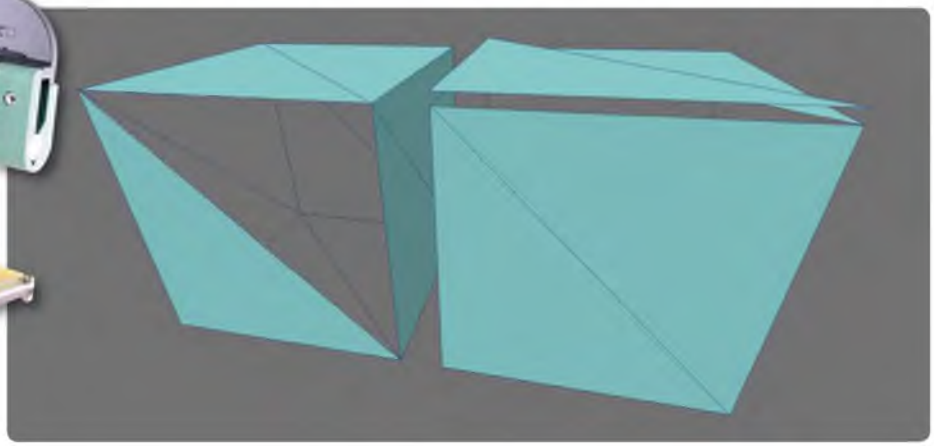


*Fig 4 - The cube on the left has a polygon missing, while the one on the right has a gap between polygons. Neither will print successfully*

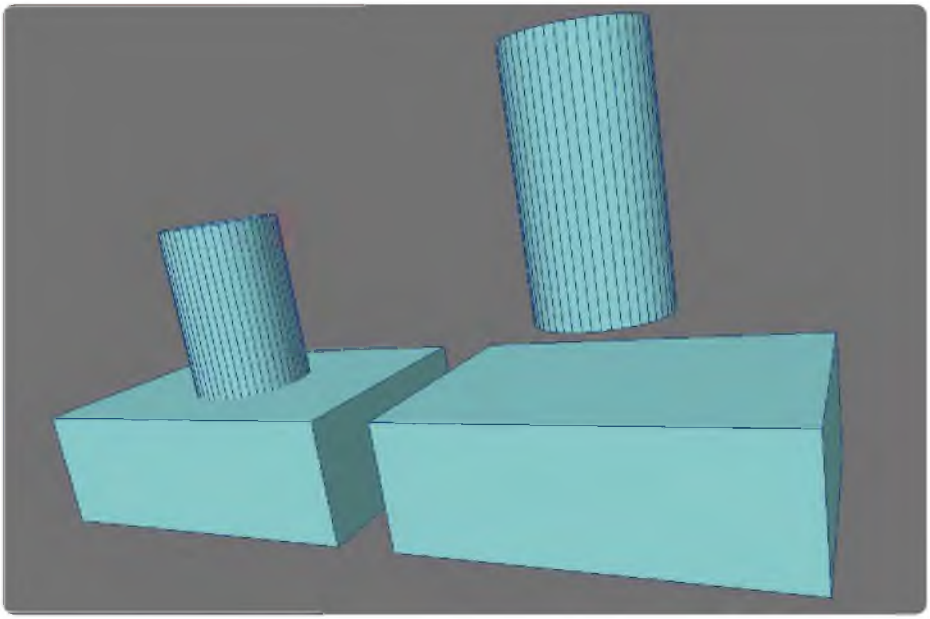


*Fig 5 - A quick way to build shapes is simply to create separate shapes and intersect them. The printer will treat them as a single object*

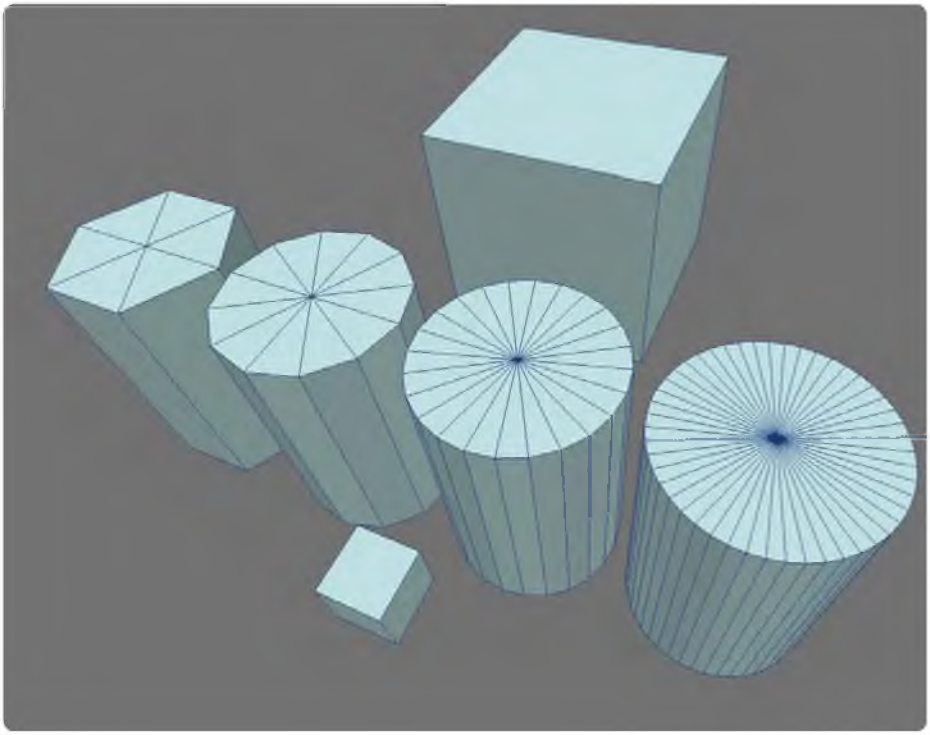


*Fig 6 - The more facets you have in curved objects the smoother the curve will appear. Square objects need the same number of facets however big they are*

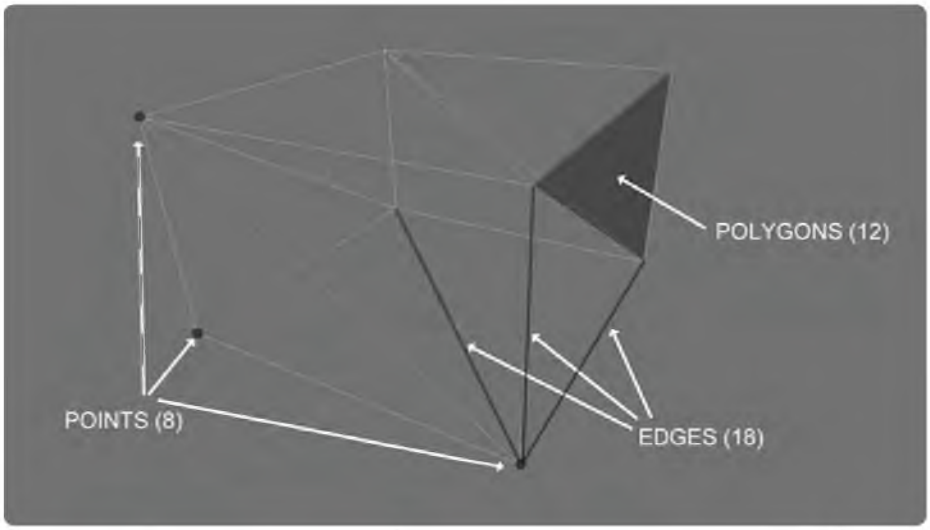



*Fig 7 - The anatomy of a mesh cube. Points, edges and polygons need careful managing*

There are a very large number of such modelling packages available, including some that are free downloads. Each has its pros and cons, its fans and detractors, and the one you decide to use is very much down to personal choice. You'll find lots of instructional videos online so maybe look at a few of those and see which one appeals.

But it leaves me with the problem of being unable to describe exactly how to model any given shape because each piece of software works differently and will use different tools. Even within one piece of software there will usually be several different ways to achieve the same result, with the user choosing the most appropriate.

The illustrations shown in this article are made using my preferred software, NewTek Lightwave, a very powerful 3D modelling and animation graphics package. The latest version costs several hundred pounds (a free 28-day trial is available) but you may find older versions for sale on Internet auction sites for a fraction of that. Do not use illegal pirate copies and only use genuine licensed ones.

## Design

Before we start we need a design for the object we're going to make. If it's a model of an existing real-world object such as an aircraft, car or other piece of machinery you may be able to find three-view drawings and dimensions, which will help enormously. If not, good quality reference photos are essential. Of course, if your subject is of your own design you'll have all this information to hand anyway.

In most 3D modelling software reference images can be used as backgrounds for modelling so that you can 'trace' over them (Fig 1).

## Symmetry

Many objects have symmetry along at least one axis. For instance, a car body has symmetry along its length, with one half being the mirror of the other. Some objects have symmetry along two or even all three axes. As a modeller you can make use of this since you only have to model one half or one quarter of an object, and when you're happy simply mirror it to instantly produce the whole object (Fig 2). Watch out for these opportunities to reduce the work needed.

Similarly, if an object has a feature that appears in more than one place you only have to make it once, then copy and paste it into the other locations.

## Accuracy

This engineering and accuracy in your work is vital, particularly if the object you're modelling has a mechanical function and needs to connect with other physical objects. You should always model in real-world dimensions, using accurate sizes and angles. If you haven't thought much about geometry since school it might be a good time to brush up on it, as you'll almost certainly going to need to calculate angles, circumferences and so on. The other reason to work accurately is that it'll make your model much easier to work with and will give better results.

