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FRONT COVER

The first of two northern Traplet Scale events, aka the 'War of the Roses Scale Competition', took place on Sunday the 15th of May, hosted by the Pontefract club. Among the high quality scale models on display was this superb Fiesler Storch belonging to John Kidd, which sadly crashed just after completing a flap demonstration. John is planning to rebuild her over the winter. However, Phillip Kent was able to take pictures and get some in depth information about the aeroplane before her unfortunate accident. Read more, starting on page 30

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Pre-flight

Kevin Crozier
Editor | Radio Control Model World
Contact me either by post:
RCMW Editorial Office,
Traplet Publications Ltd
Willow End Park, Blackmore Park Rd,
Malvern WR13 6NN. UK
or email: rcmw@traplet.com

Welcome to the July issue of RC Model World. My workshop has become a source of great annoyance in recent times. Basically it had morphed into a storage unit for models, boxes and magazines, all encroaching more and more, to the point where it was almost impossible to get in the door, let alone do any meaningful work inside.

For a long time I have been meaning to have a grand clear out, but previous half hearted forays had caused me to beat a quick retreat, with dark thoughts about how the heck I was going to make a start on sorting everything out. And where was it all going to go while I did so? (I have a pact with Mrs. C not to keep models in the house.)

So I decided to bite the bullet and invest in a few weeks hire of a small storage unit. This will, I hope, give me enough breathing space to sort out all my clutter and consolidate it so that I only bring back the models and other items that I use on a regular basis.

The problem I now have is that having rediscovered the joys of being able to gain free access to my workbench and tools, I don't really want to clutter my workspace up again – especially with models!

This is where I hope our readers can help as I'd like to read about your model storage solutions, especially those that make full use of upper walls and ceilings. If we get enough responses then we may compile them into an article to share the most inventive ways of keeping wings and fuselages out of the way, yet easily accessible.

In the meantime I am quite enjoying keeping my model collection elsewhere. I can pop around after work to collect a couple of models to fly at the weekend or on a calm evening. And the cost is surprisingly affordable too, being half of what I spend on a TV package, the only real benefit of which is live coverage of Formula 1 races! So I might just dump that and keep hold of the keys to my little metal hangar...

This chat about storage was inspired by seeing pictures in this month's 'Sport Channel' column of George Stringwell's neat chalet based workshop. I'm truly in awe of any modeller who can keep his workspace so neatly organised! George is also the designer of this month's free pull-out plan, which is a twice size Widgeon, based on the popular V-tail rubber model by FROG. Our feature plan this month, 3-Way, continues the reduced storage theme as it can be flown in three different formats – low wing, high wing or biplane!

Other features include an electric conversion of Traplet's V-tail Towrag glider tug, as well as an 'all you need to know' article about aerotowing. We also describe the process of making a dummy VW aero engine for scale models using a 3D printer.

Reviews this month include Hangar 9's P-47D, the Eagle 1 electric glider from Century UK and the Hubsan X4 multirotor with a neat 'follow me' function.

That should keep you going for a bit. Right, I'm off to shift some more models, so until next time...

Happy flying!

Kevin

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Editor
Kevin Crozier rcmw@traplet.com

Contributors
Kevin Crozier, Michel Maisons, Dave Goodenough, Mark Wilcockson, Brian Collins, Mike Chambers, Phillip Kent, Andrew James, Bill Bowne, Neville Hill, Jonty Walkenden, John Stennard, Franco Bugada, Anthony Bennett, Frank Skilbeck, Chris Bowler, George Stringwell, Donatas Pauzuolis, Gray

Design & Production Manager
Nick Powell

Designer
Nick Powell

Advertising & Trade Sales
Angela Price
Tel: +44 (0)1684 588568
Email: angela.price@traplet.com

Advertising Copy
email: adcopy@traplet.com
Tel: +44 (0) 1684 588517

Subscription Marketing
Ally Alldritt
Tel: +44 (0) 1684 588521
email: marketing@traplet.com

Managing Director
Tom Stephenson

Chairman
Tony Stephenson

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North American Distribution:
Traplet Distribution USA Ltd, 806 Parkland Ct, Champaign, IL 61821, USA
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Take Off R/C News and Views

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

Traplet Scale Venue Change

Due to flying site issues the Bickershaw MFC are unable to host the second round of the Traplet Flying Only Scale event on August 7th. However, Peter Maw reports that an alternative venue has been found and our thanks go to the members of the Wirral Radio Control Flying Society, who will now host the popular 'War Of The Roses' competition at their field in Arrowe Park Birkenhead on August 7th. This is the same date so it is really just a venue change.

The postcode for Arrowe Park is CH49 5LN. Full directions can be found at:

www.wrcfs.co.uk/index.htm

Our thanks go to the committee and members of the WRCFS for stepping in so promptly following the flying field problems at Bickershaw and for letting their site be used for this event in mid-summer.

We would also like to wish the Bickershaw MFC well for a prompt resolution of their flying site issues and we hope that they do not lose too much flying time over the coming summer months.

Support The UK F3C\F3N Team

The Association of Helicopter Aerosports (AHA) is the specialist body within the BMFA that represents all R/C helicopter disciplines and pilots.

The AHA will be holding a fund-raising raffle to support the British F3C (precision aerobatics) and F3N (3D/freestyle) teams attending the European Championships in Poland this July. The two teams are joining forces to raise money to go towards covering the costs of attending the EC's (over £5000).

The raffle will be drawn on Sunday 14th August at the AHA's 'Quads & Copters' weekend at Leamington Hobby Centre (LHC), where they intend to hold a fun-fly on the Saturday and competitions (F3C /F3N and possibly FPV) on the Sunday.

Official F3C\F3N team shirts and caps are also available to buy at £10.00 each, plus £3.50 p&p, or you can collect from one of the many events on the AHA calendar. The shirts are available in Large, XL and XXL sizes and are emblazoned with the Team GBR logo.

For more details please visit the teams' websites:

www.teamf3cuk.co.uk

www.ukf3nteam.co.uk

It's A Game Of Drones For Flying Bebop

In the sixth week of auditions for top TV show Britain's Got Talent, Nadia and Gavin - aka 'Flying Bebop' - had a special surprise in store for the BGT judges, with the pair putting on an impressive dance routine with the help of a squadron of Parrot Bebop 2 drones.

While the rest of the panel seem thrilled with their performance, Simon was left wondering, "Where are the aliens?"

Flying Toys Directors, David and Janine Rawlins, the UK distributors of Parrot drones, were delighted to see the Bebop Drone 2 presented on the popular show, where the display achieved an unanimous 'Yes' from the four judges, taking them through to the semi-finals. Subsequently the Britain's Got Talent video attracted over 500,000 hits in five days.

The journey with Britain's Got Talent started in January 2016, following a referral from Flying Toys. The challenge was to create something spectacular within the show's many constraints, with limited space on stage, limited duration for the audition and limited time to set up. And in a very busy radio environment the show had to work first time!

For the semi-finals Flying Bebop presented another stunning drone accompanied dance routine, this time working their magic to Coldplay's 'A Sky Full of Stars'. However, despite a perfect performance, they failed to go forward to the final, being in competition with several other impressive acts on the 10th Anniversary show.

David Rawlins, Managing Director of Flying Toys, would like to congratulate Flying Bebop for producing a fantastic demonstration in front of millions of viewers with so many Parrot Bebop Drones.

Flying Bebop is a dance act that combines the best artists, engineers and drones to create dynamic and beautiful shows. The aim is 'to showcase what's possible with autonomous drone swarms, by increasing the level of dynamism and interaction between both dancers and drones to such a degree that they become one medium, working together to communicate beauty and emotion'. Their ambition is to create the largest, most dynamic and spectacular drone shows in the world.

You can see a video on the 'Making of 'Flying Bebop' as seen on Britain's Got Talent, featuring the Parrot Bebop Drone 2' by visiting the following link:

youtu.be/B5a_GuKKaHs

MODEL SHOW NEWS

Festival Of Flight At Ragley Hall

The date for the brand new Ragley Hall Festival Of Flight has now been finalised for the weekend of 1st and 2nd October 2016. The estate landlords have entrusted the organisation to The Wrekin MFC, who also run the popular International Model Air Show at Weston Park.

Ragley Hall is a wonderful location for this new venture and many international model pilots from the UK and Europe are booked to fly. Richard Goodwin will also perform some amazing routines with his full size Pitts Special and the Glider FX team will be there all weekend.

On different parts of the park there will be the Helifest model helicopter competition and display, FPV quad racing, a large boating regatta on the eight acre lake and model car racing.

Gates will re-open on Saturday at 5 pm for a spectacular night show and firework display. A large trade participation is anticipated, as well as a swap meet.

For more information please visit the Weston show website at: www.westonparkmodelairshow.co.uk

Or telephone Steve Bishop: 01952 587298 or 07758 895068

(For trade enquiries please call Peter on 01952 684169)

Traplet Gunsights

We all know that a decent pilot can make or or break the appearance of an otherwise excellent scale model. But filling out the cockpit with other items can make a big difference too!

Following on from the success of Traplet's WW1 gun kits we can now also offer Reflector Gunsights for a wide range of WW2 warbirds. So if the cockpit of your R/C Spitfire or Hurricane looks a bit empty, perhaps this is what's missing? The reflector gunsight is mounted in clear view at the top of the instrument panel and your fighter is not really complete without one!

Traplet's 3D printed kit of the Barr & Stroud Reflector Sight MkII contains parts to build two complete gunsights - an early version with oval reflector glass and a later version with square glass. As well as parts made on our 3D printers the kit includes laser-cut clear plastic parts to represent the lenses in the gunsight body, plus the reflector glass itself.

The gunsights can be fitted to a range of large scale models built from Traplet plans and wood-packs, but will also no doubt fit other suitably scaled models too.

The version with oval shaped reflector glass was In use from 1938 to end of 1940. It was installed in the last RAF biplane fighters, the Bulldog and Gladiator, and in Spitfires and Hurricanes throughout the Battle of Britain. Suitable plans include:

MW3455 Bristol Bulldog
MW3344 Gloster Gladiator
MW3333 Hawker Hurricane MkI
MW3566 Hawker Hurricane MkI
MW3342 Supermarine Spitfire Mk.IA

The later version, with square reflector glass, was in use from the start of 1941 until the end of WW2. These were installed in most British fighter aircraft operated by the RAF, including Spitfires, Hurricanes, Typhoons and Tempests, as well as some US aircraft in both RAF and USAAF service, including the P-40, P-47 and P-51. Slightly modified versions were produced for rocket firing and night-fighter use.

MW3337 Supermarine Spitfire Mk.VIII & IX
MW3342 Supermarine Spitfire Mk.XIV & XIX
MW3563 Supermarine Spitfire Mk.16E
MW3565 Hawker Tempest Mk.V
MW3564 Hawker Typhoon Mk.1B
MW3332 Republic P-47D Thunderbolt (Bubble Canopy)
MW3335 Republic P-47D Thunderbolt (Razorback)
MW3329 Curtiss P-40E Kittyhawk
MW3325 North American P-51D Mustang

Product Code: 3D055
Name: Reflector Gunsight MkII
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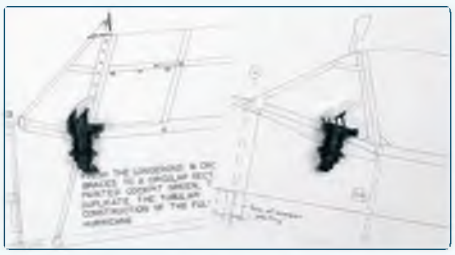
Price: £14.95



Available From:
gb.trapletshop.com/reflector-gunsight-mkii

Mayfly Motors

Some readers have requested information on alternative motor sets for the Mayfly-6e powered glider, which was our Free Plan in the May issue. So we asked the Mayfly's designer, Chris Ward, for some other suggestions. Chris writes:

"There are two possible alternatives for brushless inrunner motors. The trouble is they are not as popular as outrunners and are difficult to make in lower KVs suitable for driving a reasonable propeller. All motors quoted are from Hobbyking:

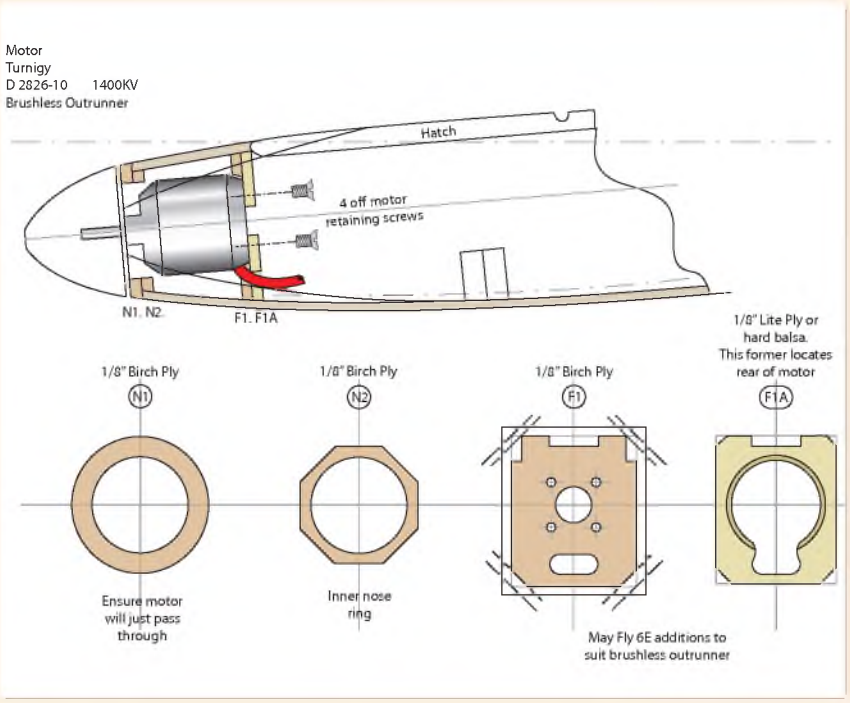
Turnigy 480L V Spec w/impeller at 2150KV
B28-47-22s inrunner at 1800KV

Both motors are quite powerful and would need no more than a 7"x 4"or 7" x 5" prop.

Also attached is my drawing for fitting a brushless outrunner. I have used this system in two other similar models. The mounting requires motors of 28mm O/D, where the leads exit from the rear.

A suitable motor from Hobbyking would be the Turnigy D2826-10 1400KV outrunner, which would be okay on a 7"x 5" prop.

Also suitable are the Turnigy D2830-11 1000KV and Turnigy 2836/8 1100KV, but these would probably need a slightly larger prop, up to 9"x 5"."



Vickers Varsity, Anyone?

Richard Sperry writes with a scale model request:

"Hi Kevin

I am a subscriber to RC Model World. I have been so frustrated for the last few years because I cannot find anywhere scale model plans for a Vickers Varsity. I don't have the expertise or knowledge to draw up any plans myself but I have always wanted to build and fly one, mainly in memory of my father and his crew mates, whose aircraft crashed on its way to the Liverpool air show in 1984. My father sadly didn't survive.

Maybe you could run a piece on this in the magazine and I could get some help in fulfilling a long held dream of mine? I have never seen one of these having been made anywhere. Can you help me?"

Much to my surprise a quick Internet search did not uncover any R/C examples of a Vickers Varsity, although there is a static scale model by Welsh Models that could be used for reference. So over to you, dear readers. If you have any information please contact Richard on: 01858 434649.

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www.pichler-modellbau.de

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www.opale-paramodels.com/

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www.airbrushes.com

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www.hobbico.com

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Further Information in the UK at motorsandrotors.co.uk

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Just in time for the start of the 2016 model flying season, Multiplex have bought out these new shirts, made of a pleasant jersey fabric. Printed on all sides, the MPX shirt creates a great Team Pilot look. Available in black and in all the usual sizes from XS to 4XL.

www.multiplex-rc.de

RC MODEL GLASSES

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www.rapideyewear.co.uk

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A lot of multirotors (especially racers) have quite low ground clearance and so drone pilots often find themselves searching for a hard surface to take-off from. The Hoodman Drone Pad eliminates this and also stops your model from becoming a glorified lawnmower in long grass! With a bright colour scheme for visibility and rustproof components this launch pad is a must-have for any pilot.

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P-47D-1 Thunderbolt

Brian Collins goes all out with this large scale .60 class warbird from Hangar 9. And, of course, he has to fit electric power! Additional photography by Val Winnett and Tony Whiteley

Steep climb out with plenty of power on tap

Very large colourful box with well packaged contents

Nicknamed the 'Thunderbolt' by its pilots because of its indisputable ability to deliver total devastation from a dive, Republic produced over 12,000 P-47 aircraft, which served in various theatres around the world during WWII.

I have always admired the P47D. The classic shape and distinctive sound of the massive Pratt & Whitney 'Double Wasp' 18-cylinder, air-cooled radial engine, which had a displacement of 46 litres (2,800 cu in) is most impressive.

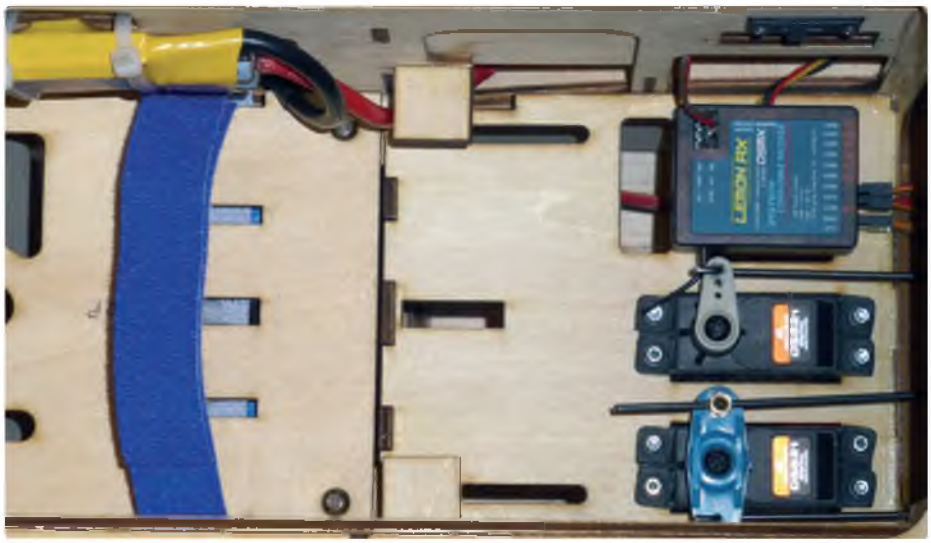
So when I saw that Hangar 9 produced a model that could be petrol/glow or electrically powered, I had to have one! A call to Kings Lynn Model Shop saw the postman struggle up the drive with a massive box the next day – now that's what I call service!

First Impressions

On removing the components from the large, full colour box you immediately note the model is constructed from fully-sheeted balsa and plywood. And to complement the scale outline the model is covered in a printed UltraCote covering, which has panel lines and other scale details 'built-in'; it also has a smooth, matt finish, which looks better than some 'shiny warbirds' on the market. Plug-in wings make transport and storage fast and convenient.

Hangar 9 have designed this P-47 to be built as an electric model, as well as glow or petrol. Indeed all the hardware is included to go IC or electric. The hatch is retained with strong magnets, providing access to the very large battery bay –ideal for swift LiPo changes! Also included are no less than four sets of decals, with group numbers and artwork, allowing you to select your preference.

The model also features operational flaps, which have internal linkages (as do the elevators). A large fibreglass cowl with a dummy radial engine are also included, as

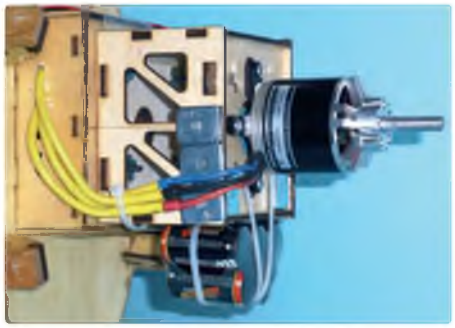


Large bay for servos and receiver installation

A large fibreglass cowl with dummy engine are included. I painted the cylinders to add some detail

The matt covering was blistered in several places but a few minutes work with a covering iron soon cured the problem

Electric retracts are available as an optional extra. Note the flap servo fitted behind the wheel well



A Dualsky XM-5060EA-8 brushless outrunner motor provides ample power. Despite mounting a 3300 mAh 5-cell Sub 'C' NiMH receiver battery 'up front' 60 g of weight was required to achieve the correct C of G

There's plenty of space for the Optipower 5000 6S LiPo in the large battery bay

are turbo and exhaust ports, guns, radio antenna, scale (like) wheels, wing pylons with fixed dummy wing tanks or bombs (both included) and even a machined aluminium spinner nut! All in all a very detailed package. Unfortunately, after going to a lot of trouble adding some really authentic scale details Hangar 9 do not include a pilot figure.

The model is supplied with a fixed undercarriage, however retractable electric worm drive units are available should you wish to fit them, which will add even more scale detail.

Building The P-47

The model is shipped in a large, colourful box with all components neatly packaged, protecting them from the inevitable knocks during transport. There are several small packets with various hardware parts included, depending which version you wish to build. There was no damage to any of the large wooden components but one thing I immediately noticed was the UltraCote covering was badly blistered in several places on both wings and the fuselage.

Changes in temperature during shipping and storage contribute to this and it's easily solved with the use of a covering iron or careful use of a heat gun. Another bonus (and a good idea) is the fact Hangar 9 include spare covering for any repairs, should they ever be required.

Brilliant Book

The build manual has to be one of the best I have come across. Whilst it is only black and white it is very detailed and contains over 60 pages. It covers every single assembly step, as well as confirming all control throw movements, recommended exponential and, of course, the C of G balance point.

Big Jugs!

The full size P-47 weighed in at 8 tonnes, which is heavy for a fighter by anybody's standards. Hangar 9's version is no lightweight either - the fuselage and wings have a 'solid' feel to them. Some modern ARTF's we see these days are intended to be so lightweight they are designed with 'lightening' holes throughout the entire airframe. No such methods are employed here. It is immediately apparent this is a solid, built up, fully sheeted wood and ply construction, which will stand the test of time.

Powerful Powertrain

Hangar 9 recommend the E-flite Power 60 brushless motor for this model. However, as I had a Dualsky XM-5060EA-8 brushless outrunner motor available, which is also classed as a .60 equivalent brushless motor, I utilised it as it offers very similar power to the E-flite unit. I also had a HiModel 'Cool' 110A ESC, which will provide 'redundancy' for current draw.

The Dualsky motor also uses a 6S (22.2 V) LiPo battery, so I opted to use an Optipower 5000 mAh 6S (22.2 V) battery pack that is rated at 50C, providing more than enough power as well as very good duration. A 16 x 10 propeller produces a very healthy 1480 watts of input power at 71.2 amps.

Nuts!

There is an issue however that needs to be noted if using a motor other than the recommended E-flite Power 60. And that involves the supplied propeller nut. Presumably, as it is supplied for the American market, it has an imperial thread,

HiModel 'Cool' 110 A ESC provides plenty of 'redundancy' for current draw

The supplied prop nut required re-tapping to fit the Dualsky prop adapter

Solid linkages provide positive control with zero 'slop'

'Little Demon' is ready for action

so the prop nut supplied with the kit will not fit metric threaded prop adaptors. A call to Peter Vidgeon soon had this issue resolved, as he was able to recut the thread in the prop nut to fit the metric shaft on the Dualsky motor. Thanks Peter! Peter can also help out with stripped glow threads (see Contacts).

Construction

I started with the wings, which as per the fuselage are built up balsa and ply construction. The flaps and elevators have internal control rods but the ailerons do not and use the traditional pushrod method. The pushrods are nice and thick, offering a very solid linkage with no 'slop' whatsoever. The ailerons are hinged via Mylar hinges, which are adhered to the pre-cut slots with super thin cyano.

There are two lengths of string taped inside the wing to pull the servo extension leads through the wings. The servos are attached to the servo covers and secured in position with screws. The flaps feature internal linkages, which are accessed via the removable hatch cover. The flap servo is screwed into position, then the linkage is attached, adjusted for the correct amount of throw and the cover replaced.

I had a pair of electric worm-drive retract units from another project and noted that the size and fittings were identical so I decided to fit these. Fitting the optional retracts is very simple. Simply remove the covering to expose the wheel well and screw the retract unit into position with the included screws, then run the servo wire out of the wing at the root – job done!

Fuselage Fitting

Fitting out the fuselage presents no issues because of the ample space provided. There is a very large battery bay, which allows excellent access for the 5000 6S (22.2 V) flight battery. The servos for the rudder and elevator are fitted towards the rear of the bay. I used Spektrum DS821 digital servos as I had several to hand from previous projects. I used an Overlander 3300 mAh 5-cell 6 V Sub-C NiMH battery to power all servos and a Lemon 10 channel DSMX receiver instead of a separate SBEC because I was conscious I would need weight 'up front' for balancing. I fitted this battery under the motor box in the cowl (see photo).

Motor Fitting

The Dualsky XM-5060EA-8 brushless outrunner is mounted to a ply box that is supplied with the kit. This is bolted directly to the firewall, which has 'built-in' down thrust and right thrust. A ply template is provided, allowing this box to be fitted in the centre of the firewall so that the motor's prop shaft lines up when fitting the cowl.

I ran the three motor wires through the firewall into the battery bay where I fitted the ESC. As I was not using the on-board BEC I removed the red wire from the servo lead because I used a separate receiver battery.

The dummy motor is supplied painted silver. I spent an hour or so painting the motor with some fine black lines just to add a little more detail. The dummy motor is then adhered into the cowl with silicone. The cowl is then screwed onto the fuselage

Elevators

The two elevators are secured together with a steel brace, which is epoxied into each elevator 'half'. The elevator is then held in position via Mylar hinges, which are secured with super thin cyano. The elevator control horn is inside the centre of the tail section, meaning it is not visible, so adding to the scale looks of the model. The rudder is also secured into position with Mylar hinges and uses traditional nylon clevises to attach the control rod, which runs through the fuselage.

The tail wheel is mounted via a removable boxed section at the rear of the fuselage and again features enclosed linkages.

The build stages of the tail section must be adhered to in the correct order as stated in the manual. With the main assembly now complete it is simply a matter of selecting the preferred decals and applying them. I then went round the model with an iron to remove any blistering the covering had sustained.

Setting Up

The 63 page manual covers the entire setting up process: recommended dual rates, control surface throws, expo and C of G, all of which were set to the recommended settings. With the recommended 16 x 10 prop balanced and fitted the P-47D-1 was ready for flight.

Flying

As per usual the Northumberland weather meant quite a long delay from model completion to an actual flying opportunity. As soon as the weather improved it was time for a maiden flight. I had two Optipower 5000 6S (22.2 V) 50C LiPo packs fully charged so I could have at least two 'trimming' flights if required. With the said 5000 pack in position the model came in at a tad over 13 lb (5.89 kg), which is 1.5 lb (680 g) over the recommended weight. However, with 1480 W available I was not exactly worried that lack of power would be an issue!

With the wings plugged in, wired up and all relevant checks completed the P-47 was lined up into the easterly 10 mph wind and the throttle opened.

I was immediately impressed with the acceleration the model displays. It was literally airborne within a few feet; indeed the amount of power available was plenty to haul this 13 lb plus model through the sky with a lot of authority! Gaining decent altitude for the stall test took seconds. I am pleased to say the stall presented no problems as I 'ran out of elevator' before the nose dropped. No tip stall was evident.

The model required four 'clicks' of left aileron trim and three 'clicks' of right rudder, which I'm sure is down to the sheer amount of torque that the 16" propeller generates.

With the P-47 trimmed and stall tested it was time to see just what the model was capable of. Scale aerobatics are accurate and look very good. Loops can be very big from level flight, with stall turns and

bunts easily achievable. Slow barrel rolls look particularly impressive, as do fast, low passes, especially with the included ordinance fitted, which I left off for the first flight. Inverted flight requires very little 'down' elevator, meaning that the recommended C of G is accurate.

After seven minutes I called 'landing' and lined up the approach for a grass strip landing. The model came in very slowly with no hint of a tip stall and touched down very smoothly (if I say so myself). Upon checking the Optipower 5000 6S battery pack with a field capacity checker, I noted I still had 42% left in the battery. So eight or even nine minute flights should be easily achievable, as the model will cruise around on half throttle.

Conclusion

Hangar 9 has a good reputation for producing quality ARTF models and the P-47D-1 is no exception. Despite the electric version's weight it flies so well one would be hard pushed to fault it in anyway. It is well designed, well constructed and performs as good as it looks – a must for any warbird fans! ***RCMW***

Painting the dummy engine helps the scale effect

'Lift-off!' Lots of power from the Dualsky motor equals short take-off runs!

Fast passes look very scale like

About to touchdown with a perfect 'three pointer'. Stable slow flying characteristics make landings a breeze!

CONTACTS

BRIAN COLLINS:
bc002d1835@gmail.com

PETER VIDGEON:
pvidg@talktalk.net

OVERLANDER:
www.overlander.co.uk

HIMODEL WEBSITE:
www.himodel.com

DUALSKY:
www.dualsky.com

KINGS LYNN MODELS:
www.kingslynnmodelshop.co.uk

HORIZON HOBBY UK:
www.horizonhobby.co.uk

MODEL WORLD

MODEL INFORMATION

NAME:	P-47D-1 Thunderbolt
MANUFACTURER:	Hangar 9
DISTRIBUTOR:	Horizon Hobby UK
PRICE UK:	£292.99 (RRP)
MODEL TYPE:	Warbird
MOTOR:	Dualsky XM-5060EA-8 brushless
ESC:	110A brushless
BATTERY:	Optipower 5000 6S (22.2 V)
PROP:	16 x 10
CONSTRUCTION:	Balsa and ply

R/C FUNCTIONS

1: Ailerons
2: Elevator
3: Throttle
4: Rudder
5: Retracts (optional)
6: Flaps

SPECIFICATIONS

WINGSPAN:	67.0 in (171 cm)
OVERALL LENGTH:	58.0 in (147 cm)
WING AREA:	825 sq in (53.2 sq dm)
FLYING WEIGHT:	10.3-11.5 lb (4.7-5.2 kg)
ENGINE:	0.61-0.91 2-stroke, 1.00-1.25 4-stroke, 15 cc 2-stroke petrol
ELECTRIC MOTOR:	Power 60
RADIO:	5+ channel radio system (6+ channels for retracts)
SERVOS:	7 standard servos required (6 for EP)
SPINNER SIZE:	1.0 in (25 mm) spinner nut included

Dislikes

Covering blistered (easily resolved with an iron)

Likes

Build quality, attention to detail, performance

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Towrag Goes Electric

Frank Skilbeck relates the build of a new aerotow tug for the Newent & District Model Aircraft Club

About 18 months ago we built the John Greenfield designed Ampley electric glider tug for use down our local flying field, electric being used as our site is noise sensitive. This was used successfully for a summer but on one outing it had an unfortunate incident with a metal sheep feeder on our field!

While we could have rebuilt the Ampley, I remembered that I'd bought a set of plans for Keith Humber's Towrag biplane V-tailed towplane some 25 years ago (Traplet plan number MW2125). With a wingspan of 76 inches, Towrag was designed for a .90 four-stroke and capable of towing up 100 inch soarers. Digging out the plans, which were in good condition, having been stored in a brown envelope, I overlaid the Turnigy SK6364 245KV motor rescued from the Ampley, along with the 8S (2 x 4S in series) 5,000 mAh LiPos, over the plan, which showed that changing from a .90 four-stroke to this setup would be relatively straightforward.

The increase in power from a .90 four-stroke of maybe 1.4 hp to the electric set up, which we knew could develop 1800 watts (2.4 hp) and turning a bigger prop, would also give a performance boost that would be ideal for the three to four metre scale gliders we wanted to tow.

Towrag was built after our Ampley lost its argument with a sheep feeding trough!

Build Team

I took the plans along to one of winter building sessions in our club building room and soon I had co-opted a couple of club mates to help with the build. We closely followed the plan, with changes limited to accept electrification and also a couple of other modernisations by placing the aileron servos in the wing, having the V-tail mixing at the transmitter instead of a sliding servo arrangement and making use of a steerable tail wheel rather than a fixed one.

The undercarriage was also changed from a dural plate design to one fabricated from piano wire, as we had the services of another club member to fabricate one of those.

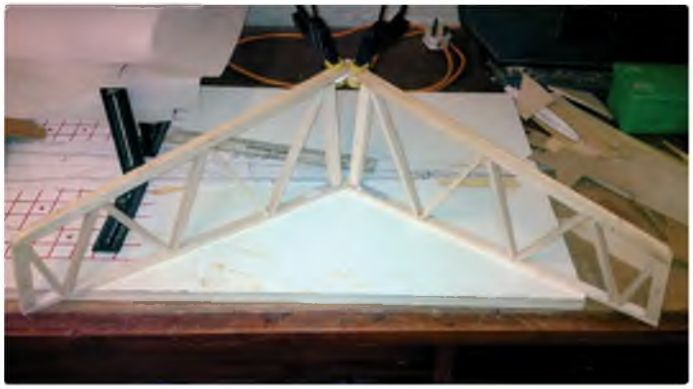
Rather than give a step-by-step building description we'll concentrate on the changes from the original. If anybody wants more details on the original they can be found in the March 1987 issue of RC Model World.

The V-tail and main wings were built as per the plan, with the exception of moving the aileron servos into the wings rather than having them mounted centrally and driving torque rods. This was to reflect modern thinking and also provided direct linkages to the ailerons. Also, having separate servos allowed programming of aileron differential at the transmitter.

The main fuselage was built as per plan up to the engine bulkhead, the main changes being to add a removable battery tray, battery access hatch and cooling for the battery and ESC. The battery hatch was simply cut out after the fuselage had been built and then reinforced. After some head scratching on how to hinge and secure the hatch, we made it removable and held it in place with some strong magnets, with a couple of small ply tabs to allow it to be easily removed. This has worked well in practise.

A 6 mm thick ply battery tray was made

Fuselage construction is conventional and straightforward



The V-tail is a simple built up structure

Fitting stringers to the turtle deck

Towrag was a collaborative build

Completed model in the club workshop

to sit on two runners on the fuselage floor so that the battery weight was transferred directly to the main undercarriage and not through the fuselage sides, ready for those less than perfect arrivals.

The ESC sat under the battery tray, with a cooling slot made in the engine bulkhead to allow for some airflow over the battery and ESC. It also provided access to run the cables between the motor and ESC. The stringers just behind the cabin area were filled in and an opening made on either side for the warm air to exit.

Power Pack

As mentioned in the introduction the original Towrag was powered by a .90 four-stroke, in the prototype's case a Webra T 90, which wasn't renowned in the day for excessive power. Keith Humber had noted that a 1.20 would probably be needed for towing 1/4 scale models. Our power set up is a Turnigy SK6364 245KV motor with a Castle Creations 75 amp ESC, which is capable of handling an 8S LiPo pack. On our Ampley this had delivered around 60 amps at 30 volts, giving around 1800 watts, and so we elected to go with this again.

The IC installation had used hardwood engine bearers, with the motor mounted upright and the cowl shaped to taper right up to the propeller spinner, giving a pointy shaped nose. The large diameter outrunner we were using prohibits this design so we mounted the motor on 4 mm diameter threaded rods back to the bulkhead so that we could adjust the motor stand-off and also the thrust.

A larger squared shaped cowl was made from ply and balsa block. A large air inlet was fashioned to direct air onto the motor, ESC and battery. And having had success with the magnets for the battery hatch the cowl was held in place with a couple of guide pins and magnets again, an idea which I copied from a Chris Williams' electric ASK 11 motor glider I'm building at present (Traplet plan number MW3657).

Snakes were used for the V-tail ruddervators, hooked up directly to the servos in the main cabin and supported down the fuselage for a slop free control run. A separate tail wheel servo was fitted in the underside of the fuselage, just behind the lower wing, with a closed loop connection to the tail wheel. Transmitter mixing allows the rudder stick to control both the ruddervators and also the tail wheel.

A tow release was made using a tube in tube design, with a 3 mm diameter tube offset inside a 12 mm diameter tube with 'Weld It' metallised epoxy. A slot was cut to about 40% diameter and a 3 mm steel rod connected to a strong servo was used as the release. The tow release was fitted into the fuselage at the rear of the top wing in the same position as on the original, just requiring a slight modification to the top wing to clear the tow release.

The model was covered in RAF trainer yellow, with control surfaces in contrasting red heat shrink polyester film for good visibility. The cowl was sprayed silver for some contrast. The windscreen and windows were cut from some clear Perspex offcuts.

