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RC MODEL WORLD

From Frustration To Fruition

Diary of a Waco YKC scale build

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The R/C Modeller's Magazine

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Turn to page 86 to read Phillip Kent's description of the time consuming design and build process behind his lovely Waco YKS scale biplane project

REGULARS

REVIEWS

FEATURES

PRE-FLIGHT

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

Welcome to the January 2016 issue of RC Model World.

Blimey, where did the last year go? It seems like only a short while ago that I was writing my introductions for the early issues in 2015. I recall writing about my good intentions to unearth my drawing board and to spend some time rediscovering my model design skills. Sadly this all came to nothing and my poor abandoned board remains tantalisingly out of reach, being covered by yet more parts of ARTF models acquired in the past couple of years, mostly of the foam variety.

I have a similar problem at my workbench. Again this solid support has proved to be a magnet for a small squadron of models, so the chances of me being able to get anywhere near it to start building something seem very remote indeed.

So, as with last year, I'm going to avoid making any firm New Year resolutions, as I'll only let myself down once again! But maybe I can just promise myself to have a good clear out once the weather improves and I can spread everything out on the lawn? Until then I'll just shut the door and carry on pretending that I'm an all-round aeromodeller...

One chap who doesn't let his workbench get cluttered up (or his drawing board, come to that!) is Chris Williams, who treats us to another one of his classy vintage sailplane plan features. For his latest scale glider, Chris has chosen to model the Slingsby Type 26 Kite 2a. Also making a speedy reappearance in the magazine is John Rutter, who follows up last month's free plan with another pull out drawing of a profile scale jet. This time John keeps it British by showing us how to model the triangular shaped Gloster Javelin.

On review, Frank Skilbeck gets a taste of 3-D flight action with the Multiplex ParkMaster Pro, whilst Tony King breathes in some fresh seaside air as he launches a Hacker Lunak semi-scale glider off the nearest cliff. And as Christmas will be just days away when many of you are likely to read this issue, we have some great R/C orientated gift ideas to inspire you when you hit the shops during the festive holidays.

Other features include Neil Hutchinson's tribute to Avro Vulcan XH558 as she concludes her Southern Tour flight in preparation for retirement. John Stennard offers some timely advice on how to start with indoor FPV and Brian Collins takes an in-depth look at popular electric flight connectors. There's also advice on building a battery charging tray, how to make a dummy radial engine, a description of the design and build of a true scale Waco biplane, converting an IC model to electric power and a chat with the folks at Balsa USA about their fabulous WW1 model kits.

That should keep you amused for a bit while you wait for the turkey and mince pies to go down! And provided that the weather holds up over the Christmas and New Year holidays all that remains to do is to wish you my standard salutation – Happy Flying!

Kevin

CHECK OUT **PAGE 14** FOR OUR LATEST SUBSCRIPTION DEALS

RC MODEL WORLD

Editor
Kevin Crozier rcmw@traplet.com

Contributors
Kevin Crozier, Frank Skilbeck, Peter Miller, Brian Collins, Bill Bowne, Neil Hutchinson, Chris Williams, Tony King, Fred Annecke, John Rutter, James Crozier, John Stennard, Chris Bowler, Phillip Kent, Brett Houghton, David Langwade, Peter Maw, Gray

Chairman
Tony Stephenson
Managing Director
Tom Stephenson
Design and Production Manager
Nick Powell
Designer
Nick Powell
Advertising Sales
Angela Price Tel: 01684 588568
email: angela.price@traplet.com
Marketing
Ally Alldritt, Abbey Morris, Samantha Minton
email: marketing@traplet.com
Advertising Copy Controller
email: adcopy@traplet.com
Trade Sales Executive
Angela Price Tel: 01684 588568
email: angela.price@traplet.com
Printer
Warners plc

Newsstand Distribution
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Tel: (001) 217-355-2970
Email info@traplet.com
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Traplet Publications & Hobbies
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Fax: (02) 9520 0032
email: sales@traplet.com.au
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Telephone: (044) 272 5978
Email: southafrica@traplet.com

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SARIK NAME CHANGE

It was recently decided to create a new company name for Traplet's sister company, Sarik Vacform Ltd., which will now be known as Sarik Hobbies Ltd. This will consolidate three associated businesses under one banner, namely Waverley Models, David H Alderton Boats and Sarik Vacform Ltd.

Tony Stephenson will have an active part in running this company as Managing Director. Barry Atkinson, previously the Editor of RC Jet International, will be known as General Manager of Sarik Hobbies Ltd and Janet Baker will work alongside him as Administrative Co-ordinator.

For more information on Sarik products please visit the following website: www.sarikhobbies.com

SarikHobbies

ENFIELD EXCELLENCE

Glyn Downing has written to us about the excellent service that he received recently from one of the UK's longest established distributors. Take a bow, Ripmax!

"Through your esteemed pages would you please be kind enough to pass on my thanks to the Futaba service department at Ripmax.

I had need of their services after the output on my elderly Skysport 6 transmitter failed completely.

After contacting them via email I received a very prompt reply asking me to send the unit along for them to check out.

A couple of days after posting I received a phone call from one of the engineers outlining the actual problem (a failed R/F unit) and the cost, including postage. I have to admit to initially thinking that the costs would probably outweigh the worth of the transmitter. But no, I was told the repair was easy and would only cost £35. As I still use a lot of 35 FM gear I was more than happy to stump up the money there and then.

A couple of days later the unit was returned, via courier, all nicely packaged and ready to go. I think they must have given it a good going over as the gimbals were really nice and smooth and the throttle ratchet must have been replaced as it was very very crisp, like new and it 'clicked' just right.

What brilliant service! Once again, thank you Ripmax, from one very happy customer!

MICK WILSHERE, 1935 - 2015

Mick Wilshere passed away on the 18th October aged 80. Best known for distributing the Italian range of Super Tigre motors, he started the model business in 1966, offering kits and components for the World Engines range of radio equipment from the USA. The Blue Max, Pylon Migit and Talisman ranges followed. In all he hand made radios for over 20 years; many were specials and one off systems.

His association with Super Tigre lasted over 40 years and working closely with the factory he was totally connected with the brand. His passion for the product often causing friction with customers! His love of aviation encompassed full size flying, both power and sailplanes. Most of his later life was spent soaring the Chiltern hills in his LAK 12 glider. The origins of the business survive in son David's Motors & Rotors company. The photo, from a few years ago, shows Mick with son Dave and grandson William at the local club field.

A Tribute From Tony Stephenson, Chairman of Traplet Publications Ltd

From my personal point of view I would like to add my own tribute to Mick Wilshere. He was truly one of the most passionate and individual characters of the modelling world, who loved all forms of aircraft, both large and small.

I have known Mick for more than 40 years and I will remember him with enormous fondness, especially for his wicked sense of humour. I am sure, like me, that many of our readers throughout the hobby will remember this great character and enthusiast who contributed so much to the modelling fraternity.

KEEP AIRFIELDS GREENFIELDS

If you are one of those lucky aeromodellers who have access to a full size airfield to fly your models from then the following may be of interest, kindly supplied by Dave Parsonage. And even if you don't fly from such a location then maybe you can add your name to this petition too, as it will be of concern to all aviation enthusiasts. I speak from experience, having enjoyed many happy hours flying with the Maidstone MFC on the wide open spaces of West Malling airfield in Kent, which has now largely been built over with residential and commercial developments.

Dave writes:

"I was talking to Barry today at your stand at the BMFA Nationals about the changes to airfield status from greenfield to brownfield.

The petition is posted on the government e-petition website: https://petition.parliament.uk/petitions/106779

If possible please could you arrange for a brief description and a link to the petition to be placed in your publication. Hopefully that we can make as many people as possible aware of what's happening and maybe reverse the situation through the use of this petition."

'The Keep Airfields Greenfields' petition, created by Stephen Slater, seeks to review airfield classification as brownfield sites. The petition states that in 2003 an 'administrative oversight' led to the deletion of planning protection from airfields being classified as brownfield sites. This has led to airfields being closed and used for development. And when aircraft can no longer land it breaks important transport links. Environmental issues are also important as airfields provide significant areas of natural habitat for plants, insects and wildlife.

There's a long way to go to reach the 100,000 signatures required before this petition will be considered for debate in Parliament. If you want to add your name then don't delay as the deadline is the 27th February, 2016.

SUKIE REPRISED

Regular readers will remember that back in 2014 we revisted the plan of Sukie, a 56" span mid-wing sports aerobatic model design by John Hancock. John loosely based his design on a Sukhoi Su26 and so it features a radial cowl, together with uncomplicated construction using traditional methods. Designed for glow power, Sukie suits .36 – .40 size two-stroke engines.

John writes:

"Dear Kevin

I've only just discovered that you had reprised my Sukie last year. I quickly sent for the back issue and received it last week (July 2014; Issue 366).

I still have my original drawings and both my original models. I enclose a photograph of self and the one that is illustrated in the article. In fact I had flown it the week before on our field at Windsor.

It and its 'sister' are very useful aeroplanes to fly when I feel the need for 'agility' practice – my brain and undercarriage are not as youthful nowadays but they still work! I have a good stable of models but many are electric these days – all 'home grown' apart from one ARTF. We all have guilty secrets... How could we survive without model aeroplanes?"

It's great to hear from you, John. And heartening to know that the original Sukie and her sister are still being flown. Hopefully another squadron of Sukies will have taken to the air after we republished the free plan in 2014. If any of our readers have built one recently do let us know.

HACKER MASTER STICK

In November's issue we featured Frank Skilbeck's review of the Master Stick high winger from Hacker Model Production. After reading the review, Karel Hacker sent us this message:

"Hello Kevin

I just received RC Model World with the review of the Master Stick, but there are some things with which I can't agree.

1. Master Stick is designed for beginners and when flying it normally and also inverted it is very stable and does not need any correction, which is written in the article.

2. We've never had a problem when towing, which is also written in the article.

I enclose a short video with the SKG Blanik (review coming soon – KC) taking off on a dolly and being towed with a Master Stick. It's a poor quality video and a little windy but it's no problem using 15 m of silicon thread and a standard 200 W motor in the Master Stick. We took off without the dolly from short grass too."

The film is short and sweet and so it's not really worth sharing the video with you on our website. But I'm happy to report that the Master Stick does indeed haul the Hacker SKG Blanik aloft with ease.

Following Karel's comments, we put his points to Frank to see if he had any feedback. Frank writes:

"After I reviewed the Master Stick in the November 2015 issue, Hacker Model Production got back in touch with us regarding a couple of my observations. I reported that our attempt to use the Master Stick as an aero-tug for a 2.25 m Parkzone Ka 8 had not been a success and I advised that we felt a bit more power would be required. Hacker have pointed out that they have used this model to tow up 2 m gliders from their SKG range very successfully. I agree that a slightly smaller glider would have towed up easier and I hope that the review didn't give the opinion that the Master Stick wasn't a suitable tug for the right sized glider, or that with a bit more power the Ka8 wouldn't have towed up okay.

We also reported that the stall when flying too slowly when inverted could lead to a nose up stall. Maybe it wasn't clear in the article but as long as the Master Stick is kept flying above the stall speed when inverted then it's quite capable and doesn't do anything unexpected."

Many thanks for making things clear, Frank.

BMFA ELECTRIC INDOOR MASTERS

The 2016 BMFA Electric Indoor Masters will again be taking place at the superb Metrodome Arena in Barnsley. The date for the Electric Indoor Masters is the 13th and 14th of February and a full weekend of indoor entertainment is guaranteed.

The competition will feature eight classes of competition, including four classes of F3P, Aeromusical, Freestyle and indoor pylon racing.

The venue offers excellent facilities, including a large flying area and tiered seating for spectators, as well as full catering. There will be a raffle each day, with a generous prize pot thanks to the EIM's sponsors.

All competitors must pre enter using the online entry form at: www.eim.bmfa.org

Spectators are able to turn up on the day and pay at the door. Entry fees are £5 adults, £3 Under 12s.

Don't miss this opportunity to see some of the world's top indoor pilots in action.

HYPERFLIGHT SPREAD THE WORD WITH CARBON

Vladimir Gavrilko of Vladimir's Models (left in the photo) and Neil Stainton of HyperFlight, suppliers of high level model gliding products, exhibited at the prestigious Advanced Engineering UK event (www.advancedengineeringuk.com) to market the world's lightest 26 g/m² biaxial spread carbon created by Vladimir and sold in the UK and EU by HyperFlight.co.uk.

The material is already used by many model glider manufacturers. The product was well received and Neil and Vladimir are hopeful that the time and investment exhibiting at the show will be repaid.

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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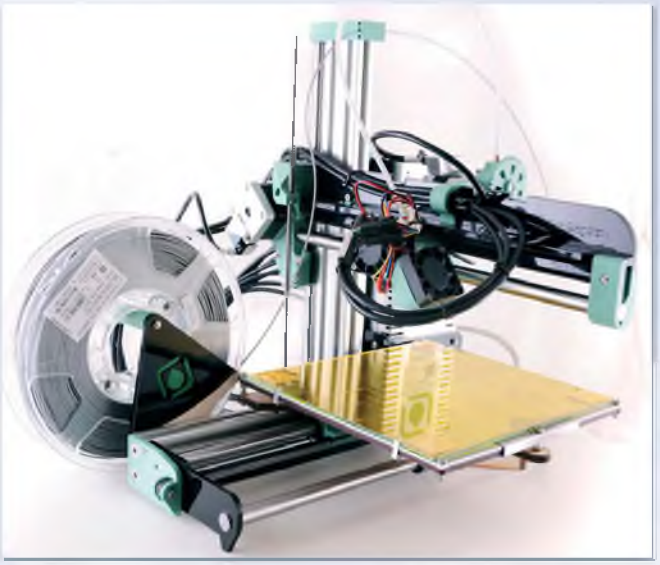

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New kits and accessories

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PARKMASTER PRO

Frank Skilbeck assembles an updated version of Multiplex's top-selling 3-D aerobatic kit

ParkMaster PRO is well protected in a very colourful and informative box

ParkMaster PRO is stable in a prop hang, making this a great model with which to build up your 3-D aerobatic skills

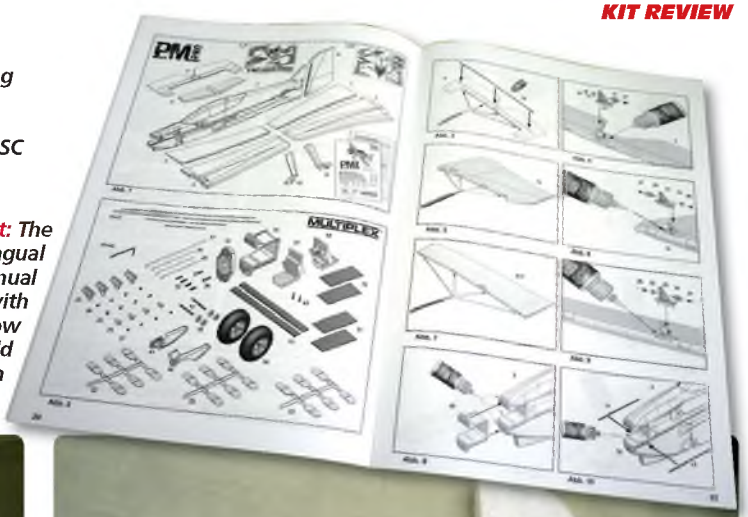
Foam parts are protected in their own shipping tray

The ParkMaster PRO is an update to the original ParkMaster 3D introduced by Multiplex some seven years ago. The Pro version includes carbon fibre reinforcement instead of fibreglass used previously and a carbon fibre landing gear instead of wire, all topped off with a new set of decals and an optional carbon fibre motor mount. Not a major redesign, just a set of well thought out updates to what is a well loved model.

The review model was supplied as the Kit+ version, which includes the brushless motor, 30 A ESC, 10" x 4.7" propeller and four Nano-Karbonite servos, leaving the modeller to supply the 950 mAh 3S LiPo and receiver, plus copious amounts of cyano. It is also available as a kit only, leaving the user to supply their own motor, ESC and servos.

As usual with Multiplex the packaging is exemplary. Not only is the box colourful and attractive but it contains a wealth of information on the model.

Left: Multiplex tuning motor set includes a Himax 2816 1220KV motor and 30 amp ESC



Right: The multilingual instruction manual is very clear, with easy to follow diagrams. A gold standard in instructions!

Foam parts and accessories are all to a very high standard

Carbon fibre rods are cyano'd in to moulded slots to provide strength and stiffness. Here the elevator stiffening rod is being glued in

Motor mount being glued into its recess in the fuselage

The motor mount is reinforced with carbon fibre rods. The bulkhead bolts on with two cap head screws and has four jacking screws for easy thrust line adjustment

The 'canopy' has to be painted. I found it easier to paint before the wings and tailplane had been attached

Opening the box reveals all the components held in their own foam tray, which provides another level of protection and makes a great stand to keep all the bits while you put it together. The multilingual instruction manual is again top rate, with clear step-by-step assembly diagrams, backed up with well written instructions, a detailed parts list plus comprehensive flying and trimming notes.

Assembly Begins

Assembly starts by fitting a carbon fibre reinforcing rod in the elevator. Multiplex recommend using their Zacki Elapor cyano for this. But as I didn't have any, and my local model shop didn't have any in stock, I used a medium cyano. Unlike Zacki, which is activated by the Elapor foam, I had to use some activator to make the cyano set. This worked quite well on these parts. Elapor doesn't require foam safe cyano but it's always best to test on a small hidden section first.

The control horns are also cyano'd into specific recesses in the control surfaces, as on many Multiplex models. The control surfaces are hinged, using shaped Mylar hinges and the parts are marked where the foam has to be slotted for these; a new, sharp knife blade is needed here for a clean cut. Here the cyano I was using (as we will see later) wasn't up to the job, so make sure you at least follow Multiplex's recommendations for gluing the hinges.

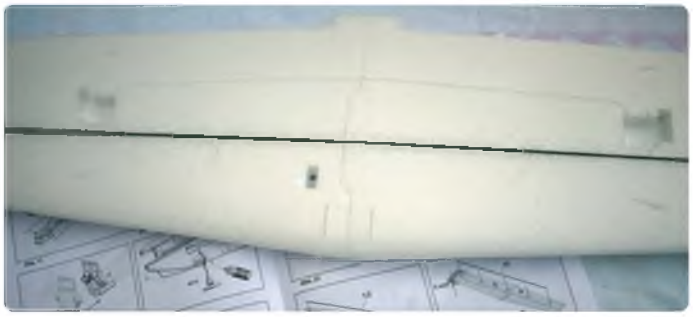
A plastic motor mount is cyano'd into a recess in the fuselage and reinforced by some carbon reinforcing rods that assist in transferring the load into the fuselage. Reinforcing rods are then installed down the full length of the fuselage to increase strength and rigidity; just make sure you keep the fuselage straight when gluing these in.

Next up is fitting the elevator and rudder servos. The Nano-Karbonite servos supplied are a snug fit in the recesses, and although the instructions show cyano being used to hold them in place I deviated and used a few dabs of hot glue.

The undercarriage is a clever blend of plastic mouldings, carbon fibre legs and wheel axles, and foam mouldings, the foam wheels being held onto the axles using star washers. It all goes together easily and the finished result looks good. The wings are supplied in two halves, which have to be cyano'd together and then reinforced with full length carbon spars top and bottom. It's important when joining the two halves that the wings are joined accurately.

Fortunately the quality of the mouldings is such that this is not difficult to achieve. The bottom spar is glued in first and then the wing is turned over and one side of the wing packed up before gluing in the top spar to ensure that the top of the wing is level and the underside has the dihedral. One of the ailerons is then hinged and the wing is slid into position in the slot in the fuselage. Again marks are provided in the wing mouldings to ensure the wing is lined up accurately in the fuselage before cyanoing into position and the remaining aileron is hinged.

The undercarriage is a mixture of carbon fibre, plastic and foam, which goes together to make a lightweight, sturdy structure



The wings are butt joined together and reinforced with full length carbon fibre 'spars'

The fuselage ready for fitting the wings, horizontal stabiliser and rudder

The wing is fed through the fuselage before the second aileron is fitted. Marks in the foam mouldings make alignment easy

The horizontal stabiliser is slotted into place before the rudder is fitted

A foam block has to be removed from the battery bay in the fuselage. A sharp knife makes short work of this

Decals supplied are very colourful and the instructions provide views showing the position of all the main stickers

The decals are easy to apply and are designed to accommodate the gaps for control surface movement

The aileron servos are fitted at this point. I used hot glue again, but make sure you have centred the servos and fitted the control arms before gluing them into position as getting at the servo arm retaining screw once the servo is in place is a little tricky.

Note that although a set of decals are supplied to decorate the model there are no decals for the canopy and this is left bare for the modeller to paint. I used acrylic gloss black and painted the canopy before fitting the wing as it is easier to handle the fuselage without the wing whilst painting.

The horizontal stabiliser is then glued into its slot before the rudder is hinged. The control surfaces are hooked up to the servos with Z bends at the servo and using screw down pushrod connectors on the control horns; you should fit these before hinging the control surfaces to provide some adjustment.

On the review model there was some slop where the Z bend fitted to the aileron servo control horns and this gave a bit of free movement on the ailerons. But it was decided to test fly the aircraft like this to see if there were any detrimental effects.

Striking Sticker Set

Before fitting the motor and ESC I applied the very striking decals provided by Multiplex. These were quite easy to apply but there's a lot of them, and the finished result is very pleasing. I suspect those more adept with an airbrush will take advantage of the blank white foam and we'll probably see some quite striking original colour schemes in the future.

The motor is fitted to a bulkhead, which in turn is fitted to the plastic motor mount that has already been fixed into the fuselage. This is held in with two cap-head screws but left/right and up/down thrust can be adjusted by slackening these off and adjusting the four grub screws to adjust the stand-off angle. While the manual gives recommended thrust settings, Multiplex advise a procedure to adjust these by observing the flight characteristics in a vertical climb.

After the initial test flights I did this on a calm day and over a couple of flights the adjustable mount made it very easy to dial in the correct side and down thrust. This was all with the standard plastic motor mount, but for those wanting some extra bling Multiplex offer an optional carbon fibre bulkhead.

I installed a Multiplex RX5 light receiver using the supplied hook and loop tape, which fitted easily into the cut out in the fuselage. This should be large enough for compact receivers from other manufactures without requiring any modifications. The ESC servo wire wasn't quite long enough so a small extension lead was required. The wires from the various servos and ESC all run in channels cut into the wings and fuselage, making for a very neat installation.

The recommended battery is a 950 mAh 3S LiPo, but I used 1000 mAh and 1150 mAh 3S LiPos for flight testing. Before committing to flight I ran a quick power check using a 1000 mAh battery, which gave 26 amps and 256 watts straight off charge with a 10" x 4.7" prop. As the model only weighs 475 grams and the batteries add another 80 to 94 grams, this is over 200 watts per lb, which is definitely not on the skimpy side! The battery goes into a slot in the fuselage, after cutting away a section of foam, and is held in position with hook and loop tape.

Once applied the decals make for a very striking model. But as an alternative the white foam base provides a good starting place for those who are artistically inclined

The receiver fits in a recess just underneath the wing. Note the slots provided for the servo cables and also to route an aerial. A Multiplex RX5 receiver fitted easily but the recess should accommodate most compact receivers without requiring any modifications

The motor fixes to the adjustable bulkhead and the speed controller is held in a recess with hook and loop tape. Servo cable and battery wires are routed through the fuselage for a tidy installation. The wings have a slot for the ESC plug, which is an exact fit for the Multiplex six pin plug supplied

Elevator and rudder servos are situated underneath the horizontal stabiliser and are connected with short, direct control runs

The same area after a few flights. The underside of the rudder rubs along the ground and can get scuffed. Some additional protection would be worthwhile

Using the flight phases on my transmitter I set up three rates. The maximum rates were as per the instructions, and then I reduced them to 60% and 30%. While I manned the camera, I asked a clubmate who normally flies 6S electric 3-D and IC aerobatic aircraft to do the test flight honours.

Fly Like a Pro

To cut to the chase, let's just say the Park Master Pro is an absolute delight to fly. On low rates it tracks round the sky like a F3A aerobatic plane, but flick to higher rates and tumbles, blenders, prop hanging and very fast roll rates are the order of the day. The rudder is so large and powerful that initially on high rates it is difficult to hold a knife edge without it doing a knife edge loop!

Once I got a go on the sticks I revelled in just how easy it is to fly. Knife-edge has no elevator or roll coupling, and multiple knife-edge loops are a real hoot. Harriers are pretty easy, and inverted flight only needs a breath of down elevator. Once the thrust lines had been set up it was easy to prop hang, especially with the Centre of Gravity at the rearward position. I don't claim to have any aerobatic prowess but the PM Pro really flattered my abilities. As expected there is ample power and prop hanging takes around half throttle, with plenty of power left to punch out into a vertical climb.

Landing and take-offs are easy but the small wheels won't suit very rough surfaces. We did our flight testing when the grass on our strip hadn't been cut for a few weeks. This gave the bottom of the rudder a hard time and this was soon looking a bit tatty, so if you aren't a 3D hotshot who hand launches and catches the model out of a prop hang you may want to consider adding some protection here against general wear and tear.

While it's more fun to fly when there's hardly any breeze, even without any fancy stabilisation electronics, the PM Pro can handle light winds quite easily and flight times of five to six minutes use about 550 to 600 mAh from the battery. The slight play in the aileron control Z bends noted earlier didn't seem to affect flight performance in any way, but after we'd finished the initial flight testing I put a dab of cyano on the servo control horns to sleeve the Z bend, giving a complete slop free control linkage.

As previously noted I'd deviated from the instructions in my choice of cyano, and also using hot glue to fix the servos in. This did come back to bite me, but also showed how tough the PM Pro is. On the fourth flight the rudder hinges came detached; having a rudder the size of a small yacht sail didn't help the handling and the PM Pro was unceremoniously dumped.

But re-fixing the rudder and all the other surfaces using a high quality thick cyano had it back in the air the next day without any further control surface problems. Until that is the hot glue holding the aileron servos gave up and they both fell out! This time, using rudder, a controlled landing on the runway was made. So the lesson here is to follow the Multiplex instructions and use good quality adhesives, preferably their own Zacki brand.

I've never flown the original ParkMaster so I can't do a comparison in that respect. But taken in isolation the PM Pro is a real sweetie. Experienced 3-D flyers will have a real ball, but the flying qualities make this

a great plane to learn to fly aerobatics and 3-D with. I'd say it would be a good follow on model to a low wing trainer as it has no bad habits and can be flown very slowly.

Better still, if you download the free Multiflight flight simulator from the Multiplex website you can try it out for yourself.

Gary, my aerobatic test pilot, who isn't easily impressed, summed it up quite succinctly while he was flying the ParkMaster PRO. He simply said, "I could get to like this!"

RCMW

You just can't help going vertical with the ParkMaster PRO!

Contrasting decals on the under surfaces show up well

This is what happens if you don't follow the instructions and use Zacki cyano!

Landings are easy, with no tendency to nose over on a reasonable surface

You can test out the ParkMaster PRO on the Multiflight simulator, which can be downloaded from the Multiplex website

MODEL WORLD DETAILS

MODEL INFORMATION

NAME:	ParkMaster PRO
MANUFACTURER:	Multiplex
DISTRIBUTOR:	J Perkins
WEBSITE:	jperkins.com
PRICE:	£95.99 (Kit), £179.99 (Kit+ inc motor, ESC and servos)
MODEL TYPE:	3-D aerobatic
CONSTRUCTION:	Moulded Elapor foam
PARTS SUPPLIED (KIT+):	Airframe, Himax C 2816-1220, 30 A ESC, 10" x 4.7" propeller, 4 x Nano-Karbonite servos
PARTS REQUIRED:	Receiver, 950 mAh 3S LiPo

R/C FUNCTIONS

1: Ailerons (dual servos) 3: Rudder
2: Elevator 4: Throttle

MODEL SPECIFICATIONS

WINGSPAN:	975 mm (38.4 in)
LENGTH:	1030 mm (40.6 in)
WING AREA:	3.12 sq ft
FLYING WEIGHT (950 MAH LIPO):	550 g (19.4 oz)
REVIEW WEIGHT (1000 MAH LIPO):	555 g (19.6 oz)
WING LOADING:	19 g/dm^2 (6.2 oz/ft^2)

DISLIKES

Slight slop on aileron linkage • Bottom of rudder scrapes on runway and can become tatty

LIKES

Flying characteristics • Robust airframe • Clever design and construction • Clear instructions • Big grin factor!

OTHER CONTACTS

Flight Simulator and Model Info:
www.multiplex-rc.de/
Manufacturer's Video:
www.youtube.com/watch?v=Y3alzfLBnjE

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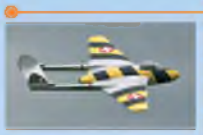

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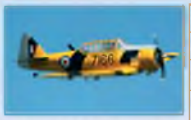

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BUILDING A DUMMY ROTARY ENGINE

Peter Miller describes how he built a replica Rotec 2800 engine for his latest scale design, the Aerolab Locamp

The Rotec radial of the Aerolab Locamp is a distinctive feature. Be sure to keep this article in preparation for Peter's full plan feature on this pretty vintage style monoplane – coming soon!

There are many aircraft that have an exposed engine. Most common in the modelling world are Continental and VW motors for light planes and all the radials and rotary engines used by fighters etc.

In many cases it will be impossible to find anything that can be used to make these engines to the scale that one needs. I have made a few over the years but the most recent was the most complicated.

The Aerolab Locamp, which will be an RCMW Feature Plan in the near future, is powered by a Rotec 7 cylinder radial engine made in Australia. At 1/6th scale this is just over 5" in diameter and my OS FS48 Surpass blends in remarkably well.

I will say that the engine took quite a long time to build. It could have been super detailed and finished off a little better, but bearing in mind that it is the first thing to hit the ground in an arrival I felt that as long as it looked good at 10 feet I would be happy.

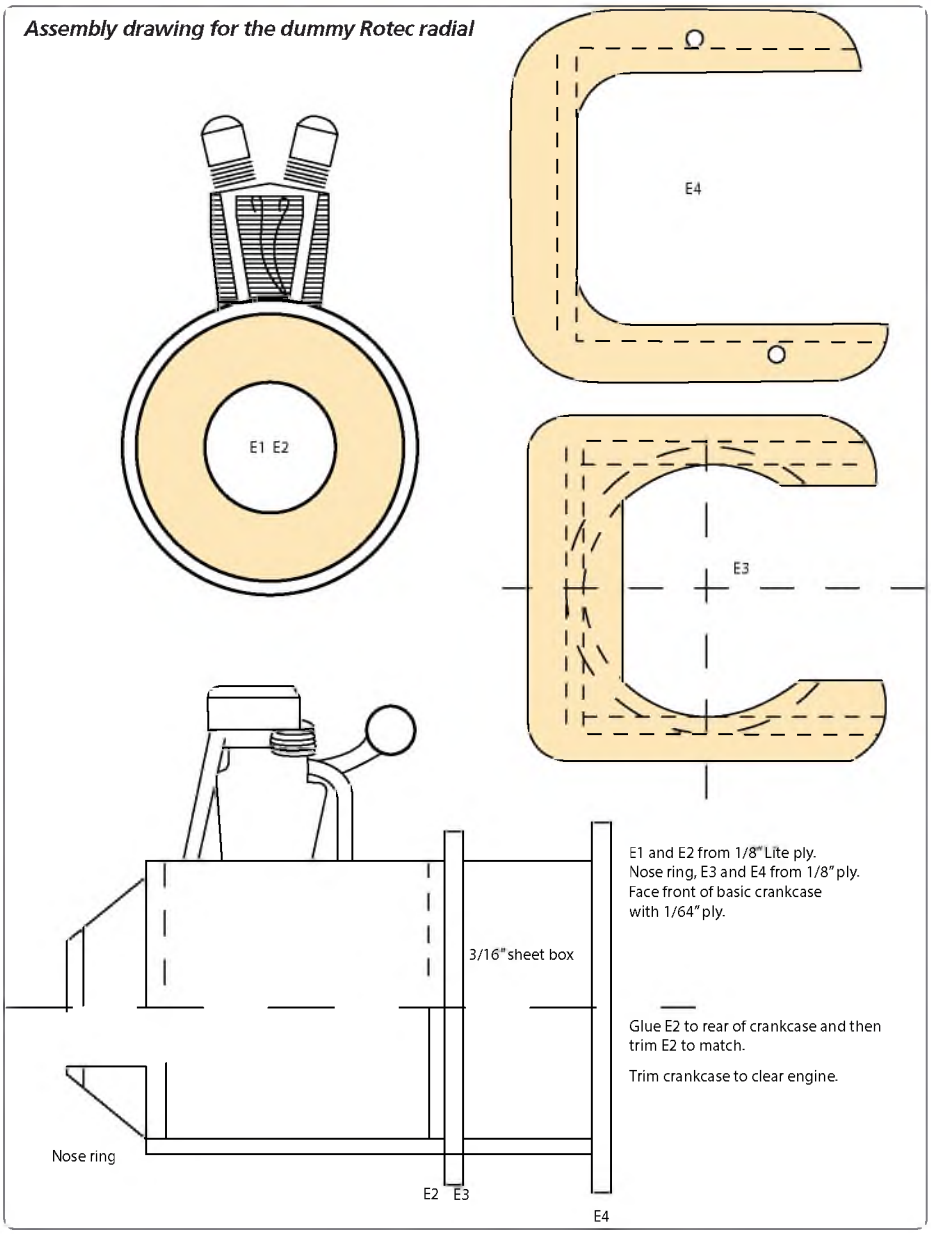
The Crankcase

The basic crankcase is formed round two round formers. These are 2¼" diameter. Make up 1/4" spacers and glue them to the E1 and E2. Glue them inside the edges as they will be removed later.

The first stage is to roll a strip of 1/64" ply round them glued with aliphatic resin (CA does not work too well with plywood) Once the glue has dried make up a strip of 1/8" balsa a fraction wider than the length of the crankcase.

Now glue the start of this strip to the crankcase with CA (cyano), and once it has gone off put a good amount of CA in the join and roll the whole thing along. This squeezes the CA along. Keep checking as you will need to add more CA as you roll everything up. Now repeat the whole process with an outer layer of 1/64" ply. Remove the 1/4 square spacers and face the

Assembly drawing for the dummy Rotec radial



front of the crankcase with 1/62" ply. The crankcase will need to be cut away for the model engine. I found that using cutting discs in a Dremel was the best tool for this. This process makes a very strong crankcase indeed. I use the same method for building radial cowls and it is amazing just how much punishment they will take.

The front of the crankcase is made from 1/2" sheet with a ring of 1/8" ply at the front. The rear is built up from the two formers and 3/16" sheet balsa. All of this is trimmed away as necessary to allow it to fit over the engine.

Carefully mark out the location of the centre-line of the cylinders and drill the 1/8" holes for the dowels. Now cut discs of balsa and glue them on over each hole. Clamp them so they follow the curve of the crankcase. Now sandpaper them flat. This is to give a flat seating for the cylinders and it is easier than trying to shape a hollow curve in the bottom of the cylinders.

Build the box at the rear of crankcase and glue it into place. You may need to grind away some of the engine mount to help with the clearance. You will also need to do a lot of cutting away and grinding to get the crankcase to slide over the engine.