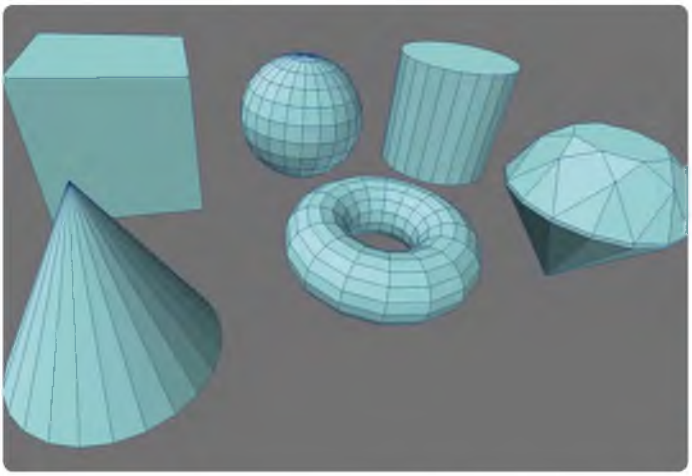


*Fig 8 - Some of the standard pre-set shapes found with most 3D modelling software. Their statistics can be adjusted according to your needs*

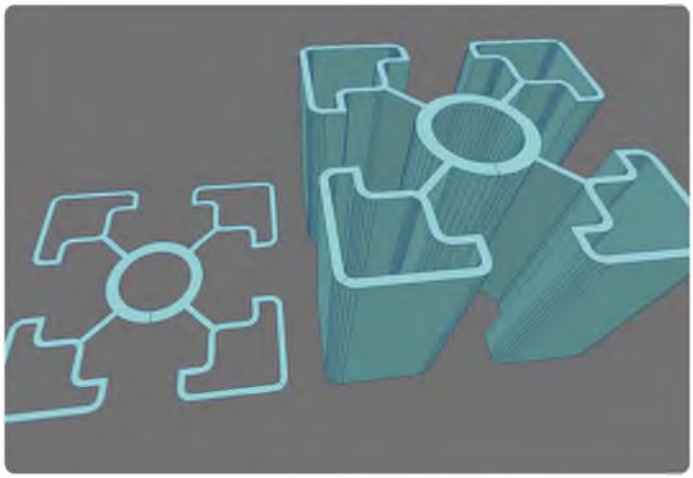


*Fig 9 - A 2D shape (often imported from a vector graphics drawing package) can be quickly extruded to form a solid printable object*

## Points, Edges, Polygons And Meshes

Any 3D model is made up from a number (sometimes many thousands) of points, edges and polygons (Fig 3). Collectively these are called a mesh and each element can be selected individually or as a group and modified to achieve the shape desired. The importance of keeping close control over these elements will be explained below. You should always try to minimise the number of points, edges and polygons in your mesh.

## Polyhedrals, Curves And Triangles

There are some fundamental rules in 3D modelling for printing that you have to comply with:

All 3D meshes used for 3D printing must consist of cohesive polyhedrals, with all the individual triangular polygon facets joined together and with no missing facets or gaps (Fig 4). Two or more polyhedrals (e.g. a cube and a sphere) can intersect and will be treated by the printer as a single object (Fig 5), but each individual polyhedral must still be complete. Non-cohesive polyhedrals will cause errors in printing.

There are no true curves in 3D modelling and printing. With all objects made from flat-faceted polyhedrals a curved surface is achieved by making the individual facets so small that the 3D printer cannot resolve them as separate straight lines. Go carefully with this though, because if you make all 'curved' surfaces from hundreds of facets your mesh will quickly become very large and complex, and be hard to work with.

To make a disc shape I'd probably use 24 polygons for a drawing pin, 48 polygons for a small coin, and 96 polygons for a large coin and so on (Fig 6). As always, experience will tell you what works. On the other hand flat surfaces need very few polygons and a cube of any size still only needs 6 square facets (12 triangular polygons).

Eventually your meshes will need to be made only of triangular facets before they can be exported for printing. However, it's often more convenient to model using squares and other multi-sided polygons, as it makes modifying the basic shapes much easier. When the mesh is complete you can use a 'triple' function in the software to convert all the polygons into triangles.

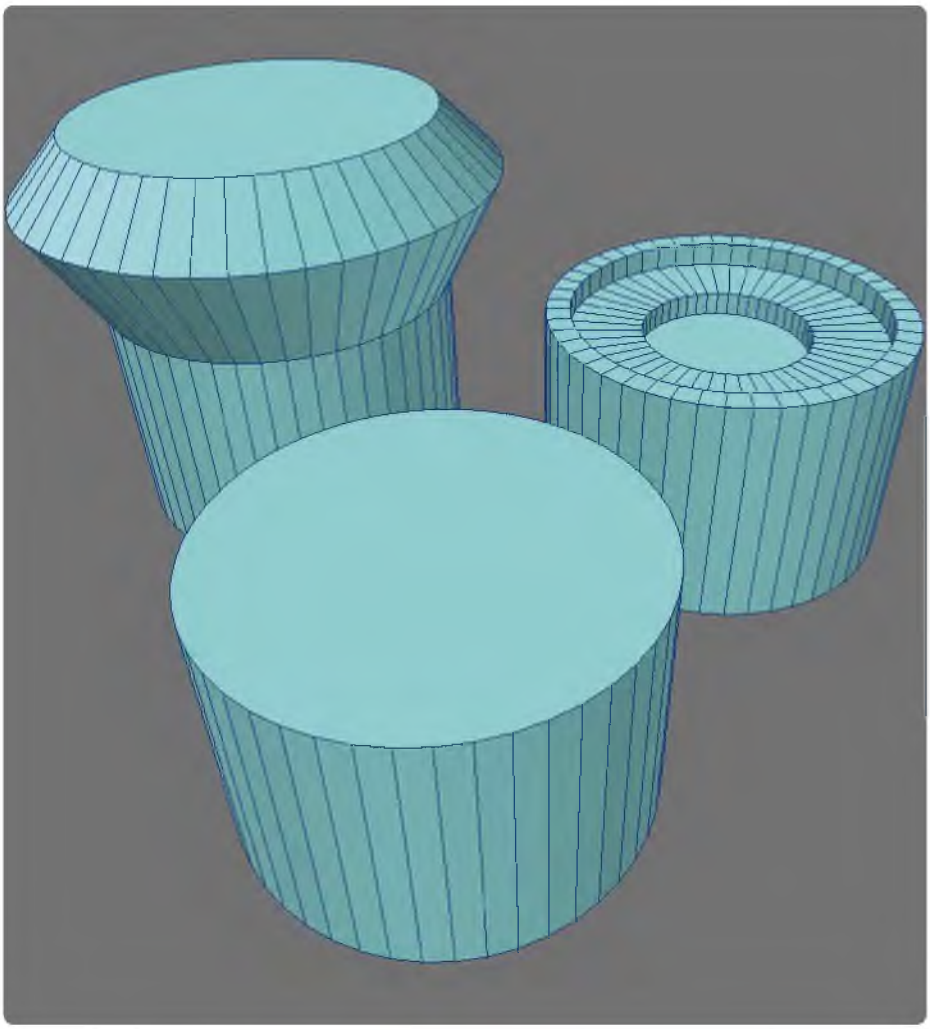


*Fig 10 - Bevel is a powerful tool that's used to add extra polygons to existing shapes*

Your 3D modelling software will be able to display the statistics for a mesh, showing the number and type of points, polygons and edges. For example, a ready-to-print cube will consist of 8 points, 12 three-sided polygons and 18 two-polygon edges (Fig 7). There must not be any polygons with less or more than three sides or any edges sharing less or more than two polygons.

If you work carefully and accurately none of this is a problem. But a messy mesh can turn into a nightmare. You should study the statistics of your mesh carefully before trying to print it, to make sure that there are no errors.

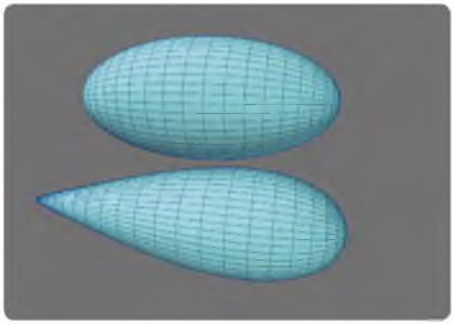


*Fig 11 - Positive or negative stretch values applied to an object changes its dimensions in one or more axes*

## X, Y & Z Axes

The whole point of 3D modelling is to create objects that have three dimensions – width, height and depth. These are represented by measurements along three axes; the X axis, the Y axis and the Z axis. The X axis is always width, but different software developers allocate height and depth to either Y or Z depending on whether the developers had a background in architecture, engineering or mathematics.

It doesn't really matter that much as long as you're clear which convention you're using. But when transferring your model to another package, like slicing software, you may find you have to rotate it through 90 degrees. In 3D printing the Z axis is always height. All shapes are created and modified with reference to measurements along or around these three axes.

When modelling symmetrical shapes you should always have the centreline of your model exactly along the relevant axis (e.g. X=0) to keep everything correctly positioned. It's tempting to position and modify objects by eye, but it's much more accurate to set numeric values and apply them. In 3D modelling you can have negative and positive X, Y & Z values, but in 3D printing they are all automatically converted into positive values.

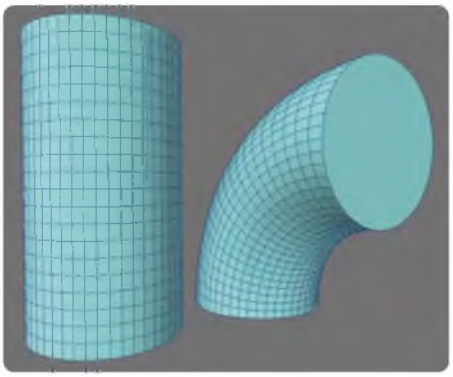


*Fig 12 - The bend tool has obvious applications. The direction, degree and scale of the bend are all adjustable*

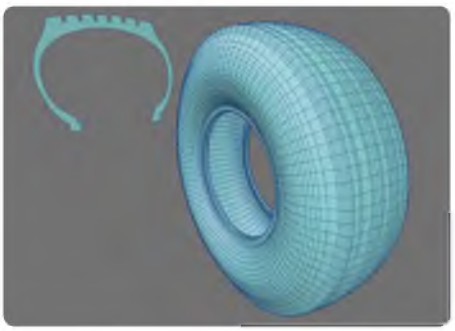


*Fig 13 - A 2D cross-section shape is all that's needed to create complex circular models using the lathe tool*

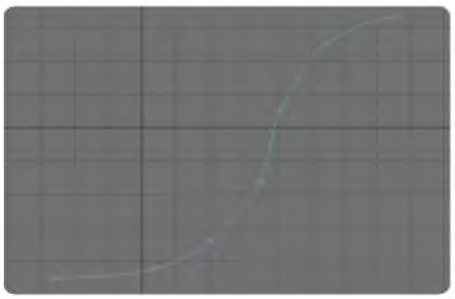


*Fig 14 - Spline draw is a quick way to produce smooth curves*

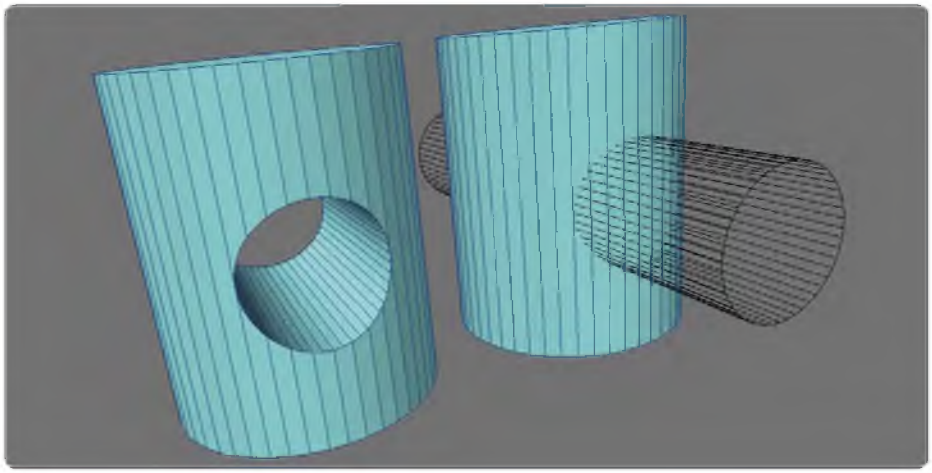


*Fig 15 - By placing a 'drill' shape in a background layer you can subtract it from a foreground shape*

## Where To Start

It's difficult to say 'this is how to make widget A' because there are so many ways of going about it. Below are ten of the techniques I find most useful:

Basic Shapes (Fig 8). Most 3D modelling packages come with preset shapes such as cube, sphere, cylinder, cone and others. A complex mesh can be quickly built up be adding these presets and modifying them to make the exact shape you want.