Rear three quarter view. Note the closed loop control to the steerable tailwheel, warm air outlets behind the cabin and the tow hitch at the rear of the top wing

The cowl has large a air inlet to cool the motor, ESC and batteries

The motor is mounted on threaded studs fixed to the bulkhead with captive nuts, with a slot for ESC cooling and routing motor wires The slot at the top is used for fuel tubes on the original model but provides cooling air to batteries in the electric conversion. The cowl is held in place with magnets and alignment pins

Plenty of room for twin 4S 5000 mAh batteries and a 150 amp telemetry sensor. A 10S pack could be used for more power

The tow hitch is a simple 'pin in tube' type, actuated by a servo in the fuselage. Note the swivel on the tow line

Two of the build team pose for a pre-maiden photo

A steerable tailwheel makes taxying easily

All Out

The final model when fitted with either an 8S 5,000 mAh or 4,000 mAh battery balanced within the recommended Centre of Gravity positions. And the all up weight with the 5,000 mAh batteries and an 18 x 10 APC E propeller was under 6 kg (around 13 lb) according to some spring luggage scales I have. On this set up the motor pulled 50 amps, based on the installed telemetry sensor, so around 1500 watts, slightly less than the Ampley. But this is because we were running a different propeller. The same luggage scales showed that static thrust was around 6.5 kg.

The first test flight was done without a glider on tow and the Towrag leapt into the air and climbed away with authority. The only issue was the tendency to nose up under power, showing that a little more down thrust would be beneficial. However, rather than adjust the motor mount a little down elevator was mixed in with the throttle to overcome this. The overall flight characteristics are a delight. Towrag flies very well and is quite aerobatic, rolling and looping with ease. The controls are well harmonised and the large wing area allows it to be slowed down before the gentlest of stalls, just what you need in a tow plane.

The biplane configuration also provides plenty of drag, so diving for the runway after releasing the gliders doesn't build up much speed, making for a pretty quick turnaround if you've got a couple of glider pilots in the queue.

Flushed with success, we hitched up a Seagull three metre Pilatus B4 scale glider and fitted a set of fresh batteries. Right from the off it was obvious that Keith Humber had designed a good 'un, the tow to 1,000 feet or so was uneventful and showed that even with this low power set up the Towrag wouldn't be too troubled with larger models.

To date we've done a few tow sessions with 3 m scale gliders and a tow to 1,000 ft, followed by a circuit to drop the tow line (to prevent it from becoming an arrestor line on the hedge at the end of our runway!) and landing uses around 1300 mAh. So three tows to 1,000 ft on the 5,000 mAh batteries are easy. A temperature sensor monitoring the ESC temperature shows this rises about 7-8 deg C above ambient, showing that the cooling provided is adequate.

Should more power be required a 10S LiPo pack would fit into the fuselage and on our motor set up would give around 2,300 watts, just over 3 hp. This maybe something to try in the future if any glider guiders feel confident with larger models at our patch.

Acknowledgements

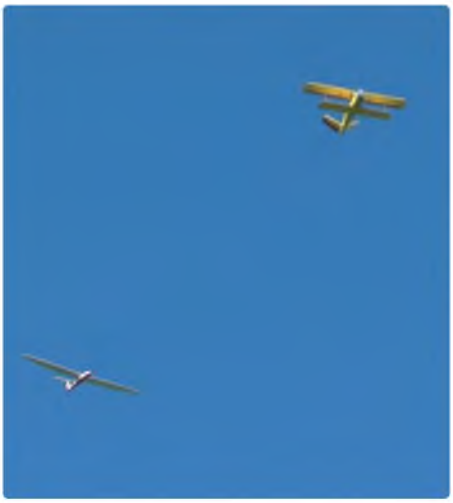
As stated earlier the Towrag was a joint build and my thanks go to fellow club members Dave Keen and Andy Parsons for seeing the project through from inception to completion, and also to Dave Stockings for making up the undercarriage.

The exercise was so enjoyable that the team has now expanded and we are onto a Mike Trew 3.3 m Slingsby T-21 (Traplet plan MW2208) that I bought at the same time as the Towrag plan. This should go well when towed behind it! ***RCMW***

Climbing away on the maiden flight

On a slow flyby. Towrag has impeccable manners in flight

'No drama' landings makes Towrag perfect for the rapid turn around required for aerotowing



Aerotowing to 1000 ft or so presented no problems

Towrag is pleasingly aerobatic and loops and rolls with ease

Coming back round to drop off the line after a successful tow

Pilatuses (Pilati?) queued up for aerotowing

A Pilatus about to alight after a thermal hunting session

PLAN DETAILS

PLAN NAME: Towrag
BUILD CATEGORY: Intermediate
PLAN NUMBER: MW2125
PLAN PRICE: £13.50

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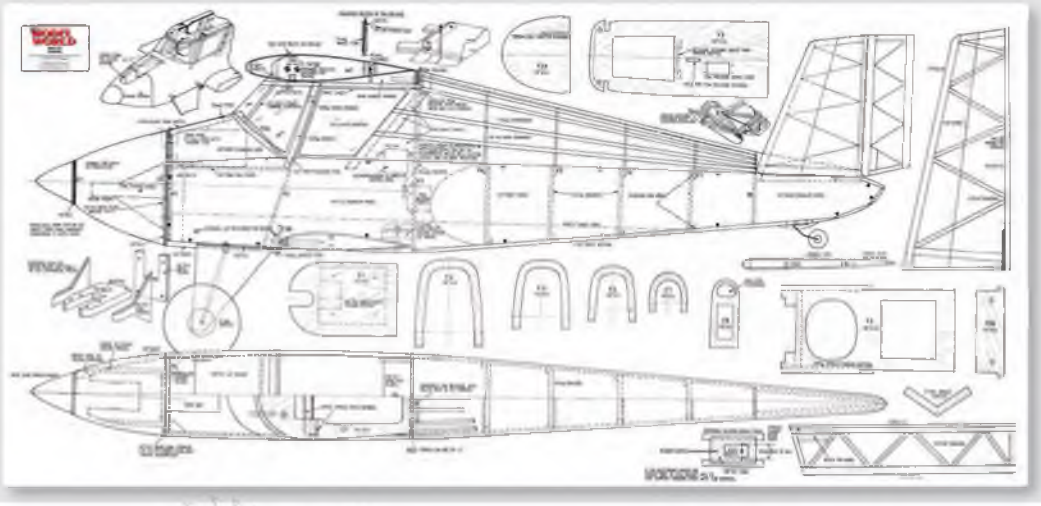

Alouette III SA 316

Michel Maisons describes his low cost conversion of a T-Rex sport helicopter into a realistic scale model. Additional photography by Jonathan Maisons

In its red livery the Alouette is a real eye-catcher and the visibility in flight is excellent

Pleasure flights in an Alouette III piloted by Jean Boulet above the Mediterranean coast and with René Romet around the Mont Blanc are stunning experiences! You take-off from the airfield of Blois in Chamonix, flying above the Bossons Glacier's deep seracs before heading up to the Aiguille du Midi, slaloming over the White Valley and the Sea Ice, between the Grandes Jorasses and the needles of Chamonix. What a great day!

I tried to revive these memories by producing an R/C model of the magnificent Alouette III.

About The Alouette

The Alouette III was developed by Sud Aviation to replace the Alouette II. It uses the same main dynamic components but on an improved scale, allowing it to expand its field of use and performance. The first version (SE-3160) made its first flight on February 28, 1959, piloted by Jean Boulet. The SA-319 version appeared in 1970 with a more modern and less greedy turbine. Production in France was stopped in 1975 after 1455 examples were built.

The Alouette III is very versatile and is used by many armies in combat configuration and for search and rescue. It was one of the first machines to be equipped with weaponry as standard. Also very present in the civilian world, the Alouette III is used on sea and land for a large number of purposes, ranging from VIP transport to road surveillance.

It was one of the top mountain rescue helicopters of its time; all mountaineers knew of the red Alouette III of the Civil Security. This machine has now retired from operation around Chamonix and has now been replaced by an Airbus Helicopter H145. But Alouettes are still in service with the French Navy, as well as in several armies around the world, and by some civilian companies.

I decided to customise my T-Rex 600 trainer with a fuselage of the Alouette III, manufactured by two talented modellers, Gilbert and Kevin Escalier. The challenge was to show that everyone can gain access to the world of scale models despite a reduced budget and a short schedule. The T-Rex 600, when equipped with two-bladed main and tail rotors, costs around 600 Euros; you have to add 250 Euros to buy the fuselage and around 50 hours of assembly work before you can perform the first flight.

To replicate the configuration of the full size Alouette you have to retrofit the mechanics with a tri-bladed main rotor, complete with electronic stabilisation, and a three-bladed tail rotor. The additional budget for this upgrade is estimated at 400 Euros.

After the first flights the cockpit can be customised by fitting seats and an instrument panel etc. The turbine can be supplemented with various pipes and basic equipment added to the fuselage, such as pitot tubes, VHF radio antennas, VOR etc. And last, but not least, the red livery needs to be applied, complete with logo and decals.

Despite its small size the Alouette has great presence in flight

Kit contents. The precisely moulded fuselage and cockpit ooze quality. Note the horizontal and vertical lips on the front fuselage that help stiffen the structure

The donor – a T-Rex 600 training helicopter

Concentrating hard during an early take - off

Assembly

I analysed the customisation options offered on the Internet and made up my mind. Then I placed an order at escalierkevin@gmail.com and three days later Santa (or more accurately, the postman!) brought the parcel. He dropped off a large cardboard box containing the fuselage, a plastic thermoformed bubble canopy, the central part of the main landing gear and the dummy turbine. All perfectly packaged and exhibiting excellent workmanship, and with assembly instructions illustrated with many photos. It now only needed elbow grease to assemble all these components!

Main And Forward Landing Gear

The central part of the main gear is provided by four soldered tubes, which need to be bolted to the wheels and fuselage. The shock-absorbing legs are formed using two aluminium tubes (of 10 and 8 mm outer diameters) that slide within each other; the suspension is obtained with an internal spring. The legs are attached to the sides of the T-Rex mechanics by flattening the ends of the four tubes. For the front, I cut two rectangular aluminium parts, 2 mm thick, that I fixed onto an aluminium tube. The shock absorber is made with a spring that connects the landing gear leg and wheel forks. The three wheels have a diameter of 45 mm.

Integration Of The T-Rex

The fuselage is light (750 g) but has a torsional stiffness so no additional reinforcements are required, owing to Kevin's moulding technique. Fibreglass fabrics are draped to form an integrated lip on the front and the horizontal part of the cockpit. The cockpit canopy is removable and this design allows excellent access to the mechanics and facilitates its easy installation in the fuselage. It also helps with future maintenance tasks.

The quality of the casting is remarkable, with carbon reinforcements around the canopy. The first task is to cut out the locations of the windows of the cockpit with a steel or carbon disc. This front part must be accurately adjusted to the fuselage and then the connection is made with pins, using pop rivets bonded with epoxy. Rubber blocks stuck inside lock the pins. The bubble canopy is fixed inside the cockpit with screws.

It just remains to install the T-Rex 600 mechanics. From the donor helicopter you have to remove the canopy, landing gear, horizontal and vertical tail surfaces and rear gearbox, along with the tail rotor. The mechanics are positioned in the fuselage, which requires cutting the top and the rear of the tail boom to fit the gearbox and the tail rotor. Then attach the frame to the bottom of the fuselage using four hex screws at the location of the fixings of the landing skids of the T-Rex.

An additional fastening to the upper part, at the level of the turbine, serves to prevent any transverse movement of the rotor hub. The axis of the rotor hub must be tilted 3° to the front by means of shims inserted under the chassis. Next, fit the rear gearbox and screw the dummy turbine onto the fuselage. Then cut a GRP or carbon plate for the cabin floor. The cockpit (instrument panel and seats) will be fitted after the first flights. The engine's airflow enters under the false turbine and exits through a hole drilled in the fuselage bottom under the engine to give an efficient cooling system.

First Flight

To reduce the pilot's stress the first flight was done in minimal configuration before painting and customising the cockpit. The two-bladed main rotor was stabilised by a Bell-Hiller bar (flybar) and using the original tailrotor blades. I took advantage of a sunny morning with no wind to carry out the first tests in my garden. After checking the radio's range and the direction of the flight controls, I then started the main rotor and checked for any ground resonance, caused by a coupling between the frequency of the tricycle gear and torsional mode of the fuselage during spin-up. The main rotor reached its rated speed of 1500 rpm without encountering a resonant frequency.

I pushed the collective stick forward and found that the extra weight required me to increase slightly the pitch from the previous trainer settings. I added one degree using the knob of my transmitter dedicated to finely tuning the collective pitch. The bird rose and stabilised in a steady hover one metre from the ground. The absence of any need to track the blades or adjust the trims showed that everything was okay. But the size of my garden prevented me from continuing the test flights.

The next day the test flights were resumed on an open site near my house. After take-off, two minutes of hovering was followed by some simple manoeuvres to take photos. Then, with a bit of forward cyclic, the Alouette transitioned into forward flight without any notable difference in behaviour from the T-Rex 600. The extra kilo brings inertia, which makes the flight very realistic. Although small the Alouette has a lot of presence in the air!

Conclusion

The goal of many beginners is to learn to fly and master a model that looks like a real helicopter. But there are two problems – time and money. Learning to fly takes a long time and could be expensive if there are too many destructive 'arrivals'. The excellent 'price to quality' ratio of the Alouette reviewed here allows affordable access to the fantastic world of scale models. The clever design of the fuselage and the quality of its construction allows a good balance between structural strength and low weight. Thanks to the removable cockpit, accessibility to the mechanics for maintenance tasks is easy, which is rare with a scale model.

The assembly work is reduced because the torsional strength of the fuselage prevents the need for reinforcement with additional parts. The integration of the T-Rex 600 mechanics is easy and only a little patience will be needed to make the necessary cuts in the upper part of the fuselage. The clean finish of the fuselage avoids the need for any long and tedious preparation before painting.

Also, a model of such modest size poses no transport problems and the financial stakes, in case of a crash and any reassembly time required, is minimised. Consequently the stress for the pilot is much less than for a more costly scale model.

With this customisation you can be sure to keep the costs very low and enjoy a fabulous scale model.

RCMW

Transitioning into a circuit

The flying qualities of the Alouette are almost identical to those of the donor T-Rex 600 but the additional 1 kg increases inertia but induces more drag

A smooth flare to cut the horizontal speed

RC MODEL WORLD

TECHNICAL DATA

WEIGHT

Fuselage (750 g), plus T-Rex 600 mechanics (3.4 kg), plus painting equals 4.5 kg

FLIGHT PERFORMANCE

With a 1.35 m rotor diameter lifting 4.5 kg the aerodynamic load is: 4.5 kg/1.35 m^2 = 3.3 kg/m^2 The flying qualities remain satisfactory, even with a two-bladed rotor

FINISHING

After preparation of the fuselage (only a light sanding is necessary owing to the quality of the gelcoated surface) red paint was sprayed on and a white band added

SPECIFICATIONS

WEIGHT:	4.5 kg
ENGINE:	Align 50
DRIVE GEAR RATIO:	8.5/1/4.5
ROTOR RPM:	1500-2200
MAIN ROTOR DIAMETER:	1.35 m
TAIL ROTOR DIAMETER:	240 mm
FUSELAGE LENGTH:	1.3 m

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Fiesler Storch

Phillip Kent describes the new Fi 156 from John Kidd

John's Storch features a silver soldered tubular steel front fuselage forward of the cockpit

The wings and tail use conventional built up balsa, spruce and plywood construction

The first BMFA Scale Competition took place at Pontefract Park, the home of the PANDAS club.

On my arrival I was immediately impressed with the new quarter scale Fiesler Fi 156 that was being assembled by John Kidd. The model cleverly breaks down into component parts that can be easily fitted into John's car. John has based his model on the full size example owned by Peter Holloway that can be seen in the Shuttleworth Collection at Old Warden. It has a wingspan of 140.25 inches and uses a 50 cc CRRC Pro petrol engine for power.

The construction uses some typical model aeroplane structures but does have a silver soldered tubular steel front end for the fuselage forward of the cockpit. The engine detaches for transportation using just four bolts to hold it in place. The engine mount is another excellent piece of the modeller's art; another silver soldered steel tube structure. The cowl is from glass reinforced plastic with litho side panels, with the moulds being made by John.

The undercarriage is a fully sprung working unit that took up the bumps superbly when landing on the less than perfect grass runway at its competition debut on Sunday. The wings and tail unit are of typical built up model construction using balsa, spruce and plywood for the ribs and spars.

This new Storch is the fourth model aircraft that John has produced in his R/C flying career and we hope to see more of this super model at more scale events this season. **RCMW**

The Fiesler's undercarriage is fully sprung

Built to quarter scale the Fi 156 has a wingspan of just over 140 inches and is powered by a 50 cc petrol engine

Making A Replica VW Engine

Chris Bowler describes the evolution of a 3D printed aero-engine for his new Turbulent project

Front view of the dummy engine halves when inserted into the cowl. Only one set of exhausts has been fitted at this stage

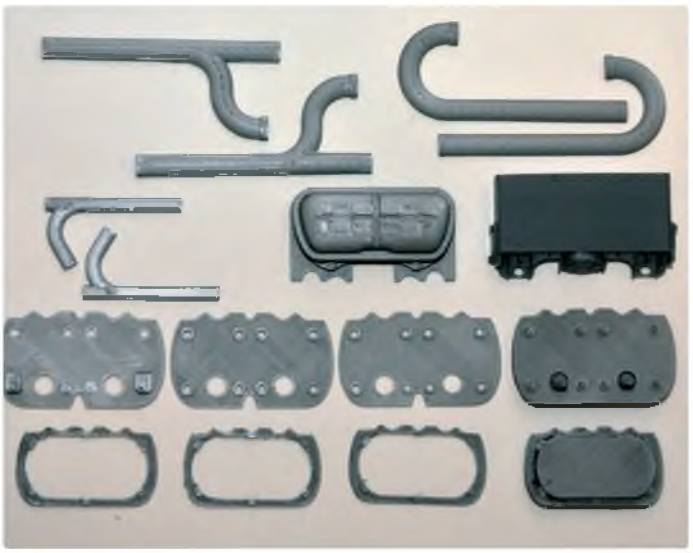
Scale modelling in any form requires a certain attention to detail and in the case of some light aircraft the engine is one such item. Many of these types use the Volkswagen air-cooled flat four and one project has just such a motor. The Druine Turbulent has exposed cylinders and exhausts that are a major feature on the nose of the aircraft.

There are of course variations; some have Siamese type exhausts, others have pairs of straight through pipes either side and some feature clad silencers. And there are those that are shaped like the old Burgess style exhausts that were a major feature of Triumph motorcycles of yore!

Versions And Methods

There are quite a few versions of the Turbulent, to different scales, in the RCMW Plans Guide, ranging from a pair of smaller versions at 36" and 37" span (MW3014 and MW 2930) to larger versions (MW 2017 at 57" and MW3440 at 63").

All feature the VW engine, as you would expect. These models can now be either



Components that make up the engine

Base of upper cylinders with spark plugs and locating pillars for cylinders

Using a balsa 'cushion', carefully clamp the cylinder shims in place

Top of the rocker box scored prior to gluing

electric or glow powered; the latter may be favourite with the smaller versions but these days even large models can be equipped with more than adequate electric power.

To produce a convincing replica meant cutting layers of ply for the cylinder fins to be slid over balsa blocks to form the shapes, then carving balsa block for the rocker covers. A considerable job and with the smaller models it is rather fiddly.

Now this is a perfectly acceptable way of producing a replica engine. But in this day of innovation I had considered a different approach - call it one of those light bulb moments! In a recent RCMW an article appeared, written by Mal Luff, regarding 3D printing and the amazing items it could produce, such as the various machine guns for WW1 models produced by Mal and available from the Traplet Shop. (And now WW2 gunsights too! - KC)

So why not an engine?

Is It Possible?

First things first, I contacted Mal and asked if it would be possible to produce a scale VW flat four? His immediate response was, "What size?"

So there we have a germ of an idea beginning to flourish! After several discussions the engine size was fixed at approximately third scale, with Siamese pipes joined behind the block and exiting just aft of the cowl rear. I am grateful to Dave Lowe who supplied some scale drawings of the engine for reference.

I am fortunate enough to have more or less open access to the full size Turbulent being restored by fellow modeller, David Huck (see RCMW, January 2015). So I took the trusty Nikon and photographed the uncowled full size engine, with a 12" rule propped against it (apologies to you metric types!). Front and side views were taken, plus a couple of detail pictures, which were then emailed to Mal, who describes the next stage in the adjacent sidebar.

Prototype

In due course - quite speedily actually - an image of the computer model was sent to me and it looked excellent. The next step was to print a prototype to evaluate and then to produce the actual unit. However, the prototype was more than acceptable for my purposes.

The first printed versions arrived in 'kit' form, with the upper cylinder blocks formed and a separate set for the lower fins with a central core to glue them to and the cylinder head and rocker cover ready to glue together. I used five minute epoxy glue, which worked very well on the material, making a very firm bond.

The only addition I made was to drill the exhausts, exhaust ports and joiners to take plastic locating pins to make final assembly easier and to produce a slightly stronger joint. The lower cylinder's central block was covered in glue and the fins slipped over into place. To keep them firm I used a piece of balsa as a 'cushion' while clamping them to the bench to keep them in place.

Some quite minute detail was present on the reproduction of the spark plugs; they looked totally authentic when white paint was added: A tribute to the fine detail that can be accomplished with this form of manufacture.

The 3D Process

When designing a 3D printable scale model you should gather as much reference material as possible. Photographs are very useful but three view drawings (with dimensions, if possible) are like gold! Studying the reference material should enable you to divide the subject up into separate parts suitable for 3D printing (Fig 1).

Factors which will guide your approach:

Getting the scale right is obviously important. I always find it simpler to model in full size dimensions (Fig 2). Then, when the model is complete, re-size it. Surface details on large areas (nuts, bolts, rivets etc) can be quite fine but stand-alone areas will not print well if they're much less than about 1 mm thick.

All parts need a flat base, so circular items such as the exhaust pipes are split along their length and printed in two halves.

Avoid big overhangs. Printers can cope with small overhangs fairly well but if you try to extrude filament into thin air you'll just get a horrible mess. Intelligent design can usually avoid the problem altogether. Complex areas like the cylinder head cooling fins would not print well as a single object so each fin is printed separately flat on the base. A 'spacer' is added to give the required separation when assembled.

3D modelling is a skill well worth acquiring. And with it you'll be able to design and print just about anything you can think of.

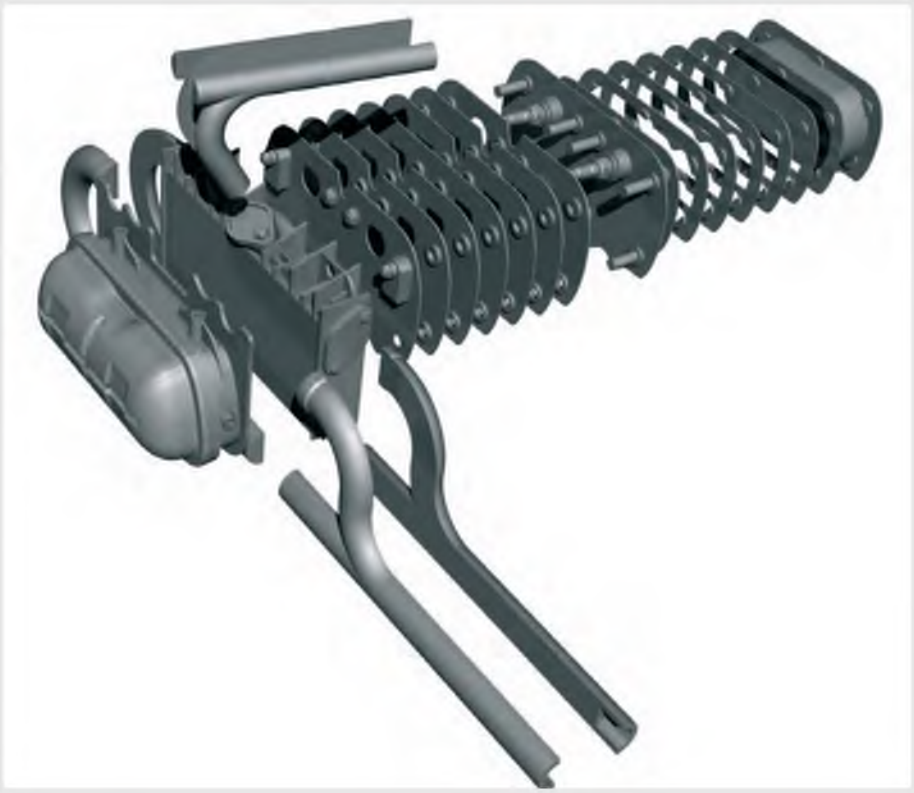


Fig 1 - The separate components used in the complete model. It looks a lot but many are duplicates and print quite quickly. The opposite bank is identical, with the exhaust attached the other way round

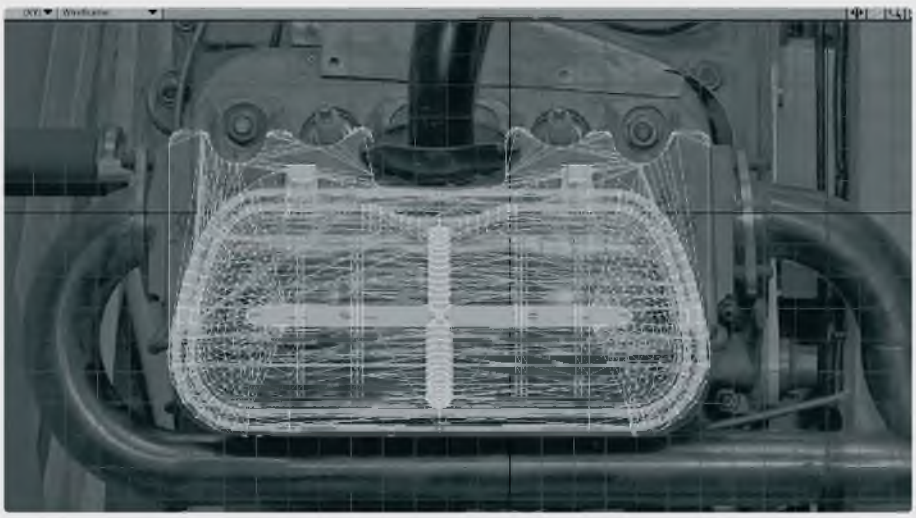


Fig 2 - Modelling the front block and rocker cover using one of Chris' photos as a background reference. The software is NewTek Lightwave 3D

Rocker box mated with cylinder head and primed in grey paint

Mal's computer generated 'model'

Finishing

Prior to colour spraying I gave the units a coat of grey primer from a motor accessory shop spray can.

I did a check spray on the prototype using Revell enamel paint, thinned with 30% white spirit. It sprayed well using my mini compressor and airbrush.

With that test complete I sprayed the whole thing silver, painting the exhausts separately. Spraying causes a bit of a workshop 'haze', so I made up a mini spray booth using an old cardboard box. It was ideal but is only fit for one-off use. The white painted spark plugs were protected with unheated heat-shrink tubing during spraying.

With that done it was case of epoxying in some studs (4 mm bolts with the heads removed!) into the base of the units, and then making up an alloy bracket to fix them to using self-locking nuts. Since the cowl is at an angle towards the nose the mounts inside it had to be at different heights. Duly measured and checked, they were epoxied into the cowl after apertures had been very carefully opened up to clear the replica engine, using templates to ensure accurate positioning. These brackets had been pre drilled and test fitted more than once to ensure accuracy before final fitting.

Once the units were in place the exhausts were added, along with the black inlet manifold. To complete the installation plug leads were made from leads taken off an old headset, with the ends 'bulked up' with heat-shrink and super-glued to the plug caps. They look quite realistic.

Spark plugs protected with heat shrink tubes (used cold) prior to painting

My very home-made spray booth

Engine assembled and primed. Note the white spark plugs

Finished units minus plug leads. Be sure to make opposite units!

Conclusions

I was surprised at how long it took to construct the units. But I think it was considerably less time, and certainly to a better finish, than this modeller would have attained using ply and balsa! They could have been a lot better had I spent time sanding and fining down the print markings but I thought the striations made it look a little more 'real'. Maybe it's just me but the option is there to work them up to a shiny finish!

A couple of surprises arose involving drilling for the locating pins. The material tended to melt a little, even with a slower drill speed. And due to the nature of the construction interior webs tended to make the drill wander. Not a real problem, but one to be aware of.

The big plus, of course, is the fact that with this prototype complete and the computer programme in place this VW replica can be made to different scales for different models.

It was certainly a good idea, executed brilliantly by Mal and his machine! And similar ideas can be yours to bring to fruition, as it was made with one of Traplet's own 'FISHER DELTA 1.0' 3D printers. If you are very keen and a computer buff you can purchase a Fisher Delta printer from Traplet to 'Do It Yourself' - plus whatever other projects from your imagination you may wish to try. Visit this link for more information:

gb.trapletshop.com/3d-printing-2

Replica Model Engine!

As a conclusion, and to give an idea of what is possible, a club member turned up at our flying site with what appeared to be a glow powered Ugly Stik.

So what? The give away was the electric prop driven by a hidden brushless motor! I don't know if the 'glow motor' was a plastic moulding or a 3D print but convincing it was!

It looks like the future might be 3D for a whole host of accessories! ***RCMW***

Plastic locating pin for exhaust stub. A wooden one would suffice

Clamping the exhaust halves while the glue sets

Using a template and Dremel tool to cut out the aperture in the cowl. Take care here!

Mounting plate, with the engine unit attached through the cowl

A mini compressor and airbrush are very handy when painting 3D printed parts

Check fit of the exhaust and inlet manifolds

Looking good on the side of the Turbulent cowling

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3-Way

This 1320 mm span multi-configuration, all-Depron model, designed by Anthony Bennett, uses two wings and one fuselage to create three different models – a hi-winger, low winger and a biplane. 3-Way is powered by a 400 watt electric motor and suits three or four function R/C

Feature Plan

Wing centre section from 6 mm liteply doubles as the wing mount

RC MODEL WORLD

At A Glance

WINGSPAN:	52 in
LENGTH:	42 in
MONOPLANE WEIGHT:	2 lb 11 oz
BIPLANE WEIGHT:	3 lb 4 oz
MOTOR:	400 watt
ESC:	40 amp
BATTERY:	3S 2200 mAh LiPo
PROPELLER:	11" x 5.5" APC-E
CONTROL THROWS:	
Rudder - 20 mm each way	
Elevator - 25 mm each way	
Ailerons - 15 mm each way	

While struggling to load the car with models for a varied days flying I wondered if it might possible to load only one model and yet maintain the same amount of fun. Enter the 3-Way, a multi-configuration model using two wings and one fuselage to create a hi-winger, a low winger and a biplane. Three aircraft, but only one model!

To reduce cost and weight it would have to be built from Depron, with local reinforcement where required. It would be powered by an electric motor and be of a small enough size to fit fully rigged in the boot of my car.

I decided on a wingspan of 52 inches as a sheet of Depron is 48 inches long and the panels could be cut from one sheet of 3 mm thickness. The fuselage would be made from 6 mm Depron, as would the ribs and formers.

I would use liteply where I needed more strength, such as for dihedral braces and U/C mounts, but its use would be kept to a minimum.

To my great surprise it worked, so let's get on with the build.

The Wings

Each wing is made from 3 mm Depron sheet, with 6 mm Depron ribs and two Depron/balsa composite spars. The centre section of each wing is made up from 3 and 6 mm liteply, as are the wing bolt plates and the dihedral braces. No wash out or wash in was required, so the wings can be built flat on the work surface. When complete the tips are jacked up to set the dihedral and the braces are glued in place. I used PU (Polyurethane) glue for the latter as it foams and gives more support to the joint than UHU-por.

Only one wing has ailerons. If you decide to add them to the other wing, let me know how you get on!

The most important part with the wings is to make sure that the wing bolt plates are in exactly the same place in each wing as the wings have to be interchangeable for the model to work as intended.

The spars are made up of 6 mm Depron cores with 3 mm balsa strips stuck top and bottom; the balsa gives the spar its strength while still keeping it light. I used UHU-por to glue the spars together as well as gluing all the ribs and spars to the lower Depron skin.

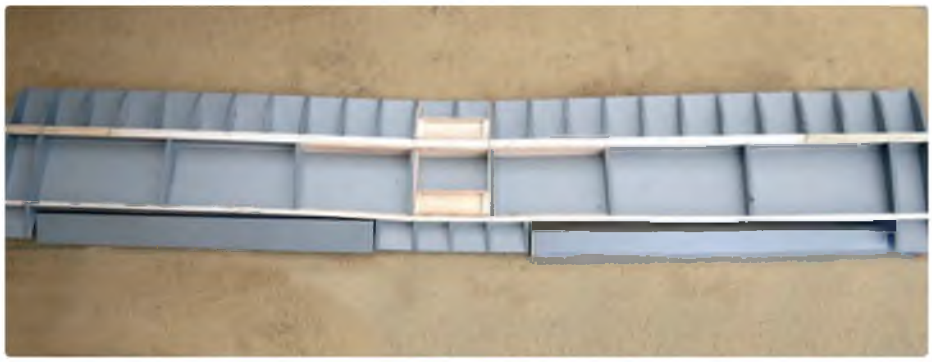
Cut two holes in the wing to take your choice of servo and line the inside of the holes with Depron for strength. Run the servo wires through the wing and out of the centre section. Do remember that they need to be able to exit the wing through the top and bottom skins, to allow for the different model configurations.

When happy with the wing internals sheet the top of the wing with more 3 mm Depron and add the built up tips.

Make up the ailerons from 3 mm Depron skins with 6 mm Depron ribs and a 6 mm x 6 mm balsa strip for the hinges to fit into. Add a small block of 6 mm balsa for the control horn mounting.

Add a strip of 3 mm balsa to the rear spar to take the hinges for the ailerons. The non-aileron wing will not require this strip. I fixed my hinges with CA glue and pinned them with cocktail sticks for extra security.

Wing spars and lower surface



Aileron wing construction

Finished aileron wing

Stage one of the fuselage construction

Opposite side of the fuselage is attached

Fuselage

The fuselage sides are cut from a single piece of 6 mm Depron foam. The non-load bearing formers are cut from 6 mm Depron. The formers around the wing mount, U/C, battery bay and motor mounts are made up from 6 mm Depron and liteply. I used CA glue for the liteply and UHU-por for the Depron. 'T' nuts can now be added to the insides of the 6 mm liteply for the wing bolt plates, remembering that they must match the holes in both the wings.

On a flat surface for support, glue the formers and the completed wing mount, battery bay and motor mount sections to the inside of one of the fuselage sides. Make sure the formers are vertical.

When dry add the other fuselage side, pulling the tail and nose in equally.

Cut the holes in the servo tray for your choice of servos and then run the snakes down the fuselage and out the sides where needed. Sheet the underside of the fuselage with more 6 mm Depron, leaving the wing mount and ESC areas open. The ESC area can be covered once the ESC has been fitted. You will need to cut a small hole to allow the ESC to 'breath' and this can be covered with a simple curved 3 mm Depron to form an air-intake and exit.

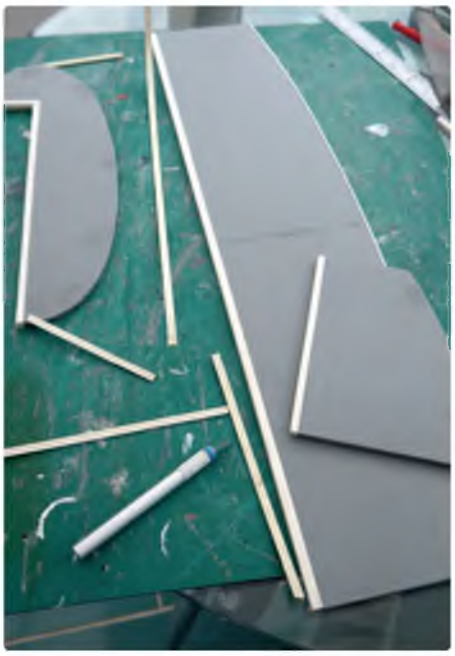
Make up the battery hatch and retain it with a ply tongue under the front and a magnet at the rear.

Fit the motor (I found 400 watts to be plenty big enough) and add the Depron side cheeks. Leave the fuselage top until final assembly of the model.