The crankcase should now have several coats of sanding sealer applied and be sanded down to get a nice finish. This is especially important on the front balsa section. It is worth checking at all stages that the crankcase fits over the engine.

Cylinders

Now this is a job that needs a lot of patience. Actually the round cylinders are easier than the squarer ones on Continental engines, but you have seven instead of just four.

The first thing to do is to go on eBay, or similar website, and buy two hollow punches, one 23 mm and the other 19 mm diameter. Also buy about two square feet of 1/32" ply. The other requirement is a block of wood; pine will do. You will use the end grain on this block.

Now sit down and using the punches cut out ninety 23 mm discs and eighty four 19 mm discs. Actually you need to cut out a few extras. Take a tip from me: remove each disc from the punch separately. If you leave more in they are very hard to extract. This is not too bad a job. I sat in the sun for an hour and punched them all out.

Take one of each size of disc and mark the centre and drill a 3 mm hole in them. Next take batches of fifteen 23 mm discs and tape them together with the drilled disc and drill right through the lot. Repeat for all six cylinders and then do the same again with the 19 mm discs.

Take long 3 mm caphead screws and assemble the cylinder fins onto them using a smear of aliphatic resin on each. Do the nuts up tight and leave to dry. Use cap heads because they will take the strain of the next stage without bending.

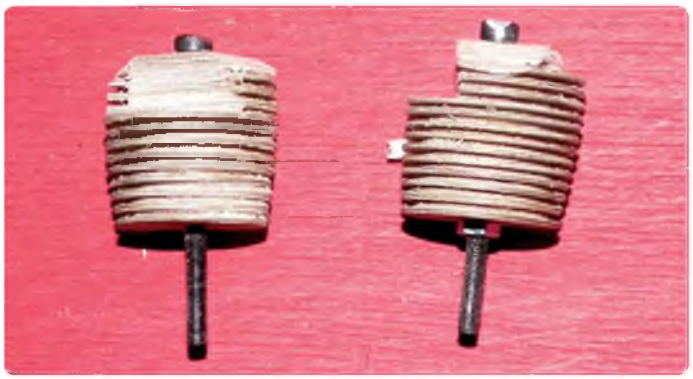
Holding the ends of the screws in a drill, true up the cylinders and turn the slight taper on their lower parts. You can use a file or sanding block for this.

The operation will cause the ply to spread a little and fill the fin gaps up. This can be removed in any one of different ways. You can use a wire brush in a mini drill while

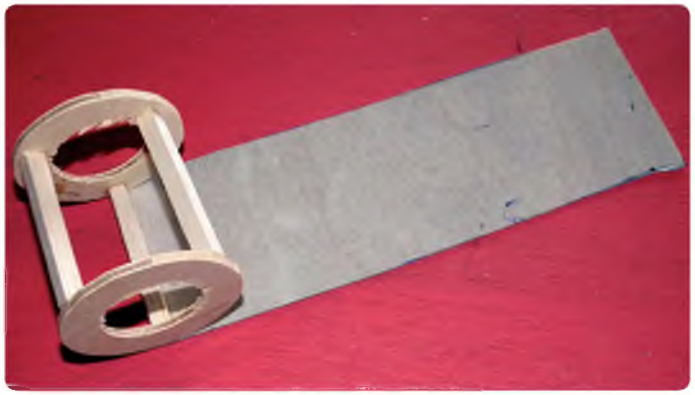
Cutting out all the ply discs is not hard

A small V block helps line the discs up for drilling. The clamps hold them firmly

One cylinder in the rough. The other has been sanded, chucked in a power drill



The locations for the intake and exhaust tubes, and the plugs has been cut away



Starting to roll on the first layer of 1/64" ply

The balsa and second ply layers ready to be glued on

spinning the cylinder in a large drill, or you can use a thin half round needle file while spinning the cylinder. Even a doubled up piece of fine sandpaper will do the job.

Next stage is to cut away the rear of the top of the cylinder for the inlet and exhaust pipes and cut away the top at the front for the spark plugs. At the same time chamfer the top of the cylinder as shown to make the seats for the rocker boxes.

Once satisfied with the shape the bolts can be removed and 3 mm dowel can be glued in, leaving a short length sticking out of the bottom to be glued into the crankcase.

I show a taper on the cylinders but documentary material obtained after making the engine shows that in fact they are parallel with the head, being slightly larger than the cylinder. The Rotec photo and drawing will help here.

This completes the basic cylinders.

Rocker Boxes

The rocker boxes on the Rotec engines are unusual in shape. The part where the valve stem and valve guides go are round, with fins. The top is a normal shape with the name ROTEC embossed on each one.

The round portion is made by taking 3/8" dowel and wrapping a double layer of thick thread round it. I used saddlery thread as this is about the right thickness. It is easier to wrap the dowel in short sections about an inch long.

Once the dowel has been wrapped undo one layer and thread to leave the other. Brush glue over these and leave to dry. Finally, cut the dowel to length. You now have twelve finned sections of rocker box.

The tops are made in two sections. The main part is a simple shape cut from 1/4 square spruce with the ends rounded off. Drill 2 mm pilot holes in one end of the rocker box. If you are going to fit the lubrication pipe you can also drill a 2 mm hole across each rocker box in the middle. The top of the boxes are a bit more complex as they have the name embossed on top. Don't panic! It's quite easy to do.

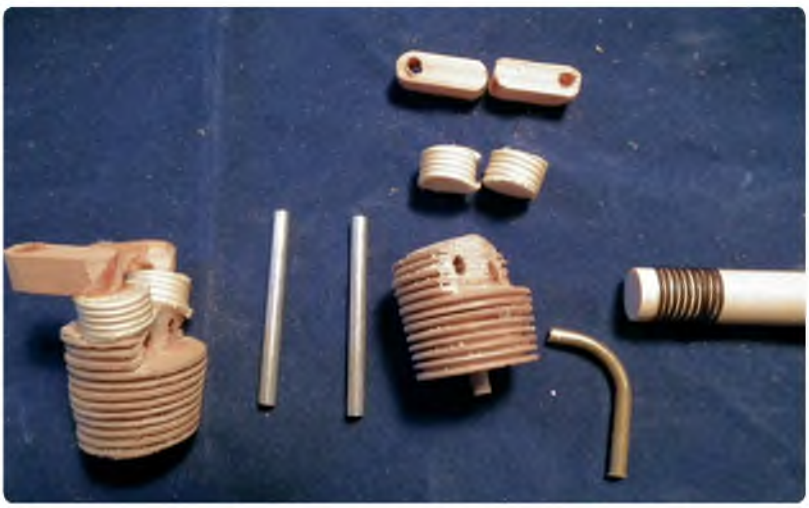
The first stage is to shape a piece of spruce to the right shape; this is the pattern and can be quite long as just the top is needed. Now comes the clever bit. Get

Basic crankcase. The front face is covered with 1/64" ply before the 1/2" balsa ring is glued on

The crankcase and rear mounting box parts

The box assembled

And the whole unit glued together



The kit of parts for the cylinders, and showing the rocker boxes

Inside view of the dummy engine

some kitchen foil and write ROTEC on it backwards. This will only be about 1/8" x 3/8". Write on something firm but with a bit of give. I use a cutting mat.

Fill the letters with epoxy; this should be thinned by warming it, then remove all the surplus epoxy as we only want it in the letters. Once it has cured carefully glue it to the top of the rocker box pattern and blend the foil on.

Now take some modelling clay and shape it into rectangular strips. Press the pattern into this twelve times. Check that the lettering shows up well.

Put the modelling clay in the freezer; I left mine overnight. Warn anyone else what you have done or you might get grilled modelling clay for tea!

Now cast your rocker box tops. I used David's Isopon but polyester resin or even thinned epoxy will do. I have made my moulds from David's Isopon in the past and removed the part before it had cured completely.

As a point of interest, when I was building my Continental engine I spent a lot of time trying to work out how to do the lettering. This method finally came to me at 4 am!

The Pipes

The pushrod tubes are simply lengths of 1/8" aluminium tube. The inlet pipes were harder because they have a large radius bend. Luckily I always use a two-clunk system on my fuel tanks so I had spare curved tubes and these did the job perfectly.

The Rotec name was too small to get a good photo. This is from my Continental engine

The short pipes that connect the cylinders to the exhaust collector ring can just be bent with a normal Dubro pipe bender, or even just pliers. The kink is not going to be very obvious.

The Collector Ring

The Locamp uses the optional exhaust collector ring behind the cylinder heads. The chances of bending any tube to that shape without it kinking are remote. I found a pot 4½" in diameter and laminated the ring from six strips of 1/16" sheet, 3/8" wide.

First I boiled this in a saucepan and wrapped it round the pattern and left it to dry. Once it had dried out it was glued up and wrapped round the pot again. The dried out ring was then shaped to a round section and sanded to a finish before applying coats of sanding sealer.

Assembly

You should now have a kit of parts for six cylinders and a complete crankcase, so you can put the engine together. Once the cylinders have been glued in place and the rocker boxes fitted, but before the moulded rocker box covers are glued on, drill down through the pilot holes into the crankcase for the pushrod tubes and epoxy them in place.

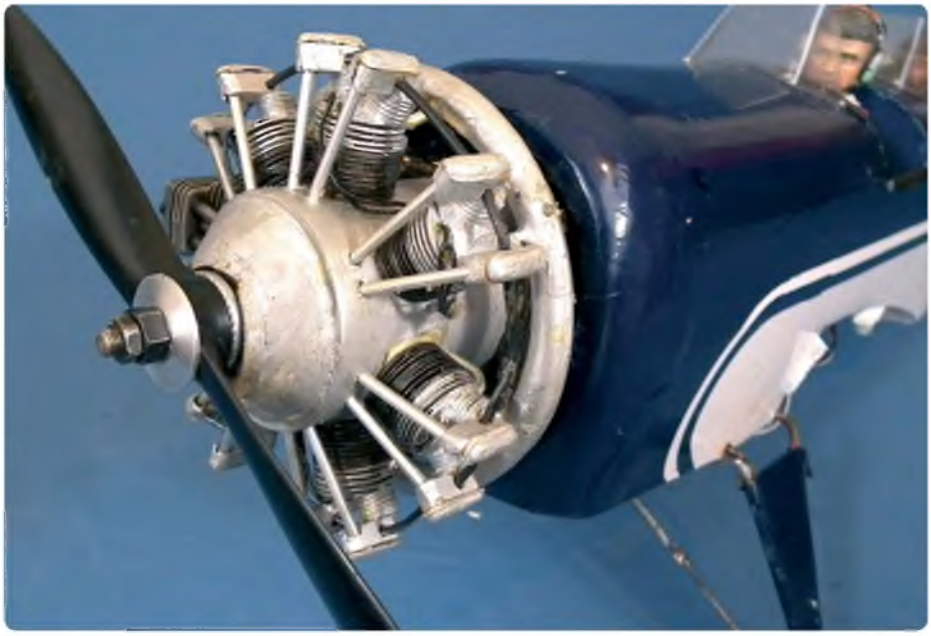
The rest of the assorted pipes and tubes can be glued in after painting the engine. It is surprising just how effective a little detail can be. Even the leads to the two spark plugs dress the engine up a bit.

The dummy engine is held to F1 with a couple of screws through E4. Drill these so that you can get a screwdriver through between the cylinders.

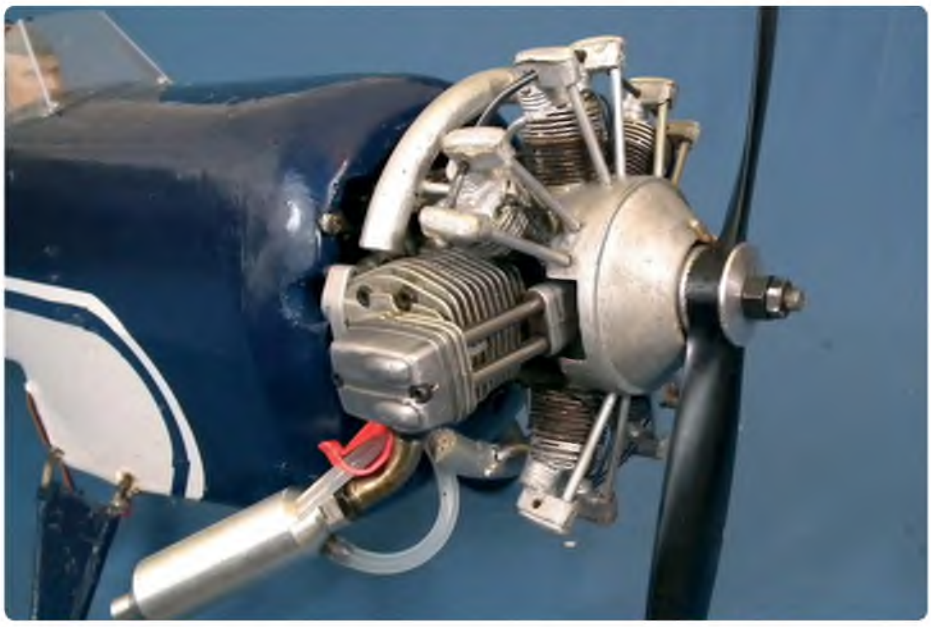
Other Engines

While this article describes the Rotec R2800 the same principles will apply to any radial engine and to the cylinders of any air-cooled engine. It is surprising how a fairly simple looking dummy engine really attracts attention.

RCMW



Left side of the engine



Right side of engine. The OS does not stand out at any distance

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MAKING THE RIGHT CONNECTION

R/C Connectors come in all shapes and sizes

There are a plethora of battery connectors available for electric flight but how do you know which ones to choose? We asked Brian Collins to investigate what makes the right connection.

In a perfect world battery connectors would be 'standardised' throughout the R/C industry. Think about it for a moment – wouldn't it make things so much easier if we all used the same kind of battery connectors? However, different model sizes and associated current draws dictate the size of the connectors due to the ability to safely transfer relevant current levels. I can name at least 17 different battery connector types currently in use – and there are probably more too!

Connector Purpose

What does a connector do? Basically it is a device used to connect two (or more) electrical elements to allow current to flow between them. R/C aircraft require connectors that meet more than just this need, however.

R/C Connector Requirements
1. Current flow
2. Solder capability
3. Wire capability
4. Polarity capability
5. Ease of use

Popular battery connectors used in R/C today are (in no particular order): JST, Deans micro, Deans mini, Deans (T type), Multiplex (MPX), Tamiya, 2 mm gold bullet, 3.5 mm gold bullet, 4 mm gold bullet, 4 mm HXT, 5 mm HXT, 6 mm gold bullet, 8 mm gold bullet, EC2 (2 mm pins), EC3 (3.5 mm pins), EC5 (5 mm pins), XT60 and XT90.

Connectors should be 'handed' to avoid the accidental crossing of polarity when making a connection, which can fatally damage many electric components such as ESC's and separate BEC's. Not to mention the battery itself!

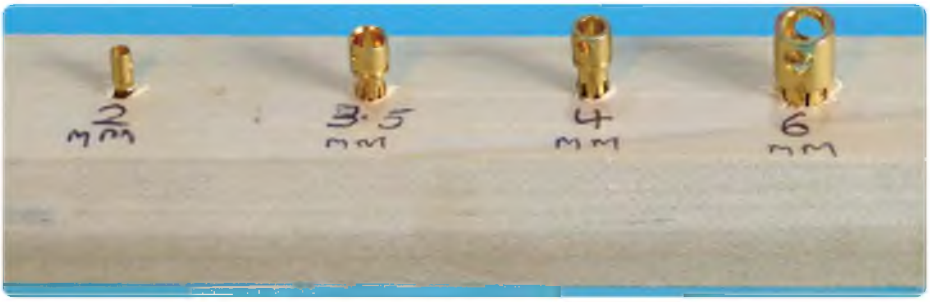
Gold 'bullet' connectors vary in sizes from 2 mm up to 8 mm

'Housed' connectors have the connecting pins internally housed

Battery connectors break down into two main types, most of which use gold plated connectors for optimal conductivity. First are the loose 'bullet' type (often referred to as 'banana' connectors). There are three types of bullet connectors: 'Sprung', Solid' and 'Cut' types. The 'sprung' type are by far the most common and feature a spring that wraps around the male connector. When inserted into the female connector the spring compresses making the connection. The 'solid' type of bullet is usually used on smaller low current draw applications and is, as the name suggests, a 'solid' male connector that fits tightly into the female connector. The 'cut' type bullets are made from solid metal (plated in gold) with the cuts running lengthwise, these types of connector are used in higher current applications.

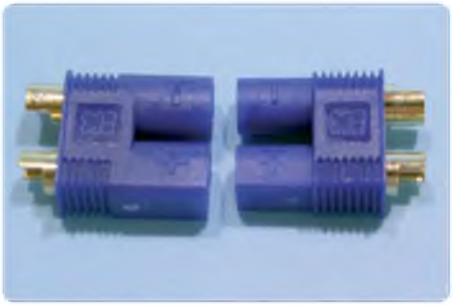
The second type of connector are the 'housed' variety, which have a nylon/plastic housing to hold the bullets (sometimes referred to as pins) in position. The housing is shared by both the male and female connectors. The advantage of 'housed' connectors is that the polarity (Positive and Negative) are usually marked on the housing and the connectors 'mate' together, so once connected it is impossible to cross the polarity. Housed connectors still use 'bullet' type pins internally to make the electrical connection.

If flying larger models that run battery packs wired in series (6S, 8S, 10S and 12S for example) a specific 'series' connector patch lead is required in order to wire the packs in series. However, if stand-alone bullet connectors are used the batteries can be linked in series, directly negating the need for extra wires. However, this is VERY dangerous as the chance of connecting one battery directly to another is present, which could result in a catastrophic short circuit!



A piece of wood drilled with relevant sized holes makes an ideal soldering jig – simple but effective!

A 'helping hands' unit is well handy for soldering housed connectors. This one even has LED lights!



Housed connectors often have the polarity marked on them (Positive + and Negative -)

Three 4 mm gold connectors, which all have different sized soldering buckets! A bigger bucket makes fitting larger wire much easier

Decisions, Decisions

So how do you choose the correct connectors? Sadly, as I mentioned previously, there is no industry standard. Indeed many battery/component manufacturers now pre-fit connectors to their relevant products during the manufacturing process, probably in the hope this will help build 'brand loyalty'. The idea being that once you have purchased a few flight batteries (and associated components) with the same connector fitted you will continue to buy products that feature the same connectors already factory fitted, saving you the job of soldering your own connectors!

The main issue to take into account when selecting the size and type of connector is the current draw of the application. A Wattmeter is an ideal tool for this purpose as it will tell you the current draw of a particular model's powertrain, allowing the selection of an appropriate connector size.

Join The Resistance

Wires are supplied with various AWG thicknesses. The AWG (American Wire Gauge) of a stranded wire is determined by the total cross-sectional area of the conductor. This determines its current carrying capacity and internal resistance. Since there are small gaps between the round wire strands, stranded wire will have a slightly larger overall diameter than a solid wire with the same AWG.

Normally wire is supplied with three numbers: the overall AWG size, the number of strands and the AWG size of a single strand. The number of strands and the AWG of a strand are separated by a slash. For example, a 22 AWG 7/30 stranded wire is a 22 AWG wire made from 7 strands of 30 AWG wire. For R/C use we tend to simply concentrate on the AWG number as a whole. The more individual strands in a wire, the more flexible, kink-resistant and stronger the wire is – and the more expensive, of course!

When determining the correct size of wire to be used for a given current load there are a lot of 'AWG current calculators' available online. However for R/C use we tend to use relatively short cable runs at lower Voltages, so some of the parameters of such calculators are not relevant. If in doubt I find it is a good idea to use the ESC manufacturer's wire as a starting point. So if, for example, an ESC is supplied with 12 AWG wire then use that size for the rest of the application as the ESC's manufacturer has used the wire to cope with the current the ESC is safely capable of handling.

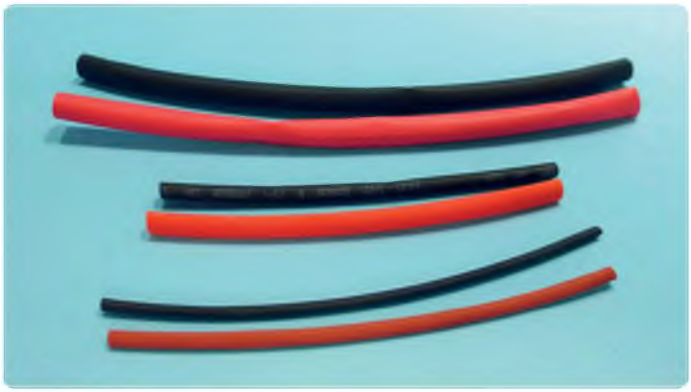
I would not recommend relying on battery wire sizes, as they are often not model specific. Some same capacity battery packs from different manufacturers can be supplied with differing AWG wires for example, which is why using the wires fitted to the ESC is a good starting point. There is nothing stopping you from fitting thicker wires than fitted to the ESC of course, as larger diameter wire will carry higher current levels. But there are practical considerations to take into account, such as connector fitting, soldering, expense and space in the battery bay. If in doubt upsizing to the next bigger size would build in a level of redundancy.

Poles Apart

Polarity is very important, especially when using stand-alone 'bullet' connectors. With this type of connector the decision on how to wire the connectors is down to the end user. If using stand-alone connectors STRICT polarity observation has to be adhered to. What is incredibly dangerous when using these connectors (I have witnessed this several times) are battery packs which the end user has fitted the SAME bullet connector to BOTH the positive and negative leads of the battery, making it very easy to 'cross the polarity', which is definitely a 'no-no', especially with the LiPo battery packs in use today. Housed battery connectors are 'handed' so there is no risk of crossing the polarity.

The Bucket List

Another point to take into account when choosing which type of connector to use is the thickness of the wires used on the battery. On a large capacity battery pack, for example, which uses 8 AWG cable,



Heatshrink tubing is available in a variety of sizes

Fitting large diameter wire (in this case 8 AWG) to gold connectors can be tricky. This is where a larger solder bucket can be of benefit!

Basic soldering equipment consisting of a soldering iron, a stand with sponge cleaning pad, solder and a 'helping hands' unit

Tinning the wires of a JST connector prior to joining the wires

Cleaning the tip of the soldering iron will allow the solder to flow better

This 300 W heat gun (used for embossing in crafts) is ideal for shrinking heat shrink tubing

trying to fit 6 mm diameter of strands (which need to be tinned with solder) into a small 3 mm solder bucket on any connector is a virtually impossible task!

Solder buckets vary from connector manufacturer. Indeed 4 mm gold connector solder buckets can vary dramatically. I always try to purchase connectors with the largest bucket I can find. This allows me to fit larger AWG rated wires successfully without having to reduce the diameter of the wire. There is not much point in using 6 mm of strands if you are forced to reduce it to 3 mm or 4 mm to fit the connector!

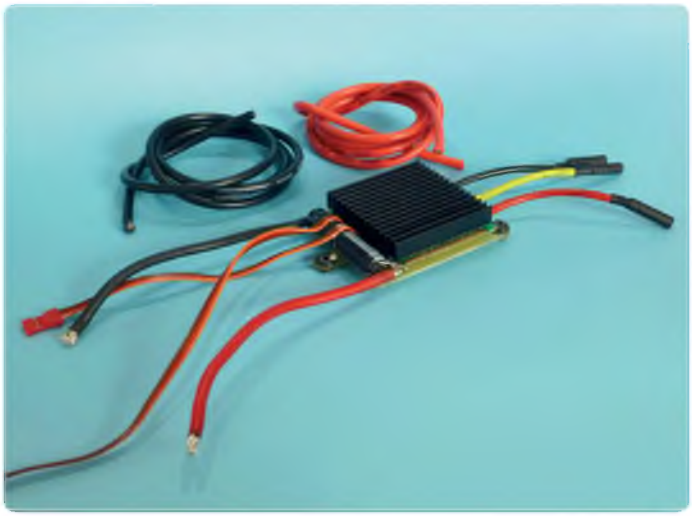
Solder? What Solder?

You'd be surprised at how many people who practise electric flight do not like to solder, especially when it comes to battery connectors. Buying a battery which already has the connector fitted is a prerequisite to battery purchase in some cases.

At some point soldering may be inevitable. A 40 W soldering iron will be ideal for most types of connectors. Once hot the 'tip' of the iron should be 'tinned'. This is done by applying a small amount of solder to the tip, then cleaning it with a damp sponge. I always reapply a small amount of solder to the tip to enable the solder to flow better when I make the joint.

Remove approximately 5-7 mm of the wire's insulation, then 'tin' the end with a little solder whilst turning the wire so it is tinned around its circumference. The bucket on the connector needs to be tinned also. It is best to ensure the wire and the bucket are at the same temperature to allow the solder to flow to both parts. You will normally see the bucket solder 'melt', then insert the tinned wire into the bucket and allow the solder on the wire to melt into the bucket. Depending on the size of the tip and wattage of the iron contact may only need to be a few seconds.

If soldering housed connectors, which have the pins fixed in position, be careful not to apply too much heat as this can melt the housing.



This 99 A Spin ESC from Jeti is fitted with 12 AWG cables, so I would use the same AWG wire if battery wires needed to be extended slightly

'Housed' connectors like this 4 mm HXT are 'handed' and mate together only one way

Using stand-alone bullet connectors allows batteries to be easily wired in series without the need of a patch lead (2 x 5S packs = 10S). However, the risk of a direct short is there so this method is NOT RECOMMENDED

A definite 'no-no' is to use the same connectors on both the Positive (red) and Negative (black) battery leads! Ensure that connectors are 'handed'

How much solder do I use, I hear you ask? Well to be honest it comes with practise. Using too little solder could result in a 'dry' joint. Use too much solder and a solder 'blob' can form. This is not necessarily a disaster but will mean a waste of solder! Once solder is applied allow the joint to cool. This will only take a few seconds.

TOP TIP

If you have no experience at soldering it's a good idea to practise on some old wiring. A little practise can make a big difference to your soldering ability and confidence!

Let's Get Jiggy

There are commercial soldering jigs available for the specific purpose of soldering connectors. However, it is a very easy task to simply make one from a piece of wood (see picture) by drilling various holes sizes depending on the size of connector to be used. I find metal jigs can absorb heat, meaning that more heat is necessary to melt the solder, which can be an issue especially when soldering large diameter wires. A 'helping hand' unit is a very good idea for holding connectors that are supplied with nylon housings.

Shrinking Feeling

Heatshrink tubing is used to insulate connectors. It is available in various sizes and simply cut to the required length. It can be 'shrunk' with either a heat-gun (my preferred method) or a lighter, but this can create soot marks on the heatshrink. I purchased a small 300W heat gun, which is ideal for this purpose for only £8!

After doing some research I have compiled a chart that shows connector current guidelines according to size. This is to be used as a guide only, as different manufacturers quote different power ratings.

My Connector Size/Current Rating Guidelines

Pin size	Current
JST (Red male/Female)	
2.0 mm:	10/20 A
3.5 mm:	10/30 A
4.0 mm:	10/80A
6.0 mm:	100/140 A
8.0 mm:	200/250 A
XT60:	20/60 A
XT90:	30/90 A

*Current rating = Continuous/Short Bursts (30 Seconds) Battery-ESC connections.

Last Thoughts

Until the industry decides on a 'standard' for connectors (don't hold your breath) the end user will have to decide which connector suits them the best. I have heard of some people complaining that the latest battery they purchased was fitted with the wrong connectors or wired the wrong way. When one purchases a battery we have to take into account that there are so many different types of power connectors used within the R/C industry that it is simply impossible for a manufacturer to fit connectors to suit everyone and all applications. Indeed the first thing many people do when they buy a new battery is cut off the fitted connectors and fit their own preference!

RCMW

CONTACTS

Brian Collins email
bc002d1835@gmail.com
Overlander (wire & connectors)
www.overlander.co.uk
Optipower (LiPo batteries)
www.optipower.co.uk
Electriflier (Connectors & Haiyin LiPos)
www.electriflyer.co.uk
Antex (Soldering equipment)
www.antex.co.uk
Maplins (Soldering equipment & helping hands)
www.maplin.co.uk
Shesto (Soldering equipment & helping hands)
www.shesto.co.uk

FOCUS ON...

Balsa USA's original 1/4 scale SPAD XIII has been flying in air shows and demonstrations for over seven years

In fact, in the USA just about every WW1 meet is dominated by Balsa USA's quarter and third-scale models. In addition, Balsa USA is one of the primary mail-order balsa and ply suppliers for scratch-builders in the US. Having built several of their kits over the years, I can attest to their being simple and rugged kits; not loaded with a lot of fancy pre-fabbing, to be sure, but nicely priced and well-engineered.

We met up with Balsa USA's travelling road show at NEAT 2015 (see our report in the last issue). Friendly rep, Chad Asmus showed us some of his company's products, that are sure to be of interest to both petrol and electric flyers.

First up is their electric conversion kit for Balsa USA's round-cowl 1/4 scale models the Sopwith Pup, Camel, Dr-1, Eindecker, etc. Laser-cut lite and birch ply components allow up to two 6S 5000 packs to fit (one on each side) of a large motor, with Velcro straps keeping the packs in place. Chad assures me that conversion kits for their in-line engine models (D-VII, Junkers D-1 and S.E.5a) are in the works.

Sadly, Balsa USA's latest model, a quarter-scale Junkers D-1 'Tin Donkey' met with an unfortunate demise shortly before Chad and his crew left for Rhinebeck.

Like the SPAD, the Camel is covered with Solartex and painted with latex paints

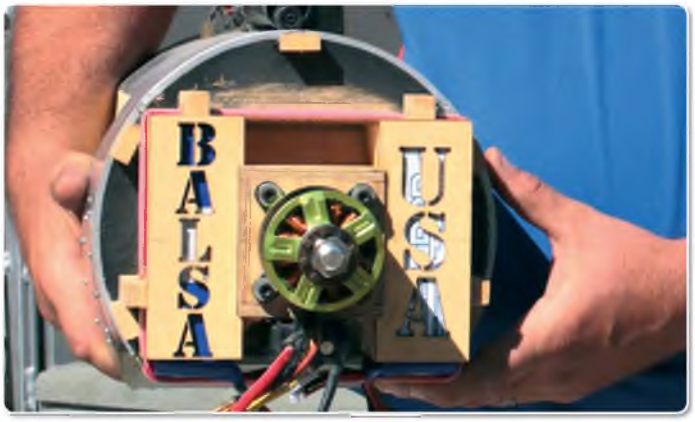
We were really looking forward to seeing this model, especially with how the Balsa USA crew replicated Hugo Junkers' innovative corrugated duralumin structure by using evenly spaced strips of vinyl. The photos we saw of the Junkers looked great but we couldn't see much of the vinyl 'kit', as white strips of vinyl on off-white paper isn't exactly easy to photograph!

Balsa USA has been making both scale and sport kits for many years, periodically updating their kits to meet new construction methods and increasing some kit sizes to meet demand for larger models. For example, their popular Smoothie and Stingray kits have been updated and enlarged, with the Stingray now available for 120 size engines. Rumour has it that their Smoothie will also be enlarged for 120s, plus there'll be a twin-version!

In addition to kits, Balsa USA carries a large selection of balsa (naturally!), ply and lite ply, plus hardware. Plans packets are available for most of their kits, as is a selection of metal and plastic parts and accessories. **RCMW**

BALSA USA

If you like World War 1 aviation, large models (or club-sized ones), or just plain like to build, you've probably heard of Balsa USA. Bill Bowne meets the BUSA crew



Balsa USA rep, Chad Asmus showed us their electric conversion kit for round cowled 1/4 scale models. Nicely engineered, the conversion kit should be adaptable to other 1/4 scale-sized models

Bottom view of the round cowl conversion. It shows battery access, plus a well-ventilated spot for a large ESC

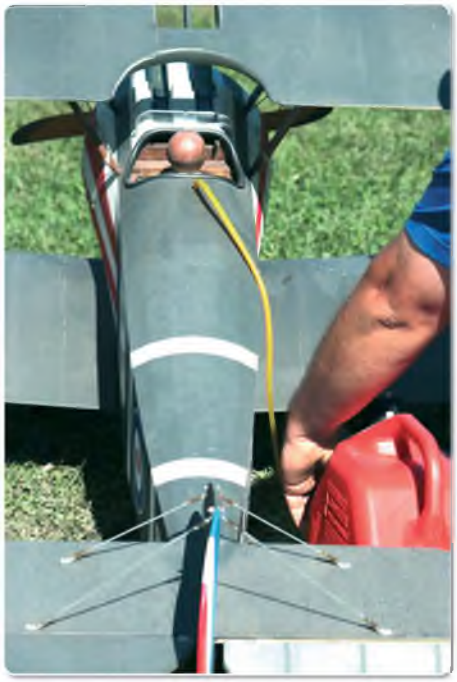
Done up in the same colours as Rhinebeck Aerodrome's replica Sopwith Camel, the Balsa USA demonstrator is powered by a Zenoah G26

Chad demonstrated an electrified version of Balsa USA's Student Trainer (the glow-powered version having been reviewed earlier this year in RCMW). With a Rimfire 46 and a 4S 5000 pack the trainer flies just as sweetly as a glow ship, only without the noise

One of Balsa USA's scaled up sport ships, the Stingray 120 (with optional flaps)

Chad says it's easy to do a wheeled landing with the model but that the model can easily get away from the pilot if a three-pointer is attempted

With a DLE20RA for power, the Stingray moves around smartly and allows for some very nice sport acrobatics



Scale fuelling point for the Camel is right behind the cockpit. I wonder how pilots felt about being sandwiched between the engine and that tank, especially in the case of a nose-in crash?

Chad and his crew manned the Balsa USA trailer during the hectic NEAT 2015 weekend, selling many kits

CONTACTS

Balsa USA: www.balsausa.com
Pegasus Models: www.pegasusmodels.co.uk
Sussex Model Centre: www.sussex-model-centre.co.uk/

SERIAL RECEIVER SIMPLICITY

The AR7700 is the simple multi-rotor receiver solution for users who want the industry-leading control only a Spektrum transmitter can provide. It's compatible with many of the popular flight controllers and offers the simplicity of a serial connector for all channels. The AR7700 also has conventional PWM outputs for auxiliary functions like gimbal control, retractable landing gear and others so you don't need a complex route through the flight controller.

Key Features

- Compatible with popular multi-rotor flight controllers
- Requires just one connector from receiver to controller
- 3 connection options: Serial (SRXL), PPM and Remote Receiver
- Up to 8 channels with PPM connection
- 8 or more channels with SRXL and Remote Receiver connections
- 2 Aux ports, 1 Gear port
- Compatible with DSMX® transmitters

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New AirWare™ software is available for users with registered Gen 2 transmitters. Once installed, you'll enjoy the availability of specially designed multi-rotor programming that makes drone setup simpler than ever.

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VULCAN

Neil Hutchinson pays tribute to the last flying V-bomber, Vulcan XH558

The late afternoon sunshine highlights the lovely Vulcan outline

The triangle shape at the front of a smoke trail can mean only one thing – XH558 has arrived!