Extrude (Fig 9). Extrude is very useful if you have 2D shape (e.g. text or a logo) that you want to turn into a 3D shape. Most modelling software can import vector graphics of the shape if you have it, or you can draw it as a 2D shape in your modelling package. You can extrude to any distance and in any direction.

Bevel (Fig 10). Bevel is an extremely versatile tool that I use a lot. Bevelling inwards can create a cavity, bevelling outwards can quickly develop a simple shape into a complex one.

Taper (Fig 11). As the name implies, this changes the size of an object along an axis.

Bend (Fig 12). Create a shape with a number of subdivisions and you can bend it through whatever angle and direction you want.

Lathe (Fig 13). One of my favourites. Create a 2D shape, apply the 'lathe' tool and you'll instantly create a circular object with that shape as a cross-section. If you draw a circle and lathe it with a linear offset you'll create a helix.

Spline Draw (Fig 14). To create complex curved shapes you can draw a spline curve then extrude it.

Subtract (Fig 15). If you want a hole in a shape, you can create the shape of the hole in another layer, then subtract it from the first, leaving a hole.

Mirror. As I mentioned earlier when discussing symmetry, you can save a lot of work when making symmetrical objects by just making half and then mirroring it.

Rotate (Fig 16). An obvious tool perhaps, but if you want a number of copies of an object arranged in a circle around an axis, you can set the angle of rotation to get them in exactly the right place.

## Will This Object Print?

You might be very pleased with a mesh you've made, but before you rush off to print it you need to think about how it will print. Consider the following:

All objects to be 3D printed need to have a flat surface to stick securely to the print bed during printing. If your object does not have one you'll have to divide it into two or more sections and join them together after printing. If the flat surface of your object has too little area to stick securely you may have to add a brim in your slicer software to increase it. This brim is trimmed off after printing.

If the object won't fit into the allowed print area of your printer you'll have to print it in sections and join them together afterwards.

3D printers cannot print detail smaller than the thickness of the extrusion. And if parts are too thin they either won't print at all or will be too weak to be practical. Any very fine detail is better left off and added later using some other method.

Be wary of big overhangs and avoid them where you can. 3D printers cannot lay filament in thin air and some printers deal with these better than others. You can consider adding support structures to be removed later, and these can also be set in your slicer software.

You could write a book about 3D modelling and in this article I've only been able to outline the basics. You may have noticed that I've only talked about 'technical' modelling, that is models of man-made objects, but modelling organic objects (people, animals etc) is also possible.

Anyway, I think that's enough theory for now and it's time you tried it for yourself. Pick a simple object to model at first and go on from there. The main thing is to make a start and begin building experience, so find a 3D modelling package you like and have a go.

***RCMW***

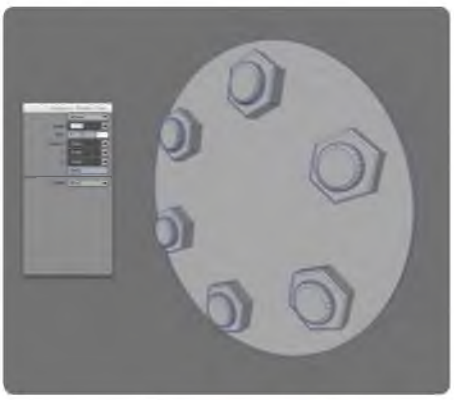


*Fig 16 - Like all the tools, you can set exact values for rotation to put the objects in exactly the right place*

# MINI VIPER JET

***Looking for some jet fun on a small scale? Brian Cooper tests a small 50 mm EDF jet from Max-Thrust that could be just what you are looking for***





*Neat carry box*

This model is simplicity itself, with three servos (two for the ailerons and one for the elevators), a 20 Amp ESC and a 50 mm EDF set-up. Yes, it looks cute and sleek and it looks like it should be quite a performer.

It is straightforward to build and no issues were encountered whilst assembling the model. There are five main foam components to bring together for the build – the wing, fuselage, tail, fin and cockpit canopy, plus some tiddly details.

We start by installing the control horns. There are four in total, two on the ailerons and two on the elevators. They are pleasingly substantial items and are simply screwed into place. The ailerons are then connected to their servos with the respective control rods, and the rods are then covered with a plastic fairing. It pays to get the throws etc. sorted out before the fairings are fitted as adjustments afterwards (at the servo end) could prove to be awkward.

The wing then has to be glued on so some care is required to ensure that the servo leads (connected via a 'Y' lead) are routed through a hole in the fuselage before any glue is applied. A few drops of foam-safe cyano is all that is needed to secure the wing to the fuselage. There is no spar in the wing and it seems a bit flexible.


*There's just five main airframe parts and some nice accessories*


After some tweaks Brian says that the little jet is a delight to fly

The nose is held on with magnets and is designed to pop off in a bad landing. Likewise the neat canopy hatch is retained using magnets too

9 g servos are pre-installed

To minimise distrurbance to the fan's airflow the 20 A ESC is tucked into a neat recess

View of the 5-blade ducted fan

The fan unit can be accessed via an under-fuselage hatch, held with more magnets

Close up on the factory fitted wing servos

Mini Viper Jet is straightforward to build and no issues were encountered whilst assembling the model


*The aileron pushrods are above the wing so they cannot catch in the grass. Neat covers are cyanoed over them to fair everything in*


*Watch out for any stray leads! The wing is glued to the fuselage. A few drops around the wing seat will do so don't go mad!*

*Tail parts are also cyanoed in place*


*Ready to fly in less than an hour*

There is a hatch (held on with magnets) on the underside of the fuselage and behind the trailing edge of the wing for access to the motor unit if required. The motor has a 50 mm fan and the exit hole in the fuselage reduces by 19% to 45 mm, which gives a useful increase in thrust.

The tailplane and fin go on next, taking care to align them with the wing. Two pushrods, one for each elevator, are installed and the control runs are silky smooth. Both rods meet at the single servo inside the radio bay and are screwed into place on the servo output arm. This is simple and effective.

The last items to be glued into place were the ventral fins on the underside of the fuselage, under the tailplane. These had locating channels moulded into the foam. To finish the fuselage there is a nose-cone which pops into place and is secured by magnets.

Electricity is provided by a 3S 850 mAh LiPo and this fits snugly into the moulded recess in the nose, and leaves ample room for a Rx of your choice. This area is covered by the cockpit canopy, which smartly snaps into place with magnets.

The entire build took no longer than an hour.

*Pulling out of a loop the wing shows signs of bending but the wing is meant to be flexible, say Century, the UK distributor*

*A fair amount of down elevator was needed to maintain inverted flight*

*Brian looks a bit tentative prior to the first flight*

*Left: The ventral fins locate into slots. Right: After the first flight Brian rotated them, raising the leading edges by about 15 degrees but at Century, Mark's model flies well at the original setting. They are cosmetic anyway, so it may be a good idea to leave them off for the first flight to set up the model. You can then tack them in place to judge the effect on flight characteristics for yourself*

*Powering through for a low beat up of the strip*

## Preparing For Flight

The manufacturer's recommended C of G location was actually in front of the leading edge of the wing. A few calculations proved this was wrong and the C of G was shifted rearwards by 40 mm. (Now corrected; see Distributor's Comment – KC)

The model weighed 350 grams and the motor produced 300 grams of thrust, which was enough for some spirited sports flying.

## First Flight

The Mini Viper Jet can be launched underarm single-handedly by the pilot. But it needs a good shove to get it going.

The model pitched its nose up and was difficult to fly. The wing was flexing and it was especially bad in a tight turn. It was not happy if flown inverted, needing every ounce of down elevator to hold it.

However, the glide was quite encouraging and the model flew along very gracefully on a whiff of power.

*By not flying flat out for the entire flight it is possible to get five minutes from the 3S 850 mAh LiPo*

*It is a fabulous looking model, with sleek lines and an attractive colour scheme*

## Back To The Workshop

The underbelly ventral fins seemed to be attached at the wrong angle and they acted like up elevator trim tabs. They were removed and re-attached in line with the centre-line of the tailplane. The difference was about 15 degrees.

The wing was then given a spar made of 1.5 mm carbon tube. This was quite easy to do and merely involved cutting a slot (21½ inches) from wingtip to wingtip and installing the tube. This was enough to stiffen the wing and it didn't add any appreciable weight.

## Next Session

The model flew straight and level and was much happier. Also, without the drag from the ventral fins it flew faster. The wing was now stiff and the model could be thrown around without trying to 'clap hands'. It would now fly inverted and it wasn't too fussed about doing it.

At a flying weight of just 350 grams this is a lightweight model so it isn't recommended that it is flown in windy conditions. But we flew it in a 10 mph wind and although it was susceptible to the 'bumps' of turbulence it coped reasonably well.

The light weight also meant that there was not much inertia. This, mixed with the limited power, reduced the vertical performance but it was still managed to produce some convincing looking climbs and we were able to do some large diameter loops.

By using a mix of differing power settings – i.e. not flying flat out for the entire flight – it is possible to get five minutes from the battery. More power would be a bonus but there is adequate power for sports flying.

Landing is very straightforward. It glides well and it has a very predictable rate of descent. The touchdown speed is about 6 or 7 mph and it just slides to a halt on the grass.

## Conclusion

It is a fabulous looking model, with sleek lines and an attractive colour scheme.

But the mounting angle for the ventral fins is wrong and the wing is too flexible and needs a spar.

However, with these issues cured this little model is a delight to fly and I shall be buying some extra batteries for my one to extend the playtime at the flying field.

