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Contents

AUGUST 2016 • ISSUE #391

FRONT COVER

Neil Hutchinson can always be relied upon to take some great shots of models seen in action at the Large Model Association flying events. Here Neil has captured the evocative de Havilland DH90 Dragonfly built by Steve Rickett. The majority of the model is of standard wooden construction but it does use some fibreglass parts, such as the engine cowls and wheel spats, all made using Steve's own moulds. Neil says that the 157" wingspan Dragonfly looks fabulous in flight and once Steve has finished off the cockpit it will be hard to tell it from the real thing.
Read more, starting on page 90

REGULARS

REVIEWS

FEATURES

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Pre-flight

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

Welcome to the August issue of RC Model World. Last time I discussed moving my models to a storage unit while I sorted out my workshop. This has worked really well and I'm even more tempted now to keep the unit long term. It has allowed me to uncover quite a few models that had lain dormant for long periods and I've been having a ball getting them back into the air and rediscovering the idiosyncrasies of each aeroplane.

Whilst doing so I've taken the opportunity to photograph each model and to add the details of each one to an app on my phone called 'What's In My Collection'. This is an easy to use cataloguing application and I use it to record details such as the transmitter used, switch positions, battery details and connector types, as well as any special notes concerning the operation of each model.

For instance, my notes for the Max-Thrust Lightning glider (which, incidentally, would have my vote for an RCMW 'Model Of The Year' award, if we had one!) show that it is flown using a Spektrum DX6 and uses an 1800 or 2200 mAh LiPo. The connector is a Deans type but requires an adapter to hook it up to my EC3 equipped battery packs. With this info to hand it's very easy to accumulate all the correct equipment the evening before a flying session, rather than turning up to the flying field and finding out that I've brought along the wrong Tx or have forgotten the battery adapter. And, yes, I've managed to do both of those recently!

This month I'll be adding a new entry for the delightful Ares Fokker DVII, which is proving to be a great little aeroplane for flying on the small patch outside Traplet Towers after work. You can read my review, starting on page 16 of this issue. Also on review we have the first of a two-part feature describing the build of a Roban Bell 407 scale helicopter by Jon Tanner.

As this issue is being compiled the model show season has kicked off in grand style and we celebrate the return of the major flying events with reports from the Long Marston and East Kirkby shows. Phillip Kent also describes some of the scale models seen flying in the first round of this year's Traplet Scale 'War of the Roses' competition at Pontefract.

If you enjoy scale gliders then this issue is a double treat, containing two articles from one of the discipline's leading lights, Chris Williams. Besides Chris' regular Scale Soaring column we are also very pleased to introduce you to the plans for his latest large-scale aircraft, the magnificent quarter scale Slingsby T42 Eagle. However, if you like to spin a prop and make a bit of noise when flying then our free pull out plan this month may be just up your alley. Designed by John Rutter, Bolt is a stylish 920 mm span V-tail sports model for four function R/C and suits a .15 two-stroke glow engine.

Add to the mix articles on fabricating a working scale undercarriage, making a lightweight field stand and more advice on setting up Electronic Speed Controllers, plus much more besides and this issue should keep you amused for a fair bit, whether enjoying the sun in the garden or soaking up the rays lying on a beach. Until next time...

Happy flying!

Kevin

CHECK OUT PAGE 36 FOR OUR LATEST SUBSCRIPTION DEALS

RC MODEL WORLD

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Take Off R/C News and Views

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

Zortayak Zortawrong!

Mike White, who designed Zortayak (MW3784), which was the free plan in the June 2016 issue, has informed us of some serious issues with one side of the drawing. Mike writes:

"I have received an email from a builder about the Zortayak in which he raises some questions about the fuselage drawing. I have laid my tracing over the free plan and I suggested to the builder to:

1) Make the wing LE 6.25 inches aft of the nose
2) Make the wing slot to fit the wing as presented
3) Make the fuselage 36.5 inches long
4) The wing plan and tailplane are OK but the tailplane slot in the fuselage has to be made to fit the tailplane

Will it be possible to make an entry in the coming magazine to correct the plans?"

Many thanks for your suggestions, Mike, which we are only too happy to pass on to our readers. And sincere apologies to yourself and any readers affected by this problem.

After further investigation it has come to light that the Zortayak plan was scanned by a different company than the one usually used by Traplet and a scaling error has occurred.

Thankfully such issues are very rare but it has been suggested in future that our plan designers should add a simple scale bar on each sheet that they supply so that scaling errors can be avoided.

For those readers who wish to build this model and who would prefer to work from a corrected drawing please contact our Customer Services department who will direct you to a PDF version.

Fisher Delta 3D Printer Parts

The Traplet Shop website has just been updated to include a large number of parts and accessories for the Fisher Delta 3D Printer that has been a great success, especially at the shows. We understand from Barry and Angela, who staff the Traplet stand at model events, that the complete stock of these printers sold out at the recent Weston Park model show!

Having scanned the parts on offer at gb.trapletshop.com/3d-printing we selected the following items as being of most interest to our readers:

Buildtak Print Surface

Product Code: 3DP1262
Price: £6.00

Works with PLA, ABS, HIPS, PET+, brick, wood and flexible (TPE) filaments. Additionally, we have had success with getting nylon and t-glase (PETT) to adhere when used with a thin layer of washable glue stick on the Buildtak surface.

It installs much easier than the masking tapes or films typically used and with fewer chances of air bubbles. And it protects the build plate. Heat resistant and durable, it can be reused for many consecutive builds and you can use different filament materials without the need to change the printing surface.

Buildtak Print Surface creates an optimal bond between the 3D printed object and build surface that maximises the chances that your object will be held in place for the duration of the print. And it then allows for clean and easy removal of the object from the build surface.

Fisher Delta 3D Printer – Prebuilt and Tested

Product Code: FD3DPPB
Price: £425.00

This offers the customer the option of purchasing their 3D printer ready built and tested for an extra £76.00 over the cost of the standard printer kit.

Fisher Delta Heatbed Upgrade

Product Code: 3DPBED
Price: £59.80

This product bundle includes all parts required to upgrade a Fisher Delta 3D Printer to use a heatbed print surface. Unleash your Fisher's potential with this heated upgrade kit, allowing you to print in a far broader range of materials, including ABS, PETG, HIPS and many more.

The heated kit is designed to simply replace the standard bed, with no disassembly of the machine required, and retaining the auto-compensation functionality of the original design. With 120 W available the print surface temperature may be raised to 110 degrees C, allowing printing with materials such as ABS with a nozzle temperature of 250 degrees C.

The upgrade kit includes: Fisher Heatbed Kit, 19 V 6.32 A (120 W) power supply, roll of Kapton tape

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Just In Time For Haverfordwest

Greg Highfield of the Haverfordwest Model Club has just squeezed in with notification of the club's fly-in, which will be held soon after this issue goes on sale. Well saved, Greg, but please give us a bit more notice next time! Event organisers are requested to give us at least two months notice to ensure that their dates can be compiled into our Diary Dates event calendar.

Haverfordwest Model Club are holding a Fly-In on Sunday 31st July 2016 at Templeton Airfield, Pembrokeshire, at the site owned by the MOD. Flying starts at 10 am following Pilots' Briefing. There is no charge for admission.

Pilots, please bring BMFA Membership Card with you. The event is open for flyers of R/C model aeroplanes and helicopters. We have an attractive setting and friendly members offering a warm welcome. There will be refreshments in the way of a burger and an ice cream van, in an area that is also set aside for people to sell their surplus models and hobby related engines, spares etc. There will be a portable loo available for the day.

For further information please contact Greg Highfield on 01437 899843 or 07913 781150.

Or email: greghighfield@hotmail.co.uk

STOL Flies!

In the May issue we published details of Denis Sharp's STOL project. The model has now been successfully flown, as Denis reports:

"It flies (just) but needs more work.

The name? Not decided yet. I was thinking of calling this model FTR, short for Flying Test Rig. An alternative name is Dulux Delta because of what I painted it with! The paint job is to improve visibility, not to win any awards for the finish.

Ideas it was designed to test:

1) Thrust vectoring to reduce take-off and landing speed, as tried successfully in 1954 with a modified Meteor jet.

2) Negative camber on the leading part of the delta (the red bit). Sometimes people consider a delta-winged aircraft as being swept wing, with the gap between the wing and the tail filled in. You need up on the elvons to ensure longitudinal stability, which reduces efficiency. I thought, why not consider it as a canard with the gap filled in? Then I thought, this must have been done before. A bit of Internet searching revealed that it had, on the Canadian Avro Arrow and Concorde. Also the super-critical wing sections used on modern airliners has negative camber at the leading edge.

3) With LiPo batteries, I thought wouldn't it be a good idea to have an inertia switch to disconnect the battery in the event of a hard landing? Also useful as a safety feature to ensure that the model is safe until you take it to the flight line. See the photos, using a modified Maplin 16 A rocker switch.

4) Again when considering LiPo safety, I calculated how much airflow was needed to cool the battery; it seemed a very small amount.

5) And, of course, the basics – C of G in the correct position, fin area and control throws.

The results:

1) Sadly, due to inadequate control throws and my slow reactions, I managed to stall it and damage the nose too badly for it to be flown before I could try vectored thrust in flight. The model will be repaired, modified and tried again. I may fit a gyro to compensate for my slow reactions.

2) I tried with 5 degrees and 10 degrees up on the leading section. Not enough and a larger area is needed to be effective. So I set it to zero and flew the model conventionally with up on the elvons.

3) This worked, particularly on the last flight!

4) Also worked, with the battery and speed controller only slightly warm after a flight.

5) Fin area was OK but the control throws were too small. The C of G seemed OK in flight but rechecking it afterwards using both the cardboard cut out method and an online C of G calculator, the static margin seemed smaller than I previously estimated (it depends what assumptions you make). The C of G position is fixed by the location of the vectored thrust, so I have to improve the static margin by cutting down the wing at the front.

The model will be repaired, modified and control throws increased. And I am considering fitting a gyro to help my slow reactions. I've now thought of a simple way to 'blow' the elvons and rudder to improve control at low speed. I may try to increase the area of the negative cambered leading section. When successful I plan to simplify the design and build a new one.

A friend who speaks French told me I made a mistake using a duck as the pilot of a delta. It would obviously be better at piloting a canard!"

Dremel Launches 'DREMEL It Yourself' Club

To celebrate the projects that Dremel users across the country create on a daily basis the precision tool maker has now launched its very own 'Dremel It Yourself' Club.

Keen hobbyists, including aeromodellers, are invited to join the 'Dremel It Yourself' Club. Joining offers members the chance to get involved in a series of challenges set throughout the year, complete with the opportunity to win Dremel prizes.

The DIY projects can be as wacky and wonderful or quirky and quaint as you like. But they must demonstrate how you have used DIY for good – e.g. created something for someone in need, made someone a special gift, or built something to be auctioned for charity. Entries will then be given a score out of 100 on the project's creativity, practicality and complexity

Those wanting to get involved firstly need to register their interest at http://bit.ly/DremelClub or on the Dremel Facebook page, where full terms and conditions can be seen.

Details of your first challenge will be sent as soon as you have registered and further challenges will be set throughout the year.

www.dremel.co.uk

www.Facebook.com/Dremel

National Museum Of Flight Hangars

National Museums Scotland has re-opened two of the National Museum of Flight's aircraft hangars following their £3.6 million restoration and redevelopment. The Second World War hangars at the East Lothian attraction offer an exciting new experience for visitors of all ages. Built in 1940-41, they are part of the East Fortune Airfield Scheduled Monument and are imposing features at the atmospheric former wartime airfield.

On completion of their restoration the hangars will house an array of world class military and commercial aircraft, engagingly presented through interactive and film programmes. The stories of those who piloted or flew in the aircraft will also be told through displays featuring uniforms, documents and photographs.

One hangar will display military aircraft, including an English Electric Lightning, the RAF's first supersonic jet fighter, and the other will display smaller commercial and leisure aircraft dating from 1969 onwards, including a Britten Norman Islander and a Scottish Aviation Twin Pioneer.

The hangars will be insulated and heated for the first time using an environmentally friendly ground-source heating system. Funding for the redevelopment includes a £1.3 million grant from the Heritage Lottery Fund and £1.8 million from the Scottish Government.

For further information on the National Museum of Flight, including directions and admission charges, visit: www.nms.ac.uk/national-museum-of-flight

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Aircraft Paint Scheme Credit: Edward Eck

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www.zoomport.eu

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The Do 335 was also affectionately known as the 'Ant Eater', due to its unusual appearance, and is now available from Pichler Modellbau. This model has a wingspan of 1724 mm and is driven by two optional motors. This ARF model is made entirely in high quality balsa and plywood, and is covered with printed film. If looking for something different then maybe the Dornier Do 335 is just what you are looking for.

www.pichler-modellbau.de

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www.trapletshop.com

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The new CGO3+ camera gimbal with a Sony® sensor has 360° unlimited yaw. Combined with the retractable landing gear this allows for unobstructed views in any direction. The Typhoon H includes the Android® ST16 Ground Station, featuring an in-built 7" HD LCD touchscreen, displaying live footage in HD 720P.

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Fokker D.VII

This little WW1 biplane from Ares is perfect for a spot of still summer evening flying. The Editor takes it for a flight or two

During our visit to this year's Nuremberg Toy Fair, Bob Petrie, from leading UK distributor J. Perkins, waved us over to the Firelands stand to show us the new range of Hitec Red products. Hitec Red uses the Hitec Minima 2.4 GHz protocol so any models that display the Hitec Red symbol can be paired and flown with any current Hitec transmitter. This is called 'Pair To Fly' or PTF for short.

One of the Hitec Red models on display in Nuremberg was the Ares Fokker D.VII, which is the subject of this review. Our sample is the Ready To Fly (RTF) version, which comes complete with a pre-paired Ares four channel 2.4 GHz FHSS transmitter that features an integral charger to charge the tiny 70 mAh single cell LiPo used to power the little Fokker.

Alternatively, you can also purchase the D.VII as a Pair To Fly (PTF) model, which is supplied with the 70 mAh LiPo and a separate USB charger, but without the Tx. The clear and concise eight page Quick Start Guide gives well illustrated instructions on how to get flying quickly with either version, including how to pair the PTF version to a suitable Hitec transmitter.

Full Of Character

At just under 16 inch wingspan this delightful small warbird represents the aircraft flown by Lieutenant Hugo Schäfer of Jasta 15, which is characterised by its red and blue fuselage emblazoned with a winged sea serpent. This is well represented on the petite model, as is the four colour lozenge camouflage on the wing panels.

Adding further character, the D.VII's large wooden propeller is replicated with a realistic 4.7" x 2.75" micro scale prop, which features some finely moulded details on its hub. And on top of the cowl can be found a neat representation of the Mercedes D.III six-cylinder in-line aero engine, complete with its distinctive multi-branched manifold and exhaust. Just aft of the engine are found a pair of tiny Spandau machine guns. And we also like the wing shaped axle cover and the large diameter scale wheels. Just to add a final finishing touch, a thin card profile adorns the cockpit.

The overall scale effect is very pleasing, although one of the flexible interplane struts on our example looks a bit 'bendy' and detracts just a wee bit. However, these struts need to remain flexible to help with the crash survivability of this agile little fighter plane.

Get Ready!

The Ares Fokker D.VII is supplied in a square format carry case with a flip top lid. This is pretty common with small ready to fly models and as always we would recommend retaining the box for storing the lightweight foam model and for safely transporting it to the flying field or hall.

The model is fully assembled and sits in an inner foam tray, using a small moulded wedge to keep it in place.

The four channel Tx in the RTF box comes with a set of four AA alkaline cells so that you can power it up straight away. But first you need to open a small hatch on the left hand side of the front panel to pull out the integral lead for charging the tiny 70 mAh single cell LiPo. When this is connected an orange LED on the Tx lights up to show that charging is in progress, and when it goes out the LiPo is ready to use.

The battery plugs into a short lead that dangles next to the battery mount under the nose of the model, where the LiPo is retained with a small but powerful magnet. The connectors are marked with a red dot to aid with orientation.

After a quick waggle of the control surfaces and testing the throttle with a blast of

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Component parts: The airframe, well produced instructions, a 1S 70 mAh LiPo, 4 x AA cells for the Tx and a four channel Ares transmitter

A foam tray inside the box keeps the aeroplane and the transmitter from sliding around

Best keep the sturdy carry box for storage and transport

propwash, to check out the proportional three channel control system, it was time to go flying.

Let's Fly!

Our first sortie was on a day with a light breeze. The instructions call for the test flights to be made on a flat calm day or within an indoor venue, but these were the best conditions that we had had for several days and the copy date for this review was looming. However, Traplet's small flying patch was surrounded by knee-high grass, so there was plenty of cushioning available if anything should go wrong.

This little aeroplane has bags of character

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A gentle underhand lob on mid-power settings sees the D.VII safely away

This model is surprisingly agile so use only small control movements until you get used to flying her

The interplane struts flex to soak up flying loads and to ensure high crash survivability. They work well, as we can testify!

After lightly gripping the fuselage behind Hugo, the profile pilot, the titchy model was given a gentle underhand lob into the breeze. Two things immediately became apparent: this model is not short on power and combined with the gentle wind and undercambered wings it climbed skywards with ease. It is also very agile and the first stick inputs were much too aggressive, causing the Fokker to perform an unintended wingover from where it nose-dived into the ground.

Of course, she managed to miss all that lovely long grass and plummeted straight into the landing strip, which offered far less protection! Upon picking her up, I was amazed to find zero damage, so another launch quickly followed. This resulted in a much longer flight, during which we managed to take the flying pictures for this review, albeit with a bit of swooping and diving as the diminutive aeroplane tackled the breezy conditions. Kudos to James, my son, for managing to track the tiny plane as it zipped around! After quickly learning to relax on the sticks a bit, she proved great fun to fly. So with a few pics in the bag we decided to call it a day and the D.VII was brought in for a soft landing into the top of the gently waving grass.

The next day was hot, humid and windless, with only puffs of thermal lift wafting through. So the Fokker was recharged and we headed out for another flying session. As the instructions indicate, these are much better conditions in which to fly this model and I was able to add a few clicks of down elevator to tame the tendency to climb, which was now greatly reduced in the calmer conditions.

This time James was able to put his camera down and have a go himself. His conclusion at the end of the flight? Two words: "Great fun!"

Unfortunately, on the model's next flight it was James' turn to succumb to over-controlling and she ticked him off by performing another wingover into the hard runway. Once again the little biplane seemed unfazed, so I launched her skywards once again. Unfortunately this time there was a resonance from the propeller, so James dropped her into the long grass to take a look.

It was evident that the motor had worked loose after its second nose-in arrival, which really is no surprise.

A Quick Repair

From examination of the cowling the obvious way to gain access to the motor it to prise off the lower panel, which includes the battery mount. However, care needs to be taken not to damage the undercarriage struts whilst doing this, and a sharp blade is necessary to cut through the rubbery adhesive patches that hold the panel in place.

After prising the panel up enough to take a peek inside, I decided to cut a break across it just forward of the undercarriage mounting points to make sure that I didn't loosen the structure in this important area. With the front of the lower cowling removed I now had access to the motor to make remedial repairs.

The motor is mounted by a collar at the front that also supports a reduction gear. Much to my relief this mount was still intact but the rear support for the motor can had broken away. The support is a simple piece of laser cut balsa that protrudes at 90 degrees from the front former. It has a cut out in the front, which supports the motor, where it is retained with a blob of glue and this had broken away. The support had also become loose where it meets the front former; a dab of cyano here and a fresh blob of glue at the front (I used epoxy) soon had everything solid again. The lower cowling was then glued back in position using dabs of foam safe glue and the easy repair was complete.

Conclusions

Flying this little biplane has proved to be good fun. It is definitely a calm weather flyer and the advice in the instructions about this should be heeded, at least for the early flights to enable you to get used to its handling and to dial in any trims that may be necessary.

It is robust too, surviving quite a few tumbles into the long grass and two especially nasty arrivals before the motor broke away. But the motor mounting system used ensured that the damage was minimal and the model was soon up and flying once again.