XH558 was christened 'The Spirit of Great Britain' in 2010

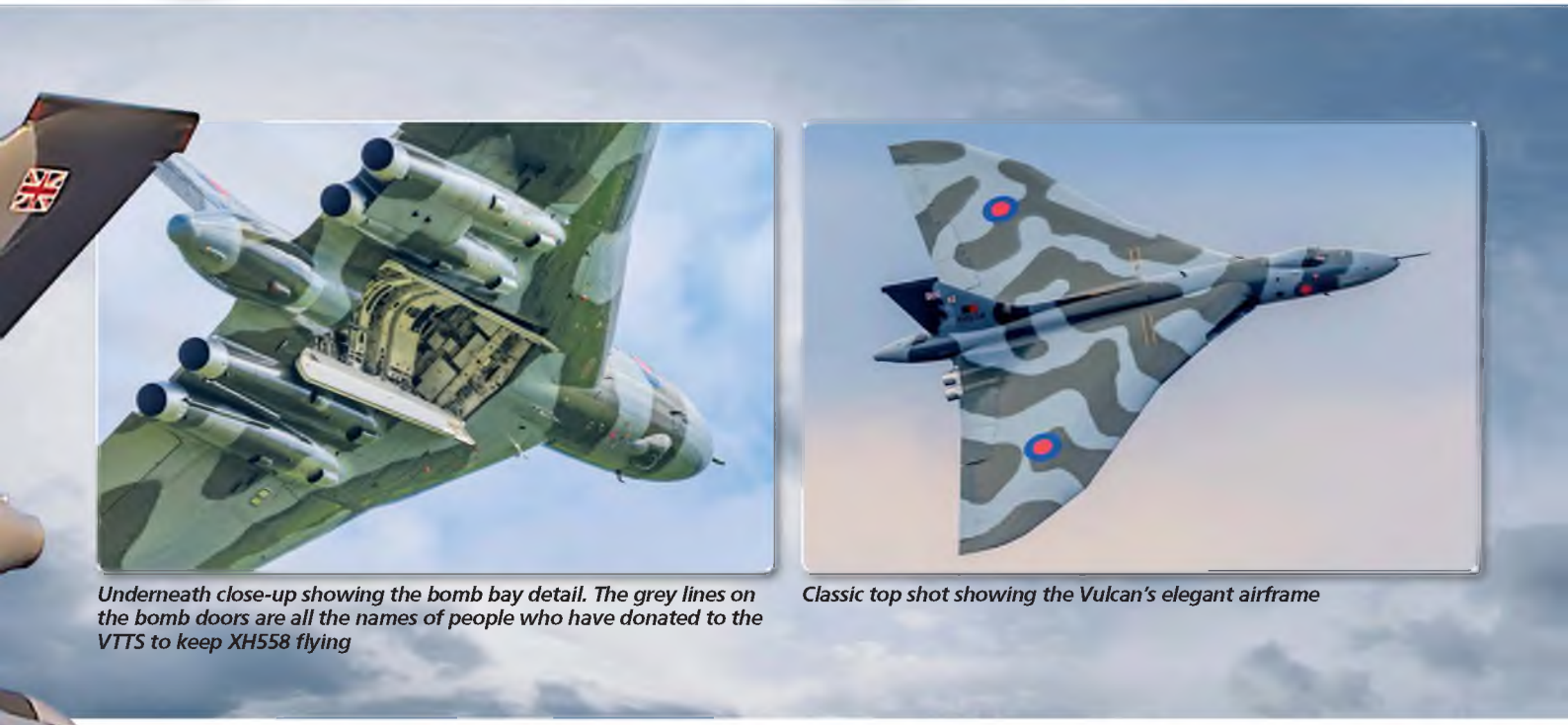
Sunday, 11th October 2015 and I'm standing where it all began. I am at Bruntingthorpe airfield and I'm waiting for the imminent arrival of Avro Vulcan XH558 on her Southern Tour flight. This will almost certainly be the last time I see this majestic aeroplane fly, as soon the sight and sound of this superb piece of British engineering will be gone from the skies over Britain forever. Reflecting on the end of her second flying career and how it all began, I remember back to 2008, watching her fly again. It was the first time I'd seen a Vulcan fly in many years.

The whole saga of Vulcan XH558's reincarnation began when David Walton purchased her from the RAF. The Walton Family own Bruntingthorpe Aerodrome and Proving Ground. The Vulcan would be joining the growing squadron of Cold War Jets (CWJ) at Bruntingthorpe. XH558 was flown into Bruntingthorpe on the 23rd March 1993. She would be kept serviceable and take part in regular Cold War Jet fast taxi days down the huge Bruntingthorpe runway. The Vulcan was undoubtedly the star attraction at that time.

In 1997 a feasibility study was undertaken with a view to getting XH558 back into the air. Financially, this was a big risk because XH558 was one of the 'star' performers at the CWJ days and would need to be taken out of service for the whole restoration to begin. The decision to begin the restoration was taken in 1998 and her final taxi run was on the 5th September 1999.

The Vulcan to the Sky Trust (VTTS) was formed to raise funds for the restoration. Applications were made to the Heritage Lottery Fund in 2002 for cash, but failed. Another, refocused attempt was made in 2004 and this time it was successful.

SALUTE



Underneath close-up showing the bomb bay detail. The grey lines on the bomb doors are all the names of people who have donated to the VTTS to keep XH558 flying

Classic top shot showing the Vulcan's elegant airframe

Running in for a simulated bombing run. Bomb doors open and plenty of power from the four big Rolls Royce Olympus jet engines

Work began restoring XH558 in 2005. Also in that year, the Walton family formally passed over ownership to the VTTS Trust. During the restoration period the Trust made many appeals for public donations and without this additional cash input the project would have failed. In fact, throughout the eight years since XH558 returned to flight public donations have played a massive part in keeping her airworthy and flying.

The 18th October 2007 was another milestone date because on this day XH558 took to the sky again. There were several technical problems post restoration, which meant that the Vulcan's first public display was delayed until 2008.

On the 9th June 2008 XH558 finally completed a 98 minute flight around Bruntingthorpe, which included a complete display routine, in front of CAA show examiners. The display was a success and an application for a permit to display the Vulcan was made to the CAA, with a view to taking part in the huge RAF Waddington show on the 5-6th July 2008.

The CAA allowed the Vulcan to fly from Bruntingthorpe to RAF Waddington on the 3rd July, but did not grant the permit to display till the following day. This meant only a short 5 minute display on the Saturday and on the Sunday there was no display at all because of an electrical fault. However, an estimated 125,000 people were at Waddington that weekend. The Vulcan had returned, but even though it was for only a few minutes we knew we would be seeing a lot more of this elegant aeroplane.

Over the following eight years there have been many close shaves through lack of funds, but somehow the VTTS Trust have always scraped through with donations from industry and public alike. The Vulcan has proved over the years that she could perform with the best. At this year's RIAT show the best display award was given to her, and quite rightly too!

I believe XH558 will be spending her retirement at Robin Hood Airport, Doncaster and will occasionally do some fast taxi runs. These few paragraphs that I've written are just a very brief reminder of her early life. For much more detailed reading and information have a look at the Vulcan to the Sky website: www.vulcantothesky.org **RCMW**

The bit of any display that everyone wants to see and hear. The Vulcan doing a steep climb...

...with a half roll at the top...

...followed by a dive down into level flight

Undercarriage going up after a 'dirty' pass

Plenty of heat and a load roar coming out of the four huge RR Olympus jet engines as the Vulcan starts to climb

A classic banking turn shot of the Vulcan

The Vulcan's final departure from Bruntingthorpe and into retirement

Two very different Avro's; the Vulcan and Anson. The Shuttleworth collection's Avro Anson 'escorts' the Vulcan into Old Warden at the 2015 season finale air show

A slightly surreal picture of the Vulcan as she passes 'through' the sun

Build Your Own Vulcan

Now that XH558 has retired, what better time to build your own model of this famous aeroplane. Traplet Publications offer two plans for this iconic bomber, which are detailed below.

Avro Vulcan B2 (68")

Graham Dorschell designed this large electric 'V' Bomber for twin pusher props. The lightweight design is smooth flying and has a superb performance. It features optional retracts and sound systems. Two large plan sheets detail the construction. An optional Laser Cut Wood Pack is available, as well as an ABS and PETA set of moulded parts.

SCALE:	1:16.5
RADIO FUNCTIONS:	4+
BATTERY:	4000 mAh 6S Lipo
WEIGHT:	14 lb
WINGSPAN:	68" / 1727 mm
MOTORS:	2 x Tornado Thumper 3542 540 watt brushless, or similar
PLAN NUMBER:	MW3397, £23.99
WOOD PACK:	WP3397, £120.99
MOULDED PARTS SET:	CA3397SET, £38.99

Avro Vulcan B2 (60")

Ron Fraser's V-bomber plan is designed for a .60 size glow engine mounted in pusher configuration.

RADIO FUNCTIONS:	4
WINGSPAN:	60"/1525 mm
ENGINE:	.60 cu in two-stroke glow
PLAN NUMBER:	MW2116, £16.99
MOULDED CANOPY:	CA2116CY, £5.99

OPTIONAL ABS PARTS

JET TUBES (ABS):	CA2116EX, £5.99
TAIL (ABS):	CA2116FG, £5.99
NOSE (ABS):	CA2116NE, £7.99
SET (ABS):	CA2116SET, £18.99

OPTIONAL FIBREGLASS PARTS

TAIL (F/G):	CF2116FG, £7.99
NOSE (F/G):	CF2116NE, £7.99

Plans and parts (if available) are subject to Postage and Packing charges at standard rates.

Copies of plan numbers MW3397 and MW2116 are available from RC Model World (Plans Service), Traplet Publications Limited, Traplet House, Willow End Park, Blackmore Park Road, Welland, WR13 6NN, England. Telephone: + 44 (0) 1684 588599, Fax: + 44 (0) 1684 578558, Email: orders@traplet.com or order online at www.trapletshop.com

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

*NOTE: All Laser Wood Packs are intricate shaped parts only. No strip wood or sheet wood is included.

The Kite at rest

SLINGSBY TYPE 26 KITE 2A

Renowned for his large vintage scale sailplane designs, Chris Williams has painstakingly revisited this classic to make it build and fly well with a minimum of effort


First stage of construction. Note the purpose built aluminium jig used on prototype


Wing joiner box attachment plates bolted to F7

Fred Slingsby's Type 26 Kite 2 first flew around 1947 making it, coincidentally, the same age as me!

It owes little to the design of the Kite 1, other than the tailplane, and there are only three or four Kite 2's left in existence. This prototype is based on the nicely restored Kite 2a 'Percy', named after the aviation pioneer Percy Pilchard.

There are one or two challenges that face anyone modelling this subject, the most prominent of which is the eight degrees of decalage that results in a wing with a very high angle of attack in relation to the fuselage. This was tamed down to two degrees on the model by virtue of setting the tailplane at a higher angle of attack than the full-size. You might think this would result in a distinctly nose-down attitude in flight but as you will see from the photographs this is not a noticeable feature. The ailerons also sport full-length diagonals to prevent the warpage that is a distinct feature of the subject. Also the canopy has been extended to cover the gap between the rear of the canopy and wings, an area of which, alas, I have little in the way of photographic information.

Build Instructions

During the construction of the fuselage a large mistake was made in the design of the wing pylon. This led to the abandonment of the plan, the mistake being brutally rectified on the bench. It was only the subsequent discovery that the model was such a nice one to fly and to look at that the plan was subsequently restarted. The pylon was therefore re-designed and re-drawn, and a mock-up of that area was made up to prove the drawing. So, some of the photographs of the early fuselage construction may appear to be at odds with the plan but it should all work out in the end.

Fuselage

Glue the jigging supports to the appropriate stations on the wooden base. For the lower front longeron use two strips of 3 mm x 6 mm spruce glued together to accommodate the curve. Add the aluminium joiner box brackets to F7, and also the 3 mm ali strut bracket. Assemble the formers and main side longerons on the jig, gluing with PVA. Hold the formers to the supports with clamps. Add the wing

Wing pylon plates fitted

J7 and J8 removed to attach wheel box

Top part of front planking completed

Tailplane being constructed over the plan

Diagonal cross-bracing shown here

Mock up of the redesigned pylon area

mounting plates and top plate. Note that the rear of the side plates will have to curve around at the rear. Use a combination of clamps and masking tape to hold all the parts in place. The tail mounting plate will act as a template for correctly setting up the rear formers.

Once all the longerons are in place add the 6 mm square balsa strips above the main longerons and between the formers. Before adding the 6 mm square balsa diagonals between the strips from F3 rearwards check that everything is square and true. Despite being in a jig it is still possible for bends and twists to try and insinuate themselves. Draw a centre line through the tailplane mount and ensure that it lines up with the top longeron. The top longeron should be straight, viewed from above and from the side, and the main side longerons should not show any waviness.

If any of these symptoms show themselves it should be possible to adjust the formers in their supports to overcome any problems. Sorting out any problems at this stage should save any difficulties later on.

Now, remove the supports between F7 and F8 and add the wheel mounting plates into their slots. Begin to add the 1.5 mm ply planking to the sides of the fuselage above the arms of the jig supports. Ply at this thickness is not the easiest material to use for planking but the result is a very ding-proof fuselage. The best way to do it is to score along the ply for three planks before cutting out. The resultant wide ply plank can then be partially bent with a pair of pliers to take up the curve of the fuselage before being trimmed up and glued in place.

Masking tape is useful for tensioning the planks together and clamps hold the wood to most of the formers.

Note that a perfect fit is not necessary for this procedure, as the outside will be filled and sanded smooth at a later stage, and the inner surface lined with mat and resin. If using the elevator actuating mechanism on the plan it's best to set it up at this stage. But first, you need to build the tailplane.

Tailplane And Fin

The basic tailplane structure can be built over the plan. Note that the top surface is flat, whilst the underside tapers in thickness

First stage of canopy production

Tailplane set up whilst still in the jig. Note the fin is unglued at this stage until the setting up of the wings

Fitting the canopy

Gluing in the wing joiner box

First stage of wing construction

First rig with basic wing framework

out to the tips. Build one side at a time flat to the plan, releasing to build the second side. Once the diagonal ribs have been fitted the tailplane should be rigid enough to fit the sheeting and cap strips etc. without the need for any further jigging, but check all the same for any warps or twists.

Make up the elevator LE by offering up 6 mm hard balsa sheet to the tailplane and drawing the shape. Note that the elevator ribs are drawn slightly oversize and will need some trimming to fit. Drill through the elevator LE to make pilot holes for the pin hinges before construction. The elevator, too, can be built flat on the plan in the same way as the tailplane. Once hinged up the elevator can be sanded flush with the tailplane.

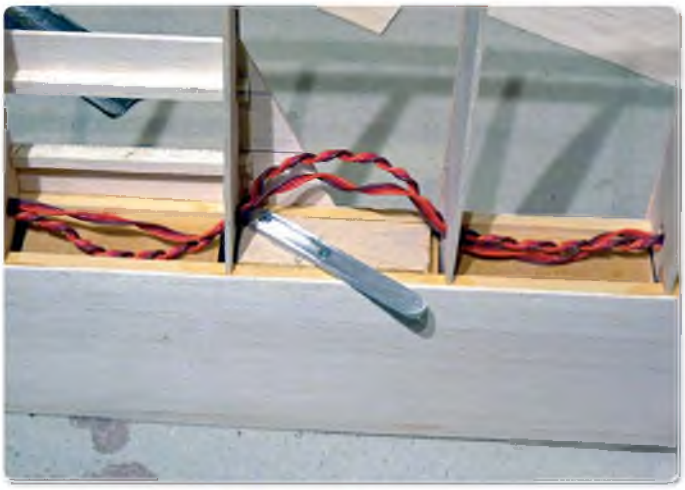
Make up and fit the brass plate-piano wire pin that will actuate the elevator. Having set up the 6 mm insert in the tailplane, and added the locating pin at the front, make up the box through which the actuator will operate.

Note that the brass box on the outside needs to be two sizes larger than the brass box that slides within it. It will probably be necessary at this stage to remove J16 and J17 to gain the necessary access. Once satisfied that the elevator operates smoothly and without friction, the actuator box can be epoxied into position between the main longerons.

The fin can be built-in-the-hand with cyano. First, offer the TE up the fuselage and add the lower rib to ensure it lines up accurately with the fuselage. Now add the top rib, false LE and remaining rib. The balsa side sheeting can be added with thick cyano and accelerator. Add the 6 mm balsa LE and sand to shape. Offer up the rudder LE and drill through the three pilot holes for the Robart pin hinges. Check that the fin sits vertically by eyeing up the centre line on the rudder LE against a length of 6 mm square spruce clamped against the centre line on F6.

The rudder can now be made up. First make the front section, ensuring that the ribs line up nicely with the fin. After adding

Dropping in the sub-spar



View of spar attachment bracket in the wing

First stage of aileron construction

Using the template to set aileron TE

Underside view of wing fairing

Filling in each side of lower longeron to increase gluing area

the side sheeting, make up the TE and cyano into place using the glued-in lower rib as a guide. Add the remaining ribs, ensuring all the while that the TE is straight and true.

Fuselage Continued

The top of the rear fuselage can now be sheeted with 0.8 mm ply. Use a card template to roughly establish the shape of the ply. Note that the ply is glued to the balsa inserts above the main longerons. Pre-steam some curve into the ply to take out some of the stresses of fitting it. Once again, using card templates, make up the ply sides below the wing pylon and then the sides of the pylon itself, finally finishing off with the small fairing at the rear of the pylon.

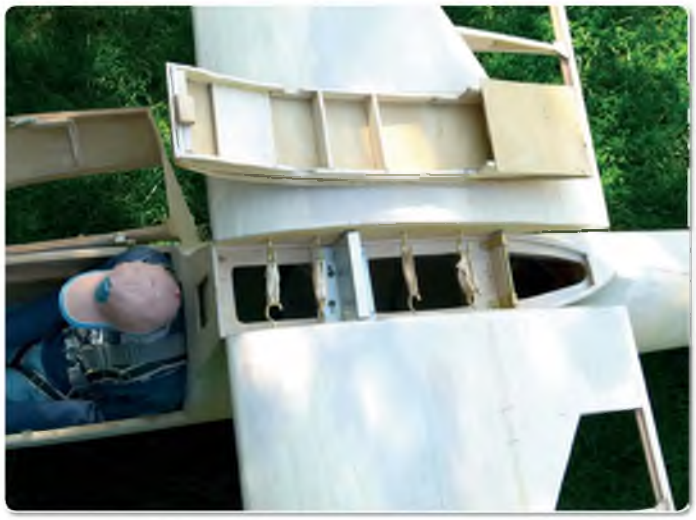
Eventually, filler will be needed, both to smooth out the join between the pylon and the fuselage, and also to smooth the fairing at the rear of the pylon.

With the top of the front of the fuselage planked and the rear top sheeted, and with all the diagonals fitted, the fuselage should now be rigid enough to remove from the jig. The first job is to glass cloth and resin the inside of the planking while you can still get at it. Then, finish off the lower front planking, sand back and apply filler to achieve a smooth shape. That done, it should now be okay to remove the temporary formers F3-5.

Cockpit Canopy

It might be as well at this stage to start making up the canopy. The side rails are from two lengths of 3 mm x 6 mm spruce, laminated together and clamped to the side of the fuselage in order take up the necessary curve. (It might be necessary to pack out the centre of the canopy rail by some 1.5 mm to allow for the natural spring-back when released.) After trimming to length, hinge up the starboard rail with the scale hinging system shown on the plan. Mask out the corners of the cockpit aperture and glue and clamp in the front and rear formers and port rail, adding hardwood gussets at the corners for reinforcement.

First stage of wing fairing construction



View of wing joining arrangement

Author with the maiden-ready Kite

Having laminated up C5, epoxy this and C2 to the frame, followed by the two C3's. Laminate 6 mm balsa to the front of C5 and also C2 and C3 to increase the gluing area. Now make up the canopy latch so that the frame can be held securely in place. Sheet the canopy framework with 0.8 mm ply in three separate parts: one across the front between C1 and C2, and the two remaining sides, using filler to smooth out the joins. Doing this with the canopy locked into place will ensure that the frame won't twist.

Masking tape is an ideal means of securing the ply in place, and the judicious use of pins will take care of any troublesome spots.

Now glue in a strip of 0.8 mm ply on the inside of C5 with an overlap of 2-3 mm to give something for the acetate canopy to stick to. Paint up the inside of the canopy, then the canopy itself can be fitted. This is cut out from the much larger Skylark 4 canopy – available from Traplet (see Plan Details below). Be sure to trim it in small increments until you achieve a fit, gluing in place with Pacer Canopy Glue with the help, once again, of tape and pins.

Fuselage Continued – Again!

Now the nose profiles can be epoxied in place, followed by the screwing of the lead plates to F1. The whole area can then be filled with car body filler. This may take three of four applications before the job is done, but the secret is to trim off the excess each time with a 40-grit block before the filler has completely set, as this will reduce the amount of elbow work required!

This is also a good time to complete the final applications of filler over the ply planking to achieve a smooth overall shape. When this is done, make up and attach the solid skid to the fuselage.

Wings

Commence the wing construction by pinning the lower spar and TE to the board and adding the wing ribs, with the exception of the second rib in from the root where the wing joiner box will go, and the aileron spar. Add the top spar, then make up and epoxy in the wing joiner box between the spars. You may need to remove the wing from the board temporarily while you clamp the 0.8 mm plates either side of the box.

With the wing back on the board add the 0.8 mm ply webbing to the front of the spars the length of the wing. Now add the triangular ply plates the rear of the ribs and the remaining rib R1(2). The balsa triangular gusset at the root of the aileron aperture serves to render the basic wing a little more rigid for subsequent handling. Now cut the slots for the sub spars (a simple job with a junior hacksaw) and PVA the spars in place.

Make up the lower sheeting from 1.5 mm hard balsa and PVA on to the wing structure. Now you can add the riblets and the hardwood blocks inside the root rib for the retaining hooks, as well as the wiring loom for the servos.

Now for the serious bit - the upper sheeting. Note that once this is glued in place the wing will be locked into its final shape, so it's important to make sure the

Under tow at Middle Wallop

The Kite being launched at White Sheet

wing is jigged straight. This is achieved by weighing it down on the jigging supports. You will notice that these are numbered to match the appropriate ribs. Don't forget to add the strip of 1.4 mm sheeting to the lower edge of the aileron spar, otherwise pack up the top of the jig supports by 1.5 mm.

It may well be helpful at this stage to peg the TE to something straight as well. Once you have eyed up the wing and are satisfied that it is straight then the top sheeting can be PVA'd in place. Once the glue has dried remove from the board, trim the LE and add the final 6 mm balsa LE. Glue in the 6 mm ply block between the last two R1's and cut out the slots for the spoiler aperture and glue in the 6 mm balsa spars, finishing off the upper sheeting in that area. Make up the rear incidence tube and finish off the wing sheeting in the appropriate areas.

Ailerons

Start the aileron construction by making up the aileron LE, offering it up to the wing and drilling out for the hinges. Then, after fitting the hinges, pack out the LE from the wing some 7-8 mm and cyano in place the aileron root and tip ribs. Add the laminated TE, using the outer jigging supports, temporarily glued to the underside of the wing, to line up the TE properly. Add the remaining ribs, constantly checking to see that the TE is straight, followed by the diagonal ribs. Note that on the full size the centre of the aileron has no diagonals, which goes a long way to explaining why the ailerons are so warped!

With the aileron clamped in its neutral position the slightly oversize ribs can be block-sanded back to the wing, after which the wingtip can be made up and sanded to shape.

Setting Up The Wings

With the wing joiner box for the fuselage made as per the plan, it's time to set everything up to be straight and true. Bolt the joiner box and screw the rear incidence tube in place. Set up the tailplane on the fuselage and then attach the wings with the central joiner bar. Now adjust the wings and tailplane until they are parallel to each other by shimming either the joiner box or the tailplane mount as necessary.

Also, check that the wings are at right angles to the fuselage and to each other. This is where it gets tricky... at the same time you need to use an incidence gauge to check that the wings are set at 2 degrees positive in relation to the tailplane. Once you have juggled these factors to your satisfaction you can now measure the distances between the strut brackets on either side and make up the basic struts from 10 mm aluminium tube, flattened at the ends.

Wing Fairing

The full size has an aluminium panel that stretches out over the gap between the wings. But as this is difficult to achieve on a model without unsightly gaps appearing a more rigid wooden structure was devised instead. So, with the wings attached as previously, place the outer profiles of the fairing against each wing root and start

to glue in the cross-pieces until a rigid framework has been achieved. Now, sand back the framework until it is flush with the wings, then glue on the top 0.8 mm ply sheeting.

Allow the outer profiles to be slightly proud on the underside at the rear, then add the lower ply sheeting. Note that the fairing slides on from the rear, overlapping the rear of the wings and filling the gap between the wings and pylon at the rear. Now attach the hardwood block at the front and drill through F6a for the retaining screw.

Fuselage Continued Even More

Once the wings have been set up and all the services installed in the fuselage, the two sides of lower ply sheeting can be added. Allow the sheeting to overlap the tailskid as much as possible to make for a strong joint. This is also the stage where the Bowden cable tubes are fitted. These should run far enough forward in to the fuselage to allow you to be able to take hold of and attach the rudder cables when they are passed through. Once again, filler should take care of smoothing out the fuselage to a stage where it is ready for covering.

Covering And Finish

The entire model was covered in Natural Solartex. The panel joins and surface texture of the full-size were replicated by first ironing strips of Solartex on the fuselage before the final covering took place.

In the place where the edges of the 'Tex lead on to bare wood, the joins were covered with many coats of brushed on two pack primer and flatted back until a smooth surface was achieved. The flying surfaces had the usual treatment of first being sprayed with two coats of two pack lacquer, which was then carefully flatted with 600 paper wet, before being sprayed again with lacquer, mixed with a flatting agent to take out some of the unnatural glossiness.

Rigging And Flying

The model was fitted with Futaba 148 servos, running on a 6V Eneloop battery. The radio consisted of an eight channel FrSky Rx, with the addition of the FrSky Vario, a combination that gives all the telemetry that you need. Rigging is a fairly simple job, despite the struts. The struts are left attached to the wings and for transport are held to the wings with a rubber band securing the strut to one of the hooks at the wing root.

The wings are first attached to the fuselage via the wing joiner, which will hold them at the correct angle, allowing the struts to be attached to the fuselage without too much fuss. The wings are retained against each other with four sets of number 63 rubber bands. These are folded over three times and two per pair of hooks are used. This system allows the wing to move out and back in again in the event of a heavy landing, and has proved its worth on the Spalinger S25. The tailplane struts are for show only, and are slipped on over the pegs in the fuselage and screwed to the ply plates in the tailplane. (I tend to leave them off when the camera isn't looking!)

The Kite in action at White Sheet Hill

Launching single-handed is achieved the same as for any sailplane, with one hand on the fuselage and the other holding the wing, with the remaining fingers of the wing hand holding the transmitter.

The Kite has no vices in flight and flies in conventional manner. The penalty drag of the struts is somewhat obviated by the thinness of the wing (12%) but you will need to take it into account on a windy day, making your downwind turn a little earlier on the approach. On its first aerotow at Middle Wallop the Kite proved to be an able thermalist, being rock steady on the tow and agile in the smaller thermals.

With the ailerons coupled to come up with the spoilers the glide-path control is quite aggressive, so once again judicious use will be required on a windy day. You can see a video of the Kite in action on YouTube by Googling Slingsby Kite 2a (or scan the QR code nearby). This was filmed on a very windy day at White Sheet Hill, so this model is capable of flying in most conditions, except maybe the very lightest.

There she is then, to my eyes at least a very pretty machine and at a size large enough for impressive flight, yet still small enough to be practical. Not for the faint of heart, but a worthy subject for the practiced builder. **RCMW**

Enjoying the light air at sunset

RC MODEL WORLD DETAILS

MODEL INFORMATION

SCALE:	1:3.25
WINGSPAN:	185" (4700 mm)
WING SECTION:	HQ 35/12
WING LOADING:	20 oz/sq ft
LENGTH:	88" (2.23m)
WEIGHT:	19.8 lb (9 kg)
RADIO FUNCTIONS:	Ailerons, Elevator, Rudder
RECEIVER:	Eight channel FrSky, with additional FrSky Vario
SERVOS:	Futaba 148

BASIC CONSTRUCTION

MATERIALS:	Balsa, Ply, Spruce
COVERING MATERIAL:	Solartex
CENTRE OF GRAVITY:	3.5" (90 mm) from Leading Edge (adjust to suit)

CONTROL THROWS:

Ailerons: 40 mm up, 20 mm down
Rudder: 130 mm each way
Elevator: 45 mm up, 30 mm down

CONTACTS

Chris Williams
c_williams30@sky.com
YouTube www.youtube.com/watch?v=IGHHQkW66Ck

PLAN DETAILS

NAME:	Slingsby Kite 2a
BUILD CATEGORY:	Intermediate
PLAN NUMBER:	MW3771
PLAN PRICE:	£30.99 ($52.99)
CANOPY NUMBER:	CA3771CY
CANOPY PRICE:	£20.99 ($35.99)
LASER WOOD PACK NO:	WP3771
LASER WOOD PACK:	P. O. A.

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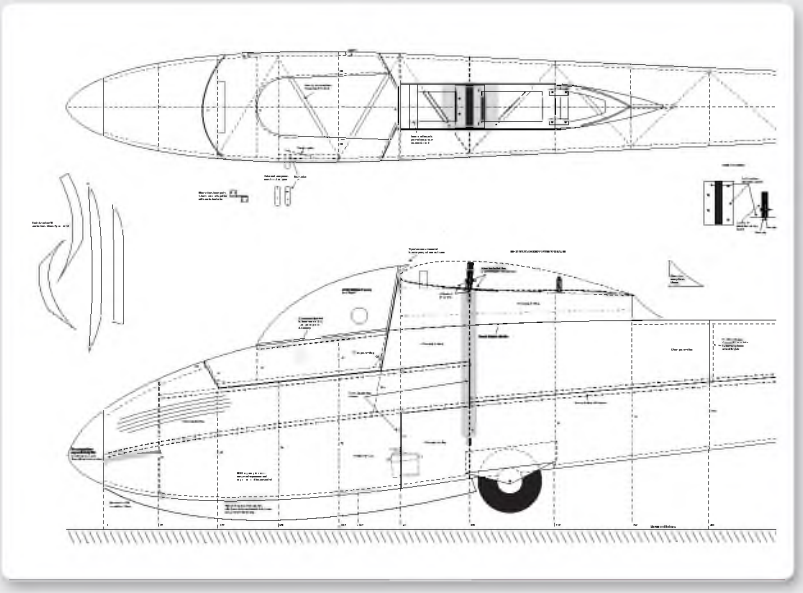

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LUNAK

Tony King enjoys a spot of cliff top soaring with a quick build EPP semi-scale sailplane from Hacker's series of Simple Known Gliders

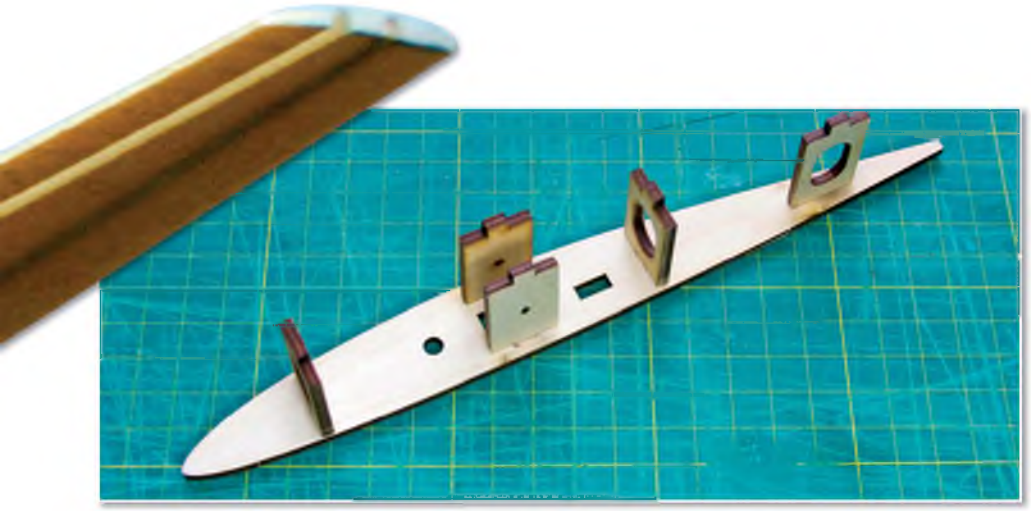
This quick build, lightweight soarer makes up into a neat representation of the Czech LF-107 Lunak aerobatic glider

Airframe parts are largely pre-finished, with everything supplied in one of Hacker's trademark slim red boxes

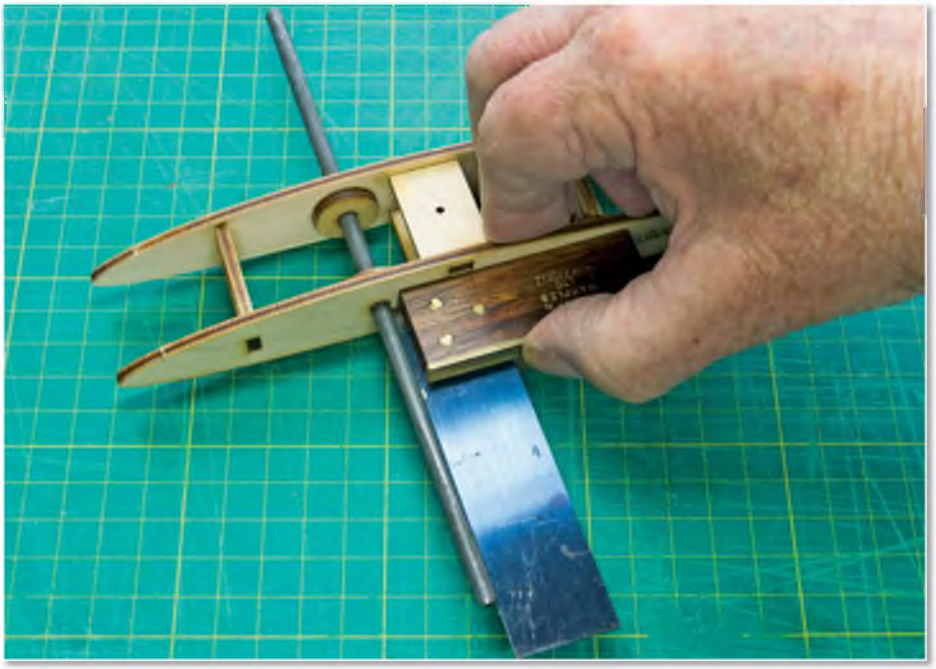
The Czech aerobatic glider LF-107 Lunak was designed by Rudy Letov and further developed by a group of sailplane pilots and aeronautical engineers. The good aerobatic and gliding characteristics of the prototype drew considerable attention at aerobatic competitions in Ziar, Poland and Grenchen, Switzerland in 1949.

With the advent of the Cold War the factory was pushed into the production of MiG-15 aircraft and only 75 examples of the Lunak were built. Production models were used in local clubs for sailplaning and aerobatics, as well as for training jet pilots. Of the 75 Lunak-107s built only nine remain in the world today.

