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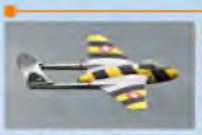

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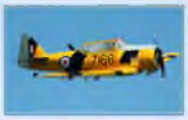

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CONTENTS

RC MODEL WORLD
APRIL 2016 • ISSUE #387

FRONT COVER

North American Aviation's T-28 Trojan was a piston-engined military trainer used by the United States Air Force and United States Navy. Recent moulded foam models of the chunky aeroplane have given it renewed popularity among R/C model pilots but built up versions have been less readily available – until now! J Perkins, the distributor of Seagull Models, have sent us their 63 inch span ARTF kit to review and Neville Hill was given the task of putting it together. You can read the first part of his review, starting on page 16

REGULARS

REVIEWS

FEATURES

PRE-FLIGHT

Kevin Crozier
Editor | Radio Control Model World
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Welcome to the April issue of RC Model World. April has been designated as Drone Awareness month in a joint initiative being run by the CAA and the BMFA. According to the Drone Aware website – droneaware.org – events will be taking place at participating BMFA affiliated model clubs where new and existing drone flyers can attend and learn about safe and lawful drone operation.

If your club is hosting a Drone Aware event please send us some pictures and let us know how you get on. Besides using them in RC Model World we will feature them in our new drone magazine, RC Flight Camera Action.

The importance of establishing contact between drone enthusiasts without any previous R/C experience and the existing model flying community was driven home to me during a recent chat that I had with a local drone pilot. He was very knowledgeable about his aircraft and had completed a CAA approved training course but his first love was aerial filming and he had no prior interest in R/C model flying.

It was obvious that he was keen to keep on the right side of things legally but I was taken aback to discover that he had been flying within a nearby Area of Outstanding Natural Beauty from which taking-off and landing any aircraft is prohibited by a long-standing by-law (with some long-standing exceptions). He was unaware of this by-law but to his credit he had checked the area's 'Things Not To Do' web page and had found nothing regarding the flying of drones.

This highlights that many new drone pilots may be totally oblivious of long standing conventions regarding the flying of model aircraft, including the fact that many open areas with public access have by-laws prohibiting our favourite activity. So if you come across a drone pilot flying from a site where local modellers avoid flying their aircraft do have a polite word and point them towards the by-law signs.

And if any drone pilots turn up at your model club in response to the Drone Aware campaign please give them a warm welcome and use the opportunity to make them aware of best practice when flying their aircraft. Shutting the gate and ignoring them is a wasted opportunity to welcome new pilots into our fabulous hobby.

Ok, let's move on to what we have in store for you this issue.

Sticking with drones, we welcome Manny Williamson from the BMFA who has written a piece on the safe and legal flying of multicopters. We join in the fun with a review of Parrot's updated camera drone, the Bebop 2. Planes are not forgotten, although the Spy Hawk tested by John Stennard is a kind of drone too, being equipped with an FPV camera in the nose. For a more traditional kit review we turn to Neville Hill, who has assembled a mighty Trojan T-28 from Seagull Models.

This month is another bumper one for plan features, with three build articles for you to enjoy. We kick things off with a free pull out plan for a DH Gypsy Moth, in commemoration of Amy Johnson, who died 75 years ago. Our feature plan is for Der Jäger, a US homebuilt biplane with scalloped trailing edges on the wings. Plus we conclude Robin Fowler's Short Stirling article with a look at the finishing and first flights of his impressive 1:10 scale bomber.

Regular columns are catered for by Chris Williams who writes on electrifying vintage gliders, John Stennard gets used to indoor FPV, while Mike Proctor goes thermal soaring on Christmas Day. And we welcome Dave Wilshere to the team as he embarks on an occasional column called Turning & Burning, which concentrates on both petrol and turbine (jet) powered models.

I hope you enjoy it. Until next time...

Happy flying!

Kevin

Kevin

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NEW MANAGING DIRECTOR AT SHESTO LTD

Shesto Ltd has announced the appointment of Dan Delic as their new Managing Director. He succeeds Richard Shestopal, who will now become the company Chairman.

Dan has been part of the Shesto team for twelve years and a director since 2010. During that time he has been instrumental in shaping the Shesto brands and developing strong business partnerships with Shesto customers. Dan has over 30 years of experience in the power tools and hobby and craft sectors within marketing, sales and general management.

"These are exciting times at Shesto with expansion into new customer sectors, pro-active product development and with our new website and trade portal just around the corner, Dan's energy, enthusiasm and motivational skills will certainly help drive the company forward" says Richard Shestopal. *"I have known and worked with Dan for many years and feel very happy and proud that he has stepped up to this level."*

Shesto Limited was established in 1907 by Nathan Shestopal, followed by his son Jack in 1921, who managed the company for nearly 50 years. Richard Shestopal, the current owner, joined the company in 1963 and was responsible for diversifying the activities of the company from watch material suppliers to developing them, with Dan, to the current mainstream sectors of Craft, Model & Hobby Supplies, Tools & Equipment for Precision Engineering, Lighting & Magnification Solutions and Cake Crafting & Decoration Supplies.

With over 100 years in business, Shesto are proud to continue offering and supplying quality products to their customers globally. For further information please visit: **www.shesto.com**

SHORT STIRLING PRICES

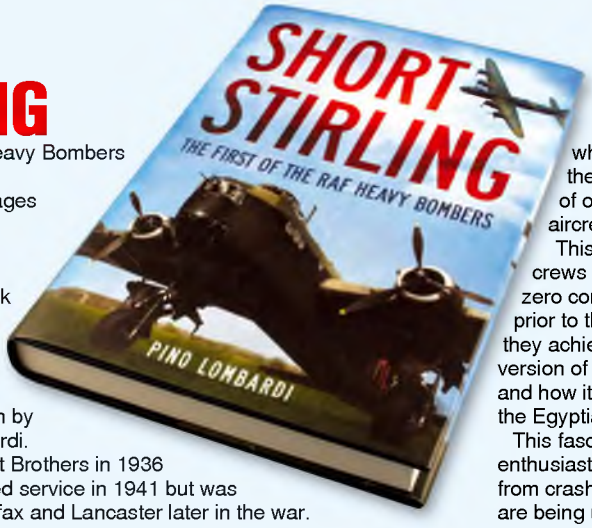
First, an apology to any readers who attempted to purchase plans and parts for Robin Fowler's Short Stirling based on the prices shown in the last issue. Unfortunately some of the prices we were given to publish were incorrect. It has also been decided not to offer a wood pack for this model at this time. The plan and part prices shown in the concluding part of Robin's plan feature, starting on page 40, now match those shown on the Traplet Shop website:

gb.trapletshop.com/short-s29-stirling-plan-5

Also, in one of those weird coincidences that happen from time to time, we were sent a most interesting book dedicated to the Short Stirling bomber, a review for which appears below.

SHORT STIRLING

The First of the RAF Heavy Bombers
By Pino Lombardi
Fonthill Media, 416 pages
978-1-78155-473-9
Hardback, £50.00



This heavyweight book may be the definitive work on the Short Stirling, being the result of 30 years of research and dedication by the author, Pino Lombardi.

Designed by the Short Brothers in 1936 the Short Stirling entered service in 1941 but was superseded by the Halifax and Lancaster later in the war. Lavishly illustrated with 400 unpublished photographs 'Short Stirling: The First of the RAF Heavy Bombers' is dedicated to the RAF's first four-engine heavy bomber. Illustrated with wartime photographs it describes the design and construction of the big bomber and shows the factories where Stirlings were produced. The men and women who built them relate their stories and aircrews give their personal accounts of operating the Stirling. A chapter is devoted to the training of aircrews and flying the Stirling is described in detail.

This comprehensive book also covers the work of RAF ground crews and maintenance units, who often worked outdoors in sub-zero conditions. Civilian men and women also undertook repairs but prior to this book little acknowledgement was given for the vital work they achieved in rebuilding battle-damaged Stirlings. The final transport version of the Stirling is featured both in its RAF and post-war civilian role, and how it went full circle to become a bomber once more in the hands of the Egyptian Air Force.

This fascinating book concludes with a look at the work of aircraft enthusiasts who dedicate themselves to locating and recovering parts from crashed Stirlings. In an Epilogue we learn how some of these parts are being used by The Stirling Aircraft Project, who aim to construct a forward fuselage section incorporating the main crew stations as a lasting tribute to the people who designed, built, flew and maintained this historic aircraft. Progress on the Project can be viewed on their website: **stirlingproject.co.uk**

PAINT CREEP

Arnaldo Correia, the author of the Sparky article in February's magazine, has written in with some thoughts on the March issue:

"Dear Kevin

I very much enjoyed the Australian Kittyhawks article. Not only because Rob Knox saw fit to pay homage to a pilot that died fighting during WWII but also because he seems to be a 'guru' at recovering foam models. I for one would love to hear more from him about those foam model refurbishing techniques, namely applied to scale models.

The Mini CAVU article and plan was 'right up my alley'. Reading it, I noticed Alan and I have faced a similar problem while painting Depron, namely paint creeping under the masking tape. I solved it by doing the following:

On non-sanded Depron degrease the surface with rubbing alcohol, apply the masking tape gently and carefully press down the edges. Then brush one or two light coats of PVA glue, diluted 50/50 with water, over all the edges. Let it dry and spray paint. If done correctly you should have no paint creep.

As much as possible I try not to sand the Depron surface away as it takes paint better. I do, as mentioned above, degrease it carefully before any painting is done, though.

On sanded surfaces the creeping can be even worse so a 'double treatment' might be advisable. Coat around the edges of the area to be masked with one coat of diluted PVA and let it dry thoroughly before applying the masking medium, as described above, including applying more diluted PVA over the edges. You can now paint it.

Do a few tests on scrap Depron and you will soon get the hang of it. With care and practice paint creep will be a thing of the past."

Many thanks for this handy tip, Arnaldo. Depron seems to be becoming more and more popular with our plan designers, especially those who favour the smaller models that we feature as Free Plans. Tips on getting the most from this versatile material are always welcome so we can pass them on to our readers.

TRAPLET OPEN SCALE – IT'S HAPPENING AGAIN!

Now in its third year, the Traplet Open Scale competition will be running again in 2016 thanks to the help of the Pontefract and District Aeromodellers in Yorkshire and Bickershaw MFC in Lancashire.

The rules are simple – five compulsory non-aerobatic manoeuvres to be performed with five further options from a choice of 18. Which means non-aerobatic models can compete on equal terms with aerobatic models.

A generous range of prizes, including magazine subscriptions, plans vouchers, modelling tools and a complete wood pack and plan for the overall winner are up for grabs, making it well worth the effort of getting out of bed.

The only requirement is that the aeroplane you fly is a recognisable version of a full size fixed-wing aircraft. It can be scratch built or it may have cost just 99p from an auction or a classified ad site, or be worth several thousand pounds and supplied to you as a super-slick ready to fly model! There is no builder of the model rule so ARTF's and ready-made models can be used. The winner will be the person who flies in the most authentic fashion.

Pilots of models weighing over 7 kg need a 'B' certificate to fly at either event. The venues are Pontefract and District Aeromodellers site (WF8 4QD) on Sunday May 15th and the Bickershaw MFC site (WN2 5TD) on Sunday August 7th. Both events start at 10 am.

Flying schedules and further information for both events can be obtained by contacting Peter Maw by email at: **secretary@bickershawmfc.co.uk**

TRACKING A RARE BEAR

Ian Jackson writes concerning the Rare Bear review in the February issue: *"I have one of the first models and regularly fly it on 6S – and very fast she is! So fast that we put a GPS tracker in it... To date the fastest pass I've had is 157.4 mph on the level – and the wings don't come off in turns even at that speed!*

One word of caution for anyone going this way though. Don't launch on more than 2/3 throttle because there isn't enough aileron to hold it against the torque until she's moving."

Thanks for letting us know about your speed tracking, Ian. And thanks also for the hand launch tip!

AIRBORNE AT THE SUMNERS PONDS MODEL SHOW

To be held on the weekend of June 18th and 19th the Sumners Pond 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
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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

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www.eagletreesystems.com

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www.zoomport.eu

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Dremel has added extra value to its three most popular corded Multi-tools with the launch of an innovative new EZ Wrap tool holder with a dedicated area for attachments, which can also be wall mounted, to make finding exactly what you need hassle free.
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www.dremel.co.uk

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www.powerbox-systems.com

New kits and accessories

IWATA PROFESSIONAL AIRBRUSH MAINTENANCE TOOL KIT

Assembling and reassembling airbrush nozzles, caps, needle packings, O-rings and air valves is now quick and easy. The kit comes with a two-sided Iwata Air Valve Guide Wrench, Soft Jaw Pliers, Needle Packing Screwdrivers (for 1.2 mm and 1.4 mm diameter needles), Nozzle Wrench, a protective Needle Tube and easy-to-follow instructions with diagrams. All of the items fit securely in the elastic straps within the soft-sided zippered case, with the case having extra room to carry up to three airbrushes. An inner, zipper pouch is ideal for containing small replacement parts. Available from mid-April.

www.airbrushes.com

MAXFORD USA HUGHES H-1

The new and improved version of the original H-1 stays true to the original design. Stable at both low and high speeds, it features concealed rudder and elevator controls, a newly developed Max Cowling fibreglass cowl, a magnetic battery hatch, spring loaded tail wheel and optional retractable landing gear. Included in the 50" wingspan kit are the pre-covered airframe, a pre-painted fibreglass cowl with dummy engine, and pre-painted plastic tail fairings. The retractable landing gear is assembled and installed.

www.macgregor.co.uk

FMS P40B FLYING TIGERS

This new 1400 mm P40 has absolutely nothing in common with the old version from FMS but shares the livery of the 980 mm P-40B Warhawk. This new model features the same ESC found in the other FMS 1400 mm warbirds, but this P-40B has a more optimised motor and prop. Additionally, a brand new twist and turn retract was developed specifically for this plane, along with the inclusion of 17 g metal gear servos throughout the model for maximum durability. The stable flying performance will rival any other warbird and the new high-magnification foam greatly reduces the flying weight.

ROCHOBBY MXS 3D

This aerobatic aeroplane is a fantastic new offering that is sure to please both intermediate and advanced 3D pilots. Easy to assemble, the rigid wing support system really allows pilots to put this plane through its paces. With a powerful 35-36 1250 KV brushless outrunner motor the MXS is virtually capable of any aerobatic/3D manoeuvre you can throw at it. With the attractive yellow and black paint scheme the RocHobby MXS will certainly gain attention at your local flying field in both looks and performance.

www.cmldistribution.co.uk

OPALE PARAMODELS MOTOR BRUSHLESS KIT

This motor and controller have been made especially for Opale Paramodels and has been thoroughly tested by the France based paramodel company. The motor/controller set has been completely assembled, so you just need to simply install it and connect – no soldering required. It is ideal for Power 1.1 and 1.8 Hybrid wings.

www.opale-paramodels.com

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NORTH AMERICAN T-28 TROJAN

Neville Hill assembles Seagull's 63 inch span ARTF model of the chunky US military trainer

A Short History Of The T-28 Trojan

The T-28 was a piston engine training aircraft used by the USAF and US Navy from 1950 onwards. It was also used as a counter insurgency aircraft during the Vietnam War.

The first Trojan flew on September 24th 1949 and was designed to replace the T-6 Texan. It was evaluated during 1950 by the 3200th Fighter Test Squadron as an advanced trainer and after exhaustive testing the aircraft was given the 'go ahead'.

It was used in a primary training role by the Navy well into the 1980s. There are many survivors today in museums around the world, with approximately 150 still airworthy. Between 1950 and 1957 over two thousand two hundred aircraft were built.

A chunky aeroplane like this one needs a generous size box!

Now To The Model

The T-28 being reviewed is manufactured by Seagull Models in the ARTF format that we have now come to expect of today's purchases, and was supplied by their UK distributor, J. Perkins. The main fuselage, wings and tail group are built from balsa and ply, and fully covered in matt silver and black heatshrink covering with all decals added.

The huge, very clear canopy comes complete with two pilots, although of different sizes. I could not understand this but when sitting in their office they somehow looked 'right'. A large cowling, with a moulding of a nine cylinder radial engine in the front, is complemented by a full set of fixed oleo undercarriage legs and matching wheels. A substantial aluminium wing dowel and a large bag of hardware and piano wire for the pushrods complete the package.

If you wish to power the model with an IC engine a tank and engine mount is supplied, or for electric a large ply motor mount and various other bits are provided.

Neatly finished wing panels come with the servo hatches, flaps and ailerons taped in place

A small amount of 'break out' is visible where the front wing incidence peg has been inserted

Trojan is finished in matt Oracover with decals already applied

The cleanly moulded canopy and factory painted fibreglass cowl are notable features of this fairly big model

There's plenty of space inside the cavernous fuselage for either an electric or IC installation

The wing panels are a tight fit in the cuffs on either side of the fuselage

A generous spread of good quality hardware

A few ice cream tubs provide temporary storage for the multitude of small parts

Upside down view of a flap hinge. This design gives plenty of movement

Neville fitted his own retaining rings, cut from fuel tubing. The control horns, pre-cut from epoxy board, are simply glued into slots in each control surface – works well!

Main undercarriage parts ready for fitting to each wing panel

Additional torque blocks are fitted on top of the retract mounts to enable fitting of the fixed undercarriage legs supplied in the kit

Manual

The assembly manual is clearly printed with small monochrome pictures. Some of the assembly instructions are fairly minimal but if you are competent to fly this aircraft you should have enough experience to build it. In two pictures Seagull's use of 'Epoxy and CA' seem to have gotten mixed up in translation.

There is lots of good advice about setting the C of G, control throws, preparation and pre-flight checks, which need to be taken note of. The fitting of retracts and an electric motor, if you choose to go this way, are also fully covered.

Following the assembly sequence in the manual proved to be fairly straightforward. A couple of areas made me think but were soon overcome.

Wings

The wings are built with flaps and ailerons, with two servos required for each. I liked the bottom hinged flaps, which allow the surfaces to come down as per full size. But I fixed some silicone fuel tubing over the hinges as I was concerned about them 'popping open'. Ailerons use the familiar 'furry Mylar' type of hinges fixed with thin CA. I found two positions where the slot was too wide and three or four applications of CA were required to secure them. The control horns are cut from fibreglass board and just need to be epoxied in position; some of their slots needed adjustment for them to fit.

The main undercarriage legs and fixtures are quite straightforward but need 2 mm pilot holes drilling for the 3 mm screws that fix it all in position. The undercarriage wing mounting blocks are from solid looking hardwood and should stand up well on our grass runway.

Check before you fix the legs in position that the sprung arms relative to the axle are the correct way round. The ones supplied with the review model were not and the axles needed to be swung round by 180°.

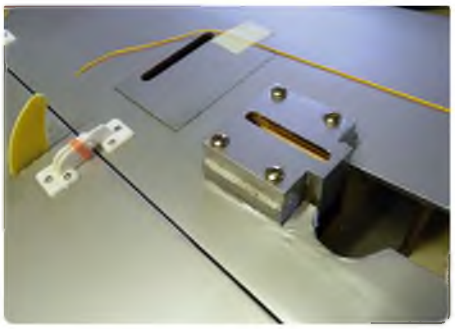
Thin plastic covers go over the apertures that would normally house the retracts, if fitted. Servos were easily fitted and the pushrods cut down to give correct aileron and flap movements.

Tail Group

All fitted snugly. Check for position and mark where the covering needs to be removed. I used my usual method with an old small soldering iron and just burnt through the covering without marking the balsa underneath; with luck this all comes away in one piece (see page 19). Recheck the fit and epoxy in position, checking again that nothing has moved. The fibreglass control horns were epoxied into the surfaces and allowed to set, one for the rudder and one in each half of the elevators.

Fuselage

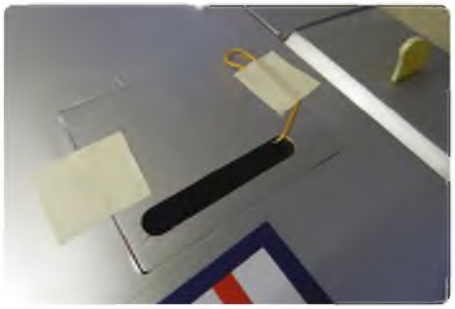
Standard servos were fitted for the rudder, elevator and throttle. The cut outs needed a quick application of a file to give the servos a nice snug fit. Slide the pushrods in from the rear, with the clevis ends, lock nuts and silicone keepers fitted, through the pre-installed pushrod outers. There are two pushrods for the elevators, connected using a small three-way steel block, which is locked into place on the wires with three grub screws.



Torque blocks screwed down and ready to accept the oleo legs

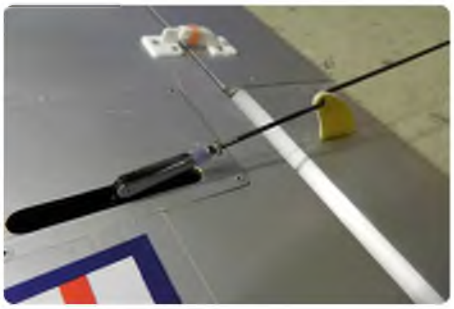
Make sure the legs are fitted the correct way around. The trailing links need to be facing the rear!

That's better! The final effect with the dummy wheel doors fitted to the main legs



Wing servo hatches are taped up with pull strings with which to pull through the servo leads

Flap and aileron servos are mounted to the back of the hatches. Note the additional webs to strengthen the mounting lugs



Wing pushrods are short and slop free. Neville used Z-bends instead of the swing keepers supplied; the pushrod shown still needs to be cut down to length

One pushrod is used for the rudder. With the servos centred, mark the position of the retaining bends on the wires where they overlap the holes in the servo arms. Then withdraw the pushrods and put in the retaining bends for the swing keepers supplied.

But you might say, with the ends of the wires now bent, how do they go back in? Easy… Take off the parts fitted to the control surface ends and just thread them back through the outers, this time from the inside of the fuselage, and re-fix the clevises etc. Job's a good one and all the rods are the correct lengths! The wire was quite soft and easy to bend so a small vice and pliers is all that is required. However, I used 'Z' bends instead of swing keepers as I have the proper tool to form these.

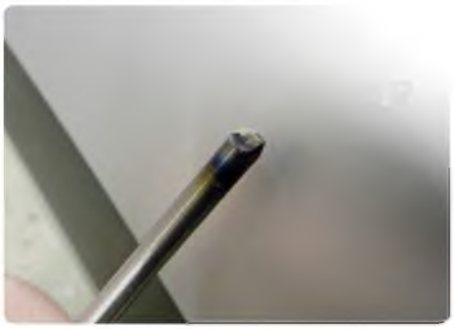
Then fit all the radio gear and position the battery as far forward as it will go. There is plenty of room within the cavernous fuselage for the receiver battery, fuel tank, Rx and, if going electric, the ESC and LiPo.

Top Tip 1

When setting up the pushrods for the control surfaces I find it useful to keep these in the correct position with a bulldog clip onto the fixed surface.

Bulldog clips were used to keep the surfaces at neutral while the pushrods were being made up to the correct lengths

The IC engine bearers fitted the pre-installed blind nuts accurately



Grinding a chisel edge on the end of a length of piano wire allows it to be used as a long drill

The piano wire 'drill' is perfect for making lined up holes in the front fuselage formers so that the throttle pushrod can pass through

The fuel tank supplied looks a little lost in the voluminous front fuselage

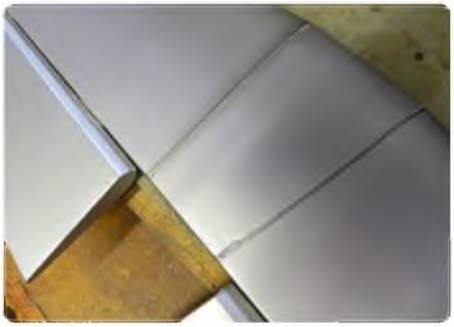
Completed engine installation

Long lengths of broad masking tape can be used to locate the position of any engine parts that need to poke out of the cowling

The marked hole can be easily transferred to the cowl for cutting out

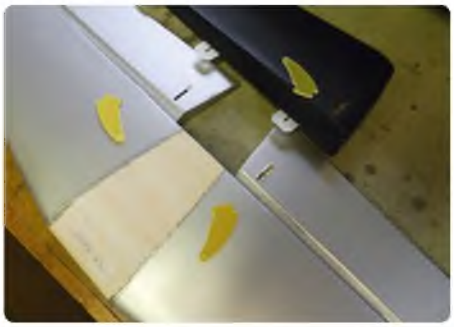
Cutting out some of the gaps between the dummy radial cylinders allows cooling air to enter the engine bay

The tailplane mount provides a generous surface area for gluing on the horizontal stabiliser



A small soldering iron can be used to score through the covering film without damaging the wood underneath

The unwanted covering can then be peeled away prior to applying glue to fix the tailplane in place



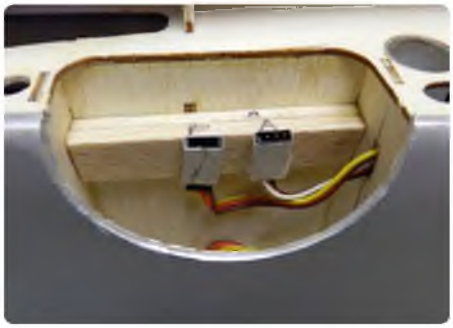
The elevator and rudders horns are prepared prior to gluing in their slots

The tailplane and fin are glued in place - after checking and double checking!

Epoxy horns and close fitting metal clevises result in slop free tail pushrods

Dual elevator pushrods are connected to the servo using a triple connector block

Despite being different scales the pilots look right when covered by the canopy



Some scrap balsa was used inside the wheel bays to make up fixed connecting points for the aileron and flap extension leads

Engine

The manual shows a petrol engine and although I have a couple, I had nothing with the correct power output. Electric appealed to me but the cost of the gear was quite high so I decided to use a new OS FS 91S II glow that I had on the top shelf in my workshop. This was at the top of the given 10 to 15 cc range.

The engine mount fits spot-on to the pre-installed 'T' nuts in sidewinder configuration. Position the engine on the mount, with its drive washer 145 mm from the firewall (as per the notes given in the manual) and drill for the engine retaining bolts.

Mark the position for the throttle pushrod and drill through all the bulkheads. Finally, fit the fuel tank.

Top Tip 2

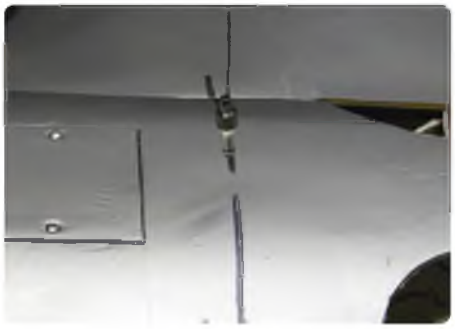
To drill through all of the bulkheads and formers to fit pushrods you need a very long drill. I use a length of piano wire, or silver steel, of the diameter required, with a chisel point ground on the end and attached to a power drill. This can be accurately positioned and will drill through balsa or plywood very easily. But be careful on 'breaking through' ply as it can push out the outer lamination.

Top Tip 3

Set the engine position from the firewall by fixing a 6" or 150 mm rule width wise between the prop washer and the prop nut, just nipped up. This can then be swung around to any position to measure back to the firewall accurately.

Lightly clamping a short steel rule between the prop washer and prop driver forms a straight edge against which the correct depth for the engine can be accurately set

Neville used a rope sling to accurately set up the recommended Centre of Gravity



A spare fuel pipe nipple acts as a plumb bob to balance the model on the marked C of G position

Close to a pound of lead was required to get the balance point correct, probably due to the lightweight OS engine used. A petrol engine would probably need a lot less weight

The matt covering provides a realistic finish

Engine Cowling

Cut out for the engine rocker cover, exhaust, nose wheel positions and needle valve, which I do with the aid of masking tape fixed to the fuselage. The positions are marked and then transferred to the cowling. This is always very fiddly but just remove a bit of material at a time so the holes can be fitted accurately around the protruding bits.

For additional cooling I opened up every other space from between the nine cylinder radial moulding at the front. Just as important, don't forget what goes in must come out, so I opened up the nose leg hole position to give a good exit for cooling air.

Covering

Some of the areas could have been better covered but generally it was okay and more importantly there was no sagging or bubbling that needed the application of the heat iron. I'm not sure what material the covering is manufactured from but it was very thick and it required a new blade in the scalpel to cut cleanly. It had been matted off by some sort of clear spray, dusted over, which is very 'bitty' to the touch. I have never experienced any surface like it before, but it looked very effective and certainly took the gloss finish off.

The build was looking good and with three days to Christmas I hoped to get it finished before I ate and drank too much and lost interest with working in a less-than-warm shed. Of course, I never did get round to finishing it before Christmas but before the New Year I made a determined effort...

The Fiddly Bits

The on/off switch is fitted into a pre-cut recess in the fuselage side, which is good as it puts it out of danger of being 'switched on' or 'off' when not intended.

Pilots were epoxied in position and when set the canopy was offered up. It fitted like a glove. I could have glued it in position but decided to use screws as I may wish to remove it for maintenance. As mentioned earlier, although the pilots were different sizes, when fitted and the canopy installed they looked just right.

All servos leads were plugged in, the Rx and battery were fitted and we were almost finished.

Attaching the wings is best done using a model stand as the fuselage is quite heavy and with fixed wheels it is difficult to hold. Fitting the nylon wing bolts is fiddly; with very little room between the formers and large fingers it almost proved to be impossible, but we eventually got there. Where the wings fit in the fuselage it was very tight and needed some fettling, but better this way than the wings being loose. Of course, the first time I fitted the wings I found that I had forgotten to plug in the aileron and flap servos, so I had to re-fit the wings (and those screws!) all over again.

When checking the C of G my usual Great Planes balancer was not man enough for the weight, although it is quoted as taking up to 10 lb. So out came the ropes and slings so that I could hang the T-28 from the roof of my shed. I found that I needed to put almost 1 lb of weight in the front, probably due to the smaller four-stroke engine being lighter than the petrol engine used in the manual. Fortunately there is plenty of room on the firewall to attach this.

I decided that fiddling around fitting aileron and flap plugs could be made easier if done after the wings were fitted in position. So I added some angled strips of balsa into the underside of the fuselage, which was easily accessible, and fixed the female plugs on to these with CA. All that is required is to pull the male plugs out of the wings and push them into the female connectors (see previous page). Easy!

Overall Opinion

The build of the T-28 was fairly straightforward. All hardware supplied was fit for purpose and the glued up structure seemed to be well put together and glued. The additional items, like the two pilots, fuel tank and wheels etc. were to a good standard. I also liked the hinges used on the flaps.

Things that could be a bit better include the two hinge slots in one wing that were oversize. And the wing retaining bolts are very difficult

Ready for her maiden flight. All we need now is for the local flying fields to dry up!

to get to in order to tighten them up, but they are secure when locked up.

The fixed oleo legs supplied look the part but I may fit retracts at a later date as I think they will definitely enhance the flying appearance.

Editor's Note

As I usually undertake the first flight of Neville's review models, he deposited the Trojan with me before flying off for a well deserved long holiday 'Down Under'. Recent wet weather has however conspired against me and it has proved impossible to undertake the first flights of this solidly built warbird from the local flying strips, which are currently more akin to wetland bogs!