Overall, this is a small WW1 model that has oodles of character and is a real pleasure to fly. It's very agile and has a surprising amount of power at full chat, which, to be honest, isn't really needed for gentle scale like flying. So dial the 'go stick' back a bit and treat the rudder and elevator gently too, and the delightful Ares Fokker D.VII will reward you with some great calm weather fun flying.

We like your aeroplane, Hugo! ***RCMW***

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In this picture you can just see the LiPo sitting under the nose, where it is attached with magnets

The lozenge camouflage, scale wheels and prop, and the finely moulded engine and machine guns all add to the scale effect

An alternative way to hand launch. Your choice!

RC MODEL WORLD

MODEL INFORMATION

NAME:	Fokker D.VII
MANUFACTURER:	Ares
DISTRIBUTOR:	J Perkins Distribution Ltd.
WEBSITE:	jperkins.com
PRICE:	£74.99
MODEL TYPE:	Micro size WW1 fighter
CONSTRUCTION:	Sheet foam wings & tail, moulded foam fuselage
PARTS SUPPLIED:	Ready To Fly airframe, 4-channel Ares transmitter w/batteries, 70 mAh LiPo
PARTS REQUIRED:	None for RTF version. A 2.4 GHz Hitec Tx for PTF version

R/C FUNCTIONS

1:	Throttle
2:	Rudder
3:	Elevator

SPECIFICATIONS

WINGSPAN:	15.63 in (398 mm)
LENGTH:	12.0 in (305 mm)
WING AREA:	432 sq cm
WEIGHT	
W/BATTERY:	1.0 oz (29 g)
BATTERY:	1S 3.7 V 70 mAh LiPo
MOTOR:	Brushed geared
PROPELLER:	4.7" x 2.75" (120 x 70 mm) micro scale
TRANSMITTER:	Four channel 2.4 GHz Hitec Red enabled
RADIO SYSTEM:	3-in-1 control (Hitec Red compatible Rx, two servos and ESC)

Dislikes

Prone to climbing in any wind

Likes

Lots of character • Flight ready • Well protected in box • Option to use Hitec Tx to control

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Scale Soaring

Chris Williams reports on some fabulous scale slope soaring at the White Sheet Scale Fly-In on the 24th April

The story of any slope-based event always starts at the Met Office. In order to create the lift within which gliders can fly the wind has to blow on one of the available hills. And for people to travel any distance they need the reassurance of a favourable forecast. At the same time a lack of appreciable precipitation is always a welcome bonus. So, given that there are three slopes available to the White Sheet club, it doesn't seem too great an ask, does it? Hah!

With the first date for this event being trashed by inclement weather, the day before this event (the back-up date) the forecasts couldn't agree, with some saying 'yes' and others saying 'forget it'. As I failed to duck quickly enough at the AGM and found myself with the job of Scale Secretary this year, it was my job to make the decision. So with fingers crossed I said 'yes' and hoped for the best.

Phil Huddleston's 1/4 scale Jaskolka in action

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"In the event the lift was mostly epic, with periods of sink that caught out poor Phil Huddleston and requiring a trip to the fields below"

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Steve Fraquet's Goppingen Wolf get the heave-ho from Barry Cole

Pat Teakle's new 1/4 scale Ka6 gets its maiden launch at the White Sheet event

Happy scene on the White Sheet club's NW slope

Motley and I arrived at the appointed early hour and shivered in the strong, cold breeze, which was, at least, blowing partly on Morgans, the club's fine North-Westerly slope. With no great confidence I launched my trusty little fifth scale Duster and was more than a little delighted when she immediately soared to altitude – the event was on! Soon, those equipped with more than their fair share of optimism started to arrive and before long the sky was filled with white specks.

Having received the news a couple of days previously concerning the loss of scale legend Cliff Charlesworth, the originator of scale soaring at the White Sheet club, it was entirely fitting that Pat Teakle, no mean scale legend himself, should turn up with a Ka6 built from Cliff's plan, ready to for its maiden flight. This proceeded without incident, with Pat declaring the model to be a 'sweet flyer'.

It had been a couple of years since White Sheet club member Chris Wynn had maidened his Backstrom Plank after an extended construction period, a period long enough to build a new aircraft carrier. This had been a memorable occasion, where much had gone wrong, to the hilarity and entertainment of the troops. His re-appearance at this event occasioned much in the way of banter, but we looked forward to seeing the Plank back in action in the expectation of a high entertainment quotient.

One of the previous problems had been the model's reluctance to fly above the horizon, the general consensus being that this would have made it dizzy, what with it having no tailplane and all.

This time, the Plank soared heavenwards to such an altitude that it started flirting with clouds and Chris struggled to get her down again, assisted by lots of 'helpful' support from the gathered throng.

A knackered aileron servo put paid to any more adventures but Chris pronounced himself well satisfied and even talked in general terms about building a bigger version!

As well as his more conventional 4m DG 808, Mark Panton had brought along a tiny foam ASK 21, surely the smallest scale glider ever to grace the White Sheet slopes. Contrary to popular expectation this little jewel coped well in the sometimes strong breeze and it only had to go to about 100' to become a speck! Landing the little beast looked to be a bit of a problem, especially as other distracted flyers tended to absentmindedly try to swat it away.

Steve Fraquet, the club's previous Scale

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Geoff Crew's new HW-4 Flamingo on a fly-by

Micro-scale! Mark Panton's tiny foam ASK 21

The Plank tastes adventure once again!

Secretary incumbent, was flying his 1/4 scale Goppingen Wolf, built by Vic Steele, he of a more northerly persuasion. This became the first of the day's casualties, when the radio link went walkabout, and the model landed on the slope face, out of sight of the pilot. Damage was relatively slight, so it seems the Wolf, like the Terminator, will be back.

Sadly, there were a few re-kitting incidents during the day, with two mid-air collisions and a case of 'flying the wrong model' syndrome (names have been redacted to protect the innocent!) On a personal note, I was able to fly the Slingsby Eagle for its first scale outing and pass the transmitter around for those flying the proper mode.

Some later expressed their disappointment that they had decided not to attend due to the conflicting forecasts and there's a moral here, if not two.

First up, there's no such thing as a perfect forecast for a slope event, at least not in recent experience.

Secondly, it's unwise to rely on just one forecast; it's better to look at a bunch of them and see where the consensus lies. The usually reliable XC Weather forecast had the wind due North and had been showing it be so for much of the previous week. This would have rendered the event a no-no. The Met Office and the BBC showed NNW and this is what transpired.

In the event the lift was mostly epic, with periods of sink that caught poor old Phil Huddleston with his pants down and requiring a trip to the field below (he was also one of the victims of the mid-air). So, check all of the forecasts and take an optimism pill, otherwise you could end up at home helping out in the garden!

Chris Wynn displays his Backstrom Plank from the Island Models kit

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Author with new electrified 1:3.5 scale Dart 17R

The Dart in action at White Sheet

Project Conclusion

We signed off last time with a bit of a cliff-hanger, notably the imminent maiden of the newly-completed electrified Dart 17R. It nearly didn't happen as I had only gone up to the slope to take some formal photographs of the beast. To my surprise the wind, contrary to the forecast, was actually on the slope (how often does that happen!) but not in very robust quantities. I set about my work until my brain, finally playing catch up, realised that these were just the conditions for which the model was built. With some trepidation I launched her off into the void, whereupon she slowly started to sink below the horizon, heading for the Brown Zone.

Brown Zone...? Not likely, I muttered, and flicked the switch that would energise the motor. Nothing happened. Well, it did, but mostly in the trouser region. Through my horror I dimly realised that the safety switch was still in the safe position and the subsequent sound of the purring motor settled my nerves somewhat. (These 16 channel trannies are all very well, but do we need all those switches?)

The big unknown with these sort of projects is just how the motor/battery combination will cope with the weight of the model, and it soon became clear that lack of urge was not going to be a problem. Just six or eight seconds of motor run saw the Dart well above the horizon and able then to make the most of the small amount of thermal lift that was about.

Four or five sessions later I can pronounce myself more than satisfied with this machine. In fact, I love it! The two 3S 2200 LiPos last long enough in marginal slope conditions for eight or nine climbs to 150 feet or so. And at around £11 per battery it's not too big a dent in the old bank account to carry some spares. The only mods to my original design, apart from simplifying the spar structure in the wing, was to extend the chord by some 10 mm in the expectation of a higher wing loading, although it turned out to need a fair amount of extra ballast in the front anyway. So excited were my pal Motley and myself at this model's success, we immediately cast around for another candidate for electricityfication, soon coming to the conclusion that my recent Bergfalke 4 design was favourite. The balsa dust has started flying – watch this space...!

Cliff Charlesworth with his 1/4 scale Ka2 Rhonschwalbe in 2002

Cliff at the SWSA 'Cliff Charlesworth' day in 2015, surrounded by his many designs

Cliff Charlesworth

It is with some sadness that I have to report the passing of scale soaring icon, Cliff Charlesworth. It could be argued, with some merit, that Cliff kicked off scale soaring in this country with the publication of his 1/4 scale ASK 18. At the time, in the 1970/80s, this model seemed enormous with its 4 m wingspan and it immediately became the glider of choice for those who like to build their own models. In the years that followed it seemed that every year a new design appeared, until Cliff's stable of designs became a very comprehensive one indeed, including his two motorgliders, the Tandem-Falke and the T61.

Many hundreds of his designs have been built all over the world, making him a household name amongst model builders. He was also instrumental in starting the iconic scale glider competitions at his home club, the White Sheet Radio Flying Club. So popular did these comps become, with the track at the top of the hill crammed with cars, that he decided to split the competition into two events, one for modern gliders and one for vintage.

In recent years his output of designs diminished, the most recent being his diminutive SF 33 electric motorglider. Some of my own best memories are of the spirited competitiveness between the participants, which seldom descended into acrimony, and which set the scene for today's non-competitive events at the same club.

Cliff's wife, Heather, pre-deceased him by only a few weeks, but there can be little doubt that his legacy will survive for many years to come. ***RCMW***

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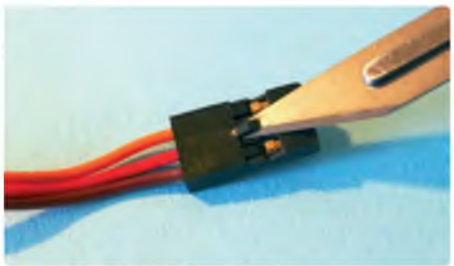
A Beginner's Guide To ELECTRONIC SPEED CONTROLLERS PART 2

Brian Collins takes the novice through the process of setting up an ESC (Electronic Speed Controller) in this second part of his 'ESCs explained' series

Programming cards make programming a quick and simple task and are relatively cheap (around £3-£5)

This 110 A ESC features an integrated BEC with a rating of 6 A. However, this will decrease as battery voltage increases



To disable an integrated BEC carefully remove the centre positive pin (usually red) from the receiver plug

Then fold back and secure with tape or heatshrink tubing

In part one we looked at what the ESC does, how it functions and various features found on popular ESCs. In this second part we will look at what the novice needs to know to set up (programme) an ESC, when to use a 'built-in' BEC, a separate BEC or no BEC at all.

When To Use A BEC?

When building higher powered electric models or models which have several servos and ancillaries it's usually recommended that the integrated BEC be disabled and the use of a separate power supply is utilised. But why? Well, as mentioned in part one the higher the input voltage the less efficient the integrated BEC, making it a good idea to use a separate power source to power the receiver and servos.

In some installations a heavier receiver battery is actually a bonus as it can help obtain the correct C of G (Centre of Gravity). This can be an issue with larger IC to Electric conversions as the electric power train usually weighs less than the intended IC engine.

Disabling The BEC

It's a simple task to disable an integrated BEC. Lift the centre pin, often the red wire (positive) from the receiver connector, remove it and tape/heatshrink it along the cable (see picture). The same principal is used for multi motor aircraft, however if the model has several control surfaces and subsequently several servos, retracts, lights etc. then it is 'best practise' to remove all the BECs and use a separate power supply for the receiver/servos.

If the model needs to be as light as possible a separate BEC device can be used. This is a small electronic circuit that accepts a wide range of input voltages, producing a regulated lower output voltage to power the receiver, servos and other ancillaries.

For example the Castle Creations BEC Pro (pictured) can provide 20 A (peak). It draws its power from the model's flight battery, however like any BEC the higher the input voltage the lower the output current. For instance, at 16 V input this unit can provide some 15 amps but at a higher input voltage of 48 V the output power drops to 8 amps.

Some ESCs do not have a BEC. This type of ESC is called an 'OPTO' ESC. 'OPTO' means the ESC's circuit is electrically isolated from the receiver/servo circuit so it only powers the brushless motor and does not supply power to run the receiver/servos. OPTO ESC's tend to be used in higher power applications where an integrated BEC simply cannot supply sufficient power, so a separate receiver/servo supply is used.

When Not To Use Integrated BEC

Personally I use never use an integrated BEC in applications of 4S or over, especially if the model has multiple servos, retracts, lights etc. I always use a separate BEC device to power the receiver and servos. Some people will see this as a little too cautious but I prefer to know the receiver and servos are still getting power, even if the ESC fails.

People may argue ESCs now feature integrated BEC power ratings of up to 6 amps. But don't forget that is at the lower end of the voltage scale and at higher input voltages this will 'drop off' significantly, which is why I prefer to use separate BEC devices at 4S and above.

ESC Programming

Many ESCs are programmable, meaning the user can adjust various settings in order to set up the model's powertrain according to specific requirements: a particular motor type or discipline for example. As an analogy think of the changes that can be made to your car's ECU. Many cars have a 'sport' or 'eco' button. This adjusts the throttle mapping (plus other parameters) to fine tune the engine's performance in accordance with the driver's requirements.

However, ESC programming is not for everyone. Indeed many people prefer to simply use a 'plug-n-play' type of ESC that 'auto detects' the flight battery and motor type, then set themselves up accordingly. The only programmable option with this type of ESC is often brake-on or brake-off.

Some pilots prefer to use a programmable ESC, which has the benefit of being able to adjust various parameters to optimise best performance or set for the highest efficiency, consequently providing longer flight duration – or a particular feature for a specific model type.

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This 'OPTO' ESC has no integrated BEC so there is no need to remove the positive wire when fitting a UBEC

Wiring in a program card is an easy task, as can be seen from this simple set up

Castle Creations 20 amp BEC 'paralleled' to a 125 A 10S ESC ready for installation in the author's Vulcan bomber

This 100 amp ESC from Castle Creations features a switching BEC, as opposed to a linear unit, so producing less heat

The author's large Vulcan bomber flying on a single 120 mm aeronaut carbon EDF unit, running on 10S (2 x 5S Optipower 50C 4700 mAh LiPo packs in series) with a Castle Creations 20 amp BEC

Programming Options

There are various ways to program ESCs depending on type and manufacturer. Several ESCs use program cards, which are able to adjust various parameters. There are different types of cards available, with some using LED lights to indicate or to confirm adjustments, whilst others use jumper plugs to select the programming options. In addition to program cards, some ESCs can be programmed via your laptop or desktop computer using a USB adapter.

Several speed controllers can also be programmed manually via your transmitter, which involves going through a programming menu via a list of musical tones, but this can be daunting to some. But once you go through the step-by-step directions that are supplied (I never buy ESCs which do not come with instructions!) it is not too difficult, although it can be rather time consuming!

The motor needs to be connected when programming most ESCs (without the prop) as it acts as a 'loudspeaker', providing audible adjustment confirmation tones. Not all ESCs work with all programming cards meaning you have to buy a card which is specific to the ESC. However, they are relatively inexpensive and make ESC programming a much quicker operation!

Adjustable Parameters

Different ESCs offer different programming options but the most popular (in no particular order) are:

Features	Options
BEC Voltage:	5 V or 6 V
Brake:	On, Off, Soft, Hard
Battery Type:	Auto, NiCad/NiMH, LiPo/Li-ION
Power Cut Off Voltage:	Auto, Low, Middle, High
Motor Cut Off Type:	Soft-Cut or Cut-Off
Start Mode:	Normal, Soft
Timing:	Auto, Low, High

In addition, some ESCs also offer the ability to adjust PWM (Pulse Width Modulation) settings and helicopter ESCs may feature a governor mode.

So what does each option do?

BEC (Battery Elimination Circuit)

The normal voltage output for a BEC is 5 V. Some controllers allow the user to select between 5 V or 6 V depending on receiver and servo type.

Brake

Most brake settings are simply a case of 'on' or 'off'. Some ESCs offer the ability to apply the brake in a 'soft' or 'hard' manner. The 'brake' functions when the throttle is closed and the ESC applies a braking effort to the motor to stop it rotating. The movement of the model through the air causes folding propellers to fold back, reducing drag.

Battery Type

Adjusts the low voltage protection threshold for the battery type selected. This function is particularly useful for LiPo battery packs, which can be rendered useless if discharged too low. Many speed controllers also have

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JP EnErG Pro ESCs feature Switching BECs and are fully programmable. This 40 A unit is low cost but can handle 2-6S LiPo packs

Being able to program the motor brake via the ESC allows folding props to reduce drag on glider installations

an 'auto detect' setting, automatically setting the threshold to a factory default setting. The ESC reads the initial voltage of the battery and adjusts the threshold accordingly. However, it is important to use fully charged packs when using this feature.

Power Cut-Off

Sometimes referred to as Low Voltage Cut-Off.

This feature cuts power to the motor before the battery is completely exhausted. Without this feature all power to the receiver and servos would also be lost when the battery becomes totally flat, causing the model to crash. The PCO/LVC monitors the flight battery voltage and cuts power to the motor at a designated voltage. Typical settings for a LiPo battery are 3 V per cell, meaning that a 4S (14.8 V) battery would be discharged to 12 V. Lower value settings (as low as 2.8 V) are often used in competition models where every single electron is needed!

However, many 'club' pilots set PCO/LVC at a slightly higher value (3.2 V), promoting longer battery life. Some ESCs feature automatic PCO/LVC and once the PCO/LVC has been activated the motor cuts. Power can often be restored again by gradually opening the throttle to around 50%, meaning the load on the battery is significantly reduced, allowing the battery to 'recover,' which often allows sufficient time to land the model safely.

Motor Cut-off

Controls the manner the ESC cuts power to the motor when low voltage is reached. It can be adjusted to cut-off gradually or to produce an immediate cut-off.

Motor Start Mode

If full power is applied to a stationary motor the initial current can be high, especially if the motor is turning a large propeller. 'Soft start' mode can be selected, which applies power to the motor more gradually, meaning the motor is rotating before full power is applied, so preventing large initial current levels. It is often used when turning large diameter propellers and if using a gearbox as it offers protection for the gears. Some EDF pilots use 'soft start' when powering up EDF models for the same reasons.

'Fine tuning' the ESC's timing can achieve power gains in high performance models like EDF jets at the expense of flight times. This Freewing F-16 has its timer set for just four minutes-but what a heart pounding four minutes it is!

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In some installations using larger Sub 'C' NiMH receiver packs can help obtain the correct Centre of Gravity

This USB programme link from Castle Creations allows the user to adjust ESC settings via a laptop or PC

Above: Unlike brushless motors brushed motors, as fitted to the author's six 'engined' Me 323 Gigant from Graupner, can run from a single ESC!

Right: The bottom row of MOSFET semiconductors have burnt out on this 100 A ESC. Correctly setting up the ESC can help avoid such failures

Larger 'outrunner' type motors usually perform best with 'low' or 'soft' timing. Ideal for converting IC models to electric power

ESC Program cards make programming much easier. Each LED light indicates the relevant setting, changed by pressing the buttons. The motor 'beeps' to confirm setting, then disconnect – easy!

Timing

The ESC controls the motor's timing on a brushless motor. It is useful to be able to adjust the timing in order to 'tune' a particular motor type, or for a particular discipline.

Like an IC engine advancing the timing produces more power but will burn more 'fuel' (higher current), whilst retarding the timing will have the opposite effect. Many speed controllers have an 'Auto' timing feature, setting the timing automatically – this works well for most motor types. However, in order to achieve the best efficiency (or power), adjusting the timing will ensure optimum performance.

Generally low pole motors (such as 2-4 pole 'inrunner' motors) run best on LOW timing settings (also referred to as SOFT timing on some ESC's) whilst higher pole motors (such as 6+ pole, as well as 'outrunner' motors) produce optimal performance on HIGH (or HARD) timing settings. However, if in doubt check the manufacturer's recommendations.