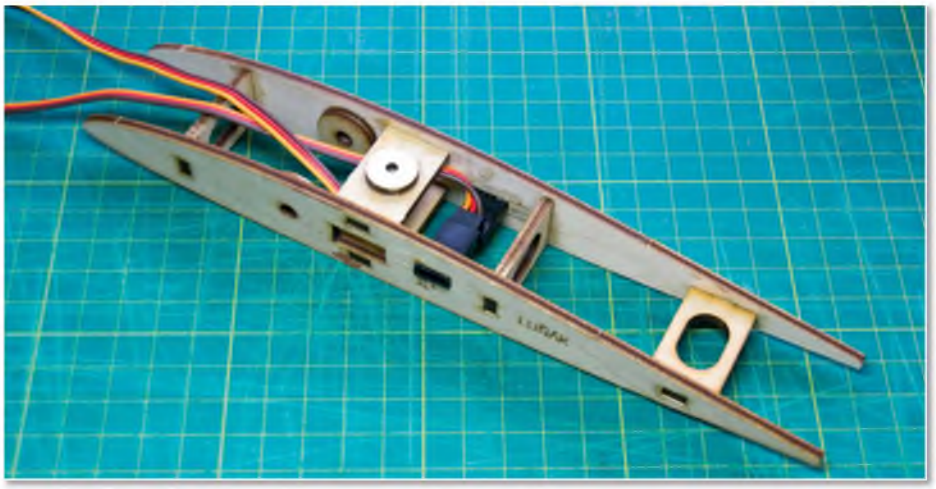
This Lunak model glider, which is a sports/thermal soarer, is part of a series of SKG (Simple Known Glider) models from Hacker Model Production in the Czech Republic. It is a semi-scale EPP model, which is intended to be an ideal beginner and intermediate model. Having a strong,



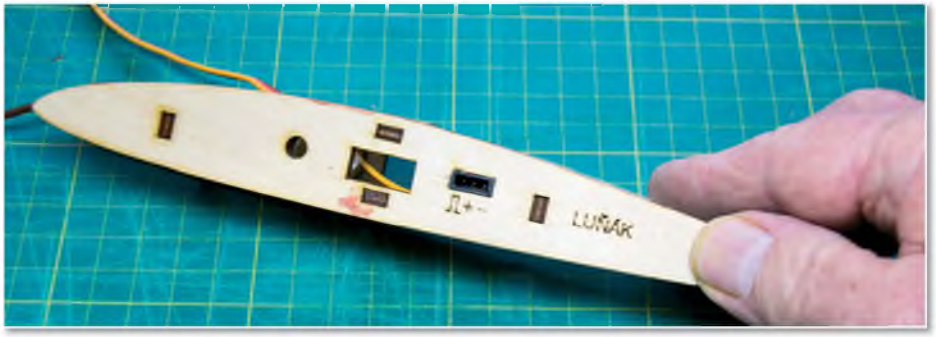
Constructing the central wing box from laser cut ply parts



Checking that the carbon wing rod is all square



Completed wing box with aileron extension leads fitted



Side view showing the signal and polarity annotations below the servo plug holder

lightweight and durable construction of expanded polypropylene (EPP) contributes to excellent flight characteristics and it should also guarantee a model with great resistance to minor accidents and not so gentle landings.

The model can fly on a slope or be fitted with a switchable tow hook for aerotowing.

Opening the large flat box we find well-packed model parts, a full hardware pack and a fully illustrated manual.

Assembly Begins

After checking the manual parts list against the box contents my first observation was that the manual contains very little in the way of written words or instructions. But it is full of drawings and pictures to guide you through the assembly. I strongly advise that the manual is studied very carefully before you start.

With a wingspan of two metres the two part wings come with pre-cut servo slots. The wing sections are reinforced with a hardwood spar. The aerofoil section is almost flat bottomed at the root but changes to a semi-symmetrical section at the wingtips.

The ailerons and wing sections are one-piece foam with moulded in hinges. There is a ply layer that is attached to the root of the wing. The whole wing is covered in a self-adhesive transparent covering.

No servos are supplied with this kit; I used the recommended 9 g servos. You may have to cut additional foam away from the wings to accommodate your servos, plus 400 mm extension servo leads will be required, and these can be secured to the servo leads with heat shrink tubing as a precaution. All hardware such as control rods and laser cut horns are supplied.

Fuselage Fabrication

The fuselage is almost a profile style shape and it is here we find that most of the assembly work takes place. You will need a sharp scalpel and a couple of spare blades, also some cyano adhesive and kicker. A tube of 'Uhu Por' contact adhesive will also be required later on in the assembly.

First job is to assemble the wing support structure, which consists of a small amount of laser cut ply parts. These are a very close/accurate fit when assembled but you should, as a precaution, check that all parts are square with a set square before finally gluing with cyano.

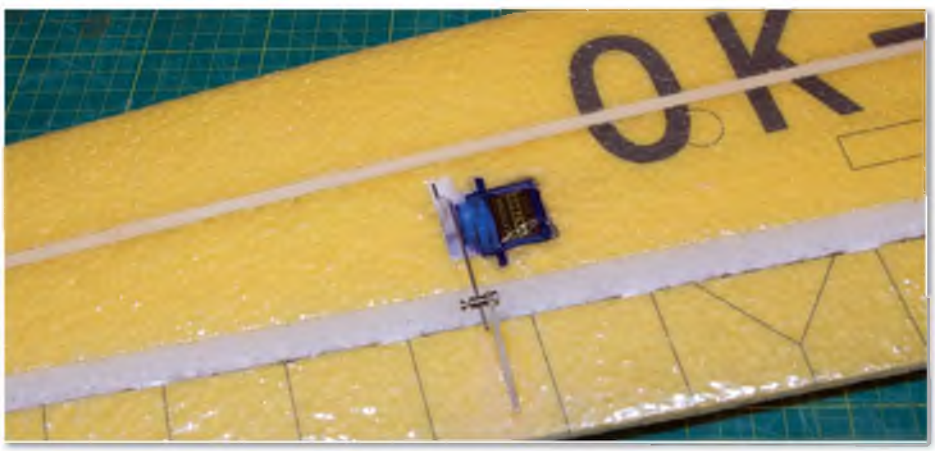
It is a good idea at this stage to fit the steel wing brace and the ply washers, followed by the wings themselves. When you are satisfied that the wings are sitting correctly you can then cyano the ply washers into place.

After removing the wings the servo leads will need to be fitted into the ply assembly, taking care to ensure that the polarities of the leads correspond to the markings on the ply cut outs. As the lead plugs are offset in the ply assembly, to lie across each other when in position, I chose to cyano these in place. The next stage is to cut away the covering on the root section of the wings to enable fitting of the ply anchor tongues. The wings will need to be re-fitted

The completed wing box is pushed into position in the aerofoil shaped cut-out in the foam fuselage. Note the faint cut line under the wing and Hacker sticker, inlaid with carbon reinforcement rods

Close up on the wheel box

Elevator joiner and laser cut transparent control horn. The horns simply cyano in to slots cut in the EPP foam



Each short, slop free aileron pushrod attaches to the 9 g servos with a simple Z-bend

to ensure accuracy of the tongues and the locking pin before gluing into position with cyano (study the manual carefully at this stage).

The centre section can now be fitted into place, ensuring that the servo leads are fed correctly through to the radio bay. When you are satisfied that the assembly is fitted squarely you can now cyano this into place as per instructions. Don't forget to position the locking pin guide into place.

You will find a selection of carbon rods in the box. These are used to strengthen the fuselage and this is where you will need a very sharp scalpel. Carefully mark the positions indicated in the manual and cut slots to suit; the carbon rods are then embedded in the slots. A little cyano will secure these in place.

There are two small lengths of plastic tube that should be cyano'd into place in the slots provided. Next stage is to fit the ply servo/battery tray into place. For this I used UHU Por adhesive. When all is set you can then fit the servos etc.

Finally, we can fit the carbon rods to the fin and the tailplane assemblies. Proper cyano hinges are provided for the rudder and you will need to carefully mark out the slots before fitting the hinges and gluing them into place. Now, remember that I said read the instructions carefully? Well this is where I went wrong!

I assumed that there was a shortage of anchor screw/stops and I fitted additional ones to secure the carbon control rods to both the elevator and rudder horns, only spotting two short metal control rods with Z-bends formed afterwards. These should have been glued to the carbon control rods and held in place with the supplied heat shrink… D'oh! Anyway, at least I can adjust the linkages at both ends of the control rods now.

I should say at this stage that when fitting the tailplane ensure that it is square in relation to the wingtips/fuselage, and that you check the diagonals between wingtips and tailplane tips before gluing into place.

Fitting the single landing wheel assembly and the landing skid is quite straightforward and just involves cutting the cut-outs in the bottom of the fuselage and fixing into place with a little cyano adhesive.

The provided canopy needs to be cut to shape and drilled to accept the fixing studs. The plastic studs are glued into place on the canopy using cyano adhesive.

After installing the radio equipment the C of G was checked at 75 mm from the leading edge. The following control surface movements were set:

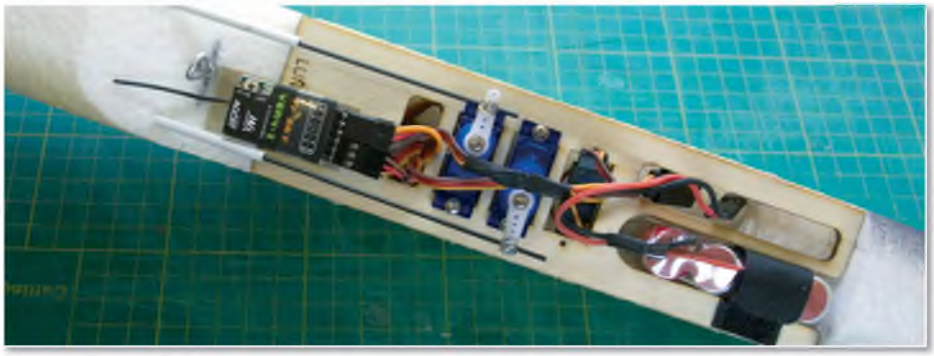
Aileron:	30 mm up, 20 mm down
Elevator:	13 mm up/down
Rudder:	30 mm right/left

Flying

I got my test pilot Brian Cooper to fly the model whilst I took the photos.

On first sight of this glider one's eyes are drawn to the enormous control surfaces. They are similar in size to what you might expect to find on a powered 3D model, which would suggest it is intended for

The forward slot in the ply radio tray is just the right size for a four cell pack of AA NiMH batteries



Neat radio installation

some serious aerobatic action. However, it is quite light and with a wingspan of two metres the wing loading is not high, which would suggest it is more of a 'butterfly' than a serious aerobatic machine.

We flew the model from slopes almost every day for a week but the wind did not want to co-operate and it mostly blew below 10 mph, and rarely blew harder than 15 mph. This proved to be both a blessing and a curse. It was a blessing because it proved how nicely the model will perform in the merest whiff of wind. But it was a curse when trying to perform aerobatics as there was no power to keep the action going.

In a gentle breeze the handling was lovely and the glider could be confidently lobbed off a hill for some sedate and relaxed 'ridge riding'. When the wind blew a little harder we were able to try some aerobatics, but those enormous control surfaces actually worked against us and rather than producing powerful control responses the surface deflections worked like air-brakes and quickly killed the airspeed. The decaying airspeed also reduced the roll rate, etc.

Quite simply, the model was too light and lacked any inertia to carry through some of the most basic manoeuvres. What it needs, for aerobatic slope flying, is more weight – and more wind. Yep, it's a butterfly!

Nevertheless, it was still a very pleasant aeroplane to fly and the controls felt positive without being too aggressive. Landing it was never a stressful experience.

Flying inverted proved to be fairly straightforward. However, bearing in mind how the airspeed decays with any aggressive inputs from the ailerons, getting it into the inverted position required some thought and planning or you could end up inverted and stalled. Simply whacking the stick across to flick it upside down is a definite no-no and it has to be 'flown' to inverted with a degree of care to maintain the airspeed.

We tried some flick rolls. Even when flown into a dive to gain some extra speed, as soon as all the controls were fully deflected the model simply lost most of its airspeed and looked a bit 'drunk'. It was like using a handbrake in mid-air, and it didn't perform any flicks.

It was the same with loops. After a dive it would easily do one, but it was unwise to try doing two unless the wind was blowing hard.

To prove a point we added some extra weight to the model. There's no provision to add weight on board, so we merely taped 50 grams of lead to the outside. It wasn't pretty but it worked. Even with this small amount of ballast the model showed a marked improvement in performance and it became far more pleasurable to fly. We mused that adding even more weight would probably improve the aerobatic capabilities of the model, especially if the wind was blowing well.

Lunak Summary

So what have got here? It is a delightful model, which is good fun to fly but it isn't going to win any aerobatic competitions. Although we have not tried it yet, we have no doubt that it will be good on a towline and would happily sniff out thermals. Basically, it is a good all-rounder, which handles well and looks good in the air. But don't be fooled by those large control surfaces; it is a butterfly rather than a hawk.

RCMW

Lunak gets the heave-ho!

A fine all-rounder with good soaring capability

Despite large control surfaces the aerobatic performance of the lightly loaded glider is limited. Extra ballast would be help in a good blow

Lunak looks nice against a brooding sky

Whilst the extra chunk of lead taped to the nose didn't help the Lunak's appearance it did improve the aerobatic performance

Ah! Simply soaring quietly overhead is a delight with this attractive model

MODEL WORLD DETAILS

MODEL INFORMATION

NAME:	Lunak ARF
MANUFACTURER:	Hacker Model Production
WEBSITE:	www.zoomport.eu/shop/
PRICE:	138 Euros
SEE ALSO:	www.t9hobbysport.com/hacker-model-lunak-semi-scale-epp-model-glider (£120.00)
MODEL TYPE:	Semi-scale glider
CONSTRUCTION:	EPP foam, in orange, yellow or red colour scheme
PARTS SUPPLIED:	Airframe and accessories
PARTS REQUIRED:	Servos, receiver and battery pack

R/C FUNCTIONS

1: Ailerons
2: Elevator
3: Rudder
4: Switchable Tow Hook (optional)

MODEL SPECIFICATIONS

WINGSPAN:	2000 mm
LENGTH:	950 mm
FLYING WEIGHT:	780 g (using 4-cell NiMH 1300 mAh battery pack)

DISLIKES

None

LIKES

Lightweight • Ease of assembly • Good quality components

CL-84 Dynavert

Flyzone
how high will you soar

No.: FLZA2800

First flown in 1965, Canadair's CL-84 Dynavert was an experimental platform designed to test the feasibility of VTOL (Vertical Takeoff & Landing) aircraft. By repositioning its entire wing, the CL-84 was able to take off like a helicopter and then transition to horizontal flight to perform like a conventional turbo-prop aircraft. In tests, it was found that in-flight transition was also possible, proving this to be a truly remarkable aircraft that pre-dated similar concepts by a significant margin!

Flyzone's replica Dynavert has many of the same features and can take off and land vertically with in-flight transition to fixed-wing flight – you can even take off and land conventionally on larger strips! Power is provided by 3 brushless motors and a 3-axis gyro guarantees flight stability. Supplied largely pre-assembled and decorated with all servos included and fitted, you'll just need a transmitter with a minimum of 6 channels, suitable receiver and a 4S 2200mAh LiPo to complete.

RC-Function:
Motors, Elevator, Aileron, Nosewheel, Wing Tilt, Pitch, Roll & Yaw

Set Contents:
- AeroCell Foam Construction Rx-R Model
- Factory-fitted RC Components
- Comprehensive Instruction Manual

Required (Not Included):
- Minimum 6Ch RC System
- 4S 2200mAh Flight Battery

Technical Specification:

Length:	1050 mm
Wingspan:	950 mm
Weight:	1700 g

FLYZONE Distributed by Revell GmbH – Tring, Hertfordshire, HP23 4QR
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Fred Annecke takes a close look at a prototype MD 600N tail rotor-less helicopter built by Stefan Reusch

MD 600N NOTAR

Stefan Reusch from Germany is always good at presenting new scale model helicopter developments. For example, five years ago he inspired the scene with a perfectly designed, electric powered Vario Bell 430, which still represents top of the range flight performance, noise and over all efficiency. But new projects always come along and some time ago he finished a Boeing Vertol prototype (tandem helicopter), which subsequently Vario put into production. His latest project is a MD 600N featuring a Notar-system, measuring a tight 2 m in diameter with a 6-blade rotor head, making it a real model helicopter goody.

McDonnell Douglas originally produced the original machine and developed the smaller MD 520N. The bigger MD 600N has eight seats and is equipped with a 6-blade rotor head, and it was this technical challenge that inspired Stefan to design and build his scale Notar model.

The mechanics are designed in a clever combination using lots of different Vario parts from several frame sets and driven by an electric motor. Many parts are from the well known Vario Benzin pod and boom trainer, including the main mast and four servo swashplate arrangement. Much more interesting is the three-stage gear train, using belts in the first and second stages and a spur gear for the third stage.

'Notar' originally stands for 'No Tail Rotor system', which means the machine does not need the usual tail rotor to compensate for the main rotor torque. With Notar the necessary counter torque is produced by a stream of air produced by an internal fan device, driven from the main gear arrangement, producing airflow through the cylindrical tail boom to the rear. At the

Cheeky graphics on the Notar end cap

This MD 600N prototype built by Stefan Reusch will be produced by Vario Helicopter as a production model kit

On the right side of the boom we see outlets directing air that help to compensate torque – known as the 'Coanda Effect'

The slotted one-piece end cap is rotated by a servo, controlling the air stream from the internal fan. The yaw servo sits inside the tip

The mechanics are extremely short in height and are located right under the 'dog house', leaving the cabin open for scale detail. The Notar fan runs inside the drum

Really impressive counter clockwise rotating Vario 6-blade rotor head, equipped with Vario Shark Skin rotor blades

Inlet cone on the lower face of the drum feeds air to the double-sided Notar fan

tail end there is an adjustable outlet cap, deflecting the necessary amount of air in the correct horizontal direction (left side when looking in the direction of flight). By varying the amount of air it is possible to steer the heading of the helicopter.

Stefan's prototype is equipped with a double-sided Notar fan wheel spinning inside a shroud and driven by a 2:1 gear ratio from the first main gear stage. A 'double-sided fan' means that the rotating disc has fan blades on each side, but each set are orientated (angle of attack) in the opposite direction, which produces twice the airflow. The fan is 155 mm in diameter and produces lots of compressed air flowing through the tail boom. A servo rotates the outlet cap that controls the air exiting the left side end of the tail boom. As with conventional helicopters a gyro system helps control the tail.

There is another clever system that helps compensate the main rotor torque, called the 'Coanda Effect'. In this case it uses a much more longer, horizontal set of small outlets along the side of the tail boom. A small amount of air exits these holes into the downwash coming from the main rotor, which has the effect of the tail boom structure itself acting like a vertical aerofoil, helping to compensate the main rotor torque.

Stefan's MD 600N runs a head speed of 920 rpm, which helps to make it very impressive in flight. Controlling left and right yaw is easily achieved, which is mainly a result of the highly efficient double fan combined with proper control of the end cap. Using a 14S 7000 mAh LiPo gives a 6-7 minute flight time, with an average current consumption of approximately 60 amps (peaks up to 85 amps). Bearing in mind the large 6-blade rotor head and double internal fan, this is acceptably efficient.

When considering the complexity of the whole project, we have to agree that this is a really well engineered model and the result hides a great deal of other refinements that popped up during the intensive test period (for example, using a clamp cone instead of screwing on the fan wheel). Nevertheless this outstanding 1:4 scale prototype flies really well and it won't be long before Vario will be able to offer a factory production kit. **RCMW**

Ready for take off

MODEL WORLD DETAILS

MODEL SPECIFICATION

HELICOPTER TYPE:	MD 600N
SCALE:	1:4
FUSELAGE:	Vario
MECHANICS:	mainly based on Vario Benzin, modified for electric motor
MAIN ROTOR DIAMETER:	950 mm
ROTOR HEAD:	Vario 6-blade
FUSELAGE LENGTH:	2350 mm
SWASHPLATE ARRANGEMENT:	4-servo eCCPM
MAIN ROTOR BLADES:	Vario Shark Skin
MOTOR:	Kontronik Pyro 850-50
ESC:	Kontronik Kosmik 200 A
LIPO BATTERY:	14S SLS, 7 Ah, 25C
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GLOSTER JAVELIN

On a low pass. The camo' works well!

Free Plan

Fly indoors or out with this simple to build 24" span all-Depron profile jet designed by John Rutter for either a 40 mm or 50 mm EDF, or pusher option

Finished model is a good representation of the Gloster jet

As a young boy I have a vivid memory of being in between two buildings at school and seeing a Javelin howling overhead. This stuck in my mind because the thing was VERY low and I could have sworn that it was inverted with no crew on board (the cockpits being empty), but as it was only a momentary glimpse I could never be entirely sure of what I had seen.

Being only a lad I knew no more about it until many years later when I researched Javelin crashes and found that on the 21st May 1960 (shortly after my sixth birthday) two Javelins had collided on exercise over the North sea. One (XA823 'P') crashed into the sea, having lost its tail and fin while the crew ejected. The other (XA835 'Z') was less damaged and apparently the crew tried to get it to RAF Middleton St. George (now Durham Tees Valley airport) before realising it was hopeless, turning it back out to sea and 'banging out'.

Unfortunately the crew-less Javelin had other ideas and headed back inland (did it bunt under and continue on a reciprocal heading while inverted? My C of G test 'chuckie' did exactly that when tail heavy), crashing at High Throston in Hartlepool, about half a mile from where I had seen it. I wonder why the pilot didn't shut the engines off before ejecting? Back then it harmlessly hit fields; now it would be very near a new housing estate!

All of the above just gives a reason for having an interest in the Javelin (with its very characteristic 'howl' being unmistakable in the air) and having just bought some XRP 50 mm, 11-blade EDF units (see Contacts), ready built and balanced with 40 A ESC.

I had tested a couple of different EDF units, including the XRP, in an old Depron Cutlass design, so at the risk of being accused of building to a formula I thought I would use similar construction for the Javelin as it is simple, quick and cheap, while giving the 'look' of the design in the air and a pleasant to fly model.

All except the tail of my model is made with 6 mm Depron (the tail is only there for show really, controls are via elevons), the tail being in 3 mm (but if you don't have any 3 mm then 6 mm would do, but it just looks very thick at this sort of size). I always cut out my Depron parts via my CNC milling machine.

TOP TIP:

An easy way to cut parts is to have the plans copied, roughly cut out the parts from paper, then use a light coat of spray mount glue to stick the drawings to the Depron, allowing you to cut through the paper and Depron with a sharp knife. Peel the paper away once the parts are cut out.

I did get a bit enthusiastic about minimising the size of the parts around the fan; it was very weak around the cut out but I have changed the plan slightly since to give a bit more 'meat' to play with.

Construction

This is very simple and quick. Start by gluing the carbon reinforcing strips into the wing and tail (not essential in the tail) using UHU-por as an impact glue. Glue the nose doublers together (four to a side despite only four being shown in the photos, and you could simply extend the fuselage parts to omit the block) and glue the fuselage doublers to the fuselage along with one of the profile plan views. I used UHU-por 'wet' and left to set.

When dry add the parts for the other side and leave to set again. Carve and sand the nose block to shape (if used). Slide the completed wing into position and glue under the profile plan view parts with either 'por or foam safe cyano, ensuring the wing remains at 90 degrees to the fuselage and fin. Do not glue the lower fuselage to the wing just yet.

Anyone still awake will by now have noticed a big hole in the middle of the fuselage where the fan is supposed to go, and the fact there is no apparent way of getting one in there! No I haven't forgotten to fit it; it goes in after the main structure is built and painted by cutting a section of the bottom away and gluing it back after fan fitment, which is why it shouldn't be glued just yet.

Round off the leading edges of the wings, tail and fin. The outer edges of the fuselage doublers can also be rounded though it is all cosmetic really. It helps performance a little to 'streamline' the entry and exit of the air around the fan. I usually use a long, thin-bladed and very sharp scalpel knife to take the thick of it away first and finish with sharp, new abrasive paper. Cut the leading edge of the elevons at about 45 degrees to allow top hinging and add the horns if using ply; leave them off if using commercial bolt on types.

At this point basic painting is a good idea as it avoids getting the expensive bits coated later on, although more detail can be added once the model is finished. I used aerosol cans in 'light' coats, with the camo' applied via an airbrush after spraying aerosol paint into a can cap to extract it.

Fitting Out

When the paint is dry cut away a section of the lower fuselage, fit the fan, glue it in position (use 'por, wet) and refit the fuselage section (using 'por). Glue the remaining lower fuselage to wing joint with a bead of 'por either side. Yes, it is still a bit weak! When the fan glue has set add strips of 3 mm x 0.35 mm carbon strip top and bottom across the fan hole and use Blenderm tape to further strengthen the join. Any remaining painting (panel lines, roundels, etc.) is easiest done now before fitting out. My markings were mainly done with self-adhesive vinyl (semi adhesive might be more descriptive on Depron!), but as I modelled XA835 I didn't need to paint any crew in the cockpits!

Servos are glued in place with 'por, while the Rx, ESC and battery are all attached via Velcro strips. Any leads (you will probably need at least one short extension for each servo) are either taped in place with Blenderm or tucked away if possible – there is enough drag on the model already!

Elevons are top hinged with Blenderm and connected to the servos via 1.5 mm carbon rods with piano wire Z-bends at either end. Heat shrink tubing and thin cyano retain the Z-bends to the carbon, but make sure everything on the Tx is set to neutral (including sub trims) and that the servos are actually in neutral before gluing as there is no adjustment possible except via the transmitter.

The tail is fitted last just to stop it getting in the way and getting knocked about. Note that it is at a very slight (1 degree) negative incidence – nose down – where it should help stability a little.

Testing a little 'chuckie' and scaling up gave a likely balance point of 200 mm (8 in) measured from the trailing edge forward and in practice this is fine. It's possibly a little nose heavy, but is easily adjusted by moving the battery. There are only two servos to worry about, set up with elevon mixing. I use about 15 mm (5/8 in) throw

Fuselage parts cut from 6 mm Depron

Wing parts are also cut from 6 mm Depron

Tail parts are made from 3 mm Depron otherwise they look too thick

One half of fuselage glued up

Second stage of fuselage construction

Nose block after cutting and sanding to shape

up/down, measured at the TE for both functions, with 60% expo on full throw and reduced rate at 60%. No reflex 'up' is needed.

Flying Indoors And Out

In the air the model is more sensitive to aileron than elevator so having rates 'in' on ailerons is more comfortable for me. But everyone has their own preferences. Okay, so it's on with test flying.

As there were a couple of indoor meetings left on the club calendar I rapidly produced a version of the model in 3 mm Depron for a GWS 40 mm fan fitted with a Turnigy 1230, 4500 KV motor and 3S 450 mAh LiPo for my own amusement. This only weighed around 1/3 of the original at 134 g (4¾ oz) rather than 354 g (12½ oz) with its 3S 1500 mAh LiPo pack, so it got a test flight first outdoors in a light 8 mph (or so) wind.

It wasn't particularly fast but flew perfectly, with no trims needed straight from a hand launch (an underhand lob works with all versions). A bit of 'chucking it around' revealed that it needed a dive to loop, lots of down for inverted flight, had a moderate roll rate and was almost impossible to stall, just tending to nod back to level flight.

Landing into the wind was amusing as gently pulling the aircraft nose up allowed the model to settle Harrier-like on to the grass, which works with all versions of the model.

I didn't get time to paint the model before the indoor meeting, where it flew well enough. But the lack of power to the controls meant that really all it did was to fly round in left hand circles at various speeds. Lack of a rudder meant that I 'corrugated' the nose on a gentle impact with a wall, so I fitted a rudder and servo when I got it back home, much improving its indoor performance.

Landing indoors, with no wind of course, showed a nice flat glide before gentle touch down. It wouldn't take-off from the floor though, seemingly sucking itself down to the ground. I couldn't really recommend the design as an indoor model unless you enjoy just turning left as it just isn't manoeuvrable enough indoors.

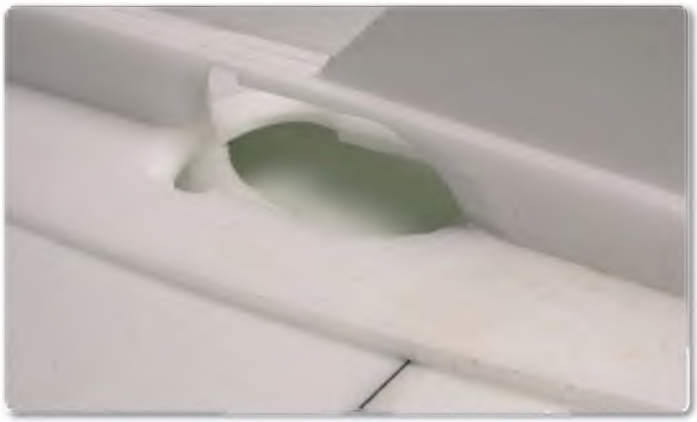
Testing the rudder outdoors revealed some remarkable effects when using full throw of about 15 mm each way (5/8 in), as the model would yaw, then roll to inverted! Even reduced throw (50%) would stuff the nose down and rudder was far more powerful than elevon in turning the model, as inputting full opposite aileron to the rudder throw would have little effect on the direction of turn.

If you only fly in light wind conditions then this version (even without rudder) is a perfectly acceptable outdoor model. Just adjust the slot gaps on the drawings to use 3 mm Depron.

Back To The Original

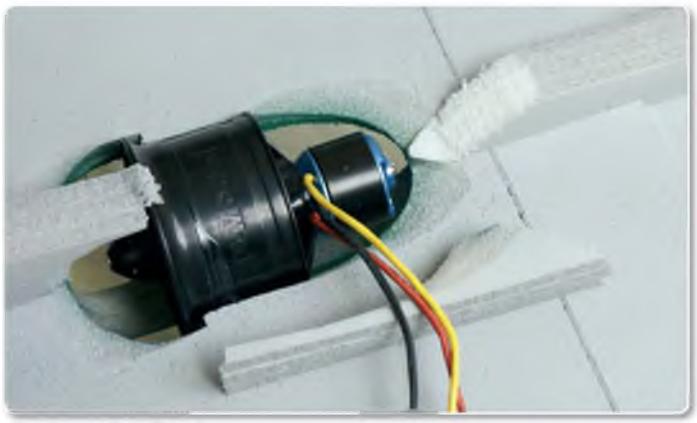
After testing the lightweight version the original 50 mm fan model took off like a rocket (it has a vertical climb on a decent battery). But all the weight on the right

The wing is reinforced with carbon strip



EDF slot after being streamlined

Basic paint job applied



The fan unit is fitted

Elevon servo installation

This equipment installation works well

hand side meant it needed left trim. Much higher speeds made full throw on aileron 'twitchy', so it was quickly knocked down with rates. But the model is much less sensitive to elevator so these were left on full throw.

Trying to get the model to stall usually produced a wing over to the right, due to the weight distribution again. But the worst stall provoked just produced a sort of half spin to the right before picking up flying speed once more.

The glide seems quite good for a Depron design. Roll at slower speeds and low rates was a bit 'barrely', but became crisp and very rapid at high speed and full throw.

I managed to snap the nose off in a crash after provoking a stall following a high alpha, slow speed pass, then snapping the throttle open quickly. The model flicked over to the right and I ran out of altitude. Only the nose was damaged, so after repairs and moving the battery to the left flying could resume.

Weight distribution was now much better and no amount of provocation could reproduce the right hand flick. I discovered that a 40C rated 3S 1040 mAh LiPo was enough for the model, and if anything gave an even better climb, though with shorter duration flights than the 1500 mAh pack (which gives around seven minutes flying time).

Naturally it goes a little further forward to maintain balance. But even with the pack fully aft, at the back edge of the Velcro mounting strip, the model didn't misbehave; if anything this simply improved the inverted flying due the rearward movement of the balance point.

For a Depron model it handles windy conditions particularly well. Some of the flying shots were taken on a day when the wind was averaging 12-15 mph, gusting 20 mph (living as I do near to the North Sea it is rare to have a calm sunny day) and the model remained steady in flight.

Pusher Prop Variant

As a final variation on a theme I decided to try a pusher prop driven version of the model using a Motrolfly 2203 kit motor with my preferred tube mount, thinking it should be lighter, more efficient and possibly more appealing as not everyone likes EDF. (I've drawn a Turnigy 24 g motor with the more usual plate mount on the plan. I flew the model on a 1300 KV version with a 10A ESC and 4S battery. It flew fine on 3S too but the 1500 KV version of the motor would be 'hotter' on 3S).

I chose to use the colour scheme of XH897 of the A+AEE (Aeroplane & Armament Experimental Establishment), the last Javelin to fly, as it is colourful and it turned out to be much easier to see in the air. It took longer to mask and paint the model than it did to make it!

Construction is identical to the others except there is no need to cut out for the EDF unit, and I chose not to fit a nose block this time. The shape is only slightly different at the rear where the 'reheat' exhaust of XH897 leaves a conveniently extended and squared off rear.

The finished EDF model looks suitably moody

On a nice fly past for the camera

Swooping in from the other direction

The 40 mm fan version can be flown indoors or out

A striking colour scheme for the pusher-prop version

Pusher equipment layout

If you go this route please do not put anything big and heavy in the back. Even with a light motor and the LiPo just under the intakes (with extension leads to the ESC) I still needed nearly 40 g (almost 1½ oz) of lead in the nose to balance the model correctly. A light but powerful motor with a fairly high KV (around 1500 - 2000) driving a smallish 6" or less prop will give adequate performance with little need for excessive nose weight. My model's AUW was 247 g (8.7 oz) ready to fly, about 100 g or 4 oz less than the EDF version.

It flew with no need for trimming and every bit as well as the EDF version (perhaps even better due to its reduced weight) but of course it didn't sound like a jet, while the prop is hardly visible in the air. It would of course be possible to build a prop driven version in 3 mm Depron but I haven't done so.

Summing Up

All the comments I've had about the model(s) say that it looks to fly very well (which it does) and it looks the part in the air.

Only folk 'of a certain age' will remember the sight and sound of a full sized Javelin flying. And I don't imagine one will ever fly again so these little model(s) help retain memories of times past. ***RCMW***

Addendum

I re-fanned the EDF Javelin with a 4,200 KV fan, but otherwise identical to the 4,900 KV unit I used originally. I did so because I have found the LiPo packs are straining a bit under the current draw of the 4,900 KV unit, which gives fantastic performance for the first half a minute or so but falling off afterwards. (Okay, maybe I should spend more money on decent LiPo's!) With the lower KV fan I get a bit less performance initially but it is more evenly spread over the charge in the pack, so it flies very well for longer but doesn't have the initial 'burst' of extreme power.