My apologies then for deferring the concluding part of this review until things dry out a bit... **RCMW**

MODEL WORLD

MODEL INFORMATION

NAME:	North American T-28 Trojan
MANUFACTURER:	Seagull Models
DISTRIBUTOR:	J. Perkins Distribution
WEBSITE:	www.jperkins.com/north-american-t-28-trojan-sea-258
PRICE:	£259.99 SRP
MODEL TYPE:	Semi-scale ARTF
CONSTRUCTION:	Built up, CNC cut balsa and ply, with matt Oracover covering
PARTS SUPPLIED:	Airframe, with painted fibreglass cowl, two piece wing, oleo-style fixed tricycle undercarriage with retract option, bottom-hinged flaps
PARTS REQUIRED:	10-15 c glow/petrol engine or 1200 to 1500 Watt electric motor, five channel (min) transmitter and receiver, propeller, seven standard servos (for IC version)

MODEL SPECIFICATION

ENGINE USED:	OS 90 4-stroke
WINGSPAN:	1600 mm (63.0")
LENGTH:	1287 mm (50.7")
WEIGHT:	4.0 kg (8.8-9.9 lb)

R/C FUNCTIONS

1: Throttle
2: Ailerons (two servos)
3: Elevator (with split pushrod for individual adjustment)
4: Rudder (coupled to nosewheel so use a heavy-duty servo)
5: Flaps (two servos)

PARROT BEBOP 2

The Editor takes Parrot's latest quadcopter for a spin

***Right:** Bebop 2 comes in a large flip top carry case*

***Right:** The drone sits snugly in its protective tray. The Skycontroller is protected by a similar layer of packaging underneath*

I have been fortunate to fly pretty much every quadcopter that the innovative technology company, Parrot S.A. have produced, starting with the original AR.Drone, then flight testing the AR.Drone 2 Power Edition and the diminutive Rolling Spider in 2014, and finishing early last year with the original Bebop

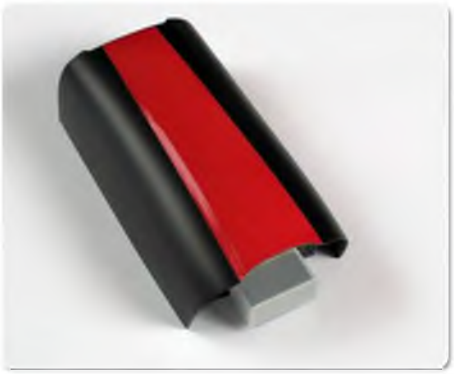
All have flown exceptionally well and they are usually controlled by a smart device (phone or tablet) rather than a traditional R/C transmitter. The most intuitive way to operate them is by using the smart device's on-board accelerometer, tilting it to move the drone sideways or back and forth.

For the original Bebop, Parrot sensibly decided that it would be wise to match their new quadcopter with an R/C style controller, although in their case it more resembles a continental 'tray' style transmitter in size rather than the more common 'cuddle box' Tx's used here in the UK. This super size device is called a Skycontroller, which makes the whole experience a lot more akin to flying a conventional R/C model.

Our review sample, loaned to us by Flying Toys, Parrot's long-standing distributor in the UK, was supplied in a big box that contained both a Bebop 2 drone and a Black Skycontroller. However, like all previous Parrot quads it is also possible to pilot the Bebop using a smart device alone, via the Free Flight 3 app. If piloted this way then the interface is the same as we have described in previous Parrot reviews so I will not dwell on Free Flight 3 too much other than to mention functions that relate to the Bebop/ Skycontroller combo.

Big Box

Upon opening the large flip top box the Bebop 2 quadcopter is revealed, nestled inside an 'egg box' style protective tray.



The combo includes two of these 2700 mAh LiPo packs. A soft cover over the contacts helps stop short circuits whilst in storage and transit

This box contains a wall charger with international plug adapters, a micro USB lead for connecting the drone to a computer and a prop removal tool

The second small box contains a well-padded neckstrap, quick start guides, the Skycontroller LiPo and a 7-inch tablet adapter

Right at the bottom of the carry case is found a large flat box that contains a two-piece sunshade, a holder for a 7 inch tablet and a set of spare propellers

A long, two-piece sunshade keeps glare off the tablet's screen when flying outside

Underneath this tray is another layer of similar packaging, this time shaped to safely encompass the impressive Skycontroller. After removing the Bebop 2 and the Skycontroller a set of three boxes is revealed, two small ones and a large flat one at the bottom of the main box.

The first small box contains a tool for changing props, a wall charger (with four international plug converters, including one for a UK style 3-pin plug) and a Micro USB cable with which to connect the Bebop 2 to a computer to download images.

The second small box contains a well padded neck strap (a vital piece of equipment due to the controller's size and weight!), an adapter for fitting 7 inch tablets to the Skycontroller, quick start guides for both the Bebop 2 and the Skycontroller, and a 2700 mAh hard cased LiPo battery pack to power the controller. A second 2700 mAh LiPo is supplied to power the drone and this can be found piggy-backed on the back of the Bebop 2.

Inside the larger flat box are found a two-part sunshade for covering a tablet screen and a hard foam adapter so that the sunshade can be used with smaller tablets. There is also a set of four spare propellers

Bebop 2

Available in either red or white trim, the body of the Bebop 2 sits comfortably across the palm of one hand with the motor booms jutting out each side; it is 382 mm wide, 328 mm long and stands 89 mm high. It is slightly larger than the original Bebop and is now supplied without the hull protectors. These were intended to be fitted when flying indoors to protect the drone from damage if it hit furniture or walls etc. The 3-blade propellers are however made from flexible material with safety in mind and they will lock if they make contact with any obstacles. The downloadable instructions give plenty of flight safety advice when flying in the open air so it seems pretty clear that Bebop 2 is primarily meant for flying outdoors, when its advanced fisheye camera comes to the fore.

Bebop 2 still uses a 14 mega-pixel camera with a 180 degree fisheye lens, but Parrot say that it is a new brighter type that provides higher clarity in low light conditions. The bulbous lens is neatly mounted at the front of the main body, where it is protected by a slip on lens cover.

Bebop 2's main chassis, which incorporates the camera and carries the LiPo battery, is soft mounted using four rubber grommets. This, combined with 3-axis stabilisation, provides vibration free images and helps ensure that the footage remains stable even when the drone is tilted or encounters turbulence. The video resolution is 1920 x 1080p at 30 fps using H264 encoding, while the photos have an increased resolution of 4096 x 3072p.

I especially liked the ability of the original Bebop to record images in RAW format and this continues with the revised drone. When post processed using a photo-editing package like Adobe Camera Raw or Adobe Lightroom far more detail can be teased out of an image file than is the case with the more common JPEG format. And there's plenty of room for videos and pictures too within the Bebop 2's 8 GB flash memory, which is the same as the original Bebop.

Besides the impressive camera specs Bebop 2 is fitted with an equally impressive control system. An embedded GPS module provides an automatic 'return home' function and assists with high altitude flight control. The Bebop generates its own WiFi network via the 2.4 and 5 GHz bands in MIMO (multiple-input and multiple-output) using two sets of double dipolar antennas; there's a drop down menu in the settings menu so that you can select the country you fly in and the Bebop will automatically select the correct band to fly on, 2.4 GHz in the case of the UK.

MIMO is a method used to multiply the capacity of a radio link using multiple transmitter and receiver antennas to exploit multi-path propagation. When controlled by a smart device the Bebop has a range

With its bulbous fisheye lens peeking out front this compact drone has potential for some serious aerial photography

Bebop 2 has a new 180° fisheye lens that is more tilted towards the ground than the original so it captures more of the ground and less sky. The lens also catches more light for better video quality in low light conditions

The battery clips on to the rear of the chassis. The power switch doubles up as a large, bright red flashing taillight that indicates that the drone is communicating with the Skycontroller or smart device

Pairs of large grommets front and rear provide effective isolation of the camera from motor vibrations

The fisheye lens is protected by a slip on cover

The props mount directly to the brushless motors and lock onto the three screw-heads. The motors have a higher winding density and extra reinforcements, giving better shock resistance

Spare props are supplied, along with a small hand tool to twist them off. Bebop 2 has 6" propellers versus the 5.5" props on the Bebop 1, which Parrot claim gives it over 10% more thrust

up to 300 metres, however when coupled with the Skycontroller the range is extended considerably and it can be flown at a distance of up to 2 kilometres (1.24 miles), although you would have to be pretty brave to push it that far!

The airframe consists of a robust and flexible central body, with reinforced individual arms. Power is supplied by four brushless outrunner motors. The propellers are mounted directly above each motor and are easy to change with a simple twist of the tool supplied.

The original Bebop was powered using a 1200 mAh hard case LiPo battery pack but this has been more than doubled for the new version. The new hard packs are now of 2700 mAh capacity and come supplied with a soft cover over the contacts to prevent short circuits when not in use. The larger packs offer a generous 25 minutes flight time. We didn't time this during our initial flight-testing but we did notice that the Skycontroller is quite economical with its battery pack, which is of the same design and capacity. It is therefore possible to get even more flight time by using the Skycontroller's LiPo as a back-up and flying the Bebop 2 using a smart device.

Besides much increased battery life the LiPo also features an improved method of retention. The original was a push fit and it was held in place with a simple hook and loop strap. The new style pack is also a push fit but it now clips firmly into place.

Black Skycontroller

Besides the convenience of R/C style stick operation and the extended range previously mentioned the Skycontroller also features a small joystick built into the top of the right hand grip with which it is possible to control the orientation of the fisheye camera, effectively giving you pan and tilt control, whilst the Bebop remains in the same orientation during flight.

A similar small joystick on the left hand grip allows navigation of the Free Flight 3 app when the Bebop is used with FPV glasses.

Rather than using goggles I flew the Bebop 2 with an iPad, which I used to stream live video back to the Skycontroller. The handgrips are widely spaced to allow a full size tablet to

Futuristic Black Skycontroller is dominated by the widely spaced sticks and handgrips, and the huge dual band MIMO antenna

Right hand stick with the Take Off/Landing button below left and the Return Home button on the right. The Emergency Landing button in the centre of the grip has now been replaced with a handy button that re-centres the camera

The camera joystick and shutter button is all in one and mounted on the shoulder of the right stick

Left hand stick unit. The two buttons below the stick allow for screen changes when wearing FPV glasses. The button with the red dot is the video recording switch

This left shoulder mounted button provides app navigation when using FPV goggles

be clamped in place. Alternatively, you can fit a 7-inch tablet using the foam adapter tray supplied or simply use the upper compartment of the clamping system to fit a smartphone.

After a tablet is fitted the clamp can be tightened up using the locking screw on the back of the controller. A similar locking screw allows the large dual band MIMO antenna fitted to the top of the unit to be orientated for best WiFi reception.

One of the problems when using a smartphone or tablet to monitor the live video stream is the glare that makes the screen difficult to see when flying outside, so Parrot supply a two-piece sunshade cover to eliminate this.

The original Skycontroller was supplied with a 1200 mAh battery of the same style as those used in the Bebop drone, so they were interchangeable. Likewise, the Bebop 2 and the new Black Skycontroller use the same 2700 mAh LiPo packs. Each pack should give about 25 minutes flying time when fitted to the Bebop and several hours worth of operation when fitted to the Skycontroller.

Apart from the larger battery pack the new Black Skycontroller is much the same as the original coloured version. However, I did notice that the moulded halves of the handgrips do not fit together quite so well as the original one we tested and there is a definite rough edge to the grips, however this is not noticeable when the device is in use.

Let's Bebop!

After charging the pair of batteries it was time to fly the Bebop 2.

After switching on the Bebop and the Skycontroller they will connect automatically and are ready to fly in stand-alone mode. However, if you want to view things on your smart device then go to the Settings menu of your device and select the Skycontroller WiFi network. You can then launch the Free Flight 3 app and the camera view will appear on the screen.

If you have flown a Parrot drone before then the buttons on the Skycontroller will be familiar as they are physical versions of the virtual buttons on the Free Flight app screen. The first one you need to use is the Take Off/Landing button on the right grip. Pressing this will automatically cause the Bebop to start its motors and to lift off into a stable hover. Pressing it again will cause the drone to drop to the floor for an automatic landing.

The original Skycontroller had an Emergency Landing button situated just below the right stick, which cut the motors in order to force the drone out of the sky. I managed to press this by mistake the first time I used the transmitter but luckily the Bebop dropped just a couple of feet onto a carpeted floor so no damage was done. I guess I was not the only pilot to do this as the Emergency button has now been replaced by a handy button that re-centres the camera. Emergency landings can still be carried out but you will need to hit the virtual button at the top of the tablet screen to initiate it.

Alongside the Take Off button, just below the right stick, is the Return To Starting Point button. Pressing this will cause the drone to fly back at a minimum height of twenty metres to the GPS location where it was first connected at the start of a flying session. Once there it

On the arm that connects the centre of the unit to the right handgrip are battery level indicators for both the Bebop and the Skycontroller. The left arm has a series of lights that show the strength of the WiFi signal and when the camera is recording video

Data connections on the side of the Skycontroller. The HDMI port can be used to connect optional FPV goggles

Left & above: Back panel showing the battery mount and the sliders for the adjustable tablet mount. The antenna orientation can be changed and locked in place using the top locking screw

will descend and hover at two metres, ready for you to take back control for landing.

Staying with the right grip, up on its top shoulder is found the camera button, which is pressed to take a picture, or moved to alter the sweep of the fisheye lens. And down on the arm that connects the centre of the unit to the grip are battery level indicators for both the Bebop and the Skycontroller.

Over now to the left stick and grip, the shoulder mounted joystick allows navigation of the Skycontroller app when flying with FPV glasses. Likewise the two buttons below the left stick are also only used when in FPV mode; they allow the user to return to the previous screen of the Skycontroller app, or to return to the app's settings menu.

Of more interest, when flying with a smart device, is the Video Record button. This is mounted in the middle of the grip and pressing it will cause filming to start, which is confirmed by a the REC LED lighting up on the arm that connects the centre of the unit to the left grip. Also on this arm are a series of lights that show the strength of the WiFi signal.

The Skycontroller is probably best described as being supplied in Mode 2, where the left stick controls the throttle to raise and lower the model, as well as controlling yaw, much like the rudder of an aircraft. The only difference is that the throttle stick has a return spring and not a ratchet, as you don't need to fly these drones off the ground. The right stick controls pitch (backwards and forwards) and roll (banking left or right). If you don't like the default stick and button settings then you can change them using the Skycontroller Settings menu. This is particularly useful if you want to change the Stick Mode.

The Skycontroller is a heavy beast, especially when a tablet is clamped between the sticks so I found the included neck strap to be a 'must use' accessory. The stick units are widely spaced but the handgrips on which they are situated fall comfortably to hand. Like a lot of UK model flyers I prefer to use 'cuddle box' style Tx's, however the Skycontroller will feel more familiar to those who prefer to fly their models with rectangular, continental style transmitters.

To prepare the Bebop for flight without using a smart device to monitor the view from the camera, simply switch both the Skycontroller and Bebop on and after a short while they will automatically connect. The Bebop intialises quite quickly, but the Skycontroller takes a bit more time to cycle through its start up procedure. Eventually the LED monitor panels built into the arms of the unit settle down and if all is well they will each display four bright white LEDs. On the left arm is the WiFi signal strength monitor, whilst on the right arm are battery monitors for both the Skycontroller and the Bebop drone.

If you want to see what the Bebop is looking at in flight then you need to clamp a smart phone or tablet between the sticks. You then get to see the view from the camera via the Free Flight app.

Skycontroller provides a sturdy support for a large tablet and so gives a much better FPV experience than transmitters with small built-in screens

Still JPEG images show a bit of softness and distortion at the edges due to the fisheye lens. But the video is processed to remove this, so the horizons are almost flat and the footage remains level, even when the Bebop is banked at an angle to counteract strong winds

A view of the new Traplet Towers taken on the first flight before changing image settings

The author takes a high level selfie with the camera set to 180 degree fisheye mode

Underside view giving a good view of the large, red anti-vibration grommets

Bebop 2 contains a new Ublox Neo 8M GPS chip. The number of maximum visible satellites has also been increased to 19, compared to 12 for the original drone. Increased GPS reliability is an advantage for the automated flight modes such as Return to Home and Flight Plan, as well as high altitude stability

The switch on sequence is a little bit different in that a WiFi connection is made first between the Skycontroller and the smart device. You do this by selecting the Skycontroller network from the WiFi network listing the settings menu of your phone or tablet. When the Free Flight app is launched a WiFi Manager window appears and this shows a list of available networks. After the Bebop has initialised it will appear on the list and should connect automatically to give a First Person View from the drone's camera to your smart device's screen – provided you've remembered to take the lens cap off!

Continued on page 96

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SPY HAWK

John Stennard gets a First Person View with the latest Spy Hawk from Hubsan, the H301S

I was lucky to have the opportunity to test the original Hubsan Spy Hawk H301. At the time this was a very innovative and unique model as it brought the opportunity to experience FPV flight to all model flyers rather than just those with a specific interest in FPV and adequate funding. The whole system – the stabilisation, the camera and the special screen equipped transmitter – all worked well.

This very practical system introduced me to flying with a 'screen view' and set a high standard for a 'off the shelf' FPV model aircraft. There is a big difference between FPV with goggles and viewing a screen but what the Tx screen view certainly does very well is give the pilot an excellent 'bird's eye' view of the landscape. An advantage is that the pilot can still be aware of what else is going on around the flying zone. Some great flying with the Spy Hawk led me back into FPV and I'm now an enthusiast.

So I was particularly pleased when a big box arrived courtesy of CML Distribution containing the very latest version of the Spy Hawk, the H301S. It was going to be interesting to see what Hubsan had done to upgrade the original's very successful design.

Starting on the outside the model box is big because the new Spy Hawk is a larger model with no gluing required to assemble it. The manual says it is 90% ready. The fuselage is complete with tailplane and fin in place and the one-piece wing and all the other component parts are contained in a particularly rigid and strong foam inner carton. Unpacking reveals the distinctive Hubsan Tx with the 2.4 GHz and 5.8 GHz antennas. The 5.4 GHz one was a bit of a surprise as it's the flat panel type - more about this later.

A mains AC/DC power adapter is supplied with a dedicated charger for the 2S 1300 15C LiPo flight pack that is fitted with a standard JST red connector. Finally, there is a micro SD card, a set of self-adhesive decals and a manual.

Before moving on I'll take a quick look at the main changes between the original H301 and the H301S. The Spy Hawk H301 had a wingspan of 840 mm (33 in) and a length of 620 mm (24.4 in); the new H301S has a wingspan of 1000 mm (39.37 in) and a length of 750 mm (29.5 in). The original used an N60 brushed motor with a 2S 450 LiPo while the new version has an 1812, 3200 KV brushless motor with a 12 A ESC and 2S 1300 LiPo. The flying weight of the original was 175 g (6.2 oz) and for the new version it is 355 g (12.52 oz). One very useful addition is a strip of green and red LEDs under the appropriate wing.

The special transmitter. It's worth making sure you understand all the functions

LiPo flight pack with its charger

The screen is easy to view, particularly with the shade in place

The servo and special Rx area

The video control, card slot and battery area are easy to access

Nose mounted camera is fitted with a protective cover when not in use

In addition to these differences the new model has a better camera with a 120° wide angle Field Of View (FOV) and 1920 x 1080 resolution. It includes a video record facility using a micro Class 6 SDHC card. The video can be switched on and off in flight. In addition to the automatic stability facility there is an autopilot, a GPS and a RTH (return to home) function.

Looking Closer

This is where life gets interesting as I start to look at the H301S in more detail. The model has all the R/C gear in place and the model uses four 3.7 g servos. Starting at the nose the camera has a protective cover and the nose area is strengthened with a rigid plastic moulding, which stretches back under the front fuselage. Inside the cockpit behind the camera there is the panel for the SD card, a video on/off switch, an output socket and a nicely positive battery holder.

Moving back to the Rx module, this has eight standard connectors, with the elevator and rudder servos are already plugged in. Two micro sockets are also provided for the connectors to the wing LED strips. There are two power type leads with red JST connectors and no identification, but the manual shows that the short one connects to the ESC lead. The ESC is inside the pusher motor housing, while the longer is the power lead for connection to the flight pack.

The wing is fitted by first plugging in the throttle, aileron and wing LED connectors into the Rx module and then snapping the wing in place. The instructions warn to 'sort out the wires'! Snapping actually means that the two plastic pins with split sprung ends on the wing are located in tubes in the fuselage and the wing is pushed onto the fuselage until the ends of the pins exit the underside of the fuselage. When they exit the split ends 'pop' open and locate the wing in place. Care needs to be taken to ensure that the ends have fully sprung open or the wing will not be secure.

Looking at the Tx it looks more complex than it really is. Of the two rotary and four toggle switches along the top only one is actually 'live' and has a use! If you have handled the original Spy Hawk Tx then this one will be very familiar. The 3.5 in screen is easy to view and an effective, clip-on, anti-glare shield is provided.

Under-wing LED strips are a very good idea and help with orientation

A much more powerful motor is fitted to this version of the Spyhawk

Spy Hawk flies away smoothly from a gentle hand launch

The first job for me was to switch from Mode 2 to Mode 1. This is covered in the manual and is very easily done. The 2.4 GHz and 5.8 GHz antennas are screwed in place and as previously mentioned the 5.8 GHz downlink antenna is a flat panel type. When switching on the screen shows the Tx voltage and the running timer until the 'Enter' switch is pressed. The screen display now displays servo reversing, sensitivity, expert mode, stick mode and the 5.8 GHz frequency. The 5.8 GHz frequency can be changed between 5725 MHz – 5865 MHz to match other 5.8 GHz devices like goggles and display monitors.

I found I could pair both my Diversity monitor and FatShark goggles with the 5.8 GHz transmission after selecting an appropriate channel.

When the Spy Hawk flight battery is connected the camera comes alive and the Tx screen displays lots of additional information. It is not recommended for the camera to work for more than 2 minutes with the model at rest as there is a danger of overheating. Cooling is clearly very important and there are cooling vents for the camera module that must not be blocked.

Working down the left side of the screen at the top is the GPS strength indicator. A figure of at least six is required and on my first flight it registered 11. Next down is the compass reading, the roll rate indicator and pitch rate indicator. Down from that is the speed in m/s, the distance and altitude, which is quite a lot of on-screen information! Down the right hand side there is the Tx battery pack voltage followed by the video recording duration and the flight pack voltage.

With the Tx examined there were two things to do before flying. One was to put the self-adhesive decals on the model and the other to fully check out the system.

The underwing LEDs show up clearly even on a sunny day

Pre-Flight Preparations

Once the Tx is powered up and the flight pack is connected the camera picture and on screen information tells you the system is working. In order for the autopilot/stabilisation function to work the pitch and roll values must be 5° to -5°. If this value is not correct a calibration must be carried out, but mine were correct.

The auto stabilisation can be switched on and off in flight by pressing the Exit button. The Electronic compass must also be checked and if not correct this must be calibrated; again mine was spot on. The GPS is only essential for the Return To Home (RTH) function. This operates automatically if the Tx signal is lost or the battery voltage is low. The FPV 5.8 GHz antenna on the model is a short wire which needs to be positioned at 90° to the fuselage, pointing straight down while the receiving 5.4 GHz antenna on the Tx should be bent so that the plate is virtually horizontal.

Using this system the video distance is reckoned to be around 1000 metres. Now clearly this is well outside visual range, which for a model of this size is likely to be around 200 m. The idea of the plate antenna is that as you will be looking at the model when flying so the antenna is going to be in the best position for receiving the signal. This does however make me wonder about the situation if the pilot is using goggles. In this situation the pilot does not face the model very often and the model could be both low and behind the pilot. I will check this out later.

The manual did not mention on screen icons like the altitude, distance and speed so I will have to wait until I fly the model to see what they register. One thing I did notice was that with the model level the elevator is set with a noticeable amount of up trim. I assume this is deliberate and may be required for the automatic landing feature.

Sky Hawk Airborne

A last minute look at the manual, under '6.3 Launch the Plane' made me think. Pusher electric gliders are normally very benign aircraft so I was slightly surprised to read *'push the throttle to the upmost, throw the Air Plane with your most strength, hold down the*

The camera gives a nice view of the surrounding South Gloucestershire countryside

Auto stabilisation is really effective and a real help in achieving smooth flying for camera work

The road looks like an ideal runway but it is rough so it's safer to head for the grass when belly landing

Turning onto finals

elevator (stick), then release it after the Air Plane reach a certain height'. I was pretty sure that this rather drastic launch technique was OTT so opted for my usual style.

With all the systems working a gentle launch at 2/3 power saw the Sky Hawk climbing away happily with absolutely no extra inputs from me. The model proved delightful to pilot with the auto stabilisation holding the model straight and level.

The big advantage with this system is that the screen can be viewed knowing that the model is just going to carry on flying in a perfectly stable attitude. The clip-on anti-glare shield works well and can be folded shut and left on the Tx; it also then acts as a screen protector.

It seems unlikely that you would want to fly the Spy Hawk as though it's a hotliner but if you switch off the auto-stability you can really notice the difference in control response. The automatic landing function works well but if you were in a tight space you might prefer to choose a landing style. Given adequate room, if you point the model in the required direction and reduce to throttle to around 25% the Spy Hawk will do a perfect landing. The under wing LEDs showed up really well and help to orientate the model.

On my next trip out with the H301S I also wanted to check the screen readings and try flying with FPV goggles. All three functions worked perfectly and I noted a slow speed of 14.5 kph (9 mph) and a full power downwind pass showed 57.6 kph (36 mph), these are conversions of the m/sec readings shown on the screen. The compass also worked perfectly and I guess if you are capable you could use it for navigation.

I fitted a 16GB micro SD card and my video test flight of around 10 minutes only used up 752MB. The quality of the video proved to be very good and the stills I took from it were all 900 KB. When the model is flying level the horizon line is horizontal but in other attitudes the horizon curves in different amounts dependent on the attitude of the model; this is to be expected. On this occasion the wind was quite strong but the Spy Hawk handled it easily, helped by the stabilisation system.

The stable flight allowed me to view the screen regularly and look at the altitude, distance reading and speed in addition to admiring the landscape. This model is really at home as an aerial viewing platform. Wearing my Fat Shark FPV goggles the Spy Hawk proved to be a delight to fly and I found no problem at all with reception from the flat panel 5.8 GHz receiver antenna.

Final Thoughts

When you consider that you are getting a powered glider with an excellent performance, which includes an FPV system, the Spy Hawk really is good value for money. If you want to hover and take photos then a multirotor copter is the best solution. But if you want an aircraft piloting experience and aerial photos then the Spy Hawk is ideal. You can fly comfortably with and in amongst other model aircraft and explore your locality from the air virtually silently. The Spy Hawk really is a very well designed and capable model with an excellent performance and it offers an ideal introduction to FPV aircraft.

RCMW

Auto landing is a useful feature and works well

If you switch off the auto-stability you can really notice the difference in control response

A farewell snapshot. The height of the model can be gauged by the size of the road shown in previous photographs

Wearing my Fat Shark FPV goggles the Spy Hawk proved to be a delight to fly

RC MODEL WORLD

MODEL INFORMATION

NAME:	Spy Hawk FPV RTF (H301S)
MANUFACTURER:	Hubsan
DISTRIBUTOR:	CML Distribution Ltd
PRICE UK:	£339.99
MODEL TYPE:	Electric glider with FPV and stabilisation
MOTOR FITTED:	18122 3200 KV brushless
ESC FITTED:	12 A
BATTERY REQUIRED:	7.4 V (3S) 1300 mAh LiPo
CONSTRUCTION:	Moulded expanded foam
EXPERIENCE LEVEL:	Intermediate

SPECIFICATIONS

WINGSPAN:	1000 mm (39.375 in)
LENGTH:	750 mm (29.5 in)
FLYING WEIGHT:	355 g (12.25 oz)
FLIGHT DURATION:	20-30 minutes

R/C FUNCTIONS

1: Aileron
2: Elevator
3: Throttle
4: Rudder
5: Video on/off
6: Stabilisation on/off

DISLIKES

- The manual does not cover all the screen readouts
- The same button is used for the video on/off and menu selection. If pressed for more than 1 second the screen will show the menu and this disables the controls. Pressing exit immediately restores control but care has to be taken when flying and switching the video on/off

LIKES

- Very well made and handles beautifully
- Stabilisation is very effective and the camera provides a good image quality
- Tx screen display is comprehensive and easy to read
- Flying with goggles is easy and provides a great FPV piloting experience

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LITTLE HINTS

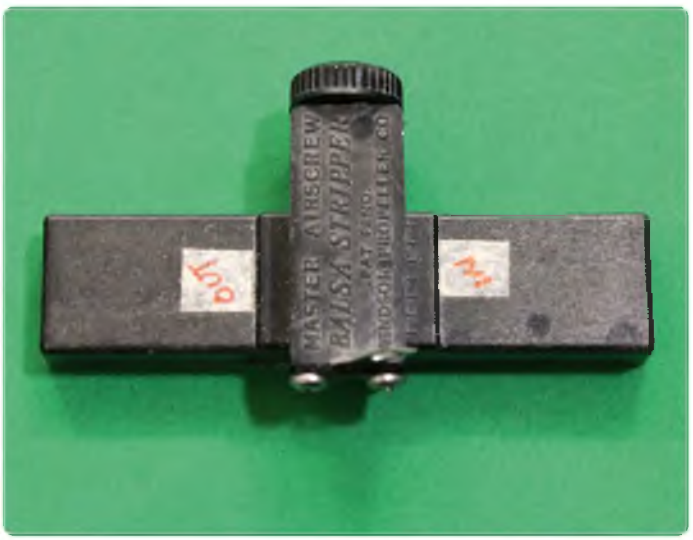
More helpful building tips from the workshop of Bill Bowne

Not winding up with dripping blobs when applying a bead of glue along the thin edge of a bit of wood is easy when you let your little finger act as a side guard for the glue and a brace for the glue nozzle as you draw the glue bottle along. Yes, you have to clean the glue off your finger afterwards, so this method only works for slow-cure glues like aliphatic or Ambroid etc. Please don't try it with CA!

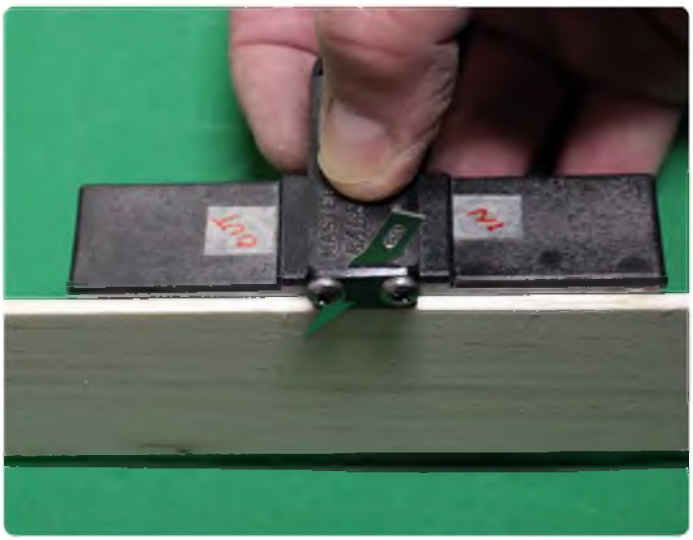
Building hints and tips can be big ideas; ones that make major changes in how we build our beloved models. Hints like using misted water to shrink tissue paper revolutionised the hobby in the 1930s. The discovery of Depron as a building material triggered another more recent revolution.

On the other hand, little hints may not make much impact on the R/C world but they still can make our hobby just a bit more enjoyable. In the next few shots we'll take a look at some of those 'little' hints.