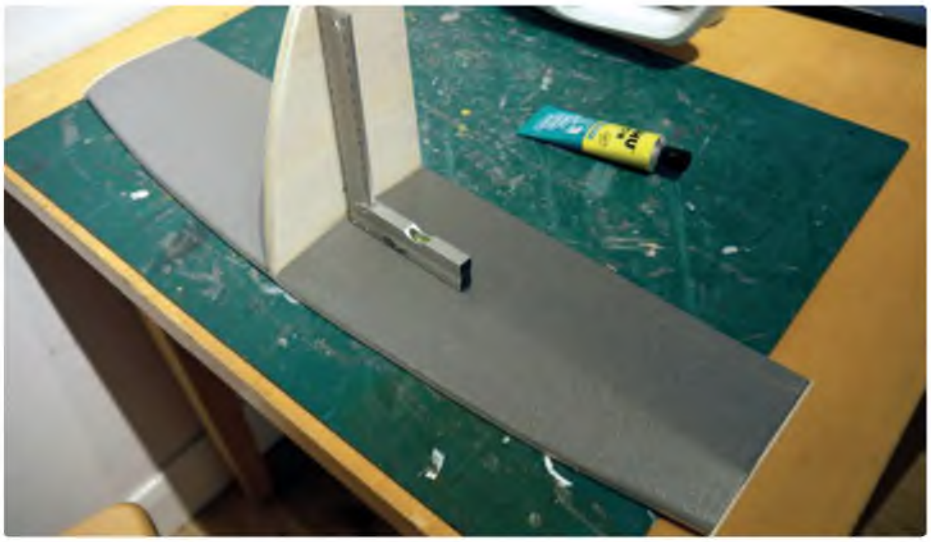
Make up the removable section that fills the gap where one of the wings would be if you are flying the monoplane versions. Add the retaining magnets (epoxy worked well for me) and test for fit. It should be tight and should need a good tug to remove it.

Empennage

Make up the tailplane by cutting the shape from some 6 mm Depron, add a 6 mm x 6 mm balsa spar at third chord, then glue on the 3 mm Depron top skin with UHU-por. Add the 9 mm x 3 mm balsa trailing edge, sand the leading edge to shape and it is done!



Tail parts ready to assemble



Gluing the fin to the tail using an engineer's square for accurate alignment

Non-aileron wing before covering the top surface

The elevators are cut from 6 mm Depron and sheeted both sides with some 1.5 mm balsa. Sand them to shape and add the hinges.

The fin and rudder are built in exactly the same way as the tailplane and elevators. Glue the fin to the tailplane, keeping it square and vertical. And that's it!

Final Assembly

Glue the tailplane and fin assembly to the rear fuselage and run the inner snake wires out through the fuselage sides. Test fit them to the rudder and elevator. When happy with the internals the top of the fuselage can be sheeted with 6 mm Depron and the edges rounded off.

Remember that Depron can be pre-curved before you glue it to the shaped sections of the fuselage by gently rolling it over the edge of a kitchen work top; it makes it easier to glue down. Make sure the wife/partner is out first, though...

Add the undercarriage and fill in any gaps with more Depron.

Covering And Painting

I used heavyweight tissue and Poly-C on the original model as it is easy to apply and gives the Depron a good surface for painting

Two coats of Poly-C were applied to seal the tissue and once dry I used Humbrol acrylic paints to decorate it in my desired colour scheme. A final coat of Poly-C sealed the finish.

Lower wing to fuselage mount

Upper wing to fuselage mount

Completed fuselage, ready to add the colour scheme

Trimming

I set the C of G on the original model at one third chord, or roughly where the main spar is situated, and then handed it over to my test pilot for its maiden flight.

Pilot's Report

The first flight was with the high wing version. Just a few clicks of down trim was all that was needed. Nice and easy to fly but I am sure it will be quite aerobatic in the hands of someone who has the ability.

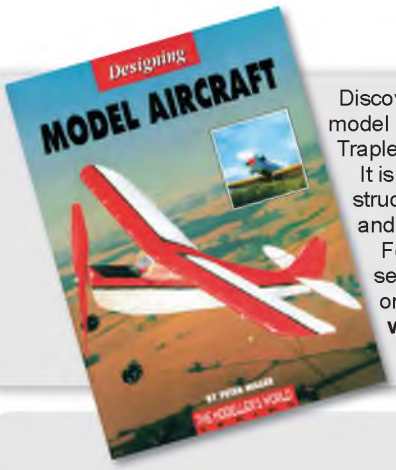
The second flight was in the low wing configuration, with no trim changes at all. It flew basically the same as the high wing set up.

The third flight was as a biplane. 3-Way leaped into the air, with just a little more down trim needed. You need to use the rudder and ailerons to initiate a turn with the biplane, just like a full size bipe.

All in all it is a little cracker and it was good to see 3-Way in the air! ***RCMW***

Low wing model, front and rear views

High wing monoplane, front and rear views. Note the inset ailerons and large tail end control surfaces. Also the wing blanking unit



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QR Code

No flying pictures of 3-Way were provided but you can see 3-Way in action by scanning this QR code

CONTACTS

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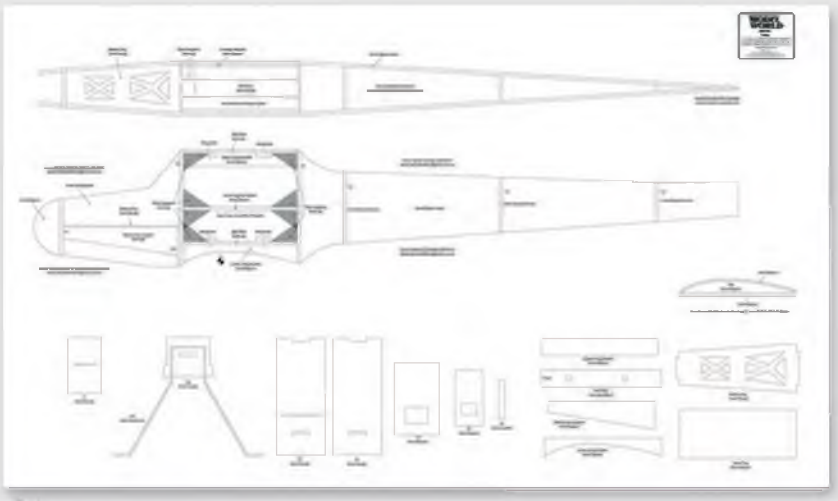


Making A Simple SPRING HATCH LATCH

Join Bill Bowne for another top building tip from the workshop

Magnets are great for securing hatches but at high speeds the air scooped in to cool your ESC can overpower the magnets and pop the hatch up – or off! That can lead to a good deal of time wasted searching for the runaway hatch. So I use a simple, reliable and mechanical hatch latch on my higher performance models. All it takes is a bit of scrap lite ply, some left over hardwood stock and a few odd hardware bits. Depending on the spring you use the complete latch will be about 1 to 1.25 inches long.

If the latch mechanism looks familiar to my fellow RCMW readers, well, it should. The bomb dropping mechanism published in the August 2015 RCMW actually descended from this latch mechanism, when I started idly playing around with one.

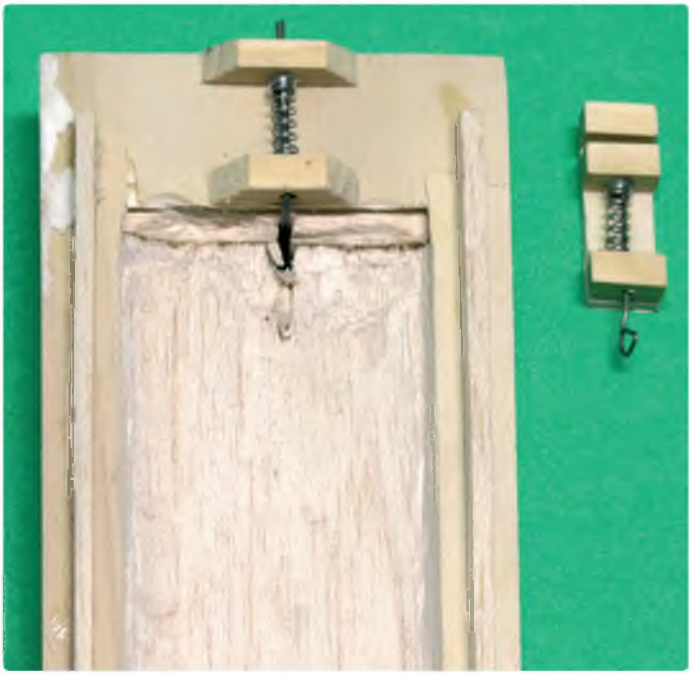
I prefer putting the latch in the rear of a hatch (please, no Dr. Seuss jokes!) with pegs holding the hatch front in place. Sometimes I substitute bulkheads or the hatch outer skin for one or more of the retaining blocks or hatch base plate. It's a very flexible and adaptable bit of hardware. So give it a good look and think of how you can adapt it to your next model (or field box, etc.) ***RCMW***

Supplies List:

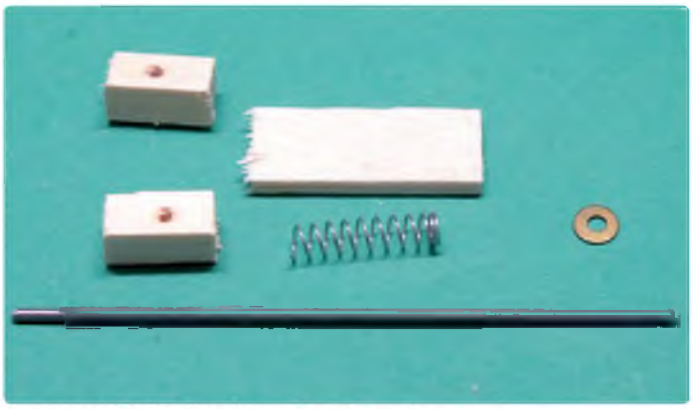
- (2) 1/2" lengths of 1/4" square spruce or bass
- 1/8" x 1/2" lite ply, approximately 1" long
- .051" music wire (approx. 2" long)
- 3/32" diameter washer
- Spring from a ballpoint pen, etc

Tools:

- Razor saw
- 1/16" drill bit
- Soldering iron

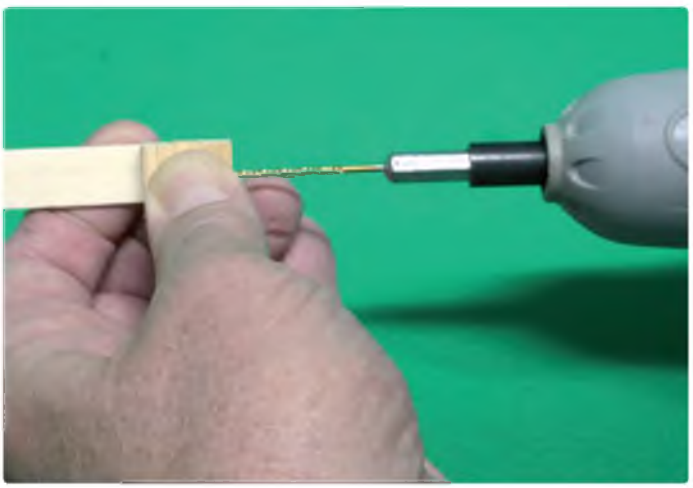


Does the bomb release to the right of the hatch latch look familiar? It should as it was in August 2015's RCMW. That release was a direct brainchild from the hatch latch. I'm sure there are other uses for this mechanism so please, fellow inventive RCMW readers, write in and share your uses for it

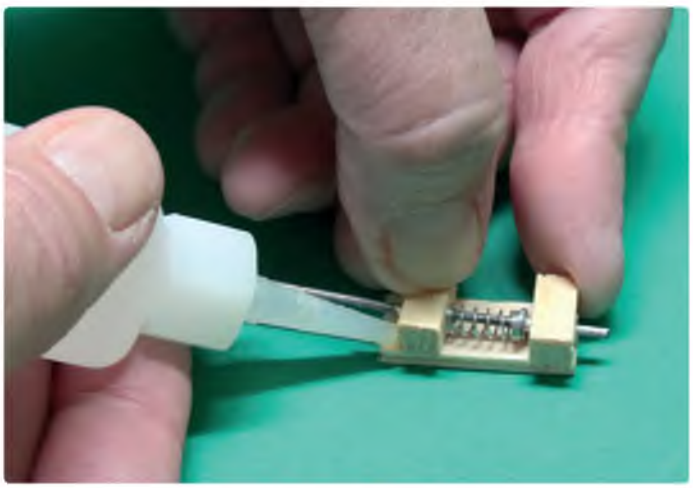


Parts needed (other than the model, of course)

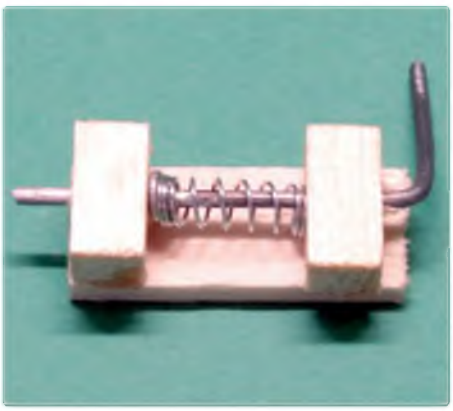
Solder the washer to the wire, leaving about 3/8" wire beyond the washer. Thread the spring onto the long end of the wire



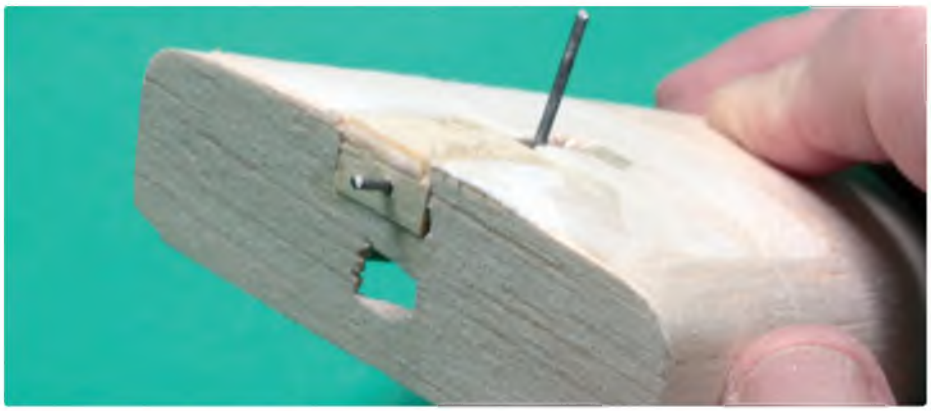
Glue B1 to the end of base plate A, then clamp B2 to B1 and drill a 1/16" hole through both at the same time (if the wire sticks, drill out the hole a bit)



Thread B2 onto the wire, trapping the spring. Adjust the spacing between the parts B. You want the spring to hold the washer firmly against B1, but not so stiffly that you can't pull it back. Then glue B2 into place



Bend the wire so it fits through the top of the hatch



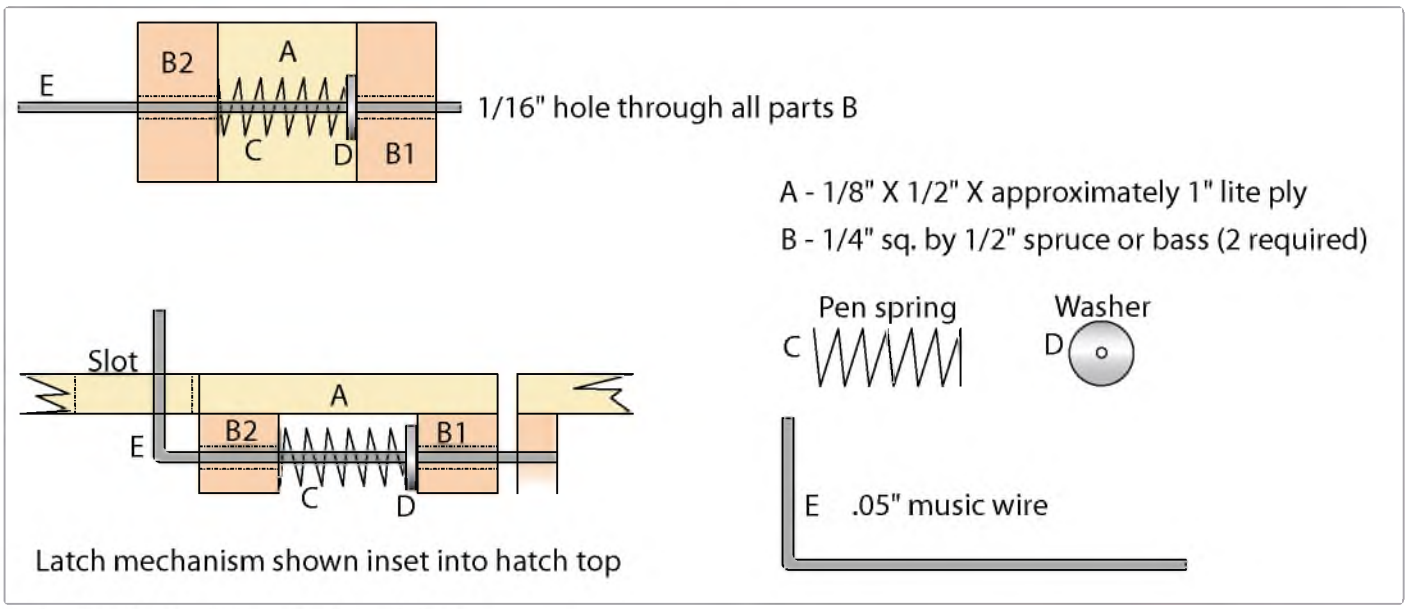
Inset the latch assembly into the rear of the hatch. Carve in a slot for the latch handle

Retract the latch, put the hatch in place and PUSH the latch towards the locked position

Remove the hatch. You should have a nicely marked dent in the wood, showing you where to drill. So, drill a 1/16" hole through the bulkhead. If the latch sticks drill out the hole in the bulkhead

Bare wire is tough on the fingers so trim the wire, roughen it, then CA on a shaped block of wood (such as the one shown on the Shrike, simulating a periscope)

A variation on the latch mechanism is seen on the Shrike hatch. Here B1 and B2 are glued to the hatch framework, letting that substitute for plate A



It only takes a few simple parts to make up the latch

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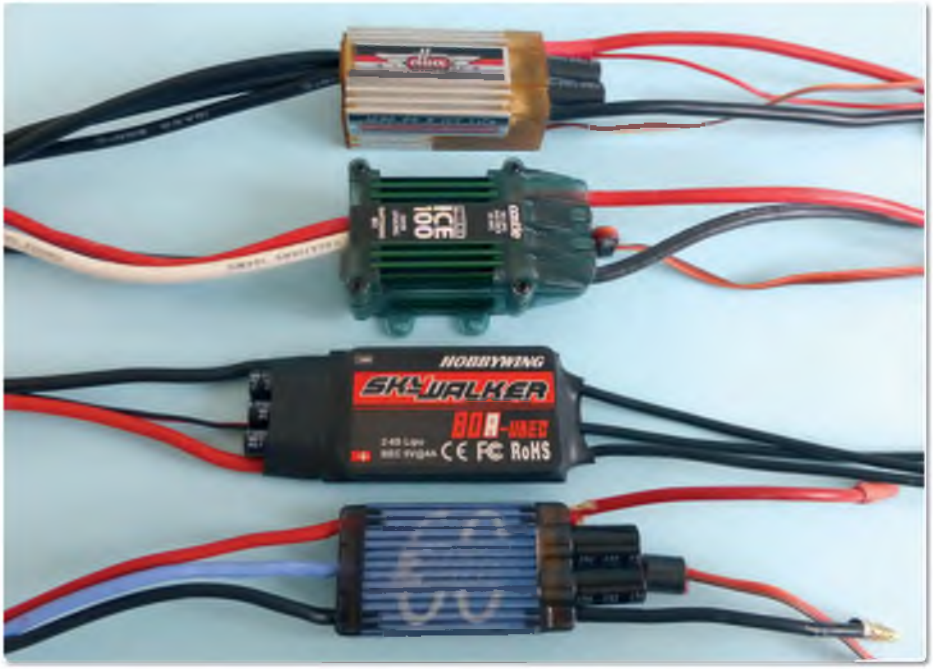
A Beginner's Guide To ELECTRONIC SPEED CONTROLLERS PART 1

The ESC is an essential part of any electric power system. But knowing how to select, install and set one up can be confusing, especially for the novice. Electric flight enthusiast Brian Collins offers a beginner's guide to choosing, fitting and operating the right speed controller for the job



Take your pick! The electronic speed controller (ESC) does a lot more than simply control the throttle

In this two part feature we'll be looking at different types of ESC and their various features and functions, with installation tips and some 'dos and don'ts'. In part two we shall explore ESC setting up and programming options.

Decisions, Decisions

When choosing a motor for a new electric model (or converting IC to electric) ESC selection can often be seen as a secondary option. However, the ESC is a vital part of the power system and needs to be selected, installed and set up correctly. After all, get this wrong and you're going nowhere!

Does Watt?

So exactly what does an ESC do and how does it do it? The ESC regulates the speed of the motor by switching (pulsing) power to the motor on and off to regulate the motor's speed. However, many ESCs possess several other features, including BEC (Battery Elimination Circuit), LVC (Low Voltage Cut-off) to protect the LiPo flight battery and a BRAKE (that applies braking to the propeller). As well as these features various parameters can also be adjusted, enabling 'fine-tuning' of the power train for different disciplines.

Programming, however, is not always required. Indeed some ESCs utilise an 'Auto Detect' system, automatically setting up various parameters like battery cut off voltage and motor timing when the flight battery is connected.

Watt Does That Mean?

For a newcomer to electric flight the associated acronyms can be somewhat confusing. So let's look the most popular terms often used.

BEC (Battery Elimination Circuit)

The BEC supplies power to the receiver/servos, negating the use of a receiver battery. Some early electric models used two battery packs; one to power the motor and another to power the receiver/servos. The battery elimination circuit was designed to enable a single battery to power the motor, receiver and servos.

Some receivers allow the use of 2S (7.4 V) LiPo batteries to power the radio as some newer servos are also capable of operating on the same voltage. But the majority of receivers are operated between 4 – 6 V. A typical BEC supplies 5 – 6 V. There are some installations, however, where using a receiver battery can be the preferred option. More on this in Part 2.

How Does A BEC Work?

There are two different kinds of BEC – the 'linear' type and 'switched' type. A linear BEC is a linear voltage regulator integrated circuit. The linear BEC works by dropping excess voltage from the flight pack across the device. The problem is that as you add battery cells the input voltage increases, meaning the power the BEC has to absorb also increases. The BEC circuit does this by resistance and as a result generates heat. The more the BEC has to 'drop down' the flight battery voltage the more heat is generated.

For example a 2S LiPo battery produces 7.4 V (nominal) so the BEC would only have to drop 2.4 V to achieve the output of 5 V. But if a 6S (22.2 V) battery is used then the BEC has to drop down 17.2 V, so much more heat is produced.

SBEC (Switched BEC) units are 'switching' voltage regulators. They work by taking pulses of energy from the flight battery, store it in a capacitor (or inductor), then release it to the receiver at a lower voltage (5 – 6 V).

The advantage of a SBEC over a linear BEC is that there is significantly less energy loss compared to the linear system, so cooling is not such an issue, even with inputs up to 44 V. However, like all high energy electronic components sufficient cooling is still always required.

An issue with SBEC units can sometimes be RF (Radio Frequency) interference, which is the 'noise' created by the switching process. However, manufacturers address this with good circuit design, shielding and spacing components accordingly. The use of a ferrite ring on the receiver wire helps combat the 'noise' issue also.

As well as supply voltage, BEC's are also rated by how much current they can deliver to power the receiver, servos, retracts, lights, bomb drops, etc. The greater the number of servos and ancillaries installed in the model, the greater the load on the BEC.

An integrated BEC will be less efficient running on a 4S (14.8 V) flight battery than running on a 2S (7.4 V) battery as it has a higher voltage to 'drop down'. There are some ESCs specifically designed to run on higher flight battery voltages and which are NOT fitted with a BEC at all. These 'HV' (High Voltage) units are specifically designed to only power the model's motor. They are optically isolated (hence the term OPTO ESC) from the receiver or servos systems.

Using the aforementioned battery comparison as an example, if the flight battery is 7.4 V (nominal) then the integrated BEC may be able to deliver enough current to support five or six large servos. However, if the flight battery is producing 14.8 V then the same integrated BEC may efficiently handle only three servos since more heat will be generated by the larger step down from the 14.8 volts to 5 volts. The amperage load has to be reduced accordingly or the BEC will overheat; less amperage means fewer servos can operate safely.

With the BEC's current rating falling as the input voltage increases this means some ESCs with a linear BEC rated at 3 A, for example, may only be capable of supplying as little as 500 mA when running on a 4S (14.8 V) lithium flight pack.

Take an ARTF (Almost Ready To Fly) model where the manufacturer fits an ESC with a

Cooling any ESC is very important. Never enclose an ESC in foam, for example

Some ESCs are supplied with a separate BEC as standard

A 6-cell 'AA' 2000 NiMH battery weighs in at 136.4 g, whereas a 5 A BEC comes in at a mere 16 g – a saving of 120.4 g

Designers often 'layer' circuit boards to save space. Great for design but not so good for cooling

ESCs can be tiny. This tiny unit from Plantraco has a receiver, servo actuator and an ESC all in one unit – it's smaller than a thumbnail!

built-in BEC capable of running the receiver and servos on a 3S (11.1 V) LiPo battery. However, after you have got used to the performance you decide you have 'the need for speed' and try the model on a 4S (14.8 V) LiPo battery. The same ESC now has to deliver power to the same radio and the same number of servos, but the extra input voltage means a drop in the BEC's ability to do this. And if the current draw gets too high the BEC may get too hot, causing a 'thermal shutdown'. This protects the BEC (and may well prevent a fire) but may also cut the voltage to the receiver, meaning you lose all power to the radio system and servos!

Should a BEC overheat, if there is sufficient cooling air going over the ESC, the BEC may switch back on very quickly as it cools down. This may even be interpreted as a 'glitch' but it may well mean the BEC is operating on its absolute limit, with failure imminent. It's a good idea to check to see if your ESC is very hot when you land. If it is it could well be the BEC is operating at the maximum limit of its capacity.

LVC (Low Voltage Cut-off)

The LVC will cut power to the motor at a given voltage, which is ideal for Lithium Polymer batteries that can be rendered useless if discharged below 2.5 V. The LVC can be programmed to cut/reduce motor power at around 3 V, protecting LiPo battery packs from over discharge.

Soft Start

A feature often used in applications that use a gearbox (also helicopters) and some EDF models. It allows the propeller (or fan unit) to spin up slowly from start up without any 'jerkiness', as can sometime occur, allowing for much smoother throttle starts and less wear on components.

Brake

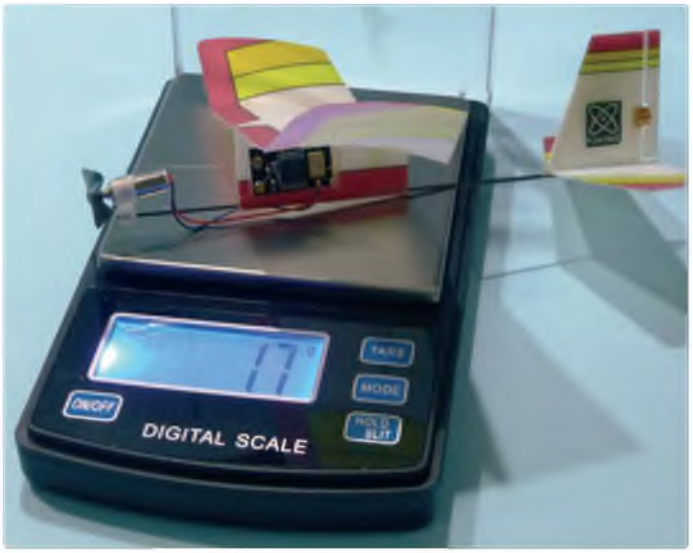
The brake will stop the propeller more quickly without 'wind-milling'. It is often used with folding propeller blades (such as fitted to electric gliders), allowing the blades to fold along the fuselage and reduce drag.

ESC Installation

Cooling is essential when installing any ESC, especially if the internal BEC is used. With various types of foam being used in the construction of more and more models ESC cooling becomes even more important due to the fact foam is very good at insulating heat!

Understandably many people do not like drilling 'holes' in models (especially if it affects scale looks) but good airflow over the ESC can avoid several issues, including BEC overloads or 'thermal cut-outs'. So make sure you have enough cooling air transiting through your model. After all a small hole in the front of the model is a better option than losing the entire aeroplane! But don't forget, if you have a cooling air vent in the front of the model the heat can't exit unless there is an exit air hole large enough to allow good airflow.

On the subject of cooling, it is not just the ESC that requires sufficient cooling airflow. Brushless motors, SBEC and battery packs also require adequate cooling to keep them operating in a reliable and efficient manner.



Microelectronics equal micro models. Believe it or not this Plantraco 'Micro Butterfly' weighs in at a staggering 1.7 g (yes, the decimal point is in the right place!)

This stand-alone BEC from Castle Creations is rated at 20 amps, providing power for several full size servos as well as other ancillaries

The heatsink on this Castle Creations' HV ESC fully encloses the circuitry, providing excellent cooling in the process

A Watt Meter provides exact information on current draw and motor power input, making it ideal for setting up electric models

Even micro helicopters have ESCs! This one has two – one for the main rotor and one for the tail motor

Foam Wrapping No-No!

Never use foam to wrap an ESC. And if using 'hook & loop' tape to install one do not fit it to the flat heatsink side of the ESC. The heatsink needs to be in good airflow! Some people (and some manufacturers) go as far as cutting a 'square' in the ESC's heatshrink, exposing the heatsink for even better cooling (see photo).

Some manufacturers cut the heatshrink tubing to expose the ESC's heatsink, which is ideal for improved cooling

Another point regarding cooling. Never run brushless motors (especially high power set ups like EDFs) for long periods statically with no cooling airflow.

I have to admit to being somewhat surprised at how many times I hear of people running electric models for several minutes statically without any airflow over the ESC, then wonder why they burn out! As little as 60 seconds running could be enough to 'fry' the ESC without any cooling airflow, especially at full throttle.

When testing be careful not to allow the ESC to get too hot. But in cases where no prop-wash is evident, particularly in EDF models for example, I never run brushless motors or ESCs up for more than a few seconds.

Cable Calamity

With some models it is impossible to fit the ESC without extending the wires. Many people ask, "Do I extend motor wires or battery wires?" There has been much debate on this subject over the years and even today some people prefer extending battery wires and some motor wires. However, it is 'best practise' to extend the three motor wires, keeping the battery wires as short as possible to eliminate any voltage drop from the battery.

Sparks Fly

Often you will hear a 'click' and see a spark when connecting an ESC. This is normal and is simply the capacitors 'charging'. In a way it is a good thing as it means they are operating well. However, in high voltage applications the spark can get too powerful and can even damage the connectors (not to mention fingers) so an 'anti-spark' device is often used to eliminate the spark.

Redundancy

It is common to hear people say,"The ESC will unload in flight." Meaning that it pulls less amperage in flight than it does when static (such as during bench-tests). However, this can be a misconception and should NOT be used as a general rule. During manoeuvres like prop hanging, torque rolls, hovering and such like, the load on the ESC can actually increase!

So, it is not correct to assume that an ESC will always unload in flight. It is a very good idea to build-in 'capacity redundancy' when selecting the power rating of an ESC. If a motor is rated at 60 amps, I would purchase an ESC rated at 80 amps to offer said redundancy.

I hope you have enjoyed this first instalment of a beginners guide to ESCs. Next time I will be discussing when to (and when not to) use a BEC. And we will be looking at programming various parameters of the ESC and how to set one up to obtain maximum performance/efficiency. ***RCMW***

CONTACTS

BRIAN COLLINS
Email: bc002d1835@gmail.com

OVERLANDER
www.overlander.co.uk

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www.odfigosnv

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www.microflight.com

LiPo battery packs represent a considerable investment and using LVC (Low Voltage Cut-off) can stop LiPos being over discharged, greatly extending cycle life

'Inrunner' brushless motors (left) require a different timing setting to their 'outrunner' counterparts (right) to obtain maximum performance and efficiency

Multi motor electric models are much easier to power than their IC counterparts, such as my Messerschmitt Me 323 Gigant with six brushed motors all running from a single ESC

EDF foam jets offer high performance but the foam is an excellent heat insulator so good cooling is essential

Quick Quads

John Stennard catches the quad racing bug

Many Quick Quads are physically and virtually ARTF and come in tiny boxes

My X160 came in an even tinier box and is also physically ARTF

If you are an electric enthusiast, and maybe even if you are not, it's highly likely you own or have flown some sort of multi-copter. It's probably been a quad and could have been a nano, micro, mini or even bigger size. If your club holds indoor flying sessions then it's also likely you have flown your quad in a sports hall, as well as your conservatory and garden.

Quads really are all around us but with an irresponsible owner they can get into trouble; you know the old maxim 'don't blame the model, blame the owner'. At our indoor sessions quads have almost replaced helicopters in popularity and a 'quad session' sees a flurry of quads in the air, some of course misbehaving as their owners try to keep them under control.

However, with basic, low cost quads of the nano, micro and mini size offering a good performance there really is no stopping the enthusiasm of our quad pilots. Larger quads have to be carefully screened on 'health and safety' grounds, and while a Parrot AR. Drone with prop protectors is fine some of the more potent larger quads are not suitable for an indoor 'free flying' quad crowded airspace.

I've been piloting quads since the early days of RTF model quads and the latest generation are just amazing. However, a bit like flying helicopters, you cannot spend your flying life just hovering and quads present their own problems with orientation.

Many of our quad pilots are in the mature category and often are quite happy hovering and flying the occasional gentle circuit. Only a few club members want to fly faster and perform more extreme manoeuvres, and/or fly FPV quads. In fact there is plenty of potential for fun or competitive flying through hoops and gentle pylon racing indoors with any size of quad.

Club members who like the idea of a 'hotter' quad are now viewing the 'quad racer' type of model and this is when things start to get interesting. They have seen racing quads in action at places like Weston Park, the Nationals and on YouTube and realise doing this with their eye/finger/brain capabilities slowing down may be beyond them.

However, they love the 'racer' concept and these guys also often tend to be the flyers who have built and flown a wide variety of aircraft that might include Club 20 racers, pylon racers, hot liners, DLGs, etc. just to experience a bit of the thrill these models can give, even when not flown competitively.

So with quad racers getting less expensive all the time, what can you expect if you want to try out this type of model? Well, you usually get what you pay for but I've been very pleased with the two 'budget' types I have tried. For just over £100 each I have a 250-size and 160-size machine but I accept that these will lack the quality and sophistication of more expensive versions. However, for the purposes of gaining quad racer flying experience they are perfectly adequate. I fly several of my standard quads with FPV and I definitely want to fly both of my racers with FPV - after I have had a bit of practice!

Thinking About It

The first important consideration is whether you have the skills base to pilot a quad that is going to be very different from a standard, extremely stable and easily piloted mini size quad.

My hand gives scale to the X 160. She really is very small

A size comparison between the 160 and 250 size racing quads

This photo shows a racing quad in more detail. The blue plastic parts are mounting points for a camera

Different coloured props and spinners ensure that the props are fitted correctly

This line up of 250 racing quads shows similarities and differences between different makes

If possible watch and observe what's going on when a racing quad is being flown by a skilled pilot, then ask lots of questions. I often let anyone who shows an interest wear the goggles while I fly so that they can appreciate what you are seeing when you are piloting both quads and planes.

Another important consideration is whether you will want to fly your racing quad using a monitor or in full FPV goggles mode. If you think you will mainly just buzz it around like a quad version of an aircraft pylon racer then orientation can be an issue.

The designed shape of the quad racer usually follows a particular pattern. The chassis has to be as small and light as possible, while being tough, resilient and capable of carrying a flight board, Rx, flight battery, FPV camera and Tx, antenna, other gizmos and maybe lights. The chassis is usually black and looks virtually the same from any direction. This is where lights are very useful; my 250 version has really bright lights that are a huge help with orientation if you are flying the model without using the FPV. But remember quad racers are intended to be flown via the camera view. Of course, quads with a hull can be easier to see at a distance.