CONTACTS

John Rutter:
j_j_rutter@hotmail.com

XRP EDF Units
www.gliders.uk.com • www.hobby-paradise.com/en/product/item/3031/product_detail.html

The red and white scheme stands out well

The pusher version is a tribute to XH897 of the Aeroplane & Armament Experimental Establishment, which was the last Javelin to fly

MODEL WORLD DETAILS

MODEL SPECIFICATIONS

WINGSPAN:	24 in (610 mm)
RADIO FUNCTIONS:	Throttle, Elevons, Rudder
RECEIVER:	6 Channel Featherlight, DSM2 compatible
SERVOS:	Blue Arrow DO3010MG 3 g
BASIC CONSTRUCTION MATERIALS:	3 mm and 6 mm Depron, 3 mm x 0.35 mm carbon strip, UHU-por, Blenderm tape
COVERING MATERIAL:	Foam friendly aerosol paint
CONTROL THROWS:	Elevons: 15 mm (5/8 in) up/down, with 60% expo on full throw and reduced rate at 60%. No reflex

ELECTRIC POWER

50 MM EDF
50 mm EDF unit XRP 11-blade (ready assembled with 4900 KV motor)
Beatles 40 A ESC (comes with XRP unit)

40 MM EDF
GWS 40 mm fan unit with Turnigy 1230 4500 KV inrunner motor
10 A ESC
3S 450 LiPo

PUSHER PROP

Motrolfly 2203 motor, hand wound 12T 27 SWG DLRK on GWS 5" x 4.5" DD prop
Hobbywing 25 A ESC
2S 1050 mAh LiPo

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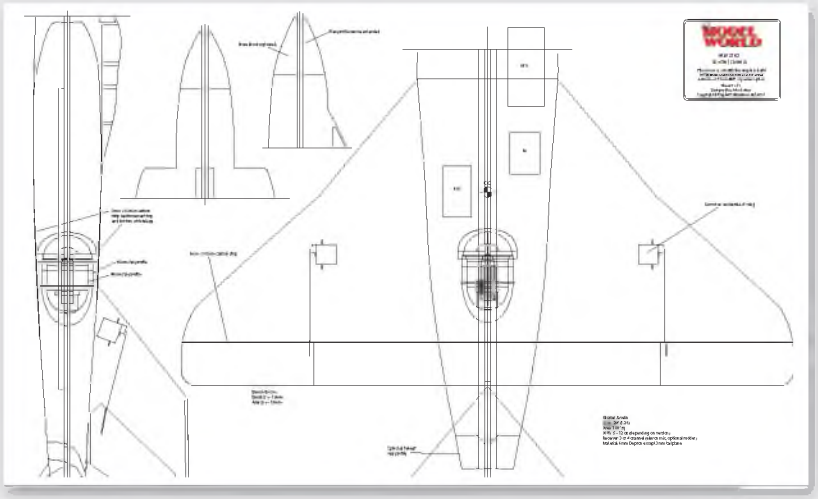

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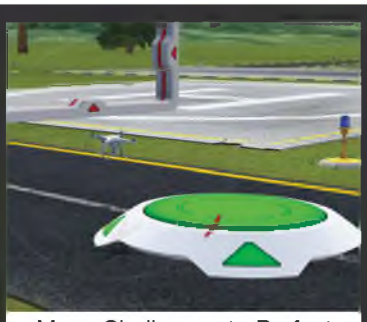
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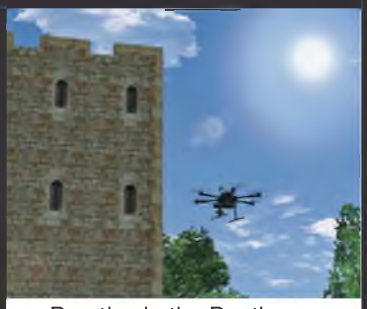
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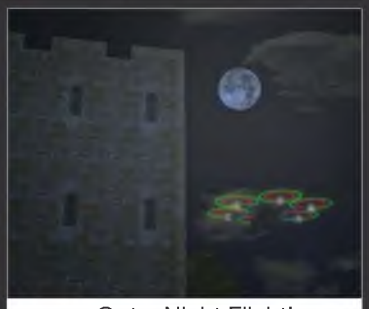
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GADGETS & GEAR

James Crozier returns with a multitude of offerings to keep you amused over the Christmas and New Year holidays

Silverlit Nano Falcon R & M

With a 'scale-esque' fuselage ('R' version), the Silverlit Nano Falcon looks quite nifty as far as budget 3-channel 'nano' helicopters go. It also features a built in gyro, precise variable speed rotors and an auto tri-band system, which gives you stable, controlled, interference free flight.

Also included is a stylish transmitter with charging dock for ease of use. The Nano Falcon R comes in a choice of three colours: black, blue and red. Nano Falcon M comes in yellow, blue and red.

£29.99

www.silverlit.com/a/product/nano-falcon-r/
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Quick Test

It's not only quadcopters that are getting tiny, but model helicopters too! Silverlit's Nano Falcon's are just 64 mm long but they fly a treat. The small IR transmitter even contains a flip-out charging jack, on which the micro heli sits whilst getting a boost.

The R version has a scale like body design, whilst the M has lightweight metal side frames reminiscent of a larger sports R/C helicopter.

Hovering is nice and stable but it is quite easy to get into a bit of a wobble if you try to change direction whilst climbing or descending. The trick is to just use the throttle to climb or descend to your chosen height, leaving the built-in gyro to keep the model stable. Then press the stubby control stick left or right until it is pointing in the required direction, following which you can fly the Nano Falcon forwards or backwards using corresponding movements of the control stick.

With a bit of practise it is possible to fluidly combine this 'point and squirt' style of flying to fly the Nano Falcon in smooth circuits around your living room. Great fun!

Revell Control Proto Quad XS

So small it can be docked to the transmitter/controller, the Revell Proto Quad XS is a lively little 2.4 GHz quadcopter that is even capable of flipping. It features a gyro system, so despite its tiny size this little quad is capable of smooth, stable flight and also boasts three speed levels.

The Proto Quad XS can be easily charged via a USB connection, or using a powerbank such as the Revell Power Bar mentioned overleaf.

Priced at just over thirty pounds this quadcopter is a lot of bang for your buck in a very small package!

£34.99

http://www.revell.de/en/products/revell-control/quadrocopters.html

Quick Test

Following the release of the diminutive Nano quads in the last year or so you might have thought that micro multicopters couldn't get much smaller and yet remain flyable. But they have, as we found out when testing the Proto Quad XS.

Controlled by a gamer style 2.4 GHz transmitter the Proto Quad lifted straight off the table into a very stable hover. Directional inputs in the default flight mode are nice and smooth, although things can be made considerably more hairy if you toggle through the sensitivity button on the top left hand shoulder of the Tx – not for the faint hearted! And since Proto Quad has a high power to weight ratio it is very sensitive to power inputs, so gentle use of the throttle is the order of the day.

Proto Quad can even be flipped, by pressing the button on the right hand shoulder of the Tx.

For some indoor flying fun, either at home, at work during lunch breaks or on club nights, the Proto Quad XS is highly recommended. The transmitter even has a flip up 'hangar' between the sticks in which to store the little quad whilst not in use!

Silverlit Spy Drone

The 2.4 GHz Spy Drone straddles the wide, murky grey line between toy and model and features four channel digital proportional control as well as a detachable camera. It's able to film at high speed at 60fps (frames per second) allowing for smooth video capture. The Spy Drone is capable of 360 degree flips when the camera is detached. A lightweight LiPo battery is included, which is chargeable using any USB outlet.

At just over eighty pounds, the Spy Drone is a great looking video-capable quadcopter at an affordable price.

£89.99

www.silverlit.com/a/product/2-4g-spy-drone/

Quick Test

This would easily be our favourite from all the small R/C models that we have tested for this feature, being a palm sized quadcopter with excellent flight characteristics, but which also boasts an on-board camera for taking JPEG pictures and AVI format videos, operated by buttons above the throttle stick. The small R/C style 2.4 GHz transmitter also has a High/Low rate button and a tumbling (flip) button.

However, it did prove problematic to pair our original model to the transmitter and at the start of one outside flying session it refused to pair completely, which was a bit frustrating as the weather was flat calm and we wanted to get some aerial shots to show you.

However, Silverlit's UK distributor, Flying Toys, responded very quickly and they sent a replacement drone, which paired instantly as soon as the transmitter was switched on.

We found that the new Spy Drone flew extremely well and appeared to be very stable, offering a good platform for taking some nice pictures and video direct to the the micro SD card supplied. This is a nice touch as it means you can start filming straight away without having to source an additional SD card. The microphone is very effective and can pick up sound from quite some distance away, but this sensitivity also means that the sound of the rotors is very prominent in flight.

If you're looking for a compact quadcopter with an on-board camera then Spy Drone is highly recommended.

Revell Control Power Bar

Any Revell Control model charged via USB is compatible with this small, lightweight power bar, meaning that you can extend your modelling sessions by quite some margin if you do not have any normal charging facilities. The charging cable supplied has a Micro-USB connector that fits the 5V 0.5A input port of the bar. The 5V 1A output is supplied via a standard USB port, so there is no possibility of confusing the input and output ports.

The power bar itself can be recharged using any available USB port such as on a PC or laptop and it can also be used as a mobile charging station for other USB devices such as a mobile phone. (However, it should go without saying that care needs to be taken when using non-Revell devices with this product.)

£9.99

www.revell.de/en/products/revell-control/quadrocopters/id/40300.html

Quick Test

Revell Control's Power Bar is just the ticket for providing a lightweight on-the-go solution for charging any small indoor type R/C model that needs to be boosted via a USB charger. Straight from the packet it took quite a few hours to fully charge when plugged in to a spare USB port on one of our laptops using the short USB to micro USB lead supplied. But the hefty 4000 mAh capacity should provide ample charges for the small R/C helis and quadcopters that we are featuring in this edition of Gadgets & Gear.

The big attraction of using a power bank like this is the convenience and ease of use. The LiPo technology used makes it very portable and lightweight. And if you just want to boost the battery pack of your favourite indoor model for a quick fly around it is ideal, without needing to bother with setting up chargers and plugging in cables etc.

Silverlit Nano Falcon XS

Certified in 2014 by Guinness World Records as the smallest remote control helicopter in the world, the Nano Falcon XS definitely lives up to it's 'XS' suffix - it's positively thumb-sized!

Despite its size the XS boasts all the features of its larger sibling: a built in gyro, variable speed rotors and auto tri-band, as well as a multi-purpose carry case which can be turned into a 'heliport' and a built in LiPo rechargeable battery pack

£29.99

www.silverlit.com/a/product/nano-falcon-xs/

Quick Test

If you think the Silverlit Nano Falcon R & M are small then take a look at their titchy sister! The Nano Falcon XS is a real treasure. We won't say much more about it as John Stennard will be covering it in one of his articles. Suffice to say that it flies really well but its small size means that it is easily upset by ground effect turbulence. So be brave and blast her rapidly into a hover well above the take off surface and all will be well. The 'point and squirt' style of flying is even more pronounced with this model, but the hovering and zipping around gives it real character - just like a busy hoverfly searching for a snack!

Revell Control Speed Devil

Here's a bit of festive holiday fun! Speed Devil is a 2.4 GHz radio controlled motorbike, which is controlled using a small pistol grip transmitter. After charging the bike using the USB charger supplied it is switched on and the headlight starts to blink. The Tx can then be switched on and the R/C system will quickly pair together, at which stage the headlight will light up continuously and an internal flywheel will start up, which provides gyroscopic stability.

£29.99

www.revell.de/en/products/revell-control/cars/id/24700.html

Quick Test

Speed Devil is prevented from falling completely sidewards by a wire outrigger on each side. It can be driven away from a leaning start, although it will tend to spin in a circle until it reaches sufficient speed to straighten up and drive away. The other option is to hold it upright whilst applying power and driving off. You will need quite a bit of space and a smooth floor to get the best out of the Speed Devil as the turning circle is quite big. It can be driven in small areas like a household room, but it will quickly run out of space and hit the furniture, at which time it will fall over. But provided that it is sitting on one of the outriggers a quick blast of power and a spin will soon have it driving off for it's next encounter with the woodwork!

We did try it in Traplet's car park but even smooth tarmac is like driving over boulders for a small R/C bike like this one. Your local indoor flying hall would be ideal though – as long as the other participants don't object!

Flair Scout Dummy Engine

Inwood Models have produced this 3-D printed dummy radial engine, which is part of the new Flair Scout series of stand off scale parts to suit the Flair Models range of kits. Supplied with stand offs and screws, this Dummy Radial kit suits the Puppeteer, Magnattila and Legionaire, and is priced at £12.99. There is also a 3-cylinder version for the Baronette for £7.99.

Replica guns in the same series start at £5.99, whilst a pair of guns for a Puppeteer is **£9.99**.

www.inwoodmodels.com

Silverlit V-Jet Mini

The V-Jet Mini is a dual mode plane/helicopter from Silverlit, which is able to vertically take off and land. You can change modes at any time, even during flight, giving the pilot a lot of versatility depending on how they want to fly. Included is a compact two-channel transmitter.

£49.99

www.silverlit.com/a/product/2-4g-v-jet-mini/

Quick Test

The largest of Silverlit's latest models on test, the V-Jet Mini is a twin rotor machine fitted to an aeroplane style body. The wing can be rotated in flight to transition the model from the hover into forward flight.

Due to its slightly larger size the V-Jet Mini needs to either be flown in a decent size hall or outside. But any wind whilst hovering will catch the wing like a sail and she will drift backwards, so it pays to transition to forward flight (by pressing the Transform button) as soon as you are at a good altitude. In aeroplane mode the rotors are still set at a relatively high angle so the model will climb quickly at higher power settings. There is no elevator stick, so height is solely controlled by varying the throttle. Mind you, there is no aileron or rudder either, with turns being made by differential power being applied to the twin motors.

It's very easy to over control this model and much like the Space Zeta things can get very wobbly, very quickly if you do. But if you stay calm and apply gentle stick movements the V-Jet Mini is surprisingly enjoyable to fly. And we just love being able to complete a carefully judged circuit by pressing the Transform button and settling the model down in helicopter mode.

MD Products Charge Caps

Keep a few of these handy 3-D printed parts close to hand when charging your LiPos and you can push one over the end of the connector to show that the pack is fully charged. If you are prone to getting your used and unused packs in a muddle at the flying field it's easy to pick out a fresh one to use for your next flight. The plastic caps also act as a safety device during storage and transport because with the connector capped off nothing can get close to the contacts to cause a short. Available to suit EC3, T-style and XT60 connectors, five per pack. EC5 and XT90 style versions coming soon.

Although produced by Inwood Models, these parts are distributed by J Perkins as part of their MD Products range.

£1.25

jperkins.com

Silverlit Space Zeta

The Space Zeta from Silverlit is a powerful twin rotor 'duocopter' that looks like something straight out of a modern sci-fi film. Sporting three channel control via tri-band infrared and a special propeller system for added stability, the Space Zeta is a great choice for any modeller looking to extend their flying session with a few fun flights once their fuel/batteries have been exhausted!

£39.99

www.silverlit.com/a/product/space-zeta/

Quick Test

Out of all the small models we have tested for this feature, we found the twin rotor Space Zeta the most difficult to control. But after a while we cracked it – and the many tumbles that it took without sustaining damage proved that this little chopper is really robust!

As with the Nano Falcons the trick is to get it up and out of any ground effect turbulence as quickly as possible. So just zip it into a waist high hover and let the the clever stabilisation inherent in the clever rotorheads, originally designed by Alexander van de Rostyne for the Silverlit Picoo Z, take control of keeping the model stable. Try to resist touching the right hand flight direction stick as any attempt to do so whilst climbing will start the heli rocking in an alarming fashion. Then, as with the Nano Falcons, simply yaw it until it is facing the direction you want to fly in, release the stick and only then push forwards (or back) to set it on its way. Persevere with it as you'll soon master this special flying technique.

Antex TCS50W Digital Soldering Iron

If you're in the market for a new soldering iron and are looking for more control and precision, the TCS 50W Digital Soldering Iron from the trusted UK industry veterans, Antex might be just what you're looking for.

This soldering iron is part of Antex's 'Precision' range and comes with a multitude of features that you'd expect from the higher price bracket. The main and most obvious selling point of the TCS 50W is that the operating temperature can be adjusted between 200 – 450 degrees Celsius via two easily accessible buttons on the tool itself. The temperature is represented on a digital display right next to the controls.

The TCS 50W also boasts an ergonomic design for your comfort, as well as a 1.5 m burn-proof silicone cable fitted as standard. It also features an iron plated, nickel coated, easy-change shimmed bit designed for long life; each tip has up to 30,000 operations lifespan and there are nine different replacement tips for this iron in Antex's range.

Voltage: 230 V
Temperature: 200°C - 450°C
Power: 50 W
Fitted Bit: 1100 (2.3 mm)
Cable Type: 1.5 m silicone with UK plug

The TCS 50W Digital Soldering Iron is available from Antex stockists. It can also be purchased directly from Antex's website:

£69.99

www.antex.co.uk/soldering/precision-range-soldering-irons/tcs50w/

Quick Test

Why use a temperature controlled soldering iron? Most modellers will have an unregulated soldering iron in their tool kits, but these can heat up to way beyond the melting point of the solder being used, especially when left plugged in for any length of time. A temperature controlled iron can be set so that it heats up to just beyond the solder's melting point but is then prevented from generating excessive heat that could damage either the soldering pads or tracks of a printed circuit board. A lot of the small surface mount components used in modern devices are also sensitive to high temperatures and can be easily damaged by holding an over-temp iron on them during soldering. The solder joints will also be of better quality when the solder is used at the correct temperature.

Traditional temperature controlled irons are quite clunky, being connected to a hefty base unit that contains the circuits and components required. But this new digital 50 W iron from Antex is no bigger than a traditional plug-in iron, as all the temperature control circuitry is contained in the slim handle. The temperature is easily controlled using the two up and down buttons, and the target temperature is easy to see on the clear LCD display. The display can also be changed from Centigrade to Fahrenheit to suit personal preference.

Our sample iron was supplied with a punched metal plate stand and a fine 2.3 mm push-on bit. This bit is good for more delicate R/C soldering tasks such as re-attaching broken wires or soldering up small connectors, but a bigger bit will be required for larger jobs. However, with a range of nine optional tips there is plenty of choice. An optional safety stand is also available, which includes a sponge that can be wetted to provide a wipe clean area for the tip when in use.

Immerse VR Headset

Immerse is a VR (Virtual Reality) headset that allows you to watch VR optimised videos from the web, as well as play games and use apps that make use of this emerging technology.

While the likes of 'hardcore' VR headsets such as the Oculus Rift and Sony's Project Morpheus are aimed at gamers, Immerse takes a different approach, using the headset as a surround for a smartphone. This makes it a much more affordable piece of hardware for those who just want to 'play around' with Virtual Reality or are only interested in the video side of things.

At £29.99, Immerse is of a comparable price to its rivals but also boasts the ability of being compatible with most modern smartphones, as opposed to just one or two brands.

The Immerse Headset is compatible with a multitude of apps and other free or inexpensive content, which makes it an ideal Christmas or birthday present. It's also adjustable, so there are no glasses required.

£29.99

www.thumbsupuk.com/Products/Immerse-_Virtual_Reality_Headset

www.immerseheadset.com/

Quick Test

We were hoping to use this headset to provide an FPV style view of some aerial videos that we had taken in the last year whilst reviewing some models equipped with small cameras, mostly quadcopters. This would require the use of a phone app that could convert video to SBS format (Side By Side), so providing two simultaneous views that could be viewed through the goggles. However, we were unable to find an app for our iPhone 4 that could do this, although we did find a couple that required a more modern smartphone, the most popular of which is Google Cardboard. An intensive search led us to 'Homido 360 VR', which allows you to record video in SBS format; this should work, but only if you are brave enough to take your phone for a ride in a model!

We were surprised to find that SBS video is not more widely supported by video player apps, but we still enjoyed using this headset, if only to view 3D film trailers, of which there are many to choose from on the internet.

THE LIGHT FANTASTIC

Kevin Wesley's Nieuport 'Be Be'

The Light Fantastic was possibly the most popular of the regular features in Quiet & Electric Flight International magazine, one of our sister titles, which has now sadly ceased publication. So we are pleased to welcome Chris Golds as he makes the jump over to RC Model World to continue his recollections as an RAF pilot, followed by a gallery of readers' models.

Little Yellow Bird

On Friday 11th September 2015, Lauri and I were harvesting the crop from our Bramley apple tree and a large carrier bag from the Dogs Trust made a fine hod to put the apples in, as we clambered slowly from branch to branch. The bag is bright yellow and in no time it was covered in insects of all sorts, just as if the yellow was an attractant. BLING!!

I was back into 1952 (I think!) and I was an Air Training Corps Cadet on a visit to Farnborough on one of the show's weekdays. A kid in a toyshop described me accurately as everywhere I looked wonderful shapes adorned the concrete – and you could walk and touch almost all the aeroplanes gathered there! Right in front of me was the tiny triangular Boulton-Paul P111 delta VT935, painted bright yellow with a small amount of black trim and – guess what? – it was smothered in Daddy Longlegs (crane flies), and I really do mean SMOTHERED in them. Sufficient anyway for the memory to pop up now, some sixty-three years later! **RCMW**

Let us begin this month with a call from our Paris correspondent Bernard Dereudre. He shows us an RF4 Fournier, a scale powered glider that was built by his friend Jean-Paul, who had the misfortune to lose his house in a massive fire, with everything gone, including all his models, tools and kit – but not the Fournier! I flew a real RF4 on the day after the R.A.F. Chivenor Air Day in 1969 when I helped the owner to push his aircraft out from the hangars onto the dispersal strip. As a reward, "Would you like a trip in it – solo, of course?" Before he reconsidered his kind offer I was airborne and I thoroughly enjoyed it, though it floated and floated and FLOATED, until I eventually found a lever marked 'Spoilers' and managed a semi-decent landing. Thank you Bernard; please send our best wishes to Marcelle and also to Jean-Paul. The RF4 is 3 metres span, weighs 8 kilos for an E POWER motor running from 8S LiPo 3700 via a 100 amp ESC

We now see two more photos of John Ranson's excellent D.H. Venom FB-4 from a kit by Mick Reeves. I saw it live when John flew it at the Bob Mahoney Memorial Day at Middle Wallop on Sunday 9th August 2015. A very scale model and flown at a scale speed. And in my XI Squadron colours too! Thanks John

Let us away to the South Seas, to Auckland in New Zealand to be exact, where we see Gerry Glover's build of my E.E. Canberra B(I)8 for twin 90 mm EDF units. Thanks Gerry, we look forward to seeing her finished and flying

David Jowers of Ipswich has appeared in LF before now and this time he shows us a bit of the past, in the shape of a Mini Robot, which he built from a free plan (Traplet Plan MW3637). Span 36½ inches, weight 17 ounces, E Max motor CF 2822 turning an APC 6x4 from a 3S 1300 LiPo. A great little performer with plenty of power, it could be flown effectively on just 2S. Thanks David and I like the comment about Bell's falling-over water!

I just could not resist yet another shot of David James' Fairey Gannet, this time with gear, flaps and 'ook down to land. Thanks, David

Al Torrance calls once again from South Africa, this time with a vintage Classy Class C Glider, enlarged and fitted with a small outrunner. Flies well and slowly, which is appealing to me more and more these days! Thanks Al, we look forward to some flying pictures

I have seen a lot of Bob Partington and his D.H.2 this summer and I am amazed just how stable she is and how well she performs. So here is another one that I cannot resist

Another vintage bi-plane fanatic is Kevin Wesley and he shows us his build of a Nieuport 'Be Be' from a Peter Rake plan, which we've also used as our introductory model this month. She spans 42 inches and weighs just 40 ounces for her BRC 2217-8T motor running from a 3S 1600 LiPo. And she looks delightful both on the ground and in the air. Thanks, Kevin

Adrian Smith from the Clacton Model Flying Club has electrified his build of Mike Keay's I.C. sportster called Goldie (Traplet Plan MW3123). Originally for a .40 glow, the model now sports a Purple Power 3542 1000 motor running from a 3S 2200 LiPo via a 50 amp ESC. The model weighs 60 ounces, which is the same as the IC version, so performance should be quite adequate. Thanks Adrian, we look forward to some flying photos

Guy Clapshaw from New Zealand is well known in aviation circles and he gets to meet all kinds of aviators. One such is Charlie Huke, ex-R.A.F. and E.T.P.S. Guy was asked by a flying friend to give Charlie a check-out in his own Percival Proctor G-ADPP, which he did to enable Charlie to air test another Proctor, at the time in re-build. Guy also shows us his model of his Proctor, which is decorated in the colours of Jean Batten's record breaking aircraft. Thanks Guy, the Proctors look fine; you are lucky to have them both

Our own Front (or is it Rear?) Admiral Steve Cheyne flies big stuff for BA and regularly goes out to the East where he can lay his hands on all sorts of exciting ARTF models. He shows us his latest arrival, that being a Canadair CL84 Tilt Wing experimental aircraft, which was a joint US/CAN/UK project of the early 1960s. Being Steve he had to embellish the basic model and added retracts, stub wings and a full paint job to produce a fascinating and completely practical tilt-wing model. Thanks, Steve and please pass our best wishes on to wonder boy and tell him to slump in his T45 seat!

Many thanks to all those who contacted me about my Scottish Aviation Twin Pioneer C.C.2. She has now flown three sorties off the grass at Middle Wallop on Saturday, 26th September, 2015 (my 234 Squadron reunion weekend) but tipped onto her nose on landing. No damage, just untidy! The model flies really slowly under full control and I am very pleased with the slats and flaps combination. She will soon become a 124 inch span plan for Traplet. So what is next? Well it is large, light duck-egg green and hopefully very lightweight. Be careful, there were similar colour schemes in that family!

Barry Larkin lives in my part of Devon, namely in Berrynarbour near Ilfracombe. He shows us a recently liberated (nicked back) Veron Fokker D VIII kit, which he gave away to a chum in the 1970s. Originally for IC, this model can and will be rebuilt, but this time for EP and we look forward to seeing her re-born and flying. I suggested to Barry to employ a live axle (where both wheels are locked to the axle and the axle turns in bearings) because the D VIII has very poor ground manners otherwise. Thanks Barry, I have now retired from Marwood

CONTACT

Chris Golds, Hideaway, Lower Loxhore, Barnstaple EX31 4SX
Tel: 01271 850456
Email: chrisgolds@loxhore.org.uk

FLYING TOYS LTD
www.flyingtoys.com

FLYING TOYS LTD
Units 7-9 The Vanguards, Vanguard Way
Shoeburyness, Essex SS3 9QJ England
Tel: 01702 295110 Fax: 01702 294640
Email: sales@flyingtoys.com

INDOOR FPV

Indoor FPV? Yes, no or simply just why? John Stennard gives us his thoughts

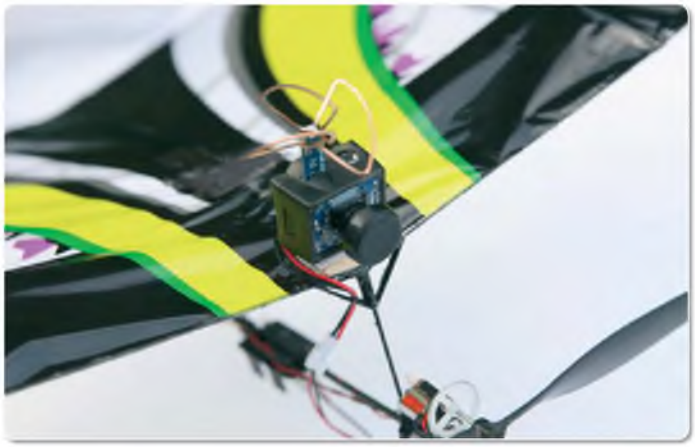
The essential Fat Shark goggles with camera, battery and charge lead

I'm talking here about whether indoor FPV is a big step forward for mankind. And perhaps it makes sense to start with 'why' before making any decisions. My early experiences with outdoor FPV were not particularly rewarding. I seemed to spend a lot of money for little return and did not find the goggle experience particularly satisfying. Then along came the Parrot AR. Drone, which offered both an indoor and outdoor performance even though the control and camera view were through a device rather than a traditional Tx. The second version of the AR. Drone also had a GPS option, enabling enhanced flying to be enjoyed. The performance indoors was always excellent, aided by the superb hovering stability.

My next optical adventure was with a HUBSAN Spyhawk and while the image had to be viewed on a screen the control was via conventional sticks. HUBSAN later released goggles for use with this model. I certainly had never considered the possibility or practicality of indoor FPV with goggles and when the E-Flite UMX FPV Vapor was announced my FPV desires were resurrected. E-flite's 'Put yourself in the pilot's seat' and 'Grab-and-go FPV fun' hype was certain to attract me and it did! The FPV Vapor was closely followed by the FPV Nano QX quad and the 'FPV ready' Hobbyzone Sport Cub, all perfectly at home indoors.

This camera is really tiny, as shown when held by my fingertips

My original Vapor fitted with the mid-wing camera mounted on a 0.5 mm ply plate supported underneath by two balsa triangles



The camera was soon moved to the front of the wing to give a better view

Again a 0.5 mm ply plate with micro Velcro fastening was used for mounting

Early Disappointments

As a very committed and regular indoor R/C flyer my eagerness to try out indoor FPV led to some early disappointments. With a perfectly good original Vapor and Night Vapor in the hangar it seemed a bit pointless to buy the FPV Vapor and a better option seemed to be to buy a Fat Shark Teleporter V 4 goggles and Ultra Micro VA 1100 camera package and fit the camera to one of my Vapors. With the goggles and camera checked out I decided to use the Night Vapor as the camera plane. It had been used for EDF Vapor Jet experiments so I took off the EDF unit and replaced it with the geared unit as used in the P-51. Although this was going to make the camera equipped Night Vapor heavier I reasoned that the extra power would be useful. In my enthusiasm I neglected to consider that as there would be no increase in wing area I really should have been keeping the model as light as possible.

My experiments led me to buy the BNF Vapor FPV

Although I had looked at the camera position on the FPV Vapor I decided to fit the camera over the C of G position rather than on the wing leading edge. Initial flights with the camera in place but not using the goggles were generally unsatisfactory. Although the motor gave plenty of power the airframe was being stressed and the wings flexed alarmingly. The airspeed was too high to be comfortable and I decided I would not be happy flying it in FPV mode.

I now looked at the original Vapor and with its lighter overall weight it seemed more suited to an FPV conversion. The camera was mounted in the same position on the wing and this time, after a few trimming flights, I had some fairly successful FPV flights. I soon realised why the camera was mounted on the leading edge and transferred it to this position. The image from my original position on top of the wing did not give enough view of the ground and this is required for an additional reference when piloting.

Flying in this mode was definitely easier but I then had a chance to view an FPV Vapor. The obvious differences, apart from the camera position, were a transparent prop and a lighter camera. The camera had no casing and was held firmly in position using a plastic mount that screwed to the wing leading edge mounting. The clear prop does not seem to be essential as I found that the standard black plastic prop did not interfere with the camera image. I was sufficiently encouraged by my moderately successful FPV attempts with the modified Vapor to purchase an FPV Vapor. There was some logic here as I would then have a 'spare' camera to fit to other models and, of course, I had needed the goggles anyway.

The camera is firmly fitted into a clip mount on the wing leading edge

The specially 'stripped down' camera on the FPV Vapor

Once you have tried it with the goggles, Vapor flying will never be the same again!

Hooked On FPV

The FPV Vapor has been very satisfying to fly and I was now thoroughly hooked on the idea of indoor FPV. Initially without using the goggles I trimmed out the FPV Vapor to fly on throttle and rudder with absolutely minimal elevator input. This means that the model is flying quite slowly at a moderate high alpha angle. Initially I gained confidence in the big sports hall and then found I could fly the model easily in our 'one badminton court' Community Hall. Using an E-flite 150 45C LiPo the flight duration has been over four minutes. Flying with a gaggle of other Vapors is quite exciting as one occasionally gets in the middle of a group and some 'up close and personal' situations arise, which even with cruising Vapors increases the pulse rate.

Buoyed up by the experience of indoor flying with the FPV Vapor I saw that E-flite had produced an FPV Nano QX quadcopter. I had already flown a standard Nano QX so I knew that this was a very stable and easy to handle model. At just 18 g (0.63 oz) the FPV Nano QX is only marginally heavier than the non camera equipped version and the camera is neatly buried in the hull. The lens is just visible at the front but of course the antenna makes it obvious that this is the FPV version. This model uses the same 150 45C LiPo.

This quad includes the SAFE (System Assisted Flight Envelope) technology feature. The instruction manual is very complete and covers setting up whichever Tx you are using for flying, switching flight modes between 'stability' to 'agility', dual rates and even expo. I spent some time test flying the FPV Nano QX without the goggles to get the model into as stable a hover as possible. Essentially I wanted the FPV Nano QX to take-off and enter a perfectly stable hover just using the throttle. As I soon found, this needs a certain amount of faith when using the goggles! The 'agility' mode proved far too lively for general small space flying.

The Nano QX FPV offers a new challenge! The camera lens projects from the 'nose' with an antenna head dress

Once I felt happy with the trim it was goggles time and a steep learning curve. Even in our big hall I initially found it extremely hard to actually hold the quad in position at a steady height. Constant minute throttle adjustments seemed to be required and I could feel the sweat breaking out! The issue is that the restricted view from the camera makes it difficult to hold a position; you have to be extremely aware of any roll, pitch and yaw movements. Without the 'big picture' to view I found it hard to stay in contact with the model.

However the old adage 'practice makes perfect' comes into its own on these occasions and a lot of airtime was devoted to just hovering and holding a position. After gaining the confidence to just 'go for it' when taking off and then some careful stick work I began to feel in charge. Cautious use of yaw followed this success then gradually some pitch was included until I began to feel I had cracked it.

From this hesitant start I'm now flying around the pillars in the Community Hall lobby and thoroughly enjoying being in the pilot's seat. Flying higher, further away and faster will be my next goals – nicely challenging and great fun!

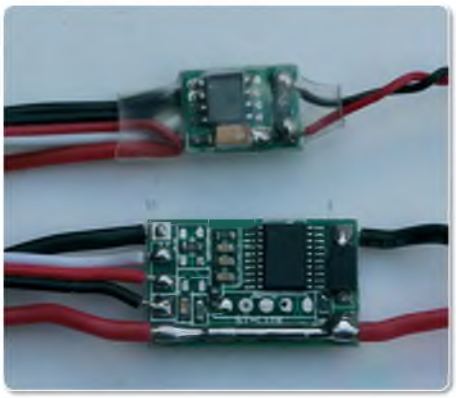
Plane Crazy

So with two models flying well indoors and a spare camera I saw two possibilities for FPV on some more indoor models The first was to fit it on a Hobbyzone Sport Cub S, which is 'camera ready', and the second was to modify my Double Helix biplane to take the camera. The Double Helix had proved to be a very stable and easy model to pilot and this is a good recommendation for an indoor FPV aircraft. Both ideas appealed so while waiting for the Sport Cub S to arrive I started work on the Double Helix.

The camera fitted neatly right on the nose of the model so the conversion looked easy and then a disaster occurred. Somehow while fiddling with the Rx module – a 4 ch version with an integral ESC – I managed to blow the ESC. Fortunately the Rx module has standard micro connectors as used on an Orange 4 ch micro Rx, so I replaced the original unit with one of these and was able to get the rudder and elevator working perfectly.