I'm sure you readers have more ideas like these, so how about writing them up and sending them in to Editor, Kevin, so we can all have it a little bit easier! **RCMW**



Master Airscrew's balsa stripper is a wonderful tool. I'm on my second, having worn one out! But remembering which way to turn the wheel to move the blade in or out is a pain in the… Well, it's a pain! So bits of masking tape with labels 'In' and 'Out' save a tiny bit of frustration



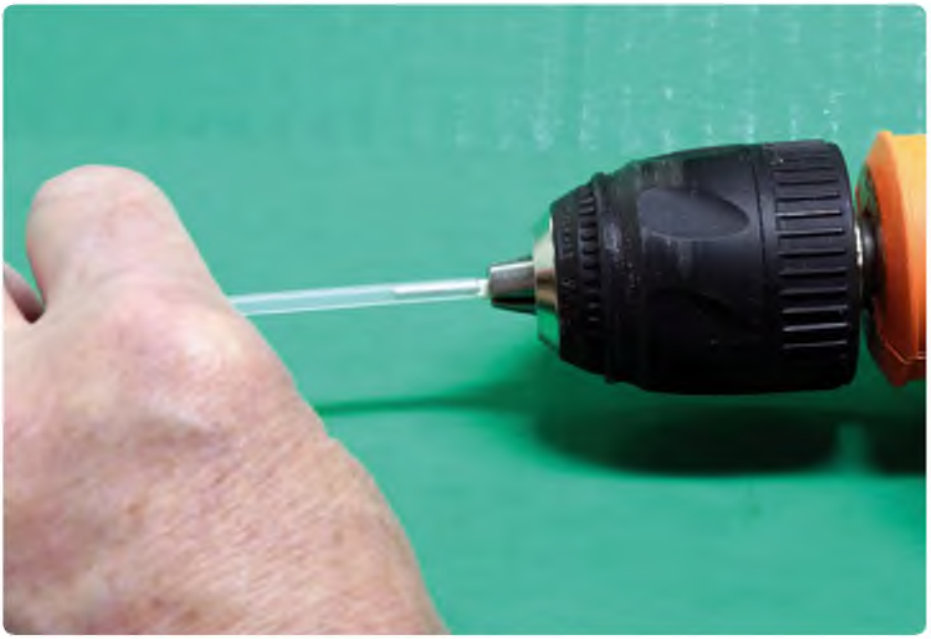
Another hint when using a balsa stripper. Instead of measuring the gap between the blade and the stripper with a ruler, just stick a bit of wood of the desired thickness into the stripper. Tighten the blade so it is just snug with the wood and you're ready to start stripping (balsa, that is!)

Right: *When working with dual-heat shrink films, such as Ultracote/ Profilm, it helps to use two irons. Set one to the low temp and one to the high, then switch back and forth as needed. Saves waiting for one iron to heat up or cool down. Also, if you've ever tried shrinking iron-on coverings, only to realise that you'd plugged in your heat gun and not the iron, wrap a bit of tape around the cord and put an identifier on it, such as 'G' for 'Gun' or 'I' for 'Iron'. If you follow our previous tip of using dual irons, mark the labels for each 'I1' and 'I2' etc. to keep them separate*

Below: *Does your wife know the Avon lady? Ask her if she has any sample packs of emery boards. They make excellent fine sanding boards and can be cut down to reach into small places*

Getting those threaded studs into the end of a nylon snake is a lot easier if you GENTLY clamp it in a drill chuck and let the drill (at low speed!) screw the stud into the snake

Start by protecting the stud threads with a winding of masking tape, covering about half of the threaded length



Next, clamp the masking taped end into the drill chuck, insert the un-taped end into the snake end and GENTLY power up the drill

For extra rigidity insert a length of pushrod wire BACKWARDS into a snake, leaving a length of wire inside the snake (but still leaving the threaded end on the outer end of the snake inner tubing)

RC MODEL WORLD GROUP BUILDS

Here at RC Model World magazine we are are keen to support and encourage as many model aircraft enthusiasts as we can to enjoy building their models from plans. Each month we publish an article describing a new or updated Feature Plan, which can be purchased from the Traplet Plans Service. And we also give away a copy of a free model aircraft plan in each and every issue with which you can start building your next model straight away.

Despite enjoying building and flying ARTF and foam models for their speed and ease of assembly, we strongly believe that there's little to beat the sheer pleasure and satisfaction that comes from building a model aeroplane from the building board upwards, starting with some balsa wood and a few ply parts.

To spread the word of this most enjoyable part of the modelling hobby we are pleased to introduce our RCMW Group Builds, which will give model clubs and associations a rising discount off a minimum of five or more sets for a Traplet Set of their choice. The more of your members that you can get to participate in an RCMW Group Build the bigger your discount will be (T's & C's apply, offer open to UK clubs and associations only).

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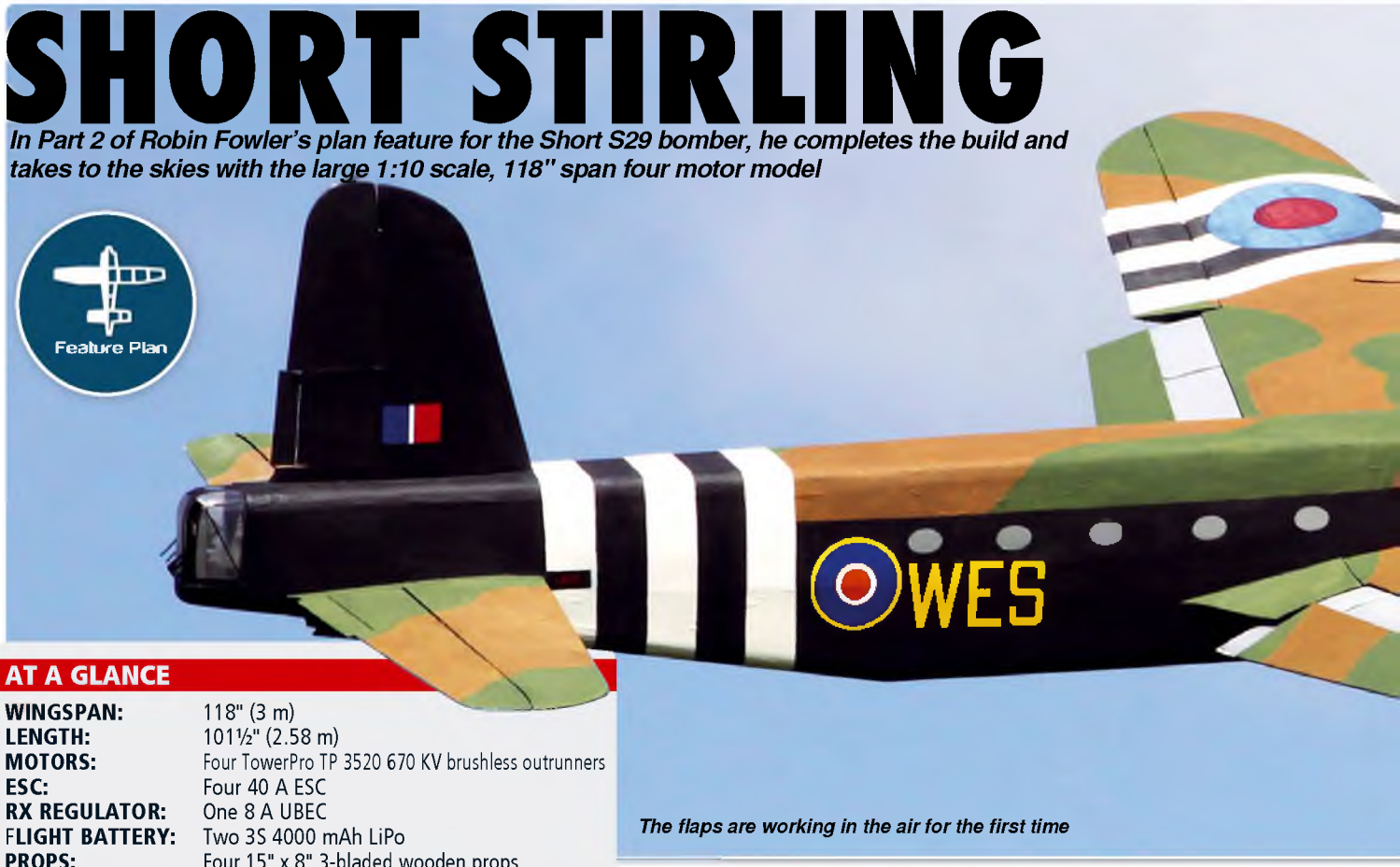
SHORT STIRLING

In Part 2 of Robin Fowler's plan feature for the Short S29 bomber, he completes the build and takes to the skies with the large 1:10 scale, 118" span four motor model

Feature Plan



The flaps are working in the air for the first time

AT A GLANCE

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

Robin's Stirling awaits its first flight

The tail is off the ground... but the model isn't moving yet!

In Part 1 we described the model concept and basics, with some detail of the build, commencing with the undercarriage and tips for construction, selecting materials and covering. A disk with the fully documented build instructions and construction photos accompany the plan so there is no need to go into great detail. To complete the model we first need to finish off the covering and detail the model.

Finishing

Generally speaking I do not spend a lot of time and effort on detail work as I reckon to build only sufficiently for my models to look right in the air. Hence my attention to lightness so it isn't flying at speeds a Spitfire would have been hard pressed to match. But the outlines are as close to scale as I can get them so I am hoping that some of you with more patience than I have will set to and show the rest of us how it ought to be done.

On the covering, however, I did spend a few ounces. Camouflaged models do not look right in gloss finishes (especially at the early end of the war) so I went back to Diatex (the basis for Solartex, but without the glue and paint), which I glued on with PVA. The drying time can be shortened by using a heat gun or an iron, both of which will shrink the material. The iron was particularly useful at corners or overlap points.

Painting was done in emulsion paints bought in tester pots to RAL standard colours at the local DIY store and the underside took an entire pot of black.

It took me just under a year to have the Stirling ready for its first flight and static testing of the retract system had not yet proved it reliable, so I left that part of the design to be tested later.

A steep angle of climb shows plenty of power

And she's away into the blue

Testing First Flights

First things first – will the model fly? A partial record of this flight is on my YouTube channel (scan the QR Code at the end of the article with your smart device), which shows the taxi tests, first take-off and circuit. What is not recorded is the actual landing. Unfortunately, although I had not attempted to retract the undercarriage the tiny movement at switch on had taken the left wheel out of its over-centre locking position and the moment weight was fully on it that side started to sag. I, and a couple of others, went to its aid and carried it back to the pits. That was my first learning experience with the landing gear!

But had it flown well enough? Yes indeed! From lift-off it had needed a lot of down elevator to keep the nose down but aside from a couple of ticks of aileron that was it. The steepness of the climb-out told me she had plenty of power and the airspeed was gratifyingly slow. Response in turn and bank was excellent. This had been evident when with only about five feet of altitude on finals a side gust came through a gap in the nearby bushes and tipped her over to a 30 degree bank. Even at low speed I recovered from that without alarm.

A further learning experience came a few weeks later. I had in the meantime fitted the gear doors and was relying on springs to hold them open once they had been pushed open by the wheels. One of the limitations of my gear design is that in order to be able to put the gear down for landing it has to complete its retraction cycle and operate the end stop switch. So when the airflow pushed one of the doors, so as to obstruct the retraction sequence, although the other leg still operated happily there was nothing I could do to unjam the stuck one. I had to aim for the long grass and hold the dodgy leg off as long as possible.

Even with that ignominious end to what had otherwise been a good flight I was pleased with progress. The motor driving the stuck leg had spent too long stalled and ran slower than the other thereafter, but I knew I needed pushrods to hold the gear doors open, so I did the modification.

I was also pleased that the general arrangement of the Stirling design meant that even in a belly landing the props (scale-sized, three-blade, home-made modified wooden jobs) were held clear of the ground and suffered no damage.

Small Modifications

I took the opportunity to change the original wooden tie bars at the fold point of the forward legs for brass inverted 'L' sheet. This allowed me to provide a pin at each end to act as hinge pins making the hinges of the doors almost totally friction free. The pushrods I made in thin brass tube, inside which I ran 20 lb fishing trace wire that was flexible enough to do without ball and socket universal joints. A blob of all-purpose glue at each end fixes the connection positions so they don't slide.

It can be a frustrating business trawling the Internet in search of miniature fittings and even if they are found the shock of the price can be considerable. Consequently I do take inordinate pleasure from devising simple solutions to problems like this using bits and

Group Captain W.E. Surplice flies again!

The starboard main leg is jammed though and will go neither up nor down

The moment of truth. May the long grass be merciful!

And the moment after. All props intact

pieces readily to hand.

While all these alterations were being applied to the main wheels the flaps were also undergoing some changes. The original plastic racks taken from a defunct video recorder had to be replaced as one got broken and the recycled servo with blown amplifier was not up to the job. There was another Internet search to find a servo with higher power and, if at all possible, a really slow operating speed to go with it. Well, I have complained before about the fact that you can't even find a slow retract servo where an operating time of four or five seconds would be appropriate. (Most programmable transmitters allow servo speed adjustment nowadays, or for a single function servo fit an inline servo speed/direction regulator.)

The slowest servo was about 1.5 seconds over 180 degrees... But then I came across sail winch servos – three turn sail winch servos! Now that would be just the job! Replace the output drum with a pinion gear and then, with a beefier pair of racks, job done... Err, no!

I found that the end stop position varied every time, so trying to set it up by altering the end point adjustment on the transmitter did no good whatsoever. So the amplifier of my £20 servo would have to come out and I would have to revert to my end stop switching system.

Testing Fate!

For the next flight not only were the wheels going up and down properly but the flaps were working in the air; not that the Stirling exactly needs flaps! The model is light enough to leap into the air within a couple of yards if the throttle is not applied slowly and I had never yet broken the undercarriage by force of heavy landing. Despite its spindly appearance it had enough strength and the springing worked well. The model made a conventional wheels-down landing – soon followed by two more. Had I not been British this would have called for a silly grin!

But then fate took a hand. How often does this happen?

I had not noticed that the pull-pull wires to the elevator and rudder had been getting stretched. I have now made a resolution to pull the stretch out of the wire before fitting it to any future model; I do it for my guitar strings, so why had it not occurred to me? The slack in the elevator wire allowed it to get hooked round the bottom of the tail wheel retract servo fitted inside the tail behind the rear door, so I was puzzled to find that all of a sudden after a low pass the model was wanting to climb.

While I was busy fighting to get level flight restored and the model was heading away, that moment came when I would normally call 'landing'. In seconds she was over trees, which were cleared by a small margin, and a couple of seconds later she was out of sight. The crunch was the cue for recovery team to set out.

The damage looked pretty extensive but a couple of weeks later all the repairs had been made. I also decided to remove the landing lights (which I had recently discovered should have been retracting in this mark) rather than repair them with new plastic reflectors, a decision which sped the process fractionally.

Gyro Added

Another alteration during flight-testing was the addition of a 3-axis gyro stabiliser to take air turbulence out of the equation.

The first flight was made with the orientation in roll the wrong way round and it took a few moments to realise why the model had a tendency to enter a bank of its own accord. That was soon put right and there being no free channel to switch the unit in and out I have quickly got used to the benefits and one or two cautions the unit offers. Seeing the model flying like it is on rails really adds to the scale effect. Well worth the money in this skinflint's estimation. And you can hardly get a better recommendation than that!

Summing Up

If I have, in recounting all the dramas, given you the impression that the Stirling is more trouble than it's worth, this could not be more wrong! I have enjoyed the challenge (and a challenge it has certainly been) but now that the design is right and the bugs are out it is a lovely model to fly. And that is quite apart from the smug pride at what I have achieved!

A fully detailed construction disk is supplied with the plan that includes a step-by-step construction manual and almost 200 images, plus video clips. So now it's over to you. How about remembering the forgotten bomber with a model of your own, to restore the balance at the flying field. I'm enjoying mine so much I'm even tempted to build another to see if I can get it lighter and even slower flying...

But who knows? So many unbuilt types, so little time! ***RCMW***

New strut on the left, with old parts for comparison, and mudguard to be reused

The gear part disassembled for new strengthened links. The new main gantry and tie beams are already in place

CONTACTS

Robin Fowler
robinfowler@talktalk.net

Short Stirling model in flight

www.youtube.com/watch?v=4W9wntESP7U

Wheeling the Stirling out for another reassuring flight

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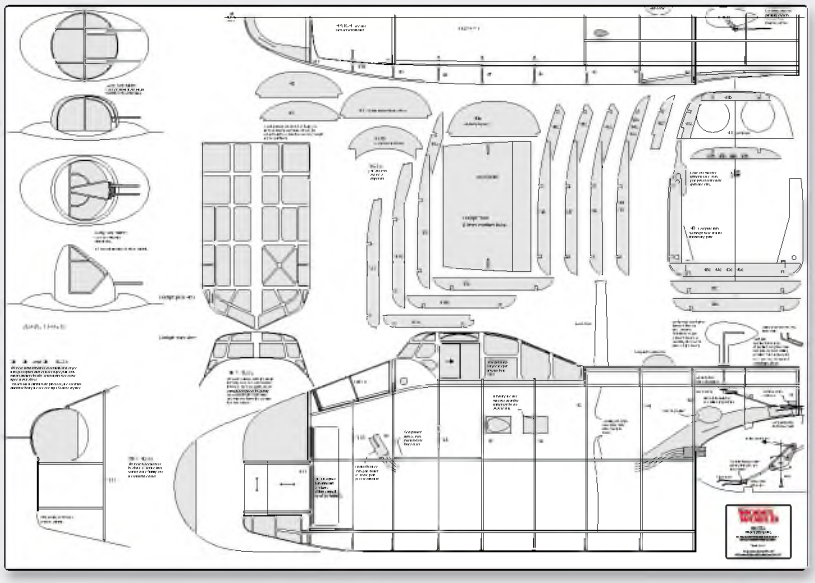

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LIGHT FLIGHT

'Shrunken' F3P style profile models and indoor FPV are amongst the topics discussed this month by our small model guru, John Stennard

Crack Yak Mini and the Hellboy line up for a size comparison. They are almost identical

Crack Yak Mini in its element indoors. A good small space flyer

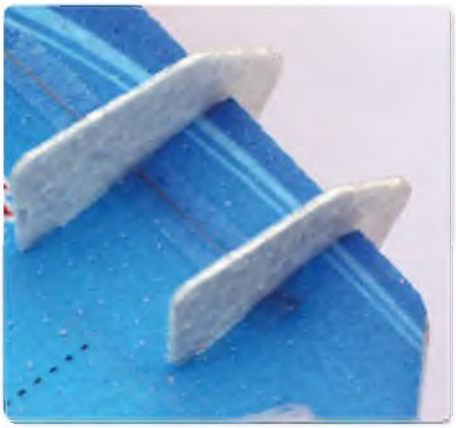
We are already near the end of our most successful indoor flying season ever. While we enjoyed our cosy one-court Community Hall venue the move to a five-court sports hall, while less intimate, offers a lot more scope for a wider range of models. The only issue with a two hour session is that unless you have a suitable model for each of the ten minute slots you do not get in a lot of flying. We now have at least four or five slots for different types of aircraft, plus one for helicopters and quads, and one for Airbug Hovercraft.

Most of the club members are now keen enough on indoor flying to have models to use in most of the slots. Surprisingly, one of the least crowded slots is the one for foam profile, FP3 type, aerobatic models. Again, perhaps surprisingly, although we have a number of members with FPV Vapor and Nano QX Quads, I am the only person that flies them regularly. In fact I always fly FPV during the Vapor and Quad sessions but would say that it is an acquired skill and you can initially be put off.

After a season of FPV flying with indoor and outdoor aircraft, and quads, I am now very happy flying with the goggles on. Initially it can be a bit stressful and demanding, and I came close to thinking 'this is not for me and I can't do it' after some early attempts. However, there is no doubt that once you get the hang of it you want more and more of it!

While the traditional 'standard size' profile foam aerobatic model is less popular there has been more interest in the smaller size of 'shrunk down' F3P type model. The RC Factory Crack Yak Mini is a good example and I've decided to stick with this smaller size of model. In this feature am looking at another of this genre...

This model is also perfect for small space outdoor flying



Side thrust generators on the Yak are not used on the Hellboy

The Yak also uses a 2S Tiger brushless that is at its best with a 6" prop

The slightly heavier Hellboy has the more powerful XC2802/44 motor, which can take a 7 or 8 inch prop

Extended servo arms require quite a powerful micro servo

End to end servo mounting makes for a firm installation

One millimetre diameter CF pushrods need supporting but this provides a very 'slop-free' action

Hellboy v Crack Yak Mini

This may sound as though it could be a very physical encounter. But this is not intended to be a competitive event between these two mini size aerobatic models; it's more a comparison of their similarities and differences in an indoor flying environment. I've written about the RC Factory Crack Yak Mini from Robotbirds before, but the Hellboy from Andy Whitehouse, with graphic design by Gary Holland, is a new model.

The Crack Mini Yak was not really built to share airspace with much heavier and faster models. And although the Hellboy is almost an identical size, it is a little more robust. The Hellboy and many other excellent models are available via the www.flying-dog.co.uk website. They even have Eleanors and the like available but these definitely need to fly alone!

Comparing the specifications, the Crack Yak Mini has a wingspan of 600 mm (23.6 in) and a length of 610 mm (24 in), while the Hellboy has a wingspan of 596 mm (23.5 in) and a length of 630 mm (24.8 in). The more substantial airframe, heavier servos and heavier motor and prop resulted in a flying weight of 115.6 g (4 oz) for the Hellboy, while the Crack Yak Mini is 89 g (3.1 oz), both using a Turnigy 2S 300 40C LiPo. The construction of the Hellboy is typical for a profile foam aerobatic model and the downloaded instructions are perfectly adequate.

Control surface hinging is done using the 'edge to chamfered edge' UHU POR method, and while this results in a tough hinge sometimes they need loosening up a little. This can be easily done but cutting some slits with a scalpel along the hinge line. I fitted two 4.5 g Blue Arrow digital servos for the rudder and elevator, and a more powerful 6 g aileron servo.

Due to the quite extreme movements required and the extended servo arm this servo struggled and eventually stripped a gear. I replaced it with a 1.5 kg torque version and made some slits in the aileron hinge line to free up the movements. This now worked fine and the aileron control is fast and accurate. The rudder and elevator CF pushrods both run through guides so the control movements are very precise.

The kit does not include an U/C but the instructions show where to fit one. I decided to fit one for the first flights as it could be removed later if required. When it came to the choice of motor I realised that the small 2S micro size motor with a GWS 6045 prop, as used in the Crack Yak Mini, was not going to push enough air over the surfaces.

Several motors are recommended for the Hellboy and I decided to buy the special XPower 11.6 g XC2802/44 feather motor available from Flyingdog. Although small it can use a 7, 8 or even 9 inch prop. I did not get the recommended high spec ESC, although I know these are particularly efficient. It does make sense to match a high quality motor to a high quality ESC but I thought I would experiment with a budget ESC first.

I started the first flights and found an initial problem with the undercarriage. I had saved time by using a recycled U/C from an old model and the legs proved to be a bit short. This meant there was virtually no angle of attack when the model was sat on the ground.

Heat shrink linkages are not my favourite system but do avoid 'slop' in the system

An underside view shows the CF bracing and, at this point, an undercarriage!

Climbing away but now without an undercarriage!

Hovering is very easy with this model

The longer U/C legs showing the tube extensions

The larger 160 mm Sukhoi prop needs some modification

The result of this was reluctance for the Hellboy to take-off; not a real issue though as a 'hand launch into hover' is regularly used to get airborne.

Once in the air the Hellboy proved to be very aerobatic, but in a different way than the Crack Yak Mini. Although smaller than a 'standard' profile foam model, the Hellboy has a similar feel to it, while the Crack Yak Mini has a much 'lighter' feel, more like an E-Flite Extra 300. The big advantage with the Hellboy is that its more robust construction makes it a better model for 'multi model' flying situations.

After a few flights I decided that the U/C was not serving any useful purpose, except for protecting the prop on landing, so I removed it. I will have to more careful when landing!

The Hellboy is quite amazing in 'knife-edge' mode and is one of the best models I have ever had for this manoeuvre. If you fancy a smaller size of profile foam aerobatic model that is capable of holding its own with its larger relatives then the Hellboy nicely fits the bill.

I mentioned the ESC situation with the excellent XPower motor and I am now on my third ESC. The first gave problems with intermittent running so I replaced it with a different budget variety. This was fine but was larger than needed so it was eventually changed for a Castle Creations Phoenix 6, which works well.

As ever the important message is too keep the model as light as possible and this does mean careful selection of the motor, ESC, servos and Rx for the best performance. This size of indoor aerobatic model makes a lot of sense and once you have a set (or two) of the right size R/C gear the airframe can be a very low cost part of a commercial kit or own-design model.

Indoor FPV

Since writing the feature on indoor FPV in the January issue I've tried out some different applications, which have worked well. The FPV Vapor continues to give me five minute flights with much better control due to using the Turnigy 1S 200 mAh LiPo and an adapted E-flite Sukhoi prop (PKZ3502). This is a 160 x 70 mm prop with a 1.5 mm bore so it needs adapting to fit the 1 mm shaft on the Vapor motor. I have some plastic tubing with a 1 mm internal and 2 mm outside diameter. I enlarged the 1.5 mm hole in the prop until the 2 mm tube is a tight fit and this compresses the tube and reduces the internal diameter. The prop will now screw onto the 1 mm shaft and is secure.

Of course this larger prop now meant that the undercarriage was too short for ROG take-offs. After a period of hand launching, perhaps not the best idea with indoor FPV, I decided to lengthen the U/C legs. This required them to be cut and rejoined with some rigid plastic tube; a length of CF rod can be put in the tube to act as a spacer. This has worked fine and I can now enjoy taking - off again.

The next model to have the micro camera fitted was a 200 QX quad. I simply glued a block of foam onto the 'nose' of the quad and the camera is held on with Velcro. This quad is beautifully stable so is ideal for a camera platform but unfortunately it does not have prop guards. It's quite a feisty quad so it does need careful flying in an indoor environment. The 1S LiPo camera battery is just held in

A Turnigy 1S 200 LiPo gives five minute flights with my modified FPV Vapor

Horizon Hobby micro camera fitted to my Blade QX 200 quad

A 1S LiPo powers the FPV camera

X7 Mini quad may supplement our fleet of 'have a go' Flyball Cagers

The 3.6 g micro FPV camera and Tx from Banggood. First tests are very promising

Headplay FPV set is a bit bulky but does give an excellent picture and works fine with the micro camera

place with Velcro. Unlike the small quads I tried with the camera, the Inductrix and the Nano QX 3D, the flight duration is unaffected by the camera weight.

Lastly, some very good news is that a micro camera system is now available from Banggood. This is specially designed for micro model use with a 1S LiPo and the range is listed as 300 m with a 15 minute battery life. It features a CMOS 600TVL camera with 170° field and complete with its integral 5.8 GHz video Tx weighs just 3.6 g. It comes complete with a laser cut ply mount and has eight channels from 5705 to 5925.

However, although I have had no problem linking to my Diversity Monitor, I have been unable to link with my Fat Shark Teleporter and Spexman SPX01 googles. On a brighter note the system links fine with my Headplay set. I will be trying this camera for some indoor flying fitted to my stabilised MCX-S mini aerobatic model.

Tail End

Our Flyball Cagers have proved very useful for 'have a go' sessions but have two disadvantages. Firstly, they use IR and secondly they have an integral flight battery. The IR causes signal loss if the Tx is inadvertently pointed at the lights and the integral battery means the model cannot be flown when it is charging. Looking at supplementing the Flyball fleet I spotted the deAO X7, which is a micro quad inside a cage. There are two big advantages; firstly it's on 2.4 GHz and secondly the battery can be removed for charging and be replaced. I'll be reporting back on the potential of this for general flying and 'have a go' sessions.

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

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

RCMW

KEEP IT LEGAL WITH DRONES

We take advice from the BMFA and look at the legal requirements for multirotor aircraft equipped with cameras, and also look at the future for multirotor platforms. Manny Williamson, Development Officer at the British Model Flying Association is our guide

The sport of model flying has undergone some significant changes over recent years, many of them technology based. Developments in areas such as batteries, motors, control systems and autonomy have placed a whole range of flying machines firmly into the 'plug and play' category that is representative of pretty much every aspect of modern life.

Perhaps the most obvious manifestation of this development is the huge increase in popularity (and ready availability) of multirotor platforms equipped with cameras, or 'drones' to use the popular reference.

The British Model Flying Association (BMFA) regularly receives queries from enthusiastic potential aviators, particularly with regard to aerial photography and the use of multirotors as a tool for this purpose. This article answers some of the questions that we receive on a daily basis at the BMFA office, both by novice pilots and also by modellers who have flown more traditional types of model aircraft, and are branching out into multirotor aircraft and aerial imaging for the first time (the majority of this guidance also applies to any type of model aircraft used to carry a camera).

Camera carrying aircraft come in all shapes and sizes, from the micro quadcopters with tiny built-in cameras, to the larger multirotors capable of supporting a considerable payload and imaging capability. Many newcomers to this aspect of model flying will purchase the readily available medium sized quadcopters capable of lifting popular 'action' cameras.

Before flying your camera equipped multirotor it is important to be clear on the legal restrictions and conditions placed on this type of activity. Fortunately it is relatively simple and a little common sense, as ever, goes a long way towards lawful operation.

Legal Framework

All aviation in the UK is the responsibility of the Civil Aviation Authority (CAA) who are responsible for creating regulation and also its subsequent enforcement. However, things are changing and the potential for 'public order' type offences with multirotors in addition to aviation safety incidents has led to a shift towards Police enforcement rather than the CAA for many drone related incidents.

The overarching requirements are covered within the Air Navigation Order, which is the legal framework as a set of 'Articles'; these are reproduced below with a brief explanation of the practical considerations.

Current Requirements

The operation of multirotors for sport and recreational purposes is covered by the same legal requirements as other model aircraft; the law makes no specific distinction on types of aircraft other than weight limits.

As referred, the overriding consideration is compliance with the relevant articles of the Air Navigation Order; the primary 'endangering' provisions are addressed by Articles 138 and 137, which are reproduced below:

Article 138;
"A person must not recklessly or negligently cause or permit an aircraft to endanger any person or property"

Article137;
'A person must not recklessly or negligently act in a manner likely to endanger an aircraft, or any person in an aircraft'

Drone Aware is already receiving considerable support and sponsorship from a number of companies within the model trade, including Horizon Hobbies, whose exhibition team is seen here

THESE APPLY TO ALL MODEL AIRCRAFT AT ALL TIMES, WHATEVER THEIR WEIGHT OR SIZE.

This of course captures multirotors. Article 166 (set out below) covers the general principles that again apply to all model aircraft. However, only the provisions that specifically apply to the activity we are discussing here are included. The conditions applying to aircraft weighing in excess of 7 kg have been removed for this article as in multirotor terms these are fairly specialised pieces of equipment more usually employed in aerial work (paid activity).

Article 166, (Small Unmanned Aircraft)
(2) The person in charge of a small unmanned aircraft may only fly the aircraft if reasonably satisfied that the flight can safely be made.
(3) The person in charge of a small unmanned aircraft must maintain direct, unaided visual contact with the aircraft sufficient to monitor its flight path in relation to other aircraft, persons, vehicles, vessels and structures for the purpose of avoiding collisions.
(5) The person in charge of a small unmanned aircraft must not fly the aircraft for the purposes of aerial work except in accordance with a permission granted by the CAA.

Perhaps the most relevant provisions in terms of photography/filming with model aircraft and multirotors as a sport and recreational activity are covered within Article 167 below, which sets out the basic conditions of operation as well as specifying exact distances.

Article 167, (Small unmanned surveillance aircraft)
(1) The person in charge of a small unmanned surveillance aircraft must not fly the aircraft in any of the circumstances described in paragraph (2) except in accordance with a permission issued by the CAA.
(2) The circumstances referred to in paragraph (1) are:
(a) over or within 150 metres of any congested area;
(b) over or within 150 metres of an organised open-air assembly of more than 1,000 persons;
(c) within 50 metres of any vessel, vehicle or structure which is not under the control of the person in charge of the aircraft; or
(d) subject to paragraphs (3) and (4), within 50 metres of any person.
(3) Subject to paragraph (4), during take-off or landing, a small unmanned surveillance aircraft must not be flown within 30 metres of any person.
(4) Paragraphs (2) (d) and (3) do not apply to the person in charge of the small unmanned surveillance aircraft or a person under the control of the person in charge of the aircraft.
(5) In this article 'a small unmanned surveillance aircraft' means a small unmanned aircraft which is equipped to undertake any form of surveillance or data acquisition.

A modern camera equipped multirotor can be flown with BMFA insurance as long as it is for Sport and Recreation purposes

Professional grade multicoptors are likely to be used for Aerial Work, which is not classified as model flying

The CAA rules apply to FPV racing quads too!

The BMFA Members Handbook also contains the following notes which help to clarify the conditions outlined within Article 167.