It is now a sweet little sports jet. **RCMW**

**Distributor's Comment**

Due to Brian's findings following the review model's first flight, and his subsequent modifications, we asked Century UK to comment. Mark Tilbury writes:

*"The dagger fins do what they are supposed to. I glued them on correctly and they worked perfectly. The model does not even need them as they are more for show than anything.*

*The wing does flex. It is supposed to flex and it flies exactly as it should with this. Because of this the model is much stronger and as it has a low wing the wing can absorb some of the not so good landings we have from time to time. Along with the knock off nose we have tried to make it super tough.*

*The C of G was wrong. It should read 330 – 340 mm from the nose. The model we sent was hot of the press and it was purely a printing error. All models now come with an amendment sheet stating this. However, with the correct battery and a normal receiver this is where the C of G is anyway and no weight is required.*

*This is a very low price, high performance fun model for sports flyers who want a great low priced EDF model. At £99.99 RRP this is what you get."*

If you visit the Century UK website and click on the Mini Viper Jet page you will find a video showing Mark flying his own model, built straight from the box. It looks great fun!

## RC MODEL WORLD DETAILS

### MODEL INFORMATION

| | |
|---|---|
| **NAME:** | Mini Viper Jet |
| **MANUFACTURER:** | Max Thrust |
| **DISTRIBUTOR:** | Century UK |
| **WEBSITE:** | www.centuryuk.com/RC-Planes/Electric-Jets/Mini-Viper-Jet |
| **PRICE:** | £99.95 |
| **MODEL TYPE:** | 50 mm EDF jet |
| **CONSTRUCTION:** | Moulded EPOFLEXY foam |
| **PARTS SUPPLIED:** | Airframe, EDF motor set and ESC, 9 g servos |
| **PARTS REQUIRED:** | Receiver, LiPo battery and charger |

### R/C FUNCTIONS

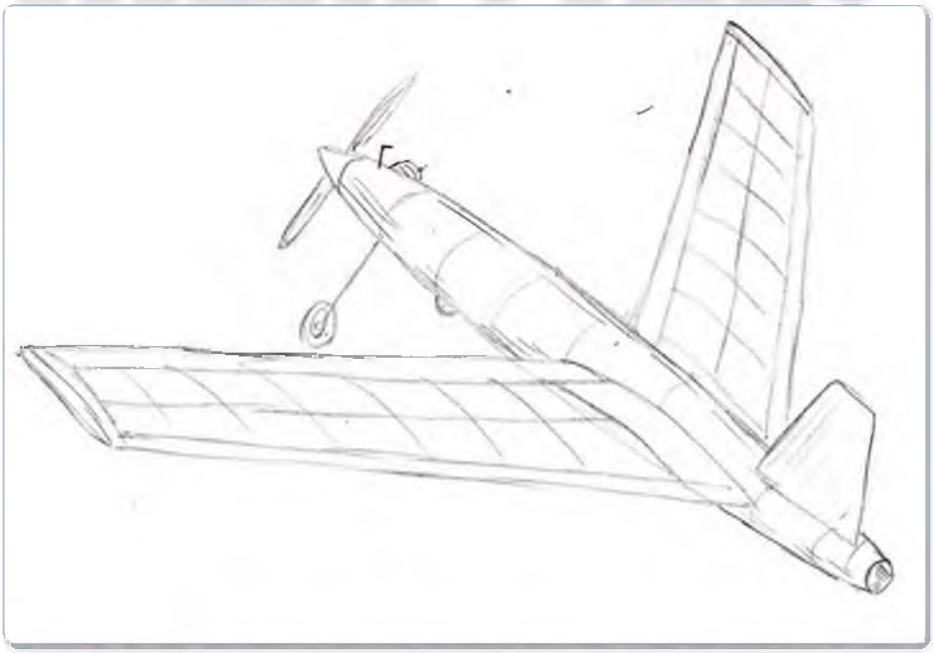
1 Throttle 2 Ailerons 3 Elevator

### MODEL SPECIFICATIONS

| | |
|---|---|
| **WINGSPAN:** | 705 mm (27¾ inches) |
| **LENGTH:** | 640 mm (25¼ inches) |
| **SERVOS:** | 3 x 9 g |
| **MOTOR POWER:** | Approx. 165 W |
| **CURRENT:** | 17 A at full power, voltage drops to 10.7 V |
| **FAN:** | 50 mm |
| **ESC:** | 20 A |
| **THRUST:** | 300 g |
| **WEIGHT:** | 350 g |
| **LIPO:** | 3S, 11.1 volt, 850 mAh LiPo, 40C |

# MODEL AIRCRAFT MEMORIES

*Denis Sharp continues with his aeromodelling autobiography*



*Ron Swinden's tailless model with swept forward wings – see Other People's Models*

## Engines And Fuel

I ended up with six diesel engines and one with a glow plug. The diesel engines were E D Bee (1 cc), Albon Dart (0.5 cc), Albon Javelin (1.5 cc), Albon Merlin (0.76 cc), Allen Mercury 25 (2.5 cc), Allen Mercury 10 (1 cc) and finally the glow plug engine, a Cox Pee Wee, a tiny 0.33 cc.

My first engine was the E D Bee and I had considerable trouble starting it when I first got it. Before getting the engine I'd bought a book on model diesel engines and this very definitely stated that when starting a model diesel the compression had to be increased for starting. It did mention that there were rare examples where the compression had to be reduced.

When I eventually did what I should have done in the first place – read the instructions that came with my engine – I found it was one of the 'rare examples'. In fact I never found any diesel engine that required the compression to be increased for starting so it was a bit of a puzzle why the book, written by a well-known expert, said the opposite.

It was much cheaper to mix your own fuel than buy it ready made. The usual mixture was one part paraffin, one part castor oil and one part ether. If I was feeling particularly hard up I'd double the quantity of paraffin, though this made starting more difficult or even impossible on a cold day. At least I thought it was paraffin. I mentioned to my father one day that the can of paraffin in the garage was getting a bit low. "That's not paraffin", he said, "that's diesel oil." Well it seemed to work in my engines anyway.

I, as a small boy, would go into a chemist to buy an eight ounce bottle of ether. "What do you want it for?", they'd ask.

"To make fuel for model engines", I'd reply.

"That's OK", they'd say. Can you still do that these days?

The Cox Pee Wee was my first and last glow plug engine. I bought it because it was only 0.33 cc (0.02 cubic inches) and I wanted to build small models. The main problem was that being American the glow plug required a 1.5 V dry battery. These went flat rapidly making starting difficult, or impossible, and of course it couldn't be recharged. You had to buy a new one.

British glow plugs required 2 V and the usual practice was to use a lead acid rechargeable battery. I got one but I knew if I used it directly it would burn out the plug. These were particularly expensive on the Pee Wee because you had to change the entire cylinder head. I used a fairly long, thin lead to drop the voltage but getting it right was a bit difficult because at the time I didn't have access to a voltmeter. The fuel was cheaper with glow plug engines but they seemed to use twice as much of it. I was much happier with diesels.

When I started in modelling, diesel engines predominated and glow plugs were fairly rare. Also, everything in the country was measured in imperial units – inches, feet etc. – but the capacity of engines, both model and full size, was measured in cubic centimetres or litres. When I returned to modelling in the 1970s I found that glow plugs were the most popular and diesels were rare. Most things in the country were now measured in metric units, but model engines were now quoted in cubic inches. I suppose it's the dominance of the American market but saying an engine has a capacity of 2.5 cc seems easier to me than saying 0.15 cubic inches.

## Tools And Materials

Looking back I'm a bit astonished how primitive things were. The place where I lived did not have electricity or gas so all cooking was done on an oven beside an open coal fire. When I built my Keil Kraft Champ, I made the holes in the engine bearers by heating a length of 16 swg piano wire in the fire until it was red hot, then used it to burn holes through the wood. I also made fuel tanks for my control line models from cut up tin cans using my father's soldering iron that you heated by putting it in the fire, then scraping it on a stone to clean it before dipping it in a tin of flux.

My practice at soldering stood me in good stead a couple of years later when I went to the local Technical School from age thirteen to sixteen. While the rest of the class was struggling to learn how to solder, I had no problems.

There were virtually only two adhesives available for modelling. The first was balsa cement. This generally worked pretty well but sometimes it went off too quickly if, for example, you wanted to glue a large area. Then one would use a technique called double cementing. You'd apply the cement to both halves of the joint and rub it into the wood with your finger before it set. Then you'd apply a second layer of cement to one half of the joint and quickly press the two halves together.

The first layer of cement stopped the solvent from the second layer soaking into the wood and gave you more time to make the joint. This technique was also useful if you wanted a particularly strong joint, on engine bearers for example.

The other adhesive was tissue paste, which as the name implies was used for securing tissue to the airframe. I used it for my first few models but when I discovered cellulose dope I found that I could produce a neater job if I used this to secure the tissue instead of the paste.

My models usually needed ballast in the nose or tail to get the Centre of Gravity in the right place. Fortunately there was a handy source of lead for this in used tubes of balsa cement. The lead from such tubes was not an ideal shape and I wondered if I could melt it down and cast it into a more convenient shape. I found I could; I put the used tubes of balsa cement into a tin can and put them on the fire.

It was important to cut the tubes up so that when they started to heat up and the residual

*Jet models were popular. This photo is (I think) of a Keil Kraft Gloster Javelin prior to covering*

balsa cement first vaporised, then caught fire, it did not cause the tubes to expand and burst. Once the lead had melted, I'd pick the tin can up with a pair of pliers and pour it into a mould made from hard balsa wood. The wood charred where it came into contact with the molten lead but it survived long enough for the lead to solidify.

Flushed with success at doing this, I cast around (sorry!) and looked for something else I could melt. I had a toy cap pistol that was broken, so I tried melting that down as well. It needed a slightly higher temperature than lead but I was able to cast a replacement interior door handle for my father's 1937 Morris 12 car.

## Other People's Models

The secretary of the model club, Ron Swinden was famous, in our eyes at least, because he'd had the plans of a model he'd designed, 'Duck Foot', published in the December 1955 edition of Aeromodeller. This was slightly unconventional in being a high wing amphibian.

An even more unconventional design of his was less successful. It was a mid-wing tailless model with swept forward wings, lots of 'wash in' to give longitudinal stability and lots of dihedral to counteract the lateral destabilising effect of the swept forward wing.

The engine exhaust was ducted through a celluloid tube of about an inch diameter, through the fuselage, so that when the engine was running it looked like a jet. See my sketch. The only time I saw him trying to fly it, the engine cut out just as he launched it. To my surprise it did actually glide but I never saw it fly under power.

I didn't do radio control in those days as it cost a fortune, but I knew a man who did. There was, in the model club, a Mr. Osborne. We never knew his first name; one didn't in those days, and it never occurred to us to ask. He was a schoolteacher who built fairly large, complex and unusual models. There was a swept wing model that looked a bit like a V bomber, powered by a diesel engine in the nose, of course. And also something that looked a bit like a double decker bus, being covered in bright red tissue, which added to the impression. It had a delta wing and tail.