A problem, however, lay with the brushed ESC. Brushed micro ESCs for 1S LiPo operation are actually few and far

The position of the prop makes the Double Helix ideal for safe indoor flying



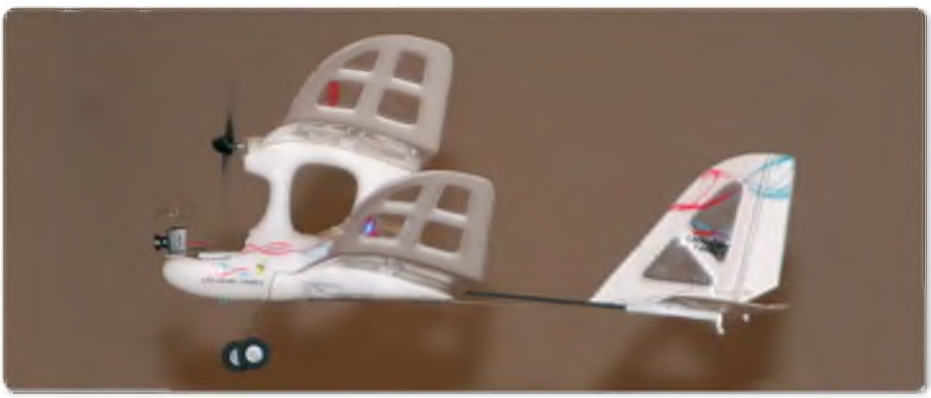
The 3 A brushed ESC was too small but a 5 A works fine in the Double Helix

The nose mounted camera gives a superb forward view

Open up the top of the cub and the Y-lead for the camera is exposed and ready to use

Sport Cub S is a full four channel model with plenty of indoor/outdoor potential

Very smooth control responses make for easy flying with or without FPV (more fun with though!)



Double Helix has proved delightful to pilot, even in our small hall

between but I eventually found a 3 A version in a web warehouse. After a power lead connector change this was installed but I was in for a disappointment. The 3 A output from the controller was not sufficient and the motor cut at around 2/3 throttle. After another web search I located a 5 A ESC, although it was slightly larger, heavier and would require all the leads to be changed. Stripped down and with the new leads this ESC weighs just 5 g. This ESC solved the problem and now I could get full power and the FPV Double Helix was ready to fly.

The basic Double Helix is a really nice model to pilot. It's a bit faster than a Vapor of course but is easy to handle. While the biplane format provides more wing area the flying weight of the Double Helix complete with camera was 47 g (1.66 oz), compared with 24 g (0.84 oz) for the FPV Vapor. My standard original Vapor weighs 15 g (0.52 oz). Flight tests with the camera in place but with no FPV working showed, as anticipated, the Double Helix to be quite nose heavy. As the pushrods had trimming provision I was able to correct this and soon had the model flying well in a flight mode similar to the Vapor.

The Double Helix has proved to be an excellent indoor FPV model, although both faster and more responsive than the Vapor. I was pleased that I had gone through the FPV Vapor indoor experience first as this had prepared me for a faster model with a different flight pattern. The nose mounted camera gives a different picture to the wing leading edge mounted Vapor camera and therefore a different flying experience. The nose camera of course gives an excellent unobstructed view as there is no prop in front.

While going through the ESC problems the Hobbyzone Sport Cub S had arrived and proved to be a really sweet model. This aircraft has ailerons, rudder and elevator and includes the SAFE technology. After carefully cutting out the film from a circular opening on top of the wing, the connector for the camera can be withdrawn. The camera itself can be held in position on the leading edge of the wing with Velcro. The Sport Cub with camera attached weighs 57 g (2 oz) but it does have a 610 mm (24 in) wingspan plus AS3X assistance and SAFE, so what can go wrong?

Of the four models the Sport Cub will be the obvious choice for calm weather outdoor flying. However it was originally purchased with indoor FPV in mind so I went through the same routine of first flying her indoors in our big venue with the camera in place but not using FPV. The Sport Cub proved to have a lively performance with quite a wide speed range and easy handling, and this was obviously reflected when using the goggles.

Flying FPV indoors at higher speeds is more dramatic and obviously one has to really concentrate even in quite a large hall. It's certainly exciting but I was really glad I had gone through the FPV Vapor trainer and Double Helix intermediate models before getting to the Sport Cub. Although a different 'feel' my time flying the FPV Nano QX has also done a lot to help me gain confidence.

Question Answered

'Yes, no, why?', was the original question and the answer for me is a big YES! The initial cost of the FPV gear and the models has been well outweighed by the pleasure I have gained by firstly accepting the challenge and secondly the added 'piloting' experience. I'm now really looking forward to some outdoor FPV flying with this set up in calm weather conditions. With the easily transferable camera the possibility of fitting the camera to other small models is always there. With a slightly larger model the camera could be powered by its own independent one cell LiPo, which would give longer flight durations. I'm sure the Sport Cub could easily carry the extra weight.

One feature of this FPV system that I have not mentioned is the ability for it to be set for 'pan and tilt'. The Teleporter V4 FPV headset includes two axis digital head tracking that senses your head movement to deliver an even more immersive viewpoint. This feature gives a smaller image but then rotating or tipping your head gives a sideways and up and down view. I did not actually find flying with the smaller image helpful indoors when one is concentrating on avoiding walls, the ceiling plus lighting bars, etc! However, I am sure it will add to the piloting experience when outdoors.

Pilot's Notes

It did not take long to land the FPV Vapor heavily enough to detach the prop. Unfortunately this usually, as it did in this case, means a broken propshaft. These are only 1 mm diameter and very unhelpfully break off inside the prop, thus requiring a new prop and shaft. Shaft breakages are a common occurrence and is confirmed by the fact they are sold in pairs! I could not find any transparent props anywhere and could not get the broken shaft out of the prop so I fitted the standard 140 x 40 mm prop.

After many more flights the performance seemed to be declining and I suspected that the coreless motor was slowing down. The FPV version does weigh around 60% more than the original Vapor but has the same motor/prop so a higher throttle setting is required throughout the flight. Another on-line trip produced numerous sources of spares and I ordered two just in case. I also noticed that the actual gearbox was showing signs of cracking apart and the new one I purchased included a shaft and gear.

While doing these bits of maintenance I decided to see if I could get a bit more power by using a different prop. A 140 x 70 mm prop is used on a number of E-flite models but has a 1.5 mm hole. I found that I could bore the hole out slightly using a suitable twist bit in a pin vice and glue in a short length of plastic tube with a bore of less than 1 mm. This then screwed easily onto the 1 mm threaded propshaft. There is no doubt that this improves the climb rate of the FPV Vapor and did not actually seem to shorten the duration.

A final test was done with a Sukhoi prop (PKZ3502), this is a 160 x 70 mm prop with a 1.5 mm hole so needs adaptation. The problem with this large prop is that it is not possible to do a ROG take off as the UC is too short. This meant that I had to hand launch and then land carefully. The performance however was excellent with more 'power on demand' and a more flexible flight performance with no apparent deterioration in the duration.

Finally, I had a lead and a camera problem. A lead came off the power Y-lead and this required a replacement connector to be soldered in place. The camera problems were also lead based; firstly one of the leads came off the VA 1100 camera I was using with the Helix and Cub S. To fix this I had to remove the back of the plastic casing and do a tricky bit of precision soldering. With the camera working again, on my next trip out the other lead came off; these leads were unsupported. After soldering both leads back in place I have supported the wires with a blob of glue from a glue gun so hopefully they will not detach again and the camera is working fine. Wires coming off like this are very frustrating if you are all set for some interesting FPV flying. No doubt there will be other glitches but these are minor incidents compared to the satisfaction to be gained from indoor FPV.

Camera blues. The wires should stay on now!

My secret quad. Am I ready for inverted FPV? We shall see!

Secret Research

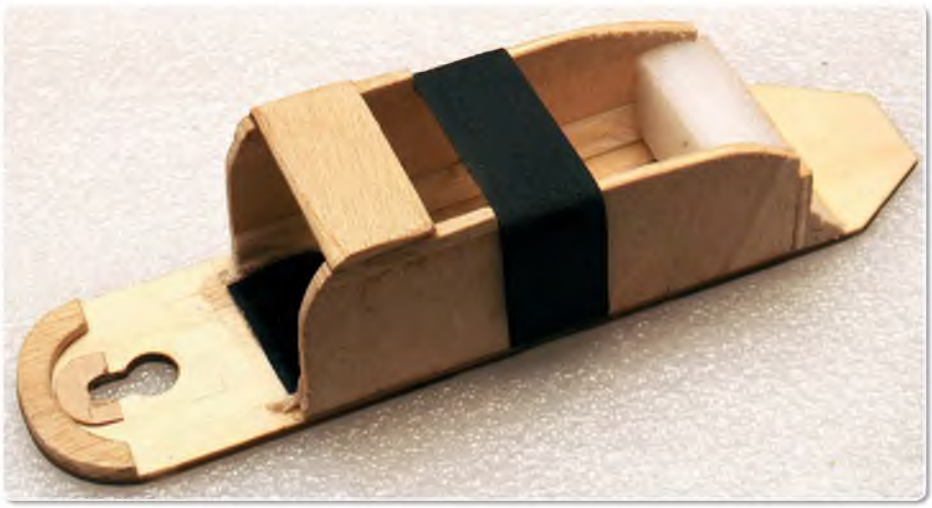
I have been flying the Nano QX 3D and really enjoying its 'aerobatic' performance. The ease with which you can 'flip' and fly inverted is amazing. Not only does it offer these manoeuvres but it is extremely stable and can be flown really fast if required. A thought came into my head when detaching the FPV camera from the Double Helix; what if the camera could be fitted to the Nano QX 3D? A quick investigation showed that with the hull removed the camera could be fitted to the battery holder virtually dead over the C of G.

The next job was to solder up a Y-lead to supply the camera as this has a different connector than the power lead. A Velcro fixing was soon in place and I quickly found that the Nano QX 3D not only flew perfectly with the FPV camera on top but performed just as well inverted! The challenge now is to test out flying FPV inverted. Watch this space, if you see what I mean!

RCMW

BUILD A BETTER BATTERY BOX

With a nod to Ralph Waldo Emerson's famous quote, Chris Bowler builds his first 'proper' electric model and seeks a practical modification to retain the chunky flight pack



The original completed battery holder

Rear support faced with foam and reinforced with triangular balsa

Electric Flight? Moi!

The universally accepted ribbing that occurs on any flight line between longstanding modelling colleagues is part and parcel of the club R/C scene. Acerbic wit seems to be a hobby pre-requisite and I'm certainly not immune to various comments.

Recently it has been along the lines of getting me off the 'methanol and I/C addiction' and trying this new-fangled electrickery stuff.

Being a mildly stubborn sort, I have resisted stoically. But there has been a proliferation of electrics in the club lately and I must admit to being impressed by the performance of some of them. It's the constant drip theory that wears away resistance...

And So...

It has to be said that I have (in the line of duty, you understand) tried an EDF, a small Waco and a foam ASK 21 electric soarer. All worked well and a couple of them still do. But somehow there wasn't the same 'feel'.

A longish spell of rubbish weather meant I had done all the checks and maintenance on the models in the shed. So while I had time on my hands I went to see Jan at Swindon Model Centre and had soon handed over cash for an ARTF Wots Wot.

Yep 'coz it is a biplane, and because I had three batteries that just might be OK for it! A motor was ordered, smaller than the one recommended, but judged to be OK for mild aeros and stooging about. It was a bit of a stab in the dark, but after some advice from friends the set up was deemed feasible.

Modification

The model is superbly packed, and while this not a review it is worth stating that everything fitted well. I did change the wheels for slightly larger diameter ones, but other than that, I built it as per instructions and a really smart model emerged.

2200 mAh battery in place. Note top brace and fabric fastening

Original battery box in place. Note screw retainer

Replacement holder with different shaped sides

Self-adhesive fastener on battery and base to keep it in place

Doubler on the front makes insertion and removal easier

A new, slightly larger battery in place with strap

New battery holder needed the front to be raised slightly

The suggested battery retention system consisted of a flat ply plate on which the power pack sat, retained by tape and a tongue that slotted into a former in the fuselage. I gave this a bit of thought and decided to make a battery holder from 3 mm ply that might be easier to use.

The batteries I had were 2200 mAh versions, so they were measured and a box constructed using the original flat plate supplied in the kit as a base.

It has a rear ply upright supported by a piece of triangular balsa, faced with a thin piece of foam and sides from the same ply.

It didn't take long to take shape using cyano glue.

Self-adhesive Velcro patches were attached to the sides to accept a strip that went over the battery to hold it in place.

Retention of the plate front was effected by a slot that fitted over a screw and then pushed into place. I found it just a tad fiddly to remove. To correct this, I made a doubler to fit the semi-circular front-end, so that I could just use a fingertip to insert and remove the whole thing.

That was that, so it was time to fly.

First Flights

The C of G was checked with the battery in place (quick learner, eh?), tranny switched on, throttle at minimum and plug in.

I should point out that all had been thoroughly tested in the workshop first! Amazing how much dust is stirred up with a quick burst of electric power, isn't it?

After the musical interlude from the ESC, all seemed well.

Out on the strip the model was opened up and away it went, climbing well. Throttling back, a longish cruise was established at about half throttle. A bit sedate but exactly what I was expecting.

I flew a few rolls and a loop, plus a couple of stall turns and after what seemed no time at all the motor appeared to slow. So I landed and checked everything over, which seemed fine except for a missing battery hatch cover.

One big plus was the still clean model. I flew the other two batteries out and went home quite chuffed, but I couldn't fly again without the cover.

Hatch Catch

After the magnetically attached hatch came off somewhere in flight, never to be seen again, a 'mod' had to be done.

A new one was fashioned from 3 mm ply to fit, which it didn't. The frame holding the magnets fouled the lid. I decided to cut these away and retain the magnets. This allowed the new hatch to slot into the fuselage with a 'tongue' locating it in place at the back. Two hardwood pegs (spares from self-assembly furniture!) were made for the front retainers and glued in where the front magnets had been. A hole was drilled in each to accept R clips. Two holes

Final version with glassed reinforcement. It might get a coat of paint one day!

R pins securely held by magnets. It's easy to lose them otherwise

Modified hatch cover being slid into place. Magnets let into the wood stores the R clips when changing batteries

The tongue on the new hatch cover slots into the fuselage

Hatch held in place with R clips in pegs

were opened in the front of the new hatch to fit to the securing pegs. The magnets were let into the hatch cover to keep the R clips in place when changing batteries. With the hatch in place the R clips were pushed into the holes in the pegs and, hey presto, I've now got a good job that won't blow away!

Recharged as per instructions, I set off and did it all again the next day. A club mate was there and after he had recovered from seeing me with an electric model he wanted to see it perform. So we did, and all was well – no trouble. Except that my rather old batteries were a tad hot to the touch. And they seemed to be a bit 'fatter' on landing... After reading a few 'LiPo Horror Stories' a decision had to be made.

Economical?

Absolutely – two days, six good flights. What's not to like? Overworked old batteries, that's what!

A decision was made to upgrade them from 2200 mAh to 4000 mAh to increase duration – and that's where the economics went straight down the porcelain saxophone! One was not enough so I ordered four and I waited a very short time for them to be delivered.

Great, slot them in and off we go. Not!

They were, of course, a bit larger than the previous set and to fit them I had to make a second battery tray.

It had to have different shaped sides, with a slight taper to allow it to slot in easily. I copied the base from the original, cut it out then checked the fit. The rear support was not suitable for these longer batteries so it was omitted and a Velcro patch added to the base and the battery to keep it in place, yet retaining removability. The front fixing remained the same and the whole thing was made from 3 mm ply.

This fitted beautifully, except that the retaining screw on the ply plate rubbed the front of the longer battery. Not good. This was overcome by simply adding a square balsa cross-piece to the base to slightly raise the front of the battery. After a couple of sessions I thought it needed 'beefing up' and the easiest way was to simply reinforce the joints inside and out with some fibreglass mat and resin. Effective, but be sparing with the resin to save weight.

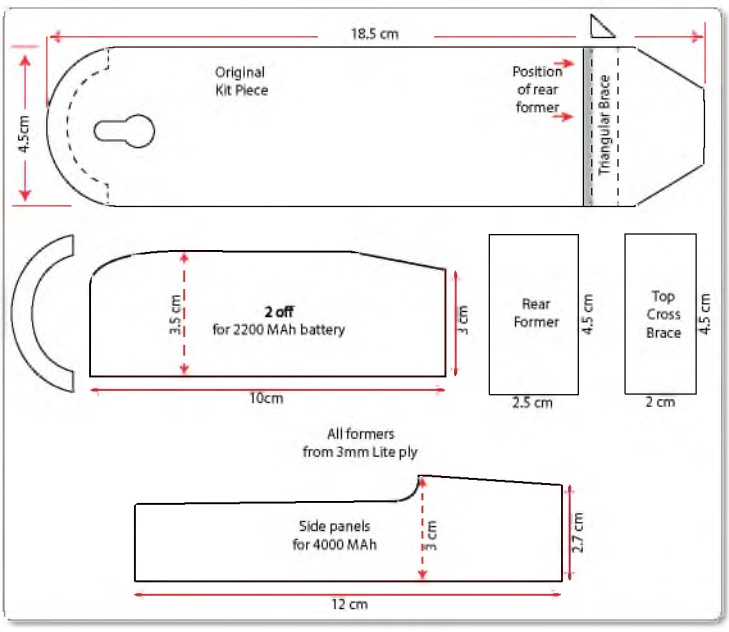
Details are shown on the drawings below.

Next Session

Flights with the new batteries were longer, as expected, and judicious use of the throttle gave an easy ten minutes. On landing the battery was at 36% capacity, which I am led to believe is about right. A further flight with more aerobatics and greater power meant battery capacity reduced to about 20% after ten minutes. I have therefore reduced the Tx timer to 8 minutes, giving leeway in the case of a missed landing for another circuit. The model is now quite lively, but equally stable and sedate when required. It now sports the 4000 mAh LiPo driving a Turnigy 32 motor on a 12" x 8" propeller.

All in all a successful first go at an electric model, though I still can't get used to the lack of feedback from an I/C engine changing note. Time, as they say, will tell. For more fun a more powerful motor would be great, but this was a 'toe-in the-water' for electrics and I tried to do it as economically as possible. Hopefully the four batteries and the trusty Wots Wot will go on for quite a while and give plenty of flights.

So there you are I've had a bash at electrics. Shocking! ***RCMW***



Phillip Kent describes the design and build process behind a long gestation scale project

WACO YKC

FROM FRUSTRATION TO FRUITION

I recounted some of the problems that I was encountering when designing a model of the Waco YKC cabin biplane in a 'Best In Scale' article in 2008. The model was being drawn up from a 24 inch span rubber powered free flight model drawing that had been supplied in a Peerless kit from 1934. This is not a recommended way of drawing out a radio controlled model version for a scale model but I did check the drawings very carefully before going along this route.

I was absolutely amazed at the quality of this small scale model. The 25 inch span miniature was most sophisticated, using a scale wing section and incorporating fittings such as landing lights, control horns and a venturi tube. The structure was in fact very similar to a modern scale free flight model structure, with the wings and tail unit built directly over the drawing on a flat board. The fuselage construction, however, was rather strange but obviously not impossible.

The fuselage formers were made up of several sheet balsa pieces that had to be assembled first. Two 1/16th square balsa stringers were then marked out with a soft pencil showing where the formers fitted looking at the side elevation of the plan. The formers were then cemented in the correct order to these stringers, both at one time, from front to back. It was suggested that fine needles, pins and rubber bands be used to hold them in place until dry. A second stringer was then added to each side. Stringers had then to be added each side until the fuselage was complete.

It is always difficult trying to build a model in your hand and later in the 1930s a construction method was developed based on centre line keels pinned to the drawing, with formers fitted and then the stringers. The half shell was then removed and another set of formers added and then completed with stringers.

Car Friendly

My first priority was to have a model of the YKS that would fit into my car without having to take it to pieces. At the time I had a Volvo V40 estate and after some calculations I decided that a model of about 1/7th scale would fit through the rear tailgate. The model would come out at about 57 inch wingspan and would be suitable for a 52 four-stroke, or perhaps my trusty Laser 70 that had been most reliable in my Monocoupe 90A.

Rather than scale up the drawings using a calculator and dividers I decided to enlarge the drawing using a

Fuselage framework under construction

professional photocopying machine. Some readers may remember a recent article when I used this technique to produce drawings for the Japanese Aichi Val dive bomber. In 2008 the drawings were not enlarged digitally and some errors could – and did – creep in. However, if you use this technique for scaling up drawings with modern digital equipment you should have no size problems at all.

I next had to work out a structure for the model but this proved to be less straightforward than I had anticipated. The fuselage was causing most of the problems. At first I thought that the crutch method of fuselage construction would be best, but this became a non-starter when it came to attaching the wings.

I eventually decided to look at the construction of the full size aircraft. This used a simple tubular steel box that was filled out with formers and stringers. Things became much easier now and a strip balsa box that took the stringer line under the windows, and then a lower stringer line for the bottom of the box, was decided upon.

There was an unexpected advantage in using the box structure. The top of the box was straight and after the two basic sides were constructed it would be possible to build the unit directly over the plan view. A big advantage for getting a true and square fuselage.

There were still one or two design problems facing me and much against my better judgement I decided that the best way to solve them was to get on and build the model. I suppose that it was the challenge but with several still unfinished models under construction I should have known better.

Upper wing box under construction

Rear stringers attached

Waco Wings

Many of the Waco cabin biplanes from the 1930s used a single diagonal strut rather than rigging wires. These struts run from the lower front interplane strut fixings to a point on the top fuselage tube cross member. Having no rigging wires is a distinct advantage for a model biplane, particularly if the model has to be taken to pieces for transportation.

At an early stage I had decided to use a two-piece plug-in upper wing. This feature looks much more realistic and is an essential feature for the larger model. The lower wings were more of a problem; should they be in one piece or two? At the centre section the wings slimmed down in both plan and front view. A two-piece wing would need to plug into a root section that would be complicated and quite difficult to build. For a model of the size that I was contemplating there were distinct advantages for using a single piece lower wing. The wing would have the correct dihedral built in and this would make things like getting the interplane struts to the correct length a much easier task.

Another complication on this aircraft was the wing root fairings. I thought of making them from soft balsa sheet but finished up using a 0.4 mm ply base with micro balloons and epoxy as filler. This worked quite well but I was concerned about the weight.

The top wing uses brass tubes and wire dowels to locate it in place. The wing section changes from Clark Y to a triangular shaped section at the root leading edge and this gave me another problem. The front joining dowel had to fit into the wing at the very front of the triangular shaped leading edge. The photographs should give readers an idea of just where they are fitted and the problem leading on from this of finding a suitable mounting for the brass tube in the fuselage.

I managed to get over this small problem by fitting two 16 swg brass tubes across the fuselage at the leading edge of the triangular section. The tubes were bound with thin copper wire and soft soldered together. The front tube is shorter than the rear one and it holds a 16 swg bent wire joiner that carries the aluminium windscreen bracing tubes. The brass tubes can be seen on the photographs, covered with a piece of split green plastic tubing that would eventually carry the windscreen glazing.

Upper wing mounting. See text for details

The rear mounting tubes and wire joiners were not a problem but it was important to line the wings up accurately before fixing them permanently in place. I fastened the wings temporally in place with small plastic clamps before using epoxy to complete the fixing.

To retain the upper wings I reverted to one of my favourite ways of fixing – a bolt screwed into the ply root rib from the inside of the fuselage. For access I made the door of the aircraft to open. There was plenty of room to fit and tighten the bolts and I could also get at the radio equipment if necessary.

It had been decided that the bottom wings were to be in one piece and would be fastened in place with a peg and two plastic bolts. As stated previously the wing is more complicated at the root where it slims down in thickness and width. There is an upward curve to the wingtip and this was built-in using plotted out ribs, balsa sheet and an outside strip balsa lamination. The structure of the top and bottom wings is basically the same; see the drawing of the section through the ailerons.

Ply ribs for supporting the strut brackets were fitted in the wing

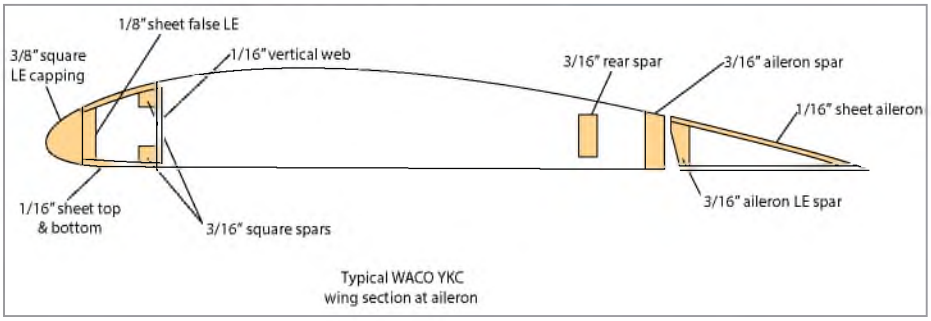
Lower wing centre section under construction

Capping the leading edge on the lower wing

Curvy lower centre section ready for covering

Wingtip showing laminations

There is a hard 1/16" sheet balsa trailing edge with a rear capping, a rear spar that is fitted through the ribs rather than to the outside, and a D box leading edge. The D box uses a false balsa leading edge, and top and bottom spars with vertical sheet balsa webs. 1/16" sheet balsa covering top and bottom completes the D. A 3/8 inch balsa leading edge capping is fitted after the sheeting is completed. A full depth aileron spar is fitted on all four wings; this item also has the upward curve to the tip.



Typical WACO YKC wing section at aileron

Aluminium Undercart

The fuselage was filled out with formers and stringers to give the required shape. The front portion was covered with 1/8" sheet balsa, whilst provision was made for the tail unit at the rear. I do like to fit a steerable tail wheel but in the case of the Waco this proved impossible.

The main undercarriage uses an aluminium blank. I did think about a wire unit but after finding the blank in my parts box I decided to use this. On checking the blank I found that it could easily be modified to suit the Waco by altering the bends slightly and cutting it in two. The aluminium unit did have two distinct advantages; it could be mounted easily on a plywood plate in the fuselage and could be faired in more easily to get the required shape.

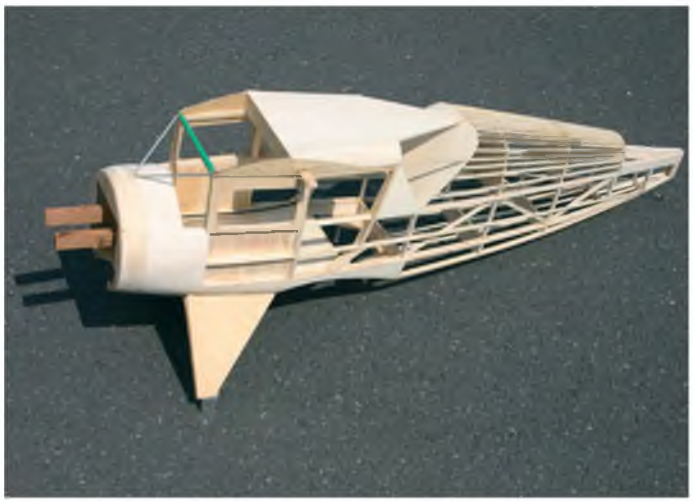
The two tie rods that fit from the centre of the fuselage to the legs were made from piano wire. They use Mick Reeves fork ends at the fuselage fitting and are a sliding fit into brass tubes at the undercarriage leg end. Springing relies upon the flexing of the aluminium legs and the wheels, the tie rods sliding free in the brass tubes.

Servo Installation

I fitted the servos and pushrods before completing the stringers. I like to use a bell crank to operate the elevator so that the servo is pulling the longer pushrod for up elevator. I use a wire or brass tube pushrod for the shorter length, with either a Z-bend or a soldered on metal snap link at one end. For adjustment a metal snap link fits onto a threaded section at the other end.

It is most important that this shorter pushrod cannot rotate, hence the Z bend or soldered on snap link. Most light aircraft of this period in time used a wire closed loop system for operating the rudder. A similar system is used for the model Waco. A pushrod again drives a crank that carries the operating wires. I tend to make all my own rudder and aileron horns from GRP (glass reinforced plastic) board. This is not difficult and the results look much more realistic.

The undercarriage was adapted from a spare aluminium blank



Fuselage nears completion

Engine And Cowl

At this early time of the build I was intending to use a Laser 70 to power the model. With this in mind the front section was designed to accommodate the engine and tank. This was another area that did not go as well as expected. I like to fit the tank in a fuel proof compartment behind the engine in my designs if possible. The tank would be visible in the cockpit if I did this with the Waco, so it was back to head scratching time!

I eventually found that I could get the tank out of sight by fitting it at 90° to its normal position. That was not the end to my problems though. The engine cylinder head was going to protrude from the cowl and I could see no way of overcoming this without changing the power unit. Work on the model continued, although not as enthusiastically.

A cowl for the radial engine was less of a problem and was constructed using laminations of 1/32" plywood with a balsa front. The photograph shows the basic structure. The blisters for the rockers were formed using a simple mould, plastic sheet and a heat gun. Again the photos of these items overleaf should help.

Cowl formers assembled prior to applying the outer skin

Sturdy wooden engine bearers were fitted to take a Laser 70 four-stroke

Laser 70 bolted in position. The fuel tank can just be seen, mounted transversely across the fuselage

Making the cowl blister patterns from a scrap piece of ply

A finished blister sits on top of the male plug

After heating up the clear plstic sheet the plug is pushed through the matching cut-out to form the blister

A set of finished cowl blisters

The blisters certainly add to the scale effect. A decent dummy radial engine helps too!

Corrugation Street

The ailerons are sheet covered and have to follow the upward curve.

This was achieved using by using a shaped aileron spar that allowed for the thickness of the sheet covering. Stroking the underside sheeting at the tip with the handle of a Swan Morton balsa knife is a good way of generating the curve. This technique is easy to do but it might be worthwhile to experiment with some scrap sheet to start off with.

The aileron sheeting, with the curve at the tip established, was pinned down to the building board. The spar and ribs were glued in position, with scrap packing pieces under the curve. The trailing edge had to be chamfered off and the shape checked before fitting the top piece of sheeting.

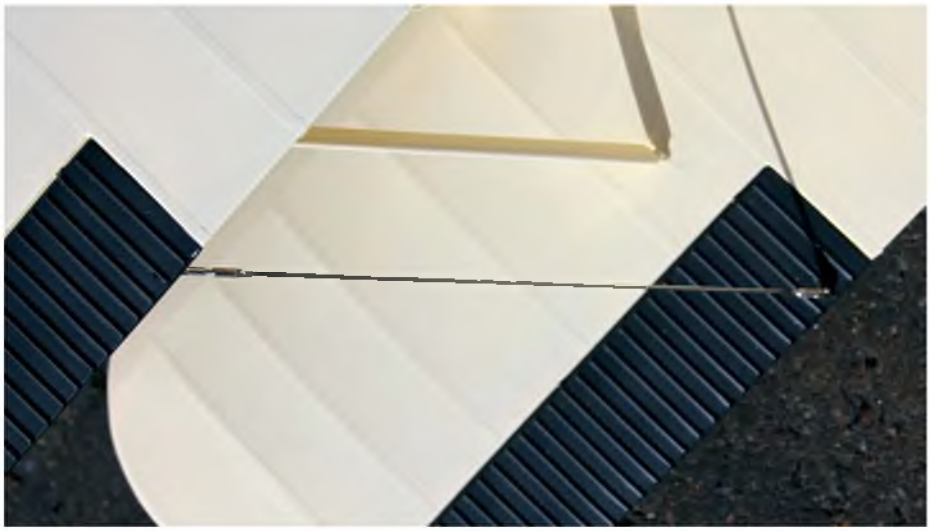
This is not the end of the aileron construction though. Scale modellers will have noticed that many American light aircraft have a series of corrugations on the flying surfaces. The full size aircraft will in these cases be using surfaces that have been fabricated from sheet aluminium. A flat aluminium sheet was not structurally sound and the top and bottom parts of the aileron had corrugations pressed into them to give the required rigidity. The operation was easy to do with simple press tools and was very economical for small runs of components. It does, however, cause the modeller no end of problems.

Over the years I have built quite a number of models that have had corrugated ailerons. On one early model, an Aeronca C1, I made the corrugations from strip balsa. A triangular groove was cut into a piece of beech wood. The groove was made to accommodate the 1/16 inch square strip balsa that I was going to convert to a triangular section. The strip was placed in the groove and I carefully sanded away the excess. The triangular strips were then glued in place on the aileron.

As you can imagine this was a most tedious task and seemed to take forever; there must be a better way. The next model that used corrugated ailerons was another Aeronca, this time a quarter scale C3. Again the crimping or corrugating was of a triangular section. My solution was to use hard 1/8 square balsa for the corrugations

but this time I used my Proxxon circular saw to cut the strip into a triangular shape. I cut a triangular groove in a piece of 1/2 sheet balsa with the saw. The balsa sheet was then placed against the guide on the saw table, with the blade just touching the balsa. I found that I could feed the strip past the blade without any trouble and was therefore able to produce long lengths of triangular strip that could be cut up to suit the ailerons.

This was the intended method of producing the corrugations on the Waco but on a visit to my local model shop I found some small half round plastic extrusions that I thought would do the job better. It is possible to get several different shaped extrusions from the K&S material stands at model shops and this material is well worth considering, particularly for quarter scale models.



Distinctive aileron corrugations were added using plastic extrusions

Struts And Tail

There were still some construction items to take care of. The interplane struts had to be fabricated and attached to the upper and lower wings. The construction was from 16 swg piano wire with flattened brass tube ends that would locate on brackets that would protrude from the wings. False plywood ribs were designed into the wing structure to carry the brackets. I had intended to bolt the struts in place with small bolts and nuts but when it came to fitting them I found that small self-tapping screws worked just as well and were much less trouble to fit. The wire structure is faired with basswood. The lower ailerons would be driven by individual servos with a wire link between the upper and lower ones. The triangular strut was from an aluminium extrusion that was obtained from my local model shop. The top fastened onto a short plywood tongue that was fitted into the wing from the fuselage. The bottom end was filled with a bass plug and fitted over an angled bracket from the wing.

The tail unit was one area that more or less took care of itself. For many years I have used the core method of construction for the tailplane, elevators, fin and rudder. Tail units can be prone to warping and this technique does help to get over the problem. A core, usually from stiff 1/16" sheet balsa for models up to about quarter scale, is cut to the size of the various components. Spars and ribs are added to one side before turning the component over and repeating the process.

When the adhesive is dry the units can be shaped and sanded to the correct section. There was a complication on the Waco; most of the outlines were rounded. A few years ago the designer would have got over this problem by making the outline from pieces of sheet balsa. More recently I have made these outline edges by laminating strips of strip balsa. Originally PVA glue was used for gluing the laminations. This was not the easiest technique to master and with the advent of cyano adhesives most of the problems have been solved.

On the Waco I used three laminations of 1/16" soft sheet balsa. The leading edge of the tailplane was fitted with the unit on the building board after the second set of ribs and spars had been added. I started by fixing the strip at the centre with cyano and then pulling each half round, dabbing the join with cyano until compete. The second and third laminations were added before the tailplane was removed from the board.

The only problem that I have had with laminated outlines is finding balsa that will bend without breaking when forming tight curves. I would suggest that it might be worth trying a thinner section or even using 0.4 mm plywood. Some builders advocate soaking the balsa before starting the bending. I did this when building a Fokker Triplane some years ago but the laminations were from basswood and it was suggested that the laminated units should be dried off in an oven after construction.