BMFA Notes

They are only concerned with models equipped with cameras, video equipment etc. that have the potential to be used for surveillance purposes, either visual or electronic. It should also be noted that the above legislation (articles 166 and 167) does NOT prohibit you from flying a camera or video equipped model for recreational purposes. The person in charge of the model must retain direct visual contact with the model (Article 166) and there are some restrictions as to where you can fly (Article 167). Probably the most important of these restrictions are the limits of not flying within 50 metres of any person or 30 metres from any person during take-off and landing and these are exactly the same as for any model over 7 kg.

The Practical Application

As already referred a little common sense goes a long way towards interpreting and complying with the relevant legal requirements.

The primary aim of the various Air Navigation Order provisions is to prevent the endangering of full size aircraft and also to prevent the public from being endangered, to a lesser degree these provisions also help to limit the potential for causing nuisance and for invading privacy.

In terms of filming or image capturing this limits how close we can get to people and structures that are nothing to do with us (i.e. not under the control of the pilot). However, the positive aspect is that the wording of 167(c) permits closer operations where it is with the consent and knowledge of all parties involved (notwithstanding the primary endangering considerations of course).

Aerial Work Or Sport And Recreation?

Another primary consideration is the purpose of the flight. The flying of a model aircraft or multirotor with a camera on board is recognised as a sport and recreational activity by the CAA and is therefore covered under the terms of the insurance provided as part of the BMFA membership package (provided that the activity is legal in respect of the Air Navigation Order).

However, where a flight is made for payment or the purpose is in any way commercial, i.e. not as a sport and recreational activity, then it becomes classed as aerial work by the CAA and requires an exemption to the Air Navigation Order to be issued in order to take place lawfully.

Details of aerial work and exemption application information can be obtained through the CAA website: www.caa.co.uk

It should be borne in mind that 'Aerial Work' is an entirely separate activity to model flying or recreational multirotor flying and photography, and as such it must be insured under the terms of an appropriate commercial policy. The standard policy provided to BMFA members does not provide cover for aerial photography on a commercial basis.

The Bit In Between – Data, Development And Demonstration Flights

Previously, one of the issues that we have faced has been the rather grey area falling between aerial work and sport and recreation. This is an area that we have been looking at for some time and in discussion with the our insurers and the CAA we established a category to define activity falling between the existing definitions.

The current position for Aerial Work is clearly defined: if a pilot intends to undertake Aerial Work with a 'model aircraft' then it must take place under the terms of a permission granted by the CAA. The permission will include an exemption to certain provisions of the Air Navigation Order, as well as stipulating conditions for the activity such as pilot competence, separation distances and height limits. This is not model flying.

Sport and Recreation is also clearly defined, and forms by far the vast majority of activity carried out by BMFA members.

One of the issues with the previous system was that if activity didn't fall within the definition for Aerial Work then the activity was not insurable with a commercial policy. Equally if the activity didn't fall within the Sport and Recreation definition then the activity was outside of the scope of a Sport and Recreational policy (which is what is provided as part of the standard BMFA membership, as well as some other organisations).

In order to address this area of concern we have implemented a policy extension that includes insurance cover for activity which falls into the new Data, Development and Demonstration category of activity for BMFA members. The extension is available as an 'add on' to existing membership.

The new definition covers a wide range of activity that falls outside of the Sport and Recreation definition, but does not trigger the requirements for Aerial Work (for example, because no payment is made for flights). The membership extension includes broad insurance coverage for D, D and D activity, and if you are undertaking flights where the purpose is clearly other than Sport and Recreation but not Aerial Work, then you may be able to benefit from the cover provided under the membership extension.

The definitions wording is reproduced below; study carefully and of course call the BMFA office to discuss your proposed activity if you are not sure where it fits. As already outlined by far the vast majority of BMFA members' activity falls within the existing Sport and Recreation definition.

***Above & below:** Racing pilots should take the time to get acquainted with the regs for Sport and Recreation flying*

Camera carrying aircraft come in all shapes and sizes, from the micro quadcopters with tiny built-in cameras, to the larger multirotors

Be familiar with the legal requirements relating to your chosen activity when thinking about buying your next multicopter

Ensure that the proposed flying location is appropriate and safe

1. SPORT AND RECREATIONAL (existing): Flights undertaken where the primary purpose is enjoyment derived from the observation, control, piloting and display of model aircraft. This includes the capturing of images and footage for the purpose of personal entertainment and recreation.

2. DATA, DEVELOPMENT AND DEMONSTRATION FLIGHTS (new): Flights undertaken where the primary purpose is other than Sporting and Recreational as defined in (1) above, but where the pilot does not directly benefit financially as defined in Aerial Work (3). This includes the capturing of data including images and film footage, flights carried out for the purpose of product development, training/testing (other than in respect of the BMFA achievement schemes and sport and recreation as defined in (1) above), education and commercial demonstration (trade display flights).#

3. AERIAL WORK (existing): Flights undertaken for the sole purpose of commercial or personal financial gain and carried out in compliance with CAA requirements for this activity (this is not model flying).

There is an additional fee of £75.00 payable to activate the membership extension and the relevant application form is available on the BMFA website.

One of the significant uses of the D, D & D policy extension is for those who are embarking on training and testing towards a commercial qualification. The policy provides cover until a commercial operator's licence is acquired, at which point appropriate commercial insurance is required.

Flying Locations

We receive regular queries regarding appropriate flying locations for multirotor aircraft.

Whilst the overall considerations are the same as for any other model aircraft, there is no doubt that multirotors open up new areas for flying due to their ability to operate in relatively small spaces. This does however mean that careful consideration is required before flying in order to remain lawful.

If intending to fly on private land then the permission of the landowner should be sought. If flying on public land, such as a park or open access site, then you must ensure that there are no by-laws in place specifically prohibiting or restricting model flying.

The other main consideration is the overall suitability of the location for the activity, and that all flying can take place in compliance with the primary 'endangering' provisions of the ANO (Articles 137 and 138) and also in accordance with the distances set out in Article 167 above.

The Future

There is no doubt that the operation of drones has caught the attention of the Government (largely as a result of disproportionate press reporting) and other countries have implemented significant new legislation in order to restrict and control their operation.

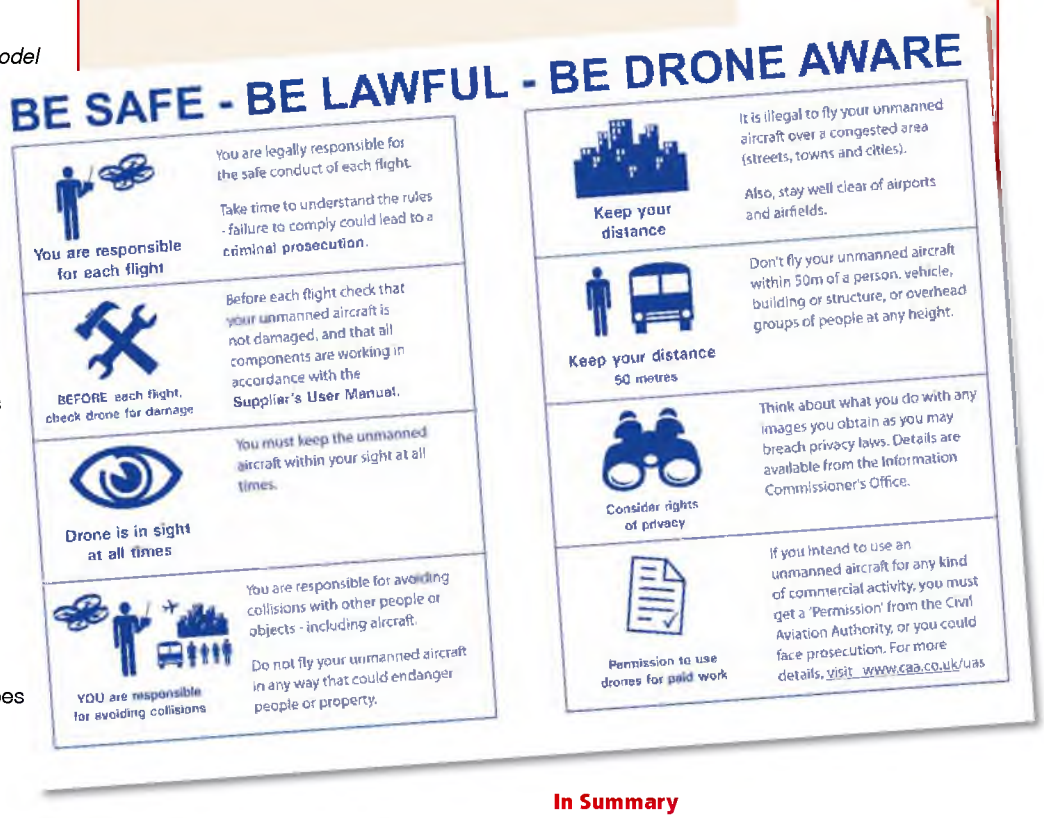
Drone Aware

As a route to achieve this we are currently working with the Civil Aviation Authority on a Drone Awareness initiative, as they also see the benefit in educating and informing the wider general public on the safe and lawful operation of drones.

The Drone Awareness initiative will be taking place for the whole month of April 2016 and will feature a number of elements which combined will help to raise awareness of the legal requirements and considerations when operating a drone, and also to help improve public perception and knowledge of drones.

Of course, an important aspect of the initiative is to raise awareness of the BMFA as the 'go to' association for sport and recreational drone and model aircraft pilots, both in terms of the insurance package provided as part of the membership, and also in terms of the range of services and support provided to members and also the benefits of being part of a recognised and well respected association.

Drone Aware is already receiving considerable support and sponsorship from a number of companies within the model trade, as well as a range of external organisations and full size aviation bodies.



Here in the UK there will be a Government public consultation on 'drone' operations due to take place later this year. We will be taking steps to ensure that BMFA Members are well represented, and dependant on the outcome of the consultation we may call for direct input and representation from our members.

Prior to the consultation process we will also be submitting a communication to the Department for Transport (DfT) in order to clearly state our position in advance of the main process.

Our aim is to maintain the current position as we view the current legislation as largely fit for purpose; time will tell whether this is an achievable aim.

Perhaps the most positive action is to educate new drone pilots in order that they understand the principles of safe and lawful operation.

In Summary

Be familiar with the legal requirements relating to your chosen activity.

Do not endanger person or property.

Ensure that the proposed flying location is appropriate and safe.

Maintain line of site for the purposes of control at all times (see CAA Exemption for specific details of FPV flight permissions).

Charging for flights renders the activity Aerial Work.

Do not constitute a nuisance.

Do not invade privacy.

Ensure that appropriate liability insurance cover is in place to protect you in the event of an incident leading to a claim against you.

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British Model Flying Association

For further information on all aspects of model flying including membership and insurance visit: **www.bmfa.org**

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DE HAVILLAND GYPSY MOTH 'JASON'

After becoming aware of this year's events to commemorate Amy Johnson, we asked Roger Vaughn to revisit his 3-channel park fly version of this delightful vintage aircraft to replicate her famous biplane, G-AAAH, better known as 'Jason'

'Wonderful Amy'

This year marks the 75th anniversary of the tragic death of Amy Johnson. So we thought it appropriate to highlight her solo flight from England to Australia in 1930. 'Wonderful Amy' took off in her De Havilland Gypsy Moth 'Jason' from Croydon on May 5th 1930, eventually landing 19 days later in Darwin, North Australia. This was an amazing achievement for both pilot and aircraft.

Transformation

The blue and silver G-EBLV Cirrus moth that featured in my article and plan in the February 2013 issue of RC Model World was still part of my model aircraft fleet. In January this year it was decided to rework this model and transform it into 'Jason'.

Recovering this model in the green and silver Jason colours, and replacing the Cirrus dummy engine with a Gypsy replica, soon produced a great little version of Amy's famous Gypsy Moth, G-AAAH ready for the flying field.

The Depron Question

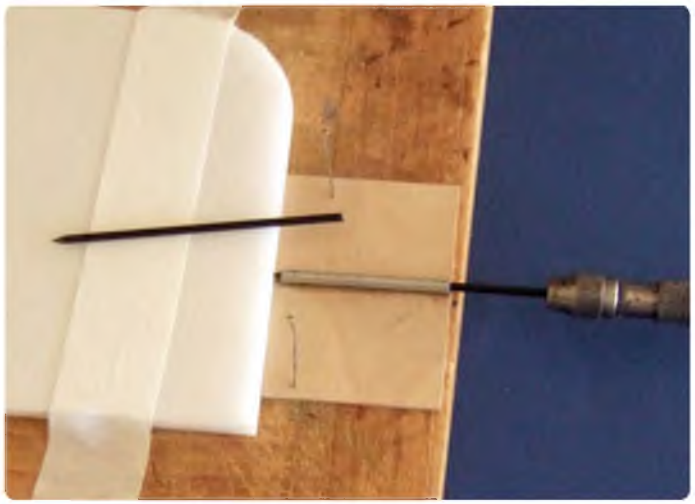
My DH Moth uses Depron to provide a strong basic structure, which is then overlaid with balsa and covered in the normal way. Using this method the two greatest problems of the Depron-only model, namely permanent dents from 'hangar rash' and the difficulty of achieving an authentic finish, are overcome. Ready to fly the model weighs just over 12 ounces.

Overlaying the Depron basic wing with balsa strips produces a wing, which, once covered, looks just like a traditionally built wing. As a matter of interest, I built an entire warp free wing panel, ready to cover, in just ninety minutes.

However, racing the clock is not really the issue. Remember that this little Gypsy Moth scale model will repay steady and careful building. It will be a help if you already have some experience of building from plans before tackling this project.

So let's start with the wing and all those 'cheat' ribs and riblets!

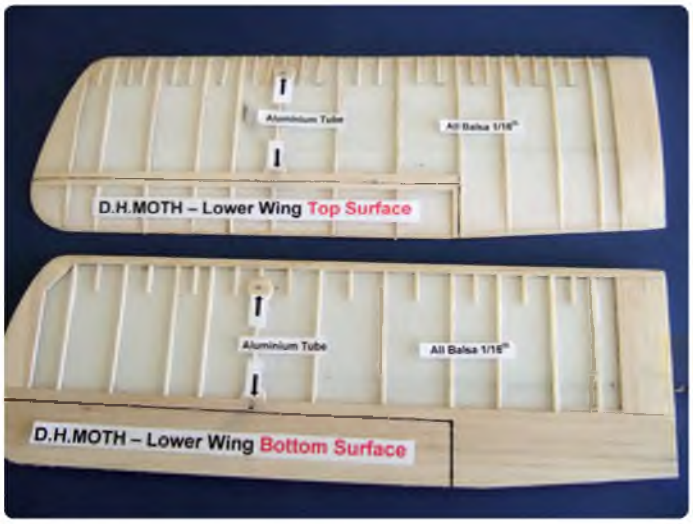
Small lightweight scale park flyers like this are ideal for those long still summer evenings. Remember them?



Jig for central boring of the 2 mm carbon fibre spar

Rib positions marked and added using cyano friendly glue

Top Depron surface now sanded to aerofoil section. A dust mask is essential!



Lower wing

Building The Wing

We start by using a cardboard template to cut four 6 mm Depron wing blanks, and then do a bit of 'jiggery-pokery' to insert a 2 mm carbon fibre stiffening spar into each panel.

The simple jig is a 2" length of 2 mm internal diameter metal tube glued squarely across a 1/16" plywood plate. Sharpen the end of the carbon fibre rod to a point and adjust the height of the jig on the workbench to ensure that the rod enters the wing at half depth. Now, using the jig to keep everything square and true, with the wing and jig flat on the building board twist and push the rod into the Depron. Do this by hand using a pin vice to hold the spar. Drills tear Depron, whereas the carbon fibre reams a perfect diameter hole.

As you make progress keep checking that all is square. You will find that the friction will increase as the rod continues to penetrate the wing. Persevere until you have about eight inches of spar let into the wing blank. Leave about 1/2" of the rod projecting to help with the attachment to the centre section later. DO NOT glue the spar in at this stage.

Now add the 1/16" sheet trailing edge, root and tip pieces to the bottom surface. Prop the leading edge up with a 1/16" jigging strip. With this structure pinned flat on the board add the 3/16" square medium leading edge. Note that when this leading edge is pinned to the board it will not reach the top of the Depron, but this overlap will be removed when the wing is sanded to section.

After the structure is dry remove the jigging strip and you will have a 1/16" deep 'frame' around the lower surface. Into this space you add the ribs and riblets, and any other 1/16" structure marked on the plan. With the underside complete you can turn your attention to the top surface.

Pin the wing down again on the edge of your building board. You are now going to sand an aerofoil section into the top of the panel. Depron dust can be dangerous so it is essential that you use a protective anti-dusk mask while doing this.

Shape the profile using light strokes with medium 'wet or dry' paper, used dry, on a large sanding block. Taper the rear until the 1/16" balsa just shows at the trailing edge and taper the tips in the same way. Shape the leading edge, including the 3/16" square balsa. Having a vacuum cleaner to hand at this stage is very helpful. This top surface need not be absolutely smooth as you will now cover it with false 1/16" balsa ribs, etc. as for the lower surface.

Lay down the riblets first, slightly oversize, and then use a straight edge and new blade to cut them all to exact length. Now you can add the main 1/16" square 'ribs'. The false aileron hinge spars, on the lower wings, are best added when all the ribs are in place, simply cutting away the ribs where necessary to allow the spars to fit into place.

Thread the 1/16" root rib over the projecting carbon fibre spar, glue it to the wing panel and then temporally remove the spar. Score the aileron hinge gap lines on both surfaces of the lower wing. Lastly, sand the entire wing smooth ready for covering.

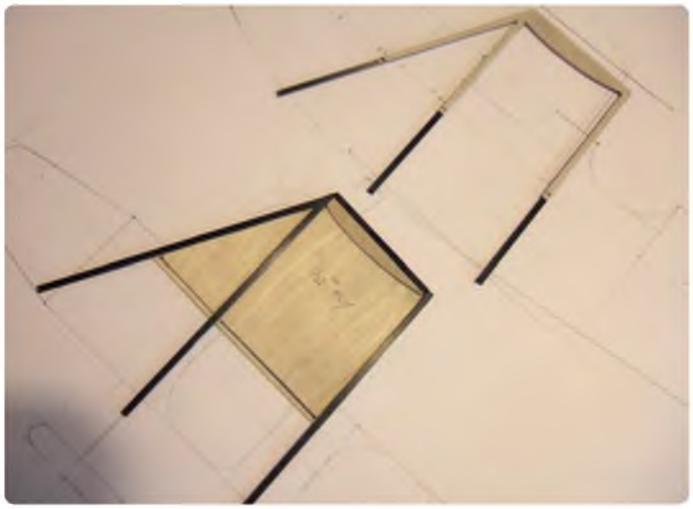
Joining The Wings

Prop up each wing panel 1" at a point 1" in from the tip for the dihedral and sand the root rib vertical. You can now see why the spar needs to be removed temporarily. With the wing still propped up using the 'jiggery-pokery' method and the entry point as near the top surface as you can, bore a hole for the shorter front 2 mm dihedral spar. You will see that when you have done both sides the rod will help to hold the wings at the required dihedral angle.

Now replace the main spar. With the dihedral spar in place pin the wings on the building board with a 2" gap for the centre sections. These are now built in situ. The lower wing is built on a 1/32" ply base, which is slid under the dihedral spar. The rest of the centre section is built up around this structure. Some 1/8" crosspieces are added to support the 1/16" balsa top sheeting.

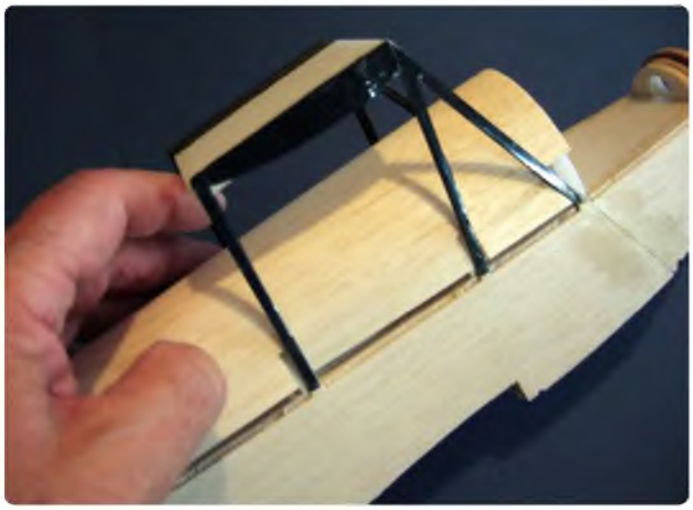
The top wing is similarly treated, except that the base is made of 1/8" lite-ply and the top covered with mini corrugated cardboard to simulate the fuel tank. I filled this section with blue foam to ensure that the tank did not sag. A hole is bored for the M3 mounting bolt and this is later disguised with a petrol filler cap. The front block is balsa and there is also

Finished tailplane and fin, and 'just finished' parts ready for covering with silver Solite

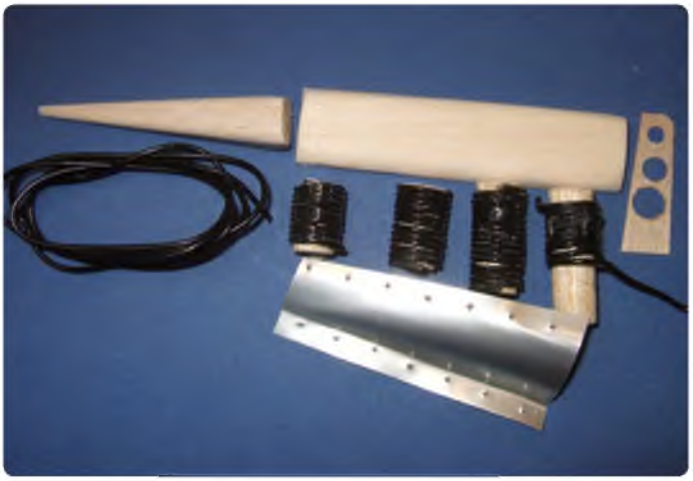


Cut away the template between the carbon fibre strips

4 mm Depron formers in the parallel section of the fuselage



Front decking



Gypsy cylinders

Moulded cowl is an optional part from Traplet

a piece of block on the underside, which is added later.

Tail Feathers

The core of the tail parts are cut from 3 mm Depron and these are edged with three strips of 1/32" x 3/16" balsa laminated together using diluted aliphatic glue and left overnight to dry completely.

The rib and spar positions are marked with soft pencil on both surfaces and made from 1/16" balsa. The rudder and elevator are carefully cut away and a strip of 2 mm carbon fibre rod supports the centre of the elevator. The hinge edges are bevelled and the hinges added. I followed Ian Easton's 'Top Tip' and used the material from old 3.5" floppy discs for the hinges and they have been excellent. See Ian's delightful Hornet Moth plan and article in the April 2012 issue of RC Model World. The 1/16" ply control horns are added after covering.

Fuselage

The first task is to make the centre section struts from 3 x 1 mm carbon fibre strip, which are cyanoed to a 1/32" ply template for accuracy and support. The template is then trimmed leaving the struts, faced with the ply and the lower tank side in position.

The basic fuselage sides are cut from 3 mm Depron and the strut positions accurately marked. Using a 3 mm file carefully file away the outer surface of the Depron to a depth of 1 mm where the struts will lie. The struts are then glued in place and the fuselage sides faced with 1/32" balsa. Note that a top 1/8" strip is left uncovered at this stage to provide a good gluing area when later adding the decking.

The parallel section of the fuselage is now formed using the three F1 6 mm Depron formers. The sides are joined at the rear, together with the 3 mm Depron top. The servo mount F4 and the 6 mm rear spacing formers

When the wings are fully assembled it is possible to remove the entire wing assembly in one piece over the tail without de-rigging

Opposing side views of Jason's 'engine' installation

are added. Holes are cut in these, together with small exit slots at the rear sides so that the carbon fibre pushrods can be fitted. The rear underside is covered with 1/32" cross-grained balsa.

An 'egg box' spine comprising parts F8-F12 is now added to the rear fuselage. A paper pattern is made for the rear decking and transferred to pliable 1/32" balsa. One edge of this decking is glued to the top of the fuselage and the wood is rolled over the formers and attached the other side. Repeat the process for the front decking. When dry remove the cockpit openings.

The lite-ply former F3 has a groove filed right at the rear to accept the undercarriage cross wire and this will ultimately be secured with a sheet aluminium plate held in place with small self-tapping screws. You could move the entire undercarriage forward by 1/4" or so. Of course, this is not to scale but will help avoid nose-over landings. Once again the choice is yours. The wing mounts F5 and F6 are fitted with M3 blind nuts and the F7 front lower wing support are glued firmly in position.

It is now time to fit the F2 motor mount and plank the front nose section with soft 1/8" sheet. I chose to make a plastic moulding for the nose block. This was fixed with tiny self-tap screws to a mounting ring attached to F2. The moulding allows more space for the motor. Because space for the engine was limited, my friends at All Electric RC suggested fitting a Suppo A1510 motor. They also provided advice on batteries, speed controllers and propellers for the model.

TOP TIP

For small motors like the Suppo A1510 face your motor mount with 2 mm Depron and attach the motor with self-tap screws. Use the screws to adjust the thrust line. The Depron will compress as required.

Details

Having studied pictures of the full size Gypsy engine, I made a simple but effective version for this model. Mount the four prepared cylinders on the top cowling and then add the rectangular head block. The front plate, with its three distinctive holes, is fixed next, followed by the shaped, very thin aluminium sheet (drinks can) starboard side engine cover. Finally, there is a tapered fairing from the rear of the head block back to the front windscreen.

The exhaust pipe is a feature of the Moth. I bought a length of 3/16" thin walled aluminium tube and bent it gently by hand to shape. Balsa was then wrapped round the thicker sections. The exhaust pipe was attached to the fuselage after covering with clips made from thin strips of aluminium.

G-AAAH has vintage style wheels mounted on a full width axle and cross bracing on the front struts.

Battery Hatch

The underside of the nose section, from the front of F3 to the motor mount, forms an access hatch for the batteries. It comprises a 1/32" ply plate faced with soft balsa and held in place with small locating blocks. A recess across the hatch locates the undercarriage front cross wire. Hardwood stub-dowels and wire hooks are Araldited (epoxied) into the fuselage sides. When the undercarriage is in place a small rubber band engages with these hooks, and with similar hooks on the front landing gear strut. This simple arrangement holds everything in place. A 6 mm Depron tray for the ESC and receiver is located above the battery bay.

Jason hand launch – nice and gentle does it!

Low fly by and perfectly stable

Amy's Gypsy Moth climbs to altitude in the bright but cold weather

Covering

I used Solite to cover both models and Solartrim for registration lettering, etc. Solite is ideal for small lightweight models. Be careful when applying it to the flying surfaces that you attach it only to the wooden parts. Do not iron it to exposed Depron because if the covering attaches to the Depron you ruin the effect of a covered 'wooden' structure. Low heat and patience is the name of the game.

The added depth of colour of the green Solarfilm on the fuselage seemed worth the few extra grams of weight. But by all means use Solite, if you wish, on your fuselage.

With the tail mounted and the pushrods connected to the horns using E/Z connectors, install the radio. Attach both the wings and ensure that everything is square and true.

Wing Struts

The wing struts are fitted to the completed model. First bend 20 SWG wire to fit in the aluminium tubes on the lower surface of the top wing. Make these over length to pass right through the tubes in the lower wing. Two layers of 1/32" balsa sandwich the wire, which has a small 'V' in the middle to stop the struts rotating. Lastly remove any surplus wire protruding from the lower surface.

Elastic thread rigging is attached to small wire rigging hooks on the wings by loops secured with small lengths of crimped aluminium tubing. Black 'Beadalon Elasticity Bead Chord', 0.8 mm diameter, is ideal. The cross wires between the wing struts pull the struts onto the fixing tubes on the underside of the top wings.

Once the model had been successfully trimmed I added a drop of glue to the lower fixing so that the wings would stay in one piece. When the wings are fully assembled it is possible, with care, to remove the entire wing assembly in one piece over the tail, without de-rigging. Believe you me, this is a real bonus!

Flying

Properly trimmed this little model of Jason flies well. In previous summers I was able to get the model to take-off easily from a new mown strip. However in January, with a very soggy and rutted strip, hand launches were the order of the day. These small models do need smooth runways for take-offs and landings. My thanks go to Andy Stone, who got some superb aerial shots using his new top of the range camera.

The large rudder works well and at this small scale the decision to omit working ailerons was sensible. The initial settings were 1/2" each way on the rudder and 1/4" each way on the elevator. Although Jason will handle some breeze, small lightweight scale park flyers like this are really meant for those long still summer evenings – can you remember them?

Meanwhile, now is the time to prepare your own version of a wonderful aircraft that was flown by a legendary woman, Amy Johnson, all the way to Australia!

Editor's Note

Our free plan this month is the same as the one that we published in the February 2013 issue of RC Model World, MW3626, but with some minor text changes relating to Roger's new version of Jason. It still includes details for building both a Gypsy and Cirrus Moth.

RCMW

Why not prepare your own version of a wonderful aircraft that was flown by a legendary woman, Amy Johnson

Jason is nicely lined up for landing on the frosty grass

RC MODEL WORLD

SPECIFICATION

NAME:	De Havilland DH60 Gypsy Moth
TYPE:	Park fly, scale electric
WINGSPAN:	30 in
WING AREA:	252 sq in
ALL-UP WEIGHT:	12.5 oz
WING LOADING:	7.5 oz/sq ft
FUNCTIONS:	Rudder, elevator, throttle
POWERTRAIN:	Suppo A1510 outrunner 12 Amp ESC 800 mAh 3S LiPo 6" x 3" GWS prop

CONTACTS

All Electric RC
www.allelectricrc.co.uk
01782 788778

Hobbycraft
www.Hobbycraft.co.uk
Mini corrugated cardboard 'Paper Touch' (from good art shops)

PLAN DETAILS

PLAN NAME:	De Havilland Gypsy Moth 'Jason'
BUILD CATEGORY:	Intermediate/Advanced
PLAN NUMBER:	MW3626
PLAN PRICE:	£13.50
ABS NOSE CONE:	CA3626NE £5.50

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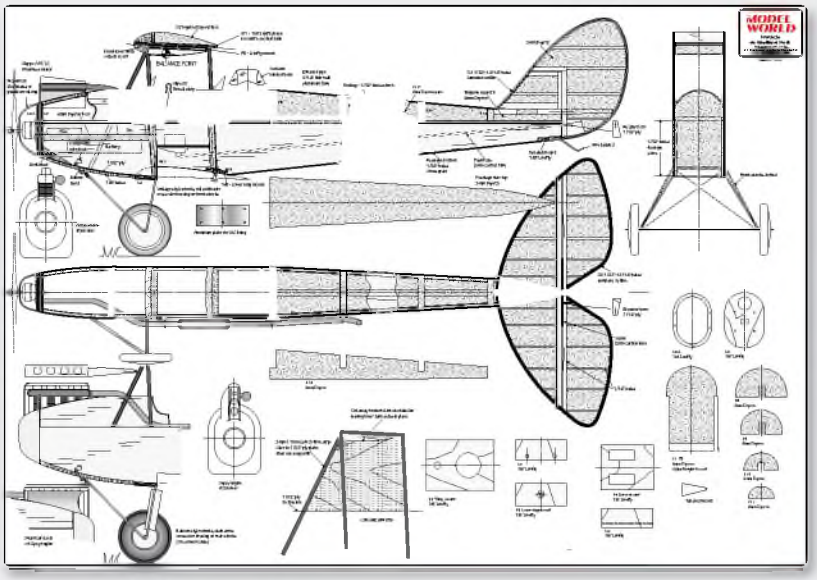


TURNING & BURNING

Dave Wilshere begins an occasional column based on higher specification models, primarily petrol planes and jets. For his first article Dave asks if we care for our models enough, as he explains how and why we should look after them from the outset, takes a look at servo voltages, powering digital servos and gives top tips on failsafe settings

Seen at the Long Marston JMA event, this well-maintained Lightning belongs to Luke Metcalf (TvG photo)

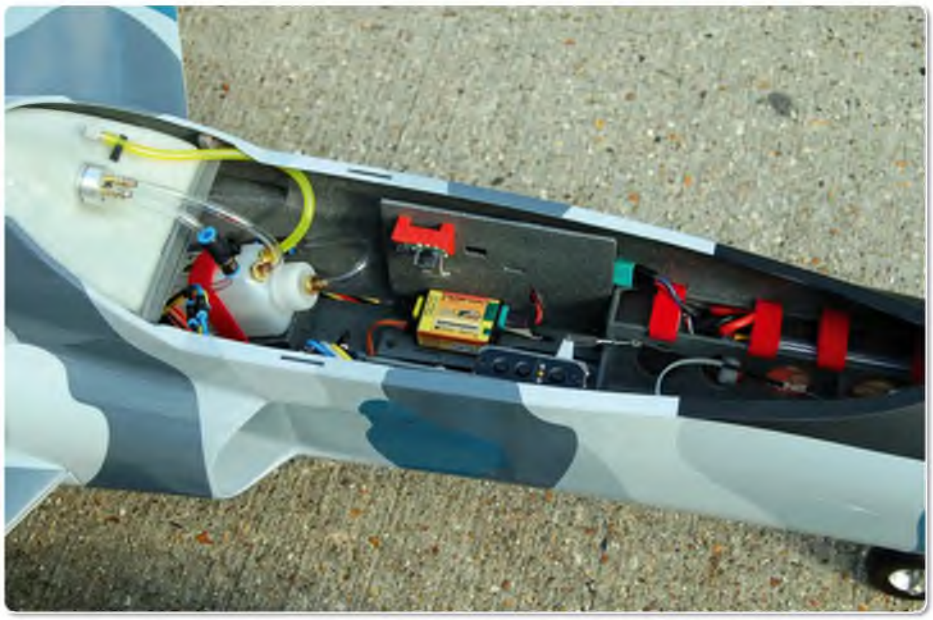
I've asked quite a few people what part of the hobby they enjoy most, i.e. building, owning or flying? It's clear that people have different priorities. At events some people never stop flying and others are happy to have a couple of flights before spending the remaining time sitting in the pits with their model.