I never saw either of these fly but one day the double decker featured in a cartoon in a modelling magazine. You can see this cartoon by visiting 'Zoe's Control Line Site' (www.fuelsoaked.me.uk). It is near the top left of the page captioned 'Seen at the Northern Gala'. I'm not sure if the Mr Osborne I remember would have appreciated being called in the text, just below the cartoon, a 'Happy go lucky freak flier'!

Then one day he turned up with a radio control model he'd built. This was a high wing monoplane with a tricycle undercarriage. The wheels were home-made and very chunky. Only the rudder could be controlled but it flew and he could get it back to the runway he took off from, more or less.

By today's standards the radio system was primitive; a single valve receiver with HT and LT batteries, and a relay that amplified the feeble signal from the receiver to a level where it could drive an electromagnetic escapement. The fuselage contained a rubber motor that had to be wound up before each flight. This drove a crank that emerged from the tail just below the rudder to which it was connected by a narrow loop of wire. If the crank had rotated

*The pusher was repaired and rebuilt with twin booms. The canard was replaced by an all-moving-tailplane, with twin fins and rudders. I dispensed with the speed controller as I needed all the power I could get. Instead I used a servo operating a micro switch with a diode/resistor/capacitor suppressor across the contacts to stop them being destroyed by the arc when they opened. I am about to intrepidly launch it on its first flight. It was flown by a friend of mine who was much more practiced at flying than I was. The model flew very well until a glitch in the second - hand radio equipment I was using put all the servos hard over one way*

*I built this Chris Foss Middle Phase II slope soarer to get some flying practice. I then modified it for electric power. Not a great success, being underpowered and overweight with the NiCad batteries of the time. With all that weight high up lateral stability was marginal, needing a blip of right rudder to start it turning, followed by a blip of left rudder to straighten it up. The model was eventually passed on without the electric modification*

continuously it would have waggled the rudder from side to side but it was prevented from rotating by the escapement. With the escapement de-energised the rudder was in the neutral position.

The transmitter was a cube about a foot long on each side. It was much too large and heavy to hold so it sat on the ground. The aerial was telescopic and it was taller than Mr Osborne when extended. The control was a single push button on the end of a flexible lead.

Each time the button on the transmitter was pressed it energised the escapement, allowing the crank at the tail of the model to rotate through a quarter of a turn, giving full left rudder. Releasing the button de-energised the escapement and the crank rotated another quarter of a turn, moving the rudder back to neutral.

The next press gave full right rudder and so on. You had to remember what you'd done last. If you wanted left rudder twice in succession you had to give a short blip to get through the unwanted right position. It all worked but everything needed frequent adjustment and tuning.

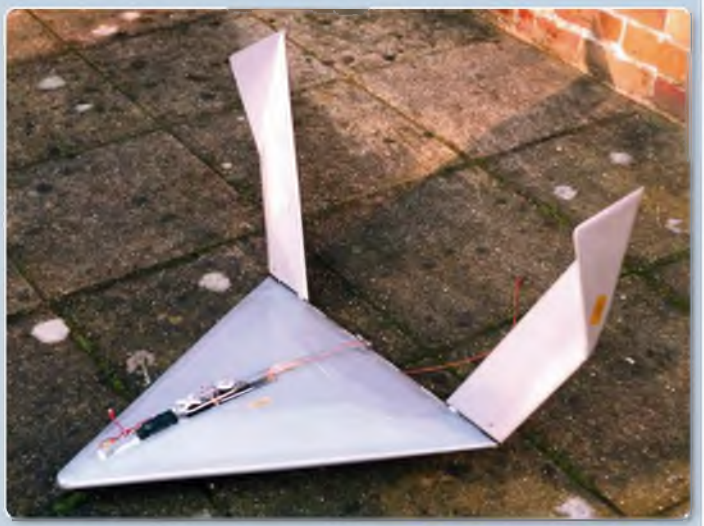
Landings were exciting because he had no control over when the engine stopped. When it ran out of fuel he had to glide it back to the runway, which fortunately was very large. Due to all the weight of the receiver, batteries etc. it glided like a brick and there was no easing back on the stick to touch down gently. It landed like modern aircraft do (apart from the Harrier that is) by descending at a constant rate as if to fly through the heaving deck of an aircraft carrier in a rough sea, rather than trying to land on it.

Now the importance of the tricycle undercarriage with its homemade balloon tyres became evident. All three wheels hit the ground together. I don't know what he'd used to make the wheels but whatever it was it didn't bounce; some sort of high hysteresis rubber we'd say these days. It just smacked down on the runway and stayed there, running along the ground until it ran out of momentum.

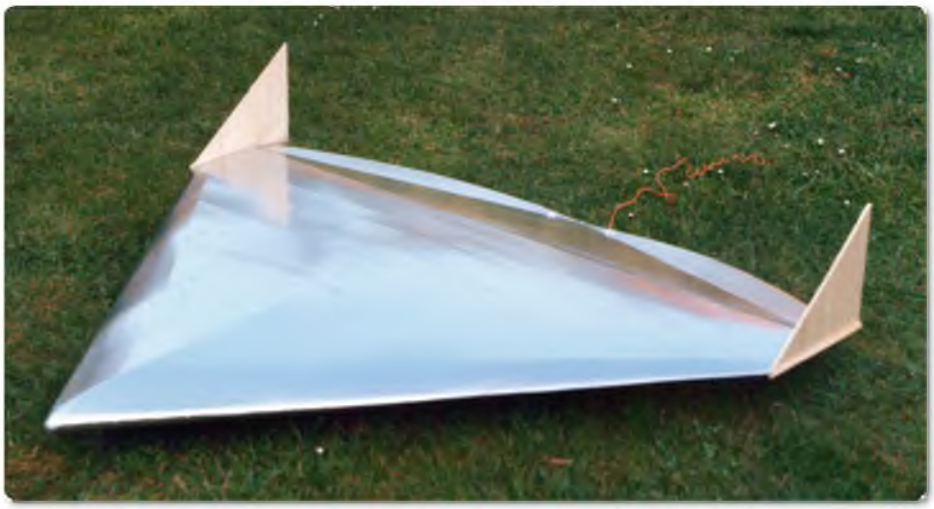
## FROG Janus Revived

One day I got permission to get my uncle's dusty Frog Janus down off the top of the wardrobe. I stripped off the un-doped tissue and examined the structure. The wing and tail just needed sanding down to the correct profile. The fuselage was a different matter; the formers and stringers that gave the fuselage its rounded shape practically fell to pieces when the covering was removed. Fortunately, the strength of the fuselage was in an internal rectangular structure made out of some sort of hardwood.

It may have been that at the time the kit was produced good quality balsa was in short supply, so they had used the good stuff in the wings where it mattered. The plans had



*According to a book I was reading around 1990, about the design and development of full size aircraft, a vertical landing is more useful (and easier) than vertical take-off for the simple reason that take - offs can usually be delayed (unless you are under attack!) but landings can't as you will run out of fuel. It was basically an equilateral triangle with the C of G in the centre. When the large elvons (sic) were in the rearward position (actually a few degrees up) the neutral point of the whole model was slightly behind the C of G so it was stable in forward flight. When in the vertical position the elvons and their tip mounted fins were intended to keep it stable when descending vertically and the centre of drag from the stalled wing coincided with the C of G. Slightly to my surprise it flew very well as a slope soarer but I never got to try out the vertical descent mode from any significant altitude*



*Here's another delta I built around 1991 to try using a gyro to give it longitudinal stability with a rearward C of G and thus fly more efficiently. With a forward C of G it flew OK, both as a slope soarer and from a bungee launch. But the gyros of the day were rather clunky with real gyroscopes that you could hear run up when you switched them on. They seemed to have lots of hysteresis so didn't really help*

long since disappeared, so instead of trying to reproduce the formers I left the fuselage rectangular. I added engine bearers to suit my E D Bee and recovered it with tissue, doped of course.

I found it was very tail heavy, either because the Bee was lighter than the engine it was designed for or maybe I hadn't positioned it far enough forward. Thinking about it now (isn't hindsight wonderful!) I should have fitted longer bearers and mounted the engine further forward. What I actually did was fit a small block of lead in the nose. The lead came from melted down empty balsa cement tubes. It flew but not brilliantly. The lead can't have helped.

## Third Tailless Model

This was designed and built a few years after the second one tailless model. I was now seventeen, working and had a girlfriend. Spare time and interest in model aircraft were now in short supply. The first two tailless models I'd built had used a conventional flat-bottomed wing section, with a balsa wood elevon fixed at about ten degrees up to give longitudinal stability. These were fitted at the tips on the first model but across the entire span of the second, tapering from zero chord at the root to maximum at the tip.

I now realised that this wasn't very efficient. What was really needed was a wing section that gradually changed from root to tip, conventional at the root and symmetrical, or even reverse camber, at the tip.

The result looked very elegant with my favoured pusher configuration. But I decided to power it with a Cox Pee Wee glow plug engine. This was my first a mistake. It glided well when hand launched, so I fuelled up the engine and tried to start it. My second mistake was that I'd brought my girlfriend along to watch it fly. She watched my efforts to start this engine with mounting disillusionment. I never did get it started and flown. She, now my wife of over fifty years, still reminds me of this episode from time to time.

## Croft Aerodrome

While the following is written down from personal experience, some dates and a few details were obtained from the book 'Pilgrimages of Grace, A History of Croft Aerodrome' by A. A. B. Todd.

Known by the locals as 'the drome', it should really have been called Dalton on Tees, the nearest village. But the RAF already had an aerodrome of that name so to avoid confusing their aircrew they called it after the next village, Croft.

During the war Croft was home to Halifax bombers. In March 1945 one of them failed to take-off and crashed and burned. A four thousand pound bomb was eventually set off by the heat of the fire, producing a massive explosion and a mushroom cloud. At the time I was in my pushchair in a shop at Croft. Suddenly the door rattled and when we got home we found out why – all the windows in the front of our house facing the aerodrome had been blown in. My grandmother, though uninjured, was not happy. She had been making bread when the explosion occurred and the bowl full of dough was now full of broken glass.

Sometime later, in June 1950, when I was eight years old, I was indoors when I heard a strange whistling noise as something flew over the house. My father had seen it and I got him to draw what turned out to be a fairly accurate silhouette of a Meteor jet fighter. The next day we went to an air display at Croft.

There was a display where Spitfires pretended to bomb a cardboard fort, spoiled somewhat by some of the 'bombs' going off before the Spitfires actually dived on it. Then an acrobatic display was put on by the Meteor, very fast and very impressive, culminating in a vertical climb until it was a dot in the sky. This was followed by a similar display performed by a Mosquito, made more impressive by the pilot using only one engine, the propeller on the other engine being stationary and feathered.