The tailplane components of the Waco are all symmetrical in section. I find it easiest to shape one side first and then match up the second one. One thing that tends to spoil a scale model for me is the inaccuracy of the leading and trailing edges. If the full size aircraft uses steel tube for the structure then both will be rounded, not square cut like most ARTF models. Many 1930s light aircraft used wire bracing on the tailplane. To replicate this I tend to use 20 swg wire soft soldered into brass tube that has been flattened where it fits onto the fin or stabiliser. I am getting a little bit ahead of myself here since the rigging wires are not fitted until after the model is covered and painted.

Tail ribs and spars can be replicated by using a sheet balsa core, then adding scale details to one side before turning the component over and repeating the process

Rear view of the completed model showing the balsa core tailplane, upper deck stringers and the curvaceous wings

Going Electric

The Waco was started in 2008 and has just had its first flight in 2015. Why has the model taken so long to build, you might ask? The first hold up occurred when I changed the Volvo V40. My new car, a Volvo C30, could not accommodate the Waco in one piece. Building was put on hold but not before I had worked out that I could get the model in if I removed the tail unit.

A triple heart bypass put an end to building for a while but later a removable tail unit was constructed. This, I am sure, would have worked. It used a one bolt fixing but connections had to be made for the elevator and rudder.

Another car change last year, a Honda Civic this time, enabled me to get the tail fixing back to normal as the model fitted into the car very well. I was still not happy with the protruding cylinder head and having had some success with some smallish electric powered scale models, I decided to remove the Laser and fit a new OS OMA-3825-750 brushless motor.

Construction was now almost complete and the model had been covered. I used Sig Koveral for the fuselage and Solartex for the rest of the machine. Koveral is most useful for models that have a fair amount of sheeting. The covering is attached with dope or Balsaloc, heat shrunk and then clear doped until the weave is filled. I also finish Solartex with clear shrinking dope before using cellulose for finishing. The colour scheme was all over cream with black ailerons, registration markings and trim.

The model was test flown in superb weather conditions in late September 2015. This was some seven years after the model was started but once again it was not a straightforward operation. I had checked everything out the previous evening and couldn't wait to get out to the flying site at Pontefract.

With the model on the strip I did a check through the controls before take-off. I couldn't believe what I saw – the ailerons were not working in the correct direction. I quickly got into the programme display to reverse the aileron servos but then I realised that the rotation of the motor was the wrong way too. Back into the pits and off with the cowl to change over a couple of wires.

After double checking everything I was ready for the take-off. The model tracked straight and was in the air after a reasonable run. I had thought that the model might be nose heavy and this seemed to be the case as I had to hold some up elevator in. The model was also tending to turn left. I did not alter the trims at this stage as I was in no trouble with the model. After four circuits I brought the Waco in for a landing. There were no problems and the model touched down nicely. The short hop had used 12% of my battery capacity. The model was not flown again as I wanted to alter a few things that I could only do at home.

After experimenting with small EP models, Phillip converted his latest scale ship to electric power, building a motor box around the original engine bearers

Cowl showing the patch where the Laser cylinder head protruded. But it was not required for the OS brushless motor

Tail feathers are reinforced using piano wire struts with flattened brass tube ends

A proper scale model build, ready for covering

That blistered cowl really looks the part. And the cockpit framework is a nice touch too

Worth It In The End!

Even though I have only made the one flight I am sure that the model is going to be a fine performer. I had worries before flying about the power unit and the weight of the model but these have proved to be groundless. The OS motor proved more than adequate for the seven pound model. I am looking forward to making more flights in the near future and to getting some flying shots of the model.

Was it worth the wait? You bet it was! I now need to get cracking on some of the other part built models! **RCMW**

A lovely Golden Era aeroplane. Only one flight so far but many more are sure to follow

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LASER 200

More hints and tips as we continue our short series on building the 30 cc Laser 200 ARF QB kit from Aeroworks by installing the aileron servos

Assembly proper of the Aeroworks Laser 200 starts with installing the aileron servos. The instructions on the CD provided recommend Hitec HS-5645 MG servos on all flight surfaces. These are a great choice but we had a set of rather impressive Savöx SA-1256 TG servos available, which fitted the servo cut outs perfectly, so we used those instead.

The specifications for each type are shown below:

Hitec HS-5645 MG	
Dimensions:	20 x 38 x 41 mm
Weight:	60.0 g
Speed:	0.23 sec
Torque:	10.3 kg cm
Gears:	Alumite and MP
Ball Raced:	Yes
Case:	Plastic
Street Price:	£27.99

Savöx SA-1256TG	
Dimensions:	20.2 x 37.2 x 40.3 mm
Weight:	52.4 g
Speed:	0.15 sec (6 V)
Torque:	20 kg cm (6 V)
Gear:	Titanium and aluminium
Ball Raced:	Yes (2)
Case:	Aluminium
Street Price:	£48.99

Picture courtesy of Aeroworks

Vibration Protection

Before installing each servo make sure that the rubber grommets supplied are fitted to all mounting positions – and the correct way around! As you can see here it's obvious when they are not fitted correctly. They should be a perfect fit in the mounting lugs

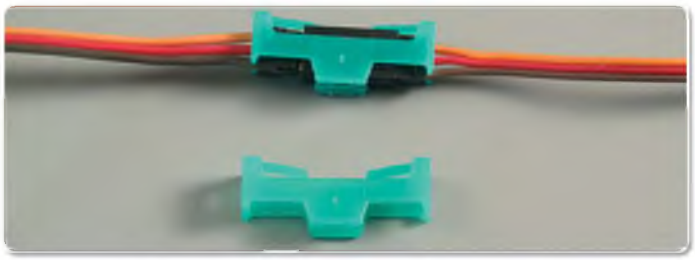
All four rubber grommets are installed and correctly aligned

It's important to fit the metal spacers, especially in a glow or petrol powered model like the Laser 200. The spacers allow the screws to be tightened down so that the grommets provide the correct level of vibration resistance. They need to be inserted from underneath. If you just use a finger it can be difficult to insert them – and it can hurt! Far better to use one of the mounting screws to guide it in and to stop the rolled edge from digging in to your fingertip

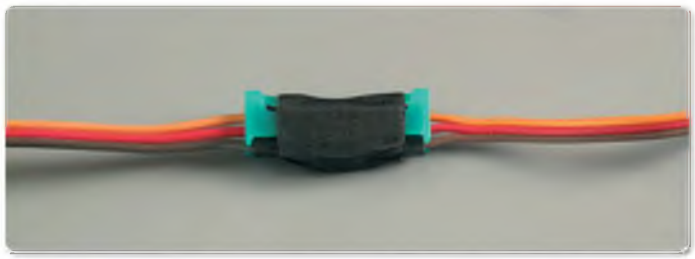
Alternatively use a sharp pencil to guide the spacer into position

When correctly installed the grommets and spacers should look neat and tidy

Lead Locks

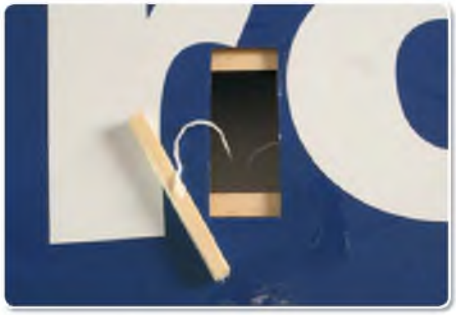


Each aileron servo needs to be fitted with a six-inch extension lead (not supplied). As with the servos it is important to safeguard against any engine vibration. So to prevent the connectors pulling apart inside the wings the instructions recommend the use of servo safety clips, similar to the ones we used here



For small models and/or electric powered types, where vibration is not such a great concern, we often just wrap the connectors in a cloth tape. Our favourite type is JR Guard Tape, originally intended to cover the sharp edges of carbon side-frames on JR helicopters. This self-adhesive tape sticks well and can be pressed down to follow the shape of the connectors. We used a wrap of it here as belt and braces protection over the safety clip

Servo Pull-Strings

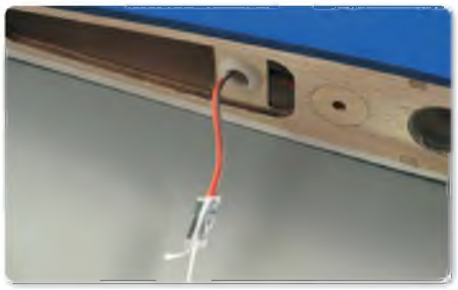


The Laser 200 wings are ready cut for the servos, with servos bearers also pre-installed. A toggle of balsa was tacked to the underside of each bearer to secure the servo lead pull-string during transit

A similar pull-string toggle was tacked inside the root wing rib. These toggles are a great idea, as they keep the pull-string secure whilst the model is being shipped from the factory to the retailer. In the UK's case this is Ladbroke Hobbies

The pull-string is tied to the plug end of the servo extension lead

A wrap of clear tape will stop the loop of string from slipping sideways off the plug. If it does the plug will be pulled sideways and it will start to hang up on every wing rib, which is very frustrating. Whenever the plug hangs up on the internal structure there's also a greater risk of the string coming undone half way down the wing – which would be even more frustrating!



The servo lead is pulled through the root rib. Note the neat rubber grommet that the lead exits through. This is another good idea as it is a tight fit for the servo plug, which means that it is unlikely that the lead will be able to slip back inside the wing during storage

The Savöx SA-1256 TG was a perfect fit in the readymade cut outs. No fettling of the bearers was required

Four Point Mounting

Use a sharp pencil to mark the centre of each servo mounting point

Lift the servo out and make sure that the lead is kept well away from the bearers so that it is not damaged when drilling the mounting holes

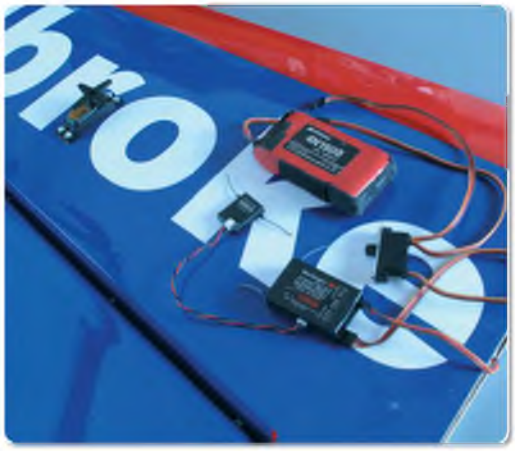
If using a powered mini-drill it is a good idea to leave it unplugged and to twist the chuck by hand a few times to start the hole off. If you try to drill without an indented guide mark then the bit can easily skid away from the intended position

A powered mini-drill makes short work of drilling all the servo screw holes in both wings. You'll need to use a fine drill bit. We used a 1.8 mm drill

On thinner wings than those fitted to the Laser it's easy for a powered mini-drill to get dragged through the hole and to hit and even penetrate the opposite wing skin. To prevent this from happening you may want to use a hand drill. A miniature version is ideal for chucking up the small diameter bit. But beware of cheap tools – the gears on this little thing slipped as soon as the drill started to bite!

The mounting screws should be tightened down until the rubber grommet just starts to twist. Then back the screw off a little bit until the grommet lines up square to the mounting lugs once again. If your grommets are too tight then they will not be able to help isolate the servo from any vibrations. Also, be sure to use all the servo mounting screws, grommets and spacers provided. If you only use two screws to mount a servo supplied with four mounting lugs then the servo will rock in use. This will cause slop in the controls and stress the lugs. They may even break, causing the servo to break loose

Servo Arm Selection



It's time to fit the servo arms. But before we do it is important to set the servos to neutral. At this stage we like to set up a basic model memory on our transmitter, making sure that all the digital trims and sub-trims are set to neutral. For set up purposes we have an old receiver battery and switch harness available to power the receiver and servos. Whilst we wouldn't trust this well used 1900 mAh NiCad from a crashed helicopter for flight duty anymore its large capacity is perfect for initial setting up of servos in the workshop

Most modern servos are supplied with splines on their output shafts. This allows for the servo arms to be fitted at a wide range of angles, such as the slight offsets required to provide mechanical aileron differential (as opposed to electronic differential when set up using an R/C transmitter). But each arm engages in a slightly different set of splines, so it is worth checking each arm with the servo switched on and set to neutral. With this four-pronged arm the servo label provides a good reference point to check that the bottom arm is lined up parallel to the servo. You will notice that it is sitting slightly to the right

After lifting and rotating the arm by 90 degrees we can see that the bottom arm has offset even more to the right

And with the third arm the offset is even more pronounced

But when checking the fourth and final position, we can see that the lower arm is now perfectly lined up with the label. This means that the arms on the left and right will be the ones we want to connect our aileron pushrod to, depending on which side the control horn sits – left in this instance. Some servo manufacturers even make a series of arms with slightly different spline positions, so the choosing the correct arm can really be finely tuned. For instance in the case of JR servo arms you will often see a number 1 to 4 marked on the underside, so it is worth keeping a master set containing one of each number with which to make your final selection

Once you have identified the arm that gives you the most neutral setting you may want to cut off the other arms to give the servo a neater appearance. With white arms, like the JR one on the left, the unwanted arms can simply be marked using a permanent marker pen. But for black arms, like the Savöx ones we intend to use on the Laser, a small tag of clear tape provides easy identification of which arm to keep

A sharp pair of large side cutters is the best tool for snipping off the unwanted arms. Do watch your eyes as depending on the material used the remnants can ping off at alarming speed. For this reason we would recommend that you always point the underside of the tool away from your face

After cutting off the unwanted arms the cut edges can be smoothed off with a sanding block. A fine Perma-Grit block is our preferred tool for this job as it provides a good grip

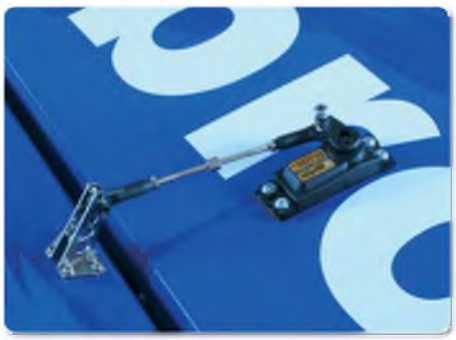
Give It A Push

Once the correct servo arms have been selected to ensure that the aileron servos are sitting at neutral, attention turns to assembling the pushrods for the Aeroworks Laser 200. And we have to say that they are probably some of the best pushrods we have seen provided with an ARTF (Almost Ready To Fly) model. The sturdy 3 inch pushrods are supplied with right and left handed threaded ends, onto which are screwed 4-40 size heavy-duty ball-links. In the middle of the pushrod is a hexagonal 'nut' shaped area which can be turned using the small spanner supplied to wind the pushrod in or out for making quick but fine adjustments without having to disengage the ball links

We have used double-sided nylon control horns before, but these one are made from pressed metal sheet – ultra tough! One of the ball-links is slipped between them and secured using an Allen bolt and lock nut. This is the first place that many British or European modellers may come unstuck, as the hex head of the bolt needs to be tightened using an imperial size ball driver. Fortunately, due to a spell pitting US made R/C cars for his sons when they were young, the Editor possessed the correct tool, which was located after a brief foraging session

The other ball-link is secured to the servo arm using another Allen bolt and lock nut, with a flat washer and a brass spacer providing supporting surfaces above and below the metal ball. Note how the bulk of the assembly hangs below the level of the servo arm – more on this soon...

Six holes for the control horn retaining screws are pre-drilled in the leading edge of each aileron. When fixing the first set of horns in position we found that it was all too easy for the screws to wander off line. So for the other set we partially screwed down into each hole to ensure that the screws followed the pilot holes vertically, rather than wandering off and going in at odd angles. Each self-tapping screw is protected against coming loose by applying a dab of thick cyano to the tip before screwing it into position



A view of a finished aileron and pushrod assembly. Well almost finished... Can you spot what the problem is? (And it's not the omission of the servo output screw.) All will be revealed in next month's issue, when we continue with the build of the Aeroworks Laser 200 QB kit

A small spanner is supplied so that the hex nut in the middle of the pushrod can be turned to shorten or lengthen it for fine control surface adjustments. Works a treat!

Output Arm Washers

Well we did say that we hadn't forgotten the servo output screws. These have been left off for now to enable a small modification to both pushrod assemblies. But it is worth pointing out that servos with metal output shafts, like the Savöx SA-1256 TG's we used, are usually supplied with an internal toothed anti-vibration lock washer. These need to be fitted so that the teeth, which are angled down on one side, bite into the plastic servo arm. If fitted the other way around, with the teeth against the underside of the screw, then the lock washer will have minimal effect. Two washers are shown here to show how they differ on each side

MODEL WORLD

DETAILS

MODEL INFORMATION

NAME:	30 cc Laser 200 ARF QB
MANUFACTURER:	Aeroworks
DISTRIBUTOR:	Ladbroke Hobbies
WEBSITE:	www.ladbrokehobbies.co.uk/Aeroworks-Aircraft.aspx
MODEL TYPE:	Scale aerobatic
CONSTRUCTION:	Built up from laser cut parts
PARTS SUPPLIED:	Airframe and extensive accessories
PARTS REQUIRED:	Radio equipment and petrol engine

R/C FUNCTIONS

1: Throttle (Hitec HS-5625MG recommended)
2: Aileron (2 off Hitec HS-5645MG recommended)
3: Elevator (2 off Hitec HS-5645MG recommended)
4: Rudder (Hitec HS-5645MG recommended)

MODEL SPECIFICATIONS

WINGSPAN:	76" (1930 mm)
LENGTH:	64" (1626 mm)
WING AREA:	1121 sq in
WEIGHT:	11.5 – 12.5 lb (5216 g)
COWL WIDTH:	8.75" (222 mm)
ENGINE:	0 cc – 35 cc petrol
SPINNER:	3.5" (89 mm)
RADIO:	6-channel minimum

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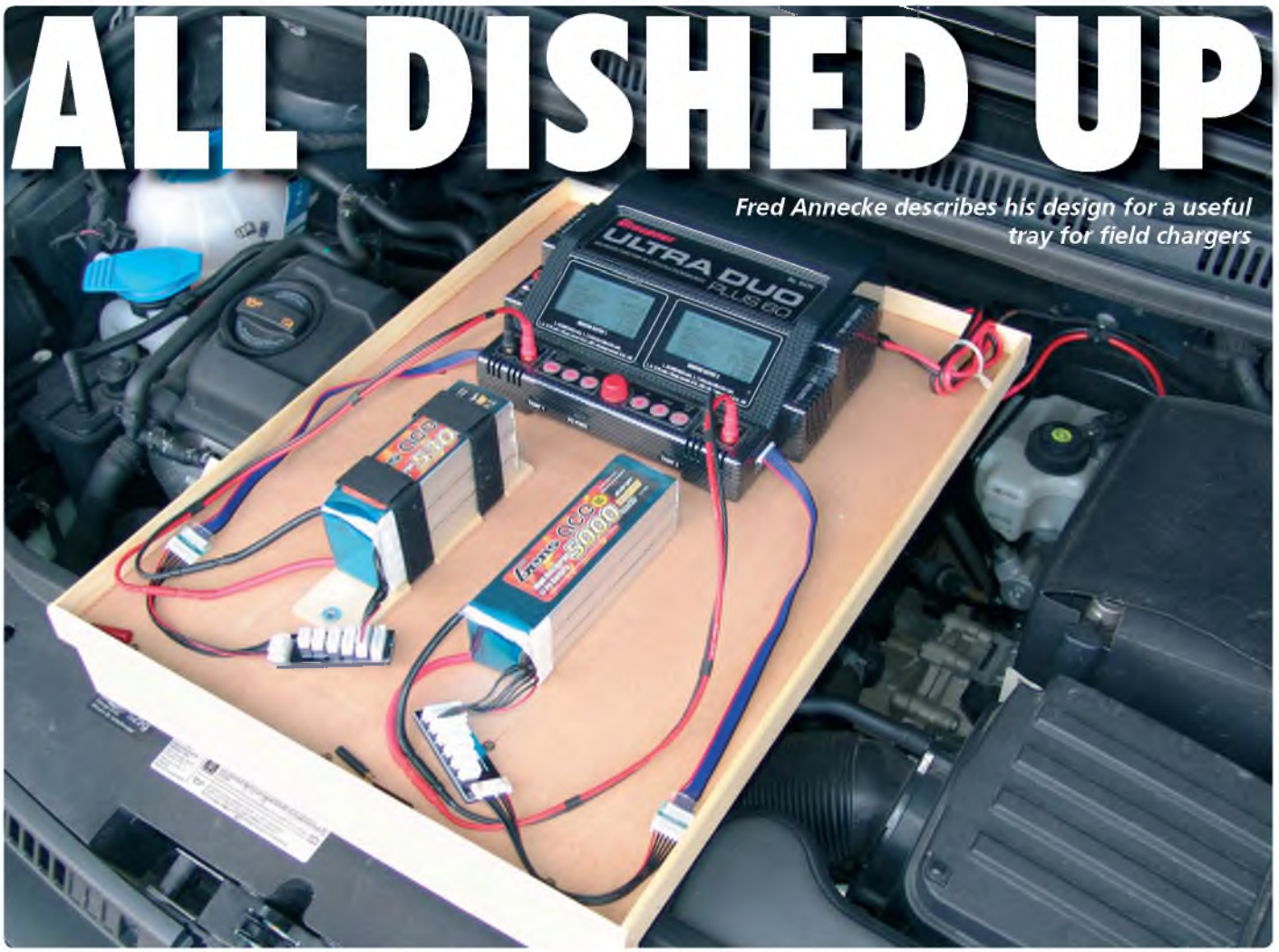
ALL DISHED UP

Fred Annecke describes his design for a useful tray for field chargers



Wire leads are soldered to cable eyelets and screwed directly to both car battery poles

Supported by a plastic body clip, the wire leads with their heat shrinked jacks are running towards the board

Without doubt quick chargers supplied by 12 V input voltage are by far the most seen at our flight sites. Common practice is often to recharge LiPo flight packs directly from the car battery by laying them on the engine itself or body panels, which brings a massive danger of producing short circuits and damage. You will know that the body of a car is not free from potential and is electrically connected to the negative pole of the car battery. All it needs is for a LiPo battery (or even the complete charger with its leads!) to fall inside the engine compartment, whereby it could short out and cause a major problem.

In order to minimise the risk of charging in this manner, I have used a home-built table for a long time. This little helper is made from 9 mm thick plywood and is adapted individually to the engine compartment size (mine is 55 x 40 cm). It is a good idea to choose dimensions such that the plate still fits snugly into your car's boot, where it can be used upside down as a nearly undetected base during daily use. I have also glued on surrounding thin wood border profiles to avoid losing any odds and ends during use.

To guarantee a rugged support for the table board, it sits on the engine casing at the back and self-adhesive foam rubber strips make it rattle free. At the front it rests on the car cross member, with a levelling skirt and two rubber pads. A shorter, second skirt behind the first one avoids any unwanted tendency of the board to slide forwards or backwards. The final dimensions have to be adapted individually according to your own car.

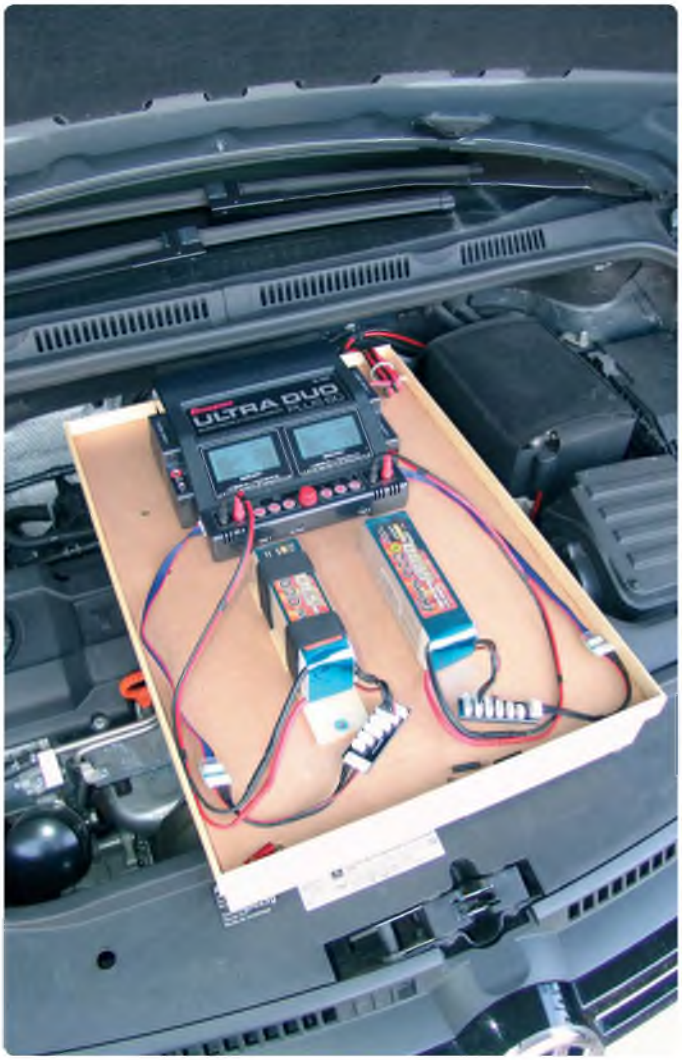
As an insulation material covers most car batteries, I connected two short

Wooden skirts level the table board to an equal height

Some wooden skirts support the table board in order to bring it in an equal, horizontal position when sitting above the engine compartment

Two rubber pads prevent the car's front end from being scratched and give a proper alignment

The little helper is perfect for instant quick charging, as it can be put in place in seconds. Surrounding borders prevent accessories from falling into the engine compartment



Even big, heavy quick chargers like the Graupner/SJ Ultra Duo Plus will find a solid place on the table board

6 mm wires to the hidden +/- poles using soldered eyelets, with the ends going to the charger fitted with 4 mm diameter gold plated female bullet connectors. Most quick chargers use this type of electrical connection system. Please take extra care to shrink tube these terminals very accurately in order to prevent any danger of a short circuit.

When you arrive at the flying site and open the bonnet, most of the engine's heat will dissipate before you need to recharge your battery pack for the first time. Nevertheless, the wooden board provides good insulation against any residual heat. Another trick is to park your car in a way that its rear faces the sun and the open bonnet then shadows the charging equipment even during hot and sunny summer days.

Have fun with your new little helper!

RCMW

Editor's Note: Please note that charging any form of battery pack in or near your vehicle is at your own risk. We would encourage our readers to perform all field charging away from vehicles and buildings using a remote leisure battery, but we know that many people do charge their flight packs direct from their car battery. And if you do charge this way, Fred's simple charging tray is a much better idea than just balancing the charger on the edge of the front wing or cross member. Alternatively, you could adapt Fred's tray and simply place it on top of a camping table or similar as part of a remote charging station.

SUMNER PONDS MODEL SHOW

Brett Houghton reports from the R/C heli flightline at the lakeside model display in West Sussex

Some of the local club models. There were a diverse range of models on display

It's a beautiful fresh Saturday morning in June 2015, at 5 am. The car is fully loaded with five helicopters and two planes, and all the necessary equipment needed to maintain my flying for the whole weekend.

This is the third year that Peter Glover from the Horsham and District Radio Control model flying club has put so many man hours into organising the Sumner Ponds Model Show. And I have to congratulate him for doing such fine job. I was kindly invited by Peter to come back again after visiting the show last year; I was the compere for the whole weekend and everyone was so nice and said that I made the event. So I thank you for that.

Well, in my wisdom, I invited the South Coast Helicopter Club to join us on the flight-line at the Sumners Ponds Model Show, which was being held at the fishing lakes in Barns Green, West Sussex.

Saturday

When I arrived on Saturday morning, to my surprise the site had changed from last year, as we had lost half the site to a massive hole in the ground that was dug up for the quadcopter guys! They certainly didn't disappoint. It looked so much fun, with these little things whizzing around the course, through hoops and stuff at what seemed to be an incredible speed.

As I got onto the site I was greeted by Peter Glover, the show CD, and we talked about the event, which was being held in aid of the West Sussex Air Ambulance.

After a few minutes Alan Mathews from the South Coast Heli Club pulled up in his big white van, with his son Lee and their crazy dog. We started to unload and put up our pitches, and it wasn't long before the

Pete Glover gives the safety briefing

Young Lee Mathews, looking forward to flying

Aerial photography drones were on show

rest of the South Coast members joined us, including Tim Bruton, the club's chairman

I would like to thank Tim and the rest of the members for coming down and putting on a fantastic static display of helicopters, and also for giving up their time to help out. I hope the flight simulator was worthwhile as it certainly was very busy over the weekend. The static display was awesome; there must have been over 20 feet long full of scale helicopters, plus pod and boom types and even some turbines.

The crowds on both days constantly flowed and they seemed to really enjoy the chat and displays by everyone, especially the two turbine display performed by Alan Mathews and Tim Bruton. I wanted to explain to the public the difference between the turbine helicopters and the glow powered models, along with the more popular electric helis flown these days. It all went down a storm and there were lots of questions after the displays.

Peter Glover and some of his club members (I'm sorry, I don't know your names but you know who you are) also flew all day with their planes and helicopters. We had some old stuff, scale stuff and some new stuff; in fact there was something for everyone at every level, which was great. So thank you for that.

Saturday's flying came to an end with a 'let's go down to the lake's café bar and listen to the music and have a few beers', along with something to eat, which is always a good idea after a full day of flying. The food from the Lake Café was fantastic and the music was also very entertaining.

Sunday

It's 7 am on Sunday morning and I'm all revved up for another day of commentary and flying. So after a lovely 'all you can eat' breakfast, I made my way back to the flying site. Yet again it was a beautiful morning, with the sun shining and it looked like it was going to be a warm day.

Once I had unloaded the PA, I woke up the rest of the guys and girls that were camping on site. As usual Alan Mathews was up and about with young Lee, walking the dog whilst holding a mug of tea and shouting 'would I like a brew'? Who doesn't!

10 am soon came round and Pete gave the usual safety briefing. Then the flying started again. The whole day was full of guys flying their planes and helicopters, together with folks enjoying their kites in the next field – it was loads of fun.

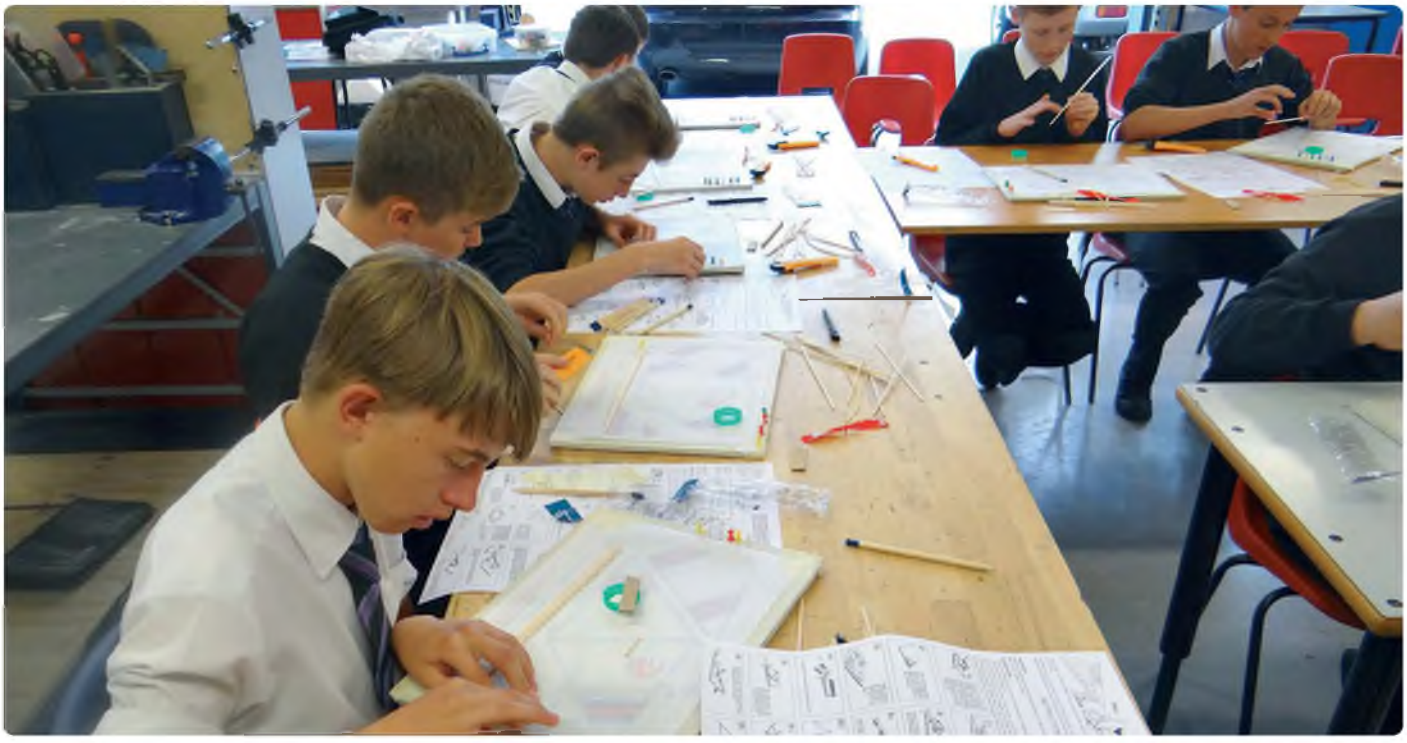
After the event Peter let me know that the raffle raised just over £600. Overall it was a fantastic and worthwhile effort by everyone who gave their time up for such a good cause. Well that's about it. I hope to see more of you next year, so let's try and make this event grow with lots more helicopters and aeroplanes.. **RCMW**

Aerobatic helicopters, with a Huey looking on

David Langwade explains how Cullum Detuners Ltd uses the BMFA Dart to help find potential new engineers

Each student is presented with one BMFA Dart kit to build

DARTING AHEAD!



All the parts are cut out and glued, taking care to ensure all the assemblies are square and in in the correct position

Throughout the years Cullum Detuners Ltd has been at the forefront of innovative engineering and they are a principal authority on noise control solutions throughout the world. Cullum has always supported Apprenticeships and the company realises that it needs to source engineers for the future to enable growth and sustainability.

To encourage an interest in various aspects of engineering and to showcase what Cullum can offer young engineers its STEM (Science, Technology, Engineering and Mathematics) ambassadors have engaged with local schools by attending careers events and workshops. Their main focus this year has been doing the Aeronaut Challenge.

The Aeronaut Challenge

The Aeronaut Challenge teaches students the basic principles of engineering and aviation by the construction of their own model aircraft using the BMFA (British Model Flying Association) Dart. This helps develop communication, organisation and time management, as well as teaching core skills such as mathematics and physics. It introduces concepts such as aerodynamics, forces, design, construction and materials. It also highlights potential engineers of the future and helps indentify individuals that enjoy the more practical building part and which ones enjoy the theoretical and research.

Once the Darts have been built and tested the students take part in a flying challenge. Each Dart has two timed flights to establish which ones have the longest time in the air.

Each academy will go through the same build, manufacture and flights, with input from the Cullum team. Currently

Rolls-Royce 58 Test Bed facility

Company Profile

Cullum Detuners is a world leading engineering company with a proven track record in providing advanced engineered solutions to the Aerospace, Energy, Marine and Nuclear Sectors. The company utilises the skills of its highly qualified engineers and designers working from its UK headquarters in Heanor, Derbyshire.