In the UK the majority still seem to assemble their own models but it is getting closer to an even split with 'hobby' time spread too thinly. There are just too many fun things to do, all of them so accessible and available for your spare cash.

Equipment has become so reliable that models can last for years. Like cars and bikes, people will pass them on after a while. But good quality gear is only part of the requirement for a long life.

Apart from selecting a good manufacturer, knowing that the airframe was assembled with quality glues and protected against future deterioration is just as important. The internal finish is almost always left to the person assembling the airframe; the vast majority of composite airframes still have wooden formers supporting the structure.

Looking around models I see at events I'm amazed by some people's apparent model life expectancy. I can only presume they expect



Mark Brown's Ultra Flash has all the wood parts treated with ZAP finishing resin and then sprayed with my favourite, 'Aged Iron' textured spray

This is how Mark's kit came before the woodwork was sealed and painted. The wood trays are supplied loose, so are easily treated to the same finish

a short life by the fact the wood parts are left plain and untreated, ready to soak up fuel, which is basically runny oil.

There cannot be many people flying turbines who have not been through the fuel burning model stage. Even from my earliest days I remember fuel proofing the inside of the fuselage, paying particular attention to the tank bay and motor area. Turbine models are the same!

Balsa wood soaked in oil loses all of its excellent qualities; the open cell nature of the wood soaks up the oil. Just because plywood is generally formed from hardwood and is resin rich does not stop it from soaking in oils. Any joints will be compromised once soaked in the oil and our composite airframes still rely heavily on wooden formers to support flight and landing loads.

I have always sealed the wood with epoxy finishing resin; two coats are enough generally. It's also possible to paint this for a nice finish. I pick colours that don't show fuel stains as many oils leave a yellow stain, so white is not a good colour.

Small fuel spillage is annoying, and burst tanks and 'popped' fuel bungs can empty litres of fuel into your fuselage. Smoke oil is even worse and seems to get everywhere! Protection takes very little effort to do, so why skip this important step?

Servo Voltages

Your chosen brand of radio does not tie you into their range of servos. Certainly in the UK JR servos can be found in the majority of jets. This choice goes back to a time when we had not seen a single lithium battery.

On many of the JR Propo servos the operating voltage is stated as 4.8 V. This is very misleading as there is no energy source (battery) that actually gives out 4.8 V. Most popular power management devices are generally set between 5.5-6.0 V for non-HV (High Voltage) servos. The 4.8 voltage term comes from the four-cell (4N NiCad/NiMH) style cell packs, which nominally each have an individual cell voltage of 1.2 V (x 4 = 4.8 V). This voltage is really only applicable when the packs are near flat.

The Ni** type of cell reaches 1.5-1.57 V per cell towards the end of a charge, so giving a 6-6.3 V pack voltage before the voltage settles. In use a good pack will deliver 5.7 V, so as you can see even on a 4-cell Ni** battery none of these servos actually operate at 4.8 V!

Electric flight speed controllers that feature a BEC (a feature that supplies your receiver its power down the throttle lead) will normally be set to give between 5.5 and 5.6 V, also above 4.8 V.

The popular PowerBox products have been used by thousands of modellers and feature in all my jets and more than 50% of my personal fleet of models. These devices mostly produce an output voltage of 5.9 V and many thousands of flights have given me zero servo or radio failures!

The reason JR say that 6.0 V should not be used on these servos is because people would think of a 5-cell (5N) pack as 6.0 V. Again, as mentioned, this is a near flat voltage based on 1.2 V per cell. The reason this pack is not suitable for JR servos is that 5 x 1.5 volts is 7.5 V and that's HV territory!

To remove any chance of using the wrong voltage, JR have introduced Wide Voltage servos. WV servos will work between 5 V and 8.4 V, with obvious differences in speed and power.

Digital Servos: Why We Should Use Them?

Non-digital servos have poor holding power. This is due to the servo's motor not being powered constantly in the way a digital servo's motor is. Also a standard non-digital servo

4-cell 4.8 V NiMH on charge at 0.9 A

After 2 mins 5.86 V and after 7 mins 6.18 V... So not 4.8 V!

does not produce its stated torque until it is moved some distance; it builds up to it each time it moves.

For jets holding power is more important than the actual torque developed. If it can't hold its position under load it will allow blow back and you get a spongy feel to the controls.

You can have the same servo motor in analogue and digital servos (the actual complete servo design, other than the processor driving the motor from the receiver's information can be the same). The majority of servo motors in digital servos are the coreless type, offering faster, smoother response due to lower moving mass within the servo motor.

The advantage of a digital servo is the near instantaneous response to any attempt to move the servo arm, in most cases by loading. When a control input is requested all the servo torque is available the instant you start moving the control stick; this is from any stationary position, centred or part way across the stick travel.

The biggest gain is the holding power. A digital servo will almost 'lock' solid at any position. So if you move a surface to a position, it will stay there.

The dead band is also less due to faster response time. This can be the only downside of a digital servo. Heavier surfaces with free hinges, coupled with long control arms, can create enough force to move the servo centre position away from the centre point and the servo responds to this and moves it back quickly. Trouble is the mass of the surface can make a servo over shoot and it goes past the position it was looking for and the whole thing starts again. This can cause a surface to buzz or flutter on the ground. Stabilising the surface will stop it and in the air the airflow supports and dampens this tendency.

Many of the programmable servos now available allow tuning of the dead band.

Fast servos can be adapted, so rather than stopping suddenly they decelerate and accelerate with less urgency, but still keeping the power. Reducing the servo arm radius to keep it as short as possible will reduce the chance of this happening as it reduces the leverage on the servo. It is always best to use the shortest servo arm possible; most servo torque figures are quoted at 1 cm radius, so geometry with long servo arms and short surface horns reduce the torque.

You can tell a digital servo by the 'tone' noise they make when any load is applied. Just the friction from linkages is enough to have the motor powered and they sing. This does not mean they are overloaded, but you do need to understand whether a servo is screaming for mercy or happily controlling the load.

So, summing up, max torque is achieved much quicker from a fraction of a degree's movement. Holding torque is much greater than analogue servos and processing speed is greater. This is achieved by powering the servo motor longer and sending information to move position faster.

Fail-Safe Settings

The step of setting your fail-safe is often overlooked, even though it is hugely important. In the UK we have a minimum requirement for jets of the turbine going to idle. This varies with sites; if the JMA (Jet Modellers Association) run an event where there is an increased fire risk we can change this to turbine stopped.

There are valid arguments over both options but overall the most important thing to remember is we don't want any crashes!

Stopping the turbine completely on a heavily loaded jet guarantees a difficult landing; at best it gives little chance of recovery from what would almost certainly be a tricky situation.

Digital servos have good holding power and should be used throughout an installation in turbine-powered models (Dave Gladwin photo)

Operating our models on 2.4 GHz reduces the likelihood of a fail-safe occurring. Outside interference is greatly reduced, though not totally as some may think! Either way the fail-safe only deals with a lack of signal getting through; it does nothing if there is a power failure!

Care needs to be taken in ensuring the fail-safe you set actually functions. Some dual Rx systems require you to set the fail-safe in the unit and not via your transmitter.

Although the primary safety concern is closing the throttle, I also fail-safe the gear, flap and any airbrake function the model might have. My default setting is gear down, flaps down and airbrakes open.

The gear down option comes from 35 MHz days, when the chances of a loss of signal were much greater. If the model is well trimmed and flown smoothly you could have lost control and not realised immediately; by the time you did it may have flown further out of signal range making recovery harder. Seeing the gear cycle was a warning that is easy to see. Dropping the flaps and airbrakes adds maximum drag, slowing the model down, again giving more time to react! ***RCMW***

CONTACT

Dave Wilshere: motrot@aol.com

Completing the line-up of Xcalibur sports jets, the latest Mini Xcalibur is due in the first quarter of 2016. Suiting 20-35 Newton micro turbines it is sure to be popular!

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SCALE SOARING

Chris Williams begins this month's scale gliding column with a tale of two monsters!

Barry Cole and Bergfalke with their pre-maiden photo-op – see 'A Double Maiden'


Scheibe
B
F

Some time back there was a ripple of excitement in the scale soaring community with the appearance of the very large K8 ARTF gliders from Phoenix Models, which, for their size, were very modestly priced indeed. My pal Motley decided to take the plunge and in due course the model was geared up and ready to rock and roll.

Its first aerotow appearance was at a Ghost Squadron event at Middle Wallop, always an exciting day out, although this time there was more excitement than usual. First up, one of the smaller versions of the same glider from the same manufacturer shed one of its wings, its pilot miraculously landing the remains in one piece.

Funny, we thought... Later, a hoarse cry from Mott clued us in to similar scenario: half of his starboard wing had gone AWOL! (After a lifetime in the motor trade, he prefers to call it the offside wing). Once again, we were treated to some excellent airmanship, the model being landed without further damage, albeit some distance away.

In the following weeks we learned of several similar incidents around the world, giving rise to the phrase 'K8 Confetti'. So, what to do? The thing of it was that, as long as the wings stayed on, these models were a delight to fly, being slow and scale-like due to their size, and without any discernable vices.

Without further ado, Mott set about stripping the airframe to discover a lamentable lack of decent wood and an even more lamentable lack of glue. Grimly he set about a series of modifications (luckily he had a spare set of wings): these included retrofitting spruce spars into the wings and introducing the airframe to the delights of being glued. The modified machine was tested out at White Sheet Hill and looped several times in succession to prove the success of the mods.

This idea caught on and several K8's around the country were thus modified, giving rise to the phrase 'Certificate of Mottification'. As a consequence of the foregoing, retailers could barely give their remaining stock away and crafty old Motley decided to cash in and buy another one at a bargain basement price. This sat in his loft until he had finished his HW4 Flamingo, whereupon it was disinterred and spread out on the bench, for a cunning plan had begun to form.

Amazingly, Geoff Crew's first 40% K8 landed more or less conventionally in this condition

Alternative ways to power a glider. This is Al Machinchy's electric Windex

The stick-on pod auxiliary power method

Paritech's impressive half-scale electric Fox, pictured here at Middle Wallop

The business end of the Paritech Fox

Consistent low-level aerobatics were part of the Fox's display

Your author strains a gusset to launch the mighty K8

Power Up

During the previous season we had seen one or two scale gliders wearing moustaches, yes the dastardly act of electricityfication was now spreading to the previously unsullied and pure form of the scale glider. (Ironically, the same thing is happening in the full size world, where retro fitted electric motors are described as 'sustainers'. Therefore, to describe such activity as un-scale could leave you standing on thin ice!)

Now, there are three ways to electrify a scale glider (not including a ducted fan) each with its own set of problems. You can fit an up-and-go, which can be very expensive, complicated, and needs major fuselage surgery. You can fit a pod, which sticks vertically out of the fuselage, but this really does look un-scale and ROG can be complicated due to the nose-down force from the high mounted motor.

Or, you can fit a moustache... This involves placing the motor as far up the front of the fuselage as you can, fitting a bearing-mounted shaft extension if necessary, and popping a folding prop on the front. The most extreme example we had previously seen was, once again, at a Middle Wallop event (I told you these events were exciting). This was one of the German firm, Paritech's half-scale Fox, complete with folding prop. The full size Fox is an aerobatic machine and the usual way it works is for the glider to release at altitude and perform its schedule, swiftly losing height in the process. Therefore, from the spectator's point of view, most of the action is too far away to be truly exciting, and it's only the last low-level whoosh from the glider that gets the pulses racing. What a difference whiskers make!

The Paritech Fox ROG'd and almost immediately became inverted, gaining a little height in this attitude. Then it proceeded to do all the things that the full size could do – loops, rolls, bunts, flick-rolls etc.– but all at a low altitude, so the spectators could hear the shriek and wail of the slipstream being tied in knots by the control surfaces.

I think it must have been this that sowed the seeds in Motley's subconscious, because it was the insertion of facial hair on the K8 that he had in mind when he laid all the parts out on the bench. With a deft twist of his arm, I persuaded him to briefly detail his adventures...

'...the mods were basically the fuselage reinforced from rear of canopy to nose, with fibreglass/resin around inside nose areas and 0.8 mm ply inserted between the keel and lower longerons for additional strength. The aero tow release was inserted approximately 50 mm below the original one and slightly off centre, with 10 mm brass tube exiting into

The electrified K8 in action at White Sheet Hill

Neat installation makes the 'sustainer' very unobtrusive

one side of the lead weight box for the servo placement, which was then sectioned off to accommodate additional lead. The original tow release mounting was removed in order to accommodate the extended motor shaft and additional front bearing/housing assy.

With slight modification to the internal nose formers a removable support was made to house the 2 x 5S LiPos. Smallpiece (another member of the gang) kindly machined a new 8 mm motor shaft and retainer end, along with an additional front bearing housing. A 1/4" lite ply plate was made up to accommodate the four motor captive Tee nuts, plus an additional 1/8" ply mount plate on top, tapered to allow for approx 3 degrees of lower offset. This was then epoxied in place after drilling out 2 x 8 mm air vents for motor/ESC cooling...'

Once the job was done there was a long and tedious wait as the wettest winter on record continued to assert itself. But finally, in the first week of the New Year, a brief opportunity arose for a test flight, once again on White Sheet hill. The conditions were tailor-made: a very light wind, giving a small but reliable amount of lift, and some very welcome sunshine.

Once the model was rigged, myself, Motley and Smallpiece drew straws and, dagnammit, I drew the short one. This made me the designated launcher. Although the K8 is of a daunting size, it wasn't too difficult to hoist her over my head and commit her to the air. She floated around slowly, looking every bit like the full size, and when Mott opened the throttle it became evident that there was plenty of oomph to spare.

The Bergfalke braves the 40 mph winds

The Bergfalke in action at White Sheet

The Brown Zone

What followed was pretty much the opposite of the antics of the half-scale Fox – after all the K8 is not a particularly aerobatic machine. What followed was surely the purest essence of flying, where the sensations of the spectator were identical to those of the pilot.

By now the afternoon shadows were lengthening and the wind had almost died to nothing. Floating by in a close pass from behind the hill, you could hear the muted hiss of the air flowing over the wings. And when down elevator was applied, as the model crested the slope, the hiss became a whistle and the K8 entered the Brown Zone where un-powered gliders would not dare to fly, unless forced there by lack of lift.

The Brown Zone (similar to the Red Zone, but somewhat whiffier) is that bit between the edge of the slope and the trees below, where many of us have had to brave the rigours of an out-landing. Floating serenely above the trees, Mott gave them the metaphorical finger, before gently powering up to repeat the process a few more times.

Kudos, then, to the lad for achieving a machine that is both impressive and practical, and for demonstrating a whole new flying experience. I was so impressed that I decided there and then that my new project, the Slingsby Dart 17R, was definitely going to be adorned with facial hair!

For those that like all the grisly details, here's a list of the stuff in Motley's glider:

Turnigy G160 290 KV motor: £52
Turnigy Delux 120 A HV Speed Controller (opto): £74
2 x Dynamic 5S 4500 mAh 30C LiPos: £36 each
6 x Power HD-1201 MG servos 13 kg stall torque: £9
52 mm yoke and 12 mm/8 mm shaft collet: £19
16 x 8 RFM F/Prop (Full Carbon): £24
Xpower switching voltage regulator (5-6 V) & Xpower SVR 3S connector: £14
440 mm Electric airbrakes (pair): £49

It should be pointed out to anyone dabbling in large-scale electrics that the folding prop blades really do need to be up to the job. The original prop, an Aeronaut 16 x 8, let go when Mott was demonstrating the set up to his son-in-law, in an episode now known as the Big Bang!

A Double Maiden

Last time around I detailed the maiden flight of Motley's HW-4 Flamingo and mentioned that Smallpiece's Bergfalke would soon be ready to go. As it turned out the Bergfalke's maiden dovetailed into the maiden flight of my Slingsby Eagle one extremely windy day over the Christmas period at White Sheet Hill. With the wing howling and shrieking at 40 mph plus, I thought I was mad even trying to fly the Eagle, but the recipient of the DFO (Distinguished Foolhardiness Order) must surely go to Smallpiece, whose scaled-up glider has a very modest wing loading.

Nevertheless, mindful that it might be many a month before another weather opportunity might arise, we persevered. And I'm glad to say that both maidens passed off without incident. The Bergfalke is scaled up from one-quarter to 1:35 from the Traplet plan and coped amazingly well with the extreme conditions. The Eagle will appear at some stage in the pages of RC Model World as a plan feature, so I'll say no more about it.

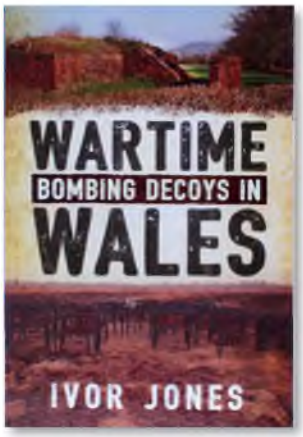
RCMW

IN PRINT

Another selection of new books to add to your aviation library

Wartime Bombing Decoys In Wales

By Ivor Jones
Fonthill Media, 160 pages
978-1-78155-233-9
Paperback, £18.99



If you pick up this book expecting to see details and pictures of those lightweight but effective decoy aeroplanes, boats and buildings used to deceive enemy pilots during World War 2 then you are likely to be disappointed. Such creations, fabricated by the British Decoy & Deception Scheme, based at Shepperton Studios in Middlesex, were intended as daylight decoys and were mainly used at 'K' sites in the south and east of England.

But don't cast off this absorbing book too quickly as it covers another fascinating side to the story of how bombers were distracted, this time at night using light and fire based decoys on dummy airfields. Called 'Q' sites, the decoys described in this book protected important sites around Wales. These included the main towns and cities, as well as ordnance factories, naval dockyards and railway marshalling yards.

After describing how the various decoys were made, Ivor Jones sets out to find the remains of many of the 'Q' sites. With the help of both wartime and modern photographs he shows how the sites were laid out and points out the remaining buildings and structures, many of which are still hidden and giving away little evidence of their top secret past.

Tornado In Pictures

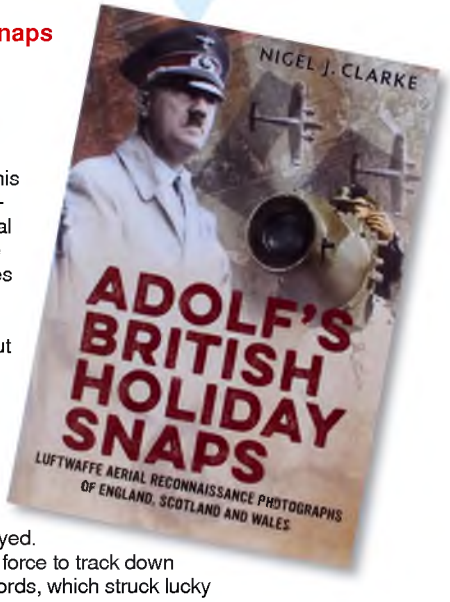
By David Gledhill and Darren Willmin
Fonthill Media, 96 pages
978-1-78155-463-0
Paperback, £14.99

A perfect 'coffee table' book, Tornado In Pictures: The Multi Role Legend shows the famous Multi Role Combat Aircraft in all its roles – as an Interdictor/Strike aircraft, an Air Defence variant and as an Electronic Combat & Reconnaissance platform. Describing flying the powerful aircraft from the aircrew's perspective, ex-RAF navigator David Gledhill offers a knowledgeable insight into operating the Tornado from within the cockpit.

Packed with pictures taken by the authors from the ground and air to air, this paperback is a worthy tribute to a highly distinguished military aircraft that has been in service since 1979. Sadly all great aircraft are replaced eventually and the Tornado is rapidly approaching the time when the last GR4 will be withdrawn from operations, to be replaced by the F-35 Lightning II, which is a highly versatile STOVL Multi-Role supersonic stealth aircraft.

Adolf's British Holiday Snaps

By Nigel J Clarke
Fonthill Media, 224 Pages
978-1-78155-119-6
Paperback, £16.99



Despite its light-hearted title this book covers a serious subject – the hunt for the Luftwaffe's aerial reconnaissance library after the WW2. The Allies sought pictures of Russia and the Eastern Bloc countries, while the Soviets wanted similar information about Western Europe.

The Red Army actually found much of the original Luftwaffe records in the chaos following the surrender of Berlin but then lost them when the river barges that were transporting them were attacked and destroyed. The Allies set up a special task force to track down any remaining pictures and records, which struck lucky when they found 16 tons of reconnaissance pictures in a barn deep in Bavaria. The entire find was sent back to Britain to be archived, where it was classified as Top Secret.

The United States declassified the records in the 1970s as satellite imagery had made the collection largely redundant for military use. But the images taken all over the UK were still used to resolve rights of way disputes, to show the loss of woodlands and hedgerows, and to help find the sites of unexploded bombs, as well as a myriad of other uses.

Packed full of aerial pictures of Great Britain, with other wartime pictures used to add plenty of context, this interesting book provides a fascinating look at well known areas of town and country in the late 1930s and early 1940s, with the unique perspective of having been taken by our would-be invaders.

Bloody Paralyser

By Rob Langham
Fonthill Media, 192 pages
978-1-78155-080-9
Hardback, £20.00

Spanning 100 feet, the mighty Handley Page Type O was the largest plane to ever emerge from a British aircraft factory when it took to the air for the first time in December, 2015. Hence the subtitle of this book: 'The Giant Handley Page Bombers Of The First World War'.

Nicknamed the 'Bloody Paralyser', with a nod to what it was intended to do to the German forces, this book smoothly blends quotes from HP aircrew with the author's own words to give a fulsome account of the operational use of the big bomber, starting with the original twin engine O/100, through to the more powerful and perhaps better known O/400, and concluding with the four engine V/1500 of 126 foot wingspan, the latter having been designed to reach and bomb Berlin.

Although mostly descriptive, this excellent book contains a 16-page central section with many black and white images of the mighty bombers, the size of which can be gauged by the Lilliputian figures alongside!

Following the First World War, the large aircraft found new roles as postal and wireless test aircraft. And of course their large size made them perfect for a brand new role – conversion to airliners...

DER JÄGER D.IX

Feature Plan

A 1270 mm span WW1-style American home-build from the 1970s, rescaled by Laddie Mikulasko for four function R/C and electric power

AT A GLANCE

SCALE:	1:5.76
MODEL TYPE:	Sport-scale R/C
SKILL LEVEL:	Intermediate builder/pilot
WINGSPAN:	50 in (1270 mm) top wing
WING AREA:	750 sq in approx.
LENGTH:	42 in (1067 mm)
WEIGHT:	4 lb 0 oz/1.79 kg approx.
MOTOR:	AXI 2826/10 brushless outrunner (300-500 Watt)
ESC:	40 A (plus) Opto
PROP:	10" x 8" APC-E
ENGINE:	.40 to .45 two-stroke IC
SPINNER:	2.25 in dia.
WHEELS:	3 in mains; 1.25 in tail wheel
RADIO:	Four function
SERVOS:	Four mini servos (40 oz/in output) (2 x A, E, R)
CONSTRUCTION:	All wood (optional Traplet Wood Pack WP3778)
COVERING:	Heatshrink film

Concept And Flying

Twenty or so years ago, in one of the aircraft magazines, I saw pictures and the three-view for a unique looking home-build biplane called Der Jäger D.IX. The full size plane was designed and built by Mr. Marshal White. Designated the White WW-1 Der Jäger D.IX it is also called the Stolp-White WW-1 Der Jäger D.IX/69.

I was attracted to the plane because of its shape and its colour scheme. I kept the drawing with the intentions of building a scale model of it. Finally, I decided to build the model to be powered by an electric motor.

Laddie gives scale to the colourful biplane

I designed the model for an AXI 2826/10 brushless outrunner motor using a JETI Opto 40 speed controller and 3S 3000 mA LiPo batteries. I used four Blue Bird BMS-380 servos for controls. For those who do not fly electric any .40 to .45 glow engine can be used.

I drew the plans and then proceeded to build it. When the model was finished the maiden flight was a non-event. The model tracked straight on take-offs and has excellent flying characteristics. It is fully aerobatic with no bad habits. The landings are straightforward. Even with the wheel pants the model doesn't nose over when flown off the grass.

I tried to make the building of this plane as simple as possible. For easy identification I have included all the parts and materials reference numbers on the wing plan sheet. The outer wing panels are removable. To gain access to the motor and battery the top half of the cowl is removable. The two aileron servos are mounted inside of the top wing. The connecting rods join the top aileron to the bottom one. The elevator and rudder servos are located inside the cockpit.

Building The Wing

On this model the individual wing panels plug into the fuselage using a 1/4" dowel as joiners. By themselves the dowels are not strong enough to hold the wing panels but once the panels are plugged in the main spar **(75)** will hold everything in place. It's not necessary, but hardwood dowels can be replaced with carbon fibre tubes.

First, transfer the outlines of the ribs and mark the location of the holes onto the plywood and the balsa. Once done, cut out the ribs and drill all the holes. Cut the 1/4" hardwood dowels **(69) (70)** and **(47) (48)** to the proper lengths. Glue two **(69)** dowels together to create a double width joiner for the top wing and then glue two dowels **(47)** together for the bottom wing joiner.

Build the top wing first. The top wing is in three sections – the two outside panels and the centre one.

Begin building the outside panels first. Pin the bottom main spar **(49)** to the board right over the plan. Pin the 1/4" sq balsa to the building board to be used as a shim under the ribs at the trailing edge. Position and glue all

Start of the wing build

Wing joiners are glued in at this time

The wing panel is sheeted before the aileron is separated

The aileron is being separated

The centre-section of the top wing is built while joiners are keeping everything aligned

Cabane parts and a complete cabane are shown

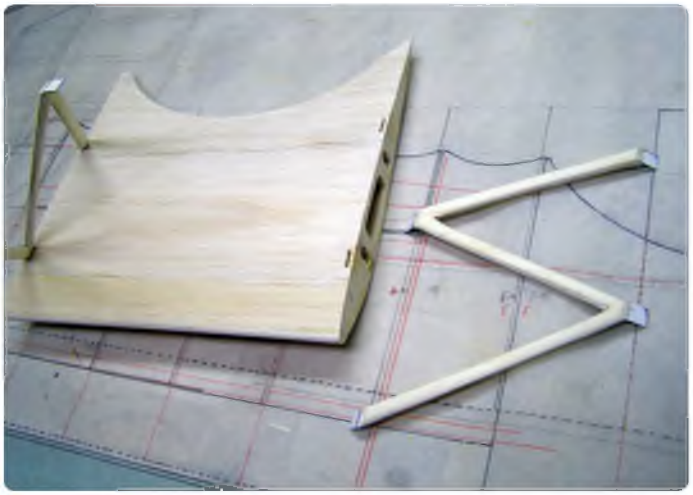
the ribs to this spar. Glue on the top main spar **(50)** to the ribs.

Cut out the trailing edge sheets **(55)** and **(56)** that include the scallops. Slide the trailing edge sheet **(56)** between the shim and the ribs. Glue the ribs to the trailing edge sheet. Glue the sub-leading edge **(53)** to the ribs. Sand the sub-leading edge so it follows the contour of the ribs. Glue the wing tip sheet **(66)** to the rib **W10**. Glue the top trailing edge sheet **(55)** to the ribs. Glue the top leading edge sheet **(51)** to the ribs and to the sub-leading edge. Glue on 1" wide aileron hinge balsa strip **(58)** to the ribs **W5** to **W10**. Glue on the top cap strip strips to the ribs. Slide in and glue the joiner dowels **(69)** and **(70)** to the ribs **W4** and **W5**. Do not go any further with this half of the wing. Build the other half of the top wing to the same stage.

Next, build the centre-section of the wing. Pin the bottom main spar to the building board. Glue the ribs **W1**, **W2** and **W3** to the spar. Glue the top main spar to the ribs. Now, take the two outside wing panels and slide the joiners into the ribs **W2** and **W3** all the way in. Glue the sub-leading edge to the ribs **W1**, **W2** and **W3**. Glue the top leading edge sheet **(51)** to these ribs. Glue on the rest of the top sheeting **(62)**.

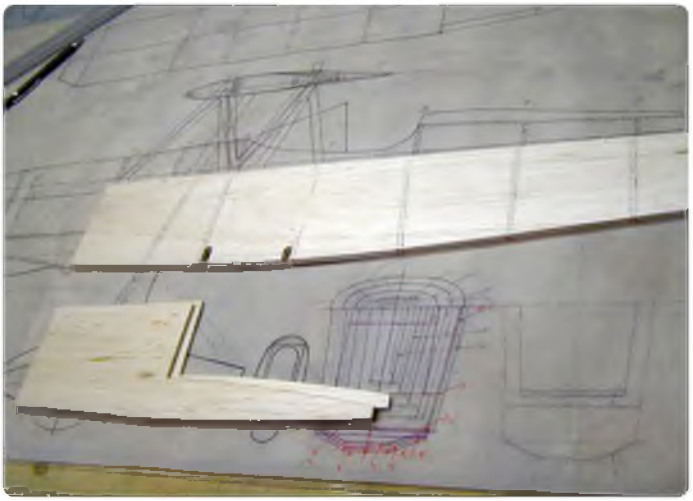
Flip the wing over on its back. In the centre section install the 'Y' harness for the ailerons. Glue the bottom sheeting **(61)** to the ribs **W1**, **W2** and **W3**. Glue in the plywood strips **(67)** to the ribs **W8** and **W9**.