Using a Tx mounted monitor sounds like a good idea but from my experience it is quite hard to fly a model close to the ground when moving at any speed from the monitor view. However, it could be a sort of halfway house and allow you to get a feel of FPV before totally immersing yourself. So if you decide to give a quad racer a go, let's move on to the main types.

A Matter Of Choice

As I've already mentioned the most popular size of racing quad at the moment is the 250 and 160, although others are now also available. There are also hexcopter racing quads! The numbers refer to the distance diagonally across the prop centre in millimetres, however I found that my 250 is actually a 280, while the 160 is spot on this size.

This feature is not being written for the dedicated quad racing enthusiasts but as a starting point for a quad flyer who would like to experience flying a quad racer either indoors or outdoors, or both.

Flying a 160 in normal indoor sessions is possible but if you will only be flying outdoors then the 250 size is the best option. It's obviously bigger and heavier; my 250 with its 3S 1500 LiPo weighs 541 g (19 oz) ready to fly, while the 160 with its 3S 800 LiPo weighs 228 g (8 oz). These racing quads have no prop guards and at these weights they represent quite a lump when flying around.

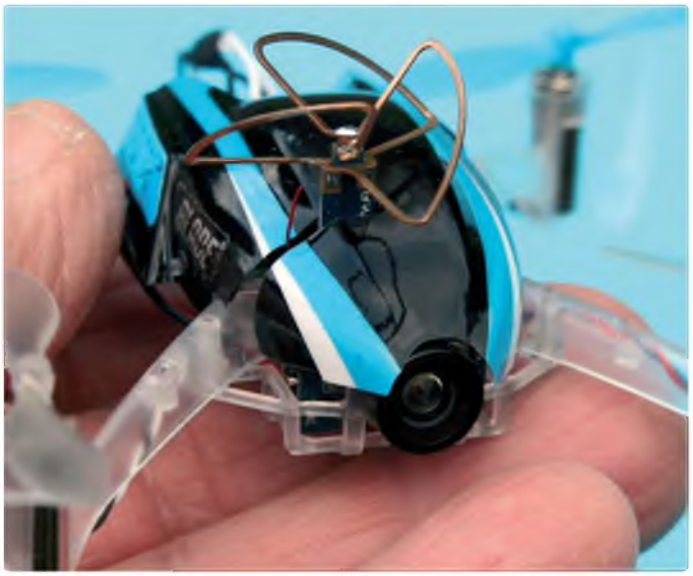
The four 5" props on the 250, and even the 3" ones on the 160, represent a hazard that needs to be considered before getting airborne. If you are flying with other quad pilots in dedicated racing environments, obviously everyone knows what is going on. But zooming around at low level at your local model field, particularly if using FPV, may lose you some friends. A mid air with a model having one prop is bad enough but a collision with a heavy four prop quad would be really bad news - probably for both models!

The 250 size is, of course, more flexible in terms of receiver and flight pack sizes and will give longer flights. These models are designed for short, fast flights so five

This racing quad has a top mounted flight pack and whip antenna

Note the domed clover leaf 5.8GHz TX antenna at the back of this model

FPV Nano QX is good for gaining some initial quad FPV experience



The small size allows you to fly with and without FPV in small spaces

Nano QX 3D will also carry a camera but a patch lead is required for the different connector size

to seven minutes will be about the average duration. The 250 size racing quad is only really at home indoors under specific circumstances; remember I'm not talking about competitive racing in this feature but just general club flying. However, a 'slot' for quads of this type could be part of an indoor session if properly supervised. The 160 size is obviously going to be better for general indoor flying, but from my experience it still needs cautious handing if being flown alongside and in amongst standard mini quads.

As soon as we move to FPV mode the scenario changes, whether indoors or outdoors. I regularly fly my E-flite FPV Nano QX and FPV camera equipped Alien quad around during the ordinary quad sessions but we are looking here at small and light quads. The Nano QX only weighs 28 g (1 oz) and the Alien 113 g (4 oz). I can fly around the sports hall at a greater height than the other quads tend to fly and keep out of harm's way while experiencing the joys of FPV.

Next time I'm going to take a closer look at my 250 and 160 racing quads but in the meantime consider the following proposal.

Why An Alien?

If you own a 250 and 160 size racing quad and other quads why bother with a new standard lightweight mini quad? Well, it's really the 'horses for courses' scenario because each can be flown in different circumstances but with the same aim in mind. I want to enjoy flying my 250 and 160 racing quads safely using FPV in a non-competitive mode. Therefore the more practice I get FPV quad piloting the better.

The E-flite Blade Nano QX FPV micro quad performs well but is limited for by two factors. Firstly, the flight duration is quite short and secondly the altitude control is very sensitive. This sensitivity means that when flying using FPV it is quite difficult to maintain a steady height. This also affects how fast you can comfortably fly.

I have also used my E-flite Blade 200 QX as a mount for a micro size camera. And while it's good outdoors and beautifully stable, it is just a touch too feisty indoors. Remember, with the FPV goggles on you do have very limited vision.

I decided what I needed for indoor and garden practice was a 'latest generation' basic mini size quad. You are spoilt for choice on websites and I purchased an Alien 250 which, complete with a transmitter, a 1S 780 LiPo, mains charger and spare props cost around £30. The Alien 250 actually measures 240 mm and with a micro camera fitted has a flying weight of 113 g (4 oz).

Flight tests showed the Alien X250 was very stable and flies for at least 10 minutes on the 1S 780 LiPo. A 2 mm ply camera mount was fitted and after some experimentation with camera angles the Alien 250 has proved to be a really good FPV 'quad trainer', both indoors and in the garden.

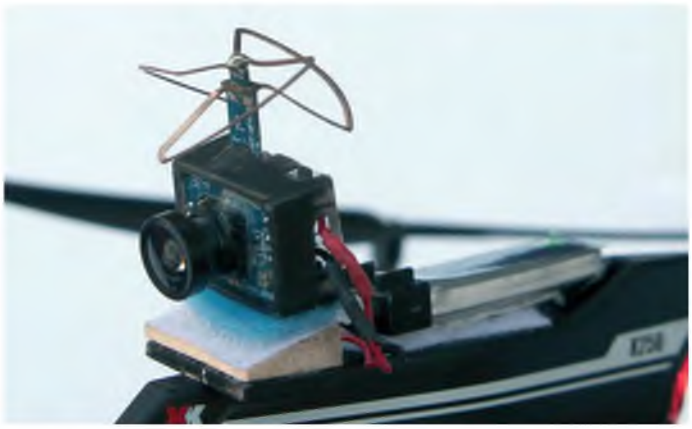
Hang On!

Of course, I have not even mentioned those all important goggles/headsets if you want the FPV experience. In the end flying these quad racers is really all about doing it FPV style, whether with a monitor or total immersion. Some flyers are happy with a monitor and these are getting cheaper all the time. But if you want the real piloting feeling it has to be the goggles/headset option. However, here prices are also dropping for some products and it's worth doing some research on the 'net. ***RCMW***

Blade 200 QX carries a VA 1100 micro camera with ease but is a little feisty for FPV indoor use with other models around

The 1S 150/200 LiPo for the camera is easily attached and is perfectly adequate

Right: Alien X250 is a lightweight quad ideal for indoor and garden use. It's shown here with the VA 1100 micro camera



A simple ply mount and Velcro works fine these small cameras

Alien X250 makes a very steady FPV quad for indoor or garden use, with good duration

The Alien X250 FPV A10 camera is also an option

Amber front and red rear lights help with general flying. Plenty of practice with a relatively docile FPV quad helps to consolidate your FPV piloting skills

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Widgeon X2

George Stringwell has taken a vintage Frog design and upgraded and doubled it to 914 mm span for three or four function R/C and electric power. The resulting V-tailed model offers some splendid all-round sports flying characteristics for the weekend flyer!

RC MODEL WORLD

At A Glance

MODEL TYPE:	Vintage style electric sport	**WING LOADING:**	10.6 oz/sq ft (32 g/sq dm)
MATERIALS:	Balsa and plywood construction	**LENGTH:**	27 in (686 mm)
COVERING MATERIAL:	Lightweight Modelspan tissue over 38 micron document laminating film, finished with nitrate shrinking clear dope	**R/C FUNCTIONS:**	3 channel – ruddervators, throttle 4 channel - ailerons, ruddervators, throttle
		MOTOR USED:	BRC A2822-14T 1400KV (150 watt) brushless outrunner
WINGSPAN:	36 in (914 mm)	**ESC:**	20 amp SBEC
AREA:	214 sq in (1380 sq cm)	**PROPELLER:**	APC-E 7" x 5"
WEIGHT:	16 oz (454 grams)	**BATTERY:**	2S 850 mAh 25C LiPo

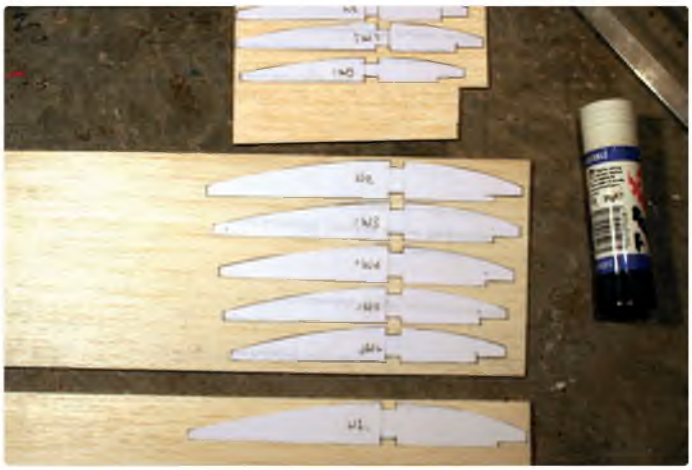
I have long been a great fan of the kit models produced under the FROG name in the 'Golden Age' of British aeromodelling from the late 1940s through to the 1970s. Their kits were distinguished by elegant and practical models allied to good structural design, accurate kitting and good quality materials.

Since turning to electric power I have built a number of the old FROG designs in their original size for radio control, notably the Zephyr and Tarquin power models, and the Witch rubber powered model. These models all made excellent 'park fly' type projects and their success encouraged me to turn my attention to the possibility of scaling up some of the smaller FROG rubber models, notably the 18 inch span 'Senior Series' designs for electric power and radio, resulting in the double size Tomtit biplane (Quiet and Electric Flight International, July 2012) and Mamba fast aileron model (Q&EFI December, 2012). Both these models are still very much part of my stable and fly regularly

After completing several other vintage projects over the last couple of years (a Plecan 'Hummingbird', Keil Kraft 'Bandit', Bill Winter 'Airknocker' and an electrified John Barker 'Lulu II' glider), I felt it was time to build another double size Senior Series model.

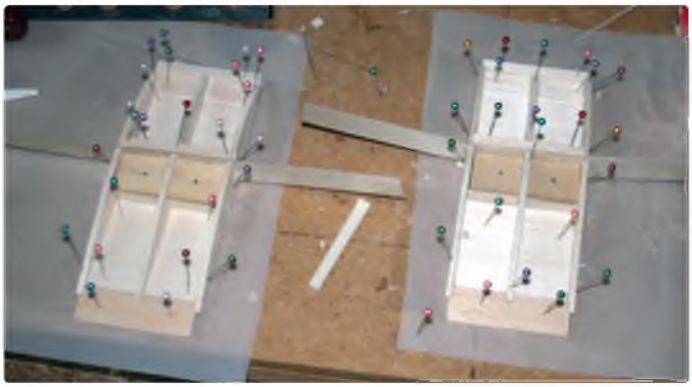
A double size 'Raven' by the late Derek Woodward has already been a full size plan in RCMW, and I had seen twice sized versions of the 'Linnet' and 'Heron'. So the choice was between the 'Redwing' high wing cabin model and the V-tail shoulder wing 'Widgeon'. I do intend to do the Redwing

The original Frog Widgeon (circa 1954) had a 18" wingspan and was rubber-powered with an 18" wingspan (web image)



Above: Completed rib sets for both wings

Left: Creating rib masters using photocopies and Pritt adhesive



First stage of wing assembly. Build centre sections for both wings

Left outer panel of plain wing being built onto centre section

Left panel of aileron wing built onto centre section, with extra structure for the aileron and the servo installed

After cutting free from the wing the aileron ends are capped with 1/64" ply. Then check they fit correctly and move freely

at some point in the future, but having a weakness for V-tail models I decided to attempt the Widgeon this time around.

Two-In-One Concept

As with the 'Tomtit' and 'Mamba' great care has been taken to faithfully reproduce the shapes and proportions of the original 18" models. But the structure has been designed from scratch to produce a practical three foot 'every weekend' model. With the Widgeon I decided to do something a little different and build two alternative wings; a 'plain' one with normal dihedral for flying as a rudder/elevator (or, more correctly, a ruddervator) controlled model and an aileron one with reduced dihedral and wing mounted servos to produce a 'full house' Widgeon.

Now I am strictly a Mode 2 pilot so I need rudder on the right stick for the ruddervator model and on the left stick with aileron on the right for the aileron wing. Thanks to the magic of modern radio this is dead easy and I can switch from one wing to the other in the time it takes to unscrew and re-fit two wing bolts and plug in or unplug the wing servos.

A rudder/elevator mixer is permanently set up in the transmitter and a rudder/aileron 100% mixer is set up, switched in and out by a convenient switch. A 'Y' lead is permanently plugged into the aileron output on the receiver, the rudder and elevator servos being plugged into the appropriate receiver outputs. To change from plain wing to aileron, simply plug in the wing servos to the 'Y' lead when fitting the wing and switch off the rudder/aileron mix. If you fancy trying it C.A.R. (coupled ailerons and rudder), leave the mixer switched in, although in this case you might want to reduce the rudder throw a bit.

I guess most people will go for one wing or the other. But if you do fancy trying both the above set-up is extremely practical.

What About The Build?

As you will need a completed wing at an early stage of fuselage assembly, it is practical to start with one (or both!). The first chore is to cut out all the ribs – two each of R2 to R9 from 1/16" sheet (nice firm but light quarter grain preferably) and three of R1 from 3/32". If building the aileron wing you will also need two each of R4A and R9A, and will also need to furnish the necessary holes for the servo leads in ribs R1 to R4.

Next, cut the dihedral brace B1 from 1/16" ply, selecting the one appropriate to the wing type you are building, the wing mounted bolt plate B2 from 1/8" ply (drilled with the holes for the two M4 wing bolts) and the 1/16" balsa packing piece, which is the same size as B2 without the forward facing tongue. The dihedral on the ruddervator wing is 2 3/4" under each tip and on the aileron wing it is 1 1/4", but if you follow my normal building sequence the dihedral is set automatically by the dihedral brace as each outer panel is built onto the centre section, so you don't have to worry about it.

Assembly starts with the centre section. First of all pin down the bottom 1/8" x 1/4" spar, the trailing edge (3/4" x 3/16"), the 1/2" x 1/8" lower leading edge and the inner 1/4" x 1/8" leading edge lamination, followed by the 1/16" bottom sheeting between the spar and lower leading edge. Now cut the three R1 ribs through at the back of the

Both wings compared. The aileron wing is ready for parting off the ailerons

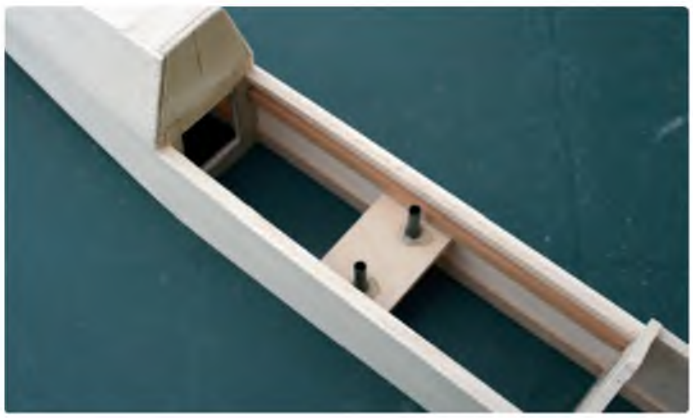
First half of tail under construction. Note the ply brace sticking up

Finished V-tail

Preparing opposite fuselage sides with longerons and reinforcements

Main fuselage formers laminated from 1/32" ply + 1/16" balsa + 1/32" ply

F2 and F3 assembled to first fuselage side



Fuselage mounting plate for M4 captive nuts installed and carbon fibre guide tubes for wing bolts added

spar slot and fit the front portions of the two outer ribs only. Trim the front portion of the remaining R1 (centre) rib to clear the tongue on the bolt plate B2 where it will protrude between the spars and fit that, followed by the top spar.

Now glue brace B1 in position to the two spars. Now fit the bottom 1/16" sheeting between the spar and trailing edge, then glue in the bolt plate B2 and the 1/16" packing piece under it, slotting B2 into B1. Trim 1/16" off the front of the three R1 rear halves and glue the outer two in place. Trim the centre R1 to clear the bolt plate B2 and glue that in place. The top centre section sheeting is not fitted at this stage. Leave everything to dry.

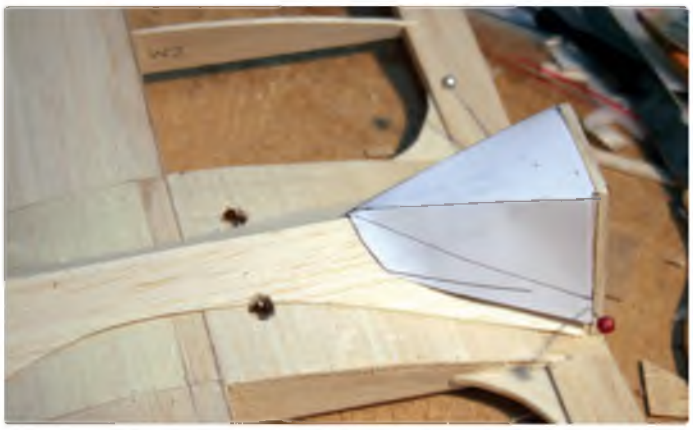
Build the wing panels onto the completed centre section one at a time, tilting the centre section so that B1 is flat on the plan and pinning down the bottom spar, trailing edge, bottom 1/2" x 1/8" leading edge and the inner 1/4" x 1/8" leading edge lamination.

Note: If building the aileron wing you will need to cut a pair of tapered 3/16" sheet spars for the aileron leading edge and wing false trailing edge, and cut and trim ribs R5 to R8 accordingly. The 3/16" sheet spars are slotted 1/16" deep for the ribs; the trailing edge is slotted 3/16" deep (a 1/16" file or two 'worn' junior hacksaw blades taped together is used for this). The additional riblets R4A and R9A are fitted with a 1/16" gap left between them and R4 and R9, but the trailing edge is left in one piece at this stage to be cut through later when the wing is complete.

Fit ribs R2 to R9 followed by the top spar and 3/32" and 1/16" spar webs (grain vertical) where shown. The gussets are cut from scrap 1/8" or 3/32" balsa and glued in place where shown, and if building the aileron wing additional 1/4" x 1/16" strips are fitted, top and bottom, alongside R4, R4A, R9 and R9A to provide attachment points for the covering and prevent the ribs from being distorted by it.

When both panels are complete the inner 1/4" x 1/8" leading edge is chamfered to match the profile of the top of the ribs and the top surface leading edge sheeting is fitted. Before fitting the remaining centre section top sheeting drill down through the holes in the bolt plate B2 through the bottom sheeting. Trim and sand the front of the leading edge sheeting flush with the inner 1/4" x 1/8" leading edge and then fit the outer 1/4" x 1/8" lamination to this, noting that it is fitted with the TOP level with the top of the leading

Over wing fairing/cockpit assembly



A paper pattern makes it easier to get the cockpit glazing just right

Building the top nose hatch on a 3/32" balsa base

Two E-Max ES08A servos for V-tail ruddervators were installed at the rear of the wing opening and fitted with 1.5 mm carbon fibre pushrods

Cowl former and cowl front piece

Rough assembled cowl ready for carving

Nose cowl (note magnets) and top hatch removed. The ply box built into the hatch houses the 850 mAh 2S LiPo

Finish sanded nose cowl and top hatch in place

edge sheeting. The 1/16" gap at the bottom will be carved out when carving and sanding the upsweep into the leading edge.

It only remains to fit the wingtips, made from laminations of soft 1/4" balsa. Drill back from the bottom through the wing bolt holes and open the holes in the top centre section sheeting out to allow the bolt heads to pass through and seat on plate B2. Then carve and sand everything to a finish.

V-Tail

The tail leading and trailing edge are stripped from 3/16" medium sheet balsa. The tips, centre section and the ruddervators are cut from 3/16" sheet. The model, being a converted rubber design, has a relatively long nose so there is no real gain in either building up the ruddervators or piercing them with lightening holes as the model tends towards nose heaviness. Indeed, if feeling lazy you could make the whole tail from 3/16" sheet with appropriate opposite grain anti-warp keys, although the built-up tailplane is worth the effort in my view as it produces a very rigid, warp resistant, structure.

Pin down the leading and trailing edges for one half of the tail, cut the centre sheet pieces down the middle and chamfer to match the dihedral brace (T1), glue and pin the brace and centre sheet pieces in place. Now add the bottom layer of 3/32" square diagonals, followed by the opposing top layer, making sure that top and bottom are glued where they cross.

When everything has dried, unpin and rotate the assembly so that T1 is flat on the plan and build the other half onto the first. The ruddervators have 1/32" ply reinforcements added at the roots for the horns, which are custom made from thin fibreglass board and slotted through the ruddervators, fixing with CA adhesive – but not until after they are covered and finished.

Now for the bit that joins it all together…

The Fuselage

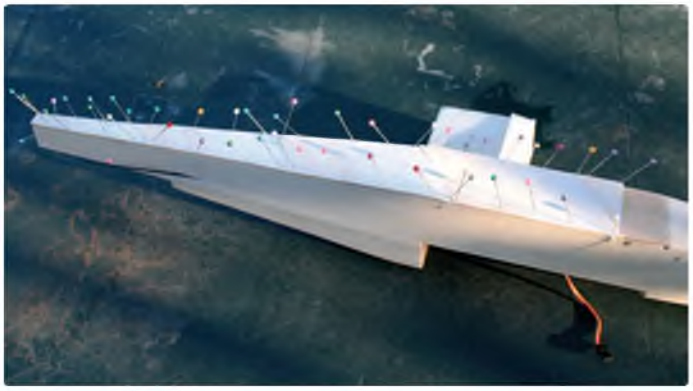
The main formers (F1 to F4) on my prototype are made up from laminations of 1/32" ply each side of 1/16" balsa, which is my personally preferred method. But you could use 1/8" liteply for F1, F2 and F3 and 1/8" balsa for F4 and F5.

The fuselage sides are cut to the outline marked on the plan from 3/32" medium balsa and then have the longerons and various spruce and lime reinforcements, plus the vertical grain 1/16" balsa nose doublers added to the inside of each whilst the sides are pinned down.

The usual caution about building one left and one right side applies. Yes, I know you would never make a mistake like that, would you?

When both sides are dry, unpin them and clamp together whilst the holes for the undercarriage tubes are drilled (to make sure the tubes will be straight) and then they can be joined using formers F2 and F3 at each end of the wing seating. I usually use a fuselage jig for this stage and the next, but I didn't bother this time as it is a very straightforward fuselage. Instead I glued F2 and F3 to one side using balsa triangles to ensure they were vertical, and then added the other side, clamping them together.

Once this is dry pull the nose together and add F1, pull the tail together and fit F4 and F5. The bolt plate F6 (1/8" ply), undercarriage tubes and reinforcing boxes are added next, then the wing is fitted and the holes in F6 drilled prior to fitting the captive M4 nuts. With the basic fuselage now completed but open at the top and bottom it is time to install the two fuselage servos and control runs for the V-tail. I used 1.5 mm carbon fibre pushrods, but commercial snakes would be



Sheet the fuselage bottom with 1/16" balsa, with grain diagonal. A 1/16" ply reinforcement is added for the undercarriage area

Bare bones, three channel version

Bare bones, four channel version

Flying surfaces covered in 38 micron document laminating film prior to tissue covering

The doc lam film provides a good base for final decoration using lightweight tissue

a suitable option. The top nose hatch is built in situ on the nose by sandwiching polythene sheet between the 3/32" hatch base and the fuselage, and adding formers F1A and F2A and the 1/8" square spine, then the 1/16" sheet side panels.

To make everything match when sanded, the top triangular portions of F1 and F2 are capped with 1/16" x 1/8" balsa strips glued with CA adhesive. The same method is used to build the over-wing fairing onto the wing using formers F2B and F3A and B. The rear top 1/8" square stringers are added, then the 1/16" balsa rear top and side panels. The tailplane seating is chamfered out to match the V-tail accurately, but this is not glued in place until after covering.

Finally, the front 1/4" bottom is added, followed by the section of ply over the undercarriage position and the rest of the bottom is sheeted with 1/16" balsa, with the grain diagonal.

The 1/16" ply former F1B is glued to the front of F1 and then drilled for the motor mounting screws and slotted out to allow the motor wires to be passed through into the ESC bay. The cowling is a simple assembly of 1/4" balsa pieces built onto the ply cowl former C1 and hollowed to clear the motor before fitting the two retaining magnets into the top and bottom of C1 and with a matching pair into F1. The outside of the cowling is finally carved and sanded to shape. The final piece to add is the 1/4" balsa under-fin, which completes the structure.

The undercarriage legs are bent from 16 and 18 SWG wire to the shape shown on the plan, inserted in the tubes and the bend of the front leg adjusted before binding and soldering to the main (rear) leg. I cover the binding with a heat shrink tube 'gaiter' to camouflage my less than elegant soldering! Lightweight foam 2" wheels are used and the undercarriage is finally fitted after covering and finishing, and retained by a dab of CA at the top of all four legs.

Finishing

My model is covered in 38 micron satin finish document laminating film on the flying surfaces, which is a beautiful material to work with, and then overall with lightweight tissue. For this model I used vintage coloured Modelspan, which I have been hoarding for years, although I normally use Japanese Esaki Lite Flite tissue (12.5 g/ sq m) applied wet and doped with five coats of thinned nitrate dope.

Obviously any reasonably light film can be used. But avoid the heavier finishes of the Solartex type.

Flying

Not too much to say about this:

Adjust the C of G to coincide with that shown on the plan (it should be 55 mm or 2 3/16" back from the root leading edge). With an 800 mAh 2S LiPo in the nose bay mine needed 10 grams of lead in the tail.

I set the control throws at 3/16" each way on the rudder and elevator (low rate) and 1/4" each way (high rate), measured at the inner trailing edge. High rates are only needed for spins. Aileron throws are 1/4" each way (low rate) and 3/8" each way (high rate), measured at the inner aileron trailing edge. The low rate setting is entirely adequate for all normal circumstances. At high rate the roll is quite rapid.

With a 7" x 5" prop my motor runs at just under 100 watts and the performance is pretty lively in either configuration. At 150 watts I am sure it would give a pretty good imitation of a pylon racer but I shall not be trying it. The 850 mAh LiPo gives about eight minutes of normal mixed flying; if you want more reorganise the interior layout, fit a bottom hatch and have a 1300 or 1500 mAh 2S on the C of G rather than the 850 in the ESC bay. It will cope with the small extra weight, no problem, and you won't need the 10 grams of tail weight I have in mine.

With the plain wing it will do the usual rudder/elevator aerobatics with ease; fit the aileron wing and it will do the same, plus all the rolling manoeuvres. Inverted flying is possible with either wing but is naturally easier with the aileron one and despite the basically flat bottom wing only a small amount of 'down' elevator needs to be held in.

The model slows down pretty well, which makes accurate landings easy. It is not quite as slow and docile on the landing approach as the lighter loaded Tomtit biplane, which is outstanding in this respect, but it is certainly easier than the much faster Mamba.

All in all it has turned out to be a very satisfactory sport/aerobatic model suited to small field operation and looking just that bit different thanks to the V-tail. Another nice one from FROG!

RCMW

The Widgeon shows itself off with the Modelspan finish and aileron wing fitted

And here's the completed model fitted with the non-aileron wing

A gentle hand launch is all it takes to get away

A gentle fly past with the aileron wing

With the plain wing Widgeon X2 will do the usual rudder/elevator aerobatics with ease

This FROG based design provides a very satisfactory sport/aerobatic model suited to small field operation

PLAN DETAILS

BUILD CATEGORY: Intermediate
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PLAN PRICE: £11.99
WOOD PACK NUMBER: WP3791
WOOD PACK PRICE: £34.99

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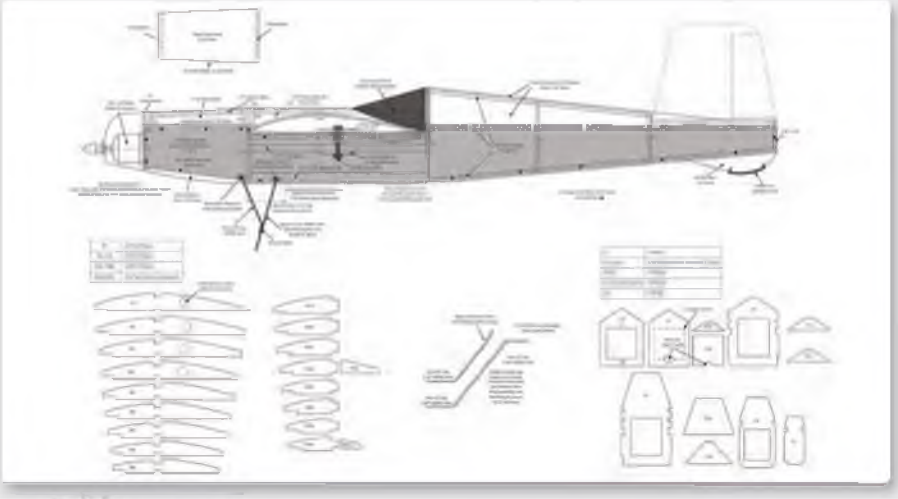


Fair Weather Twofer

This month Dave Goodenough builds a couple of models from his kit stash

Manly and heroic? Our Kev catches me in front of the camera for once – with favourite Anglo flying hat too. It's not cricket, you know!

In goes the LiPo. Readying for the first fright with fingers a-tremble!

A big heave and off it goes, waiting for the first, tentative stick wiggle – all went well

I may usually build bigger models these days but I have not left the realms of 'little' models by any means. From time to time my fingers chase cheapies on 'a well-known auction site' and will occasionally delve into the retail market to see what's about. If it tickles my aerial fancy, I'll buy it – which is why I have a small stack of unbuilt kits in the playroom!

With the outlook of balmy days yet to come the boxes were winnowed until two such little 'uns sat on the workbench, pleading to be built and flown. One was the 40" (1m) span Piper Cherokee from the American company, Herr Engineering. A beautifully presented and prepared laser cut kit. You know, bits of balsa and ply that you glue together and cover with film.

The Sunbird motor glider was the other – small for such a device at 1.5 m or so, yet large enough to go thermal sniffing, or close-in slope soaring in places where you'd never risk a biggie. Again, it's a build-it-yourself laser cut model, but at the other end of the kit spectrum – real budget stuff!

So how did I get on? Was it worth the fiddling, and did they actually fly? Are you sitting comfortably? Then we'll begin…

Sunbird Seething

The Sunbird looks like a shrunken version of the long-popular 'Bird of Time', the classic thermal glider from America that's been around since Pontius first picked up a transmitter. Nowadays you can buy it as either kit or ARTF, either way it's a beautiful model with a long, thermal sniffing pedigree. I believe that the Sunbird came first and that the B-o-T was expanded from it; anyway, it looks just the same. What initially drew me was the price – just 30 Eurinals for a glider kit. Proper job!

The kit box is minimal, with lots of laser cut balsa and ply. Even the wing spars are laser cut ply strips! The one thing you won't find in the box is a plan, only colour photos of the build sequence with some annotations. This is not a model that you should build without previous kit or plan-build experience as you need to be able to 'interpret' the photos somewhat.

Saying that, it's not too difficult to assemble if you take it slowly and logically, as the fuselage, tailplane and fin/rudder are simple to follow and build. It's the wings that take some head scratching – there are three dihedral braces (some people say two, but the kit has six cut pieces to make three paired items). It appears that you build the four wing panels and then cut away the first two ribs by each dihedral break – between the wing spars – to create a pocket to slide the ply dihedral braces into. It sounds odd but it works well in practice, just so long as you sand the ribs and braces to mate and join well with adhesive. I used PVA to give me adjustment and clamping time. I've done some 'vigorous' flying to date and nothing has broken in the air.

The film covering is simplicity itself (it took little of my 'left-overs' stock), as is fitting all the ironmongery. I did change some of the control fittings but that was personal choice and I reckon the kit items were sound enough.

The avionics and motor set-up were from my 'ready to use' cupboard. An outrunner of around 80 watts was deemed plenty powerful enough, paired with a 15 A ESC, 2.4 GHz FrSky mini receiver and four budget servos – 2 x 8 g for the rudder/elevator and 2 x 5 g for the ailerons – all powered by an 800 mAh 3S LiPo and hauled by a 7.5" x 4" folding prop. Even factoring in the low price covering film, I reckon the whole deal came in well under 100 Euros.

Pretty as a picture and one sweet glider to fly

Sunbird shows its 'Bird of Time' looks as it whiffles past

Propeller folded, the Sunbird glides serenely over the off-piste heathland

Nice, innit? The little Herr Cherokee is ready for the off. You can hardly notice the new film hinged ailerons

Pre-ailerons, the two-axis terror in a rare level pass under radio 'annoyance'

In Its Element

With hope, but no expectations, I arrived at the piste on the same day that I intended to test the little Cherokee – more of that later. The Sunbird's Centre of Gravity was checked and found to be a bit behind the main spar, a tad rearwards for safety. A few grams of church roof (I always carry a bit) was wedged inside the battery foam filler, the balance re-checked, et voila, parfait! No more prevaricating about, over to the off-runway grass, open the noise tap and commit aviation.

Sainte M***e – the little thing went off a bit quicker than I'd expected! The next couple of minutes were a trifle testing, pushing my hypertension medication to the limit! Despite frantic fingers on the motor control the little glider really only needed a bit of 'down' to calm its vertical orientation, whilst a tad of right aileron dampened a slight left turn.

At around 1/3 power the Sunbird whiffles around almost silently but give it all the throttle and it'll climb quite rapidly. Not a rocket or 'hotliner' by any means, but enough to get you up smartly. The thin wing section gives very little drag.

Chop the power at height and this wee thing flattens off into a very nice glide. The ailerons were initially very sensitive and I've reduced the throw to give a slightly softer response, though it will still aerobat well.

What surprised me the most was whilst cruising around and exploring the glide the right wing tip suddenly twitched up. A rapid flat right turn saw this little beastie in a real boomer of a thermal – it went up like it was in a lift! Later flights proved that it wasn't a fluke, as the 'twitching wing' heralded lift every time the model clipped the edge of a thermal.

I've recently returned from a quick holiday break to the North-West Finisterre coast, not far from Aber Wrac'h, at the Dunes of Keremma. I took the Sunbird (it sat nicely on the parcel shelf), as I wanted to try low-level dune soaring. Needless to say, the mild on-shore breeze was perfect for this sprightly glider and I didn't have to run the motor at all. Sitting there with an evening picnic, working the lift along the face of the long dune was most therapeutic, as was the very nice glass of Saumur and the stroll back to the caravan site in the dusk half-light. Magic!

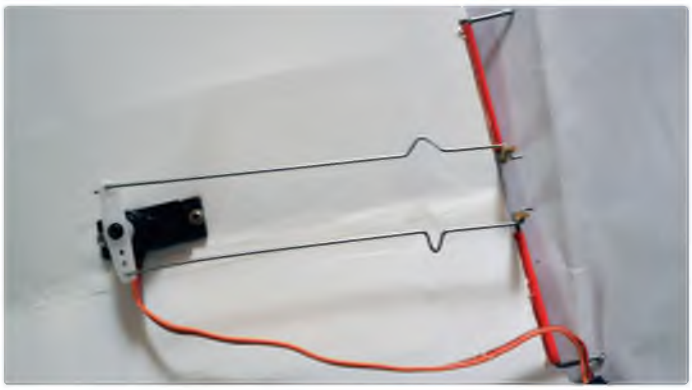
Cherokee Quality

Almost a polar opposite with regard to kit quality is the Herr Engineering Cherokee. The substantial box is unlikely ever to be damaged in the post (mine was perfect) and once opened it is plainly clear that this is a 'quality' kit. As I'd bought it online as an auction cheapie my flabber was truly ghasted!