PWM (Pulse Width Modulation)

Brushless ESCs generate a 'pulse' whose width or switching rate (i.e. duration), which can be altered. A simple explanation of PWM is how much power the ESC sends to the motor with each 'pulse'. Popular values for PWM are: 8 KHz, 12 KHz or 16 KHz. As a general rule the higher the timing and PWM setting the more power the motor should produce at the cost of efficiency, flight duration and increased temperatures.

As per timing, most ESCs have a PWM 'Auto' setting and many pilots will never need to adjust this parameter. But for those who do it is important to read the motor manufacturer's recommended settings prior to making any adjustments otherwise serious damage may occur.

Governor Mode

Governor mode is used for helicopters. Basically governor mode will keep a certain head speed that you set it for on positive rotor blade pitch, doing the opposite with negative pitch.

Other Options

Other programmable ESC features include 'factory reset', 'motor rotation' and even programmable musical tones, most of which are self-explanatory.

And Finally

I hope this series on ESCs has provided the novice/beginner with some useful tips and information on how to select, install, operate and program an ESC – a vital part of any electric model's power train. ***RCMW***

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Long Marston Model Air Show 2016

The popular Midlands model show kicks off our event reports for the 2016 summer season

The Long Marston Model Air Show was held on the airfield of the same name over the weekend of June 4th and 5th. With its proximity to Stratford-upon-Avon it offers plenty of alternative attractions for other family members while the modellers settle down to enjoy the flying displays and to browse the multitude of trade stands. Here's a small taster of what went on during the event.

RCMW

There were quite a few nice scale models at the Long Marston show but one of the best was this delightful 1/4 scale Tiger Moth built by Richard Welch from the Pilot kit. Powered by a Laser 180, Richard's highly detailed model is based on the full size example based at Reading

Daren Graham, standing with the Union Jack Spitfire, heads up the exuberant 'Mighty Reds' team, who put a selection of the ever popular Cambria Funfighters through their paces. It's great to see – and hear! – these vividly coloured glow powered models tearing up the sky
www.funfighters.co.uk

A large Extra, sponsored by Al's Hobbies, punches vertically into the overcast sky. Fortunately it stayed dry for the duration of the show
alshobbies.com

Wheels off! One of a pair of 'Gentleman Jim' P-51D Mustangs takes-off, quickly followed by another. Although designed for 60 cc petrol power, the 89 inch span display aircraft are both powered by the optional E-flite Power 360 electric motors. Paul Camilleri and AJ White present their tasty warbirds to the camera
www.horizonhobby.co.uk (search for HAN4770)

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These days we get to see some quite stunning piloting skills at model shows. Some of the best flying at Long Marston was performed by Callum Setter, seen here with his 104 inch 3DHS AJ Slick, which is powered by a DLE 111 and controlled by Hitec radio

Callum also flew probably the smallest and arguably the fastest model at the show, an electric Voodoo. So fast it proved impossible to photograph in the air!

We interrupted Mike Stevenson as he was charging Tony Hooper's 1:15 scale Concorde in preparation for a fast taxy tun along Long Marston's runway. The P160 JetCat turbine powered model is 12 feet 6 inches long and features a working droop nose, which Mike demonstrated for us

We asked some of the traders to show us an example of their best selling products. Ali Mashinchy of Al's Hobbies was quick to pick out this Yuneec Typhoon camera drone
alshobbies.com

Steve Tandy of the Cambrian Model Company proudly displays a bare bones sample of The Answer. The 44 inch span laser cut kit comes complete with hardware, including a preformed undercarriage. Perfect for flying on those still summer evenings
www.cambrianplanes.co.uk (search for The Answer)

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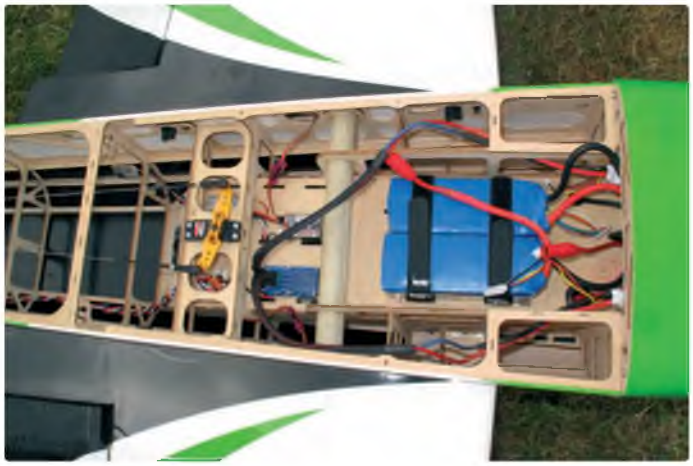
Traplet's 3D printing guru Mal Luff was on hand to demonstrate the Fisher Delta 3D Printer to interested visitors. He is also the man behind Traplet's new range of 3D printed kits, which include guns, gunsights and instrument panels
trapletshop.com

The avionics bay of one of Horizon Hobby's demo jets is a good illustration of the components needed to control a modern R/C jet. Neat job too!

Long Marston regular Shane Harding had a spot of bother starting the previously reliable turbine in his Rafale jet. He is seen here trying to spot and evict those pesky show gremlins

Rising star Rory Tooley ably demonstrated his 3DHS Extra 330LT, powered by a Scorpion motor. At just 11 years old, Rory has already secured sponsorship from RC heliGURU
rcheliguru.co.uk



Chris Bransbury of the MacGregor Industries/JR Propo display team shows off his vivid green Extra 330 SC from the Pilot RC kit. Powered by a DualSky GA6000.8 Xmotor, energised by twin 6S 5000 mAh Optipower LiPo packs, this 88 inch wingspan beauty is controlled by a full JR XBus setup using JR NX8925 servos
macgregor.co.uk/pilotrc.htm
www.jrpropo.com/english/propo/XBus

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Cheerful as ever, Mark Tilbury of Century UK chose these Top RC 750MM warbirds as his premium pick from his stock for the show. There's a wide range of these warbirds to see on the Century UK website
www.centuryuk.com/RC-Planes/Scale-Planes

Pick a favourite model at the show? The elegant 4.7 metre Hangar 9 ASW 20 motor glider flown by Steve Schafer would be high on the list. Steve was joined in the air by Horizon Hobby pilots Azza Stephens, AJ White and Sonny Millgate, all flying HobbyZone Conscendo S motor gliders. It made a lovely sight when they were all in formation
www.horizonhobby.co.uk (search for HAN4955 & HBZ8600UK)

'Propguy' Steve Warltier (right) shows his new large model introductory plane, The Graduate, to Callum Setter. Callum will soon be building his own display model from one of Steve's kits and we've asked him to send us a build and flying report. No doubt he'll be using a petrol engine near the top of the 30 – 60 cc range!
www.propguy.co.uk/category/news

Paul Gosling's choice of top product on the Nexus Modelling Supplies stand went to the Hangar 9 P-51 Mustang S 8 cc petrol powered trainer. The near 55 inch span model comes complete with an Evolution 8 cc petrol engine and SAFE R/C technology that delivers bank/pitch limitation assistance, high stability and Panic Recovery capability
www.nexusmodels.co.uk
www.horizonhobby.co.uk (search for HAN5100)

If you hadn't guessed by now Horizon Hobby were pretty dominant on the flight line at this show. The lion's share of promotional activity at shows now seems to have fallen to the talented HH display team, with the company's blue gazebos sadly missing from the trade line

Azza Stephens wowed the crowd when flying this mighty jet powered Fox glider from Paritech
www.paritech.de/content/modelle/foxmdm1.php

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Slingsby T42 Eagle

In the first instalment of a two part article, Chris Williams describes the main build of his 174 inch wingspan, quarter scale sailplane from the mid-1950s, which he has designed for five function R/C

Author with his newly completed Slingsby T42 Eagle

MODEL WORLD

At a Glance

SCALE:	1:4
SPAN:	4416 mm (174")
LENGTH:	2127 mm (87")
WEIGHT:	8.6 kg (19 lb)
WING SECTION:	HQ35/14 centre section to HQ35/12 at the tips
RADIO FUNCTIONS:	Elevator, Rudder, Ailerons (2 separate channels), Airbrakes, Tow Release
WING AREA:	Approx. 14 sq ft
WING LOADING:	20 oz/sq ft

A Practical Model

Fred Slingsby's Type 42 Eagle has the distinction of being the first two seat glider to cross the English Channel, flying on past Brussels before landing. Despite such unflattering nicknames as the 'Mahogany Bomber' and 'Soap Box' the Eagle had a reasonably good performance and was a practical prospect when it came to rigging and maintenance. There are still a few examples flying today for those who want to build an exact replica.

I have incorporated some deviations from scale for reasons of practicality or aesthetics. The ply-covered ailerons of the original have been left open structure, with diagonals for stiffness, in the interests of weight saving. Likewise, the wings have less sheeting than the full size, although both these deviations can be hidden by painting over these areas.

My chosen colour scheme is of the fantasy variety as I was not particularly taken with the full size colour schemes on offer. The canopy used was the ubiquitous canopy from my Skylark 4 plan (MW3106), which has gone on to grace many a model, and this case resembles quite closely one of the modified canopies of a current full size example.

Although one-quarter scale might these days be considered small for a scale glider, such are the proportions of the Eagle that the result is a model that still seems quite large! However, with an AUW of around 19 lb this is still a practical beast for those that like to throw their creations off a hill.

Fuselage

The fuselage sides are first built over the plan. Use the 6 mm ply curved template to steam the bends into the longerons at the front (clamp the longeron end to the template and apply kettle steam copiously). 6 ft lengths of Cyparis were used for the longerons; annoyingly, they were 10 mm short, so they were spliced at the rear under the tailplane seat where the tailplane mount and the ply sheeting will provide adequate reinforcement.

Make up the aluminium brackets for F8 and F10, noting that the dimensions stated aren't set in stone – use whatever is available for the job. Commence construction by gluing F8-10 to one of the fuselage sides. Take care to ensure that the fuselage side is

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the correct way up, as this could easily be confused! Now add the other side, followed by the side plates and then the three central wing mounting plates, which will ensure that this part of the fuselage is correctly aligned. Clamp the rear temporary alignment plates between the F14 and F17 positions, followed by the rear former F20 and the tailplane mounting plate.

Make sure that the tailplane mounting plate has a centre line drawn on it, and use that to sight up against the rest of the fuselage to ensure that, so far, the fuselage is straight.

Add the front formers one by one, starting with F7 and working forward. When you get to F1 there will be a fair amount of bending resistance and a cable tie top and bottom might be necessary. Glue in the 3 mm ply plate between F2 and F3 and use the temporary alignment plate between F4 and F5 to ensure the front of the fuselage is straight and true.

With the pilot holes for the axle drilled out glue in the U/C plates and adjust with a rod through the holes such that the rod is level, both vertically and horizontally. With the rear alignment plates in place begin to add the 6 mm square cross members and diagonals along the bottom, then remove the plates and fill in the gap. Now the top rear formers can be added, followed by the diagonals and the top longeron.

All through this process it is vital to keep checking that the fuselage has no bends or twists in it.

Wing Centre Section

In order to continue with the fuselage it will be necessary to attend to the mounting of the wing to the fuselage.

Pin the TE to the board, followed by the lower main spar and the ribs, except for the ribs where the wing joiner box goes. Add the horizontal LE's and the top main and top rear spars, then add a couple of ply web plates to tie the spars together. Now the wing joiner boxes can be epoxied in between the spars and locked together with ply webbing plates each side. Finish off the webbing for the rest of the wing panel and add the lower rear spar.

Now, fill in between the spars at the middle of the panel with 6 mm ply and close off with a webbing plate to the rear. Make up the 1.5 mm hard balsa lower sheeting and PVA into place. The sub ribs can now be added and the aluminium bracket bolted in place. Add the 1.5 mm ply plate between the rear of the centre ribs.

Now to set up the wing panel on the fuselage. Draw a centre line on the cut out at the centre of the panel, offer up the panel to the centre line on the fuselage, and drill through into the aluminium bracket in the fuselage with a 6 mm drill. Bolt the wing into place, then set the rear of the wing centre

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Early stage of fuselage construction

View of front wing mounting captive nut

Cable tie or tape used to hold fuselage sides together at the front

Temporary jigging plates hold the rear of the fuselage straight

9-pin 'D' plug mounted on its own ply plate

6 mm square spruce diagonals are used to keep the front of the fuselage straight

line to line up with the centre line of the fuselage, and drill though the ply for the rear bolt.

When the wing mounting has been completed, if you are going to use a fixed 'D' connector now is the time to set it up. Glue a 1.5 mm ply plate to the lower sheeting in front of the rear spar and mark out and cut the hole into which one part of the 'D' connector will fit. Screw the connector in place and bolt the wing centre section to the fuselage. Make up another ply pate to fit in the fuselage between the wing mounting side plates, apply a couple of pieces of masking tape to it, then offer it up against the connector in the wing and press hard in order to leave an imprint in the masking tape. This will then give a guide for cutting the aperture for the second half of the 'D' connector.

Once satisfied with the fit of the wing to the fuselage the 'D' plug can be wired up and the top sheeting fitted. Lay the wing panel on top of the jigs, glue the balsa sheeting in place with PVA and weigh it down on to the jigs. As with the outer panels pegging a straight edge of some sort to the TE will help to keep it dead straight as the glue dries.

Fuselage Continued

Make up a card template for the rear turtle deck sheeting and after cutting out the ply, steam some of the stiffness out of it before gluing it to the fuselage. Similarly, make up a template for one side of the lower sheeting and glue the two pieces in place simultaneously. Once the turtle deck is in place you can set about making up the fairing that allows the wing to blend smoothly into the fuselage at the trailing edge.

Start by epoxying in place the two triangular F11d's, then F11c, followed by the 0.8 mm ply sides to the wing pylon. Note the ply extends to and matches the shape of the F11d's. Fill in as far as possible the insides of the F11d's, then finish off with car body filler to achieve the final shape.

Wing Outer Panels

Pin the TE to the board, followed by the lower spar and add the ribs with the exception of R2. Cyano the rear of the ribs

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View of wing TE/fuselage fairing, to be finished off with filler

View of elevator actuating mechanism deep inside the rear of the fuselage

Setting up the basic fin structure

Extra lead ballast added to the F1 before applying the filler

to the TE temporarily; when you add the ply stiffeners use PVA for a permanent joint. Add the top spar, false LE's and aileron spar. Glue in the wing joiner box, ensuring that it's the right way up! Glue in two or three 0.8 mm ply webs, spread throughout the wing, and leave to dry.

Remove wing from the board and epoxy in the 0.8 mm ply closing plates either side of the wing joiner box. Now add the 6 mm square rear balsa spars and the remaining ply webs. Note that 1.8 m (6 ft) Cyparis spars were used on the prototype's wings to avoid the need for splicing.

Now make up and glue in place the lower 1.5 mm balsa sheeting. Ensure that the edge that will be laid against the lower spar is straight; this can then be used to ensure that the wing is straight lengthwise as you peg the sheeting in place. Glue in place the 1.5 mm balsa strip on the lower aileron spar before pinning the jigs to the board and weighing the wing down on them prior to gluing in place the upper sheeting. Masking tape is ideal for securing the sheeting to the LE. When dry, remove from the board, trim the LE sheeting and add the final 6 mm balsa LE. Insert the wiring loom for the servos.

Tailplane

Pin the TE upside down on the board. Cyano in place the ribs, followed by the false LE's. Add the solid balsa infill between the two centre ribs, then make up the lower sheeting and glue in place with PVA.

Pin the three jigging supports to the board and place the tailplane on them. (The tailplane is now upside down again, with the flat top resting on the supports.) Add the top sheeting, weighing the structure down to press it firmly against the supports. When the glue has dried, remove and fit the block balsa tips and 2.4 mm balsa strips inside the elevator shroud, which should then be hollowed out to a roughly semi-circular shape.

Make up the 6 mm hard balsa false LE for the elevator, making it slightly over size. Offer it up to the tailplane and drill through for the Robart hinges. Once the false LE is hinged to the tailplane sand it down to match the profile of the tailplane.

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Setting up the rear canopy framework

Rear canopy almost complete

Setting up the front canopy framework

Adding the 'trimmed' Skylark 4 canopy

Pin the elevator LE upside down on the board, followed by the TE's. Add the ribs and block balsa tips. Remove from the board and add the 6 mm balsa final LE. Hinge the elevator to the tailplane and sand the elevator flush. Add the extra 6 mm balsa blocks to the elevator to accommodate the Robart hinges, then carve and sand the LE to a rounded shape. Offer up to the tailplane and sand further as necessary so that the elevator LE rotates more or less within the shroud. Epoxy a piece of 1.5 mm ply in between the elevator halves and then make up the actuating rod and plate, which is then screwed to the ply.

Now you can make the necessary arrangements to bolt the tailplane to the fuselage. (Note: draw a centre line through the tailplane and through the top of the fuselage, to help with lining the tailplane up properly.) Make up the elevator actuating mechanism and also the spruce/balsa pushrod. Tack-glue the balsa block with the brass outer tube in place, attach the tailplane and work the elevator, adjusting the angle of the brass inner tube by slightly bending the 2 mm soft steel rod until the tubes slide freely together.

Fin And Rudder

Start by clamping the fin base to the fuselage and then glue in place Fin 1. Remove from the fuselage and add Fin 7, followed by the balsa false LE. Fill in with the remaining ribs, then add the 0.8 mm ply sheeting to one side. When that has dried add the other side, ensuring all the while that no twist is induced during the process.

After adding the 6 mm balsa LE offer up the false LE of the rudder to the fin, drill through and hinge the LE in place, before sanding flush with the fin. Now add RUD 6 and RUD 1 with cyano, using the plan to align correctly, then add the TE. Carefully check that the TE is parallel to the LE before adding the remaining ribs. Make up the two lower diagonal half ribs by offering up a suitable piece of 3 mm balsa each time, marking out and cutting as necessary.

Now remove the rudder and add the 6 mm balsa LE, first marking out the areas to be cut out for the hinges. Add the 6 mm blocks to accommodate the hinges and round off the LE and trim as necessary until the rudder rotates more or less within the fin shroud without binding. (You are unlikely to ever make it perfect!) Once you are satisfied with the fit the top block balsa tips can be added to both the rudder and fin and the whole assembly sanded to its final shape.

Canopies

The Eagle's rear canopy is of uncommonly complicated construction. It sits between the cut out in the wing centre section and is hinged to the centre section with two retractable pins either side at the rear, as per the full size. These pins are connected together and the canopy is released from the airframe for de-rigging by pulling on the cable to retract the pins. The canopy is largely constructed with the wing centre section bolted in place.

Construction commences by taping the lower 6 mm square spruce side rails to the fuselage and gluing in place C1 and C2. (Tape over the join areas on the fuselage to prevent the frame from sticking to the fuselage.) Add the 6 mm x 3 mm spruce top rail. Make up the C3's by laminating four strips of 5 mm wide 0.8 mm ply against the template. Trim the C3's to length, epoxy them in place, and then drill through all the joins with a 1.5 mm bit and insert and glue in piano wire pins to reinforce the joint. Pack out the aperture in the wing with 3 mm balsa and glue in place the aerofoil blanks to C1. Add the ply fairing C4 to the front of the canopy.

Now add the 2.4 mm balsa false LE's to join the blanks to C4. Add the 0.8 mm ply sheeting each side between the lower surface of the blanks and the C3's.

You will now need to fit the commercial canopy latches either side of the rear of the canopy frame. Join them with crimped wire, with a loop running down in to the cockpit to allow you to release the canopy from the wing centre section. Now the top frame C5 can be epoxied in place, followed by the 12 mm balsa LE's. Sand the LE's to match the wing and use car body filler to smooth out the joins. Glue in place the 0.8 mm ply side panels.

On the prototype the rear canopy latches are made up from servo arms. Cut off the servo arm from its hub, drill out the end hole for a 1.5 mm threaded control rod and saw into the hole, leaving a small part of the hole on the bottom, which will act as the catch. Screw the arms to each side of the lower canopy rails, put the canopy in place and

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Next time we will complete the build of this graceful glider and see how she flies

drill through into the fuselage sides to accept the threaded part of the control rod. Cut to length so that a small amount protrudes, and then test the latch. A certain amount of fiddling about will be required before it works perfectly, but then it should give no trouble in service.