You must use five-ply plywood; the plywood strips will be holding the brackets for 'N' struts and the main struts **(75)**. Glue on the bottom leading edge sheeting **(52)**. Glue the aileron strip **(58)** to the ribs **W5** to **W10**. Glue on the sheeting **(63)** over the ribs **W4** and **W5** and sheeting **(59)** and **(60)** over the ribs W7 and **W9**. Glue on the cap strips. Glue on the leading edge spar **(54)**. Separate the ailerons from the wing panels. Glue in the hinge spar **(57)** to the wing and the aileron leading edge



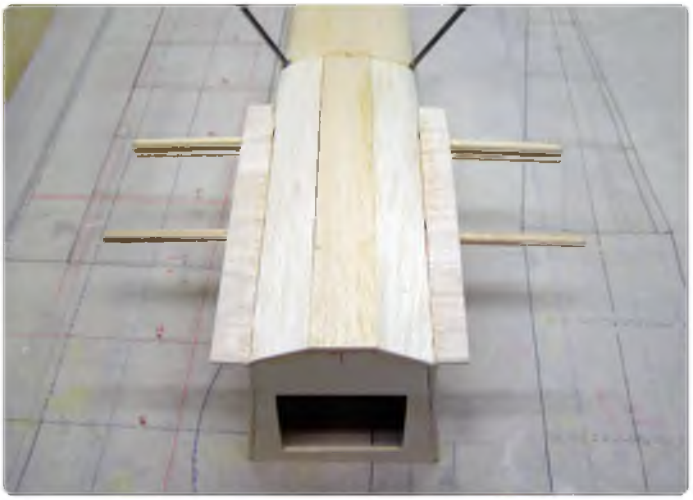
The centre-section is sheeted. Notice the slots cut out in the sheeting for the cabanes' aluminium tabs to go into

The bottom wing is partially built

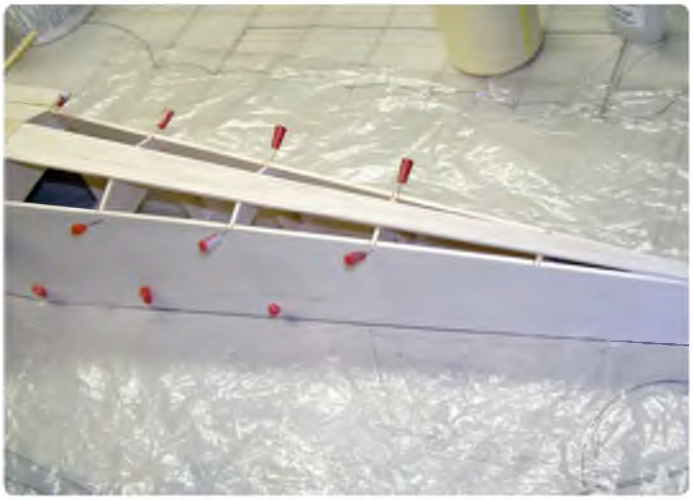


Cut two fuselage sides and mark former positions

The front half of the fuselage is built upside down



All the sheeting is done on the bottom of the front section of the fuselage



The rear section is added

to the aileron itself. Sand the wing. Glue in the plywood mounting frame for the aileron servo. Cut out the slots in the bottom of the centre section for the cabane struts to go into and one larger hole for the extension cable.

Build the bottom wing in a similar fashion. The difference is having the joiners **(47)** and **(48)** glued to the two identical root ribs **W11**, which will become part of the fuselage. The outside wing panels will slide onto them. Once the wing panels are built, line up both halves of the bottom wing and place 1/2" shims under the wingtips to get the proper dihedral. At this time glue the left joiners to the right joiners.

Tail Surfaces

Before building the elevators and the rudder, cut out templates from corrugated cardboard. Cut four 1/4" wide strips from 1/16" balsa sheet. Smear the glue onto the strips and laminate them around the templates to form the shapes. Use the pins to hold them against the template until the glue dries. After the glue is dry, glue in the rest of the frame and the 1/4" sheets.

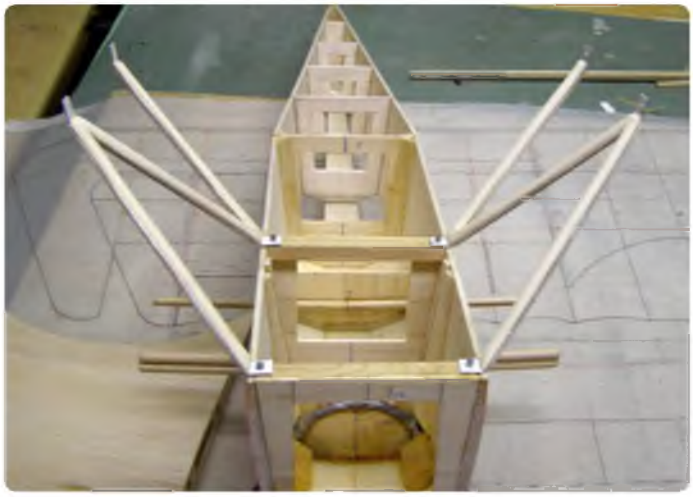
Build the stabiliser and the fin. Sand all the surfaces. Bend a 1/16" (14 SWG) piano wire to form the tail wheel strut. Take this strut and insert the end of it into the balsa sheet in the rudder. Glue in this wire with thin CA glue.

Now, wrap the whole sheet with fibreglass. Again, you can use thin CA glue to saturate the cloth.

Cabane And Wing 'N' Struts

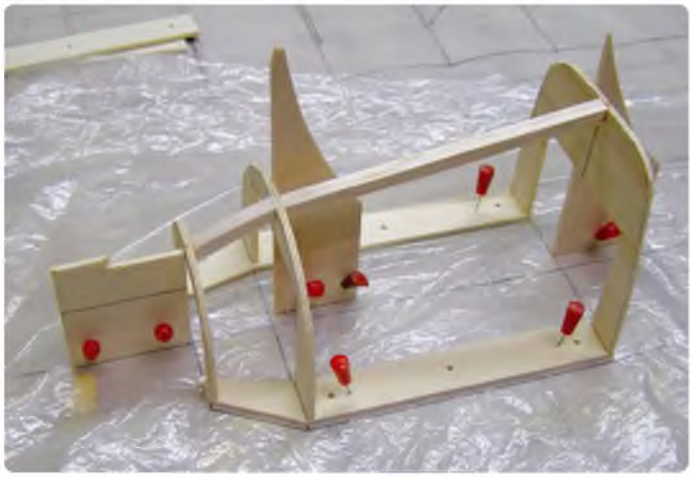
Use 1/8" liteply to cut out four identical cabane struts **(72)** and four 'N' struts **(74)**. Using 1/32" aluminium sheet, cut out two cabana struts **(71)** and two 'N' struts **(73)**. Drill the 1/16" holes in 'N' struts as shown on the drawing. Sand the surface of the aluminium with sandpaper. Using CA glue or GOOP type adhesive, glue the plywood pieces to both sides of the aluminium struts. Sand the corners of the plywood to stream line

Vertical triangular stock pieces stiffen the joints between the front and rear sections

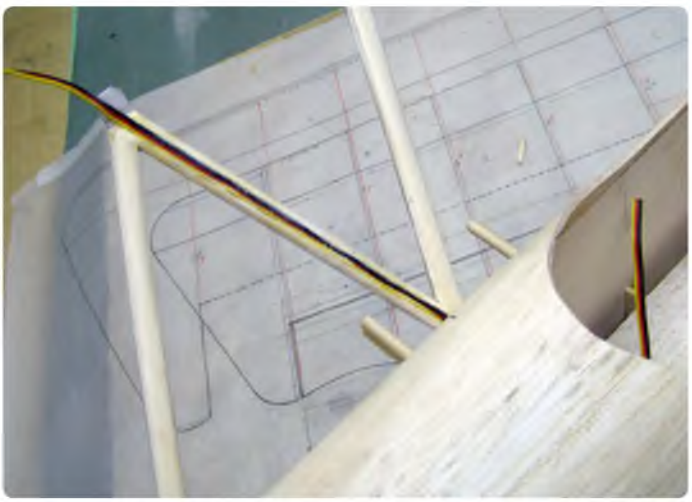


The cabane is screwed into the hardwood blocks

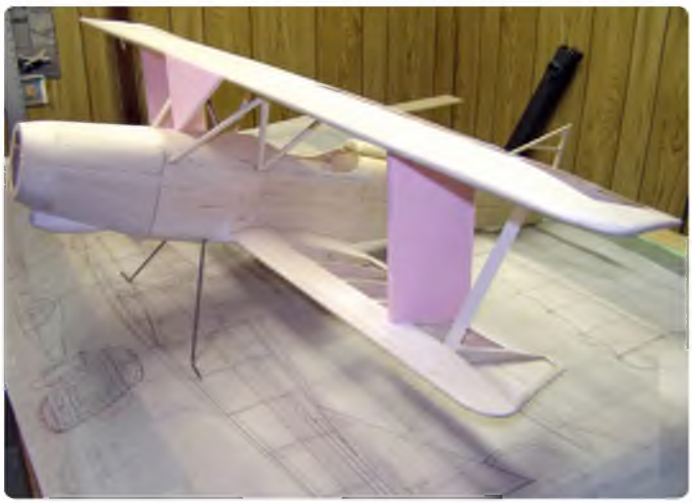
Top of the front fuselage section is sheeted. Notice the battery floor in place



The bottom of the cowl is being built



Aileron extension wires are embedded into the strut



Foam templates are used to align the wing geometry

the shape. In one of the front cabane struts cut a slot and insert and glue in the aileron servo extension cable. Wrap all the struts with fibreglass and saturate them with thin CA glue. Sand lightly and bend the exposed aluminium ends of the struts as shown on the drawing.

Building The Fuselage

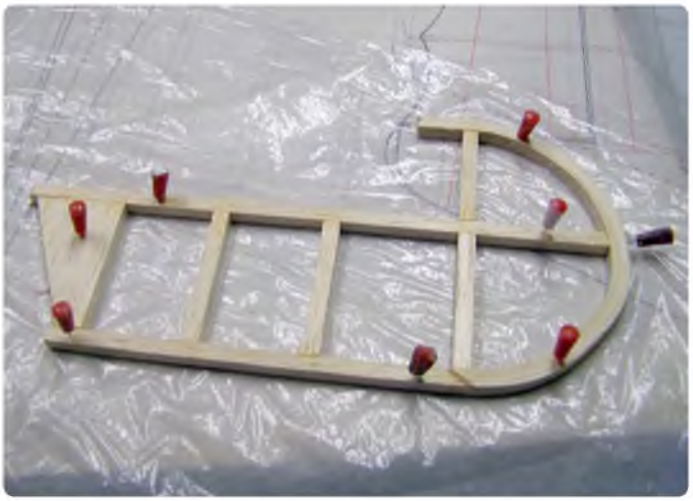
Cut out as many parts as possible. The fuselage is built upside-down in three sections; the cowl, the centre-section and the tail section. Cut and bend the 5/32" (8 SWG) piano wire to form the main landing gear legs. Attach the main landing gear legs to the former **F5** with thread. Glue the hardwood block **(17)** to the former **F4B** and hardwood blocks **(18)** to the formers **F3D** and **F6B**. Pin the formers **F3D**, **F5**, **F6B** and **F8B** to the building board. Pin and glue the fuselage sides **(1)** to these formers. Insert and glue in the battery floor **(13)**.

Insert and glue in the formers **F4B** and **F7**. Pin the formers **F9B**, **F10B**, **F11** and **F12** to the building board. Glue the rear fuselage sides **(2)** to these formers and to the fuselage side **(1)**. Glue 3/8" triangular stocks between the fuselage side **(2)** and the former **F8B**. On the outside of the fuselage, between the formers **F3D** and **F6B**, glue on the balsa doublers **(3)** and between **F6B** and **F8B** the doublers **(4)** to the fuselage sides.

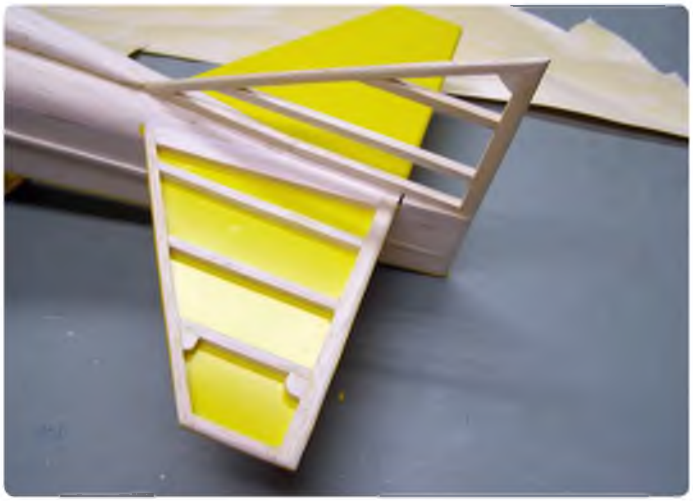
At this time the bottom wing has to be glued to the fuselage. Slide the joiners **(47)** and **(48)** into the slots in the fuselage sides **(1)**. Check the alignment and glue the joiners to the formers **F6B** and **F7**. Glue the balsa strip **(12)** to the bottom of all the formers. Complete the sheeting of the bottom between formers **F3B** and **F8B**.

Turn the fuselage the right way up. Glue the firewall **(20)** and firewall support sides **(19)** to the battery floor **(13)** and to the former **F3D**.

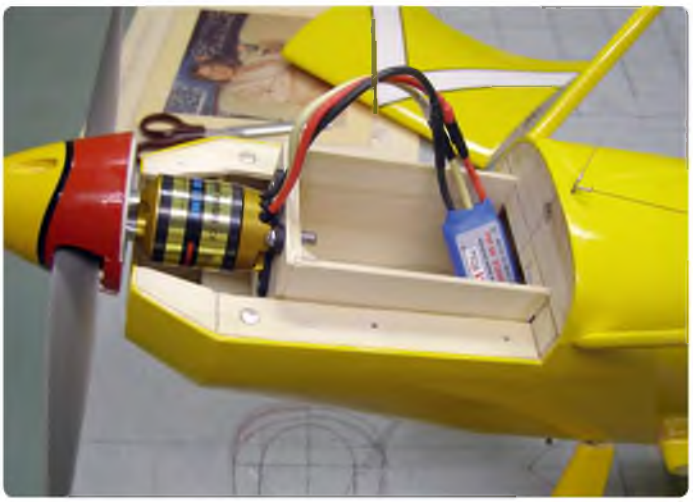
The cowl is built in two halves, top and bottom. Cut four identical plywood pieces **(21)**.



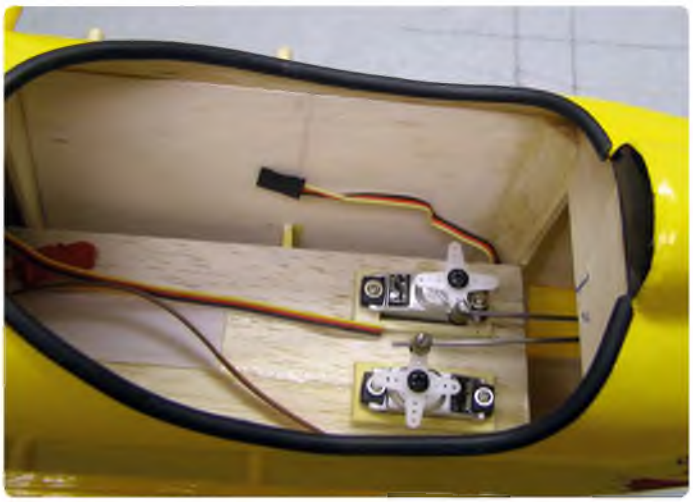
Elevator frame in build. Laminated tips are from four layers of 1/16" balsa



Covering the tail surfaces



The AXI motor is mounted and connected to the ESC



Elevator and the rudder servos mounted to the battery floor

Attachment of the connecting rod between the top and bottom ailerons

Twin stabiliser flying wires for additional strength

Drill a 1/4" hole for the magnets and drill a 1/16" hole for the guide pins. Pin two of the four plywood pieces **(21)** to the building board. Pin and glue the formers **F1B**, **F2B** and **F3B** to them. Insert and glue in a 1/4" sq. balsa into these formers. Glue on the sheeting **(9)** and **(10)**. Remove the bottom of the cowl from the building board and glue the scoop **(24)** to it.

The bottom of the cowl can be glued to the former **F3D**. Build the removable top of the cowl in same way but don't glue it to anything. Glue the magnets and guide pins into the plywood pieces **(21)**.

Next, mount the cabane to the hardwood blocks **(18)** using self-tapping screws. Insert the cabane's top tabs into the slots in the bottom of the centre-section of the top wing. Line up the holes on cabane struts with the holes in **W3** ribs and then with self-tapping screws attach the cabane to the **W3** ribs. At the same time feed the plug from the aileron extension into the cavity between ribs **W2** and **W3**. Plug in all the wing panels and check the alignment. If any adjustments are required, now is the time to do it.

Install the wing 'N' struts, again use self-tapping screws to hold them to the wings.

The most important drag strut **(75)** is to be installed now. Take the 1/2" K&S aluminium tube and cut it to the proper length. Flatten the ends. Drill a 3/32" hole at each end. Bend the ends so that the flat end is flush with the plywood **(67)** behind the main spar of the top wing. Same goes for other end, but it has to follow the contour of the hardwood block **(17)** in the fuselage.

Drill the hole in the hardwood block and the plywood for self-tapping screws.

Remove the wings from the fuselage including the centre-section. In the top wing, install the servo extension for the aileron servo.

Der Jäger is all dressed up

Top view shows off the bright scheme

A lively take-off!

The pretty biplane climbs out with ease, with plenty of power in hand

Settled down into a low circuit and looking good

Glue the stabiliser to the fuselage. Glue on all top fuselage formers. Glue on the top sheeting **(5)** to the front fuselage formers and the sheeting **(6)** to the back formers. Cut out the cockpit opening. Glue on the headrest **(25)**. Glue the longeron **(14)** to the side of the fuselage. Glue the fin to the fuselage.

Make the wheel pants and the streamline covers for the main gear legs.

Finishing And Set Up

Use your own method to apply the finish. I used iron-on Ultracote heat-shrink film. After the covering was completed, I installed the hinges and the servos. I installed a threaded connecting rod between the top and bottom aileron with a clevis at each end. The small 'L' shape aluminium bracket is attached to the plywood plate on each aileron with self-tapping screws.

The dummy engine is made from scrap balsa pieces and then glued to the top half of the cowl.

After the radio and motor are installed, remove the top half of the cowl and slide the motor battery onto the battery floor. Check the C of G position is where shown on the plan. Move the battery as needed to get the model to balance on this C of G spot. Mark the location of the battery. I used Velcro to hold the battery in place.

Install the servos and check the operation of the control surfaces. The elevator should travel 3/4" up and down. The rudder 1¼" left and right at the widest point. The top ailerons should travel 1/2" up and down at the widest point.

The building is now done. Have fun flying this unique looking scale model. ***RCMW***

Front view shows the difference in wing spans

CONTACTS

Laddie Mikulasko
Email: lmikulasko@cogeco.ca

Watch Der Jäger fly at:
www.youtube.com/
watch?v=vikeJmnmHNQ

or scan the QR code to view a clip from the NEAT Fair by SKS video

Plenty of details added. This could be the real thing!

PLAN DETAILS

BUILD CATEGORY:	Intermediate/Advanced
PLAN NUMBER:	MW3778
PLAN PRICE:	£17.99 ($30.99)
***LASER WOOD PACK:**	P.O.A. WP3778

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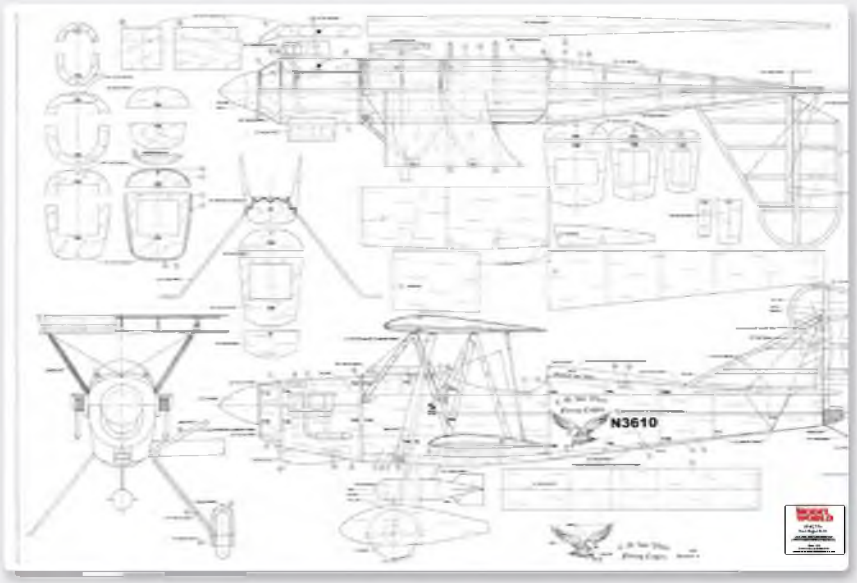


SOARERS' SLOT

Mike Proctor enjoys a Christmas Day thermal soaring session and test flies a second-hand glider

Christmas morning, 2015. I managed to get out on the only available half-day in December to do my Postal flights; three with each model. The rain started as I packed up!

Writing this on one of many cold January days, under another grey sky with rain coming down, is likely to kindle thoughts of summer days spent flying in nice thermic conditions. The problem is that summer wasn't too clever either! In the UK the autumn produced some of the best flying weather for some time: calm, warm and with a wide variety of lift patterns. November onwards was decidedly different again.

The Winter Postal series of eSoaring events (see eSoaring.net for details) is a good indicator of weather. November produced only five results nationwide. In York there were only two flyable days in the month and, unusually, the Scottish contingent had a good day for their attempts. Only two people returned scores in 2M and four in Open.

If anything December was worse, being typically rain and wind. In Scotland an attempt to get some flights in earlier in the month had ended with several rounds being lost to rain and consequently low scores. In Yorkshire it looked like there would be no chance of returning any scores but as Christmas approached the possibility of a small window in the weather appeared. It arrived at 10 am on December 25th!

As it happened I was 'home alone' at that time, the rest of the family out doing other things. I shot off to the field and in strange conditions – calm on the ground, airborne wind moving at 90 deg to the cloud – I did both Open and 2M flights with reasonable results. I finished my first ever Christmas Day flying session as the first raindrops hit the wing and we headed for Number 2 son's home, warmth and dinner!

Two days later, near the east coast, Dave Langley was enjoying a flat calm day with blue sky, turning in some good 2M results, whilst here in York the River Ouse rose to near record levels, flooding quite a large area of the city.

January has not quite finished as I write but again hardly any flyable days have happened this way. I hope wherever you are things have been better.

Sapphire Retrospective

There is a healthy trade in used models, especially as the cost of new ones rises and of course many come with the added incentive of having much of the hardware included in the price.

I recently acquired a second-hand, Vee tailed Sapphire 2M. I thought it might be a bit stiffer than the Magic Special 2m, which I have been flying for a year or two, and therefore be a bit better in breezy conditions. I had minor problems with a couple of things during the 're-fit' but both were sorted with different levels of head scratching.

First problem was the motor, which was a perfectly fine Hyperion GS2213-14 outrunner of 1350 KV. Not wishing to use a 2S battery, it quickly became apparent that this powerful little beast would need taming in the propeller department for use with a 3S. Indeed a first check revealed it to be running at 220W on

Competitors at the Loire Valley F5J International 2015. After all the wind and rain in the UK in the last few months let's hope we can have flying conditions like this in the 2016 season!

the 9.5 x 5 with which it arrived. As the model was heading for a finished weight of just over 600 g, this would far outweigh my usual power norm of about 200 W/kg.

Looking for about 120 W, I finally finished rifling through mine and everybody else's prop collections for testing purposes but still had to buy an 8 x 4! This now pulled 110 W at 10 A on an 850 3S Turnigy nano-tech. I had to do a bit of fiddling with the blade roots to get a good fold against the fuselage sides using a 30 mm spinner.

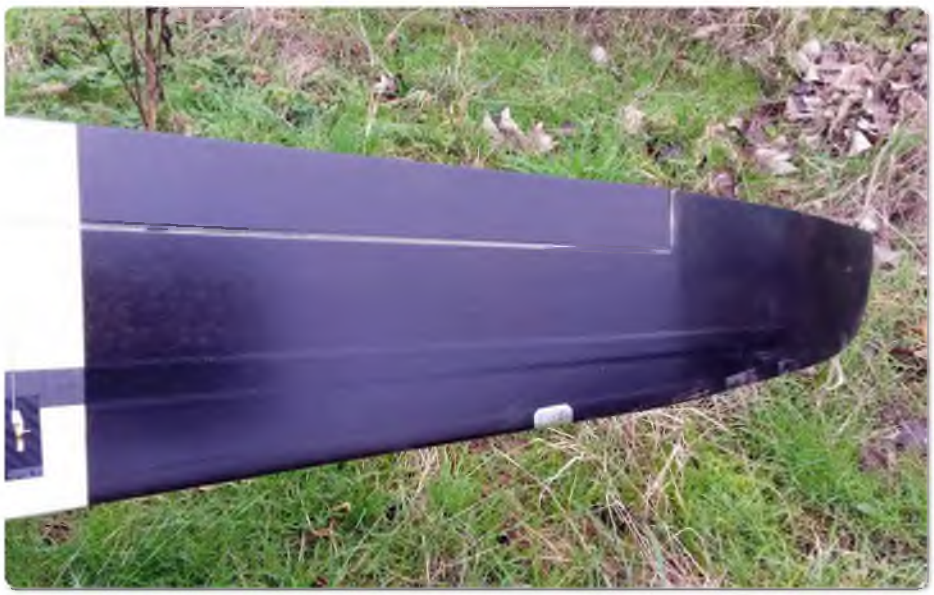
The second things needing attention were the flap servos, in that there were none installed previously! All the other surfaces had SD 100's installed but I used Turnigy D56 MG's for the flaps, because I had them lying about. Although the pre-prepared hole for the servo wire is reasonably small, I removed the pins from the plastic holder and pulled them through singly, into the underwing exit hole, without much trouble. I then replaced them in the holder (carefully!) and proceeded to hook up new flap drives and horns.

I did actually decide to replace the two elevator tube-in-wire drives to get a better centring and complete the re-fit.

I did a bit of fiddling to get all the bits and bobs happily into the fuselage pod. Although there is a reasonable amount of room in this version a smaller carbon pod is available and would be a bit tight for my 'had it handy so used them' system. But if you want 'small' this could be a way to go. In fact Hyperflight has a good selection of spares for Sapphires.

Subject of our mini review, a Sapphire 2m Vee tail version. This one belonging to Martyn Wharrie shows off the proportions and standard colour scheme well. Being an almost eggshell finish in white, people often colour the underside for better visibility

This is a Q12, which is more or less the same as the now obsolete V tailed Sapphire, but clearly is a X-tail version (see text). This one has had extra colour added to the wing and tail end



I spray painted the underside of my Sapphire tips with about eight coats of Pound Shop black car paint. I kept the wing in a warm workshop, gave it a very quick dust over, then gentle blow-dried. I was very surprised how good a finish I got and all for 4 g per wing of added weight

Underside of my Sapphire with black tips. I may yet do the tail in orange for side-ways viz. Collapsible chairs make excellent model stands for 2M machines

Back on the summer evening 'thing' again. Phil Brandreth built this Dixielander for a bit of powered soaring after a hard day at the competitive stuff. Amazing how many people have such a model squirreled away and then forget to take it out on the appropriate day – or maybe that's just me?

Sanding sticks for loads of little modelling jobs can be found in your local Pound Shop beauty isle!

Dave Langley sorting his Goldberg Gentle Lady prior to a flight in the York MAS Wednesday night competition series. Dating from the 60s this model has out floated many a super lightweight modern machine during 2015

To the flying field… I checked everything out and set the fail-safe, ready for my (not 'the' as it had flown before) first flight. The 8 x 4 sounds a bit revvy but the Sapphire climbed out in a steady but positive manner and would have got to 200 m around 30+ secs had I let it. With UK 2M gliders having 40 seconds power run this was fine, the small amount of programmed 'down' on throttle was just right. The glide needed some up trim and the flap/brake/elevator compensation was spot on.

I started by moving the C of G backwards, as the battery had a fair amount of movement available, eventually settling on a combination of this and a little 'up' elevator for the final trim. I was surprised how good natured the model was in this condition and even with 2 mm of flap for thermal trim it showed no tendency to stall quickly. Aileron and V tail rudder were mixed and steering was crisp.

All in all this was a nice model to fly. I have only flown it in calm conditions but it holds light lift well. I cannot see any reason to try build the Sapphire any lighter than the 615 g it weighs, as I suspect that it will perform quite well in a breeze at that weight, although propping up by one inch in either pitch or diameter might be better in those conditions. Using a full 40 seconds to climb to 175 m in UK Postal series uses only 90 mAh, so six climbs per charge of the 3S 850 is the usual order of the flying day, but I have done seven without problem! A very pleasing autumnal project.

(If I understand correctly 'Sapphire' is its UK name. It is made by Horejsi, where my Vee tailed version is called Q11. It has now been replaced by the X tail Q12 but is still called Sapphire in the UK.)

Just Pitch In

How many times have you wanted a particular prop out of your box, to test a new motor, or somebody at the field asks what prop you have on your model? What happens then is all too often much rubbing and scraping at the root of a blade, in the hope of reading the numbers where the manufacturer originally embossed the diameter and pitch figures. Unfortunately it is most likely that, even if you land in soft grass most of the time, they disappeared long ago.

The Aeronaut range is particularly susceptible as the embossing is exactly where all my blades rub on the ground when landing, making later identification rather tricky. The simple answer is to have a 'correction pen' handy in your workshop and write the diameter and pitch on both blades whenever you open a new set.

Why both? Well mine are held together in pairs by rubber bands but occasionally the sharp trailing edges break the band and they end up loose. Until you have seen and heard a model with an unmatched pair of blades you will just have to believe how bad it sounds and what the vibration is like!

Weather Or Not?

I have mentioned before that the York MAS members fly club competitions on Wednesday nights during the middle of the year. The number of events flown is a useful catalogue of the weather at one particular time each week.

It is quite remarkable that during the generally poor conditions in 2015, between mid-May and early September, members had flyable conditions on 12 Wednesday nights. Exactly the same number as in 2014 and once again a mixed bunch of mainly 2M electric glider flyers took part.

Significantly the two models which came first and second were not as up-to-date as most of the others.

Jon Edison took first place with a Highlight Unlimited 1.8 m. Powered by a Pulso 1100 KV motor, doing 200 W on 1800 3S and an 8 x 6. Certainly not a super-modern lightweight set-up at 900 g, but he is considering using a lighter battery next year!

Second, only 15 points adrift in a total score of nearly 27,000, was Dave Langley. Dave

Better view of the Gentle Lady showing its simple lines and construction. The wing section is as flat bottomed as it could possibly be. Only the leading edge strip is rounded and both the spars are on the bottom surface. A 2.5 m version is in the offing – more anon…

Interesting comparison of old and new. Magic Special sits on top of the Gentle Lady. Quite a difference in many areas, not least that of the wing with its large chord. Tail spans are the same but again, much bigger chord on the GL. Magic has a fully flapped wing, which makes it much easier to land. Also the fuselage is much longer and skinnier than the GL

Left: Fed up of staring at the root of your prop to check its size and finding that the figures have been rubbed off by your landings? Write the size on the back of the blades with a corrector pen for a less stressful life

Right: Airborne view of Jon Edison's Highlight Unlimited, which has performed very well for the past few years in club 2M comps, despite being only 1800 mm span and weighing 900 g

often flew a Goldberg Gentle Lady from the 1960s, having a box fuselage with a 'very square' wing on top. However, with generous dihedral it is easy to see in an evening sky and all too often it hung-out until slot-end, showing once again that, mainly, flying skill matters most!

Now For The Nail Biting Ending…

I am a great believer in sanding boards to do most modelling jobs rather than using any old bit of abrasive paper. If it's a flat or convex surface you are working on some kind of support behind the abrasive nearly always produces the best result. It also prolongs the life of the abrasive by a considerable factor. If you want to do small jobs, say relieving the hubs on a propeller to get a free fit on a yoke, then a small sanding board is required. In which case using contact adhesive or double-sided tape to fit abrasive to an A5 size piece of 1.5 mm ply works well. It's better if you do both sides of course before cutting it into strips

However, a trip to your local pound shop will probably reveal that they sell sanding sticks, usually used for filing fingernails, in different abrasive grades and sizes. At 40 for £1 they should last a while, especially if you throw them in an old yogurt pot so you don't lose them all over your bench!