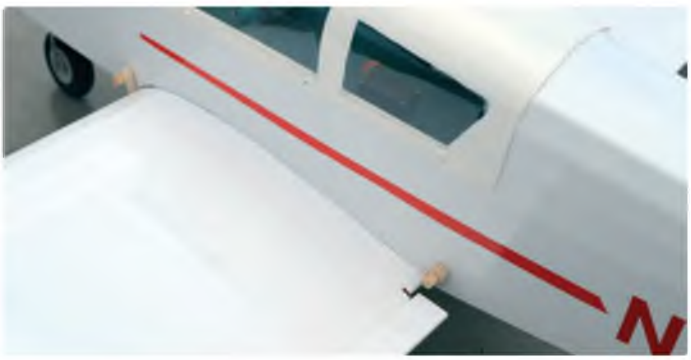
Two very well drawn plans sit rolled in there, all the small bits are of good quality and bagged-up, plus the balsa and ply parts are superbly laser cut and of perfect wood density/grain choice. There is also a detailed

Getting a bit flustered! Our little lady tries to bite back in a turn using just rudder and elevator controls

A pair of torque rod sets in the making



Torque rods in, with guide tubes glued to the trailing edge



All done, with enough room for the securing rubber bands – a very practical solution

The model's underside shows how tidy a 'bodge job' can be

building sequence booklet complete with all parts shown in an explanatory drawing. A very impressive effort by Herr, it boded well for the coming build.

I didn't need the instruction book but decided to follow it anyway, despite the plans alone being wholly adequate. They are so well drawn and detailed that in fact that you could easily use them to build another model. Following the build sequence was logical, with the laser cutting and component fit being perfect. The only thing I needed to do was sand some of the laser singed edges to provide a good wood-to-wood glue bond. No build info is needed here in this missive – it's all in the kit instructions. Suffice to say, if you can't build this model easily and quickly you need to stay with the foamies!

As with the Sunbird, I changed a few of the smaller fittings for personal preference but there's nothing wrong with the supplied bits. I found the cockpit canopy to be a bit thin but the shape was good and it trimmed to fit perfectly. Similarly, the nose cowling is a simple ABS moulding – fit for purpose, but uninspiring.

Fitting it out is easy as there's enough space to fit mini or micro R/C gear. I chose the mini route, with a 100-odd watt outrunner, a 20 A ESC (all I had), a 6.5" x 4" folding prop (later changed to 7.5" x 4"; I had no spare 'rigid' props the right size), the same type of FrSky 4-ch Mini Rx and battery as the glider and 2 x 8 g servos on rudder and elevator – yes, it's only a two-axis controlled model.

Therein lies a problem; I usually fly small two control axis models on aileron/elevator, as rudder control can be insufficient on small, fast models. But I gave way to the instructions and left it 'as designed'…

Final assembly and covering was as simple as you can get – all white, with just a few red decals, just like so many low-wing 'spam cans' out there. I only wanted a little 'hack' model after all and couldn't be bothered to add fiddly detail to such a small plane. I did add a pilot though – you MUST have someone in the office!

Torrid Tantrums!

The most recent spell of good weather – in fact the first this year – saw me fettling the Cherokee in the pits. Basically two rubber bands to hold the wing on and shove the LiPo under the hatch – done and ready for the first attempt. A quick genuflect at any benign entity, ease the motor power on and away it trundled with the tiddly nose-gear steering in concert with the fin – just like the big boys. Once lined-up with the runway on went the power and the pretty Piper raced away, skipped a couple of times, then rose – rather too fast!

Hmm…a bit too much elevator trim, methinks. Ease off the power, tap in some elevator down trim, stop the fingers shaking and feed in some left trim too. That's better, all straight now so time to try a turn. A bit of

left rudder, then more… now ALL the rudder – it gradually turned left and zoomed up, before a bit of down quenched the near-stall. Let's try that again shall we? Back straight and level-ish, feed in some right rudder this time…Well turn, why don't you!

Ok, so the rudder is ineffective, so what do I do now? Dead right – chop the power and try to control the glide down into the long grass. And what a super glide it has; quite a surprise in the circumstances.

A rapid rudder extension was cobbled together in the pits using a bit of thin card and some sticky tape before the little devil was rolled out for another try. A super take-off, a tad more directional control but nowhere near enough for safe and controlled flight. Once more unto the weeds and another rethink.

The pits consensus was that the Centre of Gravity was still a bit rearward, making this model a sensitive little soul. A couple of large diameter M10 flat washers were stuffed in the battery foam alongside the lead ballast, the battery reconnected and off we wandered to the piste again.

Same old, same old. It took off well and climbed out nicely, but ignored most of the rudder waggling on my behalf. It's true that the model flies well, has a nice 'sit' in the air for such a small device, but attempting to fly it well with such a minimally effective rudder is just too much for my nerves! At least on the last two flights I managed power on approaches and oh-so-nice-and-gentle landings.

So, what to do with this wanton little hussy of an aeroplane?

Close Encounters Of The Third Kind!

Ailerons – the third axis – was the only way to go. It was obvious by now that the model is almost a free-flight stable design, with the original size rudder being little more than a large trim-tab to guide the Cherokee generally in the right direction. In fact once trimmed to fly level at low power in wide left or right turns it stays there! It's only when you annoy the model with a larger rudder input that it gets upset and tries to have a tantrum.

With the wing fully finished there was no way that I was going to cut it about to fit inset ailerons. The only way to go was strip ailerons, controlled by a small servo. I did take the lazy way and fitted an 8 g servo in a pocket I cut alongside the centreline rib, at the dihedral break as there's plenty of space in the fuselage above the wing. All simple stuff to do and only a few minutes work, before bending up a pair of 'handed' torque rods, complete with pivot tubes from a piece of control snake inner.

The ailerons were dead simple too being 2 x 15 mm wide strips of 3 mm balsa, almost the full span of each wing half, ending about 8 mm from the fuselage side. A couple of strips of covering film to form the aileron hinge, two small control horns and, finally, a pair of simple bent wire pushrods to link the torque rods to the servo – it really couldn't get any simpler. From a few feet away you don't notice the extra bit of wing chord and it enthused me to try the model out once again at the first opportunity.

Rash At The Runway?

As I'd not changed the elevator and rudder throws, and the ailerons had been adjusted to align with the flat underside of the wing, there was no reason to expect a drastic change in the flying characteristics. Stride manfully out to the take-off point, plonk the wee beastie down and open the tap… Well, that's a surprise – a straight-as-you-like take-off, gentle climb, then a tentative wangle on the aileron stick proved that they worked, though needing a couple of trim button taps to stay level.

The rest of the flight was a total non-event. The Cherokee, now safely convinced by the extra guidance to behave, became the pretty little Indian maiden of the skies it was intended to be. No more war dancing!

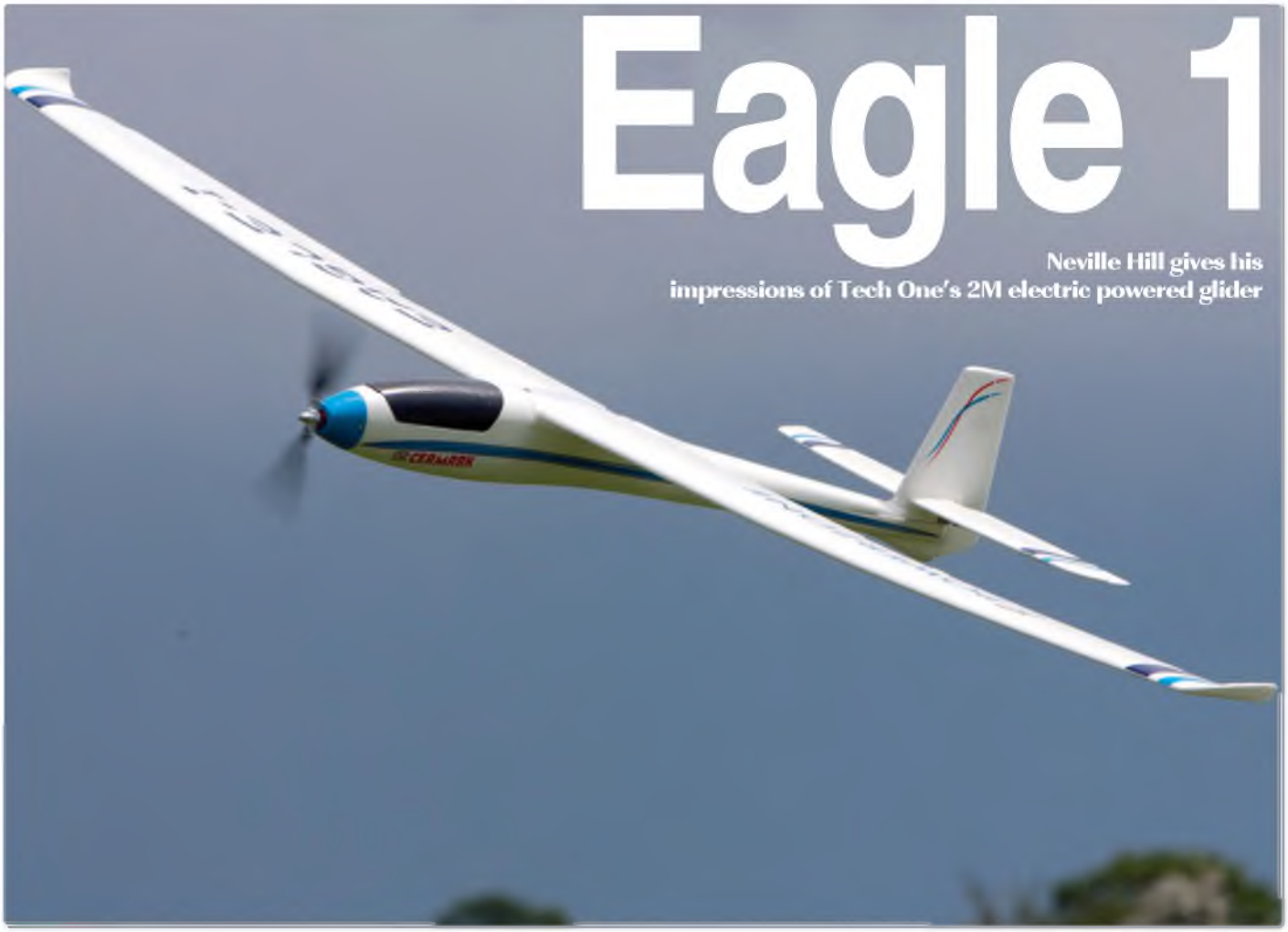
Unfortunately, I blotted my copybook somewhat as I enjoyed the flight so much that I'd forgot the minimal battery size. Needless to say the ESC reminded me that there were no electrons left and cut the motor. No problem as this little lady glides very well indeed – until it runs out of lift!

My fault entirely, as I stretched the glide too far with no chance of a burst of power to get me out of trouble. A stall at very low level was followed by a clatter as our little dear arrived somewhat uncomfortably! No worries – a little model plus light weight equals just a bit of 'runway rash' to besmirch her features and she lives to fly well again another day. ***RCMW***

CONTACTS
DAVE GOODENOUGH
dizzy3@sfr.fr

Eagle 1

Neville Hill gives his impressions of Tech One's 2M electric powered glider



The parts count of this two metre span glider is quite small, with the fuselage, wings and tail surfaces being the main parts. All are well packed in polythene bags. The hardware includes screws, two 'Y' leads, short pushrods, wing joiners and bolts, and a straight Allen key with a plastic 'T' handle, all supplied in their own bags.

The 9 g micro servos are pre-fitted, with one each for the rudder and elevator, and two each for the ailerons and flaps. A 1400 KV brushless outrunner motor, folding propeller and 30 A ESC are, again, all pre-fitted and complete the package.

The fuselage, wings and tail surfaces are cleanly moulded in EPOFLEXY foam, with all edges nicely defined and with no flash lines. The parts are fully finished, complete with decals. All parts arrived intact with no damage.

Assembly Instructions

A nicely printed instruction leaflet with monochrome pictures is provided, with a short explanation for each step of the assembly, although some of these could have been more detailed. For example, would a first time builder know how to fit the two-part control horns to a foam wing, and which glue to use?

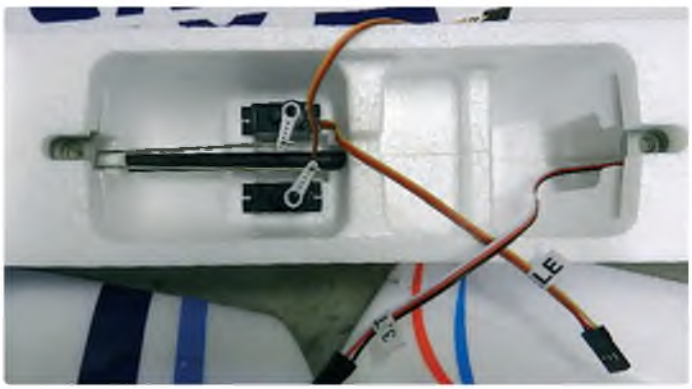
One other point was that the motor and propeller on two photographs were called 'the ducted fan'; obviously lost in translation, as these things sometimes are.

On the positive side, various spares are listed, which you might need should you have an arrival at any time. And there's lots of detail about setting up the glider.

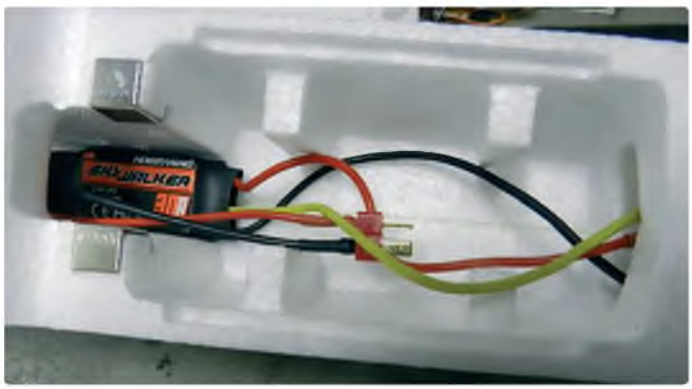
Eagle banks away from the camera to show of its four servo wing

There are just a few airframe parts in the box, all neatly moulded from EPOFLEXY foam

A good spread of decent quality hardware is supplied



9 g servos are pre-installed, six in all



Battery bay ready for a 3S LiPo. The model comes with a 30 A ESC

In common with most ARTF's the ESC is fitted with a Deans style connector. So Neville cut it off and fitted a matching connector to suit his LiPos. Making up a short adapter lead is another way around connector mismatch problems

The long aileron and flap servo leads run in ready made channels underneath each wing

The Build

It's hardly worth calling it a build and it should not take long to complete. In fact my model, not even rushing, was finished in less than three hours.

Following the manual, first attach the aileron and flap horn assemblies. A nice little sunken moulded area shows exactly where these go. Position the horn backing plate here and make a single cut in the centre with a sharp scalpel blade. Remove and push through the long tag of the horn and fit the backing plate to the opposite side. I used medium ZAP cyano to lock it in place. Do this for all aileron and flap positions. Cut off the excess tags that are sticking out, then adjust and connect up the two pushrods.

According to the manual that's that, but the aileron and flap surfaces do need to be cut free of the main wing, down the edges only, or they will not be going anywhere. Hinging is as per normal on foam surfaces, with full length thin foam acting as the pivot points. Work these up and down a few times to ensure 'full and free movement'. The wings are stiffened by carbon rods that are let into the under surface but they remain quite flexible.

The leads from the two servos are also let in to the underside of each wing, along a small channel. To stop the leads from flapping around I used a dab of 'hot melt' glue in a few places and a strip of white electrical tape to seal them in.

Tail

Dry fit together the vertical and horizontal surfaces to make sure everything fits. Which it did, very snugly. Then offer the tail assembly up to the rear end of the fuselage.

As with the wings, fit the horns to both the rudder and elevator before you fix them in position. It's much easier to do on the individual parts, rather than trying to do this when everything is finally glued together.

When the rudder was moved it fouled on the elevator joiner at the circular cut-out. So a few shavings were removed from each edge at 45°, allowing the rudder to freely move to its limits.

A flat carbon rod stiffens up the elevator on both sides. But unfortunately the elevator horn is in the way on one side, so the carbon is cut short, resulting in the elevator moving up and down on one side more that the other. I could do nothing about this so we will see if it makes a difference when flown. (I fly a Sonata E with an elevator on only one side of the tailplane and that flies fine, so this shouldn't be a problem.)

Finally, glue the tail in position. No particular type of glue is mentioned but the assembly picture shows a typical cyano bottle, so I used ZAP medium CA. *(It's a good idea to test a small hidden area of foam with the glue you intend to use to make sure it doesn't affect the foam - KC)*

When fully cured, which only takes a few minutes, fit the ready made pushrods to the horns. You may need to adjust the pushrods slightly to get the control surfaces lined up at neutral.

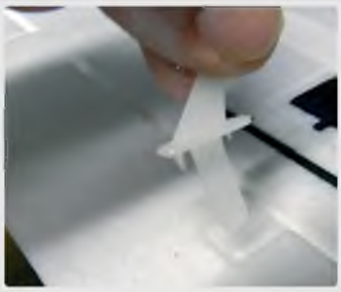
Twin carbon rods add strength but retain flexibility at the wing tips

The servo leads were fixed in their grooves with dabs of hot glue and then covered with insulating tape

Using an old 4.8 V receiver pack to set up and test the aileron and flap linkages

The flaps and ailerons need to be cut loose at each end using a sharp knife

Cutting a small, central slot prior to fitting the control horns



The long tab on the control horn is pushed through the cut

A backing plate is pressed firmly into place

The excess tab is cut off using a pair of side cutters

Top Tip

For testing purposes I plug in a 4.6 V receiver pack direct to the Rx, which does not give me any worries about the propeller starting and whacking my fingers.

When you are happy with all the control throws, and that everything works in the correct direction, remove the 4.6 V battery and plug the ESC lead into the Rx. Then couple up the LiPo to test the motor for correct direction and failsafe.

Radio Gear

The servos were coupled up and the receiver was attached by hook and loop tape to the obvious position moulded into a central position within the fuselage. I fitted old Biro tubes to take the two aerials of my Futaba receiver at 90° and it all seemed to work OK.

The control movements were set as per instructions at 15 mm each way for the rudder, flaps and elevator, and 18 mm for the ailerons.

All Joined Up

The wings are joined with a carbon tube and held together using plastic plates top and bottom. These plates are, in turn, fixed to the fuselage with two plastic bolts that are screwed into nuts inside the fuselage. The only problem I found was that the nuts dropped out of their fixing and I had to glue them back in.

The recommended C of G is set at 75 mm back from the leading edge of the wing and pushing the LiPo fully forward ensured that this was spot on. I also had to change the plug on the ESC to suit my LiPo's plugs.

General Comments

Foam fuselages can be quite flexible and the Eagle 1 had a substantial carbon rod inserted down the middle of the fuselage to stiffen it up. This seems to work well.

The rudder and elevator servos moved about when activating the surfaces, so I decided to give them a little extra support and ran a bead of hot melt glue around them.

The canopy is fitted in the usual way, with a substantial lug fitting under the front and two magnets at the back, which all fitted quite snugly.

Time taken in total was approximately three hours. I never rush builds, whether from kits or ARTFs, as I find this is part of the fun of aeromodelling. And most times I learn something new.

Flying

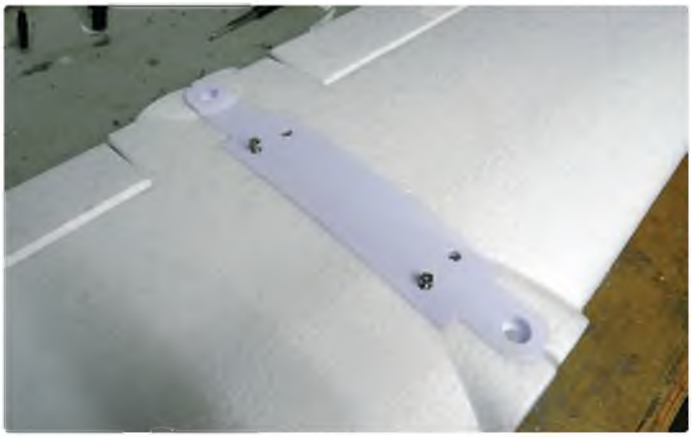
A suitable day dawned (bright, dry and sunny, no less!) So with Jonty, my test pilot, at the ready, we decided to give it a try. But on checking the glider over we were unable to get full movement on the elevator, as recommended in the assembly manual.

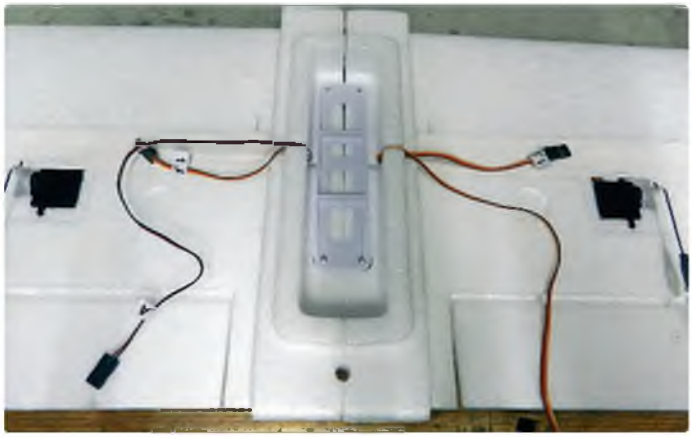
Wing linkages are short and direct

The cut-out for the elevator joiner needed to be chamfered to allow full movement of the rudder

Fully assembled tail after gluing in place on the fuselage

Tail linkages are made using 'wire in snake' style pushrods





Plastic plates hold the wing panels together top and bottom

The thickness of the foam hinge was causing the long and unsupported snake pushrod to bow quite considerably. Also, as the elevator half fitted with the horn moved, the elevator twisted and had only about half of the movement on the other side.

The rudder was showing the same problem, with lack of movement and a bowing snake due to the thick, stiff foam hinge, although the ailerons and flaps were fine.

So we made the decision to cut the rudder and elevator free and then retro fit pinned hinges to provide full and free movement at the tail. It really would not have been a good idea to attempt to fly the model with the tail hinges as supplied.

The next day was almost as good as the previous one, with minimal wind and no rain. I think we even saw the sun on occasions as well! So we had good conditions for the second try.

With a freshly charged 3S 2200 LiPo and everything double checked, we were ready for the first hand launch. Over to Jonty and Ray, pilot and photographer, in that order…

Pilot's Notes

The 3S LiPo was placed as far forward as it would go for the first flight. This resulted in the C of G being 75 mm back from the leading edge, as per the manual. So, having checked everything over (again!), Nev gave the Eagle a nice level launch with about 60% throttle. I don't give any powered glider the full beans on launch these days, as most of the models I've been asked to maiden have had a nasty habit of trying to stick their noses up at 45 degrees or more immediately after launch.

With this level of power the Eagle sauntered away, climbing very gently, so I began a left hand circuit to get the feel of the controls. She felt very nice and the rudder was effective without being overly so. The ailerons, using a differential of 2:1 (in other words, the down-going aileron throw was 50% of the up-going aileron) were spot on, with no yaw whatsoever, especially when used in conjunction with the rudder (which is how it should be done, gents!) The elevator though did feel very 'dead' indeed, despite a reasonable amount of throw. Mmmm...

Having flown the Eagle around gently for a while it was time to check out how well it could climb. So I gave it the beans into what little breeze there was. All that really happened was that it gained speed very nicely but it wouldn't do the homesick angel bit unless it was given a pretty big dose of up elevator. Anyway, having gained a decent height, I closed the throttle gently to level it off to try the glide – and it behaved exactly as I thought it would with such a forward C of G. Down went the nose, and the Eagle exhibited a steep glide angle. This was why it hadn't done the usual leccy glider trick of trying

to loop on launch, as most need a hefty application of down elevator held in under high power, or a Tx mix to take care of things.

So we decided to land and change the LiPo pack. The landing was faster than I would have preferred due to the forward C of G and ineffective elevator, but it was quite uneventful. Not bad at all really; it just needing a bit more setting up.

The second pack was installed as far back as it would go in the compartment and off we went again at approximately 60% power. The nose immediately came up on launch, then with more power being fed in I had to correspondingly apply more forward stick to prevent the Eagle from trying to prop hang. In other words, the usual powered glider scenario. This was great as it meant the C of G was now somewhere in the ball park for a decent glide performance!

Full power, allied with about 35% down elevator, gave a really respectable climb. Then, on levelling out and cutting the motor, this time the Eagle behaved itself and acted like a glider. Nice!

The controls, including the elevator, were just right, so I did some photo passes for Ray. Then, as there wasn't any lift about, I spent the rest of the flight doing rolls, loops, stall turns, inverted etc., all of which the Eagle performed very nicely indeed. This time the landing was very much slower and no nasty habits raised their ugly heads, and there was much more pitch control evident. The ability to flare nicely with very little forward speed remaining was really pleasing. Good fun!

Altogether the flights we've had with the Eagle have shown that the manual's recommended C of G doesn't make the most of the model's gliding potential. But simply placing the LiPo rearward works wonders.

I would not fly the model without replacing the tail surface hinges. But, that apart, I think it's a good 'un! ***RCMW***

Neville shows off the Eagle 1 for size

It's pretty standard for the recommended C of G of ARTF models to be well forward to ensure safe first flights. The balance point can then be moved rearwards to suit your experience and to maximise flight performance, as was necessary with the Eagle 1

After setting the model up test pilot Jonty gives the Eagle his seal of approval and concludes his report with, "..it's a good 'un!"

MODEL WORLD

MODEL INFORMATION

NAME:	Eagle 1
MANUFACTURER:	Tech One
DISTRIBUTOR:	Century UK
WEBSITE:	www.centuryuk.com/RC-Planes/Gliders/Tech-One-Eagle-1
PRICE:	£139.96
MODEL TYPE:	Electric powered glider
CONSTRUCTION:	Moulded from EPOFLEXY foam
PARTS SUPPLIED:	Airframe, 6 x 9 g servos, 1400 KV outrunner motor, 30 A ESC
PARTS REQUIRED:	Receiver and 3S 2250 mAh LiPo battery

R/C FUNCTIONS

1: Ailerons
2: Elevator
3: Rudder
4: Throttle
5: Flaps

MODEL SPECIFICATIONS

WINGSPAN:	2060 mm (81.1")
LENGTH:	1300 mm (51.2")
FLYING WEIGHT:	1100 g (38.8 oz)

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S.55 X Model Goes Full-Size!

We are pleased to report some interesting news coming from Italy, following the article on the Savoia Marchetti S.55 X seaplane that appeared in the March 2016 issue. Franco Bugada takes up the story

Erick Marin's magnificent model of the S.55 X was featured in RCMW, March 2016

Following my article on the Savoia Marchetti S.55 X model that appeared in the March 2016 issue of RC Model World, a full-scale mock-up is starting to be built for the Volandia Museum in Italy

In March a new partnership was formed, the 'Savoia Marchetti Historical Group' based in Somma Lombardo, Varese, very close to Milan Malpensa airport. The head office is in the Volandia Park and Flight Museum, located in the same factory where Gianni Caproni designed and built a long series of aircraft.

The new partnership includes many passionate aviation enthusiasts, technicians, journalists and fund raising experts, including the 'Group of SIAI MARCHETTI Senior Workmen' and the 'Association of Volandia Friends', with the support of some companies that are active in and around the Varese area, like Aerosviluppi and Officine Villella. The new group is supported by several publications, including RC Model World, Modellismo and VFR Aviation, who published my article on the S.55 X.

Filippo Meani is the Co-ordinator of the four teams taking care of Program, Construction, Communications and Financing tasks. The scope of the Group is to search, find and repair existing wrecks or rebuild old historic aircraft, as well as to restore and scan the technical documents and drawings in order to generate new documents that can be used without any danger of damaging the originals.

For this purpose, Maurizio Grillo and his staff have examined approximately 900 assembly, detail and working drawings of the S.55 seaplane. They have been helped in this task by Marzio Mariani - President of the SIAI Marchetti Seniores Group, Paolo Montonati - President of Volandia Friends and Dr. Claudio Tovaglieri - President of the Technical and Scientific Committee at Volandia Museum.

Bits And Pieces

In the past the S.55 was built in many versions, making a total of 250 aircraft. The search for information about wrecked aircraft came up with the news of one small float part existing in the Museum of the Italian Air Force in Vigna di Valle, not so far from Rome.

More important pieces were discovered in Siberia, coming from a disaster in 1935. At that time an S.55 P ('P' for passengers) lost its way in very thick fog, touched the top of a larch tree and dropped into the forest. Nine people lost their lives and the plane was destroyed, breaking into numerous pieces. Unfortunately the area is very difficult to explore, even in the summer, with plenty of trees, rivers and hills. In 2008 parts from the crash were discovered in the region of Khabarovsk. The Historical Group of Savoia Marchetti is trying to obtain at least one of the two Isotta Fraschini 750 hp motors and, if possible, some other pieces.

A complete S.55 seaplane exists in Brazil. It is the 'Jahú' seaplane of Joao Ribeiro de Barros, which crossed the Atlantic Ocean in 1927, following after Francesco De Pinedo in S.55 'Santa Maria'. The 'Jahú' was carefully maintained in the TAM Museum in the State of Sao Paulo, but the museum has closed recently and it is very likely that the S.55 will move to some other location.

Full Scale Mock Up

The above situation pushed the Historical Group to consider the construction of a full scale mock up of an S.55 X. Their actual dream was to build a flying replica of the S.55 X to commemorate the planes that made the North Atlantic Ocean crossing in 1933. Unfortunately seaplane flying from nearly all the Italian lakes and coasts, even by historically significant aircraft, is now forbidden due to current safety regulations.

Only Lake Como can accept seaplanes and a modern flying school operated by Como Aero Club is still located on the beach. But the site is not sufficiently large enough to accommodate and recover a big S.55 at 24 metres span and weighing 5,500 kilograms.

So the decision was made to build a mock up to be exhibited at the Volandia Museum. Construction will follow the scanned drawings and the original Instruction manuals.

We are all fascinated by this program, instigated by our Italian friends. And we hope that in a few years it will possible to visit and take pictures of this aeroplane, the original examples of which made aviation history.

RCMW

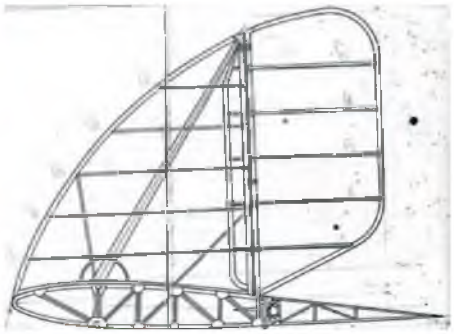
IMAGE CREDITS

Photographs used in this feature were supplied by Franco Bugada, Giorgio Apostolo, Costantin Pronyakin and Marco Gueli, together with pictures from the original instruction manuals.

A complete S.55 seaplane still exists in Brazil. It is the 'Jahù' seaplane of Joao Ribeiro de Barros, which crossed the Atlantic Ocean in 1927

Part of the remit of the Savoia Marchetti Historical Group is to find and repair parts from existing wrecks

Aerosviluppi, a company located close to Volandia Museum, has manufactured one of two vertical fins for the new full scale mock up



Above & below: New parts are being built using scanned copies of original drawings

The S.55's cockpit was integrated into the large wing centre section

Strasbourg F3P

Donatas Pauzuolis reports from the Federation Aeronautique Internationale's F3P test event

Aeroplane waiting line for practise

Introduction

Every other year the FAI (Federation Aeronautique Internationale) organises a World Championship for the F3P class (indoor aerobatics), with the first two championships being held in Germany and Poland. As an unofficial but general rule, a year before the World Championship the hosts organise a test event. It always attracts the best European pilots and this event is called the 'Unofficial European Championship'.

The next WC will be held in Strasbourg, France, so the FAI and Aéro-Club de Brumath organised a test event on February 20th and 21st, 2016. It became the main F3P event for this winter's indoor flying season and attracted 48 pilots from thirteen countries from all over the Europe. This event review will give you a general idea how the F3P class has evolved and what we can expect to see in 2017's World Championship.

Competition Format

As usual the organisers selected an already proven competition format. There were three flying categories – F3P-B (National) sequence, Freestyle-Aeromusical (F3P-AM) and, most important, F3P-FAI class.

F3P-B class is a first step towards the FAI class, where less experienced pilots fly less demanding pattern sequences.

As always Aeromusical was the most attractive class for spectators. Unfortunately the number of pilots who were flying in this class decreased because F3P-FAI class became more complex and time consuming. So most pilots choose to spend more time training for the F3P-FAI pattern and less time Aeromusical flying. But despite the small number of Aeromusical pilots the level of flying was extremely high.

The best French pilot in the Aeromusical class, Julien Hecht, put in a very memorable flight during the first round. He flew the plane so hard that wing construction broke in the air! Despite this Julien was able to finish his routine. Such failures aren't surprising because routines have become faster and more aggressive, and at the same time pilots are striving to make their planes as light as possible.

As mentioned the most important class was F3P-FAI. Organisers set a limit for 40 pilots; having more wouldn't be possible because of time issues. The registration limit was reached just two days after the launch of the official competition website! Since this was an official FAI competition, after the preliminary rounds the final rounds, with more difficult F3P-AF sequences, were flown to identify podium places.

Pilots

In the last few years in F3P class we have seen pretty much the same names on the podium and this competition proved no different. Almost all the finalists from the last

Oppliger Christian performs a warm up flight for the judges

Group picture of all Strasbourg F3P contestants

two World Championships were present in Strasbourg.

But one very positive aspect I saw were several new young faces. Twelve year old Ignace Pawlenko from Belgium made some very solid flights for a pilot who has only a few years of indoor flying experience. He even reached the final rounds and flew more difficult sequences without making any crucial mistakes. This young man has a very bright future in the F3P class if he continues with the same passion.

It was also a good time to stop a little bit and think about my history in this great aerobatic class. I realised that my first international competition was in 2004 in Belgium. At that time Ignace Pawlenko probably wasn't even born!

Another bright personality in this competition was young German pilot Marc Faulhaber. Marc flew extremely well and ended up in fifth position in the overall standings next to the senior pilots. You wouldn't expect anything else from the 2015 World Champion in the junior class. On top of that Marc managed it with his own designed model!

Planes

Compared to the last season this year the planes made big steps forward. In 2014, together with my friend/pilot and brilliant engineer Alexey Lantsov, we started a new era of ultra-light F3P aeroplanes. Together with a unique, light 1S coaxial system and by changing the building material from Depron to carbon, we managed to bring the plane's RTF (ready to flight) weight down to 37 grams.

The storage room was fully packed with models. Many transportation boxes were used to deliver planes safely

Above & below: As usual young Marc Faulhaber made some great looking and precise flights with his Arrow GS and secured a place on the podium

Derk van der Vecht from the Netherlands is quite happy with his Aeromusical flight. His uncle Bert removes the battery from his Arrow V.6

Janne Lappi's aeroplane 'Rane 2016'. With 84 cm wingspan and just 42 g RTF weight the model 'fitted' in the hall very well. The plane had no aerodynamic air brakes so all braking was provided by the 14 inch contra rotating propellers made from balsa wood

Julien Hecht's 'Wash' was popular with French pilots. Julien built his plane from carbon rods

Above & below: Nicolas Pietu's model 'Ares'. A very high fuselage provided a big side area, which helps a lot in knife-edge flight. Many high co-efficient manoeuvres in final sequences benefit from such construction

Gernot Bruckmann's plane 'Trivia V.2' is built from carbon rods and tubes. The Austrian pilot used the same model last year to secure his second F3P World Championship title in Poland

QR CODES
Aeromusical Flights

Donatas Pauzuolis

Julien Hecht

Marc Faulhaber

Some people admired our achievements but others were a bit more sceptical. They were saying that this technology is too difficult to produce for inexperienced modellers and it's too expensive compared to Depron. But the competition in Strasbourg was obvious proof that carbon technology is firmly established in this class. Depron models were almost extinct and carbon airframes dominated in all pattern classes.