The front canopy commences with the starboard rail. Both rails are made up to the shape of the fuselage by laminating two lengths of 3 mm x 6 mm spruce together. These are taped to the fuselage sides to take up the shape, with a short piece of 2.4 mm balsa packing in the middle to allow for the natural spring-back. The scale type hinges are made up from four small brass plates with 14 g brass tubes soldered to them and the piano wire rods epoxied into two of them. (These hinges allow the canopy to open wide enough so that the rear canopy can lift up.)

Screw the hinges to the starboard rail and screw the rail to the fuselage. Mask out the corners where the glued joints will be, then clamp the port rail in place and glue in the front and rear formers C6 and C7 (pack formers out by 3 mm) gluing in place spruce gussets to reinforce the joints. Note that C6 sits on the fuselage sides, whilst C7 sits on the canopy rails.

When the epoxy has cured remove the frame from the fuselage and pin the joints with fine piano wire as extra insurance. Make up C8 from four lengths of 0.8 mm ply laminated around the balsa former. Add C6a to C6: this will give you the correct position for C8. Glue in the spruce block to the rear of C7, cut C8 to length and epoxy in place, along with the two C9's to hold it horizontal. Add the two C10's. Now add the ply sheeting to the front of the canopy frame, noting that this is two pieces, joined at the centre. When the PVA has dried, add the two rear pieces of ply as well.

Now glue a 12 mm wide strip of 0.8 mm ply to the inside of C8, the protruding edge of which will provide something for the canopy to fit to. Fit both canopy frames to the fuselage and prepare to cut the PETG canopy to size. Cut off the ends of the moulding, which was originally made for the Skylark 4. (Note that the profile will not be as it was when the Eagle left the factory, but it does match the profile of one or two of the current surviving examples.)

Keep as far as possible to the front of the moulding in order to maximise the curvature. Trim gradually, using fine line tape as a guide, until you have achieved a fit.

Glue the canopy in place with the canopy frame attached to the fuselage to avoid any warps creeping in. You will find that the shape of the mould will resist being glued to C6 but it is easily possible to clamp it in place from behind, through the windows of the rear canopy. On the prototype small self-tappers were used on C6 to hold the moulding in place. Now mask out the moulding in line with the 12 mm ply strip and add filler to smooth out the join between the PETG and frame.

Next month we shall see the completion of the model and find out how it flies... ***RCMW***

Author's Note

For those who like to cut their own parts, I have saved all the parts drawings in PDF format. Most are in A4 and printable from a standard desktop printer but some of the larger parts are in A3 format and might need to go to a suitable shop for printing. Just email me for copies:

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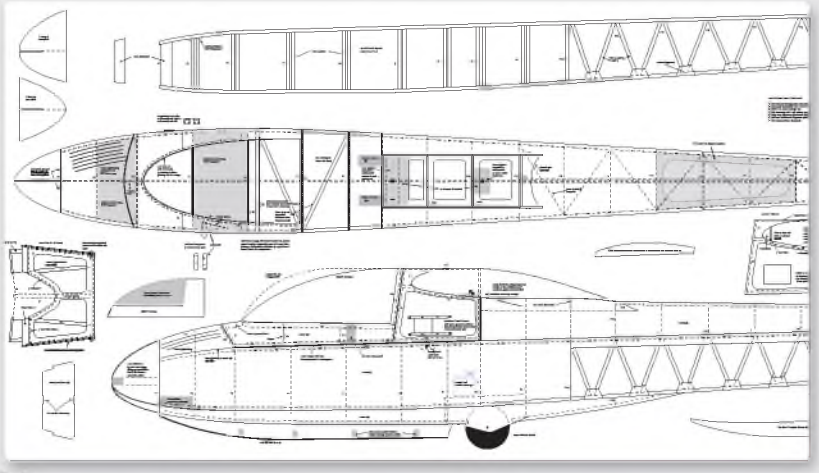

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Light Flight

John Stennard's small model column is a mixed bag this month, covering both indoor and outdoor R/C aeroplanes

Dynam Hawksky V2 has been an excellent and resilient FPV trainer

Budget price 5.8 GHz Tx sets like these are very inexpensive. This one from Eachine uses the balance lead from the flight pack for power

E-flite USM Cub is great for small space and close in FPV flying. It has the AS3X system, which is a great help

As usual at this time of the year Light Flight steps outside to enjoy the sunshine whilst still keeping an eye on the weather free indoor environment. I'm hooked on FPV, from indoor FPV Vapor size to bigger outdoor aircraft, plus the odd quad or two. 'Goggles on' flying offers such a great experience that I would recommend it to any competent flyer. Hooked doesn't mean that I don't still love flying my EDF and aerobatic models, helicopters etc., but for me FPV aircraft do add an extra dimension. So, no apologies for putting on the goggles and launching into a bit of FPV to start off this month's Light Flight.

Hornet FPV

After a year of great FPV flying with my Dynam HawkSky V2 aircraft and E-flite Cub, I decided that I was ready for a more dynamic FPV experience. From being lucky to land within 50 metres of my intended touchdown spot I had progressed to a high proportion of accurate spot landings. The learning curve had included a few mini dramas, such as when the headset battery went down mid flight and I was plunged into darkness.

Two things saved the day. Firstly, my observer knew where the model was and secondly the model was equipped with AS3X stabilisation. Although in visual flight range it was well downwind and I eventually cut the power and let it land. We found the model easily and it had made a perfect landing.

This incident was a sharp lesson to:

- Always check the headset power pack before flying and, as I did later, fit a low voltage LiPo warning device on the balance lead

- If you wear glasses, have them hanging around your neck for instant use if required. Your observer can see the model, but can you?

Another lesson learnt the hard way is to get to know the area around where you fly FPV. Taking a look at the surrounding area on Google Earth is always a good idea and start by just circulating around the perimeter of your flying field. Doing this at different heights is a good idea before flying further afield; it's quite amazing that even with quite distinct landmarks one can easily lose your way when you have the restricted headset view of the world.

I think one of the attractions of FPV aircraft is that you are very much, even with stabilisation, in the pilot's seat. I appreciate that an FPV quad can also give a pilot's seat experience but an aircraft is never going to be stationary in the air and has to be landed by the pilot rather than the computer, which does make a difference.

Wanting an advanced FPV experience that included aerobatics, after some net trawling I came to the conclusion that a flying wing with a pusher motor was the best format. I was prepared to either use a model designed for FPV or modify a standard flying wing.

I initially came across a size issue as I wanted a quite small and compact model, and most were much bigger. However, when looking at an old favourite, the Flying Wings website, I came across a new model called the Hornet. This model is listed as a mini racing model so in theory you could fly it around an FPV racing course. Something for the future, perhaps?

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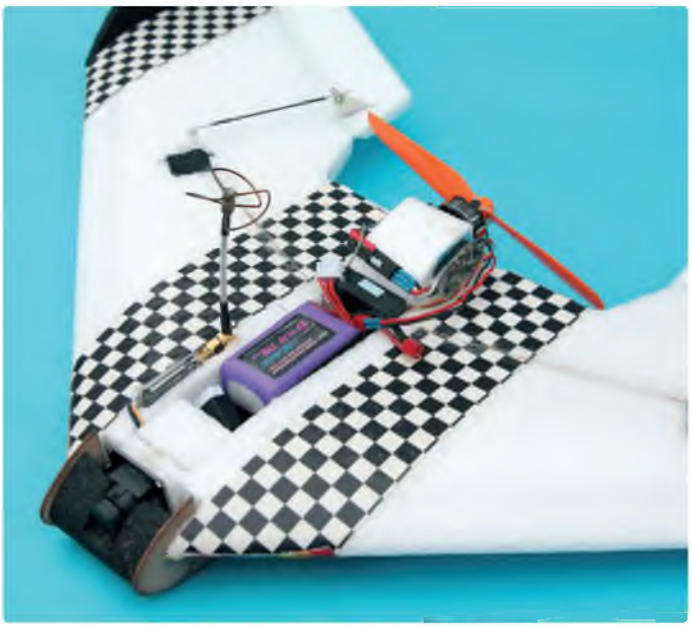
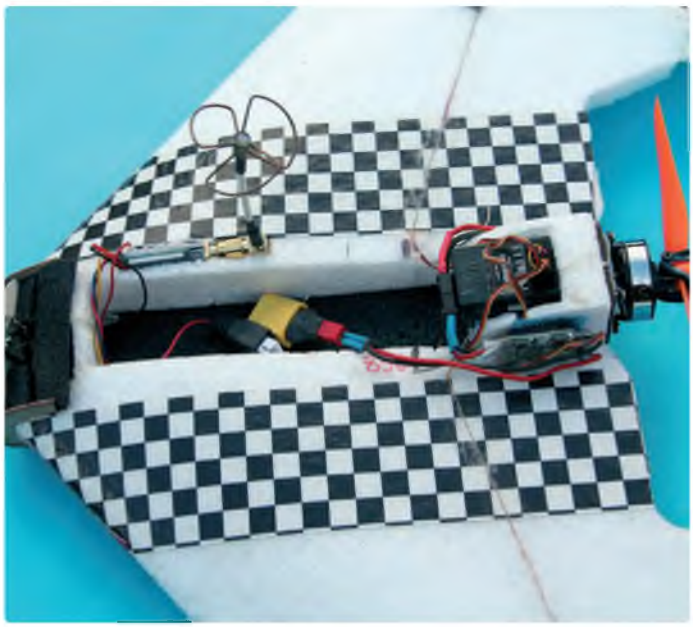
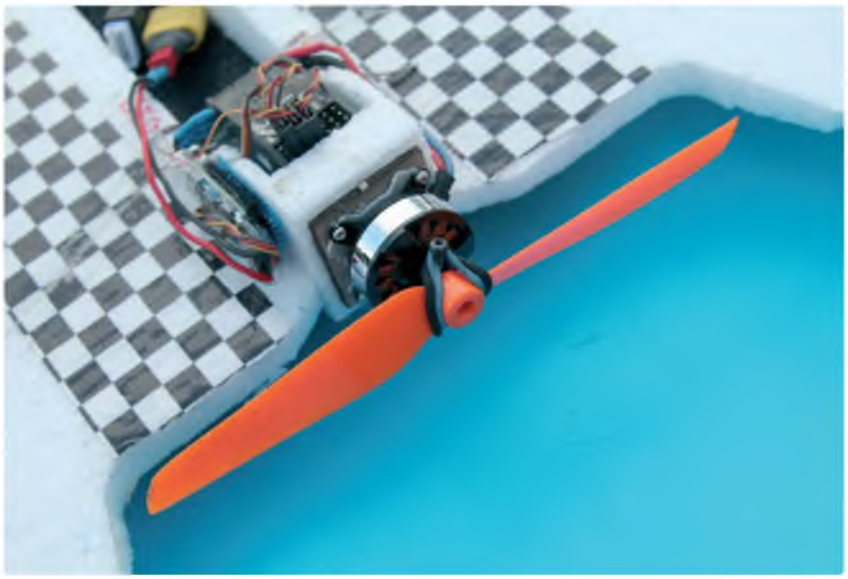


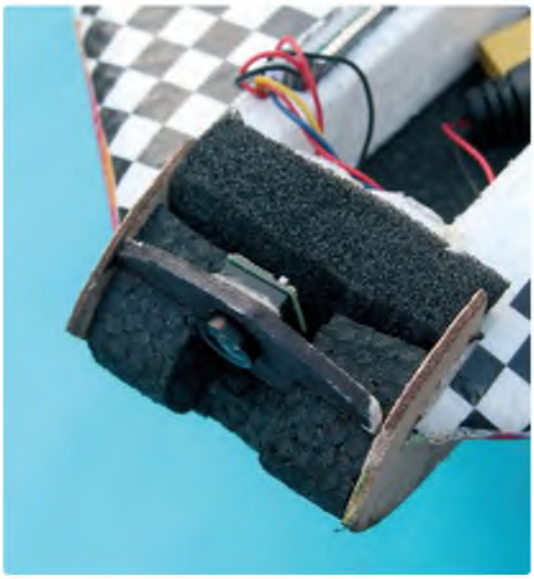
The central part of the Hornet contains all the gear



A modification moved the Rx back and gave a larger battery space



The Rx and ESC are now just in front of the brushless motor



Several different cameras have been tried, with non-permanent modifications to the nose area

At £19.95 I thought the Hornet was extremely good value for money. The 560 mm (22 in) wingspan meant the Hornet was a perfect size for me and it is specifically designed for FPV. It is a really good design, with all the black and white EPP parts well cut and with clear and concise instructions. It is designed around a small 3S brushless motor (an 1806 2280 KV is listed) driving a 5 to 6 inch prop using a 3S 800 LiPo and 10-12 A ESC. There is ample room for a standard 5.8 GHz video Tx and camera.

An advantage of the type I fit is that the flight pack balance connector is used for the 5.8 GHz Tx and camera power. This type of system is extremely inexpensive online and you can get a 5.8 GHz Tx and camera for around £20. Remember, I am talking budget gear here and you can of course get much higher spec equipment for a higher outlay. If you eventually decide you want to stick with aircraft FPV then you may decide to upgrade.

With a combination of UHU POR and the trusty glue gun, the Hornet was assembled very quickly and ready for some personalisation. In a local craft store I had found coloured and patterned duck tape – more details in Tail End. Different pattern tape was applied to part of the upper and lower wing; this tape has a double function as it strengthens as well as providing a visibility aid.

My Hornet, without the flight pack, weighs 195 g (6.9 oz) and with a 3S 800 LiPo on board it is 275 g (9.7 oz). The instructions show 240-260 g (8.5-9.2 oz) so mine was only slightly overweight.

I decided that I would thoroughly test fly the Hornet with the FPV system on board but not using it to make sure I was at ease with the flight characteristics. The initial flight was only dramatic in my mind and not in reality as I had to solo hand launch. The only way to do this was with a frisbee fling and obviously it's preferable to have two hands on the Tx for a test flight.

The Hornet performed magnificently and flew away dead straight like a well flung frisbee. After minimum trim adjustments I was able to confirm that the Hornet was extremely stable, easy to handle and it looped, rolled and flew inverted with ease. It had an excellent glide and showed all the signs of being a particularly good small FPV platform.

Ready for a frisbee launch. The Hornet behaves perfectly so it's a stress free event!

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Up and away, the Hornet has plenty of power for a fast climb

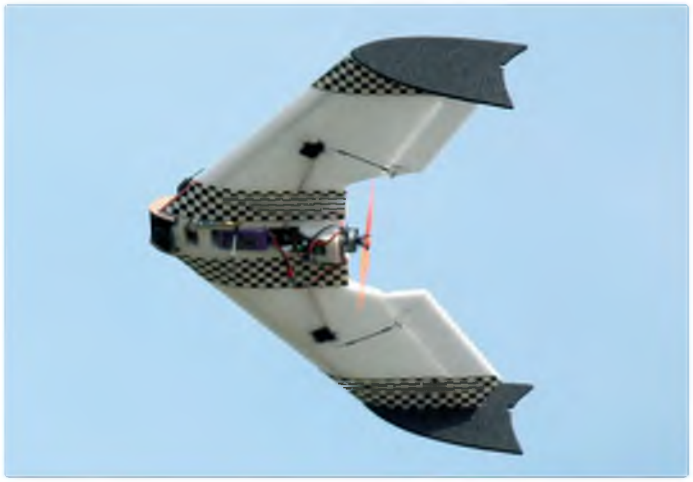
FPV flying is better with a stable model and the Hornet has proved to be perfect

At this point I could (and should!) have left things alone and just waited for some good FPV flying weather. Instead, I decided to fit a stabilisation system, which proved, after a number of test flights, to offer no advantages. The Hornet was very stable anyway and did not need any extra assistance.

With the original Rx returned to the Hornet as soon as some suitable FPV weather arrived I found that it was a perfect replacement for the Hawk Sky V2. It addition to a stable platform it offered the opportunity to perform FPV aerobatics with ease. I still think the typical pusher electric glider is the best model to use for a first FPV model. But after gaining experience most pilots will want more and I have found the Hornet perfect in this role.

Interestingly a major warehouse has just introduced an FPV flying wing with a span of 850 inches and a flying weight of 650 g. This, like the Hornet, is a basic kit with no servos etc. but costs over £70! It's a bit bigger in size but hugely bigger in cost so the Hornet is a real bargain.

Another model that I enjoy flying in a different FPV way is the E-flite UMX Cub. The size and manoeuvrability of this little model makes it perfect for closer in FPV flying and is yet another opportunity to be in the cockpit for a different flying experience.



An inverted pass. You need to be sure of your FPV piloting skills before doing this!

Reader's News

It's always good when readers share their personal experiences and confirm that sport indoor flying is alive and well. Bob Davidson sent me some information from his local area. He not only did this but included a link to his great collection of small model photos:

'Hi John

I live just north of Perth (Scotland, not Oz!) and fly with Perth Model Flying Club. I started flying R/C in 1975 and flew free flight before that. I can't believe the progress made in model flying over that period, especially over the last 5-10 years. Most of our flying is outdoors but a few of us dabble in indoor from time to time.

Our first really successful indoor flying came along when the Silverlit X-twins appeared. We flew them in a poorly lit grain store, which still had a mountain of grain in the corner and the rats outnumbered the flyers by about 10 to 1. Not for the squeamish (me!)

We then joined the Forfar club for a few indoor sessions in a sports hall, which was a bit more like it. We've also flown a few times with the Dundee club who rent the Dundee International Sports Centre, a huge facility which is a brilliant place to fly but expensive. We are now very lucky to get the use of an indoor 5-a-side football pitch for a short period over the winter. It's a huge, unheated inflatable tent with a concrete floor and it's usually a degree or two colder inside than it is outside so masses of clothing and flasks of hot coffee are required. It is indoor flying, but not as we know it. It's character building!

Just a few of Bob Davidson's really interesting fleet of indoor models

The first Depron indoor model I made for the gear from the Parkzone Su26 was an Albatros. This was basically a scaled down Ebenezer free flight plan to about 18" span, with the wing incidence tamed down a little. I was so pleased with the way it flew I think I made an SE5 after that, again to 18" span.

This time I just took a three view drawing of a full size SE5 and blew it up to the right size to use as templates for the Depron. I enlarged the fin and rudder a bit but I don't think that was necessary. Just about any full size prototype could be given the same treatment. 18" span for the bipes, 21" for the

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monoplanes, and try and keep the weight under 40 g.

The fact that the fuselages are just flat profiles doesn't bother me at all. They look fine in the air. I use watered down emulsion to add a bit of lightweight colour and print the decals on normal paper and stick them on with PVA. I never bother with ailerons; rudder and elevators are fine and it keeps it simple. I use 6 mm Depron for the fuselages and 3 mm for the wings, with 6 mm square balsa bearers for the motor and gearbox and for an undercarriage block.

A wee bit of dihedral and a bit of positive incidence on the wing, with the leading edge 2-3 mm higher than the trailing edge, and that's usually fine. Wing struts are cocktail sticks or 1/16th balsa. It's great to see 8 or 10 WW1 types in the air together, like we've sometimes had at the DISC (Dundee).

I'm still as amazed now when I see a model aeroplane flying as I was when I first saw one fifty years ago. I think there's possibly magic involved! It's a fascinating hobby and I'm intrigued to know what 'they' are going to come up with next.

A quick thanks to yourself for all your contributions to the magazines.'

bobsmodelplanes.weebly.com/indoor.html

Left: This brightly coloured Duck tape can be put to good use with foam models

Right: Here it has been used to both strengthen and improve the appearance of the Airbug shroud

Tail End

Colour me up, Ducky!

There's Duct tape and Duck tape, and I'm definitely ducking and diving this time. On a casual trip to our local Hobby Craft store I made the acquaintance of a large range of very colourful tapes by Duck. These are the usual type of very tough tape but instead of the usual silver and black there was a wide range of solid colours and patterned tapes. There are so many appealing patterned tapes that I found it difficult to choose, so I went for one of the gaudiest.

I had an immediate use for this to reinforce the shroud on an Airbug hovercraft. But I could see plenty of other future uses to support my Zig Posterman applied colour schemes. At £3 a reel I thought the tape a good buy, with dual uses for reinforcing and decorating at the same time – that's got to be a winning combination! Be gone white foam, naked models and look to Duck tapes for colourful inspiration!