RCMW

Closer view of the Highlight as Jon prepares to launch. This is a relatively old design and has a fuselage of 'reasonable' proportions. It currently houses an 1800 3S battery, which might yet go on a diet for 2016? As with several older R/E designs this one also lacks airbrakes of any kind, which can make descending from lift and landing with accuracy... taxing!

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The Maschinengewehr 08/15 was widely used on German fighter aircraft during WWI. A development of the water-cooled infantry weapon, the guns fitted to aircraft had the distinctive heavily slotted air cooling jacket instead. It used belt-fed ammunition and could be synchronised to fire through the propeller arc.

1:4 Scale
MW3005 Fokker Dr.I
MW3125 Fokker D.VIII

1:5 Scale
MW3225 Albatros C.III
MW2218 Fokker E.III
MW3599 Fokker D.VIII

MW2187 Fokker Dr.I
MW2044 Halberstadt D.II
MW3068 Pfalz A1
MW3457 Pfalz D.XII
MW3369 Rumpler C.IV

VICKERS MACHINE GUN (FLUTED BARREL)

The Vickers machine gun became the standard armament of British and French WWI military aircraft. It was heavier than the Lewis Gun, but could be synchronised to fire through the propeller arc. Used on aircraft the water cooling system was unnecessary.

1:4 Scale
MW3467 RAF SE.5a
MW3290 RAF SE.5a
MW2011 Sopwith Pup

1:5 Scale
MW2248 Sopwith 1 1/2 Strutter
MW2042 Sopwith Camel

1:6 Scale
MW3455 Bristol Bulldog
MW2020 Bristol Scout
MW3442 RAF SE.5a
MW2036 Sopwith Camel

VICKERS MACHINE GUN (JACKETED BARREL)

The Vickers machine gun became the standard armament of British and French WWI military aircraft. It was heavier than the Lewis Gun, but could be synchronised to fire through the propeller arc. Used on aircraft the water cooling system was unnecessary. but the jacket was retained, emptied of water and had gills cut in it to allow cooling air to be forced through it.

LEWIS MACHINE GUN

The famous Lewis Gun was the first machine gun to be fired from an aeroplane. Easily recognised by its distinctive pan magazine, it was reliable and lightweight, and was fitted to many British and French fighter aircraft. It could not be synchronised to fire forwards through the propeller arc, so was often mounted on top of the upper wing to fire over it, or was on a swivel mount and fired by a gunner.

1:4 Scale
MW3467 RAF SE.5a
MW3290 RAF SE.5a

1:5 Scale
MW2791 Nieuport 12
MW2248 Sopwith 1 1/2 Strutter

1:6 Scale
MW3315 Airco DH-2
MW2907 BE2C
MW2020 Bristol Scout
MW3442 RAF SE.5a

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WELCOME TO NUREMBERG

Zweiter Teil!

Following on from last month's tour of the model hobby halls at Europe's top toy fair, here are a few more new R/C models and products that you can expect to see on model shop shelves during 2016

These charming ladies were happy to pose with the latest issues of RC Model World and Traplet's new drone magazine, RC Flight Camera Action

AEE *en.aee.com/*

Exhibitors often use vehicles to draw attention to their stands. AEE's choice was a little larger than most!

Fly your AEE drone from water with this clip-on float set

This EDF version of Art-Tech's ASK-21 sported an underwing camera pod. Art-Tech models are distributed in GB by Century UK www.art-tech.com/en/productview.asp?id=195

Both Ripmax and Graupner exhibited four motor VTOL models. Here is Graupner's X44 version www.graupner.de/en/

Hacker Model Production *www.zoomport.eu/shop/*

This quick to assemble foam dolly is a simple and effective way of getting Hacker's EPP semi-scale gliders off the ground when aerotowing

The Toxic series of 'shock style' models includes an MX2 and Edge 540. Constructed from 5 mm pre-cut and coloured EPP, they span around 830 mm and suit MFORCE 2815CA-20 motors and a 2S 350 mAh LiPo

Perfect for when the wind keeps R/C models out of the sky, this colourful RESCUE airboat would be a lot of fun on even the shallowest bit of water. You could even use it for its intended purpose – to rescue a marooned R/C boat! Or team up with clubmates and play water polo...

Horizon Hobby www.horizonhobby.co.uk/

Horizon were displaying an impressive spread of FPV related products

Blade Inductrix 200 FPV Drone is a compact, 155 mm square, easy to fly aircraft that is compatible with Fat Shark Teleporter V4 headsets. Supplied with a custom 800 mAh 3S LiPo

E-flite T-28 Trojan 1.2 m now has flaps and is available as a BNF Basic kit. Requires a 3S 2200 mAh LiPo

Left: HobbyZone Conscendo S now includes SAFE technology to return the 1.5 m span electric glider to straight and level flight at the push of a 'Panic' button. Supplied with a 2S 1300 mAh LiPo

Hobbico www.hobbico.com/

Helimax Form 500 has folding motor arms for compact storage and features a novel twin rail mounting system so you can fit bespoke payloads. An action camera mount is included to get you started. Supplied with a 5000 mAh LiPo

TecZone AirPusher 140 is Hobbico's latest take on the 'pylon mounted pusher' electric glider format. 1.4 metre wingspan, as the name suggests

Left: First seen at the Toy Fair last year, the Great Planes P-47 Razorback is an imposing model. The 'Giant Scale' series model spans 85 inches for 50 – 61 cc engines or equivalent electric power

Right: Flyzone Rapide is categorised as a 1522 mm wingspan 'warmliner'. Fitted with a brushless motor set, the AeroCell moulded foam glider promises a high level of aerobatic agility

Flyzone's 1475 mm Sensei FS (Flight Stabilisation) trainer features WISE stabilisation. This offers three piloting modes, starting with Beginner, which limits bank and pitch to 30 degrees. WISE also offers a 'bailout' function to resume level flight, as well as automatic take-off and landing. Best of all it works with most commonly available R/C systems. Sensei FS also features a 'Drop Door' payload system – ideal for toffee bombing!

Great Planes Twinstar EP is a 1205 mm wingspan twin motor sports model of ARTF built up construction, covered in Monokote. Requires a 3S 2200 mAh LiPo and four function R/C

Seawind is a 1438 mm wingspan model based on the US amphibious aircraft. Powered by a 3S brushless motor set it can be flown from land and water thanks to its retracting undercarriage. Also features nav lights and flaps

Anyang Lanyu Model Co. from China were showing a range of conventional ARTF models – and a huge selection a balsa wood chuckies! The Minimoa was pleasing to look at, being available in 1/3 (5.6 m) and 1/4 (4.36 m) sizes
lanyumodel.com/

An ideal aeroplane for the Hacker Stream-Fan 70/3500 EDF, this sleek foam Viper Jet is just 1040 mm in span. Suits a 4S 3800 mAh LiPo on the 3500 EDF, although up to 6S can be fitted if using the Stream-Fan 70/2700
www.hacker-motor-shop.com/

It pays to take suitable precautions when charging and storing LiPo's. These new fire-resistant products from Multiplex, in the form of a Safety Mat and an 'Akkusafe 10' storage/transport bag, are well worth investing in. The bag can store up to ten 3S 2000 mAh LiPo packs
www.multiplex-rc.de/en/

Super Flying Models *www.mth.com.tw/en/main/*

This attractive colour scheme decorated a Fokker D.VII on the Super Flying Models stand. Of 1200 mm span the laser cut ARTF is powered with an 850 KV brushless motor and 4S-220 LiPo

Other SF Models included Tri-40 II, a low wing sport model with classic styling. 1.6 m span for .40 two-stroke, .60 four-stroke or 10 cc petrol engines. Can also be flown with a 840 KV brushless motor on a 4S-2600 LiPo

An uncovered example of the Fokker allowed visitors to assess the quality of construction

This P-51 Mustang is just over 1.7 metres in span and suits .60-.90 two-stroke engines, 20 cc petrol motors or 6S-4500 electric motor sets

Get back to basics with the Sparkler, a 1.2 m high-wing sports model for electric power using a 3S 2200 mAh LiPo

With its popular blunt styling the Super Stick is available in 180 and 120-size versions for IC or EP power. There are five colour schemes to choose from

ORIGIN HOBBY www.originhobby.com/

Wilga 2000 from Origin Hobby spans 1330 mm for a 1200 KV motor via a 30 A brushless ESC

Origin were displaying several commercial drones including this 1.8 metre span twin boom pusher, the FPV 'Skyhunter'

Left: Having recently published John Stennard's 'Quad Jet' article this little 120 mm span Jet Fighter caught our eye on the Revell Control stand. With 6-axis stabilisation, it also has an aerobatic flip function www.revell.de/en/

Right: It's always good to see British companies doing well in Europe. Shesto had partnered up with Krick Modelltechnik to show their range of tools and model products www.shesto.co.uk/

Ripmax www2.ripmax.net/

Featured in last month's report in its 'Sport' colour scheme, the all red livery of the Mini Xcalibur is bound to be popular with UK jet modellers for obvious reasons! Of fibreglass and wood construction, the 1310 mm wingspan twin boom kit suits 20 – 35 Newton turbines and seven channel R/C

Primarily aimed at the German market, the 1.22 m wingspan Skyleaf Samba EPP is one of Futaba's range of F3A style aeroplanes

Radial Rocket from Black Horse is just over 1.4 metre wingspan and suits .46-.55 IC engines or 1000 – 1800 W, 800 KV brushless electric set ups. Inspired by the full size homebuilt, the Rocket features a spatted fixed undercarriage for durability and ease of operation

Sky RC www.racing-cars.com/scp/Manufacturer/SKY_RC.html

Left: Sky RC products are now being distributed by Schumacher Racing, who are best known for their R/C cars. First in their new range of quadcopters is the Sokar, an agile FPV racer – full review coming soon!

Right: With four charging ports to the left, right and centre the Sky RC Quattro Q200 charger provides a comprehensive charging solution for popular R/C batteries, including the latest LiHV packs. Powered from an AC or DC source it can be hooked up to a PC for in-depth monitoring and has its own smartphone app too

Simprop Modellbau *www.simprop.de/*

Simprop always have a nice selection of sleek electric gliders to drool over, such as the new 1.57 m span Lift Off XS, which can be set up in Sport or Hot modes. Smokin!

If you like carbon, you'll love this hot electric glider! Streamtec Carbon Design spans 2210 mm and features RDS (Rotary Drive System) linkages

Looking for something a bit different? Exceloctylus is a twin EP flying dinosaur with a 1.6 m wingspan. It is operated by ailerons and an inverted V-tail

Tech One *www.centuryuk.com/RC-Planes*

Tech One are distributed in the UK by Century UK. Kraftei is an Me 163 Komet inspired flying wing

The 44 inch span Revolution and 33.1 inch span Sbach look likely to provide a lot of fun. Watch this space because we have reviews of both kits coming soon!

Century are selling this model as the Max-Thrust Riot XL. Read our full review, coming very soon!

DLG-1000 has a wingtip mounted peg for discus style hand launching

Neptune II is an EPO flying wing with B2 styling

Walkera *www.walkera.com/en*

Walkera's stand was dominated by drones. F210 is their new FPV racer that features a 'bow' design chassis cut from carbon fibre and fitted with a new F3 flight controller

Runner 250 is fitted with 'intelligent direction warning lamps' – basically flashing indicators that show which way the drone is turning, just like your car! FPV pilots need all the help they can get during high speed races

XK Innovations *(www.cmldistribution.co.uk/*

XK models are being distributed in the UK by CML. The A1200 is an FPV equipped, EPO moulded electric glider of 1.2 m span that is powered by a pylon mounted 2380 KV brushless motor. Supplied with a Tx, it is compatible with Futaba S-FHSS radios

A closer look at the 1080p HD camera fitted in the canopy of the A1200

Above: DHC-2 A600 is a miniature Beaver with 580 mm span wings and powered by a 300 mAh LiPo

Right: This eye-catching Henseleit helicopter was one of the few R/C helicopters on display

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INDOOR

19th Mar '16
Indoor R/C Meets, in the Main Hall at Fleming Park Leisure Centre, Passfield Avenue, Eastleigh, Hants SO50 9NL. From 7 pm to 10 pm. No free-flight models. £8 for flyers, £1 for spectators, proof of insurance required. For further details please contact: Alan Wallington, 'Wrenbeck', Bull Lane, Waltham Chase, Southampton, Hants. (Tel. 01489 895157) or see our website: www.wcaero.co.uk

29th Mar, 26th Apr 31st May, 28th Jun
Indoor R/C Small Models Meets, in the Main Hall at Wickham Community Centre, Mill Lane, Wickham, Hants PO17 5AL. All meetings will run from 7.00 pm to 9.30 pm. Models to be flown at these meetings are to be limited to a maximum weight of 95 grams (3.5 ounces) for fixed wing aircraft, in flight trim, including battery (not to exceed a 2-cell LiPo pack). Helicopters are to be limited to a rotor diameter of 12" (305 mm). All models will be weighed before flight, and will be judged on their suitability for the venue on the evening. Admission to the meetings will be £4 for flyers and £1 for spectators. Flyers will be required to show proof of insurance. For further details please contact: Alan Wallington, 'Wrenbeck', Bull Lane, Waltham Chase, Southampton, Hants. (Tel. 01489 895157) or see our website: www.wcaero.co.uk

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

2nd Apr '16
Pre-Scale Indoor Free Flight Nats Trimming Meeting, at The Bushfield Leisure Centre, Orton Centre, Peterborough PE2 5RG. 10 am to 2 pm, entry: £6.00, spectators £2. Free flying but priority given to scale Indoor FF Nats entry trimming. Contact: Andy Sephton, andrewjsephton@gmail.com or 07872 625279

9th Apr, 8th Oct, 12th Nov, 10th Dec
North London MFC Indoor R/C Meetings, at Furzefield Sports Centre, Potters Bar, Herts. EN6 3BW (Junction 24/M25), 6 pm-10 pm. All up weight limit for fixed wing 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

10th Apr '16
Pre-Scale Indoor Free Flight Nats Trimming Meeting, at The Bushfield Leisure Centre, Orton Centre, Peterborough PE2 5RG. 10 am to 2 pm, entry: £6.00, spectators £2. Free flying but priority given to scale Indoor FF Nats entry trimming. Contact: Graham Bantock, gray4990@yahoo.co.uk, 07951 3904730

11th Apr '16
The Frome MFC Easter Swapmeet, from 09:00 – 12:30, at The Conygre Hall, North Road, Timsbury, Bath BA2 0JQ. Tea, coffee and bacon rolls will be available. Entry is £1 per person and tables are free. Pre-booking required for tables, and entry from 08:30 for sellers. For more information and booking please contact, Rob Buckley 07791 278292, Email: rob@rwbuckley.co.uk

1st May '16
BMFA Scale Indoor Free Flight Nationals, will be held in the same venue as last year, the University of Wolverhampton Sports Centre. Official events will include free flight competitions for Open Rubber, CO2/Electric, Peanut, Pistachio, Kit Scale and the newly introduced Glider class. Please refer to the 2016 BMFA Scale Rule Book and the BMFA Scale Judges Guide. Pre-entry to the main events must be made by Friday 15th April 2016. Unofficial competitions will be held for Air Race and Mass Launch – these are free entry on the day to competitors. There will be an additional £6.00 entry fee for non-competitors. Pre-entry for this is not required. A raffle will be held for aviation and modelling related goodies – please help to make it successful by bringing and donating a prize. Access to the site and parking facilities are excellent and there is a viewing gallery with a restaurant that will be open all day. Doors open at 8.00 am and will close at 6.00 pm. Competitors: pre-entry only, Spectators: £6.00, Accompanied children and those under 18 years: free. Contact the organiser for the official competition entry form and/or more information, Graham Banham: gray4990@yahoo.co.uk, 07951 390473 or John Minchell: j.minchell@btinternet.com, 07989 744251

GENERAL

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

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

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

27th Mar '16
Horam Swapmeet at Horam Village Hall. All proceeds to Kent/Surrey/Sussex Air Ambulance. Tables please contact, R. Richardson on 01825 762372. Email: rob.richardson@talktalk.net or T. Inman 01892 652734, Email: oilerinman@btinternet.com Postcode for event is TN21 0JE. Doors open at 10 am

2nd Apr, 1st May, 4th Jun, 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

10th Apr '16
Ash Park MFC Annual Auction at South Molton Community College, signposted from A361. Doors open at 09.30 am sale starts at 10.30 am. £1.50 admission, light refreshments are available contact John Newman 01237 479575 or Email: john.new@talktalk.net

10th Apr '16
White Sheet Scale Fly-In, to be held at the White Sheet Club slopes near Mere, Somerset (back up date 24th April). 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

16th & 17th Apr '16
PSSA 'Fly for Fun', The Great Orme, Llandudno, North Wales. Meet at the 'Tank Track' car park for 10 am each day. Open to non-PSSA members. Proof of insurance required. For more information contact Phil Cooke on 07772 224719 or Email: webmaster@pssaonline.co.uk

17th Apr '16
F3A. BMFA 1st GBR Team Selection Event. Stansted MFC. FAI 'P' and 'F' schedules. Also GBR/CAA League competition. All Schedules. See gbrcaa.org – then forum 'Competition News' for details and 'Competition Entry Form' for fees and payment. Team Selection competitors have priority entry if competition is over subscribed. Visitors welcome but please contact Contest Director, Mark Pearce on 01279 505798 or mobile 07764681116 for details

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

23rd & 24th Apr '16
NYE Jets 2, the second Nye Jets Kero Burn will take place at Throckmorton Airfield, Long Lane, Throckmorton, Worcestershire WR10 2JH. Absolutely NO ENTRY after the cut-off date of April 15th. The event will be fly for fun for jet models only (no pulse jets, prop jobs or helicopters). Pilots must be current BMFA/LMA/SAA members and B certificate qualified as a minimum (including both pilots if a buddy-box system is in use) NO INSURANCE & NO B CERTIFICATE = NO FLYING. Models weighing over 20 kg and subject to the LMA Large Model Scheme certification are to be made known to Jamie Cuff (see email), certificates will be required as proof of scheme compliance before the model(s) are allowed to fly. IT IS THE PILOT'S RESPONSIBILITY TO MAKE THE EVENT ORGANISER AWARE OF ANY OVER 20 KG MODELS. All models will be scrutinised and flying will take place from 1000 through until 1800. There will be LMA Scheme flight witnesses available over the weekend if required. Entry fees are as follows: Pilots: £16 per day, Others £6 per day. For more detailed

information and an Entry Form email: nyejets@yahoo.co.uk

1st May '16
F3A. BMFA 2nd GBR Team Selection Event, Hurley. FAI 'P' and 'F' schedules. Also GBR/CAA League competition. All Schedules. See gbrcaa.org – then forum 'Competition News' for details and 'Competition Entry Form' for fees and payment. Team Selection competitors have priority entry if competition is over subscribed. Visitors welcome but please contact Contest Director, Adrian Harrison on 07976 244004 for details

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

15th May '16
Traplet Flying Only Scale, Round 1 at Pontefract and District Aeromodellers, West Yorkshire, WF8 4QD, 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

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

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

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

22nd May '16
White Sheet Scale Fly-In, to be held at the White Sheet Club slopes near Mere, Somerset (back up date 5th June). 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

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

5th Jun '16
F3A. 3rd BMFA GBR Team Selection Event, Ashbourne, Derbyshire. FAI 'P' and 'F' schedules. Also GBR/CAA League competition, all schedules. See gbrcaa.org – then forum 'Competition News' for details and 'Competition Entry Form' for fees and payment. Team Selection competitors have priority entry if competition is over subscribed. Visitors welcome, please contact Contest Director, Adrian Harrison on 07976 244004 for details

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

11th & 12th Jun '16
PSSA Fly-In and Clwyd SA Ray Jones Memorial PSS event, The Great Orme, Llandudno, North Wales. Meet at the 'Tank Track' car park for 10 am each day. Open to non-PSSA members. Proof of insurance required. For more information contact Phil Cooke on 07772 224719 or Email: webmaster@pssaonline.co.uk More details for Sunday's memorial event on the CSA website or Email Matt Jones at mattjonesgte88@hotmail.co.uk

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

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

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

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

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

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

10th Jul '16
F3A. 4th BMFA GBR Team Selection Event, Oxford. FAI 'P' and 'F' schedules. Also GBR/CAA League competition, all schedules. See gbrcaa.org – then forum 'Competition News' for details and 'Competition Entry Form' for fees and payment. Team Selection competitors have priority entry if competition is over subscribed. Visitors welcome but please contact Contest Director, Peter Brett on 07795 061145 for details

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

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

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

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

7th Aug '16
Traplet Flying Only Scale, Round 2 at Bickershaw MFC, Lancashire, WN2 5TD. 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

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

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

PARROT BEBOP 2

Continued from page 27

With a maximum inclination of 35° versus 30° on the Bebop 1, the Bebop 2 is faster and quicker than its predecessor. It can now reach a top speed of 18 m/s (65 kph). Bepop 1 was timed at 13 m/s (47 kph). Climb speed has also been increased, the drone now having a maximum vertical speed of 6 m/s, versus 2.5 m/s for the original Bebop

In Flight

Most of the virtual buttons that you see on the Free Flight app screen are replicated as physical buttons on the Skycontroller. These include the Take Off/Landing, Emergency, Return to Starting Point, Video Record and Photo Record buttons. But one omission is the Flat Trim button, so after finding a level area from which to take-off you should press the Flat Trim icon on the app screen.

As soon as the Take Off button, which is found just below the right-hand stick, is pressed the props will spin up and the Bebop will take-off and settle into a waist high hover. It will do this automatically, with no input needed from the pilot.

When you are ready you can start to gently move the sticks and explore the Bebop's handling. Both sticks have soft return springs to automatically return them to their centre positions when they are released so if you let the sticks return to the centre the Bebop will stop and hover by itself, allowing you to look at the FPV screen to set up a good view to take a picture or to start filming.

There is also a facility to download a map of the area you intend to fly over. You can switch between Map Mode and FPV mode in flight. The map view will show the relative positions of your smart device and the drone itself.

If you do find yourself piloting the Bebop at a distance and get disorientated then it's time to press the Return to Starting Point button, which is situated next to the Take Off button on the right stick unit. The Bebop will spin around and will fly back until it is overhead the position at which you switched it on, using its GPS sensor. It will then descend to 2 metres above the ground and will hover there until you take back control.

Flight, Camera, Action!

All the clever control mixing and GPS positioning that makes the Bebop so easy to fly also ensures that it's a stable camera platform too. Bebop 2's camera also has a 3-axis stabilisation system so the images remain level and stable regardless of any small movements made by the drone. The stability of the HD 1080p video is very impressive when compared to other drone footage that we have taken.

Still images can be taken by pressing the camera joystick inwards. The Skycontroller emits a quiet 'shutter' sound when a picture is taken but the drone is quite noisy and it is often difficult to hear this. For a product that is packed full of technology a simple earphone jack would be a much-appreciated addition.

Using the Recording Settings menu you can opt to shoot either DNG or JPEG format files. Most people will be familiar with JPEG picture files as this is the standard format used by most digital cameras. But DNG is popular with photographers as it contains the raw data taken by the camera, without any in-camera processing having been applied.

The files sizes are much larger compared to the compressed JPEG files. This gives much more freedom when post-processing the images, such as pulling details out of areas in deep shadow, but it does require the use of more specialised image editing software, such as Adobe Camera Raw or Adobe Lightroom.

Experienced photographers will also appreciate the ability to change White Balance, Exposure and Contrast settings using the Image Settings menu within the Free Flight app. There's also a time lapse feature.

Images can be retrieved either by plugging the Bebop into your computer's USB port using the lead supplied or by transferring them to the phone or tablet using the Internal Memory function of the Free Flight app.

If you get bored with floating the Bebop around and taking videos then you can spice up your flying with some aerobatics. These take the form of pre-programmed flips, either left or right, or front and back. To engage this function simply tap the Flip icon on the top right of the Free Flight screen and choose the direction you want from the drop down menu. Then, with the drone in flight, just double tap the screen anywhere and the Bebop will flip over. It's a neat trick, especially when spectators are not expecting it!

Conclusions

I have thoroughly enjoyed testing the Bebop 2 drone. And flying it with the distinctive Skycontroller makes it all the more enjoyable thanks to its R/C style controls.

Regarding still images, I especially like the ability to record DNG files so I can tease out extra details from the much larger files. The only gripe I have is the same one that I had with the Bebop 1 in that JPEG pictures taken straight 'out of the box' are well processed 'in-camera' to remove a lot of the distortion produced by the fisheye lens. But as soon as I started to experiment with the other

image modes – DNG and JPEG 180 degree – and then returned to JPEG the pictures all exhibited a high level of fisheye distortion. I queried this with Parrot, who advised me that still images taken while video was being captured would be of a lower resolution and without any lens correction; I guess this is because they are just snapshots taken from video frames?

However, this does not explain why reverting to shooting JPEG's without video should result in distorted images when they were so well processed 'in-camera' before, added to which the JPEG files are also of lower resolution than those I would expect to see from a 14 mega-pixel ground based camera. I don't want to dwell on this too much though as anyone using this drone to take photographs is likely to be an enthusiast, who will more than likely want to shoot in DNG format and be able to use image editing software like Photoshop or Lightroom to make suitable lens corrections.

Regarding video footage, this is clear and remarkably stable, even when taken during quite windy conditions when the drone is being buffeted by gusts. The horizon remained nice and level even when the Bebop 2 was leaning into the wind. And it is good to be able to use the camera joystick on the Skycontroller to finely-tune the view from the camera whilst leaving the drone in a stable hover.

Overall I have found the Bebop and Skycontroller combination to be fun and engaging to use. It's also much simpler to set up than some other camera drones we have tested, so you should be up and filming in no time – weather permitting! **RCMW**

Original DNG picture after limited processing to remove some of the distortion from the fisheye lens

DNG files allow for much greater post-processing than JPEGs. Here is the same file after a few basic corrections using Adobe Lightroom

RC MODEL WORLD

PRODUCT INFORMATION

NAME:	Bebop 2 Drone with Black Skycontroller
MANUFACTURER:	Parrot S.A.
DISTRIBUTOR:	Flying Toys
WEBSITE:	www.flyingtoys.com
	Bebop 2 Drone £439.99 SRP
	Bebop 2 Drone & Black Skycontroller (inc. 2 batteries) £759.99 SRP
MODEL TYPE:	Quadcopter with integral fisheye camera
PARTS SUPPLIED:	Airframe, 2 x 2700 mAh LiPo packs and charger, spare props and prop tool, Micro USB lead, Black Skycontroller, neck strap, mini tablet adapter, sunshade
PARTS REQUIRED:	Smart device – phone or tablet

PRODUCT SPECIFICATIONS

CONNECTIVITY:	WiFi 802.11a/b/g/n/ac
CAMERA:	CMOS 14 Mpx, 1/2.3" sensor
BATTERY:	Lithium Polymer 2700 mAh
PROCESSOR:	CPU, Dual-Core
SENSORS:	3-axis
GEO-LOCATION:	GNSS
DIMENSIONS:	38.2 x 32.8 x 8.9 cm
COMPATIBILITY:	iOS, Android

DISLIKES

Slightly rough edges on Black Skycontroller handgrips (compared to original)

LIKES

Easy to set up • Very easy to fly • Very stable filming platform

ON WITH THE SHOW

Dave Bishop decides the time is right to reveal a thirty year old secret...

The Team

Names Abbreviated:
'Boddo' = David Boddington – Ideas Man
'David' = David Johnson from Warrington – Daring Pilot
'Andrew' = Andrew Johnson – Offshoot of Above and Assistant to his Dad
'Dave' Watts = Southern Model Fuels 'Mr Pop Bang'
'Reg' = Reg Strudley – Brains with the Myford Lathe
'Terry' = S.M. Services – Electronics Gezzer with a soldering iron
'TVG' = Tony van Geffen – Cameraman, Video Guy and other stuff

The huge 10 foot plus wingspan Plumpton DC3 Dakota World Record holder, piloted by Dave Johnson. His 13 year old son Andrew holds the Ruskin Airways model for his father

Now It Can Be Told

The real story of August 16th, 1985 at Plumpton Racecourse, Sussex.

The Dakota was our secret 'Star of the Show'. There it stood in all of its glory. I knew I had commentated on it somewhere at another place and it suddenly came back to me where I had seen it. My dear old friend, David Boddington (Boddo) had made a number of them for the television series, Airline.

At well over ten feet wingspan the Dakota was in the colours of Ruskin Airways. Standing beside this monster was David Johnson and his 13 year old son, Andrew. The thing that worried us all was, could it do what it had been secretly much modified to do? The aim of this beautiful monster was to break the World R/C Duration record of 7 hours and 52 minutes, presently held by America.

The Family Model & Craft Show

It was a warm Thursday evening with a perfect twilight and still summer air that begged for a following weekend of many thousands of visitors coming to the annual Family Model & Craft show at Plumpton Racecourse, situated near to Lewes in Sussex. This was show number six and it continued the practice of a friendly family get together since the first one was started in 1979.

As usual people had started arriving on the Wednesday to get a good position for their tents and caravans, and the working team of 34 DB Sounders were busy making everyone of them welcome. The venue had been especially chosen because it had proper toilets and showers.

All of the large marquees had been erected for the traders and to provide overnight model pens. The train ride track was laid, the large model boat pool had been filled with 9,000 gallons of water, the control line area had been laid out and the stock car race organisers were ready for some 120 speedy entrants.

On the flight line the two grass runways had been cut for the first time and the second and third cuts would be gang mowed tomorrow (Friday) to be ready for the many flyers to take-off and land their R/C models properly.

Above all the weather forecast was going to be perfect for that specially chosen weekend. Already the food traders were cooking bacon baps and sausages with fried onions for the early arrivals. The air was full of excitement and anticipation for the many family visitors to enjoy a great time 'away from it all'.

Some Months Before

A few of us 'workers' were having a conversation at lunchtime in one of the restaurants at Sandown Park Symposium during the Elmbridge Club's annual show. The talk was all about the Americans who had just broken the world duration record with a radio controlled aeroplane. How it had been achieved was related by one trader who had just returned from 'over there':

"There had been quite a team of people involved" he said, "and the 8-foot wingspan aeroplane had been fully statically tested before the record attempt had even started. The aeroplane had been secured and timed to see how long the engine could run from when it had been started until the fuel finally ran dry from the very large tank inside the fuselage."

So What Was Needed?

One of the quartet, David Watts of Southern Modelcraft Fuels, knowingly said, "It's all about fuel. Get that right and Bob's your Uncle!"

"Ah" said Reg Strudley for Haverfordwest. "But something happened with the motor because the static engine running time, after the fuel had been leaned off, was timed at 6 hours 55 minutes."

"So how on earth did the engine run for another hour after the original test run when it was airborne?" added Terry Bowden-Rooke of SM Services. "Something happened that we can't figure out!"

Tony van Geffen suddenly clicked his fingers and, with widening eyeballs, asked, "What was the time that the model took off in the day?"

David Johnson from Warrington spoke for the first time, "Just before 4.30 am at daybreak."

"And what was the temperature at that time?"

All four of us wondered where this was question leading to, as he went on, "It was in the southern part of America that the event took place, right?"

"Yes!", we chorused. "So what's your question about?"

"Well", TVG continued, "just say that the temperature rose as the sun came up and the temperature increased! If the fuel was being heated up then it would expand, right?"

Slowly we mulled this statement over and nodded in agreement.

"What about us heating the fuel for our Dakota, then?"

David Johnson jumped in with the statement, "I have seen some model boats with diesel engines being cooled down by winding copper

Part of the team of my 34 'DB Sounders' on the flight line at Plumpton racecourse in Sussex, who helped me annually for the 20 years that it was run there

tubes around the fins on the cylinder and connecting tubes to a scoop behind the boat. That forces cold water around the engine, cooling it down whilst the boat goes bombing through the water like the clappers."