Health and safety, and security considerations seemed much less important in those days. After the Mosquito and Meteor landed they taxied over to the crowd, stopped their engines, then everyone gathered round them to have a good look.

I remember the Mosquito's engines making ticking noises as they cooled down and dripping petrol. My father lifted me up so I could look into the air intake of the Meteor; it seemed to be cluttered with lots of 'bits' and did not look very aerodynamic. The exhaust seemed to be black, sooty and smelt of paraffin. "How does it work?", I asked.

Later I asked my grandmother the same question about the rockets used in firework displays. She told me, "You light the fuse at the bottom, this makes fire come out of the top and this makes them go up." This did not make sense to me so I concluded my grandmother, while very good at making bread, was not the best person to consult on rocket technology.

At school we small boys noticed that Meteor jets left vapour trails clearly visible against the blue sky. We'd never seen this from other aircraft and didn't realise it was because they generally flew at a higher altitude than aircraft fitted with piston engines. We decided that when they flew through a cloud some of the cloud got trapped in the engine and was then slowly released.

One day in January 1951, shortly before my ninth birthday, a Meteor flew much lower than usual. It was lunchtime and the pudding had just been served; it was spotted dick and custard. We heard the familiar whistle of a Meteor but much lower than usual. Suddenly there was a tremendous crump. We all leapt on to the tables to look out of the window. There was a column of grey smoke boiling skywards from the field behind the school cookhouse. The field sloped. Near the top there had been a large tree stump that we used to play on; now there was a crater like the one in the film 'Sound Barrier'. There was nothing recognisable left of the Meteor. The rest of the day was a bit of a blur, with fire engines and police cars everywhere.

Then, in April the same year, I heard that a Meteor had landed beside one of the runways with its wheels up. I went to see it; getting onto the aerodrome was no problem as it was surrounded by farms and the only access to them was via the Aerodrome, so people were always crossing it. When I got there the fuselage of the aircraft had been lifted up on trestles and the wings outboard of the engines removed and laid on the grass, together with the fuel tank. It was about as big as a telephone box laid on its side and appeared to be covered with a dull red padded material, presumably it was self-sealing.

A rod protruded from the root of the wing. I was intrigued to discover that pulling and pushing it operated the aileron. Then I noticed the nose cone had been removed. I was pleased to discover that the designers of full size aircraft had the same sort of problems I had with my model aeroplanes. There were two blocks of metal bolted there, which seemed to have no other function than to get the Centre of Gravity in the right position.

Normally the school bus that I used to catch would go directly from the village I lived in to the school at Croft. What I didn't realise was that normally, before coming through our village, it would go into Croft Aerodrome and around the perimeter track to pick up the children who lived on the farms there.

One day, for some reason, it came to our village first then went round the Aerodrome. As we were trundling round the perimeter track we encountered a taxying Meteor jet. I remember it stopped to let us go first. That must have been expensive! Years later I

heard that a Meteor used twenty gallons of fuel just to start its engines and taxi to the runway.

Mentioning the school bus reminds me that my modelling friend from the village would, from time to time, take a lead acid battery on the bus to get it charged up at a garage in Croft. It was used for the low-tension supply for his parent's valve operated wireless set. No-one worried about this at the time. These days I don't think the authorities would look very kindly on parents getting one of their children to take what was basically an easily spillable glass jar full of sulphuric acid on a school bus!

Croft Aerodrome was in a slightly unfortunate position. It was beside the main railway line from Darlington to York. The line was in a cutting and when they'd built it over a hundred years ago the spoil from the cutting was piled up alongside the railway line. With the usual prevailing wind all landings had to be over the spoil bank. I used to watch them from my bedroom window as they skimmed low over the bank but eventually this palled.

One day in October 1954 I was downstairs playing with my Meccano set. I could hear the engine noise of a Meteor coming into land then it cut out, followed by a bump. I ran upstairs and looked out of the window. I couldn't see anything at first then I noticed a smoky haze in the field near the spoil bank and a man running across the field.

By the time I got there a fire engine, an ambulance and a lorry had arrived. The Meteor had actually touched about one and a half fields before the spoil bank and then skidded across the ground till it hit the bank, went up it and over the other side, finishing up on the railway line. There was a snapped off undercarriage leg and a dead sheep just before the ditch between the two fields.

They stopped the trains and got the pilot out, who had a badly injured leg. The ambulance couldn't get across the field so they put him on the back of the lorry to take him to hospital in Darlington. Apparently it ran out of petrol on the way and he had to be transferred to another vehicle. As it said in the book, 'Not the happiest day of his life!'

Croft Aerodrome is now Croft Circuit and used for motor racing.

*I always liked unusual models. This was a 48" span canard pusher I designed in 1986 after I'd returned to modelling. It had near full span ailerons and differentially operated air brakes at the tips in lieu of a rudder. An all moving canard acted as elevator. To make sure people knew which way it was meant to fly I called it 'THIS WAY' and put a broad arrow on the wing, just visible on the left wing. Power was provided by a 540 - size brushed motor driving an 11 x 6 propeller via a 2.3:1 toothed belt speed reducer. The motor was controlled by an own design and built pulse width modulated speed controller with low battery voltage shutoff. The battery was a home assembled pack of eight 500 mAh nickel cadmium cells. Sadly it did not last long; due to a miscalculation I made the canard too small and had the C of G too far back*

## Afterword

Building and designing model aircraft set me up for an interesting working life, researching into anti-lock brakes, satellite TV, high voltage power supplies for scientific instruments and, finally, for the last twenty-one years, designing electronic equipment for military aircraft.

It's been an interesting journey, particularly for someone born on a farm and in a village with no mains services at all. Candles and oil lamps for lighting, water from a well, cooking in an oven beside an open fire. I won't mention the toilets!

***RCMW***

*These pictures bring us up to the present day. This model has a ducted fan, which can be swung through 90° to give horizontal or vertical thrust, as they tried successfully on a Meteor jet back in 1954 (using moveable guide vanes). The object is not to take - off or land vertically but simply to reduce the landing speed. The model was initially flown without any dihedral on the rear wing, I was hoping the dihedral on the canard and the sweepback on the wing would give sufficient lateral stability. It may work with a better pilot than me – note the repaired damage. I've added some dihedral on the rear wing but have not had chance to try it yet. I am no longer a fan of twin fuselage models; no matter how I arranged all the bits I still had to put some weight in one of the wingtips to get the lateral balance right*

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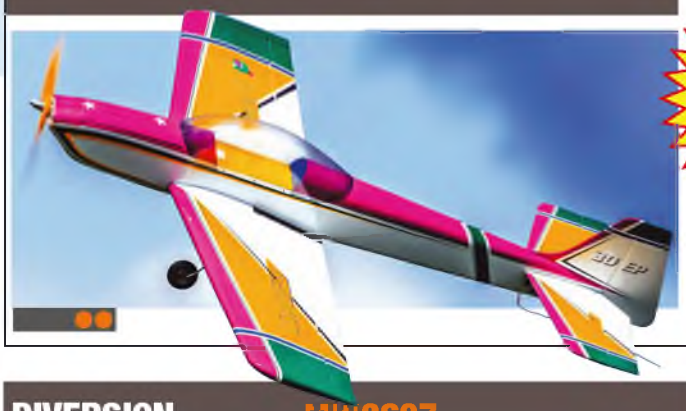

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# IN PRINT

*A selection of new books to add to your aviation library*

## The Strangest Aircraft Of All Time

***By Keith Ray***
***The History Press, 168 pages***
***978-0750960977***
***Paperback, £9.99***


Written in a light-hearted style, this engaging book makes a perfect coffee table book as it can be picked up and browsed, ticking off a couple of the aircraft mentioned each time you sit down for a cuppa. If you've been reading R/C model magazines for a while then you could be forgiven for thinking that it could be also titled 'The Model Aeroplane Designer's Handbook' as so many of the subjects covered have also been made into R/C replicas by adventurous aeromodellers. The Hughes H-4 Hercules 'Spruce Goose', Heinkel He-162, Edgley Optica, Rutan Varieze, Blohm & Voss BV 141 and Arup S1 to name just a few.

The strange thing is that such aeroplanes do not look particularly weird to our eyes, but of course to the wider public who may not have seen pictures of them before they must indeed look pretty strange. But fear not if you are searching for inspiration for your next model as there are plenty of other wacky aeroplanes to choose from in this fun-filled compendium – there's even a man-carrying quadcopter! Our favourite is the Caproni Stipa, with its whale-like fuselage that looks like it has swallowed a Tiger Moth! Scratch that – we've just found several R/C models of the Stipa on the internet...

## Paint Locker Magic

***By William Tate and Jim Meehan***
***Macmillan, 240 Pages***
***978-1-62545-041-8***
***Hardback, £30.00***


Sub titled 'A History of Naval Aviation Special Markings and Artwork', this well researched book covers the amazing artwork that has adorned US Navy, Marine and Coast Guard aircraft for over 100 years of naval aviation. The book starts with an interesting introduction, which defines exactly what such artwork is, especially nose art, which has its origins in the figureheads attached to the bows of ships.

Most people will be familiar with the scantily dressed ladies that decorated the noses of WW2 bombers, of which there are many illustations in Chapter Two, which covers the Second World War era. Liberators seem to be a favourite here, the deep, flat fuselage sides providing an excellent canvas on which to paint the saucy images.

Moving on to the Korean and Vietnam wars, the illustrations had become a bit more restrained and the young ladies were largely replaced by well-known cartoon characters. On to the Cold War Era and aircraft artwork had evolved into badges, the rectangular format being well suited to painting on helicopter doors where they were surrounded by red and white striped emergency markings. On jets the arrival of the F-14 Tomcat allowed for a flurry of feline related nose art.

By the time of Desert Storm such artwork had become far more restrained and used a limited colour palette that would not show up like a beacon during combat, however a limited number of aircraft were still dressed up on notable occasions, such as when a squadron celebrated a special anniversary.

After a comprehensive listing of nose art against aircraft type and squadrons this absorbing book finishes with a chapter titled 'The Mark Of The Beast', which concentrates on the shark teeth and other beast markings that often adorn US naval aircraft.

## Spitfire in my Workshop

***By David Glen***
***Brown & Brown Books, 192 pages***
***978-0952690726***
***Hardback, £39.99***


This beautifully produced book, published by Brown & Brown, is a 'must have' on any serious scale model builders bookshelf. Written by master modelmaker David Glen it details his 11 year project to build a museum standard model of the Supermarine Spitfire. It has extra resonance for R/C aeromodellers as the basis for the model was a 1:5 scale DB Models Sport and Scale Spitfire Mk 1A kit, which has been skilfully wrapped in litho plate, into which tens of thousands of small rivets have been drilled and inserted – a mammoth undertaking!