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

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

RCMW

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The Wheel Deal

Chris Bowler shows how to make a working scale undercarriage

Almost without exception, when an aircraft is not in its three dimensional airborne element a basic requirement is a set of wheels. In this article I aim to show that with a bit of nous, some simple tools and patience, a good replica of a full size light aircraft gear can be made.

Materials And Research

All of the components in this build were obtained from the local DIY store, the exceptions being silver solder and flux from a welding supplies retailer. It is more than feasible to source such items online.

Before browsing the local store's metal rack be sure to have the relevant dimensions to hand. Carefully check the stock for accurate or very close sizes that you require. I can't give specifics because sizes will depend on the scale of the model you are building. This example is typical of a light aircraft such as the Druine or Rollason Turbulent at just under one third scale.

A web search will provide photographs and line drawings of such aircraft and they can be used to judge the layout and size. If, like me, you have access to a full size machine, approach the owner and ask to photograph the set up. Most will be only too happy to oblige. I have found that modellers and full size flyers share a natural bond through aviation and that both like to share information and enthusiasm.

I had a plan courtesy of Sid King, based on the late Ken Forty's design that included drawings of the undercarriage. It looked very simple but, as always, appearances can be deceptive.

First Things First

Heeding my own advice I went to have a look at the full size. It is in the process of a major overhaul and the wings hang in the roof of the workshop. That was a bonus as I could photograph the mounting points and have a good look at the layout. The undercarriage legs were on a bench, so I had a good gander at those, noting that the actual axle was a bend at the bottom of the main leg with a welded bracket and back-plate for the wheel to fit to. That bracket imparts considerable strength to the bend and I wondered just how to replicate that.

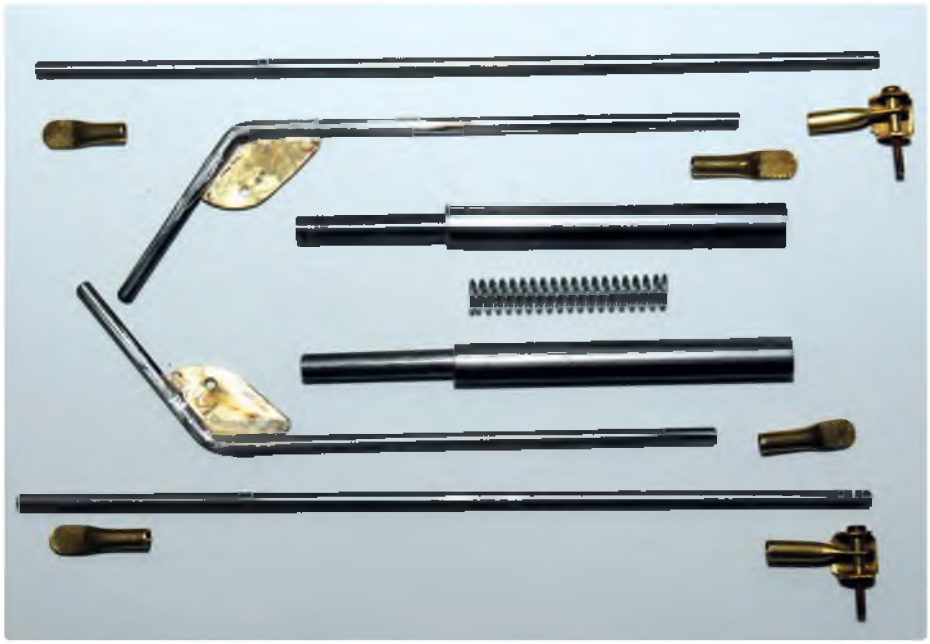
At this point I should say that this would be an impression of the full size, not a complete like for like replica.

Once a note had been made of the relative sizes of the struts, oleo legs and location of fixing points, I then went about gathering the material, as described above.

Oleo Build

The main legs are made from steel tube, sized so that the smaller one easily slides within the other without any slop. To obtain a scale 'look' the lower end of the main leg will need to have a plate silver soldered in place, drilled and milled to an accurate fit to guide the inner leg.

A bit self indulgent – but you gotta have wheels!



Components for a complete undercarriage set

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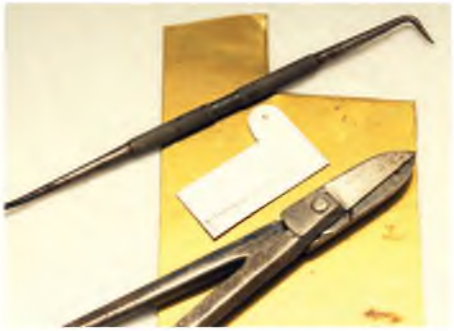
Original drag strut bracket and strut end



Brass sheet with scriber and tin snips used to cut it to shape

Main leg opposing brackets with oleo leg set at the correct angle. Check and check again!

Simple strut bracket

Brass brackets and backings test fitted with nuts and bolts. Allow space to allow for balsa sheet wing covering

Grinding the drag strut down to tapping size carefully

6BA threads being cut on the drag strut rear end

Nuts check fitted

Drag strut ends, the bottom one is the second version with a ball joint clevis

The length and movement will be determined by your prototype. To keep things simple I decided to have a spring system housed in the main leg, with the sliding inner butting up to a spring to give resistance for suspension. I used trial and error to obtain what I thought would be a good resistance, based on the expected weight of the finished model. The tension was finally obtained by using two springs coiled inside each other for added resistance.

Travel of the inner has to be limited both up and down, so a simple solution was to have a slot in the main leg with a sliding pin fitted through the inner, which solved two problems. It limited the travel and fixed the position of the inner.

As I have mentioned before I have no access to lathes or milling machines. All my metal work is done with hand tools and a Dremel rotary tool or similar.

The slot position is carefully marked out using a scriber and a hole drilled right through top and bottom of the required slot. With a rotary cutting tool attached carefully remove the metal between the two holes to form the slot. Make sure both sides match and the locating pin, made from a 4 mm bolt secured with a self-locking nut, is exactly horizontal.

Next Steps

You should now have an oleo leg that has a sliding inner operating with a locating pin but with both ends of the main and inner leg open. The bottom of the main oleo leg can now be looked at. Put to one side the inner, the springs and the pin for the time being.

Make a washer to fit the bottom of the main leg from a piece of brass sheet. I tried to use commercial washers for this but I found that the material they were made from refused to accept solder! It must have been some sort of alloy that looked like steel or iron. No doubt they will come in handy in future for something!

The brass sheet is silver soldered to the base of the main leg and, using a bench grinder, fined down to a good finish that blends into the edges of the tube.

Centre punch the brass base and drill a small pilot hole. Using a series of drills, open this hole until it is very close to the size of the inner leg that will slide through it. All holes were drilled in a pillar drill with a hand drill clamp to hold the piece. To obtain a really good fit I finished the hole using milling tools in the pillar drill – very carefully!

Drill a 4 mm clearance hole just under the top of the main oleo. This will act as a locating pin for the leg and a 'top stop' for the spring. Again, a simple solution.

At this point you can pat yourself on the back on a job well done! Then begin again for the other side. This is the difficult part because it has to be exactly the same as the one you have just made.

Brackets And Fixings

As mentioned earlier, I had taken reference photos of the full size and used these, plus some check measurements to gauge a scale-like look. Brackets are fashioned from brass sheet to fit at the scale positions. This meant I had to bolt them through the main wing spars, as per full size. Much time was spent locating the bracket positions and temporary clamping of the brackets before any holes were drilled. The main legs are set at an angle and the support brackets impart this angle on the model versions. Each bracket has a backing counterpart on the opposite side of the main spar to spread the load and provide a secure fixing for the self-locking nuts. Once committed there is no going back!

The drag strut brackets are made from brass sheet and are a U shape bolted to a ply-reinforced bracket at the correct position on the wing. All brackets were fitted after the wing was sheeted and suitable cut outs made to complete a neat job.

With the main leg sorted and now able to hang free, the side and drag struts need to be made.

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Drag strut fitted to modified bracket

Wheel retainers are soldered onto axle

Wheel retainers fitted, complete with split pins

Full size undercarriage strut and axle. The model units were simplified to make the angles easier to represent

Bracket fittings on the full size wing

Rear of wheel showing washer and tube soldered in place

Brass shaped insert to accept lower oleo and drag strut ends

Wheel retained with a washer and split pin

Strut Your Stuff!

Struts were all made from stock bar found in the DIY store. The leg, including the axle, is bent to an angle, constantly checking for accuracy. At the inside of the bend a brass sheet insert is shaped to fit and silver soldered in place. This, I admit, is a little tricky, holding it in place while obtaining sufficient heat. It took several attempts as on a couple of occasions I managed to blow the brass insert off the piece due to gas pressure of the blowtorch!

Perseverance paid off though and a good joint was made. I made up both axle struts at the same time to ensure an accurate pair. The drag strut is made of the same material and is easier to make. Check for accurate length, allowing each end to have room to fit a brass tube fitting to make them up to the correct length.

It was intended to have a brass tube soldered into place at each end, flattened and drilled to take a 4 mm securing bolt. Solder a brass tube with flattened and drilled ends that will fit the wing fixings.

I later changed the drag strut ends where it fits to the wing to a ball joint type that allows a little movement at that point. L shaped brackets were made to accept the new fixing and bolted into place in the same position as the earlier U shaped versions. This was a trial and improvement modification that evolved during the build.

A slot is cut at the lower end of the sprung oleo leg and fitted over the silver soldered brass insert. Make sure you cut it in the correct orientation. Drill a 4 mm clearance hole and bolt the oleo to the strut end. The drag strut is then fitted in a similar fashion with a 4 mm bolt. It is all a little unruly at this point but when attached to the wing brackets a very firm, sprung undercarriage results.

Wheels And Axles

The wheels are retained by a tried and tested method that I have employed on many models. This consists of a brass tube that is a push fit over the axle rod, with a washer silver soldered at one end and a hole drilled to take a suitably sized split pin at the other. I found the best way was to silver solder a rough-cut piece of brass sheet to the back of the axle then shape it round on the grinder. It works very well but mind your fingers!

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Original drag strut bracket and fixing. Note strong plywood insert

Milling tools used in pillar drill to cut correct size hole in lower oleo

Oleo leg showing slot, spring and retaining bolt

The images show the Tiger Moth wheels I used as test piece. The model requires 5.5" inch wheels and, as you might guess, I had to make slightly larger axle bearers to take the bigger wheels!

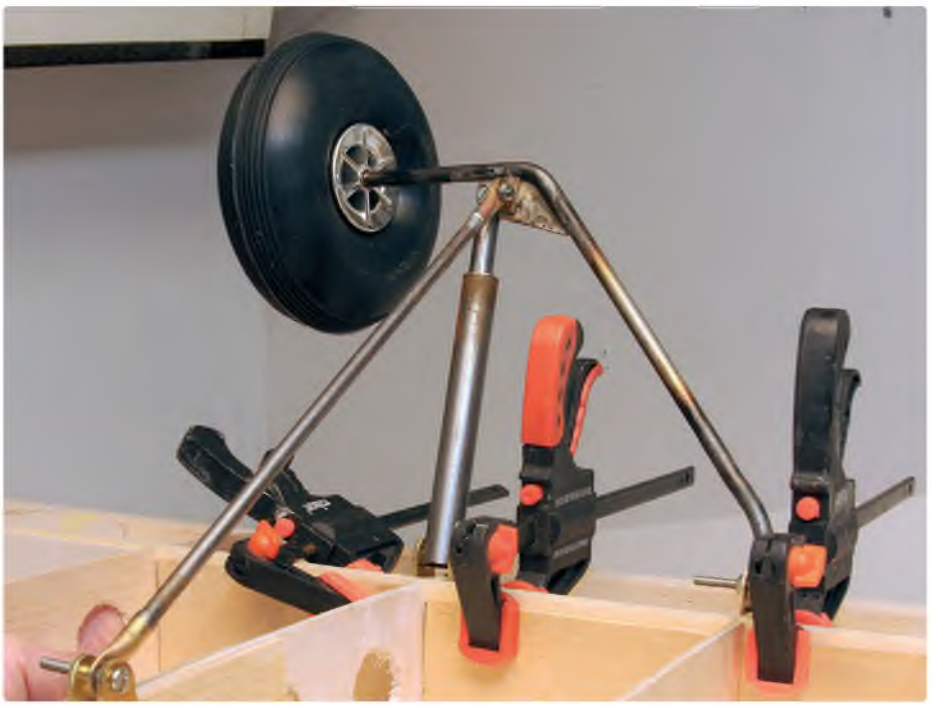
Finally, the whole thing was sprayed with grey primer and finished with glossy grey Humbrol paint.

Worth The Effort?

When written down the effort required to make this undercarriage seems considerable. I actually made five units. The first one was a tester to see if it was practical. For this I used slightly smaller diameter tubes and rods but it didn't quite 'look right', hence the ones shown here.

Why another two? Well two models were proposed, but the second one never quite came to fruition. So now I have a spare U/C set in case (when!) I mess up any future landings!

Was the effort worth it? In a word 'yes', because these details are what makes a scale build or a 'more or less' scale model stand out. ***RCMW***



One of the many test 'clamp-ups' before final fitting

Neat finish with the final fitting on the sheeted wing. It all had to come off again for covering, of course!

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FISHER DELTA 3D PRINTER

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

Complete kit only £349 PLUS P&P

So versatile you will wonder how you managed without it!

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

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

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

3D printing is the perfect way to make bespoke scale details for all types of models. The builder of this big 1:3 scale RC model of a Druine D-31 Turbulent aircraft needed to represent the parts of the VW engine that protrude from the side of the cowling. He was able to supply reference photos and drawings of the full-size engine, so creating a 3D printable model was fairly straightforward. He'll need to do some sanding/filling/finishing before painting and detailing it, but it should look just right when installed in the model.

SPECIFICATIONS

Firmware
- Calibration:automatic bed levelling and machine calibration routine
- Layer resolution:0.3mm 0.05mm
- Build surface: Removable bed, uncooled Buildtak print surface (for printing with PLA). Heated aluminium plate available as an upgrade, (allows printing with ABS,PETG, PC, HIPS, and many more).
- Print speed:0.4mm nozzle up to 6mm3/s
- Motion:Up to 250mm/s, 3000mm/s² acceleration, segmentation free real time delta movement
- Nozzle:0.4mm diameter, maximum operating temperature 300oC, warm up time ⊠ 60secs.
- Power adapter 100V/240V, 60W
- Software: Machine control: On board web interface available via ethernet, USB control also available
- Standalone printing from onboard microSD card

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

Materials
- Standard 1.75mm diameter filament (PLA Plastic)

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We are working to develop parts to upgrade your Fisher Delta and ensure that you are up to date with current technology. The printer is strong and durable, but in the unlikely event that you need spare parts or wish to upgrade your printer, we have them ready for immediate dispatch. All our parts are designed in the UK, so there is no having to wait weeks for delivery.

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This product bundle includes all parts required to upgrade a Fisher Delta 3D Printer to use a heatbed print surface. Unleash your Fisher's potential with this heated upgrade kit, allowing you to print in a far broader range of materials, including ABS, PETG, HIPS and many more.

The heated kit is designed to simply replace the standard bed with no disassembly of the machine required and retaining the auto-compensation functionality of the original design. With 120W available the print surface temperature may be raised to 110C, allowing printing with materials such as ABS with a nozzle temperature of 250C.

The upgrade kit includes:
- FISHER HEATBED KIT
- 19V 6.32A (120W) power supply
- Roll of Kapton tape

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Bolt

A sleek 920 mm span V-tail sports model for four function R/C and .15 two-stroke engines, designed by John Rutter

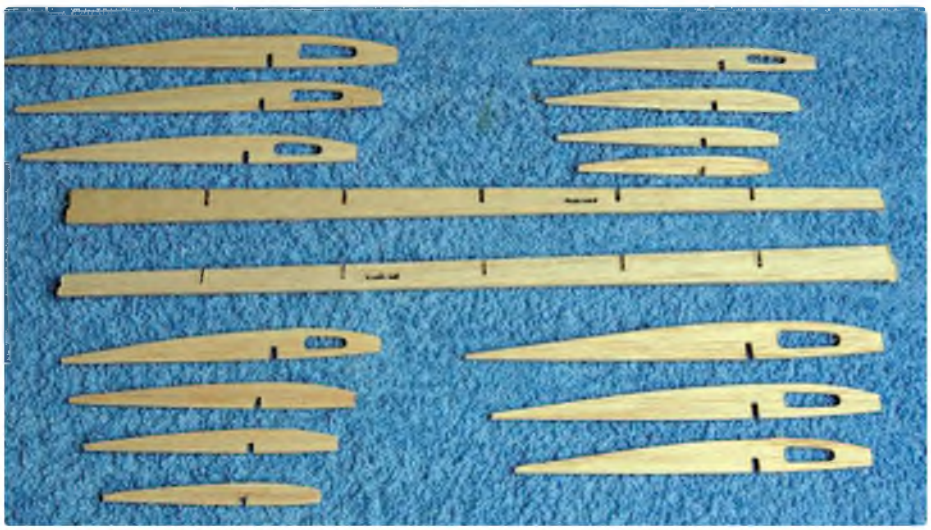
Free Plan

MODEL WORLD

At A Glance

SPAN:	920 mm (35½")
LENGTH:	812 mm (32")
WEIGHT:	602 g (21.5 oz)
WING AREA:	240 sq in
WING LOADING:	13 oz/sq ft
RADIO CONTROL:	4 functions (Elevator, Rudder, Ailerons, Throttle)
SERVOS USED:	Blue Arrow D05010MG Sub Micro 5.7 g
ENGINE:	AP 0.15 Hornet two-stroke glow

Bolt is ideal for any spare .15 glow that needs a new home



Cut out the ribs and spars

Concept

While I've recently been designing electric planes almost exclusively, I've never lost interest in IC. I just got fed up with oil over everything and the faff of starting the things (and keeping them from cutting out in the air).

Some time ago I made a model for an AP 0.15 Hornet glow, converted to diesel (which actually significantly increased its power output) but I noted that it was a very clean running engine whose exhaust goo could be directed away from the model easily. I had also designed an electric twin called Arrow, which had a very efficient wing. So I thought crossing the two should be fun and so I came up with this design.

Building The Wings

As I like building wings I started there and proceeded to cut out a couple of full depth spars from fairly hard 1/8" and wing ribs from fairly hard 1/16". I like to half lap the pair together to make a substantial 'D' box once the leading edge is sheeted. I also used the band saw to make some 40 mm wide TE

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Wing trailing edges

Basic wing construction

Top sheeting and cap strips done, and cleaned up

Second centre rib glued to the first

First panel propped up for dihedral

section from light 3/8" - a lot of it is planed or sanded away so why make hard work for yourself? The first bit of construction is to glue a 1/2" wide strip of 1/16" to the lower leading edge of these. Tape the strip to the TE, bend the joint open, glue with PVA, then pin to the board to set.

Note that the TE section goes all the way to the tip but the strip ends at the last rib. Remove the tape and pin one of the sections to the plan. Dry fit (to ensure good joints) the ribs to the spar, then glue the ribs to the spar and to the TE section, putting a strip of scrap 1/16" under the spar to space it off the plan. Carefully glue and pin the LE section to the ribs and leave to set. Add the top TE strip and carefully plane the LE to match the curvature of the ribs before gluing the top LE sheeting, centre sheeting and cap strips. I generally use a contact glue for LE sheeting and PVA for the rest.

Sand the ends flat with abrasive glued to a flat block and glue the second centre rib to the first, thus ensuring a perfect joint. Pin the second TE assembly to the plan, making sure it mates accurately with the first when this is butted up against it, while a block about 1" thick props the first panel up under the tip rib before gluing the TE's together. Continue to assemble the second panel on the board as before but making sure the joints between the spars and LE's are good.

When sheeting make sure the joints are good. When set the assembled wing can be lifted from the board before using sharpened tubing to cut holes near the root of, and just in front of the spars to allow the passage of extension leads. Thread some light string or strong cotton through these holes, the holes in the front ribs and the slot in the spar to allow the extension leads to be pulled through easily later on. Tape them securely so they don't get removed accidentally and then finish the underside sheeting and cap strips.