Cullum was founded by Horace W. Cullum in 1898 and it started life as a specialist acoustic building supplies business based in London. Interest by Douglas Jack W. Cullum in the noise generated by aircraft engines and propellers led to the design of a silencer for the W2 700 Jet Engine developed by Sir Frank Whittle and his team at Power Jets Ltd.

From 1943 the significant growth and development of the jet engine produced demand for a 'Detuner', a generic term for a jet engine test cell exhaust system. Since the pioneering days the company has been a leading supplier of noise control equipment to the aerospace industry, from manufacturing and installing their first commercially ordered Detuner for the deHavilland Engine Company in 1943, to completing the largest Advanced Test Cell facility in the world for Rolls-Royce, Derby in 2007.

three academies are taking part: Hall Park Academy Eastwood, Aldercar Community Language College and Heanor Gate Science College.

Certificates are awarded for the best three times and the individual winners from each Academy go forward to the final fly off, with the overall longest time winning the Cullum Aeronaut Challenge trophy.

Summary

The opportunity provided by Cullum's STEM Ambassadors in engaging with local schools using radio controlled planes and the building of model kits has given the company confidence that its future engineers can be cultivated from events and workshops such as the Aeronaut Challenge. And having support from associations such as the BMFA is also important to its success.

Cullum Detuners Ltd recognise that growing their own talent will help them to succeed and in this way they can be assured that there will be a sufficient and skilled resource available to ensure future growth and prosperity.

A big thanks to the Cullum STEM team and all the students for making the Aeronaut Challenge such an enjoyable event. **RCMW**

Each BMFA Dart is flown and tested by the students, and any final alterations to their models are completed before taking part in a Group Fly-Off

Cullum STEM Ambassadors: Chrissie Symon, John Dent, David Langwade, Nicola Stapleton and Joe Cox

CONTACTS

David Langwade,
Assistant Project Engineer
Email: david.langwade@cullum.co.uk

Cullum Detuners Limited
Adams Close, Heanor Gate Industrial Park,
Heanor, Derbyshire DE75 7SW
Tel: +44 (0) 1773 717341
www.cullum.co.uk

Peter Maw relates how Bickershaw MFC entered the world of corporate hospitality to host an event for guests who wanted to try their hand at flying R/C models. With additional photography by Simon Naylor

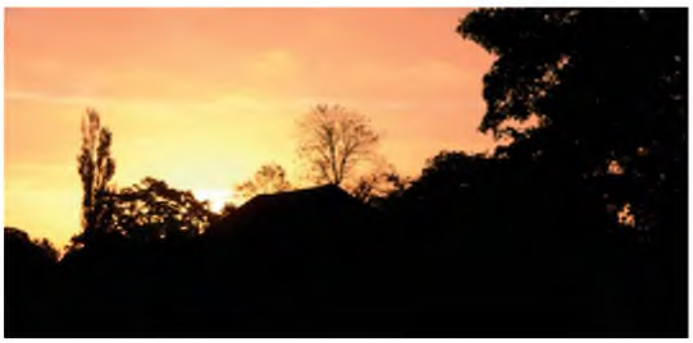
THAT'S ENTERTAINMENT!

Two guests were flying on buddy boxes throughout the event

It all started with a random email from our website. Would we be interested in holding a corporate hospitality day for around 20 people who would like to fly a model aeroplane? Fed up with the standard 'boys with toys' day out, our potential client was looking for something entirely different. He had stumbled across our website and thought it looked reasonably put together. Did we think it was something that we could handle?

An exploratory email went back outlining the pros and cons of hosting a professional day's entertainment. The risk of bad weather was a definite factor on the negative side, as was the fact that our field is just a piece of grass in the middle of a farm. Although we think it is lovely the sort of people who are invited to corporate hospitality days may think it is well below par for a day out. I worked out a long time ago that it is far better to under promise and over deliver rather than the other way around.

The email didn't put off our potential client and he arranged to visit our club on a normal flying day. I asked our Chairman



We woke up to a beautiful sunrise and knew everything would be alright

Dave Phipps relaxes after setting up the BMFA simulator

The demo planes make an impressive array in front of the hospitality tent and BMFA Simulator

Blue sky and a Spitfire. What a perfect introduction to model flying

This highly detailed Spitfire Mk.Vb was built by Lee Smalley from a DB Mk.I kit and is powered by an MVVS 40 cc petrol engine

if he was up for it and suggested he wear a business suit while flying in front of important guests. I was to be dressed in standard 'scruff'. For some reason he wasn't happy with the concept. The offer was accepted with alacrity and we let them fly a Wot 4-E.

It's All In The Planning

After the visit it was important to work out what was going to happen and who was going to be responsible. Although our club regularly hosts events for the BMFA and Traplet we do that on the basis that if the basics are in place and the weather is nice our guests will enjoy themselves and have fun. It isn't quite the same when the club is being offered money to host an event where we represent the face of aeromodelling to people who have never experienced anything similar before.

We were obviously happy to sort out straightforward stuff, but we needed our client to organise transport for the guests, as well as catering and shelter. We really didn't want to organise something where we were involved in up-front costs that we would not be able to recover if the event didn't happen because of bad weather. We had contacts for Portaloos (never underestimate how important this is for any big event), and they had the contacts for marquees and catering, which meant that all the major components were covered.

It was arranged for the event to take place in early autumn, starting around midday to give us and the guests plenty of flying time. It suited everyone for the event to be held on a Thursday as there were unlikely to be any of our club members who would want to fly on that day. And obviously the hospitality needs to be delivered on a working day. Invitations were sent out by the client and there was no going back from there.

We confirmed with the local authority and our landlords that it was OK to hold the event, as required by our Certificate of Lawful Usefulness. Although the club was going to be paid for the event it was important to make it clear that the individual pilots could not be paid directly as BMFA insurance does not cover individual pilots who are paid to fly.

It's Not About Us

In the forefront of our mind was the knowledge that the event was being held for our clients. We would have to keep them involved throughout the day. With a couple of months notice the first thing to do was select pilots with interesting models, good flying skills and good training skills. Seven club members were approached and they accepted immediately, booking time off work to make sure they were available.

A schedule was put together to keep the day moving, which involved 30 minute flying slots for the guests where we would give two people at a time 7-8 minute flights with a trainer and buddy box each. That allowed us to have six people flying in every 30 minute slot. We would then do a 10 minute demonstration slot to impress the guests, and repeat the sequence throughout the day.

We decided that the demonstrations should show how aviation has developed over the past 100 years. Between us we were able to bring a Sopwith Pup representing 1915, a Spitfire, Hurricane and Mustang representing the 1940s, an Extra and Yak for the late 1990s and a Bae Hawk to represent today's aircraft, as well as a Capiche and a 3-D helicopter to show off the best in sport aeromodelling.

We didn't actually think we should fly the planes in age order as although the Pup is a very pretty and interesting plane it just potters around sounding beautiful, but it isn't very exciting. The perfect choice was to fly the Spitfire and Hurricane together to start the show off and with some loose formation flying we hoped to run the Battle of Britain stalwarts down the flight line to impress the guests.

2014 Nationals scale champion Brian Wood, along with Lee Smalley flew their Hurricane and Spitfire, with Lee giving a running commentary throughout the flight. His model is a DB Models Spitfire MK1a, highly modified to Mk Vb Tropical version. It is powered by a MVVS 40 cc petrol engine and fitted with a bespoke silencer by Just Engines. The Spit was painted using masks supplied by Flightline Graphics and then sprayed with Warbirds Paints. It looked lovely and attracted loads of attention.

What Could Go Wrong?

The obvious answer is the weather. Even if it didn't rain on the day there would be a problem with the field if there had been heavy rain for a few days beforehand. Our grass contractor asked if he could put off cutting the grass during heavy rain the day before. We explained that next year's grass cutting contract would go elsewhere if it wasn't cut, which seemed to sort out that little problem.

Boredom would be the other issue. With only two people being trained at any one time, and two being briefed before their flights, that would leave 16 people with nothing to do at any time. Something else was needed. Our chairman suggested a flight simulator. We initially decided that was a good idea but we would need to feed the images through a large screen. And that would mean a generator for power and a large screen on a stand.

We're not proud. We let helicopters muscle into the event as well!

None of our visitors knew that model planes could fly so fast and look so realistic. Paul Lawton flew his BAe Hawk to great effect in his demonstration slot

The generator was easy as several club members share a generator to charge their helicopter batteries. However, it was adding a level of complication which may not work properly on the day. The 'Keep It Simple, Stupid' principle should always be applied to new events.

One of our pilots suggested using the BMFA flight simulator so an email went off to them to check availability.

It was apparent that we would have to be responsible for transport from the East Midlands and that seemed to be the end of that. However, we received a call from them asking why we wanted the simulator on a Thursday?

Once we explained the situation they got back to us with an offer of bringing the simulator over to us with an operator – none other than their Chief Executive, Dave Phipps - in exchange for an article in BMFA News. Well, we couldn't say no, could we?

The Grand Day Out

Miracle of miracles, a beautiful sunrise was followed by a lovely autumn day with virtually no wind. Money had been put into the club account (you should never do an event like this without being paid up-front). The field had been mown and looked perfect. All pilots were asked to be at the field for 10 am to give us time to prep our planes, have a test fly, make sure buddy leads and transmitters were working, and generally be ready to go as the minibuses full of guests turned up.

As the hog-roast ordered by the client wasn't arriving till mid-afternoon we organised light refreshments using camping gas stoves, which were available to all on the field. Unlike many corporate hospitality events no alcohol was allowed until flying stopped at around 4.30 pm.

A marquee was in place by 11 am, along with a Portaloo. And Dave Phipps turned up at 11 am to give himself time to set up the impressive BMFA simulator. The event was being filmed so the cameraman had plenty of time to become acquainted with filming model planes; we had a group shot of all the planes and then we were ready to go.

Once the guests arrived we gave them a quick introductory chat outlining the day's events, introducing our pilots and instructors and explaining safety issues. We started the event with a rocket and got the Spitfire and Hurricane to open the show. Timing was strictly adhered to as we did not want people to miss out on flying for themselves, which meant I kept tight control on how long each demo and each flying lesson lasted for.

The guests were young and old, male and female, which meant it was a very varied audience. They all took chairs from out of the marquee and arranged them behind our pit area to watch the first demo.

The first two victims for flight training were briefed. Within minutes of the demo planes landing they were up in the air and flying electric trainers. We had suggested that the guests try the simulator before their flights so that they could familiarise themselves with the transmitter controls and there was soon a group of people around it. Other guests took great interest in the models we had on show and the rest were content to sit and watch their colleagues fly and chatter among themselves.

Unknown to our client's guests we had been asked to pick the person who had shown the best aptitude for flying, so that they could receive a prize at the end of the day. The prize we had suggested was a ready to fly multicopter fitted with an HD camera, so it was well worth winning. We used three instructors for the majority of the afternoon: Paul Lawton, Clark Disley and Lee Smalley. They had little problem awarding the prize to a lady who was flying circuits by herself within two minutes of getting airborne.

How Did It Go?

Spectacularly is the answer to that question. Everyone had a go at flying and some were able to have two flights. The demonstration highlights were a superb display by Paul Lawton with his Bae Hawk, and Rob Greenwood stunned the crowd with his display of 3-D helicopter flying. The vertical take-off to 100 feet in a couple of seconds wowed the crowd. When he inverted the heli and hovered it with the blades millimetres from the grass they were amazed, but then so was he. Even the helicopter in the new Bond film couldn't do that!

Everything was kept on schedule, we got a couple of new members and the BMFA were able to promote safe model flying. And to top everything we were able to show that model flying is an impressive hobby.

The client, Bright Wealth Management, generously included all of us who staged the event in their after show catering and we went away very happy. We also now have a professionally produced video showcasing the event. For interested readers there is a link to the video on the Bickershaw MFC website: www.bickershawmfc.co.uk

In the end we probably over-delivered and under-charged, but that is far better than disappointing people. Club funds were swollen significantly and we were able to contribute to the expenses of all the club members who took part in the event.

As far as the Bickershaw members who were involved were concerned, they all thought it had been an excellent day out, which they thoroughly enjoyed doing.

Most importantly the client's guests all thought they had had a really interesting and fun day out, and they were full of praise for the club and our organisation of the day. Which means we have a new way of promoting model flying; we can't wait for the next one! **RCMW**

A guest concentrates as she guides her aircraft around the sky – with a little help from her instructor!

One of the bonuses of the event was that the show was filmed. We now have a good quality video to promote the club

The cameraman got good coverage of all the models on display

The BMFA's Simulator was well used

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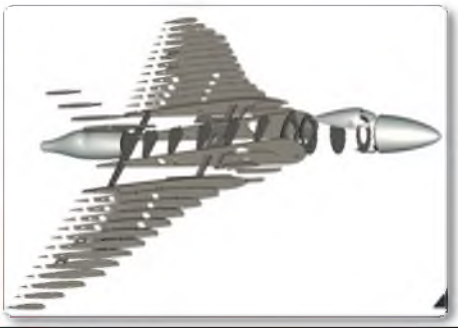

Graham Dorschell has designed this large electric 'V' Bomber twin pusher for lightness and smooth flying and a superb performance. It features optional retracts and sound systems. Two large plan sheets detail the construction, plus optional Laser Wood Pack available. Not for beginners.

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- 10 x 1/16" (1.6 mm)
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- 10 x 3/32" (2.4 mm)
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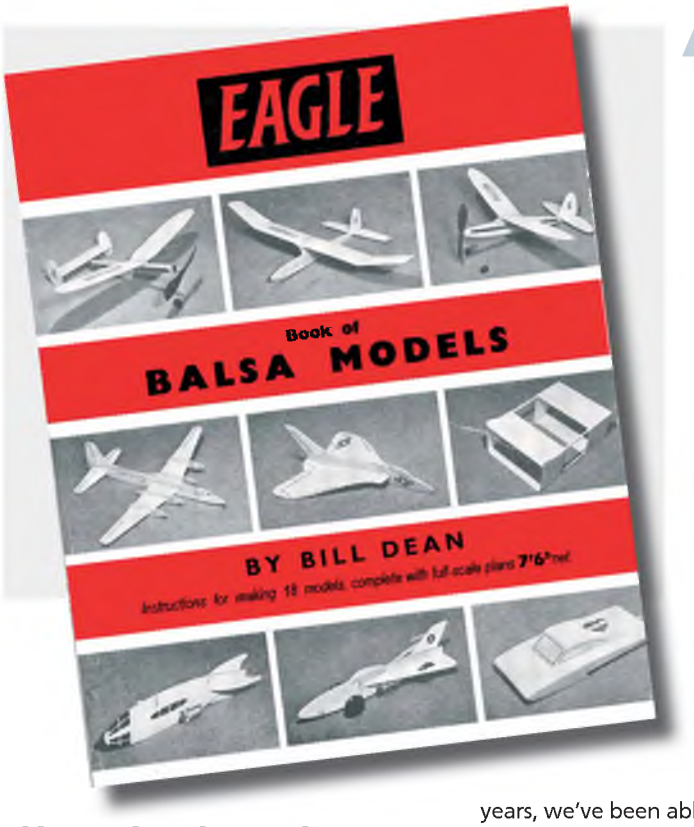
THE SPORT CHANNEL

Amongst a plethora of subjects this month Gray checks out a new website offering a selection of out of print model-flying books and magazines



"GOOD PLANS ARE THE BEST WAY TO MAXIMISE FUN..." (KATHERINE HANNIGAN)

Your author's all time favourite aeromodelling book and the starting point for so many other lifelong modellers, the 'Eagle Book of Balsa Models' by the great Bill Dean. A later imprint is now available free online

This Month's Wise Words

It's no surprise that whenever this column discusses early aeromodelling influences, the 'Eagle Book of Balsa Models' by Bill Dean is one of the most frequently cited.

First appearing in 1959, it was one of a series of hardback modelling titles from the publisher of the legendary British comic 'The Eagle'. Aimed at a young readership taking their first steps in the hobby, Bill's slim volume was packed with simple but attractive all-sheet balsa models that really flew despite the average builder's inexperience.

I long ago lost count of the number of modellers who owe their entry into our hobby to this book, as I do. Through the years, we've been able to supply copies of several of the plans for readers to either recreate models of their youth or reinventing them for modern micro R/C.

As this edition was being written, we heard that the UK's top plan download website Outerzone, had just set up a new sister-site offering a varied selection of out of print model-flying books. 'RC Library' offers an already growing collection of books, magazines and catalogues covering all genres of aeromodelling. Recently added was 'Bill Dean's Book of Balsa Models', which is an updated reprint of the Eagle book, from 1970, published in the USA where Bill was then living.

Print copies of all the Eagle modelling titles still sell for absurd prices on collectors' sites, but this is your chance to own this unique collection of plans for free. I can't recommend it highly enough – without it, I wouldn't be writing this!

Elsewhere on the site, previously lost old favourites regularly pop up. Just recently, I downloaded the 'Aeromodeller Pocket Data Book' which itself was a reprint of a US 'Flying Models' publication. I had a copy in the 1970s and 'couldn't put it down'. It was full of sound modelling and theoretical information with hundreds of superb illustrations. I think it disappeared in the 80s when I foolishly lent it out, so I couldn't resist this one. Have a look at RC Library and also let us know what your favourite modelling book was (obscure ones especially welcome!).

Transglobal Technostalgia

Another subject that's undoubtedly acquired its own fan following is the work of George Stringwell, in both his imaginative 'Technostalgia' updates of famous designs and his single-handed elevation of the tissue over Mylar covering technique to an artform. With several of George's designs available through the Traplet Plans Service, they now fly throughout the world. A special favourite seems to be his enlargement of Keil Kraft's little all-sheet 'Sportster' from the 1950s/60s 'Eze-Built' range. Reader Alistair Heathcote in Australia took George's plan as the starting point for his own version of the KK Sportster. Alistair explains: *"The model is 48 inches span (i.e. 50% enlargement of the plan). I used 1/16" for the fuselage but the rest of the wood is also 50% up in section. The colour on the wings and tail is newsagent tissue. After 3 coats of thinned dope on the wings, I applied the tissue strips dry by painting with acetone. It worked perfectly. The fuselage had 4*

Left: Australian reader Alistair Heathcote with his very successful 50% enlargement of George Stringwell's R/C adaptation of Keil Kraft's 'Sportster'

coats of dope and the yellow and red are a single coat of Humbrol enamel to show the grain.

Power is a 1400KV Park Fly Turnigy motor and a 500 mAh battery which gives over 10 minutes of flight time. I added a small amount of lead to get the C of G just on the main spar (this is forward of that shown on the plan).

It weighs 16 ounces all up which I was very pleased with. So – commit to take-off – a non event really. In windless conditions it rolled about 2 yards and gracefully rose into the air. Very easy to control on rudder and no trim required. Landing - reduce power and let it descend to the ground – a little flare and that's it.

Lots of "Ooh – I must make one" from the small crowd! Just as good on subsequent flights but if I made another one I might put a bit of 'give' in the landing gear. I'm now looking at a 2X plus a bit KK Eaglet with an ED Racer Diesel for the next nostalgia but must finish my 1/4 scale Nieuport 17 first!"

***Left:** Alistair's Sportster in action. The original design was a 1950s all-sheet rubber model in the KK range. It's come a long way!*

A Military Victory

Some readers will be aware that over the past two or three years we've been watching with great interest the evolution of free flight scale gliders into a viable competition class. From early experiments indoors, launching the models with hand-tow, winch and bungee, it became apparent that the concept was going to be challenging.

Achieving comp durations under indoor conditions was not as easy as first imagined and builders' design and construction methods and choice of scale subject would prove critical to success. More recently though we've seen developments with outdoor scale gliders and the potential here for larger models and thermal assistance looks promising.

The first item from a recent package from our old pal Simon Rogers from Warwickshire is news of a personal success in that arena. Simon is a long-time supporter of the class and back in the summer his efforts paid off when he won the Glider event at the Oxford MFC's Scale Day at Port Meadow.

Simon's project, a 46" General Aircraft 'Hotspur' military glider has been a long time in the making and I've followed its progress over a few years. It has an impressive design pedigree, as it's a collaboration between no less than Bill Dean (that name again!) and Ron Warring. It's undoubtedly one of those 'Builder's Models', as the fuselage structure is quite labour-intensive with a set of individually laminated hoop formers (all different!) which support a mass of stringers.

Simon Roger's 46" span General Aircraft 'Hotspur' WW2 troop-carrier won him first place in Scale Glider at the Oxford MFC's meeting last summer. Designed by Bill Dean and Ron Warring when the full size was still in service!

It's good to see it completed and doing so well. Simon says the Hotspur flies really well. It goes up on the bungee as straight as a die and comes off the line at the top perfectly and the glide is very scale-like.

Rare Rotorcraft Revisited

Our item last time on the history of the Monocopter was surprisingly well received and I hope that all the readers who requested our free plan downloads (still available, send me an e-mail) will give one a try. As always, please send us some pictures when it's built (It should take you two evenings at the most!). I was pleased to hear from renowned designer John Rutter whose very neat F7U-3 Cutlass plan had just appeared in the same issue.

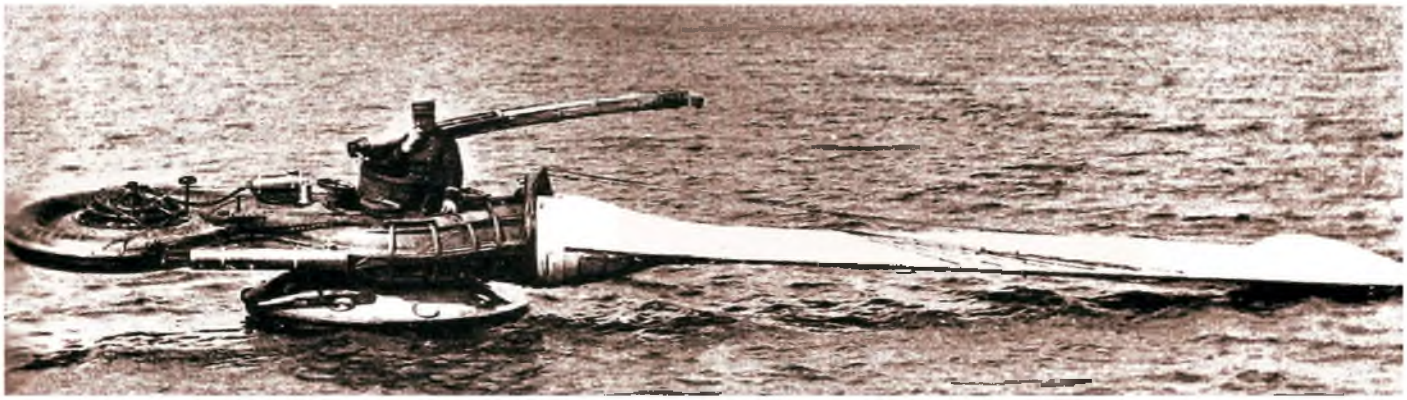
John writes: *"I spotted your bit about the Monocopter, which I must admit I didn't think had quite such a long history. Twenty or more years ago I helped a pupil build a 'Chip Chopper' (or was it 'Charybdis'?) from an old Aeromodeller article as an A Level minor project.*

It flew very well, at one time disappearing over the school and landing about half a mile away when he overfilled the tank and didn't allow for downwind drift (this was out of lesson time, he got quite enthusiastic about flying it).

He eventually got it back after a plea for help in the local newspaper but I often thought of building an R/C version to avoid the flyaway situation. The radio bit is easy enough but I never managed to figure out the 'control' bit. How was the monocopter supposed to be controlled in flight? Weight shift perhaps?"

A valid point, John – some of the material I've seen on current R/C monocopters mentions GPS and accelerometers, which would open up many technical possibilities, such as a servo tab on the rotor blade to apply cyclic control anywhere around the rotor disc, while maintaining a fixed heading. Likewise, a separate power pod, carrying separate forward thrust motors, located at the centre of rotation could easily be kept pointing in the right direction.

As there should be a load of winter projects underway right now, has anyone seen any Whimsy bipe scale-ups? Earlier in the year, we sent off dozens of plans, mostly for enlargement and R/C electric conversion. Are any flying yet? We caught Dan Mellor's rubber version, which started all the interest, in flight at the NCMAC show back in August, an amazing little performer



The idea of a full size monocopter is still not convincing some sceptical readers! But, the Papin-Rouilly 'Gyroptere' did exist and is seen here during testing on Lake Cercey, in France in 1915. Just being at the centre of that massive whirling rotor must have been traumatic enough, let alone the danger of a dunking!

Simon also sent some Papin-Rouilly material in his package. During its water borne tests the 'Gyropter' was plagued with what seemed to be C of G problems, with its rotor/exhaust tip catching in the water.

In a group of six pictures on yellowed paper (which we were unable to reproduce, sadly), the monocopter is seen running up on the water. Looking closely at the images, you can see the tip of the rotor blade; the heavy spray actually seems to be coming from the engine end of the machine. After many such setbacks the Gyropter was scrapped. Simon wisely sums up this ill fated but bold project:

"The French military said it had no practical use, but I think if I was a German soldier in the trenches and saw that coming over No Man's Land towards me I would have run a mile!"

Signing off, Simon referred to the two reproductions of those magnificent early 20th century popular science magazine covers we used recently for the Gyropter and the 'Bolas' anti-aircraft weapon. Simon recommends a website with a wealth of similarly outlandish but gloriously depicted future tech, from an age when anything seemed possible. I've visited this site and ended up spending a couple of hours totally engrossed in its content, I can guarantee that it will not only raise a smile from most modellers, but also stir a few creative ideas. See if I'm right. Address is in Contacts .

As we move into another year, I must thank all SC's readers for their support and for the priceless stream of material that keeps this column alive and about to celebrate its sixteenth year!

Traditionally, this must be the time for winter projects, so whatever you have underway for next season, please tell us all about it...

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www.rcmodelworld.com

Diary Dates

INDOOR

21st Dec '15, 4th & 18th Jan, 1st & 15th Feb '16
Yeovil RC Flyers Indoor Flying at Crewkerne Sports Centre (south west of Yeovil, Somerset), 7 pm to 9 pm, £10 per adult, juniors half price, insurance required. Flying takes place in a big, 4 court hall with some power points. Meets first and third Mondays each month, except Bank Holidays. For more details contact Jack Mitchell on 01935 445311 or
Email: jack@home9999.plus.com or check out the website www.yeovilrcflyers.org.uk/index.php

29th Dec '15, 26th Jan '16, 23rd Feb, 29th Mar, 26th Apr, 31st May, 28th Jun
Indoor R/C Small Models Meets, in the Main Hall at Wickham Community Centre, Mill Lane, Wickham, Hants PO17 5AL. All meetings will run from 7.00 pm to 9.30 pm. Models to be flown at these meetings are to be limited to a maximum weight of 95 grams (3.5 ounces) for fixed wing aircraft, in flight trim, including battery (not to exceed a 2-cell LiPo pack). Helicopters are to be limited to a rotor diameter of 12" (305 mm). All models will be weighed before flight, and will be judged on their suitability for the venue on the evening. Admission to the meetings will be £4 for flyers and £1 for spectators. Flyers will be required to show proof of insurance. For further details please contact: Alan Wallington, 'Wrenbeck', Bull Lane, Waltham Chase, Southampton, Hants. (Tel. 01489 895157)
or see our website: www.wcaero.co.uk

2nd Jan '16, Feb 6th '16, Mar 5th '16, Apr 2nd '16, May 7th '16, Jun 4th '16, Jul 2nd '16, Oct 1st '16, Nov 5th '16, Dec 3rd '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

9th Jan '16, 6th Feb '16, 5th Mar '16
Indoor R/C Meets, in the Main Hall at Havant Leisure Centre, Civic Centre Road, Havant PO9 2AY. From 7 pm to 10 pm. No free-flight models. £7 for flyers, £1 for spectators, proof of insurance required. For further details please contact: Alan Wallington, 'Wrenbeck', Bull Lane, Waltham Chase, Southampton, Hants.
(Tel. 01489 895157)
or see our website: www.wcaero.co.uk

23rd Jan '16, 20th Feb '16, 19th Mar '16
Indoor R/C Meets, in the Main Hall at Fleming Park Leisure Centre, Passfield Avenue, Eastleigh, Hants SO50 9NL. From 7 pm to 10 pm. No free-flight models. £8 for flyers, £1 for spectators, proof of insurance required. For further details please contact: Alan Wallington, 'Wrenbeck', Bull Lane, Waltham Chase, Southampton, Hants.
(Tel. 01489 895157) or
see our website: www.wcaero.co.uk

7th Feb '16
BMFA South Eastern Area 41st Crawley Indoor Meeting, at K2 Leisure Centre, Pease Pottage, Crawley, West Sussex RH11 9BQ. Free Flight 11 am until 5.30 pm, Indoor R/C 5.30 pm until 8 pm, competitions and plenty of fun flying time, including Comps 12" Catapult Glider, HLG Peanut Scale Open Scale, EZB Living Room Stick Gyminnie Cricket, Legal Eagle Mass launch of Butterfly and Hangar Rat. For more details contact Comp Secretary John Dart, 01293 420830,
Email: johndart17@aol.com
or check out www.cadmac.org

13th & 14th Feb '16
BMFA Electric Indoor Masters 2016, will again be taking place at the superb Metrodome Arena in Barnsley, and a full weekend of indoor entertainment is guaranteed. The competition will feature eight classes of competition, including four classes of F3P, Aeromusical, Freestyle and indoor pylon racing. The venue offers excellent facilities, including a large flying area and tiered seating for spectators, as well as full catering. There will be a raffle each day, with a generous prize pot thanks to the EIM's sponsors. Spectators are able to turn up on the day and pay at the door. Entry fees are £5 adults, £3 Under 12s. All competitors must pre enter using the online entry form at: www.eim.bmfa.org

GENERAL

15th to 17th Jan '16
London Model Engineering Exhibition, at the Great Hall, Alexandra Palace, Alexandra Palace Way, Wood Green, London N22 7AY. Fri & Sat 10 am-5 pm (last entry 4 pm), Sunday 10 am-4.30 pm (last entry 3 pm). Model Active Zone closes 3.30 pm Sunday. Adults £11, Senior £10, Child £4. www.londonmodelengineering.co.uk or contact Meridienne Exhibitions, Leamington Spa, Tel: 01926 614101.
Website: www.meridienneexhibitions.co.uk

6th Feb '16
Home Counties Swapmeet, organised by the Chobham Common Model Flying Association, 10 am until 1 pm at West End Village Hall, Benner Lane, West End, Surrey GU24 9JP. Space available for 45 trestle tables. (Tables are provided) Hall open to sellers from 9.30 pm. Entrance fee is £2 per person, the fee for the hire of a table is £6 and this includes entry for one person. Booking for tables must be done in advance. Get in touch,
Email: ccmfa2015@hotmail.com
Tel: 07401914341
www.ccmfa.moonfruit.com/

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

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

18th Mar '16
DADMAC Auction, the Dumbarton and District Model Aircraft Club Bring and Buy/Auction takes place in the Chivas Community Suite of Dumbarton Football Club, Castle Road, Dumbarton. Book in items from 5.30 pm, Auction kicks off at 8 pm. Entry fee, but no commission on sales. Bar/Snacks available. Auction forms available on website www.dadmac.org.uk Contact Maurice Irvine 01475 689711 for more information

23rd & 24th Apr '16
Spalding Model Engineering & Hobby Snow, 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.
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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

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

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

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MODELS for sale, Cessna 172, part built, £20. Herrera 3D with a Thunder Tiger 75 TS, £40. And a Piper Arrow, part built, no engine, £100. Giving up due to ill health. Contact Steve 07931 875584.
MOTOR glider, carbon body, balsa sheeted wing with aerilons, 78 inch span, 480 watt brushless motor and controller, never flown, buyer collects. Call 0191 5203239, Tyne and Wear.
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NEXT ISSUE

PSS A-4 Skyhawk

Phil Cooke has designed this 36" span A-4 especially for the 2016 mass build project by the Power Scale Soaring Association. If you want to join the PSSA members and build your own version of this fine looking semi-scale slope soarer then be sure to buy a copy of the February issue of RC Model World and read the plan feature. A laser cut wood pack and moulded canopy are also being developed to go with the plan for this two-channel jet style glider

Simple Sandbox

It's often said that the best ideas are the simple ones and this is certainly true of Bill Bowne's clever adaptation of a workbench drawer. Box it in, add a hole for a vacuum cleaner hose and sand away over the top of it. As you shape your work-piece nearly all the wood dust gets sucked cleanly away

FEBRUARY 2016 ISSUE ON SALE THURSDAY 21ST JANUARY

Maxford Gotha

Here's something a bit different from the run of the mill scale ARTF's. How do you fancy a model of the Gotha WW1 bomber? Matthew Boddington builds Maxford USA's 62.5" wingspan sport scale kit for twin electric brushless motors

PLUS...

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

All contents are subject to change without notice

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EXPERIENCE THE THRILL OF MAXFORD USA'S GOLDEN AGE ARFs

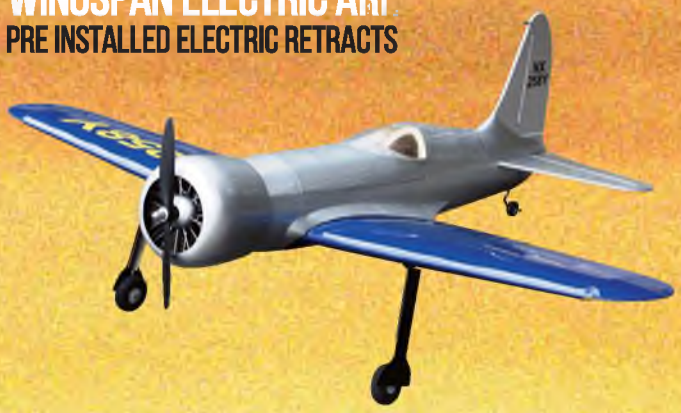
Stearman PT17

1/5TH SCALE - 77" WINGSPAN
IC OR ELECTRIC ARF

Wingspan: 77in (1956mm)
Overall Length: 57in (1447mm)
Wing Area: 1,686 sq in

HUGHES H-1 VERSION 2

50" WINGSPAN ELECTRIC ARF
WITH PRE INSTALLED ELECTRIC RETRACTS



Wingspan: 50in / 1270mm
Overall Length: 41in / 1041mm
Wing Area: 490sq.inch

Curtiss PUSHER

1/9TH SCALE

50" WINGSPAN
ELECTRIC ARF

Wingspan: 50in (1270mm)
Overall Length: 48.5in (1232mm)
Wing Area: 788 sq in

Rumpler Taube

64" WINGSPAN
ELECTRIC ARF

1/9TH
SCALE

Wingspan: 64in (1625mm)
Overall Length: 46in (1168mm)
Wing Area: 653 sq in

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Specifications

Wingspan:	1000mm (39.37")
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Motor:	920kv Brushless (Inc.)
ESC:	40A Brushless (Inc.)
Battery:	3S 2200mAh 30C Li-Po (Req.)

Part Number: A-CF050

The new Wots Wot Foam-E is an amazing flier, combining the slow speed characteristics of the Wot 4 Foam-E with the precision and 'locked in feel' of the Acrowot Foam-E. Designed to suit a 3S 2200mAh Li-Po battery, the resulting model can fit in an average hatchback car boot fully assembled!

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