Dave went on, "So what if we could reverse that situation and heat the fuel before it gets to the fuel tank?"

Control Of Expanded Fuel

Dave Watts continued, "Yes a good idea. But the fuel would need adjustments to the throttle to compensate for the air and liquid mixture. Now what about if I made up some special fuel that could be easily heated to expand in volume. What do you reckon?"

Terry replied, "Say the throttle was made to vary somehow with the rise in outside temperature so that the motor would run on a lean burn setting. Then surely it follows that it would be possible to go for a new and much longer World Record?"

We all sat back, and with a smile Tony said, "The carburettor will be fed with an adjustable throttle. That would surely do the job?"

It was Terry, the electronics whiz kid, who quietly said, "I have been testing a system that measures how high an aeroplane is from the ground."

"So? Who needs to know that?", came the reply from the engine genius, Reg Strudley.

"Well", said Terry, "my idea is to send a signal back to the person operating the transmitter, informing him of how high the model is flying. Now what if I added another sensor to my signal so as to send to the transmitter the temperature of the heated fuel. In other words, keep an eye on how it is performing?"

He went on, "It could also be instructed to keep the engine speed at the correct revs so that the motor wouldn't stall."

Dave said, "Great idea, but who could make a throttle control adjustable from the ground?"

Reg replied, "I could do that easy on my Myford lathe - in a day."

Dave said, "Wouldn't it be great if we could see what is actually going on in the model itself whilst it is all taking place?"

"Funny you say that", said Tony. "I have just been experimenting with a tiny camera lens and the picture it produces is actually a good one that can be digitally sent to a monitor."

"Well, that's easy!", said Terry. "It's just another radio channel and no problem at all."

All of this 'Dan Dare' science was over 30 years ago. It was a dream of brilliant British engineering, from different people, that just might come true.

Mixed Fruition

It was decided that all four chaps would be working out between them the necessary work needed to make this World R/C Duration Record attempt. And we would each do our own contributory piece in total secrecy. My job was to arrange for the six judges to witness the attempt at the next Family Model & Craft show at Plumpton Racecourse. Because the forecast was for a full moon it was decided to make the attempt overnight at the show.

Take Off Of The Dakota

The engineering chat had been completed and now it was August at Plumpton Racecourse. Everyone necessary to contribute to the attempt was assembled at midnight on the runway, all of them wearing headband lights. Dave Watts had filled the four large gravity fed tanks in the fuselage with his 'special mix of fuel' and the engines were given a short test run, whilst Terry checked the radio and video link from the aeroplane back to David's transmitter.

Reg carefully witnessed the two throttle adjusters on the Enya 120 4-stroke motors, making sure that they were synchronised with equal revs on both propellers. The model was held by the ground crew of Andrew and Tony, whilst pilot David opened the throttles to full bore. Gently the giant Dakota, now weighing over 50 pounds, ran along the prepared grass runway, gathering speed. It just cleared the boundary fence by a few inches to soar away up into a bright moonlit sky.

It was almost silent as David settled the Dakota into a continuous gentle left handed cruising circle. The time was 00.54 am and it was now Friday morning.

Time Flies

It had been arranged that a number of easy swivel armchairs be placed on the flight line for the six witnesses. Five of them came from abroad and all were complete with their individual clipboards, small lights and stopwatches. Refreshments were served every hour as requested by the senior witness and there was an Elsan toilet located nearby without a door or roof fitted so that all of the judges whilst sitting on the 'throne' could see the small indicator lights on the Dakota as it

A young Andrew Johnson 'stopped' the Plumpton Show with his scratch built Concorde many years ago

slowly flew in large gentle left hand circles at some 2,000 feet. The bright moonlit night was soon replaced at 3.25 am by a beautiful coloured azure early morning dawn sky, with not a cloud in sight.

The engines behaved beautifully all of the time and the fuel temperature was kept at a steady 122 degrees Fahrenheit, with the special 'dip stick' sensor signalling back that the fuel tanks were still half full at 7 am. Without a doubt this British invention, with its excellent modifications, was working

Hanno Prettner, Jo Koullen and Philip Avonds were world class flying guests at my Plumpton show. This picture was taken at another cracking show in Londonderry

beautifully because by now in 'normal' conditions the fuel tanks should have been almost empty. To beat the existing World Record by the required extra 10 percent the Dakota would have to fly till 9.10 am and must finally land in the required marked out 50 foot circle on the runway.

Cheers!

David Johnson was still standing on the runway and fully in control of his Dakota when at 9.55 am he asked, "How much fuel is left?"

"About a quarter", was the reply from Terry and Dave Watts.

"Then", David said, "work out how much longer will it fly?"

Tony, with his slide rule in hand, said, "Certainly till midday."

David's reply was quiet. "But I had a curry supper last night and I suddenly feel the urge!" said with some desperation in his voice.

One of the six witnesses then said, "But the rules state that the pilot is the only person nominated to fly the aeroplane, so perhaps you might consider landing soon..." So it was decided that the Dakota would be landed at 10 am.

And so it came to pass that David brought his aeroplane into a groovy landing, right smack in the middle of the marked out circle to rapturous applause from an appreciative small crowd.

And Finally

I had been delighted to be in at the beginning of this World Record duration attempt, especially as it was staged at my 6th show at Plumpton Racecourse. The show eventually turned out to be a record-breaking crowd job and it was a real cracker that once again enjoyed perfect weather for the many thousands of attendees. One of the many post show jobs was to get the paperwork for the World Radio Controlled Aircraft event ratified ASAP!

On returning home on the Wednesday following the show there were two very serious looking men in black overcoats waiting to see me! In minutes I found myself being escorted in a large black car and driven to London. In my mind I thought that I was going to Buckingham Palace to be given a Royal something for being part of the team that had beaten all opposition to obtain the World Record for the United Kingdom!

Instead, I was ushered into a tower block close to the MI5 (Military Intelligence Five) building by the River Thames. I found myself nervously seated in a place that looked like one of those rooms where one could be beaten to death without the outside world knowing anything about it!

What's Going On?

Eight black suited men were seated in a ring, looking at me as though I had done something nasty to each of them. In the middle sat a Big Man and his face was something that only a mother could love! The questioning started with him asking, "Are you Dave Bishop of DB Sound?"

"Yes, I am and I am proud to have been involved with the successful team that has brought the World R/C Duration record to this country!" I carried on with my spiel, "Because I'm British, you know!"

Big Man leapt to his size 14 feet and banged his fist on the polished table. "Yes you ****** well did and that is why you are here!", he hollered out.

I tried to look angelic and asked, "Why, what's wrong with that?"

He pointed to a tiny Pip Squeak of a man at the end of the table. "Tell him!", he roared.

Squeak wiped his by now sweating brow with a giant black handkerchief and sneered at me. "Did that radio controlled aeroplane have a receiver in it sending signals back to the transmitter?"

"Why yes", I replied. "And it also sent fuel status, a video picture and fuel temperature as well."

"And that's why you are here", smirked Squeak. "Don't you realise what you have done with that stupid attempt of yours?"

"Nope", said I. "What have I done that seems to have upset you a bit?"

"What you have done is to upset most of the world's traders and armed forces who work hard to keep this world safe and successfully employed!"

I burst out with, "How on earth do you work that out?"

His explanation floored me – totally!

The Actual Problem

The interview lasted almost two hours, during which I learned that Dave Watts' 'special fuel', with its lubricant known as a 'synthetic mineral' mixture, used one thousandth of the normal required additive for consistent running of any engines. His 'experiment' was over 20 years ahead of itself, well before this particular expensive lubricant would be generally available for commercial and domestic use.

Secondly, the digital signalling system designed by Terry was again 30 years ahead of anything being produced in the world. Big Man stared at me through bloodshot eyeballs and spat harshly, "That radio system makes all next generation fighter pilots redundant? What will happen to the business of building fighter aeroplanes and training their crews if, as you have done, all of their flying can be controlled from an armchair?"

Breathing deeply, he continued. "That monitoring system could be possibly turned into a live signal being sent back to earth from an aeroplane, which again makes the training of piloted aeroplanes redundant!"

He went on, "For your information we have already had the motor industry crying out about the billions of gallons of lubricating oil being sliced and no longer needed because of this new synthetic stuff that your man Watts has invented. Your scheme is stupid and it won't work – not in my lifetime!"

"And what's more, we are here to tell you that your blasted World Record attempt has been a No-No!"

Big Man finished with, "It never happened and as far as this country and the world is concerned it never will happen! Do I make myself clear?

Now clear off and if you ever mention this anywhere or any place you will be clapped in irons and moved to a place where you will never be seen or heard of again!"

I was herded back to the black car and driven back to my house, arriving about midnight. My wife asked me if I had enjoyed a good day? To which I replied, "Not too bad really", whilst secretly gnashing my teeth!

How about that? All of that work gone down the drain. The whole team was under no misapprehension that if we ever breathed a word to any soul we would disappear from this earth!

Today, April 1st, 2016

I have just returned from a super day's flying at the field and had a good time on the transmitter sticks of one of the lads' quadcopters. The FPV (first person view) surround vision goggles are a dream. Such a thrill to see a radio controlled model flying with me 'seated' in the cockpit, although my feet were firmly planted on terra firma.

My mind went back some 30 years when a certain 'Big Man' told me that such a thing would never happen in his lifetime, and I wondered if he was still alive? As I was being escorted from his London office, I happened to ask the car driver what was Big Man's real name?

His reply, "It's a foreign one – Loop Fliar!"

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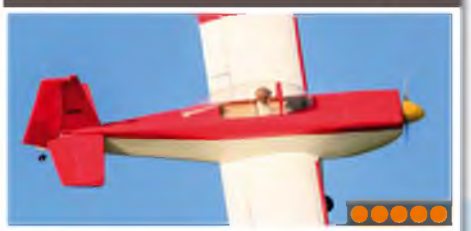

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Designed by Mike White. Simple-to-build 31-inch (788 mm) span EPP delta sports model for 3-channel R/C and a 650 Watt brushless motor power is a recipe for fun, aerobatics, and speed. Flying weight around 3 lb (1.34 kg) this sleek delta design will fly equally well with a 7" x 6" prop and 3s or 4s 2200-3300 mAh LiPo. Not recommended for beginners.

PLAN PRODUCT CODE MW3589
RRP £13.50
SPECIAL OFFER PRICE £12.15

BELL HOP MW3427

Designed by Sid King. This simple to build electric sports design is constructed from all wood using traditional building skills, and will fly well with a simple bell-type brushless motor.

PLAN PRODUCT CODE MW3427
RRP £13.50
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BUZZ-B MW3540

Designed by John Blakey. This is an easy to build 807mm span 'Sportique' fun fly model powered by a small 125 Watt bell motor with a 3s 1500 mAh LiPo. Construction is all wood from the informative 2 sheet plan and suits experienced pilots.

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RRP £13.50
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BLUDGER MW3476

Designed by Geoff Northmore. This classic vintage-style model from Gepff Northmore is based on a full-size original that will fly well on a 480-size brushless motor (around 250 to 300 Watts) with a 860 mAh 3S LiPo battery and full house controls.

PLAN PRODUCT CODE MW3476
RRP £14.50
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LASER CUT WOOD PACK PRODUCT CODE WP3476
RRP £36.99
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DE HAVILLAND DHC-2 BEAVER PLAN MW3754

Designed by Terje Gimming. When designing this model, the main criteria for Terje Gimming's new DH Beaver was that it should fit inside his small car without dismantling and be suitable to fly at his park like flying site. The car criteria limited the wingspan to 1.3 m, for which a 1000 KV brushless motor and a 3S 2100 mAh LiPo provides good performance. Terje wanted to build the plane as light as possible but it was also designed to tolerate rather heavy landings without structural damage
WING LOADING: 70 g/sq dm

PLAN PRODUCT CODE MW3754
RRP £12.50
SPECIAL OFFER PRICE £11.25

MORANE SAULNIER N PLAN MW3713

Designed by Bill Bowne. Bill Bowne describes his design as a 'stand-very-far-off scale' model of the classic early-WWI fighter. With a 432 sq. inch wing and weighing under 3lbs on a .15 to .25-sized electric motor, it's capable of most sport acrobatics, yet can be throttled back and flown like an advanced trainer.
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WING LOADING: 14.7 oz/sq ft (46.7 g/sq dm)

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THE SPORT CHANNEL

Gray settles in after yet another house move!

"You never know what events are going to transpire to get you home..." (Og Mandino)

This Month's Wise Words

I don't know if it shows but I'm writing this edition of SC perched on a wobbly stack of cardboard boxes. Well, it's not the first time it's happened...

Some readers may be ahead of me already. In fact I know they are, judging by the number of cards I've received – how word does travel. I'm very happy to report that I've moved house once again!

It must seem like the development of a strange habit, being my second in a year, but my new home came suddenly as an opportunity that had to be seized. I'm now back in my old hometown, close to friends, club and flying field, and free of a wearying commute to work.

My previous residence was oddly designed and lacked space for modelling activities. I have to confess that I've done literally no building at all for the past year and have suffered withdrawal symptoms that you couldn't imagine.

My new home though is nicely proportioned and I'm already setting up a workshop. Plus, as an extra bonus, I'm looking into installing a shed. Let it never be said that I have my priorities wrong! As soon as I've resumed production I'll show you some projects here.

Although unpacking is still going on and may take weeks yet, and despite outbursts of redecorating between, this place is already feeling like home and it feels fitting to be writing this our 180th edition of SC in such agreeable new surroundings.

Chief Rules The Hills

Once my house move was complete the first model I checked for transport damage was my original kit-built 1960s Keil Kraft 'Chief'. I'd feared that the big, lightweight, uncovered airframe with all that fifty year old 1/8" sq construction would not survive the trip.

As it turned it out it arrived unscathed, unlike some finished and covered models in the same box. Perhaps it was a good omen – I can now resume the project to reproduce my first radio model, a single channel Chief, flown back in 1970.

The Chief still has great appeal as a radio conversion and reader Alan Charlesworth from Conwy in Wales started with a KK kit and transformed Bill Dean's 1950s A/2 design into a no-nonsense piece of slope equipment.

Alan writes: *"As I fly from the Great Orme in Llandudno, I redrew the plan to beef up the fragile open frame to withstand the 'brick lifters' we get here.*

To keep my model 'vintage' I used as much wood from the kit as possible. A hatch was put in front of the cockpit for the battery and servos, with the receiver glued to the floor behind the pilot.

The fuselage sides are 1/16" sheet, the top and bottom 3/32" sheet, with the tail end stiffened with 1/32" ply to stop the twisting effect of the rudder and elevator.

I decided on an inset elevator and used the rear spar as the hinge line. The original fin was made 1¼" taller to add more area for the rudder and the hinge line put at 1/3 chord.

The tailplane was moved back 2" to clear the end of the fuselage. To protect the nose a 1/4" ply skid was glued under the front. No towhook was fitted.

I increased the span to 82" and the chord to 8", to give about 4.2 sq ft of area. I used a two-piece wing with an 'I' bar up front and wire joiner at the rear. The inner parts of the wings are flat with 4" of tip dihedral. This worked out fine and no washout was used. All-up weight is just over 3 lb, giving a wing loading of about 11½ oz.

The Big Chief first flew at last June's PSSA event on the Great Orme. She flies nice and slow and graceful like an old lady should but can do mild aerobatics when asked. One has to wonder what Bill Dean would have said if he'd seen his fragile old Chief doing a barrel roll!"

Well said, Alan! I'm sure he would approve of one of his best-loved designs still giving a good account of itself all these decades later. Our recent item on 'Keil Kraft Kids' who started out on KK kits drew a lot of response, which we'll follow up shortly.

Alan Charlesworth with his reworking of Keil Kraft's 'Chief' vintage A2 glider. Stretched to 82" and engineered for the rigours of Welsh slope sites, the 'Big Chief' nonetheless incorporates an actual KK kit

Following the sudden interest in the 'Littlest Stick' micro single channel design, Colin Hutchinson sent this pic of his SMA fleet, which is undergoing renovation. The shot includes his own Littlest Stick (nearly ten years old?) and hardy regulars, Sharkface, Dumas Dakota bipe, M.A.F. Rainbow (ahh – I have happy memories of demo flying that range at shows in the 1990s!)

N.I. Nostalgia

Our brief mention of one of our favourite micro models, the 'Littlest Stick' single channel sportster by Fred Reese from 1975, was met with an unexpected resurgence in interest and several requests for plans.

We've championed this design for decades and we've seen it evolve from its early versions with Cox TeeDee .010 power and pulse proportional radio and adapt to today's electric power.

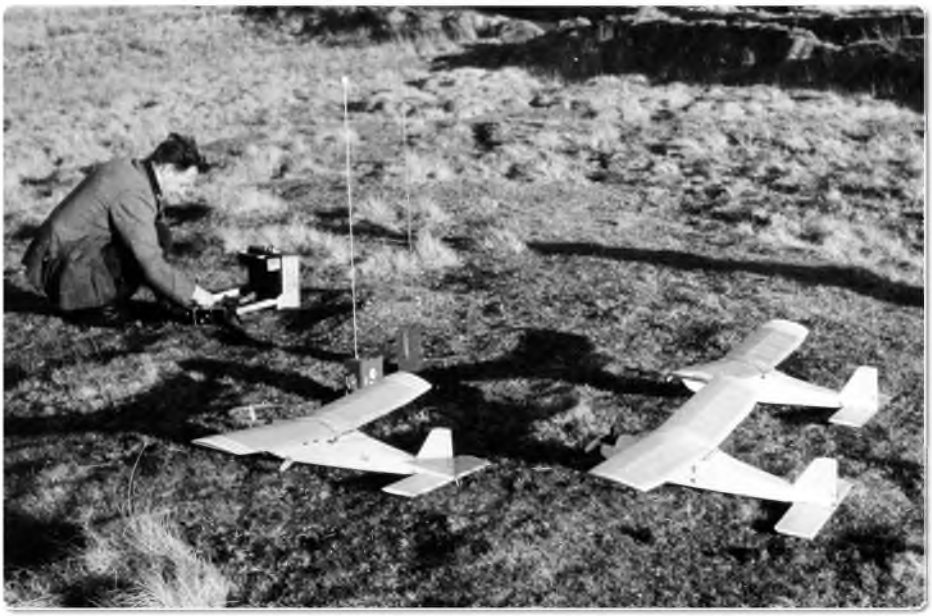
The secret to enjoying models like this is to keep to flying controls to rudder only, as originally intended. The obvious temptation is to add an elevator, which you're perfectly entitled to do, of course.

What you get though is a small, cute rudder/elevator sport model, which will fly exactly like that. Learning the art of flying rudder-only is not only fun but for a lot of modellers is a real revelation. We can recommend it!

Long time contributor, Colin Hutchinson of Camberley in Surrey, mailed in with a recent fleet shot including his long-serving Littlest Stick, which we first showed here when we started discussing the design about ten years ago. In a burst of enthusiasm Colin has begun renovating his entire small model fleet, which also includes the celebrated 'Sharkface'.

Another reader who got in touch regarding the Littlest Stick was 'Slieve' from Northern Ireland, a returnee to the hobby with some recollections and evocative photos of the heyday of single channel R/C flying.

Slieve writes: *"I joined Larne Model Club on the Antrim coast in Northern Ireland in 1952 when I was 12 years old and the three older members who I remember best were Louden Blair, his younger brother Wilson (T.W. Blair) and David Read, who later moved to England. (The club is still going strong though apparently under the name 'East Antrim Model Aircraft Club' and I see on the web that the contact name is T.W. Blair.)*



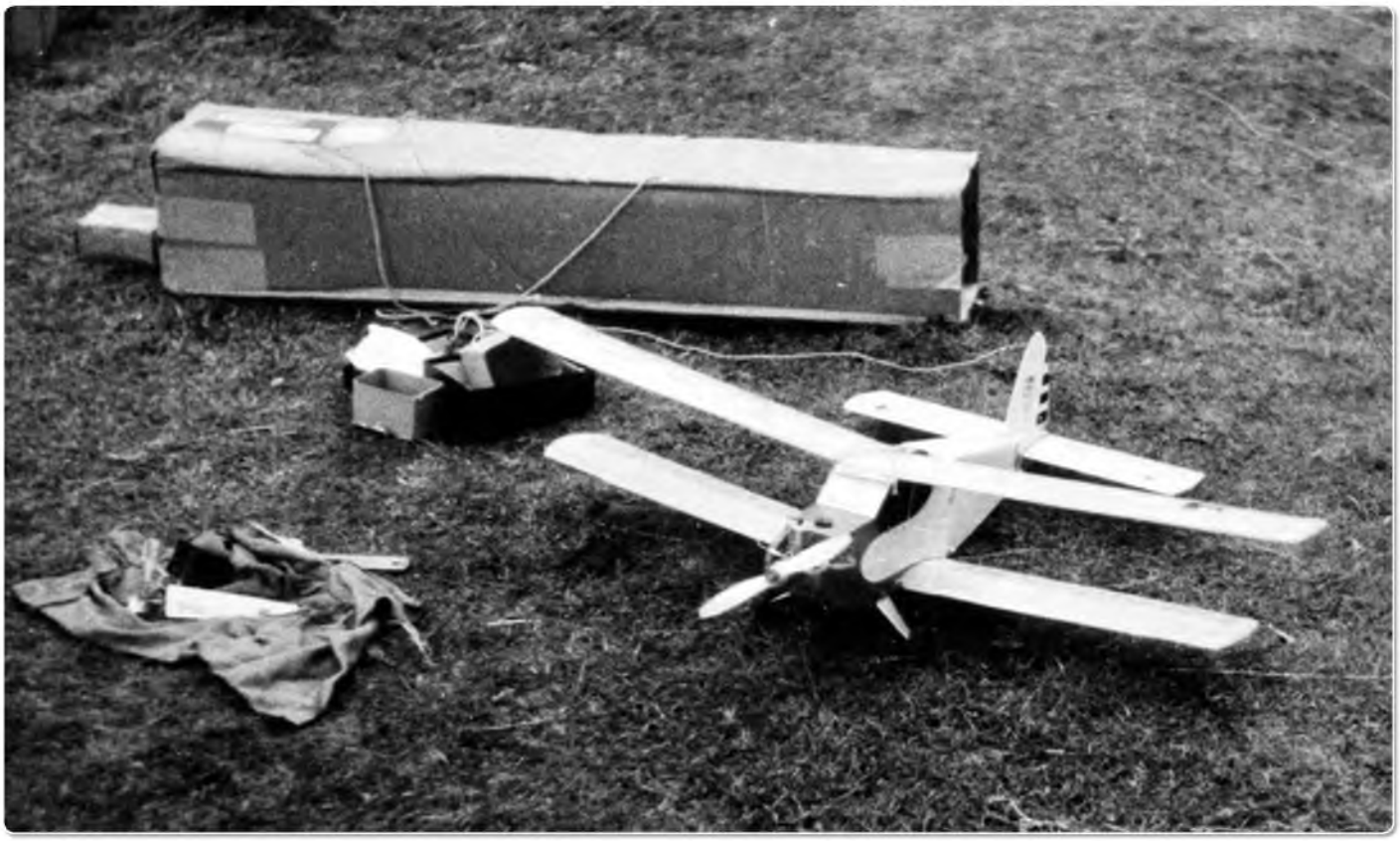
Courtesy of former member 'Slieve', a wonderful moment from the early 1960s when the Larne Model Club in Northern Ireland built Dave Platt's single channel 'Half Tone' en masse. Seems the current incarnation of the club has a similar fondness for it too. See text

I started with control line and we had some excellent team racing. But with free flight, I didn't like running after them too far so I was keen to get into radio control. Louden had an 'R6B' (60" span, I think) with an AM 10 on top and that was probably the model we started on.

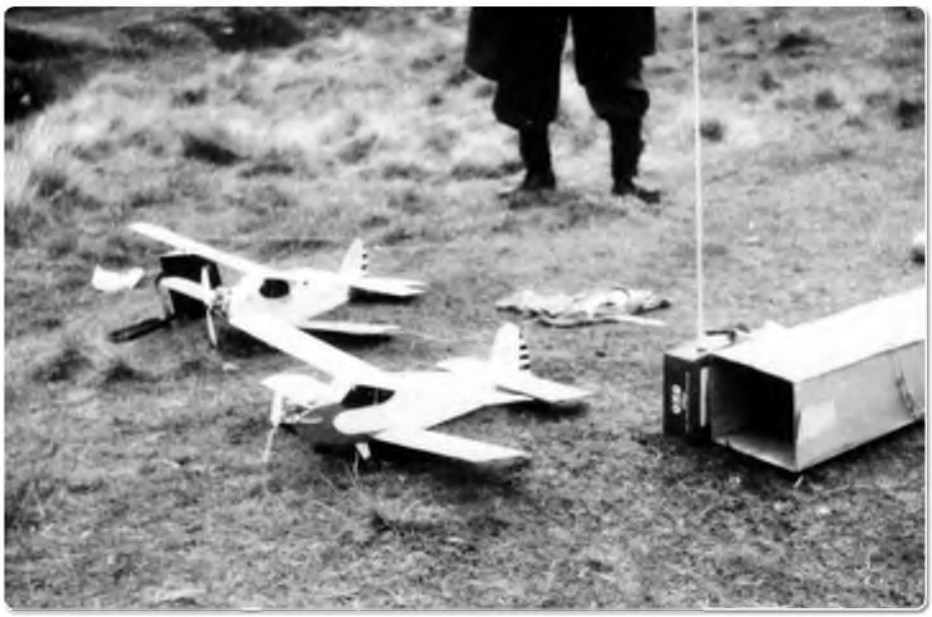
We were building our own radio gear (for financial reasons), though generally used the Conquest escapement except when we used Mighty Midget motors. With these units we stretched the frequency band and could fly two at once with super-regenerative receivers so tail-chasing taught us to fly low and fast, and not just drift downwind.

Louden built the RCM&E 'Kakadu' biplane design in 1960 and he has just told me that he still flies that original model with the same Allbon Merlin now some 55 years later! At least two others also built it, including myself and we found it to be a great design with that engine.

A year later, Dave Platt's 'Half-Tone' design appeared and seemed to have all the advantages of the Kakadu but with less parts, and it could be rigged and flying more quickly from arriving at the flying site by bike with a



Another favourite of the Larne club to get the production line treatment was the 'Kakadu', locally nicknamed the 'Wee Bipe'. We can remember when flying sessions looked like this!



A fleeting moment in the 1960s, beautifully captured. Two Larne Kakadus at rest between flights. Check out that homemade Tx with the Oxo tin case!

long cardboard box strapped to our backs.

About this time some of the boys were building multi-channel radio gear and even their own reed units, keying switches and servos, and we started crossing the water to attend the British Nationals. Speaking from memory, I believe 6th place in Multi-Channel was the highest place achieved with these home built radios, flying against expensive commercial equipment.

In 1964 I completed my education and left N. Ireland, so I started to lose contact with the boys. After a couple of years I became involved in full sized aeroplanes so I didn't have time for models. But the Larne club continued. (I'm drifting back into models as my grandsons grow up.)

Bringing things up to date, the club with its revised name, has 22 current members, which include both Louden and Wilson. Apart from Louden still flying the original Kakadu model, I am told that there are 30 Half Tones owned by the members!

Apparently they ran a production line with members churning out many repeated bits. Louden has one with an AM 15 engine with throttle, though there are also electric ones and Wilson uses a 150 watt outrunner in his. I suppose it is safe to say that the Half Tone and Kakadu are held in high respect in one corner of the British Isles! The members fly all types of models so these great models are used to get back to basics. Apparently there is a photo around which shows 13 Half Tones, which I hope to get a copy of. So we'll see what turns up!"

A splendid story and pics, Slieve, which bring back some memories for me too. I was very fortunate to experience what was to be the tail end of that magical era in aeromodelling. I wouldn't have missed it for anything.

As a fan of Dave Platt's designs the 'Half Tone' was one I wanted to try, but of course I never did. If any of the East Antrim club are reading this I really would love to see a mass fleet shot of all those Half Tones together...

Should any readers care to try their hand at this new fangled rudder-only craze I can provide free downloads of the Littlest Stick, Sharkface and Half Tone plans. Drop me a mail at the address at the end of the column.

Also, I can recommend checking out Phil Green and Shaun Garrity's Single Channel website. They have been responsible for promoting this fine aeromodelling artform and taking it into the 21st century. Watch, learn and be amazed. I must re-establish contact with Phil and Shaun as the past year's dislocation and relocation has disrupted so much correspondence. See Contacts below.

Contributions, please to The Sport Channel c/o the Traplet Publications address. All Email: correspondence to: gray_rcmag@hotmail.com ***RCMW***

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NEXT ISSUE

Aerolab Locamp

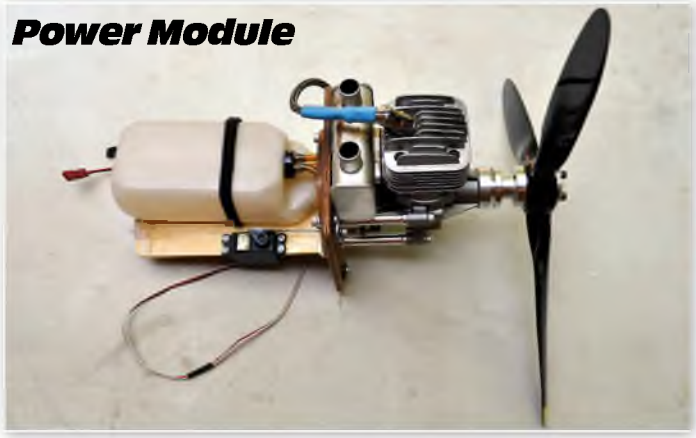
The Locamp was designed by Francesco Rizzi, an Italian airline pilot, about 15 years ago. Aerolab USA offer a very complete kit for the homebuilt aeroplane. Francesco kindly supplied Peter Miller with some superb 3-view drawings with which to draw up his 60-inch wingspan model, which features scale ailerons and flaps. Peter also wanted to make a detailed engine as this is such a prominent feature of the aircraft, details of which were described in an article in the January 2016 issue of RC Model World (please ignore the article's title!) Designed for a .52 four stroke the Locamp has a wing area of over 600 square inches and weighs 5lbs 9 ounces, which gives a most civilised wing loading of 20 ounces per square foot.

Mayfly-6e

Our aptly named free pull-out plan for the May issue is a 56" span polyhedral wing electric soarer designed by Chris Ward for a 2835 inrunner brushless motor and 3-function R/C. Chris aimed to design an electric powered glider where simplicity and clean design were adequate to achieve good thermal soaring results. Mayfly-6e was designed to meet these ideals, being an upgrade of an earlier model that he originally built for NiCads and a brushed motor.

MAY 2016 ISSUE ON SALE THURSDAY 21ST APRIL

Power Module



Chris Freeman's 'Power Module' has the fuel tank, ignition module, battery and servo all attached to a dummy firewall in such a way that it will fit through a suitably sized hole in the firewall of his 'engine test' aeroplane (a large Stik). It is simply fixed in place by bolts into blind nuts on the back of the model's firewall. Just plugging in the throttle servo or ESC (it can be used to test electric set ups too!) into an extension lead is all that is needed to connect up the Power Module.

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- Automatic charging function
- Temperature sensor (option)
- Aluminium casing
- Store function
- Data graph

Specifications	
AC input voltage:	AC 100V ~ 240V
DC input voltage:	DC 11.0V~18.0V
Charge current:	0.1A~10.0A
Discharge current:	0.1A~5.0A
Charge power:	max. 100W x 2
Discharge power:	max. 12W x 2
Balance current:	max.350mA
Balance tolerance:	±0.01V
NiCd/NiMH battery cell count:	1~15cells
Lithium battery types:	Li-Po, Li-Ion, Li-Fe
Lithium battery cell count:	1-6 cell
Pb battery voltage:	2V~20V
Digital Power:	3V~24V
Operation system:	Graphical display
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Dimensions:	170x240x56mm

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Charge current:	0.1A~10.0A
Discharge current:	0.1A~5.0A
Charge power:	max.90W
Discharge power:	max.20W
Balance current:	max.350mA
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NiCd/NiMH battery cell count:	1~16cells
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