Centre sheeting can be taken right across in one piece, which helps strengthen the centre join. Trim the cap strip on R4s to fit the light ply servo mounts flush with the underside of the wing. I made up tips from scrap Depron because I happen to have plenty of it (2 layers of 6 mm sandwiching a layer of 3 mm) but blue/pink foam or light balsa could also be used. Shape the leading edges and tips and sand the wing smooth before cutting away the ailerons.

All servos are fitted for life so I usually cover them in heat shrink, roughening one side of the shrink to glue them in place with Evo-Stik or similar. Now fit the aileron servos (test them thoroughly first!) and extension leads. I top hinge my ailerons with tape (though I used a single piece of Mylar hinge near the horn in this instance to give a more 'positive' hinge action) so chamfer the leading edges to suit. But they could be 'V' shaped for centre hinging if that's what you prefer.

Temporarily fit the ailerons and fit the horns in line with the servo arm outputs and make up pushrods between. I used threaded 2 mm rods with a piano wire 'Z' bend at the servo end, held in place with heat shrink tube and thin cyano wicked into the joint, and a threaded metal clevis on the horn end. Try to make sure servos are set at neutral (including any sub trims) on the Tx for now.

V-Tail

The tail is simple and quick to make. Cut the shape from medium 1/8" sheet and round off the leading edges and tips (the square section at the TE helps avoid flutter). Cut away the control surfaces, part cut through the centre line and crack the join. Prop it up against a 60 degree set square and run thin cyano onto the cracked joint from the top. When this has gone off turn the tail over and repeat the glue application into the cracked side of the joint. I then filed the gap a little with a square file (to get rid of any raggy bits in the joint) and used thick cyano to glue a bit of 1/8" square in place. This was sanded flush when set. If using ply horns then they

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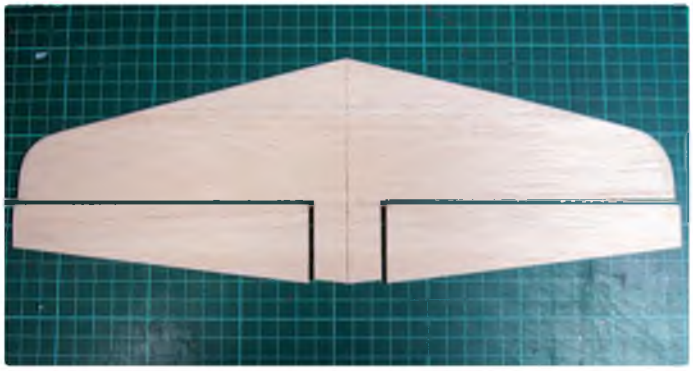
Second panel top completed

Guide in the thread for pulling through the servo leads

Depron tip block. Sand to shape. Balsa would be okay here too

Aileron servo (D05010MG/5.7 g) viewed from top

Aileron servo viewed from underside



V-tail components cut from 1/8" balsa sheet

can be glued in place now or commercial horns can be fitted temporarily.

On With The Fuselage

Cut out all the parts and fit the engine, with the spinner and prop attached, onto its bearers. I usually recess the bearers to take steel nuts epoxied in place and fit the engine with Allen head cap screws. The bearers are cut away aft of the firewall to allow the tank to fit between them before fitting to the firewall and F3. Place the engine on its formers against one of the sides and, allowing for a bit of a gap and the thickness of the nose ring, note where the lower bearer and F3 will have to eventually be trimmed away to clear the wing.

Part cut through to ease the task later on, mark the inside of the fuselage side for former placement and remove the engine. Glue the five full width formers to one side (F4 andF5 are glued together too) then glue the other side to the assembly, being careful to line everything up with a square.

At this point I put the fuselage into a jig to keep things straight. But I used to use a line on a board, which works well enough, if you've not got a jig. Pull in and glue the tail end of the fuselage together and add the other two formers. As the rear of the fuselage tapers, if you just glued the tail in place it would have considerable negative incidence, so if you've not already done this the sides need cutting at a slight angle (see the plan) with the knife held at 60 degrees (or thereabouts) to enable the tail to sit level. Check that the tail is centred and level, and the tips are an equal height above the board before running a bit of thin cyano into the joints front and rear. When set pull the fuselage out of the jig and run cyano along the main parts of the joint.

At this point I glued the tail servos to the inside of the fuselage with the arms centred (after checking the servos worked!) in the slots. In retrospect it might have been better to leave this bit until after the top planking had been finished and sanded. Like the aileron servos, I covered them in heat shrink and roughened the glued side.

In the photos I used 4.3 g servos but they proved too weak and I later replaced them with the same Blue Arrow D05010MG digital metal gear servos I used for the ailerons. I glued a spacing block of balsa between them for extra security.

Make up or buy a pair of short extension leads to reach back to the space over the wing. I glued the plug joins to the fuselage sides to stop things flopping around.

Now we get to the 'Marmite' bit! I like planking but I've known plenty of people who don't. Either in or out of the jig, the top of the fuselage now needs planking with 3/16" wide strips of 1/8". I chamfer the inner edges slightly to give a better join and glue with PVA while holding with lots of pins. The centre of the 'V' could be solid balsa if you prefer. Once the rear is done the same is done for the nose section to the engine firewall. Leave it all overnight to set thoroughly. Plane and sand to shape when dry.

Block and sheet is now used to box in the rear bit of the lower engine bearer to give it extra support before cutting away the rear of the bearer and part of F3 to allow the wing to fit. F4a can now be glued in position. Mark the front of the wing where it'll have to be flattened for F3b, then trim it and fit F3b.

Don't forget to check that the wing is sitting level before gluing F3b. Drill the wing

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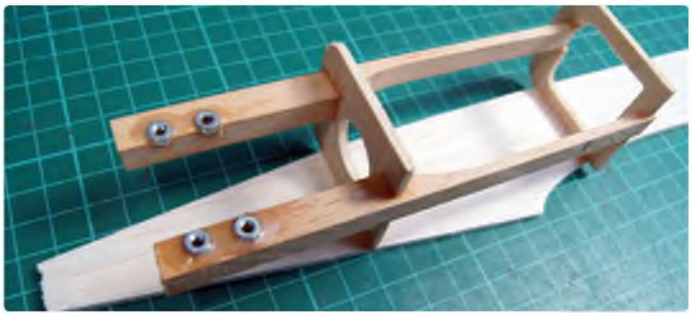
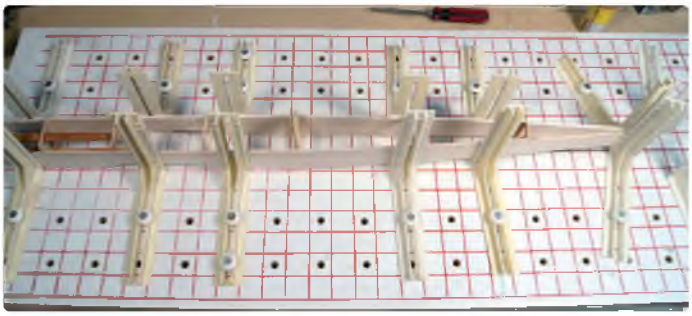
Assembled V-tail propped up against a 60 degree set square

AP.15 mounted on hardwood bearers



Front formers glued to the fuselage side



Second side glued to first, then placed in a SLEC jig to keep things straight

Keep the tail level!

Tail viewed from underside – it doesn't look right, but it is!

leading edge through the holes in F3b and fit the retaining dowels. Check fit the wing. Glue thin ply reinforcements to the top and bottom surfaces of the wing trailing edge at the centre and drill for a 2 BA plastic bolt. Fit the fuselage blind nut retaining plate 'dry' and mark through the hole in the wing the position of the nut, ensuring the wing is at 90 degrees to the fuselage centre line. Remove the wing and plate, drill for the blind nut and squash it into position in a vice. Glue the retaining plate into the fuselage.

Carve away enough of F3 to fit the 2 oz tank. I used a rotary sanding drum in a Dremel type tool flexi extension. Cut off the starboard fuselage forward of F2. Fit the engine with its prop and spinner and bolt it in position. Finish blocking in the nose, not forgetting to pull in the port side of the fuselage to match the spinner. A little 3/8" triangular stock on the inside corners might help tidy things up.

Roughly carve the shape, remove the engine and sand the nose end of the block flat to allow the neat fitting of F1. Check the clearance and positioning with the engine back in place temporarily and glue F1 to the nose blocks. Remove the engine to finish carving and sanding the nose and the rest of the fuselage. Put the engine back into the model to sort out the throttle linkage. This is best described as 'novel' but it's simple, adjustable and fits the very confined space.

The servo is fitted onto a balsa block about 3/8" thick (heat shrink and glue again) just in front of F4 but with the arm facing the starboard fuselage side in order to keep the linkage as near to the side as possible. The throttle arm end is simply a length of 18 SWG piano wire with an 'L' bend in it. This wire fits through a hole drilled in the bottom left corner (when facing you) of F2 and is long enough to fit most of the way to the servo. The servo arm is fitted with a thinner length of wire (size depends on the hole size in the servo arm) long enough to overlap the main one to the throttle arm and with a 'Z' bend on the servo end. The pair are connected by being slipped through an electrical connector robbed from a 'chocolate block' connector.

The set up is to push the wire to full throttle, put the servo to full throttle on the Tx, tighten the screws then play with the ATV and/or servo arm hole to get the desired movement. Once you're happy with it pull everything except the servo back out and fuel proof the engine and tank bays.

A Simple Canopy

The cockpit canopy isn't a commercial item but is easy enough to make. I copied the shape from the plan and carved it out of some cheap balsa block (the kind that is often sold at giveaway prices at a show). Then I found a two litre pop bottle, emptied and washed out of course. These bottles are made from very tough PET plastic and are made by heating something that looks like a thick walled test tube with a screw neck and then blowing air into it in a steel mould. When re-heated they try to shrink back to their original size due to an effect called 'plastic memory' that we can make good use of.

Cut the screw end off at the point of maximum diameter and find a bit of wood to make up the difference between the canopy and bottle diameter but preferably slightly narrower than the canopy when it is inserted in the bottle. In the pictures I used the canopy pattern from Arrow, the model's ancestor.

It is probably possible to put the whole lot in

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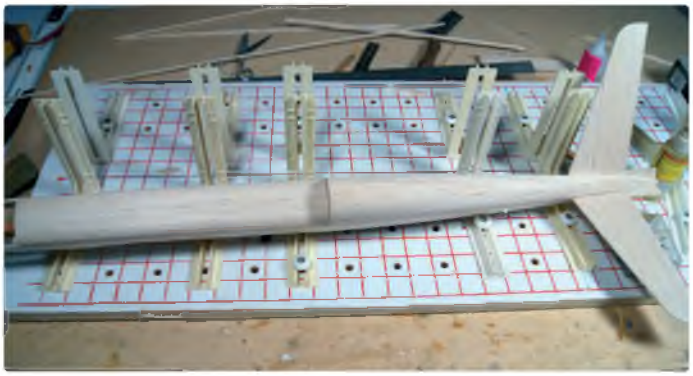
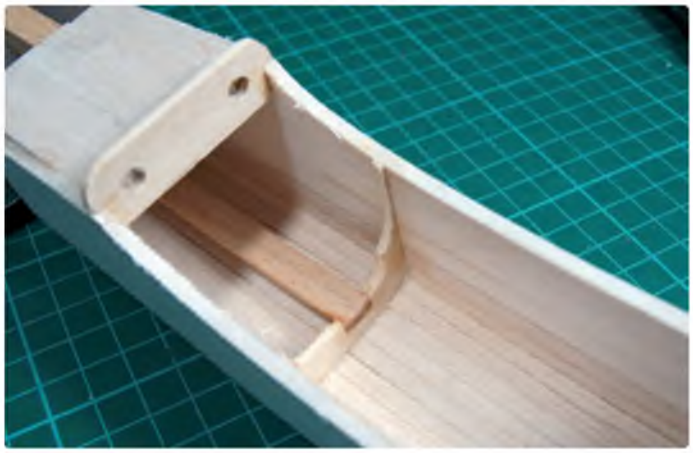
V-tail servos. Add a block between them to keep them rigid

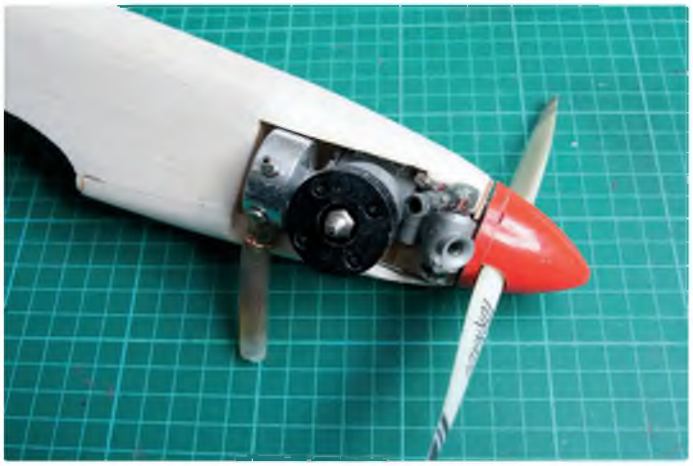


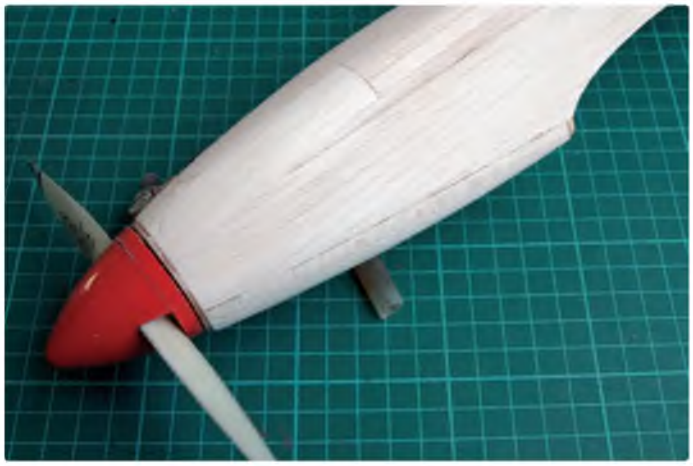
Front and rear planking added and sanded smooth

Wing dowel locators



F3 is sanded out with a rotary drum sander to allow the tank to fit





Engine side block and nose block work completed

an oven at about 120 degrees C, but I used a heat gun to soften the plastic. Hold the neck end and start at the open end with the heat gun, trying to heat evenly all round so the plastic shrinks evenly. Gradually work your way around and down to about half way, grip the other end of the bottle (when it is cool enough) and repeat for the other end.

The aim is to get even shrinking with no wrinkles. If you overheat the plastic it will blister so be wary of this. Use a fine line marker to mark off the desired shape while it's still in the moulded stage, then cut away roughly on the waste side of the line with a Stanley knife or similar. Be careful with the knife; the plastic is very tough and the knife tends to skid. Trim with scissors to the line.

If you think you might need to make another and are happy with the shape you have got, draw around the outline of the canopy back onto the pattern to make life easier next time. You can see this on the pattern for the Arrow's canopy. Bottles come in a variety of colours so you could do a tinted canopy if desired. But I just sprayed the inside silver after a bit of mild roughening with scouring powder.

As the weather looked to be pretty awful at the time I was building the model, I was in no rush to complete it. So I decided to tart it up a bit by using lightweight filler on the tail to fuselage junction and fitted a wing root fillet. This is unlikely to increase the speed of the model significantly and it is certainly optional, but it looks good. The wing root fillet is made from 1/64" ply slipped between the wing and fuselage at their junction, held by the wing being bolted to the fuselage before running a bit of thin cyano along the join, making sure the fillet is flat to the wing so far as possible. Thicker cyano holds the bit just behind the wing.

The filleting is done with two layers of lightweight filler. The first layer fills most of the gap and is then left to set overnight; the second is the finished layer, which is again left to set before gently sanding (it's very soft stuff) to final shape. For both layers I used a piece of shaped (rounded end) thin ply to apply the filler.

If, like me, you intend painting the fuselage it is worth sealing the surface with acrylic varnish (water based) before using cellulose based paint, as the material seems to be attacked by the thinners. Even if you intend to finish with film covering the varnish aids adhesion and helps to strengthen the filler a little.

Finishing

Time to do a bit of finishing, after a final sand to get everything smooth. As it seems to survive engines and their fuel better than film, I covered the fuselage and tail in tissue paper and doped/painted/proofed it to a finish. You could use glass/epoxy if you prefer. Wings were covered in film after giving the surface a coat of acrylic lacquer (often sold as quick dry varnish) to aid film adhesion but let it dry first!

Be careful with heat on the foam tips. I have a problematic film iron that gradually

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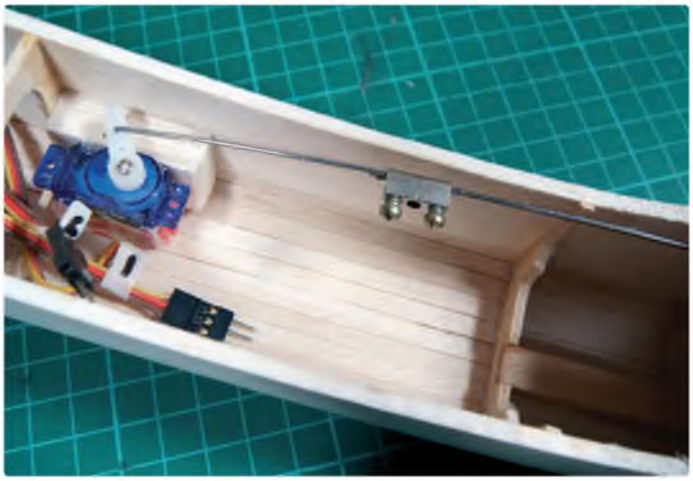
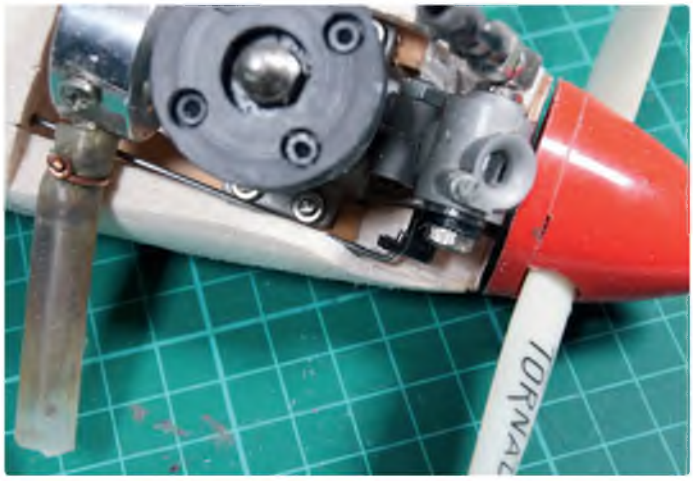


Simple 'adjustable' throttle linkage



Throttle linkage at the engine end

Making the optional fairing

Tidy up the underside with filler

After second layer of filler and smoothed to finish

Moulding the pop bottle canopy

lets the temperature creep up if you don't keep an eye on the control dial. This gave me rather 'lumpy' tips on the model where the foam melted slightly under the film due to overheating. The entire fuselage and tail is fuel proofed with two-part varnish.

If you have not yet made up elevator pushrods do so now. I used the same style as for the ailerons. Re-fit engine, tank and receiver battery (four AAA in a square or 'rhomboid' configuration) with foam packing to keep everything in place and to reduce vibration. Check for correct balance (3¼" or 85 mm from the LE) and ballast if needs be. Mine turned out to be spot on but if you use a heavier engine or make the tail out of very hard material things could vary quite a bit. It looks a long way aft on the drawing but this is an illusion caused by the wing sweep.

Set up the controls on your Tx. Use a separate V-tail mixer if your Tx doesn't have one, or fit a servo reverser to one of the elevator servos and a 'Y' lead to the Rx if you just want elevator and don't have a fancy Tx. I used 'flaperons' (channel 1 and 6 mixing) for ailerons but again a 'Y' lead is a possibility. Initial set up was for about 8 mm each way on the 'ruddervators' when used as elevators and 18 mm each way when used as rudders, measured at the inboard end. Ailerons with rates out are about 10 mm each way and 60% of this with rates in. This doesn't look much, particularly on the elevator, but it is more than enough throw.