Lavishly illustrated, there are many scale techniques that could be learned from this book, although care needs to be taken not to accumulate too much extra weight if building a flying scale model. David's aircraft was built as a static project so in anticipation of the anticipated extra mass he inserted a new spar fabricated from half-inch oak on which to mount the undercarriage!

Completed in 2003, this eye-catching model is now on display at the RAF Museum, Hendon. The story of how it came to be housed within this iconic aircraft collection, beloved of aeromodellers throughout the UK and beyond, is a great story in itself. But David hasn't been resting on his laurels and he has now almost completed a scratch built P-51D Mustang, also to 1:5 scale. Hopefully, if this book is the success it deserves to be, he will follow it up with a detailed description of his American warbird.

As a limited edition book, you can purchase a copy of 'Spitfire in my Workshop' direct from the author's website:
**www.spitfireinmyworkshop.net**

## Doctor Who: Impossible Worlds

***By Stephen Nicholas and Mike Tucker***
***BBC Books, 288 Pages***
***978-1-84990-966-2***
***Hardback, £35.00***


Aeromodellers share a close affinity with those professional modelmakers who spend their careers making painstaking minatures for special effects used in the film and TV industries, although their input is somewhat diminished these days by the ever increasing use of computer generated imagery. It is heartening therefore to learn that the BBC Visual Effects Department still operate a 'Model Unit', which is run by one of the co-authors of this heavyweight book, Mike Tucker.

Mike has teamed up with Stephen Nicholas, who was the supervising art director for Doctor Who, to produce this fascinating 'behind the scenes' look at the much loved BBC television series, which is still attracting huge peak time audiences. From past series to the very latest Doctor, played by Peter Capaldi, this book showcases how members of the programme's art department work alongside the costume, make up and special effects teams to transport viewers to other worlds and back and forth in time.

Whilst some models are featured the bulk of this interesting book is taken up with sketches and conceptual artworks that show how the multitude of sets, characters and plots were brought to life for the small screen. And if you want to find out what a Time And Realtive Dimension In Space unit is for your local pub or model club quiz then this book is just what you need!

As a final treat, at the back of the book you will find an envelope containing small prints of artworks showing a selection of famous objects and characters from the show, which would look great when framed and put on the wall of any modeller's den.

# THE SPORT CHANNEL

***Are you a Keil Kraft Kid? If so, you'll like this month's column from Gray, who is on the look out for a mystery KK model***

## This Month's Wise Words

When we ran our recent piece on the misidentification of (ahem...) a Cessna 172 as an Avro Vulcan we imagined it would prove nothing more than a mildly amusing oddity, in keeping with our love of the absurd. But of course it's never that simple, judging by the response we've had. Readers have for decades seen and heard things relating to the perception of aviation and aeromodelling that would lead lesser beings to question reality itself.

Such was the chat I had with a gentleman at an early season model event. He'd seen our Vulcan piece and was reminded of a curious incident from about thirty years ago.

At the time one of his clubmates lived in a village less than a mile from a small commercial airfield, which housed a flying club with the usual procession of Piper Cubs, Cherokees, Cessnas and the odd Tiger Moth passing overhead most days as they flew in and out of the field. The airfield and its users had a good relationship with the local community and vice-versa.

My informant's clubmate loved it and plane-spotting from his garden was a simple day-to-day pleasure. His neighbour, however, was by no means an Aviation Person. Not only did he have no interest in aircraft, he regarded the lightplanes pottering by as an environmental nuisance equal to living on the flightpath to an international airport.

One day the clubmate was out in his garden and passed the time of day with his neighbour. Just at that moment a lone Jodel, or something similar, made its unhurried way into the circuit for the airfield. Spotting this the neighbour shook his fist at the disappearing aircraft and began a tirade against the 'noise and inconvenience' caused by what was really quite light rural air traffic. He really didn't like aeroplanes and he had tried to form a protest group to support his cause but found no takers.

He turned to the modeller and snapped, "You probably know about these things!", and pointed to another aircraft passing by. He went on, "I can't even understand why they keep so many of them flying. Are they valuable or something?"

At this point the conversation had shifted to a level that other readers have reported in similar circumstances. Not sure if the modeller had heard correctly or misunderstood the question, there began a process of disentangling the cross-purposes, assumptions and downright misinformation.

And what did the modeller uncover? Somehow, his neighbour genuinely believed that anything smallish and prop-driven was a restored WW2 German military aircraft! How he'd arrived at this narrative is anyone's guess, but the modeller patiently tried to explain the reality of the situation to his still fuming neighbour. But y'know what? He wouldn't accept it.

The mail we've received shows that there's a wealth of such baffling stories out there and although we don't want to exhaust valuable column inches on this stuff, we'll definitely run the strongest ones.

**"NO MATTER HOW WRONG I AM, I CAN ALWAYS CONVINCE MYSELF I AM RIGHT..." (JAROD KINTZ)**


***A genuine modelling mystery and we'd never heard of it! Keil Kraft's 'Consort' was briefly advertised in the late 1960s but was seemingly not released. A KK kit that never was?***

## First With The Late News (1960s)

I'll be the first to admit that there have been occasions when this column has not excelled itself in the field of cutting edge, instantaneous, on the spot news gathering. Thankfully that only represents a tiny fraction of our remit, but the topic I would like to present here came as a genuine surprise. Not only did I become aware of it after hearing that it had been a web forum topic for a couple of years, its subject dates back to the 1960s where I evidently missed it the first time round..

Along with so many of SC's readers, during my early hobby fumblings I was unashamedly a Keil Kraft Kid, for no better reason than my nearest modelling supplier kept KK kits. And, with varying degrees of success, these formed most of my building output.

It was in the late 60s that I got my first Keil Kraft Handbook, the first model catalogue I'd seen. I could hardly put it down; I would even sneak it into my school satchel and would daydream about all the free flight and control line kits I had yet to try from this alluring range.

Back then the 'grown-up' end of the Handbook, where the R/C kits resided, was mysterious and unexplored territory. These models just seemed impossibly complex and more or less unobtainable.

New at that time was the 'Intruder', a 72" span aerobatic competition style model for .49 to .60 power (whatever that meant!). How I longed to get hold of an Intruder kit. Admittedly, even if I'd been able to save up for it, building it would have been a challenge too far.

Then, just a few weeks ago, my attention was drawn to this forum topic online – in a magazine advert, along with the trusty old Super Sixty and the shiny new Intruder, was a pre-release picture of the Keil Kraft 'Consort'.

The what? Exactly! This seems to be one of the few appearances in print of a KK kit that never made it to the model shop shelves. The only information given was that it was 67" wingspan and intended for .61 power. It had quite attractive semi-scale lines and it would be easy to imagine it as one of those designs that proliferate in clubs everywhere.

But that seems not to be the case. Discussions about the Consort seem to suggest that for some reason it never went into production and certainly no-one recalls having seen one.

I immediately thought that this was one for SC readers, so could I re-pose the question:

Does anyone remember the Keil Kraft Consort, whether as a fleeting ad or as an actual model? Please let us know.

Another of my favourite KK designs from that period that I revered from afar was the 'Elmira' thermal/slope soarer, which I'm sure appeared on a KK Handbook cover. I couldn't even imagine how to set about building something so attractive and with a monumental amount of construction.

It's been good to see Elmira kits appearing as collectables in recent years and not too long ago as a downloadable plan. (For more details just e-mail me at the address at the end of this column)

I was pleased to learn that the Elmira was by one of KK's greatest designers, Cliff Goater, who founded The Balsa Cabin and later kitted one of my other all-time favourite soarers, the 'Sonata'.

## Rise Of The Machines

Last time our topics included winter projects, the 'Stik' family of sport aerobatic models and my former local clubmate, Steve Burns. Following a mail from Steve we can recombine the self same subjects here.

Steve has been busy over the winter months, creating a couple of favourites from the 1960s and 1980s, both adapted for electric power. The 'Das Little Stick' (original, pre-'Stik' spelling) is Steve's contribution to a club one-design build, which should result in about six models, for which he's also been cutting foam wings. When finished they should make for a great fleet photo opportunity – any chance of some shots, Steve?

Steve's other build is a sensational fun/display aerobatic model that was well loved at our patch for many years. Designed in 1983 by US modeller Don Muddiman, the 'Flying Machine' was the forerunner of a whole genre of insanely aerobatic fun models the like of which we hadn't seen before.

With its astute design and aerodynamic features, the Flying Machine packed performance into what superficially appeared to be a club sport aerobatic model. But it was so much more – with its high power to weight ratio and solid control response it could push a pilot's abilities to wild extremes.

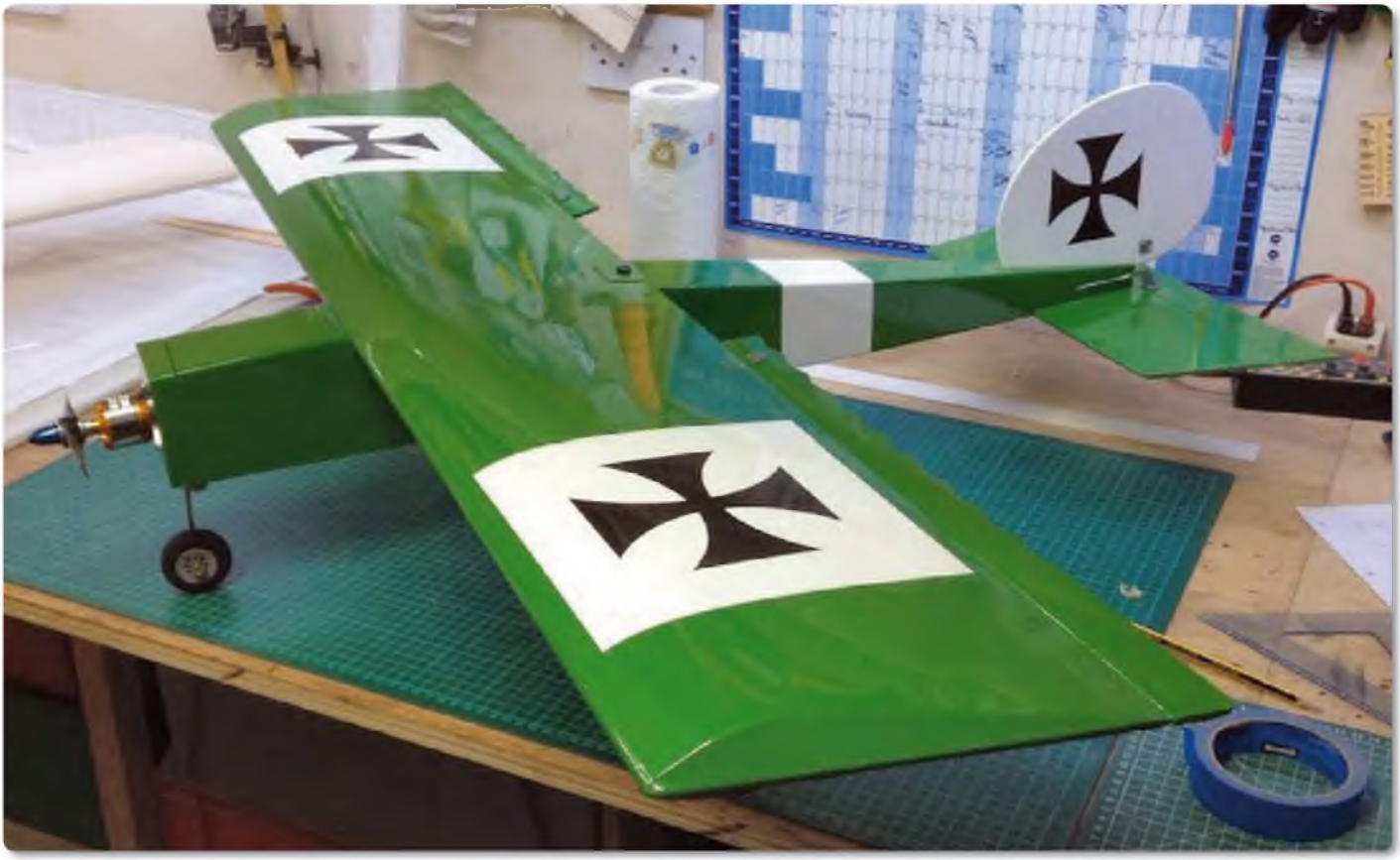
The first time our gang saw one in action, I think, was on a video brought back from the States by the late Dereck Woodward. This included footage of Don Muddiman demonstrating his Flying Machine with the Cloud Dancers display team.