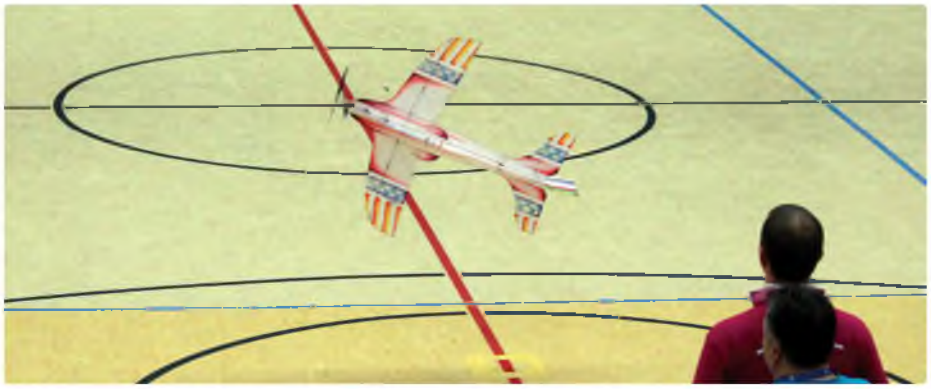
Personally, I've put my faith in carbon technology and made my Aeromusical aeroplane, 'Arrow Competition Special', completely from carbon. In the Aeromusical class, as in pattern, carbon provides many benefits to airframes. It makes planes noticeably lighter and more rigid. A lighter plane allows us to use better and even heavier equipment, and a more rigid plane allows the pilot to perform Aeromusical routines with much more precision and scope. I'm quite sure that next season we will see more models built from carbon in the Aeromusical class as well.

Warm LiPo batteries work better. The Finnish team use a compact heating box to keep their small 120 mAh 1S LiPo packs warm

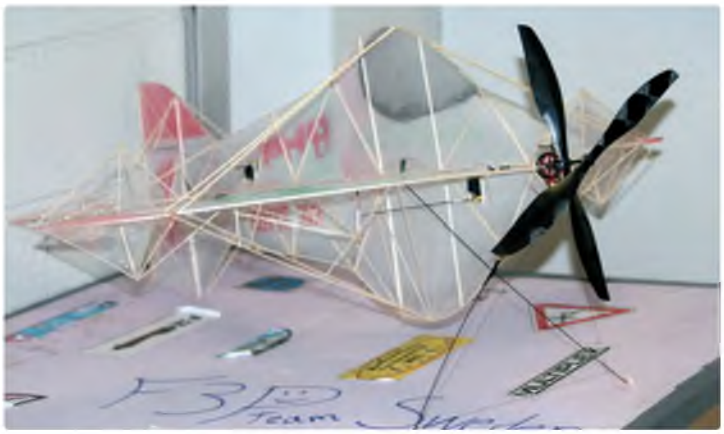
To save weight on model reinforcements many used carbon rods. Such precise work takes many hours

QR CODES
Preliminary Pattern Flights

Donatas Pauzuolis Janne Lappi



Donatas Pauzuolis' model 'Victory XL' is also built from carbon rods and tubes. This big plane was made especially for the huge hall in Poland where the second F3P World Championships was held in 2015. It uses an AL coaxial unit and new, light 12 inch props



Interesting experiment by an F3P Swedish pilot, whose plane was built from balsa wood. The model is not as strong as one built from carbon but it is a good alternative. It is noticeably cheaper and the work with balsa is not so complicated

Quite unusual and a really beautiful colour scheme made by Ruedi Gallati from Switzerland

Some top pilots that visited Strasbourg were well prepared for the exact hall where the competition was held. For example, Janne Lappi from Finland, who finished in second place in the overall standings, reduced in size his successful model 'Rane 2015', which he used in previous World Championships. His new model 'Rane 2016' with 84 cm wingspan and 42 g RTF weight fitted the average size Strasbourg hall perfectly.

Another noticeable airframe construction adjustment was made by Nicolas Pietu (he ended up in fourth place in the final standings). This year both preliminary and final sequences required great 'knife-edge' flight characteristics. To achieve this Nicolas increased the fuselage side area quite drastically. It almost looked like the fuselage side area was bigger than the area of the wings!

Equipment

Another technology that became an integral part of F3P is the coaxial unit. The Strasbourg competition was the very first where every single plane had a coaxial unit. A few coaxial units made by Kimmo Kaukoranta were used but most of pilots were using units made by Alexey Lantsov or by Sergej Glavak.

All units were capable of spinning huge props; 12 and 13 inch carbon propellers were most popular in this competition. Janne Lappi made a step forward by making a 14 inch, really wide propeller blade from balsa wood. Janne didn't use any aerodynamic brakes on his aeroplane; all the braking in the down lines was done by the propellers.

Conclusion

Due to the new technologies most planes were lighter than 55 grams. Low weight allows pilots to fly very slowly and naturally such flying styles require more time for completing pattern sequences. For example, a few years ago when completing very similar pattern sequences only two and a half to three minutes was required. Now it takes about four to five minutes. So the competition with the same amount of pilots and the usual number of rounds (four preliminary and three final rounds) was simply not possible with 48 pilots in one weekend.

The organisers decided to reduce the amount of rounds; there were just three preliminary rounds and only two final rounds. In the Aeromusical class rounds were cut to just one preliminary and one final round. There was a similar situation with Friday's practise flights; each pilot was allowed only two practise flights. This problem will be solved by the time the next World Championships are staged, as more days are planned.

Overall the organisers did a great job by preparing and running this big event. We are sure the small details will be fixed and Strasbourg will be proud to host the next F3P World Championships in 2017. **RCMW**

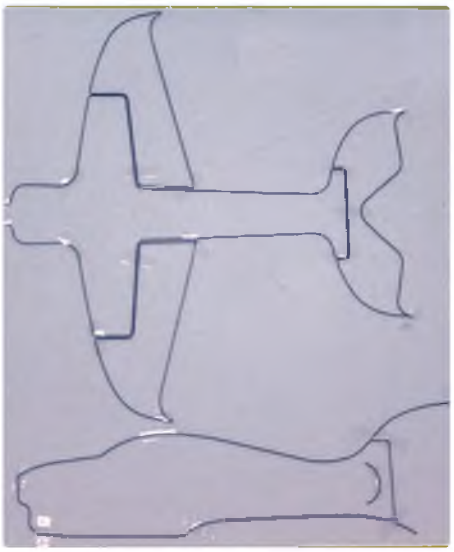
Modellers never rest. Czech Republic team pilot working on a model's colour scheme during breaks between competition rounds

QR CODES
Final Pattern Flights

Gernot Bruckmann

Nicolas Pietu

Julien Hecht pushed his model to hard during the first Aeromusical round. He broke the wing in flight but managed to finish his routine



Each top competition brings something new. Zilvinas Lapacinskas presents new possibilities in model building with shaped carbon rod technology. This modeller can make thin 0.5 mm carbon rods in any shape he desires, maintaining just a 3 mm bending radius

Competition trophies right before the award ceremony

Young German, Marc Faulhaber checks the propeller balance on his own design aeroplane before the next round

F3P-FAI class podium. Champion: Gernot Bruckmann, second place: Janne Lappi, third place: Donatas Pauzuolis

Article author, Donatas Pauzuolis with his trophies and his Aeromusical model, the 'Arrow Competition Special' made from carbon

The Electric Flight Specialist


Brushless Inrunners


Brushless Outrunners


Bell Motors


Micro Brushless Motors


Brushless Speed Controllers


UBEC's/Voltage Regulators


EDF Units

High Performance LiPo Batteries


NiMh Eneloop Rx Batteries


Spektrum LiPo Tx Batteries


Chargers


Power Supplies

Meters, Testers & Analysers


Wattmeters


Silicone Wire


Heatshrink Tubing


APC Electric Props


JXF High Performance Props


Folding Props


Spinners


Prop Balancers


Prop Drivers


Rear Mount Sets


Cage/Rack Mounts


Connectors


Spektrum Transmitters


Spektrum Receivers


Large Model Accessories


Servos


Servo Extensions & Y Leads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Thinking Outside The (Tool) Box

Bill Bowne finds a use for everyday objects in his workroom

Some of the most useful modelling tools are not usually found in your average toolbox - and not even in an R/C hobby shop, for that matter! Let's take a look at some of them.

Probably the cheapest and most versatile tool I have in my workbench drawer is plain old masking tape. Yep, masking tape. Probably the only thing I don't use it for is paint masking!

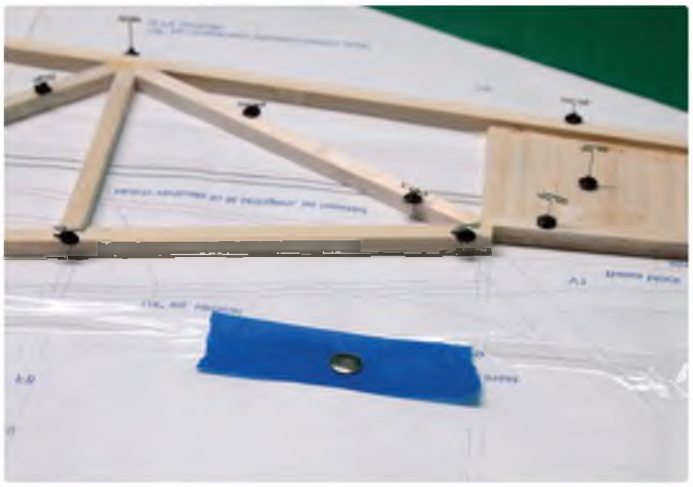
In the following pictures you'll mostly see blue masking tape. Not that blue tape is magical, it's just that ordinary beige masking tape doesn't photograph well against balsa.

Masking tape works well as an impromptu clamp, for protecting wood whilst sanding and for masking epoxy when fibreglassing a wing centre section or a fuselage firewall. Just remember that masking tape won't stick well to dusty wood, so cleaning the wood first (another bit of masking tape will do the job) is a must.

One more regular use for masking tape, although it isn't exactly for building, is to temporarily tape stuff together. That way, I can see how things fit, how they look, and so forth. No, I don't use it to hold the stuff together so I can 'fly' the model while making aeroplane noises. At least, not very often!

Of course, it has lots of other uses, like emergency Band-Aids, but we won't discuss that particular use any further...

Masking tape's sticky glue would pull the paint off Micki's damaged micro foamie Tiger Moth. So I wrapped a loop, sticky side out, around the wings to hold them in place as the glue dried



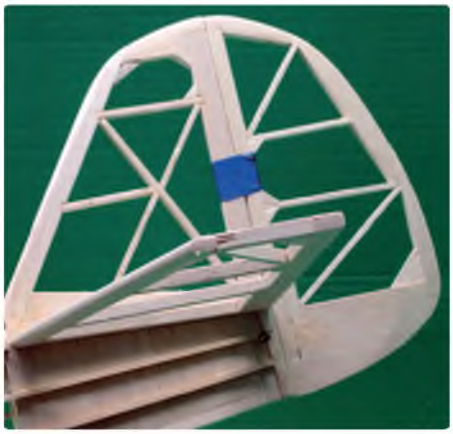
Use masking tape to spread the stress of pushing a drawing pin through sandwich wrap when protecting plans prior to a build. The tape keeps the wrap from tearing

Masking tape makes a great, impromptu clamp. Remember that the tape sticks best to clean surfaces and to its own sticky side. Plan your tape/wood 'joints' so that stress is along the tape, not perpendicular to it

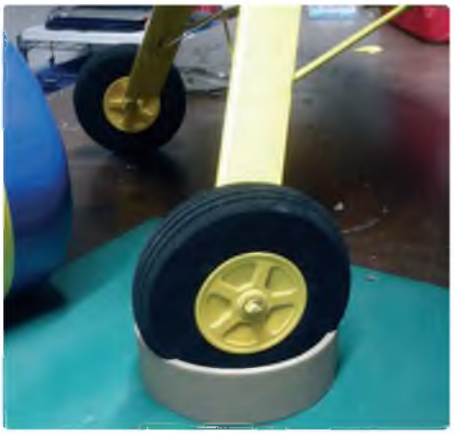
Masking tape protects soft parts when sanding. Coloured tape is good here as any sanding through the tape shows up quickly

Need to dam up glue while it dries? Use a strip of masking tape as glue won't stick to the sticky side of the tape. Here, a strip of masking tape keeps a slurry of epoxy and microballoons from dripping

Whilst it isn't quite paint masking, masking tape controls the spread of excess epoxy when applying wing centre-section tape



Fitting control surfaces is easier when you tape them in place with loops of masking tape



Masking tape keeps giving even when it's finished! The cardboard centres make handy wheel chocks

Share And Share Alike?

Let's shift to some tools your wife may have in her hobby room. Two really nifty such tools are self-healing mats and cutting wheels. Micki, my wife (and our photographer) is also a very skilled quilter. She introduced me to Olfa mats and their matching rotary knives. These 'self-healing' cutting mats are available from most quilt shops and hobby dealers. They're available in many sizes; I have three, ranging from around 12" x 15" to 3' x 6'.

I use the mats mainly for cutting fibreglass tape and shrink film covering. The rotary knives make very short work of Monokote and fibreglass and are excellent for making long, straight cuts (plus they're a lot safer than a hobby knife or razor). For detail cuts in coverings I use a Gyro-Cut with the same mats (click on gb.trapletshop.com/gyro-cut). Whilst the Gyro-Cut is excellent for cutting film, a rotary knife and straight edge are better for cutting fibreglass cloth.

Now, I don't recommend swiping your wife's stuff. That could be dangerous to domestic tranquility! Instead, buy her a new mat and cutter, and then graciously accept her old ones as hand-me-downs. That way you get some good stuff, plus some brownie points!

No, it isn't time for pizza! A self-healing mat and a rotary knife. (I borrowed Micki's mat as all three of mine are pretty well used and not very photogenic!)

Magnetic Attraction

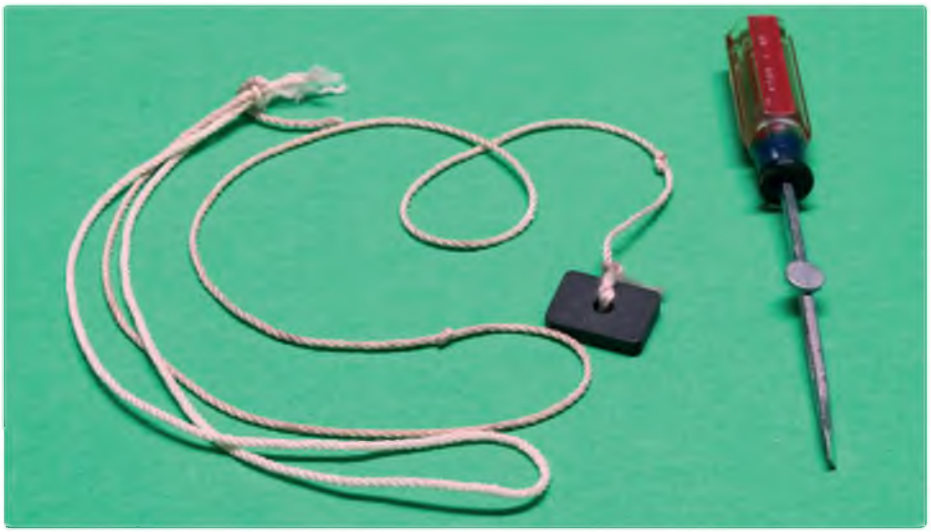
One last 'tool' is the ordinary magnet. I have one salvaged from an old pot-holder hook. Since it has a hole in the middle of it, I was able to tie it to a string. I keep it near my work area for picking up the odd stray pin or screw that misses my lap.

I have another magnet, a rare-earth 'super-magnet' that I keep conveniently stuck nearby. Should I lose a small screw inside a model, or have a screw that I can't quite get in place, I stick the magnet to the appropriate screwdriver.

Of course, that doesn't work for non-ferrous screws. For them, a bit of tape on the screwdriver does the job (yes, masking tape works well!)

I'm sure most of you have a good supply of ideas that you've gathered over the years. Please write them up and submit them to the Editor so we can all share in them!

RCMW



A simple magnet, hung on a string, makes for an easy way to retrieve ferrous bits from the floor. A tiny rare-earth super-magnet stuck to screwdriver picks up bits from inside tighter spaces and helps keep screws on the screwdriver blade

Gadgets & Gear

Andrew James takes over our tech based new products column and looks at another selection of R/C related products and other items of aeromodelling interest

The Antex Rework Station includes a power supply with a side-mounted 700 W hot air rework tool and a lightweight 50 W soldering iron and stand

The soldering iron and hot air tool temperatures can be individually adjusted

The hot air tool comes with a pair of nozzles

The stand includes a sponge that can be wetted to help keep the bit clean during use

Antex 760RWK SMD Rework Station

In a recent edition of Gadgets & Gear we looked at the Antex TCS50W Soldering Iron and described the importance of using a temperature controlled soldering iron, especially when soldering near to delicate electronic components, such as when attaching cables to the printed circuit board pads of an ESC etc.

As you develop your soldering skills you will probably want to improve the quality of your tools and soldering equipment doesn't come any better than the new 760RWK hot air rework and digital soldering station from Antex. This is a complete temperature controlled workstation that is aimed at serious enthusiasts and professional users. The iron is designed to use Antex's 1100 series bits.

The Rework Station includes a power supply, an ST6A iron stand and a lightweight 50 W industrial grade soldering iron fitted with silicone heat-resistant cable and a 2.3 mm (1100) bit. The station has a temperature range that is adjustable from 200°C to 450°C, which is verified by a clear digital display, and separate LEDs give an indication of mains and iron power. It also includes a 700 watt hot air rework tool, which is also variable from 100°C to 500°C. This tool comes with two types of nozzles and the most likely use by modellers is for sleeving joints using heat-shrink tubing.

The station is housed in a sturdy metal case, which you'll want to keep close at hand on your workbench so that you can deal swiftly with any delicate soldering tasks that crop up, no matter what type of modelling you participate in. Replacement bits and soldering irons are available separately from popular electronic industry suppliers like Maplin, RS Components and Farnell.

You can buy the 760RWK SMD Rework Station direct from Antex for £249.98.

www.antex.co.uk/soldering/soldering-stations/760rwk

IPA Cleaning Tools

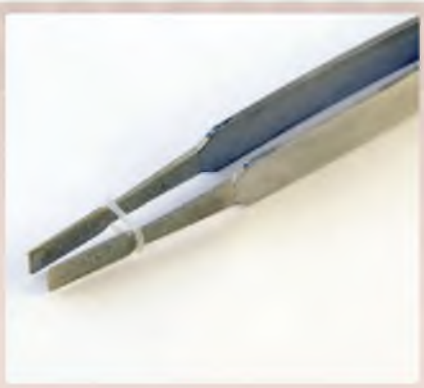
Innovative Tools of America (IPA) are manufacturers of innovative tools and equipment for a wide range of industries. Browsing their catalogue we spotted a selection of 'Contact Care' tools that we thought would make good fine-grade sanding tools for a wide range of modelling applications. Oh, and they are pretty useful for cleaning the pins and contacts of electrical connectors too!

You can read more about IPA's range of tools, including the selection shown here, by visiting their website:

www.ipatools.com

First up for discussion is this set of Carbide Tube Pin Cleaners. Ten of these stiff cardboard tubes are supplied, which are coated inside with #240 Grit Carbide. Although chiefly designed for industrial use – for cleaning some pretty hefty electrical pins! – they can double up as tubular files for gently sanding round objects such as wing dowels or cleaning up wires prior to soldering. IPA Product Code: #8076

These tweezer style Diamond-Grip Terminal Cleaners are supplied with a protective wallet, with a magnetic catch. The tips are in large, medium and small sizes and are useful for gripping and sanding the edges of thin workpieces, such as taking the rough edges off ply formers etc. We have to admit though that so far they have been of most benefit when used for their true function, when cleaning oxidisation off budget priced, non-gold plated servo connectors. IPA Product Code: #8040



This 12-piece set of diamond coated Micro Round Files range in size from .030 to .120 of an inch. They are like conventional needle files, only smaller (much smaller in some cases!) and with blunt tips. They can be used for general filing applications and will tackle most common modelling materials, as well as aluminium, plastics and brass. A nicely made wallet is supplied to keep them safe, held closed with a magnetic clasp. IPA Product Code: #8042

This three-piece set of Micro Round Pin Cleaners are also supplied in a magnetically sealed wallet. Originally designed to clean the male contacts of electrical connectors, the diamond coated inner surfaces can be used to file thin edges and wires. An example would be to deoxidise the wire undercarriage legs of a small vintage model prior to soldering on a captive washer after fitting the wheels. IPA Product Code: #8043

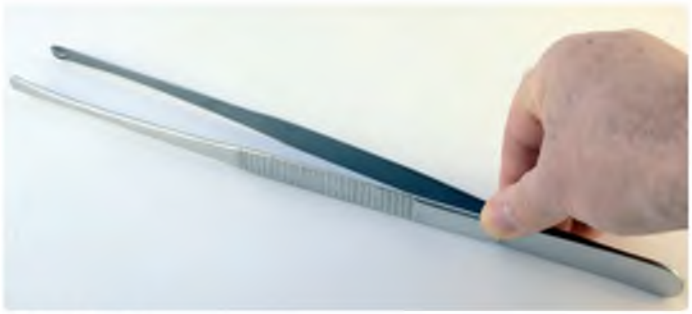
These Diamond Coated Flat Files look very much like conventional files but they are much thinner – and they are flexible too! Three sizes are supplied, with 15, 9 and 6 mm wide blades. Each file has an easy to grip handle, which is coloured bright orange so they will be easy to find on even the busiest workbench. IPA Product Code: #8047

The file blades are thin and flexible

A decent pair of tweezers will come in handy in any modeller's toolbox. The Mantus Tight Access Tool shown here is a cut above the rest as it has broad, serrated and round tips that interlock to get a tight grip on anything that you need to grab onto, especially in the tight confines of a fuselage or wing. IPA Product Code: #8041

And just to prove that they really do 'do things bigger' in the USA, how about this monster version, the 14" Large Mantus? This whopping pair of tweezers will help you root out anything hiding in those hard to reach areas. Those same interlocking teeth will get a good grip on any nuts or washers that dare to go into hiding, whilst the slim profile allows easy access to tight areas, such as the back end of a fuselage. IPA Product Code: #8100

Round interlocking jaws provide a good grip at the end of these tweezers



Go jumbo size!

We conclude our look at IPA's offerings with this giant pack of industrial grade swabs, called Swab-Eez. Totalling 325 pieces, this eye-catching selection of cotton buds comes in a variety of lengths and with different size heads, some of which are really big. With this pack it will be ages before you need another swab for cleaning or applying lubricants, or even paint. And when you do those small things from the supermarket will seem just a tad inadequate! IPA Product Code: #8100

Git2 Pro

In this edition of Gadgets & Gear we are looking at two cameras that we have used for aerial filming and photography. Our first device is a robust action camera that emulates the appearance of the market-leading brand, even down to the sturdy waterproof casing that it is supplied within. This same casing can be fitted to the camera mounts of popular multicopters to protect the camera (and especially the lens) from accumulating dust and insects when filming in forward flight. We found that it fitted the universal camera mounts of all the drones we tested it with, including an XK Detect, a Traxxas Aton and the Helimax Form500.

Distributed by King Cobra Racing, the Git2 Pro retails at just £119.99 and represents very good value, coming as it does with a wide selection of mounts and mounting screws. These include a handlebar mount, a tripod mount and a helmet mount, so the Git2 Pro can be used for plenty of other activities other than aerial photography.

The specification of the camera is pretty broad too, offering both high quality 1080P/2K video and 16MP still images at its highest settings. Lower resolution video and picture settings are also available. A long list of menu options can be selected in both modes, allowing the user to change important settings like white balance and exposure compensation, although in our flight tests we found that the Auto settings worked pretty well.

You can also choose whether to display the Date & Time etc. as an On Screen Display (OSD) on your footage, as well as enabling the built-in gyro to help stabilise the images. Although all the mounts we used were soft mounted using rubber grommets, we elected to turn this feature on and we very pleased with the results obtained.

The menu list is too long to repeat here but other functions of interest include: Loop Recording, Audio Levels (we turned ours off), Menu Button Function (custom setting), Wide Dynamic Range, Slow Motion, Wide or Narrow Fields of View, Centre/Average/Spot Metering, Motion Detect and G-Sensor (auto recording when the camera is moved). In photo mode the Git2 is also able to record

RAW uncompressed images as well as JPEG photos. This allows for more advanced post-processing in photo-editing software like Adobe Photoshop or Lightroom.

An optional FPV Cable is available so that the AV Out port of the camera can be connected to a video transmitter, allowing the camera view to be transmitted back to an FPV screen bolted to the pilot's R/C transmitter or another ground based screen. We were just about to use this when Traplet's XK Detect drone was recalled for use as a competition prize, so we had to resort to using the Time Lapse setting to take a sequence of photos without being able to see what the camera was pointing at.

However, due to the wide point of view of the camera in its default Field Of View setting we were able to crop our pictures pretty well to include features we were most interested in. We chose the 5 second time lapse to provide a good spread of pictures to choose from. (A note of caution: this camera also offers Time Lapse in video

mode too. When we first set it up this was the menu option that we inadvertently used. So instead of a series of still pictures what we actually got was a very fast video!)

If you want a bit more control over the camera then an optional wristwatch style remote control is also available. No range is given in the specs so we cannot say if this will continue to work when the camera is being flown high up with a drone.

You can also download an app to control the camera using a smartphone or tablet. But again this is a short-range option, and anyway it uses WiFi (as does the remote) so we wouldn't want to use it alongside a drone's 2.4 GHz R/C system.

Just for interest's sake, we downloaded the Finalcam app, which is a generic action cam controller, and this seemed to work fine, allowing us to frame up ground based pictures and press the shutter. GitUp are working on their own app but it was not available at the time of writing.

The Git2 Pro comes with a USB cable for downloading pictures and videos to a computer, and it can also be used to charge the 950 mAh internal battery. Images are recorded to a microSD card of up to 64GB capacity (not supplied). Another nice touch is the silicon rubber lens cap, which protects the lens whenever it is taken out of its waterproof casing, for charging etc.

We found the Git2 Pro to be easy to use, although it did help to take a hand written 'cheat sheet' along with us when flying as it is easy to press the wrong button when trying to access a particular function or menu. The pictures and videos that it provided were of good quality and comparable to those we have taken with other higher priced action cameras.

When you consider that the Git2 Pro comes with a waterproof case and several mounts it represents very good value for money indeed and is highly recommended if you are interested in mounting an action cam to an airframe to try out some aerial photography or filming. It will save you from having to spend hundreds of pounds on the market leading products, at least until you are ready to take your aerial photography to the next level.

The only downside is that unfortunate name, but that's a British peculiarity. I guess it could have been much worse!

www.kingcobra.co.uk/camera-s/camera-s/gitup-2-pro-hd-action-camera-2k-60fps-wifi-enabled.html

The camera comes with a wide variety of mounts

Git2 Pro in its housing was a perfect fit for the action cam mount supplied with the Traxxas Aton

In the box you'll also find a USB charge/data lead, a quick start guide and a silicon lens cap

MODEL WORLD PRODUCT SPECIFICATIONS

CHIPSET:	Novatek NTK96660
LENS:	High quality all glass elements
ANGLE OF VIEW:	170°,120° Adjustable
SENSOR:	Sony Exmor IMX206 16MPLCD
DISPLAY:	1.5 inches LCD screen
VIDEO RESOLUTIONS:	2160P HD video: 2880 x 2160 @ 24fps 1440P HD video: 2560 x 1440 @ 30fps 1080P HD video: 1920 x 1080 @ 60fps or 30 fps 720P HD video: 1280 x 720 @ 120fps, 60fps or 30 fps WVGA video: 848 x 480 @ 30fps VGA: 648 x 480 @ 240fps
VIDEO FORMAT:	H.264 encoder, MP4 video container
PHOTO RESOLUTIONS:	16, 12, 8, 5 or 3 MP
TIME LAPSE PHOTO:	2 sec /5 sec./10 sec./30 sec./60 sec.
MICROPHONE:	Built-in, monaural speaker. Support for external mic
HD VIDEO OUT:	Micro HDMI
ANALOG VIDEO:	Mini USB (AV-Out composite cable sold separately)
STORAGE	microSD memory card with a Class 10 or UHS-1 rating. Up to 64GB capacity
BATTERY:	950 mAh Lithium-Ion (up to 90 minutes in Full HD)
USB CHARGING:	DC 5 V, 1000 mA
CAMERA WEIGHT:	64 g
WEIGHT W/HOUSING:	154 g
DIMENSIONS:	59 x 30 x 41 mm

The colour screen provides a clear view from the lens and is also used to set up the camera using the extensive menus

An optional FPV lead can be used to connect the camera to a video transmitter (VTX)

The Lee Bug

Sticking with aerial photography, here's a product that has been available for a while but which has only just come to our attention. When taking landscape pictures experienced photographers will often use a graduated Neutral Density (ND) filter in front of a camera's lens to darken the sky so it is not overly bright compared to the land in the foreground. The filter starts off dark at the top and gradually lightens as it reaches the centre of filter. The change over point is lined up with the horizon and can be either hard or soft, depending on the effect required. Ask any photographer who makes the best filters and the answer is likely to be Lee.

Aerial landscape pictures taken by action cameras bolted underneath drones can now benefit from graduated ND filters too by clipping a LEE Bug filter holder to the front of their camera's waterproof housing and inserting one of Lee's stamp size filters. The only drawback is that the LEE Bug only fits Go Pro HERO 3+ and HERO 4 housings, so you'll need to be using a premium action cam to benefit from these titchy filters.

We tested the LEE Bug Action kit, which contains a LEE Bug holder, 0.9 ND Grad (3 stops), high quality glass polariser, protective pouch and cleaning cloth. As expected it works really well, but you do need a stable drone, preferably with an FPV set up and gimbal mount so you can make sure that the graduated sky lines up with the horizon.

Lee also make a variety of fully ND filters (with no grad, for long exposures) and coloured filters for the Bug system, as well as special underwater filters, allowing you to get the best use from a Go Pro camera when used on the ground or in water.

Lee Filters are widely available from photographic stores:

www.leefilters.com/index.php/camera-directory/camera-dir-list/category/lee-bug-action-kit

Lee Bug is supplied with a 0.9 ND Grad and a glass polariser

Coloured filters are also available. Here's the Blue Water (red) and Green Water (purple) filters from the Underwater Kit, which should be interesting to try when making black and white conversions of aerial photographs. For example, a red filter will make a blue sky darker in a mono picture

Transcend DrivePro Body 10

This easy to use camera is primarily designed for use by police officers, security guards and other professionals who need to record videos and snapshots from their body's perspective. It features a 360° rotatable clip that firmly attaches to clothing or straps.

Not much use for modelling, then? But then we noticed that it has an infrared recording capability, and small IR cameras are usually prohibitively expensive. This unit has an SRP of £129.99 but can be picked up for around £110 on Amazon (as recommended by Transcend). We wondered how useful it would be if we hung one from a camera drone for a spot of night-time aerial video work?

The camera boasts a wide 160° viewing angle, a fast f/2.8 aperture lens and a 1080p HD capability at 30 fps. A group of four infrared LEDs surround the lens and are automatically turned on in low light conditions, allowing video recording and snapshots to be taken at night, with footage recorded in grayscale. The DrivePro Body 10 is also water and shock resistant so it should be able to soak up a bit of rough treatment when strapped to a multicopter or even a suitable model aeroplane.

The downsides compared to the usual brick shaped action cams that a lot of people use for aerial filming are a bit more weight (108 g) and the larger rectangular format, which is needed to accommodate the strong spring clip. This could be a positive though for use in a cabin model, as the camera can be clipped to a suitable piece of internal structure, such as a servo mount, and pointed out of the windscreen, or the side windows if mounted at an angle.

Even with the long legs of the Form500 drone the DrivePro Body 10's elongated case can touch the ground unless angled forwards or backwards

The camera comes with a good quality USB charger and data lead

The built-in 1530 mAh LiPo battery is claimed to record 3.5 hours of footage in daylight, but no figures are given for use with the IR LEDs switched on. A USB wall charger and lead are supplied in the bottom of the neat presentation box.

A handy snapshot button allows you to take photos while recording video but once in the air this is of no use as it is out of reach. And unlike a lot of action cameras there is no way of setting a time lapse function going so that it will automatically take a series of snapshots. However, as this particular camera is meant to always be attached to the operator we cannot criticise it in this regard. It could come in handy though if you reattach the camera to your body after an aerial sortie to capture some snapshots of your clubmates from the pit area.

Software wise, Transcend have developed the freely downloadable DrivePro Body Toolbox as an easy to use file management system, which simplifies the setting up of the camera and video/photo files. However, it is also possible to either plug the camera in to your computer using the USB lead supplied and download the video and image files directly, or you can simply extract the microSD card and plug it into a reader.

The camera comes with one of Transcend's high quality 32GB microSDHC memory cards, which can record up to 240 minutes of Full HD video. So there's plenty of storage capacity, even if you undertake several flights in one session.

We mounted the DrivePro 10 to a Helimax Form500 utility drone, which has fairly long legs. But due to the length of the case, plus the action cam mount we tie-wrapped the unit to, we found that we had angle the camera backwards quite a bit to prevent it from touching the ground on take off and landing. It gave quite an unusual viewpoint though.

Aerial footage suffered from slight banding, most likely due to the strobing shadows caused by the large propellers fitted to this particular drone. Ground based videos and pictures were of good quality and richer in colour, which is not surprising as this is what the Body 10 is designed for. The camera films three minute long clips, but automatically restarts so segments can easily be stitched back together in post-processing.

Our night flying experiment didn't get off the ground though as during some test filming we discovered that the infra red LEDs don't really have much range and anything much above head height results in a very narrow cone of recorded area, which rapidly bleeds off to black afterwards. The closer you get to the subject the bigger and brighter the footage becomes, but the lack of IR range means that there's no advantage to mounting it on an aircraft for filming at night.

The camera's shape and mounting clip do make it an interesting prospect for filming from within a cabin model though, which is what we will be trying next.

www.transcend-info.com/Products/No-704

RC MODEL WORLD

PRODUCT SPECIFICATIONS

DIMENSIONS:	88.4 mm × 52.2 mm × 19.6 mm (3.48" x 2.06" x 0.77")
WEIGHT:	108 g (3.81 oz)
LENS:	f/2.8, 160° wide angle
MICROPHONE:	Built-in
RESOLUTION/FRAME RATE:	Full HD (1920x1080)/30fps
VIDEO FORMATS:	H.264 (MOV: up to 1920x1080 30fps)
MEMORY CARD SUPPORT:	MLC-based microSD card, 8GB/16GB/32GB (Class 10 or above)
CONNECTION INTERFACE:	USB 2.0
BATTERY TYPE:	Li-Polymer 1530 mAh
OPERATING TEMPERATURE:	-20°C (-4°F) ~ 65°C (149°F)
WARRANTY:	Two-year Limited Warranty

Transcend Memory Cards

Built with top-tier MLC NAND flash chips, the Transcend 32GB microSDHC memory card supplied with the DrivePro Body 10 camera is claimed to offer a long-life, durability and endurance. The four hour recording capability (with the Body 10) should be enough to keep you going for quite a while but if you are an aerial photography enthusiast then you will probably want to invest in some extra cards, especially if you take RAW images or record a lot of videos. Transcend recommended Amazon as a supplier of their cards and there we found additional **Transcend 32GB Premium microSDHC Class 10 UHS-I Memory Cards** (without adapter) for the bargain price of just £7.13, compared to the full RRP of £22.20.

Transcend are obviously proud of their memory cards and they sent us some additional products that they felt would be of interest to drone and FPV pilots. Prices shown are those listed on Amazon at the time of writing:

Transcend Premium microSDHC Class 10 UHS Memory Card Black 64GB
- **RRP £27.99** (but on offer by Amazon at £12.45 at the time of writing)
- Supports Ultra High Speed Class 1 specification (U1)
- SDHC Class 10 compliant
- Full HD video recording performance

Transcend 32 GB Class 10 Premium SDHC Memory Card
- **RRP £8.39**
- Supports Ultra High Speed Class 1 specification (U1) and Class 10 compliant
- Read: 300x – up to 45MBs (varies due to host)

Full HD video recording performance
- Allows for fast-action consecutive shooting
- Suitable for SDHC/SDXC compatible devices

Transcend 64GB Ultimate SDXC Class 10 UHS-I 600x Memory Card
- **RRP £20.95**
- MLC flash-based performance and reliability
- Supports Ultra High Speed Class 1 specification (U1)/ SDHC Class 10 compliant
- Full HD video recording performance
- Allows for fast-action consecutive shooting

Note: Although this is one of Transcend's 'Premium' range of cards not all digital cameras are compatible with SDXC cards. If your camera is not compatible then its storage will be limited and you may not get the best use from the large 64GB capacity of this memory card.

Hoodman Drone Launch Pad

Hoodman are well known in photography circles for their clip on eyecups for DSLR camera. This innovative US company have now turned their attention to the multirotor market and their first product is this large, weighted Drone Launch Pad.