Try it before going further. Bolt is very sensitive on elevator and rolls are jaw dropping at speed on full throw. I use 60% expo on aileron and elevator functions with rates out. AUW of my model 'dry' was 21.5 ounces.

So How Does Bolt Go?

Pretty is as pretty does, it flies very well indeed. I didn't have my photographer pal with me on the first test flight (he was visiting family) and it is always a bit worrying to fly something to the limits before getting the photos but I needn't have worried over this one. I launch the model with an underhand lob (not that it needs much of a chuck) and it will immediately pull away into a vertical climb if desired. It's got a lot more power than weight!

On the first flight I limited things to a steep angle and checked it out for stability, nose drop in turns and stalling. It needed about three 'beeps' worth of right trim on the ailerons but otherwise flew very smoothly – 'on rails' to use an over-used term. Rolls were axial and inverted needed very little down. It looped wide or very tightly without losing speed and it was fast without being ridiculous. The prop on this occasion was a 7" x 6". (A 7" x 4" gives better power but more noise.)

I couldn't get a decent stall out of the model. It would just mush around, sawing the nose right or left, which is easily corrected on aileron (rudder works too, in full size terms ailerons would NOT be used near the stall). When I cut the engine the model turned out to have a very good and flat glide, which

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was not a surprise given the glider heritage of its wing section and low drag, low weight design.

On one occasion I thought I just detected a snaking motion of the tail (as often happens with V-tail designs) but the rudder effect of the V-tail will yaw the model without actually turning it. This is the desired effect for aerobatics as you don't want the model turning out of knife-edge, but there is very little side area for the latter manoeuvre so it will only do this at high speed.

The flying photos were taken on a very blustery winter day in winds of around 15-20 mph (rather 'calmer' than it had been while I waited for a bit of sunlight!) and the model had no problem coping with the conditions, although it did of course get bumped around quite a bit. Most of the time I don't suppose the elevator moved more than 1/8" either way, except for the flare on landing. And roll with full throw on ailerons is of the multiple rolls per second variety, so I find myself flying on low rates most of the time!

With a 7" x 4" the climb is endless and the speed is higher than when using a 7" x 6", presumably because the engine is at its peak rpm, yet it still flies for around 10 minutes on a 2 oz tank (I set my timer for eight minutes to be on the safe side).

On warmer and sunnier days it is just the sort of little model to drop into the back of the car before 'going for a quick flight'! ***RCMW***

Bolt is finished and raring to go!

This little 'racer' simply cuts through the air and is aerobatic too!

Inverted? No problem

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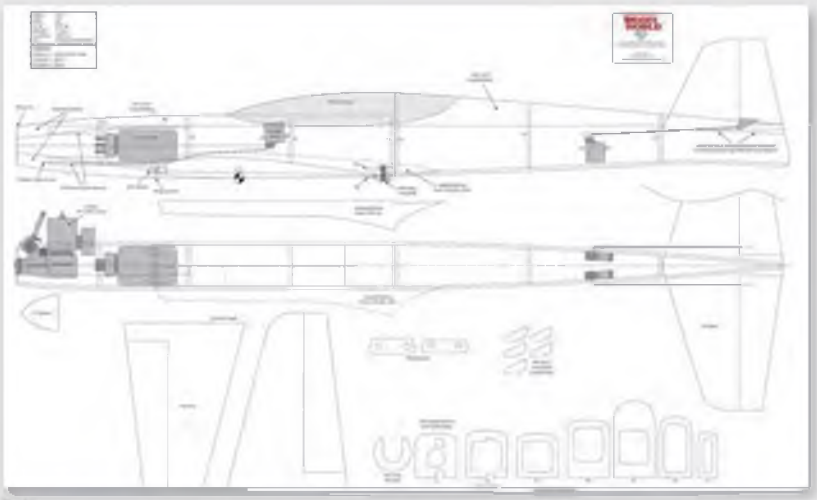

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Messerschmitt Me 262

Peter Iliffe shows us his latest WW2 micro jet

One of the pleasures of attending the Long Marston Model Air Show is to be able to catch up with Peter Iliffe and see what latest miniature marvel has been created on the workbench of this master aeromodeller.

This year Peter approached with another of his tailor-made model boxes (which would be worthy of an article all to themselves!) inside of which nestled a delightful 1:16 scale Me 262. Of stick and tissue construction it weighs a mere 250 grams.

Radio control is from a Spektrum set, with a pair of E-flite 28 mm EDF fan units providing the thrust to fly the 'Swallow'. A 3S 500 mAh LiPo sits in a slot under the nose, and which can be seen in the picture nearby.

The scale undercarriage is for static use only and unplugs quickly and easily for flight.

Another magnificent model, Peter. Thank you for sharing it with us. ***RCMW***

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Soarers' Slot

Mike Proctor returns from a short Portugese holiday – with a weekend of thermal soaring tacked on the front...

Clive Needham flew this ex Dave Worrall, home built 4 m soarer in the 1st Northern eSoaring competition. Looks 'old' but flew very well!

At the same Northern eSoaring competition this Pike Perfection was lost in a monster thermal but was found five days later – see text. Remember to put your phone number on your models!

Could be an all time first? Three generations of the Haley family – Bill, Steve and Simon – placed in the top three places in a BMFA National eSoaring League competition in May

Up And Away...

Last thing first this time, chronologically that is.

At the first Northern eSoaring competition at the end of May the weather conditions in the early part of the day produced some very powerful lift, which led to the loss of a Pike Perfection. This model was being flown with four others in a slot; I was one of them and from the 'off' it was clear that models were still going up strongly, even after the power was cut.

Checking my logger later I discovered that the Maxa was at more than double launch height in two minutes, at which point I purposely held it at that altitude by flying fast in distance trim. But at four minutes I started downwards. I very rarely use the brakes to descend as it takes so long with slow airspeed but I tried them this time to see what happened. Even with the model held vertically down it seemed not to be descending and with any relaxation on the down elevator the flap just contrived to keep it 'stopped' in the thermal and probably therefore going up again! So I did what I usually do in such circumstances and flew down in speed trim, away from the thermal.

I think the Pike got higher than I did before remedial action was taken – flap and elevator – by which time it would have still be climbing fast and was lost from sight in a cloud. I am very happy to report that the model has been found as I type this column! A result that shows that dedication can pay off in these circumstances. A full description can be found on the eSoaring website: www.esoaring.net/forum/viewtopic.php?f=6&t=3081&start=20

To recover from these situations you must be sure of the trim of your model, as speed can build very quickly at height and airspeed can be very high, with the model descending fast into rising air. This is no time to have to be sticking in fistfuls of down, as many a broken model can testify!

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One other thing happened at this meeting and it was of an entirely different kind from the above. It is not unusual for us to have three generations of the Haley family flying in our events, but this time they took the top three places too, which could well be a unique achievement?

More Nostalgia

The Beatnik build report last time has produced a fair bit of interest, both among people doing new-builds, of whom there are a few, and among those who have electrified and modernised old free flight designs for soaring purposes. Robin Sleight is one such and he was kind enough to send pictures and some detail (reproduced here) of the way in which his 1960 Open Power model, an iconic, fast climbing Tom Smith design has steadily morphed into efficient electric power.

"As I said the original free flight model was powered by an Eta 29 (as is shown on the plan). It, as did almost all other free flight comp power models of its day, had deliberate wash-in on the starboard inner wing panel, and the tailplane was tilted to line up with the dihedral of the port inner wing panel so as to give a (hopefully controlled) corkscrew type climb. In converting this model to radio I built a new fuselage but, following the structural methods of the original, stripped the wing to remove the deliberate warp and the tailplane was no longer tilted. The wing was re-covered in MonoKote but the tailplane (original) is still Jap tissue covered. That used a geared Astro challenger motor and eight NiCad Cells. Performance was adequate, and the climb was OK but disappointing.

To amuse myself this past winter I put an Overlander brushless (3548/05 – 710 watts) motor into the model and lengthened the nose for balance. I could then get a 1300 3S LiPo and ESC into the nose area to further help with the balance. The Rx goes in a compartment under the CG in the pylon, where in its first electric incarnation I had fitted the NiCad batteries. The two servos for the tailplane and rudder are in another compartment behind the pylon. The tailplane is actuated by rubber bands at the front edge, which will pull it up (as for free flight, that pulled the tailplane up for DT) and a little horn at the back, driven by a small bell-crank to raise or lower the trailing edge. A neat installation and it works well.

The motor drives a 12.5 x 6.5 prop drawing 300 watts or so, and the model all up with battery weighs 700 g (24 oz). Thus, the power loading is 430 w/kg, which gives a much more dramatic climb than a typical

No, your eyes do not deceive you. This is not the Beatnik from last time in its covered state but Robin Sleight's much re-vamped, but largely original and now electrified, version of one of Tom Smith's 1960 stable of fast climbing Open Power models. See text

Electrified Open Power models need a lengthened nose. Even a battery and motor cannot compensate for the ETA 29 which once lived there! Why were tailplanes so large, yet fins so small in those days? This one still flies OK though

Model transport box construction was described last time but fitting out detail was completed later. The Tx and various other 'bits' were stored in the original polystyrene packing and secured with more Correx, fixed with cabinet joining screws. A charger and more 'bits' went in the opposite corner

Cabinet screws, described in the text, for use joining 10 mm Correx parts. Plastic variants can be easily cut to shorter lengths but the three-piece metal threaded versions are a bit more fiddly to do

The box just about ready to be shipped to Portugal. Everywhere there was a space was filled with bubble wrap and finally the top was gaffer taped down. Luggage straps were used as handles and tie wrapped closed

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soaring glider! In fact (hard to compare) but the climb rate now probably exceeds that of the Eta 29. The model is 1.6 m span and as the tailplane is also lifting, the total lifting area is about 4.5 ft sq, so the loading is about 5.5 oz/ft sq – quite light but providing the wind is fairly light it penetrates OK.

Finally, I brought the C of G forward a little – it is about 87% of the root chord on the F/F version; on mine it is now at 77%. That still sounds frightening but the tailplane is also a lifting surface and it all seems quite stable in pitch."

Next time I hope to have flying pictures and a final report on the Beatnik – now covered in bright orange and having a similarly rearward C of G!

Portugal F5J World Cup Event

If you followed the Correx box building saga in the last Soarers' Slot you will be pleased to hear that it performed splendidly on our trip to Portugal for the F5J event there. To complete the internal fitting out my polystyrene transmitter box was installed in a corner compartment made from scrap correx, folded into a 'Z' shape and retained by plastic 'cabinet joining screws'. I did the same for the charger box in the opposite corner. Both boxes had various bits and pieces filling the available space. I put other odds and ends in smaller cardboard boxes and found homes for them (and my spare shoes!) amongst all the bubble wrap as I filled in around the two models. The box was finally taped shut and had decals and address details added.

Having booked 23 kg 'extra' with Monarch, we just rolled up at Manchester Airport and checked in our boxes, which were weighed (all under 20 kg) and returned to us to put on the 'odd size baggage' conveyer. The only difficult bit so far had been getting the boxes on the bus from the car park to the terminal.

Four of us travelled to Lisbon: Steve Haley and his wife Fiona, and Martyn Wharrie and me. (Brian Johnson and his wife Norma had to withdraw when she suffered a serious break to her femur. Thankfully, following a long operation, she is on the road to recovery.) On arrival we were met by Manuel Leite de Almeida, who had convinced us that Portugal was a good place to visit and fly F5J. He was not wrong!

Manuel and various club members helped us by transporting the boxes to the flying field and back to the airport afterwards. We hired two small cars (large cars/vans are very expensive to hire!) and headed about 100 km east to the old town of Evora for the duration of the competition, which was held at a glider airfield near Motemor-o-Novo about 20 km away.

The weather had been poor for a week before we arrived and when we went to do some test flying on Friday there were a few rain showers going through and the sky was completely overcast – very British, you might say! One big advantage of the field was that the hangar was available for shelter and we were able to leave the models assembled there, securely locked at night, for the whole event.

Competition started on Saturday, with a decision not to have a fly-off, and eight rounds were scheduled, with four to follow on Sunday. The weather was still very British and the lift could be very patchy; the wind might have peaked at 10 mph but was generally light.

The hangar at Montemor, Portugal was very useful for shelter and storage. You just needed to remember the full size wings when you stood up!

The UK contingent in Portugal. It got warmer as the competition proceeded

Rich Frederick came from the USA, by way of Spain, to Portugal and flew this lightweight Pike Perfection in unusual V-tail configuration

Manuel Medina's Pike demonstrates how a good colour scheme can show up well in virtually any conditions. It had good visibility in the blue sky later on day two in Portugal

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We flew models around 1.7 kg to 2 kg but several others were flying lightweights of 1.4 kg plus. But in these conditions they were at no particular advantage.

Launch heights were generally above 150 metres and often a considerable search was needed to find reasonable air. When the wind rose the hangar and associated tree line of cork oaks could be a useful lift generator, but they could 'sucker' you into sink, as one guy who landed (safely!) in the field behind could testify. Steve flew his Pike Perfection exceptionally well, as usual, only dropping a few points all day and consequently he was first when we packed up at 6 pm, to head off to the excellent banquet at a local restaurant, with lunch and drinks having been served in the glider club house all day long!

Sunday was a brighter day, the lift was more fickle and the wind was much the same as Saturday. Many came to grief in very tricky slots, some of which only lasted three to four minutes. But there were also a number where just one or two pilots got away from the pack and consequently improved their scores dramatically against the others. During this time Steve flew very consistently, scoring maximum points in each round, to finish an excellent first, dropping only 25 points in 11,000! I snatched defeat from the jaws of victory, dropping five places on the second day and Martyn had a couple of model issues and finished just behind me.

The prize giving took place in the hangar, as the full size gliders and tug were already being prepared to use the remaining good weather for flying. The organising club must be congratulated. This was a well run event in every respect and most enjoyable to take part in. Several students had been recruited for timekeeping duties, this being the first time most of them had seen model flying activities, and they performed in a very professional manner.

The other thing which was remarked upon was the quality of the sound system; it was as perfect as any outdoor system I have ever heard, contributing greatly to the smooth running of the event.

The event should go ahead again at about the same time in 2017 and I would encourage anybody to attend. We moved on to Lisbon for three days holiday and had a splendid time in a city with much to see and do. The box transporting went just as easily on the return – even the airport car park bus was driven by a model flyer!

BMFA Soaring Nationals

As we go to press I am able to report that, after a long struggle to find a single alternative venue to hold the Silent Flight Nationals, various sites will be used. They are:

Wetlands, Lound, Notts. August Bank Holiday weekend:
Saturday – F5J; Sunday – F3J & 2MeS; Monday – Open eS

Twywell, Sunday 4th September:
100S Glider

Other classes are currently seeking alternative venues, or will designate a competition on their League schedule, as counting for the Nationals Trophy.

RCMW

Winners podium top step in Portugal was occupied by Steve Haley, second was Angel Christobal and third was Rui Silva

This 4 m V-tail Electra performed well in Portugal. It looked and felt quite light

If you are into wild flowers then the flightline at Montemor is the place for you. Typical slot start every time in F5J, with everybody away on the button. Student timekeepers did a first class job over two days, as did the whole organising team

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Field Stand

Fed up with crouching down to your model on the ground? Then its time you made a stand. Mike Chambers describes a fold-up unit designed and used by members of the Medina Model Flying Club

Models are supported at a convenient working height

When folded the stand is easy to stow and carry

Assembling a model aircraft at the flying field and making it airworthy demands attention to detail. This ought to be done in a calm and unhurried frame of mind and without distraction. Bending over a model on the ground is tiresome; it's much easier to concentrate if the model is at a comfortable working height

A suitable stand is called for but if the car park is some distance from the pits then the stand needs to be light, compact and easy to carry.

Here is a description of the prototype of a model stand for field use that provides a stable working platform but which folds in two directions, making it compact and portable. A list of materials and dimensions and handy hints follow for those wishing to build one.

The stand provides two platforms 60 cm apart at a working height of 85 cm (the same height as a domestic worktop) to support the nose and tail of the model, upright or inverted. It is particularly handy for those electric models where the battery is installed from underneath. The complete stand weighs 2 kg and when folded up is 1 m long with a cross section of 10 cm x 5 cm. Erecting the stand takes less than 30 seconds, and folding it up again is even quicker.

Suitable for trainers and sports models up to about 2 m span, and gliders a bit larger, the stand is in the form of a 'trestle'. Two 'A' frames form the ends and these are linked together by cross bracing members on each side.

There are two distinct parts to the finished stand; the main folding frame that provides the basic work platform and the cradles that hold the model in place. Once assembled the main frame is in one piece and there are no loose items such as locking pins or screws to worry about or to lose in the long grass!

Constructed from readily available materials the only engineering operations required are cutting-to-length, drilling holes, plus a little bit of filing.

The form of folding linkage used for the 'A' frames has two advantages. Firstly, the top platform (head-piece) lies horizontal when the frame is open but in line with the legs when folded. Secondly, the folding tie bar is horizontal when the frame is open and so can act as a shelf support if needed.

Each of the four 20 mm square legs has a different combination of length and hole positions. The hinge points all use a 10 mm or 12 mm M5 screw and a 'Nyloc' nut. For a smooth, snag-free exterior the screws

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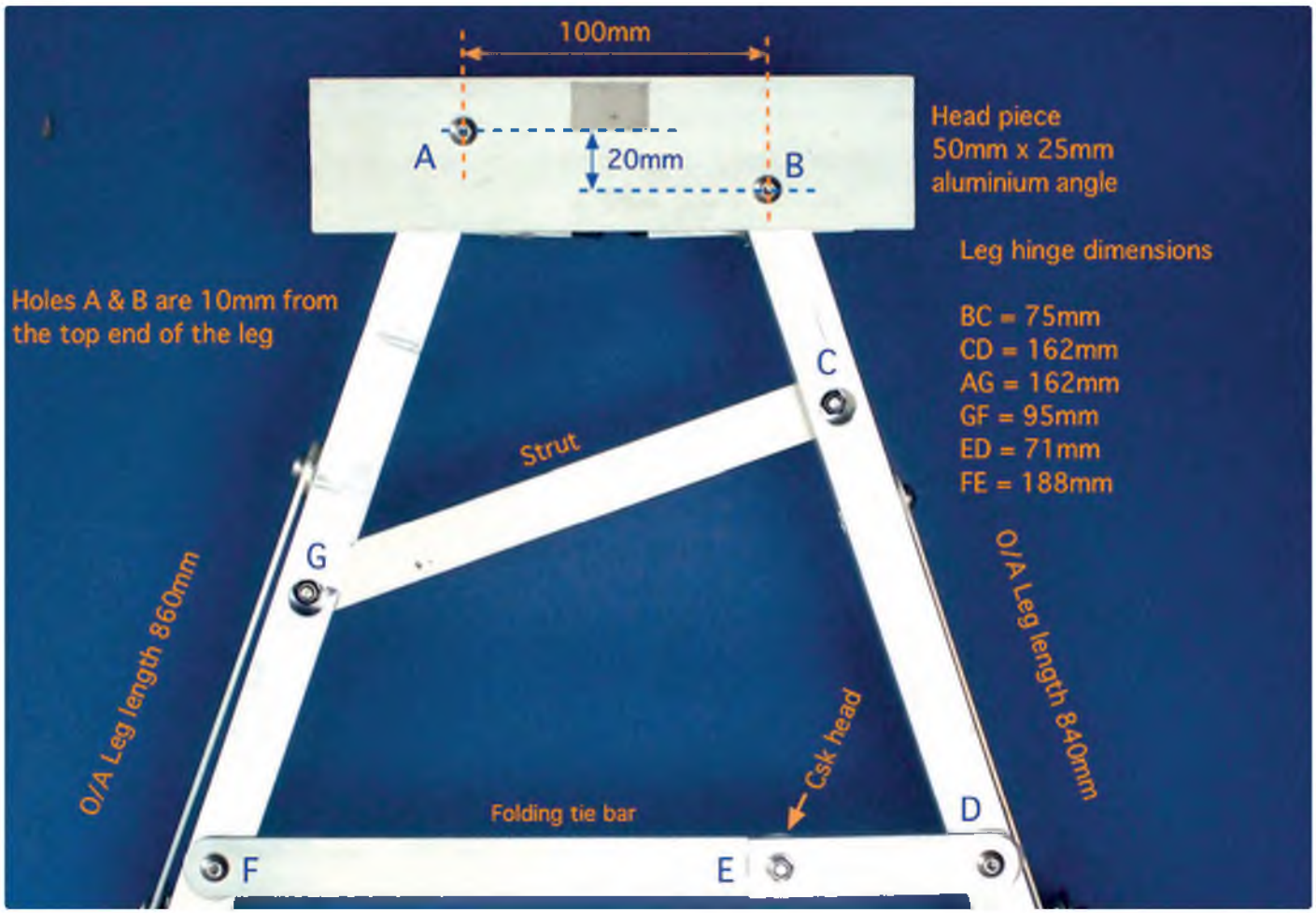

Folding 'A' frames form a rigid support when 'open'

Collapsible cross bracing is locked by a simple turnbuckle

Adjustable cradles can take many forms

One end of each two-part cross brace needs a spacing washer

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are hex-drive button-head. In each case the hole for the screw is in one face of the leg, with a 12 mm hole in the opposite face allowing access for an 8 mm socket spanner. A 20 mm polythene washer between the moving surfaces ensures a smooth action, as aluminium sliding on aluminium is prone to seizing.