We were astounded at its crazed agility and seeing the climbing flat spin manoeuvre we needed no further convincing! Flying Machines were popular in my club well into the 1990s and we had several examples of the Mini Flying Machine for .049 to .09 engines, which proved equally exciting. A look on the Internet shows something of a Flying Machine revival underway.

Steve concludes: *"The Flying Machine is coming along. It's going to be running at about 1100 watts and the components have been sized so as it should come out at the same weight as the .46 IC version. Looking forward to this one and hope to bring it along to the 2016 North Cotswold bash.*

*The Das Little Stick is good, although a little odd on rudder as it pitches up. It also has no stall – must have forgotten to fit it during the build! This makes for a well-mannered model, but it has a downside – it won't spin. I think I might try it with the C of G somewhere behind the wing!"*

Naturally, as we do on these occasions, we must ask if any readers are currently flying Sticks or Flying Machines, and we'd like to show them here.



***The winter projects are beginning to emerge! Nice electrification of the 1960s classic 'Das Little Stick' by Steve Burns of the North Oxfordshire MAC as a club build project. Final fleet could be six of them, so let's see some formation, guys!***

*Making a welcome return, with electric power, a model that caused a sensation in the 80s and 90s. Steve Burns recreated Don Muddiman's 'Flying Machine'. A design currently enjoying a revival, we hear*

**First With The Late News (1940s)**

Not really a missed scoop, this one. But a neat follow-up to the item we ran earlier featuring a late WW1 technology magazine with a gaudy all-action cover showing a projected rocket-propelled weapon with ferocious rotating cables ripping an intruding German biplane to shreds.

It looked uncannily futuristic and we heard subsequently that other weapons based on the same principle have been developed right up to the present day. It seems that a variation on the theme appeared in WW2.

In the November 1942 issue of 'Popular Science' magazine, kindly supplied by long time correspondent Raymond Lefrancois of North Carolina, USA, is an illustration that shows a couple of bizarre projectiles in action in what looks like the Pacific Theatre of the War.

The accompanying text reads: *"Many new ideas are being developed along the lines of the anti-aircraft 'spaghetti shell', Britain's rocket that trails long tentacles of wire to ensnare the enemy's planes.*

*One of the latest plans calls for stringing the wires at intervals with small bombs that would act as mines, either when struck directly by a plane or pulled into contact with it by the winding action of a snarled propeller on the wires."*

I've no idea if any such armaments were ever built and deployed in WW2. But the concept undoubtedly has a grisly sci-fi ingenuity behind it. Don't try this at home!

Contributions, please to The Sport Channel, c/o the Traplet Publications address.
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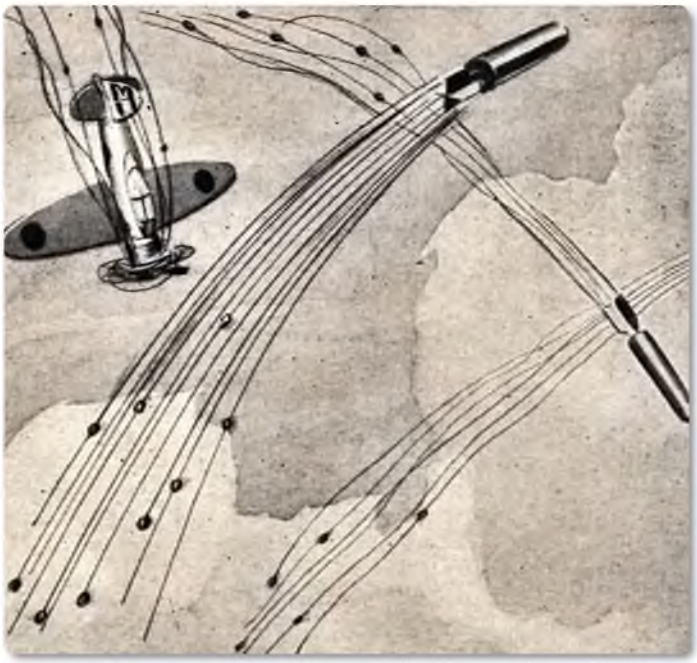
***RCMW***



*I don't know how we came to feature Weird Weapons in the first place. But following up our piece on the strange spinning 'bolas' anti-aircraft device from WW1, we received this later variation on the theme from WW2, the 'Spaghetti Shell', which trailed cables and bombletts into the path of enemy aircraft*

*Following the mention last time of your author's club's Vic Smeed designs event this summer, Gloucestershire correspondent Boycott Beale sent this dramatic study of his giant scale up of one of Vic's cutest, the 'Coquette' bipe. We understand that this one is being kitted. Look forward to seeing it, Boycott (And having a go – nothing like booking early!)*

# WEB DIRECTORY



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# SHOPPER'S DIRECTORY

Don't miss our April 2016 issue!

# NEXT ISSUE


*Our Feature Plan for the April issue is a scale model of EM White's homebuilt, designed by Laddie Mikulasko for spirited electric power. Laddie's 50-inch wingspan biplane flies on an AXI 2826/10 brushless motor, powered via a 40 A ESC. Don't you just love those scalloped trailing edges?*


*We test the Parrot Bebop 2 to assess the improvements made to this highly capable camera drone, fitted with an integral fish-eye lens and HD video capability*

## APRIL 2016 ISSUE ON SALE THURSDAY 17TH MARCH


*Robin Fowler concludes his introductory article for those wishing to build a 1:10 scale model of the first, but rarely modelled, British four-engined bomber. Robin reveals all you need to know about making successful sorties with this 118" wingspan super-sized electric aircraft*

**PLUS...**

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

*All contents are subject to change without notice*

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# Advertisers Index

# EXPERIENCE THE THRILL OF MAXFORD USA'S GOLDEN AGE ARFs

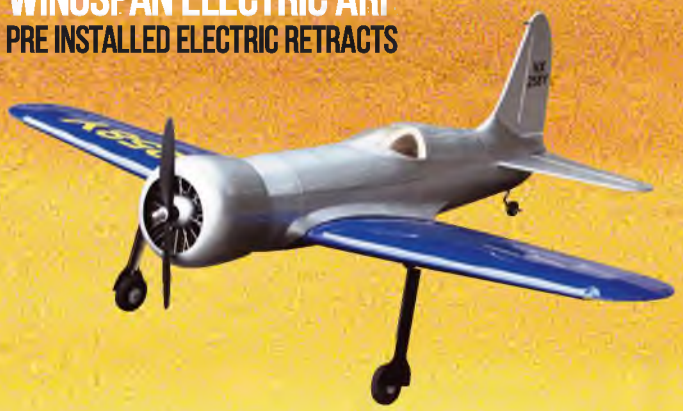
## Stearman PT17

1/5TH SCALE - 77" WINGSPAN
IC OR ELECTRIC ARF

Wingspan: 77in (1956mm)
Overall Length: 57in (1447mm)
Wing Area: 1,686 sq in

## HUGHES H-1 VERSION 2

50" WINGSPAN ELECTRIC ARF
WITH PRE INSTALLED ELECTRIC RETRACTS



Wingspan: 50in / 1270mm
Overall Length: 41in / 1041mm
Wing Area: 490sq.inch

## Curtiss PUSHER

1/9TH SCALE

50" WINGSPAN
ELECTRIC ARF

Wingspan: 50in (1270mm)
Overall Length: 48.5in (1232mm)
Wing Area: 788 sq in

## Rumpler Taube

64" WINGSPAN
ELECTRIC ARF

1/9TH
SCALE

Wingspan: 64in (1625mm)
Overall Length: 46in (1168mm)
Wing Area: 653 sq in

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Ripmax

# TRANSITION VTOL

**Specifications**

| | |
|---|---|
| Wingspan: | 695mm (27.4") |
| Length: | 846mm (33.3") |
| Radio: | 5 Channel |
| Motor: | 4 x Brushless (Inc.) |
| ESC: | 4 x 12A Brushless (Inc.) |
| Battery: | 4S 1300mAh 30C Li-Po (Req.) |

## VTOL is no longer a dream...

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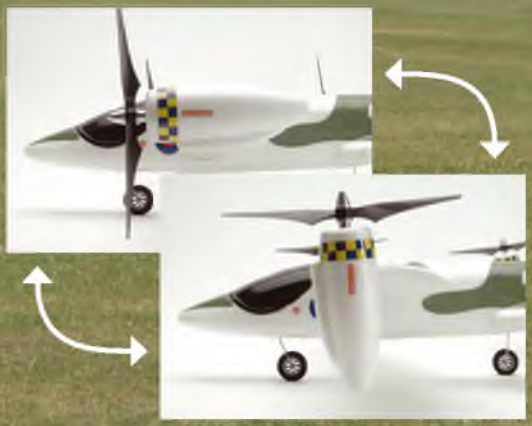
**RTF £379.99**
**Part Number:** A-RMX210



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