As anyone who has operated an R/C drone or helicopter will know these machines can stir up a lot of dust and dirt, especially in dry conditions. Particles can be sucked into motors and other moving parts, causing abrasions and premature failure, as well as coating valuable payloads such as cameras and their lenses. It also stops long grass from twisting around the motors and shafts.

By placing this five foot diameter launch pad on the ground a clean take-off and landing area is assured. And if you fly FPV then the bright orange denier polyester pad, decorated with black heliport markings and compass headings provides a highly visible marker when returning to land. (We used our smartphone's compass app to point the compass rose in the right direction.)

The galavanised steel perimeter hoop weighs eight pounds, so it is able to keep the pad on the ground without staking out if used in normal flyable wind conditions. Despite the weight, it is easy to fold it up for storage in the large 20 inch diameter carry bag. You do this by twisting the perimeter into three smaller circles, much like one of those fold-up windscreen covers for your car. The bag has a secondary use for commercial drone pilots as it can be hung on a gate or fence etc. to warn passers-by that a drone is operating in the area.

Keep your favourite drone clear of long grass, dust and dirt by flying from a Hoodman Drone Launch Pad

The equally bright carry bag can be hung from a fence or gatepost to warn passers-by that a drone is flying nearby

Our sample was provided by RK Photographic, where you can buy a launch pad for £130.00

www.thedarkroom.co.uk/hoodman/hoodman-5-foot-diameter-drone-launch-pad.html

The large diameter pad makes an easy target to aim for when landing

Boomerangs And Flying Discs

Warning! Those readers who disapprove of non R/C aircraft related items in the magazine should skip this bit (or maybe this whole article!). But for those with a broader outlook (hopefully most of you), you may still get a kick out of flying things like boomerangs and frisbees, especially if you have kids or grandchildren. Here's a trio of products from UK company, Wicked.

The Wicked Indoor Booma is made of special 'memorang' foam, which is soft and safe, yet durable. With its special properties you can tune the 'wings' for different types of flight and the boomerang will hold the shape – or approximately so! When thrown as instructed the Booma will fly around in a four to six metre circle and come right back to you. And if something gets in the way it is so soft that it shouldn't smash anything. It certainly bounced off my walls a few times without a scratch. The Indoor Booma is made in the UK and Wicked have even sold it to Australia! It costs £4.99 from Smyths and is available at other toy outlets.

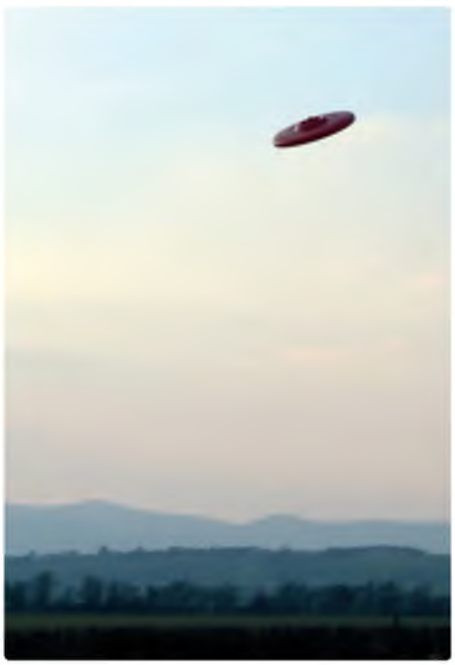
There's also an outdoor version, the Wicked Outdoor Booma, which has a flight range of 15 to 20 m and also features a similar advanced tri-blade design made from 'memorang' polymer. Or how about the Wicked Sonic Booma that whistles as it flies by? The Sonic Booma costs £7.99 from Toys R Us and is available at other toy outlets.

Finally, here's the latest take on the ever-popular flying disc. Wicked Sky Spinner is a hand-propelled spinning disc that features a balanced and weighted rim. The indent in the centre allows you to balance the Sky Spinner on a finger, where you can then spin it to 'unleash an awesome array of tricks and stunts; throw it, crank it, spin it or slam it!' Or so the publicity blurb says, but I still need a bit of practice to get it to 'crank' or 'slam', whatever they are, let alone a 'claw grind', a 'finger hop' or a 'body roll'... Wicked claim that the Sky Spinner can reach up to 500 revs per minute, but even at the lower revs that I managed to get it rotating at, I still managed to do a reasonable imitation of Meadowlark Lemon. The Wicked Sky Spinner costs £10 from WickedMania and is available at other toy outlets.

www.wickedmania.com

Above & below: The wings of the Indoor Booma can be twisted to vary its flight path. Lots of fun and safe too!

Above & below: Sky Spinner is a weighted flying disc that you can spin up on a fingertip



Sky Spinner takes on a UFO-like appearance in flight

In Print

A look at some more worthwhile additions to your aviation library

The Avro Manchester

By Rob Kirby
Fonthill Media, 510 pages
978-1-78155-285-8
Hardback, £50.00

There cannot be many aeromodellers, especially British ones, who don't have a soft spot for the mighty Avro Lancaster with its four powerful RR Merlin engines. And if you're an aviation enthusiast it's likely that you are well aware that this most famous of bomber aircraft evolved from the lesser known twin RR Vulture engined Avro Manchester, from which it inherited it's distinctive box-style fuselage and twin fin empennage.

The Manchester is a curious beast to look at with modern day eyes, which are so accustomed to the distinctive shape its successor. The Manchester has stubby wings, pointed engine cowlings and small oval shaped fins, to which a short central vertical 'shark' fin was soon added. Later variants returned to twin tail configuration, but of the elongated variety that were carried over to the Lancaster.

This heavyweight, hardcover book runs to 510 pages and, now in its second edition, covers all aspects of the bomber's development, right from initial design and test flying, through to its operational use and its successes and failures. As the author concludes in the book's final chapter, 'history has tended to judge the Manchester harshly'. He goes on to write, 'Almost all the problems with the Manchester can be laid at the feet of the Rolls-Royce Vulture', which was plagued with reliability problems.

However, that the design eventually evolved into the Avro Lancaster, which was one of the most significant aircraft of the war, is a fact that we should all be grateful for. This book is essential reading for anyone with an interest in the RAF's bomber aircraft of WW2.

IL-2 Shturmovik

By Jason Nicholas Moore
Fonthill Media, 256 pages
978-1-62545-042-5
Hardback, £40.00

The IL-2 Shturmovik was a low level close-support aircraft that was designed to attack armoured vehicles and other ground targets. Dubbed the 'Flying Tank' by the Soviets it was able to withstand a great deal of hostile fire and still get its aircrews safely back to base. German forces on the Eastern Front had an entirely different name for this bruiser of an aircraft, calling it the 'Butcher', as it took a terrible toll on their infantry and armoured vehicles. However, the cost was also great and during the early stages of the war its pilots were not expected to survive more than five or six sorties.

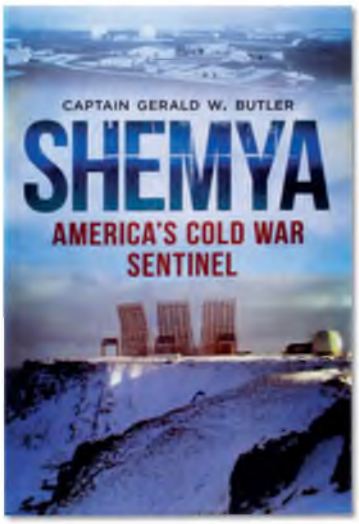
Production peaked at 900 aircraft per month in the Ilyushin factories and by the war's end over 36,000 examples had been built.

This book takes us through all stages of the famous Soviet aeroplane, from the prototypes, through to its active service, including pilot interviews. It then goes on to detail the technical development of the design, including the various variants and modifications, before concluding with the IL-2's legacy, including a look at all the various plastic kits that are available to model the Shturmovik, and which would make a great starting point for designing an R/C scale model. If you take up the challenge, do let us know – we would very much like to add an IL-2 to the Traplet Plans range!

Mention should also be made of the large colour section in the middle of this book. Besides copious pictures of museum examples of the IL-2, it also provides a wealth of colour plates showing liveries for single and two seat variants, including the swept wing 'Arrow' types with a Heinkel He-111 style wing planform.

Shemya – America's Cold War Sentinel

By Capt. Gerald W. Butler
Fonthill Media, 144 pages
978-1-62545-038-8
Paperback, £16.99



The Aleutian Islands are strung like a necklace of beads, stretching from the Alaskan Peninsula to the Kamchatka Peninsula, just below Siberia. They form a dividing line between the Bering Sea and the Pacific Ocean, and their location makes them of vital strategic importance to the USA, who maintain most of them as part of Alaska.

Their use as a potential land bridge to attack North America was well tested by the Japanese in 1942, who launched an air attack on Dutch Harbour, close to the Alaskan mainland. Bitter battles for the islands then ensued but these were successfully terminated by US and Canadian forces.

Post war the importance of the islands came to the fore once again as the Cold War between the USA and the USSR intensified. Intelligence gathering became vital to US security and so the barren island of Shemya, very close to the Russian Kamchatka Peninsula, was developed into a sophisticated electronic monitoring station.

Colossal equipment was installed, which could detect satellites and missiles – and supposedly even UFOs! Reconnaissance aircraft operated from its long runways and many were lost in the severe Artic weather. To compound the hazardous conditions there was always the ever present threat of Soviet aircraft and anti-aircraft missiles.

In this absorbing book, Captain Gerald Butler, who was stationed at the base in the early 60s, tells the island's story, from its early use as a fur trapping station, through the Second World War and right up to the present day.

Build Your Own Drone Haynes Manual

By Alex Elliott
J H Haynes & Co Ltd,
160 pages
978-0-85733-813-6
Hardback, £22.99

Haynes is probably best known for their in-depth, yet easy to understand car manuals and many of you have probably used one yourself. It's no surprise then that these same principles have been applied to a new manual all about building and repairing multirotors, as well as a wealth of information on drone legislation and safe flying.

This manual features build guides for both FPV racers and camera/utility drones with step-by step, well-explained instructions featuring everything from antennas to flight controllers to frames.

The 'Build Your Own Drone' manual also bears the average modeller in mind, providing alternatives for most parts to suit any budget.

While following the guides provided in this book will of course require some building, the author, Alex Elliott, has done a great job of comprehensively exploring each concept in detail, as well as providing a brief history of drones. This makes it the perfect introduction to the hobby for current modellers (fixed-wing or otherwise) and total beginners alike looking to take their first steps into the world of multirotors, as well as a handy reference guide for those already in the hobby.

'ALL OUT!' The Art Of Aerotowing

Mark Wilcockson describes how to enjoy a day out aerotowing model gliders

E-Flite Blanik and our smaller SDD Greenley tug (80 cc) ready for action

In a brief divergence from aeromodelling in my late teens, I flew full size gliders, launching by winch, aerotow and bungee (that was an experience!) By far the launch method I loved most was aerotowing, mostly behind a Piper Pawnee. So it was only natural, once returning to model flying, that aerotowing was a challenge that I would just have to take. And whilst I undertake many forms of model flying it is aerotowing that still gives me the greatest satisfaction.

So if you are needing to reinvigorate your mojo, or simply wish to try a new something new, why not give the challenge of aerotowing a go?

Lets start by dispelling some myths and fears:

It's hard - it may take a little practice to perfect. But in reality if you can fly a model in circuits in front of you, you can aerotow.

It's dangerous and instead of losing one model in the event of a problem, both will be lost - the aeroplanes are not flying aerobatic manoeuvres so getting seriously out of shape is unlikely. If things do go wrong, provided both the glider and tug have a tow release either can get off the line at the first sign of a problem.

You need a big tug and glider - whilst bigger planes fly better, and we fly tugs up to 120 cc, we tow quite a lot with a Multiplex Fun Cub or HK Tundra and an EasyGlider, which is less pressure and quick and simple to set up and learn on. The same principles apply whether the planes are large or small.

Anatomy of the tow line

Multiplex tow release being embedded into the nose of my Mucha

This Tangent Kult uses a simple slot and rod tow release. The outer sheath of the release is secured firmly to the fuselage

SDD Greenley being prepared for towing duties

Aerotow gives the option of towing some very large gliders

Towing Basics

In its simplest form you need a tug and a glider and a way of connecting them to the towline.

The more stable the tug, the easier the tow. Typical tugs are high wing designs, such as the Greenley family of tugs, designed by John Greenfield. Simple and quick to build, they have been designed for towing and excel. Plans can be downloaded from the Scale Soaring UK website for each of the designs, which includes an electric version called the Ampley.

Virtually any glider into which can be fitted a tow release can be towed, although rudder/elevator gliders are not recommended for beginners as it's harder to keep the wings level without ailerons.

Both aeroplanes should have the ability to release the tow line. Usually the glider will be the one to release, but in the event of a problem the tug needs to be able to release and let the glider bring the line home.

A note of caution, however. If there is a moment of panic both planes should not release at the same time and drop the line. A lost line into a farmers field is a hazard to machinery and every effort should be made to recover the line if it has been ditched.

Commercial tow releases for both the glider and the tug are available online from glider specialists. My preference for the glider is the Multiplex tow release and I have this in most of my gliders up to 5.2 m wingspan. It's simple and highly reliable. When fitting the release don't skimp on the release servo; the forces on the tow release can be very high in the event of an issue. The last thing you want is a stalled servo which is not powerful enough to operate the release, so put in the best servo you can afford.

Anatomy Of A Towline

The towline must have minimal stretch as you don't want it acting like a piece of elastic. For most towing a nylon builder's line of about 30 metres is ideal and can be picked up cheaply from one of the DIY sheds. Usually fluorescent orange, it makes it easier to find when searching for it in a field! However, at height the colour disappears and to make the line visible during the tow it's usual to add a flag. This is added near the glider end of the line so it makes it easier to see when the line has been released. The flag is highly advisable as at times I have seen pilots who, convinced the line has been released, have let the tug commence a steep dive to earth - rapidly pulling the wings off the glider! You have been warned.

The line needs a loop at each end to attach it to the aircraft. Quite a few options here, the most common being fishing trace wire (braided wire, sheathed in thin plastic) or fishing line of a sufficient breaking strain to tow the glider without it breaking. Personally, I use 60 pound fishing line on gliders up 20 lbs.

Three generations of the Wilcockson family ready for a day of aerotowing at Sandhays, Lincolnshire

Fastening up your link before going out to be towed speeds up the process

SDD Greenley makes a full flap touch down

Lift off! Note the flag on the line

Keep the wings level

Ray Watts' Wilga. A popular tow plane

There is a school of though that a weak line should be added to the line, just in case of a snatch (when the line goes slack and then get pulled rapidly taught again, putting strain on the glider) whilst towing, or in case the line gets caught up on any obstacle on a landing approach, which will rapidly and abruptly stop the tug dead in its tracks. Personally I don't use a weak line as I will release the glider if I can see the tow going out of shape. And if the approach for the tug has trees or fences, which risk a catch up, we will release the line over the landing strip during a low pass prior to landing.

Finally, the loops are attached by quick links available in various strengths from fishing tackle shops.

At organised aerotows, to speed up the turn round time, you should have a number of towing loops made up ready (they have a habit of disappearing) and a loop attached to the glider before your turn on tow. When it's your turn the tug will pull the towline in front of you and your loop is clipped to the line via the quick link. This saves time as it avoids the glider pilot trying to get a loop hooked up whilst the tug and rest of the participants are waiting.

Now We Are Ready For Towing

So we have a suitable tow plane, a glider, both with tow releases, and a tow line. Now for the moment of truth.

Ideally, for the first time glider pilot, it's a good idea is to find an experienced tug pilot. There are several organised aerotows held throughout the country were the participants are only too willing to help new pilots. Check the Scale Soaring forum for event details.

If you cannot find an experienced tug pilot, it's not too hard to have a go if you follow some simple guidance:

Glider Pilot - The glider pilot's job is quite simple - keep the wings level at all times and if the glider starts slipping to the inside on turns add a bit of opposite rudder.

Tug Pilot - The tug pilot has a slightly harder job. The tug should accelerate hard on the ground and stay straight. The tug should stay

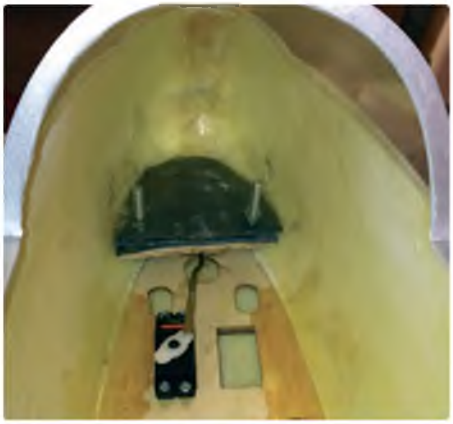
Some aerotow events cater for overnight stays. But book early as they fill quickly

All rigged and ready for a day's towing

Multiplex's EasyGlider is a great way of learning to aerotow

A happy author, with tug pilot (and nephew!) James

Some people use the strangest things as a flag on the line. I wonder where they came from?



This E-Flite Blanik needed a strong link for the tow release. I replaced the stock item with better piano wire as the original bent under towing forces

on the ground until the glider is airborne and then climb at a steady and constant rate, including through any turns, which is not as simple as it sounds!

The First Tow

Right, we are nearly ready. But before we commit to the air we need to check that the towline will release. Hook up both the glider and tug and pull on the line hard before operating the release on your transmitter. Hopefully, it will release smoothly. If not make sure you work out why and correct it before flying. The last place you want a hooked up glider is in the air!

So with the releases tested you are now ready to have a go. Both pilots should agree where they are aiming to deposit the glider and they should stand together to make communication easy.

Line up the tug into wind, with the glider directly behind it on the end of the line. The glider wing should be held level by a helper if you have one, or if not propped up on your foot. If using a helper don't have them try to support the wing as the glider starts to move, as they are more likely to make the glider yaw as they try to keep up with the acceleration. Simply ask them to release as soon as the glider starts moving.

The tug pilot takes up the slack on the line. It is essential at this point that you check the line is over the top of the tug's tailplane. A line under the tailplane makes the tug virtually uncontrollable and at best the outcome is an aborted tow.

When ready the glider pilot calls "All out!", and that's the signal to the tug pilot to accelerate hard, keeping the tug straight on the ground. The tug should stay on the ground until the glider is airborne, and to assist in this the glider pilot calls out either "Airborne" or "Line" when in the air.

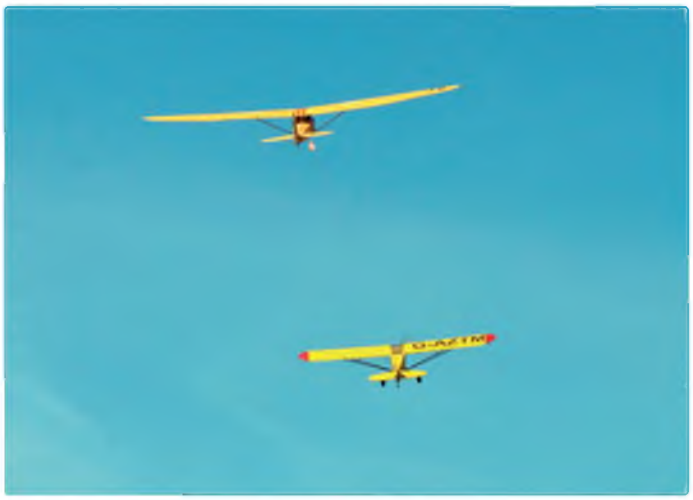
For a first tow I would suggest the pilots simply fly straight, which avoids the complication of turns. You will be surprised how high you can get with a straight tow. When the glider pilot is happy with the height, before releasing he (or she) should advise the tug pilot that he is ready to release. This allows the tug to be throttled back and

The helper should simply support the wing and release it immediately the glider starts rolling

The moment of lift off. The tug stays on the ground until the glider is airborne

"All Out!"

Blaniks make popular aerotow subjects



Blue skies and two lovely model aeroplanes in perfect harmony. What could be better? So why not give aerotowing a go!

reduces some of the tension on the line. At that point the glider can release and head off into that booming thermal.

Once the first few tows have been completed in a straight line it's time to try some turns, which will allow you to get higher. Again these are quite simple, as long as you follow some simple guidelines:

Fly ovals or figure 8's across wind rather than up and down wind, as flying down wind will see the glider catching up with the tug and the line snatching

Turns should be wide and a constant climb rate maintained. Turning too tightly results in the line going slack and being at risk of snatching

The glider should not attempt to turn but should allow itself to be pulled round by the tug whilst keeping its wings level. If the glider starts to cut into the turn simply apply some opposite rudder

It's as simple as that!

If It Goes Wrong

The tow does not often go wrong, but when it does the rules of the game are easy:

- If the glider starts to yaw or snags a wingtip whilst on the ground, RELEASE
- If the tug deadsticks, RELEASE
- If the line goes slack and you are at risk of snatching, RELEASE
- If the tow goes out of shape in any form, RELEASE
- If the glider starts catching up the tug, RELEASE
- If the tug pilot tells the glider to release, RELEASE. Otherwise you may find you may be dumped and have to bring the line home

You will have gathered in any emergency that releasing is essential, sensible and makes it more likely that both planes can be brought home safely.

In reality you will be surprised how relatively straightforward areotowing is. Once you have perfected the art, it's a truly rewarding experience. So why not give it a try? A word of warning though - aerotowing can be very, VERY addictive.

Look on the Scale Soaring website for an event near you, then go along and have a go. I can promise that you will receive a warm welcome.

RCMW

Mucha being hooked up. And, no, it's not being towed by the small Wilga!

Mucha on the line. The marker tape used as a flag is clearly visible

E-Flite's Carbon Cub is great for towing smaller models and comes with a ready installed tow release

A typical aerotow meeting at Sandhays

Hubsan X4 FPV

Star in your own movies with the X4's 'Follow Me' function

At first glance this mid-size FPV quadcopter looks pretty ordinary, although we do like it's rather sleek styling. It looks a bit like something out of Star Wars, which is apt as the DVD of the latest blockbuster has just been released.

However, dig a bit deeper and you soon realise that it is quite a capable machine, with an IMU module that contains an inertial sensor to stabilise the drone in flight and a barometer to measure flight altitude. A GPS and Compass module endows it with Position Hold and Navigation facilities, including a Return Home function.

Best of all though we just love the Follow Me function, which means that you can use the X4 to automatically track the position of the transmitter, allowing you to take it for a walk (or a ride!) while keeping yourself in shot with the 1080P HD nose mounted camera.

Carry Box

The carry box contains an easter egg style see-through carton containing the X4, plus the transmitter, as well as a flight LiPo and charger with an AC power adapter. The set also includes eight propellers – four for the quad and a full set of spares – as well as a wrench to deadlock the motors while the props are being attached.

This particular drone is available in either white or black, both having eye-catching gold trim. Our sample was the white version.

Box contents. Spare props are always useful!

X4 FPV is also available in matt black

The battery compartment has a 'clip' style access panel

Images and video are recorded to a microSD card

The transmitter has a built in FPV screen

After putting the LiPo on charge it was time to attach the props. As with all quads the props come in right and left hand pairs that need to be fitted on opposing sides. The prop hubs and the drone's arms are marked A & B, with appropriate direction symbols, so it's obvious which props go where. Failing that, read the instructions! A pressed metal wrench is supplied to hold each motor still as you wind on the props. The props are moulded with integral spinners so there are no separate prop nuts to hold them on; simply firmly hand-tighten them and the rotation of the motors in flight will tighten them further automatically.

FPV Transmitter

Our transmitter was supplied as Mode 2, which suited us fine. But Mode 1 set-ups are also mentioned in the instructions. You can also reverse the channels if you have learned to fly with reversed versions of the popular stick modes.

The set is quite large, encompassing a 4.3 inch LCD FPV screen in the top half, with the twin sticks in the centre. Finger and thumb pilots will probably want to wear a neckstrap when using it and a 'tunnel' is moulded into the plastic case, just under the screen, to allow for this; thumb pilots should be comfortable just holding the Tx. You will need to source four AA cells to power it.

The screen provides quite a lot of information but the characters are quite small and can blend in easily with the background view from the camera. Nonetheless it's very comprehensive if you like to monitor such info in-flight, including:

Voltage, Flight Time, Speed, Altitude, Distance, GPS Strength and Co-ordinates for both the drone and Tx, Battery Capacity for both the drone and Tx, Camera Status, Recording Time and SD Card, plus Trim indicators

Phew! That's quite a list.

On the left hand side of the screen is the switch that activates GPS and this will normally be left on (pushed forward), unless you want to deactivate GPS to try some aerobatics. Underneath the GPS switch is a push-button to take still photos of the picture being shown on the FPV screen.

On the right hand side of the screen is the Return Home switch, which is pulled back for normal flight and pushed forward to initiate the automatic return sequence. The push-button on this side starts and stops video recording. A micro SD card needs to be inserted in the X4's main body to record both still and video images.

Further switch functions (Headless Mode and Follow Me) are enabled by firmly pushing down on the main sticks

X4 In Flight

Upon powering up the transmitter and drone the indicator below each motor should be checked to check the GPS and/or battery status. The front indicators stay white all the time but the rear ones blink green when GPS is enabled, blue when Return Home is selected or red when the battery is low. Normal flight status is therefore when the leds are blinking green, but if they should turn red then you need to land promptly.

Drones will often require compass calibration when flying at a new site for the first time but they should store the information afterwards. The screen will

The large screen allows you to focus on lining up your shot

The editor tests out 'follow-me' mode

This model is great way to learn to fly FPV

display the message 'Calib Compass 1' if the X4 requires this procedure to be carried out, or you can initiate it manually by flipping the GPS switch. The calibration sequence is quick and easy to perform, however our X4 does seem to require it to be done each and every time we fly.

Starting and stopping the motors is by the old 'sticks in the bottom corners' trick. The X4 is easy to fly but we did find that in anything more than a gentle breeze the motors did hunt a bit to try to maintain altitude. Headless and Failsafe Modes worked well, and when selecting the Return To Home switch the X4 would reliably return to its take-off point.

Our favourite flying mode with this particular drone is, however, when Follow Me is selected by pressing down on the right stick (left stick in Mode 1). The drone will then turn and face the transmitter. After adjusting the altitude to make sure that you are framed in the middle of the FPV screen you can start walking and the X4 will follow you, and will maintain its position to the side, front or rear as you move forward. If you hit the record button you can film yourself in action.

Obviously walking is a bit slow action wise, so you may want to experiment with putting the Tx in a bag (making sure that the sticks and switches cannot be accidentally knocked) and carrying it with you on a bike or even on a boat – if you are brave enough! The only drawback to more adventurous follow me filming is if you need to quickly get hold of the transmitter in an emergency, as really you should be in control of the transmitter at all times. So in reality this limits you to being a passenger when flying in this mode. A tandem bicycle, anyone?

Also, the camera angle is quite shallow so you need to fly the X4 at around head height when flying fairly close so that you are captured at a reasonable size by the camera. It is therefore quite vulnerable to hitting obstacles like fences or vegetation, so you may prefer to record your hikes from a more distant (higher) perspective. You also need to be aware that any obstacles between you and the drone, or strong interference, could result in the model entering Failsafe and automatically returning home, which could happen with you remaining blissfully unaware and pedalling in the opposite direction!

However, when used with caution and appropriate safety measures there's no doubt that 'Follow Me' adds an interesting new dimension to 'selfie' filming from a drone. And the Hubsan X4 FPV has proven itself to be a very capable machine with which to experiment with in this respect. It's great fun!

RCMW

MODEL WORLD

PRODUCT INFORMATION

NAME:	X4 FPV Brushless (H501S)
MANUFACTURER:	Hubsan
DISTRIBUTOR:	CML Distribution
WEBSITE:	www.cmldistribution.co.uk (search for H501S)
PRICE:	£359.99
MODEL TYPE:	FPV quadcopter with Follow Me & Return Home functions
PARTS SUPPLIED:	Airframe, transmitter, LiPo and wall charger, prop wrench, manual
PARTS REQUIRED:	4 x AA batteries for Tx
RADIO TYPE:	4 channel, 2.4 GHz
RANGE:	300+ metres
FLIGHT BATTERY:	7.4V 2700 mAh LiPo
GYRO:	6 Axis
FLIGHT TIME:	Approx. 20 minutes
DIMENSIONS:	220 x 220 x 70 mm

FISHER DELTA 1.0 3D PRINTER

At £349 the Fisher Delta 1.0 makes quality 3D printers affordable

- Includes FREE roll of filament
- Designed in the UK
- Ongoing upgrades and UK support available
- FREE Building the Fisher Delta guide available for download
- FREE Introduction to 3D Modelling guide available for download

If you can imagine it, you can print it!

Design

Designed with the versatility to be updated as and when new and advanced parts are developed. For example, a new heated bed will shortly be available as an optional add-on to the system.

Designed and developed in the UK, it has the distinct advantage over many of it's mass produced competitors in that each machine is designed for reliability, quality and durability and is backed up by an excellent ongoing development and customer care service.
Simple to use and with the ability to produce an infinite number of printed parts and components.

Assembly

The Fisher Delta is supplied in kit form with component parts which are quick and easy to assemble by following the comprehensive online instructions, requiring only a few basic tools
All electronics are supplied ready to use with pre made wiring harnesses – no soldering is required.

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

Parts

The Fisher Delta is strong and durable, but in the unlikely event that you need spare parts or wish to upgrade your printer we have them ready for immediate delivery.

Parts printed from the supplied roll of PLA filament are very light and extremely strong, perfect for all modelling applications; whether mechanical, structural or decorative.
Extra rolls of filament in a range of attractive colours are also available. Your first printing project is supplied with the machine and ready to go as soon as you have assembled it.

* PLUS P&P

3D printing is the perfect way to make bespoke scale details for all types of models. The builder of this big 1:3 scale RC model of a Druine D-31 Turbulent aircraft needed to represent the parts of the VW engine that protrude from the side of the cowling. He was able to supply reference photos and drawings of the full-size engine, so creating a 3D printable model was fairly straightforward. He'll need to do some sanding/filling/finishing before painting and detailing it, but it should look just right when installed in the model.

SPECIFICATIONS

Firmware

- Calibration:automatic bed levelling and machine calibration routine
- Layer resolution:0.3mm 0.05mm
- Build surface: Removable bed, uncooled Buildtak print surface (For printing with PLA). Heated aluminium plate available as an upgrade, (allows printing with ABS,PETG, PC, HIPS, and many more).
- Print speed:0.4mm nozzle, up to 16mm3/s
- Motion:Up to 250mm/s, 4000mm/s2 acceleration, segmentation free real time delta movement
- Nozzle:0.4mm diameter, maximum operating temperature 300oC, warm up time 60secs.
- Power adapter:100V/240V, 60W.
- Software:Machine control: On board web interface available via ethernet, USB control also available
- Standalone printing from onboard microSD card

Software

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

Materials

- Standard 175mm diameter filament (PLA Plastic)

For more information or for technical support please email info@traplet.com
To order visit www.trapletshop.com/3d-printing-2
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The Sport Channel

Gray's diverse selection of topics this month covers modellers' workshops, more Larne larks, indoor gliding and micro piggyback launching

"Happiness is a workshop!" (George Stringwell)

George Stringwell's workshop is a cool continental variation on the traditional shed! This neat chalet is built from a flatpack kit

This Month's Wise Words

Our opening item this month also provides our header quotation, which I find hard to argue with. Since our piece on Christian Moes' self-build masterpiece in Canada, SC readers have been quick to get in touch and discuss their special relationship with their modelling workspace. The response we've had seems to confirm a long-held theory that where we create can be as important as what we create.

Regular correspondent George Stringwell, acclaimed model designer, journalist and author, mailed in to describe the rather charming and stylish workshop he set up at his home in France. George writes:

"I suppose that I was spoilt during the thirty-odd years we occupied our last home in the UK, in that I had a dedicated modelling workshop that occupied the converted loft space and which covered the whole of the footprint of the house. I had this kitted out exactly as I wanted, with 'L' shaped building benches and separate drawing board and model storage areas. I created several hundred models up there, including all my big thermal soarers, and it was ideal in all respects, except one - the fact that models had to be taken up and down a flight of stairs and a loft ladder when going flying!

When we moved to France in 2006, I was returned to my teenage years of building on the dining table for several years whilst working to elevate our little farm house into 21st century living accommodation. Although I managed to build a fair few models, it wasn't ideal and I sensed that my wife, Alison, preferred to have modelling and living areas segregated!

So, with assistance from a couple of friends, I erected one of the DIY wooden chalets that are sold here, on a concrete slab in a corner of the garden to provide a 12 square metre, purpose built workshop. Although not as big as my last 'man cave' in area, with careful laying out this is pretty good and in this last five years has seen the production of models at a steady rate of three a year.

It gets hot in summer - but a fan and dehumidifier, plus opening the double doors, cures that - and cold in winter, when a heater is required. But it is comfortable and entirely adequate, with the bonus that it is in a very pleasant setting and only 100 metres walk from my regular flying field, which is adjacent to the north end of our garden."

Personally, I need no further convincing. George's chalet workshop looks totally idyllic (French location notwithstanding!) and makes an attractive alternative to the traditional garden shed that aeromodellers have inhabited for generations. Not long ago I saw something similar on sale at a famous garden centre in the Cotswolds; I think a return visit to investigate may be in order!

Your thoughts on workshops are always welcome here, as we've featured some appealing and out of the ordinary examples through the years.

One that I don't believe we've mentioned before was described to me by a late clubmate, who told me about twenty years ago that he knew a senior aeromodeller who ingeniously combined two of his hobbies by doing all his building in an aviary! My friend had apparently expressed some concern that the conditions in there might be detrimental to models on the building board and in storage. But apparently this gentleman insisted that his collection of birds enjoyed his company and apart from a couple of practical problems his models mostly remained intact!

Setting The Tone

One item that's been a surprise hit this year is the account of Northern Ireland modeller 'Slieve' of his times with his old club, the Larne Model Flying Club on the Antrim coast, in the heyday of single channel radio in the late 1950s and early 60s.

Readers have found Slieve's reminiscences and photos so evocative of those heady days that their own memories were pleasantly stirred. Slieve told us how the club was gripped by a mass-building frenzy that produced a fleet of 'Half Tones', a popular Dave Platt design of the day and 'Kakadu' bipes.

Even today the club's current incarnation, the 'East Antrim Model Aircraft Club' continues this tradition. Slieve sent in a collection of images from the 'good old days' and more recent times –far too many to reproduce in one edition. But we've assembled some into a couple of montages with Slieve's descriptions. He begins with the earlier pics:

"(A) The label says it all 'The Larne MFC, 1958'. Note the average age!"

"(B) I said we flew them low! Sometimes too low... My sister was not too pleased that I'd parked her car so close to where the action was. Despite the speed there was no real damage to the Half-Tone as the wings came off, but the car had a scar for the rest of its life, even after my 'repair'!"

"These next photos were from a Half Tone competition/ get together in 2008. Typical of N. Ireland, it was rather windy, but they still flew and even ended with two limbo passes before a spot landing. A number bounced off the posts or tape, or even the ground, but were picked up and launched again. All were electric with rudder and elevator, and the elevator was narrow chord and not quite full span.

"(C) Note how the average age has changed!"

"(D) This close-up shows the original Kakadu (Wee Bipe) from 1960 in the background, at 48 years old."

"(E) Line-up of the models. The complaint was that only 14 turned up, out of the present 30 total!"

"(F) On the back of this photo it says 'Mid 1980's', but I think is must be later."

Thanks for another fix of nostalgia, Slieve. We could have filled several pages with your photos but we'll run some more of them another time. If any members of the present day East Antrim club recognise themselves in these images please get in touch and let us know what you're flying these days.

As mentioned previously downloadable plans for the 'Half Tone' and scaled drawings for the 'Kakadu' are available via the e-mail address at the end of this column.

From the archive of Northern Ireland reader 'Slieve' come more images of his old club, the Larne MFC, from single channel days to the recent past. See text for key

Members of the modern successor to the Larne Club still have a large fleet of 'Half Tones', designed by scale legend Dave Platt. These turned out in 2008

SC Checks Out I.S.G.

The first model event I was able to attend this season was the BMFA Indoor Scale Nationals, held at the University of Wolverhampton. This most sublime of comps in the free flight calendar has already been admirably covered elsewhere in the model press. But I would like to quickly mention the new and evolving class of Indoor Scale Glider.

We've mentioned this class a couple of times since its inception and it was enlightening to see how competitors are approaching its special challenges. The Nats saw a good field of entries with some imaginative choices of subject.

Flight times are gradually improving as the art of extracting the maximum performance out of these tiny soarers without thermal assistance is further refined. I noticed that the best flight times were achieved by models with extra light construction – one with single surface balsa/tissue wings and another built entirely from 2mm insulation foam sheet.

Launching methods are still being explored. We saw bungees, hand-tows, winches and even hand-launching from the upstairs observation gallery in the university sports hall!

Indoor Scale Glider is still very much a 'work in progress' but one with a promising future. I hope we'll be seeing some published designs emerging soon.

One model that stopped me in my tracks was of a subject that we've discussed here more than once. Robert Pajas brought along an exquisitely built Piper TG-8, the military training glider conversion of the ubiquitous 'Cub'. My enthusiasm for the design was vindicated! A couple of years ago I drew up a plan for a TG-8 very close to the size of Robert's. I don't think I could have matched his detailing and airbrushing though... Launched from the upstairs gallery the little Cub sailed clear across the vast hall and set down so perfectly on its low-slung balloon wheels. Awwww!

I've got some more TG-8 material stashed somewhere and I'll bring it to you before too long.

Seen by your author at the Indoor Scale Nats. Robert Pajas's Piper TG-8 Cub was an entry in the new glider class

Piggybacking's Back!

Still with small free flight gliders, none other than Europe's undisputed champion of air-launching micro soarers has been in touch to show us his latest experiment.

Back in the day, 20 plus years ago, Horst Fenchel, Germany's Small Model Association pioneer, was astounding everyone by lofting his single channel 'Sixpence' gliders on a variety of Cox powered carrier planes and achieving incredible thermal flights.

My friendship with Horst began at this time, just as I was coincidentally developing my own 'Hawker Headbutt' piggybacker. Horst's release mechanism for popping the glider from the carrier cradle was the missing link I needed and SMA technology proliferated!

RTF foamie R/C models could have been invented for Horst and he's done some suitably unorthodox things with them since they became a regular feature of our hobby. At present though he's taken a minimalist approach and returned to his love of piggybacking, equipping his Kyosho Cessna Centurion with a simple balsa cradle to take a tiny all-sheet glider, with a release rigged to operate with a quick application of full rudder. The whole combo weighs only 24 grammes and so is restricted to calm weather sessions, but I've seen some video of some early tests and the glider gets away to soar spectacularly well.

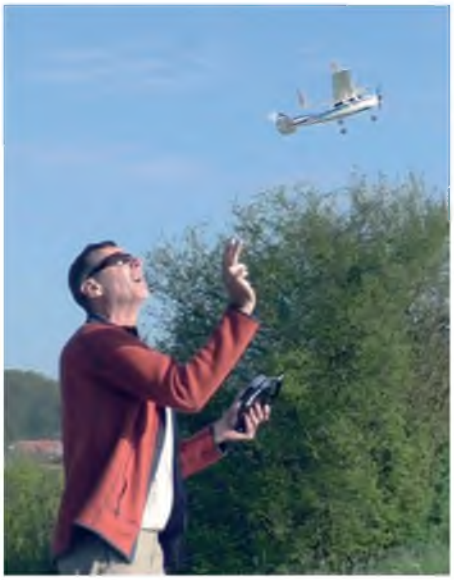
I suggested to Horst that this could form the basis of a neat fun competition class. A few micro foamies lofting cheap, quick to build, semi-disposable gliders, timed from their release (maybe after a limited motor-run) to touchdown, could have potential. What do you think? Who wants to give it try?

I'll always remember the time I took up a very junior club member's favourite chuck glider on a carrier model with which I normally piggybacked R/C gliders. I didn't, strictly speaking, ask his permission to take his chuckie to a vast altitude and cast off and lose it in in a monster thermal... But it happened and despite a brief spell of tears and trauma he grew up to be a top competitive aerobatic flyer!

Contributions, please to The Sport Channel c/o the Traplet Publications address.

All e-mail correspondence to: gray_rcmag@hotmail.com **RCMW**

Horst Fenchel returns to micro glider piggybacking with his 38 cm span foamie Kyosho Cessna carrying a 33 cm all balsa F/F glider. Release is triggered by full rudder



Horst's Cessna piggyback combo gets away on a test flight. The tiny glider has an impressive glide. How about this as the basis of a comp?

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Canopy D Type (CA3325CY) **£14.50**
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Spinner Set (CS3325SET) **£22.99**
FULL SET (SET3325) **£181.78**

Designer: Brian Taylor **Wingspan:** 69" / 1753mm
Power Source: .75 to .90 4-stroke; .60 two-stroke

MESSERSCHMITT BF110C (71") MW3326 ●●●●●

Plan (MW3326) **£24.50**
Lasercut Woodpack (WP3326) **£103.99**
FG Cowl - pair (CF3326CL) **£36.50**
Canopy (CA3326CY) **£12.50**
FULL SET (SET3326) **£159.74**

Designer: Brian Taylor
Wingspan: 71" / 1803mm
Power Source: Two .30-.40 cu. in. two-stroke

MESSERSCHMITT ME163 KOMET (49.75") MW3347 ●●●●●

Plan (MW3347) **£17.50**
Lasercut Woodpack (WP3347) **£51.99**
FG Cowl (CF3347CL) **£13.50**
Canopy (CA3347CY **£7.50**
FULL SET (SET3347) **£81.44**

Designer: Brian Taylor
Wingspan: 49.75" / 1265 mm
Power Source: .30 cu. in. 2-stroke

N.A. T-6 TEXAN/HARVARD (94.25") MW3336 ●●●●●

Plan (MW3336) **£27.50**
Lasercut Woodpack (WP3336) **£118.99**
Cowl (CF3336CL) **£35.50**
Canopy 2 pc (CA3336CY) **£19.50**
FG Undercarriage Fairing (CF3336FG) **£18.50**
Flanged Prop Nut (Large) (CD3336SP) **£7.50**
'Full Size Focus' Photo CD (FF20) **£4.99**
FULL SET (SET3336) **£209.23**

Designer: Brian Taylor **Wingspan:** 94.5" / 2.425 m
Power Source: 1.20 to 1.50 cu. in. 4-stroke

NORTH AMERICAN AT-6 TEXAN/HARVARD (68.5") MW3352 ●●●●●

Plan (MW3352) **£20.50**
Lasercut Woodpack (WP3352) **£73.99**
FG Cowl (CF3352CL) **£23.50**
Canopy (CA3352CY) **£12.50**
Flanged Prop nut (Small) (CD3352SP) **£7.00**
FULL SET (SET3352) **£128.24**

Designer: Brian Taylor **Wingspan:** 68.5" / 1740 mm
Power Source: .45 to .60 cu. in.2-stroke

HAWKER HURRICANE MK.1 (70") MW3333 ●●●●●

Plan (MW3333) **£22.50**
Lasercut Woodpack (WP3333) **£81.99**
PETG Canopy (CA3333CY) **£7.50**
FG Cowl (CA3333CL) **£24.50**
Aluminium Spinner set (CS3333SET) **£22.99**
FULL SET (SET3333) **£143.53**

Designer: Brian Taylor **Wingspan:** 70" / 1780 mm
Power Source: 75 - .80 cu. in. 4-stroke or .60 cu. in. 2-stroke

SUPERMARINE SPITFIRE MK.XIV & XIX (69") MW3342 ●●●●●

Plan (MW3342) **£23.50**
Lasercut Woodpack (WP3342) **£118.99**
Aluminium Spinner Set (CS3342SET) **£24.99**
Canopy Mk.XIX (14") (CA3342CY-A) **£7.50**
Canopy Mk.XIX (19") (CA3342CY-B) **£6.50**
FG Cowl (CF3342CL) **£40.50**
FG Carburettor Intake (CF3342RAD) **£13.50**
FULL SET (SET3342) **£211.93**

Designer: Brian Taylor **Wingspan:** 69" / 1753 mm
Power Source: .60 cu. in. 2-stroke or suitable 4-stroke

CHANCE-VOUGHT F4U-1 CORSAIR (61.5") MW3349 ●●●●●

Plan (MW3349) **£20.50**
Lasercut Woodpack (WP3349) **£58.99**
FG Cowl (CF3349CL) **£23.50**
Canopy (CA3349CY) **£7.50**
Domed Prop Nut-pip (Small) (CD3349SP) **£12.50**
FULL SET (SET3349) **£110.69**

Designer: Brian Taylor
Wingspan: 61.5" / 1562 mm
Power Source: .60 cu. in. 2-stroke (or equivalent 4-stroke)

CHANCE-VOUGHT F4U-1 CORSAIR (82") MW3338 ●●●●●

Plan (MW3338) **£27.50**
Lasercut Woodpack (WP3338) **£108.99**
Cowl (CF3338CL) **£44.50**
Canopy (CA3338CY) **£13.50**
FG Wing Crank Fairings (pr) (CF3338FG) **£23.50**
Domed Prop Nut-Pip (large) (CD3338SP) **£16.00**
FULL SET (SET3338) **£210.59**

Designer: Brian Taylor **Wingspan:** 82" / 2.082 m
Power Source: 1.50 cu. in. 4-stroke

KAWANISHI N1K2-JA SHIDEN KAI 'GEORGE' (64") MW3330 ●●●●●

Plan (MW3330) **£22.50**
Lasercut Woodpack (WP3330) **£108.99**
Canopy (CA3330CY) **£12.50**
Cowl (CF3330CL) **£33.50**
FULL SET (SET3330) **£159.74**

Designer: Brian Taylor
Wingspan: 64" / 1620 mm
Power Source: .60 cu. in. 2-stroke

DH98 MOSQUITO FB.VI (71") MW3345 ●●●●●

Plan (MW3345) **£24.50**
Lasercut Woodpack (WP3345) **£58.99**
Aluminium (Single) **Spinner Set** (CS3345SET) **£22.99**
Canopy (CA3345CY) **£12.50**
FG Cowl (CF3345CL) **£65.50**
FG Undercarriage Door (4pc) (CF3345UC) **£17.50**
FULL SET (SET3345) **£181.78**

Designer: Brian Taylor **Wingspan:** 71" / 1830 mm
Power Source: Two .25 - .40 cu. in. 2-stroke (equivalent 4-stroke)

HAWKER TYPHOON 1B (72.75") MW3339

Plan (MW3339) **£22.50**
Lasercut Woodpack (WP3339) **£108.99**
Canopy (CA3339CY) **£12.50**
FG Cowl (CF3339CL) **£43.50**
Aluminium Spinner Set (CS3339SET) **£22.99**
FULL SET (SET3339) **£189.43**

Designer: Brian Taylor
Wingspan: 72.75" / 1848 mm
Power Source: .90 to 1.20 cu. in. 4-stroke

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Lasercut Woodpack (WP3337) **£189.99**
Canopy (CA3337CY) **£7.50**
FG Cowl (CF3337CL) **£43.50**
Aluminium Spinner set (CS3337SET) **£22.99**
FG Carburettor intake (CF3337RAD) **£16.50**
FULL SET (SET3337) **£277.18**

Designer: Brian Taylor
Wingspan: 83" / 2.108 m
Power Source: 1.50 cu. in. 4-stroke

HAWKER TEMPEST MK.V (61.5") MW3328

Plan (MW3328) **£22.50**
Lasercut Woodpack (WP3328) **£88.99**
Canopy (CA3328CY) **£7.50**
Aluminium Spinner Set (CS3328SET) **£22.99**
FG Cowls (CF3328CL) **£42.50**
FULL SET (SET3328) **£166.03**

Designer: Brian Taylor
Wingspan: 61.5" (156.21cm)
Power Source: .60 cu. in. 2-stroke

CESSNA 120 (62") MW3346

Plan (MW3346) **£20.50**
Lasercut Woodpack (WP3346) **£48.99**
PETG Canopy Screen(CA3346CY) **£12.50**
Cowl (CF3346CL) **£23.50**
FULL SET (SET3346) **£94.94**

Designer: Brian Taylor
Wingspan: 62" / 1575 mm

SUPERMARINE SPITFIRE 1A (69") MW3334

Plan (MW3334) **£22.50**
Lasercut Woodpack (WP3334) **£108.99**
Canopy (CA3334CY) **£7.50**
Cowl (CF3334CL) **£37.50**
FG Alternative Cowl Chin (CF3334AUX) **£12.50**
Aluminium Spinner Set (CS3334SET) **£22.99**
FULL SET (SET3334) **£190.78**

Designer: Brian Taylor Wingspan: 69" / 1753 mm
Power Source: .75 - .80 cu. in. 4-stroke or . 60 cu. in. 2-stroke

REPUBLIC P-47D THUNDERBOLT (RAZORBACK) MW3335

Plan (MW3335) **£24.50**
Lasercut Woodpack (WP3335) **£118.99**
Canopy (CA3335CY) **£11.50**
Cowl (CF3335CL) **£45.50**
ABS Drop Tanks (CA3335TK) **£8.50**
Domed Prop Nut (Large) (CD3335SP) **£9.50**
FULL SET (SET3335) **£196.64**

Designer: Brian Taylor Wingspan: 76" / 1930 mm
Power Source: 1.20 to 1.50 cu. in. 4-stroke

GLOSTER GLADIATOR (56") MW3344

Plan (MW3344) **£22.50**
Lasercut Woodpack (WP3344) **£95.99**
Canopy (CA3344CY) **£7.50**
Cowl (CF3344CL) **£24.50**
Aluminium Spinner Set (CA3344SET) **£22.99**
FULL SET (SET3344) **£156.13**

Designer: Brian Taylor Wingspan: 56" / 1422 mm
Power Source: .60 cu. in. 2-stroke (equivalent 4-stroke)

DH98 MOSQUITO PR.XVI (81") MW3340

Plan (MW3340) **£27.50**
Lasercut Woodpack (WP3340) **£95.99**
Canopy (CA3340CY) **£11.50**
FG Cowl (CF3340CL) **£69.50**
FG Undercarriage Doors (pr) (CF3340UC) **£21.50**
Aluminium Spinner Set (CA3340SET) **£22.99**
FULL SET (SET3340) **£224.08**

Designer: Brian Taylor
Wingspan: 81" / 2.057 m
Power Source: Two .40 to .50 cu. in. 4-stroke

MESSERSCHMITT BF109E (68") MW3341

Plan (MW3341) **£22.50**
Lasercut Woodpack (WP3341) **£68.99**
Canopy (CA3341CY) **£12.50**
FG Cowl (CF3341CL) **£37.50**
FG Chin (CF3341AUX) **£12.50**
Aluminium Spinner Set (CA3341SET) **£21.99**
FULL SET (SET3341) **£158.38**

Designer: Brian Taylor Wingspan: 68"/ 1727 mm
Power Source: .60 cu. in. 2-stroke; .75-.90 cu. in. 4-stroke

VOUGHT-SIKORSKY OS2U KINGFISHER (58") MW3343

Plan (MW3343) **£20.50**
Lasercut Woodpack (WP3343) **£78.99**
Canopy 2 pc (CA3343CY) **£21.50**
FG Cowl (CF3343CL) **£26.50**
Flanged Prop Nut (Small) (CD3343SP) **£7.50**
FULL SET (SET3343) **£139.49**

Designer: Brian Taylor
Wingspan: 58" / 1473 mm
Power Source: .30 - .35 cu. in. 2-stroke or .35 - .40 cu. in. 4-stroke

MESSERSCHMITT BF109F (61") MW3348

Plan (MW3348) **£20.50**
Lasercut Woodpack (WP3348) **£78.99**
Canopy (CA3348CY) **£12.50**
FG Cowl (CF3348CL) **£29.50**
Aluminium Spinner Set (CS3348SET) **£22.99**
FULL SET (SET3348) **£148.03**

Designer: Brian Taylor
Wingspan: 61" / 1550mm
Power Source: .60 cu. in. 2-stroke

GRUMMAN F6F-5 HELLCAT (64.25") MW3350

Plan (MW3350) **£22.50**
Lasercut Woodpack (WP3350) **£108.99**
Canopy (CA3350CY) **£7.50**
FG Cowl (CF3350CL) **£34.50**
Domed Prop Nut (CD3350SP) **£12.50**
FULL SET (SET3350) **£167.39**

Designer: Brian Taylor
Wingspan: 64.25" / 1632 mm
Power Source: .60 cu. in. 2-stroke or Enya .90 4-stroke

N.A AT-6 TEXAN/HARVARD (68.5") MW3352

Plan (MW3352) **£20.50**
Lasercut Woodpack (WP3352) **£73.99**
Canopy (CA3352CY) **£12.50**
FG Cowl (CF3352CL) **£23.50**
Flanged Prop nut (Small) (CD3352SP) **£7.00**
FULL SET (SET3352) **£128.24**

Designer: Brian Taylor
Wingspan: 68.5" / 1740 mm
Power Source: .45 to .60 cu. in. 2-stroke

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CURTISS P-40E KITTYHAWK (65.25") MW3329 ●●●●●

Plan (MW3329) **£22.50**
Canopy (CA3329CY) **£14.50**
FG Cowl (CF3329CL) **£25.50**
Aluminium Spinner Set (CS3329SET) **£23.99**
FULL SET (SET3329) **£77.84**

Designer: Brian Taylor
Wingspan: 65.25" / 1657 mm
Power Source: .60 cu. in. 2-stroke

SUPERMARINE SPITFIRE MK.22 (61") MW3452 ●●●●●

Plan (MW3452) **£27.50**
Lasercut Woodpack (WP3452) **£73.99**
Canopy (CA3452CY) **£12.50**
FG Cowl (CF3452CL) **£19.50**
Spinner Set (CS3452SET) **£24.50**
FULL SET (SET3452) **£142.63**

Designer: Dennis Bryant
Wingspan: 61" / 1550mm
Power Source: .60 cu. in. 2-stroke

FOCKE-WULF FW190 A-4 (60.25") MW3327 ●●●●●

Plan (MW3327) **£22.50**
Lasercut Woodpack (WP3327) **£71.99**
Canopy (CA3327CY) **£12.50**
FG Cowl (CF3327CL) **£32.50**
Aluminium Spinner Set (CS3327SET) **£22.99**
FULL SET (SET3327) **£146.23**

Designer: Brian Taylor
Wingspan: 60.25" / 1530 mm
Power Source: .60 cu. in. two-stroke

REPUBLIC P-47D THUNDERBOLT (BUBBLE) (61") MW3332 ●●●●●

Plan (MW3332) **£22.50**
PETG Canopy (CA3332CY) **£12.50**
FG Cowl (CF3332CL) **£26.50**
Domed Prop Nut (Small) (CD3332SP) **£8.00**
FULL SET (SET3332) **£62.55**

Designer: Brian Taylor
Wingspan: 61" / 1550mm
Power Source: .60 cu. in. two stroke

DCH-1 CHIPMUNK (68") MW3444 ●●●●●

Plan (MW3444) **£27.50**
Lasercut woodpack (WP3444) **£71.99**
Canopy (CA3444CY) **£20.50**
FG Cowl (CF3444CL) **£22.50**
FULL SET (SET3444) **£128.24**

Designer: Dennis Bryant
Wingspan: Up to 24"
Power Source: IC Propeller

HAWKER FURY 1 (60") MW3453 ●●●●●

Plan (MW3453) **£27.50**
Lasercut woodpack (WP3453) **£133.99**
Aluminium Spinner Set (CS3453SET) **£22.99**
FG Cowl (CF3453CL) **£21.50**
FULL SET (SET3453) **£185.38**

Designer: Dennis Bryant
Wingspan: 60" / 1542mm
Power Source: .60 cu. in. 2-stroke

WESTLAND LYSANDER (81") MW3448 ●●●●●

Plan (MW3448) **£32.50**
Lasercut woodpack (WP3448) **£103.99**
FULL SET (SET3448) **£122.84**

Designer: Dennis Bryant
Wingspan: 81" / 2057 mm
Power Source: .60 to .90 cu. in. 2-strokes; . 90+ 4-strokes

DH82A TIGER MOTH (66") MW3460 ●●●●●

Plan (MW3460) **£27.50**
Lasercut woodpack (WP3460) **£101.99**
ABS Tank/Seats/Wheel Covers/Step/Oil Tank (CA3460AUX) **£12.50**
Clear Instrument panels (x2) (CA3460MNT) **£6.50**
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Cowl Bowl (CF3460CL) **£14.50**
Tank (CF3460TK) **£30.50**
FULL SET (SET3460) **£179.99**

Designer: Dennis Bryant **Wingspan:** 66" / 1677 mm
Power Source: .60 to .80 cu. in.

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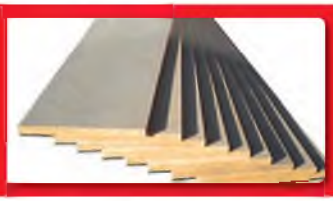

Strip Wood - Pack A
- 6 x 1/8" (3.2 mm)
- 6 x 3/16" (5 mm)
- 6 x 3/32" (2.4 mm)
- 4 x 1/8"X1/4" (3.2mm X 6.5 mm)
- 6 x Spruce...

Rrp £10.99 + p&p/s&h

Strip Wood - Pack B
- 9 x 1/8" (3.2 mm)
- 10 x 3/16" (5 mm)
- 10 x 3/32" (2.4 mm)
- 6 x 1/8"X1/4" (3.2x6.5 mm)
- 10 x Spruce...

Rrp £17.82 + p&p/s&h

Strip Wood - Pack C
- 14 x 1/8" (3.2 mm)
- 14 x 1/8" (3.2 mm)
- 14 x 3/16" (5 mm)
- 14 x 3/32" (2.4 mm)
- 10 x 1/8"X1/4" (3.2x6.5 mm)
- 15 x Spruce...

Rrp £26.65 + p&p/s&h

Strip Wood - Pack D
- 14 x 1/8" (3.2 mm)
- 14 x 1/8" (3.2 mm)
- 20 x 3/16" (5 mm)
- 20 x 3/32" (2.4 mm)
- 20 x 1/8"X1/4" (3.2x6.5 mm)

Rrp £21.62 + p&p/s&h

Sheet Wood - Pack A
- 2 x 1/8" (3.2 mm)
- 2 x 3/16" (2.4 mm)
- 2 x 3/16" (5 mm)
- 5 x 1/16" (1.6 mm)
- 1 x 1/4" (6.5 mm)

RRP £21.13 + p&p/s&h

Sheet Wood - Pack B
- 3 x 1/8" (3.2 mm)
- 4 x 3/32" (2.4 mm)
- 4 x 3/16" (5 mm)
- 8 x 1/16"x1/4" (1.6 mm)
- 2 x 1/4" (6.5 mm)

RRP £37.51 + p&p/s&h

Sheet Wood - Pack C
- 6 x 1/8" (3.2 mm)
- 6 x 3/32" (2.4 mm)
- 6 x 3/16" (5 mm)
- 10 x 1/16" (1.6 mm)
- 4 x 1/4" (6.5 mm)

RRP £50.56 + p&p/s&h

Sheet Wood - Pack D
- 10 x 1/8" (3.2 mm)
- 10 x 3/32" (2.4 mm)
- 10 x 3/16" (5 mm)
- 14 x 1/16" (1.6 mm)
- 6 x 1/4" (6.5 mm)

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www.rcmodelworld.com

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INDOOR

28th Jun
Indoor R/C Small Models Meet, 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

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

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 225 g, 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

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

18th & 19th Jun '16
IMAC UK Competition, Wrexham, Flintshire, Wales. Point of contact for information etc. is Mal Green at mcgreen65@hotmail.com

18th & 19th Jun '16
Airborne At The Sumners Ponds Model Show, is now in its fourth year in the lovely surroundings that make up the Sumners Ponds Fishery and Campsite in Barns Green, Horsham, West Sussex. Last year the show attracted over 2000 visitors. New for 2016, FPV Quad Racing will have its own flying field adjacent to the main flight line, as demand has been so high. And there will also be an area put aside for Control Line flying. The main flight line will once again cater for helicopters and aeroplanes. Camping is available on site and is free to all pilots on Friday and Saturday evenings. If you wish to participate please contact Peter Glover (07954 370936) or see the show's Facebook and web pages at:
www.facebook.com/airborne.sumnersponds
www.sumnersponds.co.uk

19th Jun '16
Salisbury Model Flying Club Midsummer Fly-In, open to all clubs, for more information check out www.salisburymodelflyingclub.co.uk,
or email: spikespencer707@btinternet.com

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 & 3rd Jul '16
Woodspring Wings Annual Model Flying Show, hosted by Woodspring Wings MAC at its airfield on Claverham Drove, North of Yatton. Access from the M5 will be well signposted and parking is free. Includes continuous displays by experienced international show pilots, flying single and multi-engine aircraft models depicting aviation throughout the years from early biplanes to modern jet fighters with gas turbine engines. The show is complemented by static displays and trade marquees that have been well received and enjoyed by thousands of visitors since the inaugural show in the early 1990s. The club will be running its popular raffle, with cash prizes for the winners to be drawn on Sunday. A food court provides sustenance throughout the day so lunch out is no problem and a bar conveniently situated near the displays offers West Country ciders and beers to enjoy. An extensive grassed area has wide views of the displays and an opportunity to sit and relax. Further details at www.woodspringshow.co.uk

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

2nd Jul, 6th Aug, 3rd Sep, 1st oct, 5th Nov, 3rd Dec '16
Wessex Soaring Association Fly-Ins, held on the first Saturday or Sunday of the month, depending on the forecast. Slopes located in South Wiltshire, approx 10 miles west of Salisbury. All welcome. Contact Pete Carpenter on 07919 903742 or pete.carpenter@yahoo.co.uk for details

3rd Jul '16
White Sheet Scale Fly-In, to be held at the White Sheet Club slopes near Mere, Somerset (back up date 17th July). No competition, just a friendly fly-in. Proof of insurance, please. Further information from: c_williams30 @sky.com. Go-No-Go decision the evening before on the WS and SSUK forums www.whitesheet.org.uk, scalesoaring.co.uk

9th & 10th Jul '16
IMAC UK Competition, Rhyl, North Wales. Point of contact for information etc. is Mal Green at mcgreen65@hotmail.com

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

10th Jul '16
North London MFC Glider Day. at Warren Lane, Baldock, Herts SG7 6RR. Flying from 10 am. BBQ and drinks available. All pilots need BMFA A certificate or LMA proficiency. Proof of insurance required. No noisy models please. £5 pilots entry fee. Contact Maurice Northcott on 07866 105721 or Email: mail@mpnltd.fsnet.co.uk

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

17th Jul '16
GBR/CAA F3A League Competition, Grimsby. 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, Dave Tofton on 07809 490847 for details

24th Jul '16
GBR/CAA F3A League Competition, Mansfield. 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, Stuart Mellor on 01246 568043 for details

24th Jul '16
Wealden Warbirds, at Berwick Flying site, nr Drusilla's on the A27. Flying from 10:30am, pilots briefing at 10 am. Noise testing will be available on the day. Proof of insurance and BMFA 'A' min req'd to fly. £5 to fly, raffle and refreshments. Prop warbirds only, sorry no jets.
Contact Mark@wealdenflyers.co.uk or 01825 744127, or
Bob@wealdeanflyers.co.uk or 01892 852137

31st Jul '16
GBR/CAA F3A League Competition, Warboys. 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, Clive Whitwood on 01487 832195 for details

31st Jul '16
Bath SPARCS All Electric Fly-In, at RAF Colerne Wiltshire. Airfield site with grass and tarmac runways. Proof of BMFA insurance required. Regret no facilities for spectators. Pilots briefing at 10 am. Contact: Bob Partington 01225 891441, Email: grpartington@gmail.com

28th Jul to 6th Aug 2016
F3A European Championships, Untermünkheim – Germany. See www.ec-f3a-2016.de/ If you need more details contact Ashley Hoyland on 0114 2873432

6th & 7th Aug '16
Redruth & District Model Flying Club 25th Annual Summer Show, 10 am to 5 pm, both days, along with our club pilots there will be again a number of local club pilots and guests, a small number of trade stands, and we can cater for a small number of campers wishing to make a week or weekend holidaying visit. There will be barbecue catering on site. Modellers wishing to fly at the show, contact Steve for available forms and to download attachment.
Contacts: Steve Polkinghorne 01209313263, or Email: stevewings55@tiscali.co.uk Alan Greenfield on 07706 929494, or check out the club website on www.rdmfc.co.uk

7th Aug '16
***CHANGE IN VENUE* Traplet Open Scale Competition Round 2**, hosted by Wirral Radio Control Flying Society, at their Arrowe Park field, Birkenhead (postcode CH49 5LN). 10 am – 5 pm. Sponsored with prizes by Traplet. The only requirement is that the plane is a recognisable version of a full size fixed-wing aircraft. There is no builder of the model rule so ARTF's and ready-made models can be used. Pilots of models weighing over 7 kg need a 'B' certificate to fly. Flying schedules and further information from Peter Maw at: secretary@bickershawmfc.co.uk

13th & 14th Aug '16
PSSA 'Fly for Fun' event with the Lleyn MAC, Nr Abersoch, North Wales. Meet at the Londis car park in Llanbedrog 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

13th & 14th Aug '16
LMA Swap Meet, at the Elvington 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

13th & 14th Aug '16
IMAC UK Competition, Clitheroe, Lancashire. Point of contact for information etc. is Mal Green at mcgreen65@hotmail.com

14th Aug '16
GBR/CAA F3A League Competition, Ashbourne. 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, Adrian Harrison on 07976 244004 for details

21st Aug '16
Deeside M.A.C. Open Event, Broken Bank flying site off the A548 Flintshire. Start time 9 am. All flyers must be B.M.F.A. members be insured with proof of insurance. Max weight of models 30 kg. Models over 20 kg to have C.A.A./L.M.A certification. Models over 7 kg will require a B certificate. The event is a family fun day for the following classes: Fixed wing, I.C./Electric, Turbine. Helicopter, IC/Electric, Turbine. On site, Toilet, Barbeque and a 230 V Ac charging facility, and the site has a take-off strip suitable for large models. The gates will be open from 8.30 am and locked at 10.30 am, however a phone number will displayed on the gate for latecomers. Contact: George Robson for further information and directions. Email: zen219506@zen.co.uk, Tel: 01352761814 or check out the website at www.deesidemac.co.uk

3rd & 4th Sep '16
LMA Swap Meet, at the Much Marcle 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

4th Sep '16
GBR/CAA F3A League Competition, Grimsby. 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, Dave Tofton on 07890 490847 for details

4th Sep '16
Salisbury Model Flying Club Scale Day, open to all clubs, for more information check out www.salisburymodelflyingclub.co.uk, or Email: spikespencer707@btinternet.com

4th Sep '16
White Sheet Scale Fly-In, to be held at the White Sheet Club slopes near Mere, Somerset (back up date 18th Sept). No competition, just a friendly fly-in. Proof of insurance, please. Further information from: c_williams30 @sky.com. Go-No-Go decision the evening before on the WS and SSUK forums, www.whitesheet.org.uk, scalesoaring.co.uk

9th to 11th Sep '16
F3A Triple Crown Invitational team competition: England, Ireland, Scotland. Venue Enniscorthy, Co Wexford, Ireland. Visitors welcome but please contact Competition Secretary, Adrian Harrison on 07976 244004 for details

10th & 11th Sep '16
PSSA 'A-4 Skyhawk Mass Build' Fly-In, 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

10th & 11th Sep '16
Southern Model Arts & Crafts Show, at Headcorn Aerodrome, Kent. will feature a stunning array of model aircraft, helicopters, ships, tank and other vehicles. A full range of other activities, including the popular Bring & Buy stand, and a showground packed with traders makes this a must visit event for anyone with an interest in this fascinating hobby whether a professional or a beginner. Entry: £12 adult, £10 child, under 5's Free, family (2 adults, 2 children) £35. For more details check out the website at www.headcornevents.co.uk

11th Sep '16
North London MFC Electric Day, at Warren Lane, Baldock, Herts SG7 6RR.
Flying from 10 am. BBQ and drinks available. All pilots need BMFA A certificate or LMA proficiency, those flying >7 kg models need BMFA B certificate or LMA proficiency. Proof of insurance required. No noisy models please. £5 pilots entry fee. Contact Maurice Northcott on 07866 105721 or Email: mail@mpnltd.fsnet.co.uk

17th Sep '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

1st & 2nd Oct '16
Festival of Flight Spectacular, at Ragley Hall, Alcester, Warwickshire B49 5NJ. Brand new, two-day model spectacular with fantastic night show Saturday evening. As well as top aircraft displays, fantastic trade support and on site camping, there will be model boats, cars, prizes and much, more! Entry: £12.00 adult, £6.00 child, £28.00 family. Camping £60 pre booked. Please visit the Weston Park Show website for more details, or contact Steve Bishop on Mobile 07758 895068

1st & 2nd Oct '16
GBR/CAA Championships, Hurley. 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 Adrian Harrison on 07976 244004 for details

2nd Oct '16
North London MFC Large Model Day, at Warren Lane, Baldock, Herts SG7 6RR.
Flying from 10 am. BBQ and drinks available. All pilots need BMFA A certificate or LMA proficiency, those flying >7 kg models need BMFA B certificate or LMA proficiency. Proof of insurance required. No noisy models please. £5 pilots entry fee. Contact Maurice Northcott on 07866 105721 or Email: mail@mpnltd.fsnet.co.uk

2nd Oct '16
Wet Wings MFC 3rd Annual Splash-In, 9.30 am to 5.30 pm at Carr Mill Dam, Garswood old road, St. Helens, Merseyside WA11 7LZ. Electric and I.C. Waterplanes fun fly (I.C. Subject to 76db limit). Pilots pre-booking fee £5, on the day £7.50, spectators free. Light refreshments, tea, coffee etc. and camping available at extra cost. There is also a Premier Inn located on the edge of the lake, please ask for details. Contact Christine Evans, WWMFC secretary at wetwingsmfc@hotmail.com for more info

2nd Oct '16
Autumn Mega Swapmeet, at the Meir Community Centre, Meir Stoke-on-Trent, Staffs ST3 7DY. Tables £7, Entry £2. Doors open 9.30 am for sellers and 10 am for buyers. To book, Tel: 01782 853883 or Email: topgun@modelpilot.co.uk

8th & 9th Oct '16
PSSA 'Fly for Fun' event – The Great Orme, Llandudno, North Wales. Meet at the 'Tank Track' car park for 10 am each day. Open to non-PSSA members. Proof of insurance required. For more information contact Phil Cooke on 07772 224719 or Email: webmaster@pssaonline.co.uk

15th Oct '16
Salisbury Model Flying Club Autumn Swapmeet, at Alderbury Village Hall, for more information check out www.salisburymodelflyingclub.co.uk, or Email: spikespencer707@btinternet.com

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Wanted silencer for enya 35 model 5224 also one for enya 15. Call 07909 766687. Suffolk

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Wanted Flying Scale Models magazine March 2005 issue. Call Gary 07792004679. Notts

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MODEL WORLD

Next Issue

DON'T MISS OUR AUGUST 2016 ISSUE!

In the first of a two part series, Chris Williams starts to describe the build of his 174 inch wingspan 1/4 scale classic sailplane for five-function R/C. Fred Slingsby's Type 42 Eagle was the first two-seat glider to cross the English Channel and despite unflattering nicknames such as the 'Mahogany Bomber' the Eagle had a reasonably good performance. There are still a few examples flying today for those who want to build an exact replica. With an AUW of around 19 lbs this large glider is a practical beast for anyone who enjoys scale slope soaring or aerotowing.

When talking about helicopters the machine that often comes to mind is the Bell JetRanger. The LongRanger, a stretched version, is a very familiar helicopter too. The Bell 407 is the latest incarnation of this aircraft, retaining the single engine but with a four blade rotor head and a two blade tail rotor. This makes it an ideal subject to model and provides endless opportunities for scale detailing. The skid undercarriage is also simple to model, so the Bell 407 is particularly suitable for someone looking for their first scale helicopter. Join Jon Tanner as he builds Roban's 700 size Bell 407.

AUGUST 2016 ISSUE ON SALE THURSDAY 21ST JULY

Chris Bowler shows that a good replica of a full size light aircraft landing gear can be made with some simple tools and patience. The example that Chris describes is typical of a light aircraft such as the Druine or Rollason Turbulent, at just under one third scale. All of the components were obtained from his local DIY store, the exceptions being silver solder and flux from a welding supplies retailer.

PLUS...

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All contents are subject to change without notice

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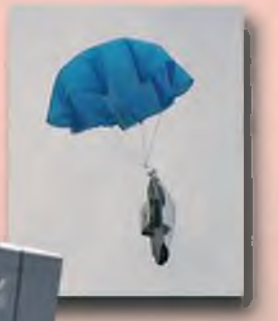

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