Both sides of the stand are cross-braced for rigidity.

Each bracing member is in two pieces, hinged together using a cap-head screw. Two such members are interlinked and where they meet at the crossover they are locked together by a catch (turnbuckle) to form a rigid cross. The slot in the turnbuckle engages with the head of the cap-head screw in the hinge of the opposing member. Where the side braces attach to the legs the hinge points are on a rectangle 594 mm high and 600 mm wide. One outer end of each cross piece has a 2 mm thick spacing washer to put it in the same plane as its opposite number.

Users may like to invent their own design of support cradles, maybe even tailor them to their individual models.

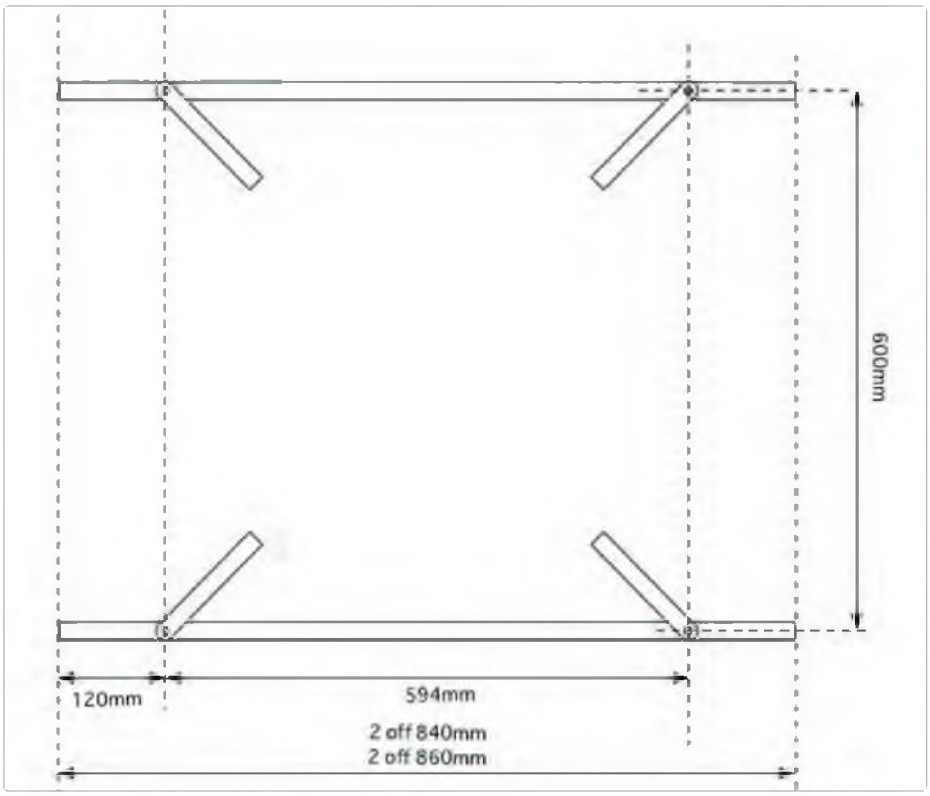
An alternative would be a simple U shaped form, lined with resilient foam and attached to the stand platform with hook and loop material. When not in use this version could be simply detached and stored with the model.

Some refinements are worth considering:

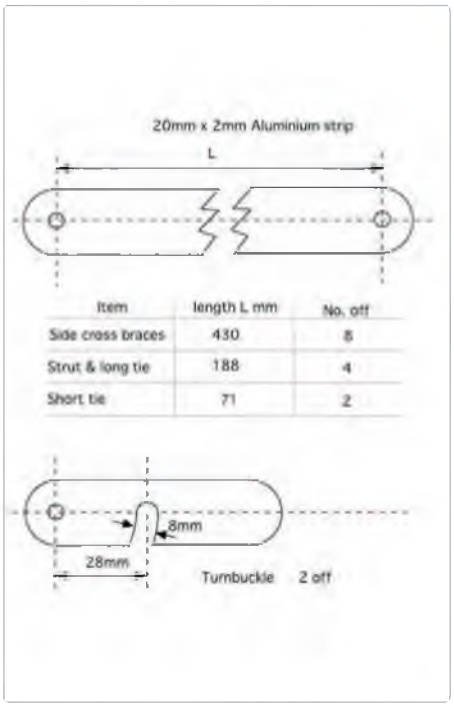
- A shelf mounted between the tie-bars can prove useful
- A hook and loop strap pinned to one of the legs will keep the whole stand tightly closed for carrying
- A loop of webbing retained on one of the legs provides a carrying handle
- Plug-in pointed feet prevent soil getting into the leg tubes and give the stand a firm stance on grass. Protruding metal spikes that can be driven into the ground would further improve stability
- Adjusting the leg length below the lower cross brace attachment points can provide a different working height

Designed and built by Medina Model Flying Club on the Isle of Wight, this stand has prevented many potential backaches, a boon particularly appreciated by the more senior members.

RCMW



Cross bracing dimensions of the prototype



Folding linkages are from aluminium strip

Plug-in feet make neat ends for the legs

A retaining strap and webbing loop can be fitted for ease of handling

CONSTRUCTION TIPS

A few tips for would-be stand builders may prove helpful:

- The dimensions of the 'A' hinging linkage are critical; errors here will prevent the assembly folding smoothly
- An M5 screw has an actual diameter of 4.9 mm. Drilling this size instead of the usual M5 clearance helps to reduce any residual play in the joints
- When setting out and drilling the legs it's a good idea to drill all the holes in the legs with a pilot size first (e.g. 3 mm) right through both sides of the 20 mm tube. Use a bench or pillar drill to make sure the holes go through squarely. Carefully pair up the legs and mark each hole as either an M5 clearance or 12 mm, then double check them before opening to finished size. Remember - all four legs are different!

MATERIALS LIST

All the materials are available from a variety of sources:

- 20 mm square aluminium tube for the legs (4 x 1 m lengths needed)
- 20 mm x 2 mm aluminium strip for the cross bracing and the 'A' frame members (4 x 1 m lengths needed)
- 50 mm x 25 mm aluminium angle for the headpieces (2 x 100 mm needed)
- M5 x 10 or 12 mm button head screws (16 needed)
- M5 x 20 mm cap head screws (4 needed)
- M5 x 100 or 12 mm csk screws (2 needed)
- Nyloc nuts (22 needed)
- M5 normal washers (about 50 needed)
- M5 'penny' washers (8 needed)
- Polythene washers (make these from the sides of a supermarket milk container)
- 20 mm x 2 mm thick M5 spacing washers (make from scrap lengths of the 20 mm x 2 mm strip) (6 needed)

The total materials bill should be less than £50.00

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Traplet Scale At Pontefract

The Yorkshire leg of the Traplet 'War of the Roses' scale competition took place on Sunday the 15th of May. From his judge's seat, Phillip Kent got a prime view of the day's action

Paul Blakeborough with his new Waco YKC

Last issue's cover model, the Fielser Storch by John Kidd that sadly crashed

The weather at Pontefract was excellent but for some reason the turnout was not as good as on previous years. However, the quality of the flying from the leading contenders was first class and there were also three competitors who were making their competition debut.

The day got off to a poor start when the third scale Tiger Moth belonging to John Bunting from the Pontefract Club had to be withdrawn due to a rigging failure after an early test flight. Things got even worse during the first round when the superb Fiesler Storch, recently featured in this magazine and belonging to John Kidd, crashed just after completing the flap demonstration. There was significant damage to the model but John assured me that a full repair would be his winter project.

All was not doom and gloom though and we had one of the most attractive and well-built scale models that I have seen for some time taking part. I am possibly biased because the model was of a Waco YKC, and as some readers will remember I had recently completed a model of this aircraft myself.

John assembles the Storch

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The Corby Starlet flown to first place by John Higgins

Although Traplet Scale is a 'Flying Only' competition it's still nice to appreciate a finely built scale aeroplane

The livery of the 72 inch span WACO YKC is based on a desert colour scheme of sand and earth, with light blue under surfaces and RAF roundels, as used by the LRDG in North Africa during WW2

Waco in flight

Waco YKC being assembled

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I did know about the model that had been built by Paul Blakeborough but it had come as a bit of a surprise when he told me about it last year when we were doing the BMFA Northern Area accounts (Paul is the treasurer and I am the auditor). At the time my model was in one of its many set aside moments but due to the visit by Paul I got the inspiration to get started again and finish the model off. I am going to give a more detailed account of the model in a separate article but at the moment here are some of the significant details. The model is to a scale of 1 to 5.5, giving it a wingspan of 72 inches. The full size aircraft that the model is based on was used by the Long Range Desert Group (LRDG) in North Africa during the Second World War. The desert colour scheme of sand, earth with light blue under surfaces and the RAF roundels is not what most of us would expect for a Waco YKC. Along with the stunning quality of the Laser powered model it flew very well too. It had the correct sit in the air and performed the non-aerobatic course manoeuvres with ease.

In complete contrast to the Waco was the ARTF quarter scale Extra 330 belonging to Jim Brown. This petrol engine model was able to complete the aerobatic section of the flying schedule with power to spare.

Newbie

One of the competition first timers was Bill Mansell from the West Midlands. Bill was flying a Piper Arrow built from an Italian kit and powered by a RCV CD 130. The model was very quiet and perhaps due to this fact I was worried that the model was not going to get airborne. But after a long, realistic take-off run the model got into the air without a problem. For a first time competitor Bill did very well with an excellent Straight Flight and a high scoring Landing mark. I like to encourage the novice flyers and Bill was given the opportunity to fly the rectangular manoeuvre again when he went the wrong way.

John Higgins from Blackpool was a previous winner of the event and one could see why. His 1 to 4.5 scale Corby Starlet was electric powered and it sailed through its aerobatic schedule with ease. Only the Descending Circle, Landing and Stall Turn failed to score 8 or more.

At the end of the first round John Higgins had a nine point lead over Paul Blakeborough, with newcomer Bill Mansell in third place.

After a lunch break flying continued in the excellent conditions. There was a very light breeze and it did turn through 360 degrees on several occasions, causing the models to land in a different direction to where they had taken off. The Waco made a better flight in the second round, with the highest score so far. But John Higgins was not to be denied and made the best score of the competition on his second flight with the Corby Starlet. Jim Brown started to show some form with his top score of the meeting with the Extra.

The trio of tyro competition flyers were all improving and after a few hairy moments they were all looking much better as they came to terms with flying the scale schedule for the first time in a competition environment.

Hard Work!

The third round got underway after a short break – it's hard work being a flying judge! The quality of flying was still high, with all the competitors enjoying the flying. The finishing order was determined by using the best scoring two flights and discarding the worst.

John Higgins from the Blackpool and Fylde RCMS was in first place with his electric powered Corby Starlet that was built from the RC Model World drawing by Dennis Tapsfield (plan number MW 2035 in RCMW, August 1985). In second place was the fine Waco YKC built by Paul Blakeborough from the Pontefract club. And third was Jim Brown flying his big Extra, again from the Pontefract club.

We were so lucky with the weather on the day and it was good to see some excellent flying. And also to see Bill Mansell, Graham Worfolk and Peter O'Keefe, all newcomers to scale competition flying. Thanks must also go to the Pontefract club for letting us use their magnificent flying site for these competitions.

RCMW

E-flite Hurricane flown by Graham Worfolk in his first competition

The ARTF Extra flown by Jim Brown to third place lines up for another round

Piper Arrow flown by Bill Mansell from Birmingham

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Roban Bell 407

Roban introduce their 700-size Bell 407 – just choose your colour scheme! Jon Tanner reports

When talking about helicopters the machine that often comes to mind is the Bell JetRanger. And as the LongRanger is a stretched version of it, it too is a very familiar machine. The Bell 407 is the latest incarnation of this machine, retaining the single engine but with a four-blade rotor head while retaining the two-blade tail rotor – all of which makes it an ideal subject to model.

The design can be traced back to 1960 as a United States Navy 'Request For Proposals' for a Light Observation Helicopter, and the prototype Bell 206 first flew in 1962. This early design was known as the 'Ugly Duckling' and was stretched to provide more passenger and cargo space to become the Bell 206A JetRanger. The 'stretched' seven seat Bell 206L LongRanger was first delivered in 1975, which was further developed to finally become the Bell 206L-4 LongRanger IV.

Development of Bell's replacement for the 206 series started in 1993 and two years later the Bell 407 prototype took to the air with its four-blade rotor head – interestingly the 407 demonstrator was a modified 206L-3 LongRanger. Delivery of the Bell 407 began with some 140 aircraft being produced in 1997 and the 1,000th rolled off the production line in 2010. The Bell 407 is used across multiple roles, from corporate and HEMS, to gas and oil platform servicing. Law enforcement and military roles are performed by the latest Bell 407GT. No wonder it is so recognisable.

From a modelling perspective the simple design makes an ideal R/C model subject. It has a big doghouse where the mechanics can be located and the tail boom is high with a straight run to the tail rotor. The fuselage itself is spacious, providing endless opportunities for scale detail. The skid undercarriage is also simple to model, so all in all the Bell 407 is ideal for any scale modeller and particularly for someone looking for their first scale model.

The Roban Bell 407

I'm sure many heli enthusiasts will be familiar with Roban's approach to presenting their models. A large plain cardboard box contains a fully painted fuselage, and further boxes contain ready assembled mechanics, in this case a four-blade main rotor head and tail rotor gearbox with rotor blades, plus the tail boom and tail driveshaft. Then there is the included scale detail such as the ready to fit cockpit with lighting system, control sticks and pedals, seven seats, navigation lights, aerials and wire cutters, and a large set of water slide decals to match your chosen colour scheme.

This means you will need: a motor and ESC, cyclic and tail servos, receiver and 3-axis gyro, Rx battery/BEC and flight battery packs.

Fuselage Assembly

The kit did not include a manual so the first job was to download it from the Roban website (www.robanmodel.com/cms/index.php/home/instruction-manuals). This is a 55 page pdf file, which I didn't print but instead I worked from the computer screen. Pages 8 to 34 cover the actual build but you will need to refer to the parts listing to help identify what's what.

The front fuselage section is a lovely moulding and has the complex woodwork installed, including the cockpit floor, which is painted. The four main opening doors are already fitted and glazed, and the cargo door is also functional. Removing the top cowls gives excellent access and the mechanics will simply drop in place – the rear cowl is screwed in place while the front

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This is how the fuselage looks out of the box

Parts are carefully wrapped

Mechanics etc. are preassembled

Nice cockpit parts – the dials are illuminated!

Tail boom, driveshaft etc. are ready to fit

Complex woodwork is pre-installed and you have full access to the mechanics

Here you can see the end of plywood plate that runs along the floor of the fuselage helping to spread the load

The cabin area is painted

is held with magnets and locating pins. This means that unlike the Apache I built before the mechanics are accessible – another example of why I think the Bell 407 is such a practicable scale model!

First job is screwing the pre-painted undercarriage to the fuselage. The U/C is the 'tall' set with the cross tubes fitting into recesses in fuselage floor. Four screws hold it in place and mock clamps cover these to simulate the full size. This gives you a stable base to work on. The tail section is a tight slide fit onto the front section and is held in place with six screws into plywood reinforcing plates. Alignment was correct so I was happy to drill the fixing holes at this time.

A foam damper is slid into the tail end of the tail section so the boom will pass through it preventing any movement between the two. The vertical tail fin is screwed to the boom and the supplied anti-collision beacon has to be installed first. This is a bit of a fiddle as the LED has to pass through the hollow fin; you may want to open up the access hole – be careful with it as I managed to damage the LED!

A white tail LED is also fitted and extension leads are provided that run through the tail section to the control board that takes its power from the Rx.

Next are the horizontal stabilisers that are moulded with leading edge slats, and very nice they are too! The small end fins are screwed on and navigation lights are added with the wires running through into the tail section.

It is worth noting that the outer ends of the stabilisers are cut at an angle so the fins angle outwards at the front – the square cut end is glued into the recesses in the tail section. Be sure to make a good job of gluing them in place and that they are horizontal as their weight does tend to make them drop a little. The manual also shows the nav light wires glued inside the tail; this is a good idea otherwise the tail boom could snag them.

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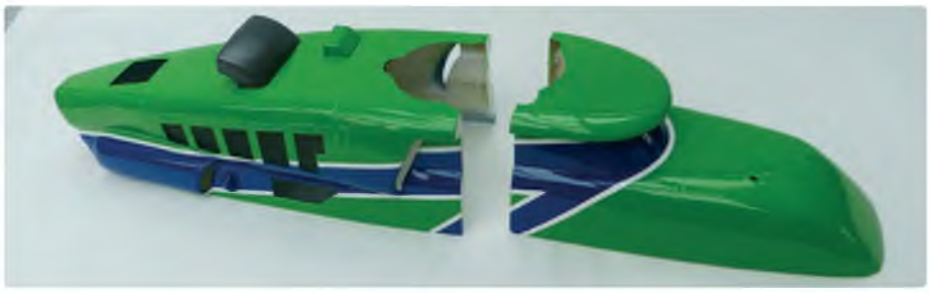
The doors are hinged with working handles and the clear glazing is properly fitted

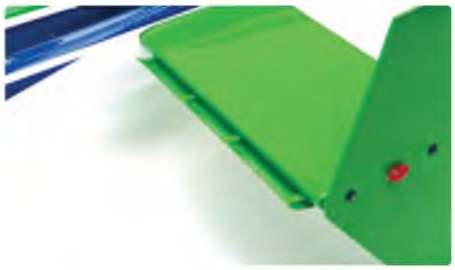


The rear cowling is screwed in place while the front uses magnets and locating pins

The undercarriage is supplied ready to fit and just needs four screws; dummy clamps are simply glued on top

The tall U/C is supplied and looks the part

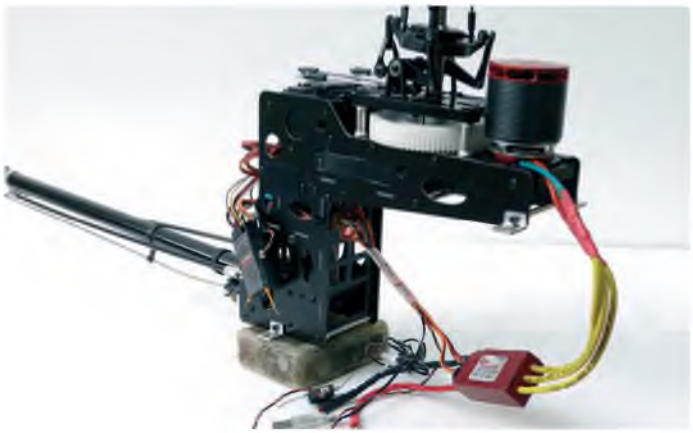
Feeding the anti-collision light wire through the fin is a bit fiddly; three screws hold the fin in place



The leading edge slats are a great detail

Tail section finished

SM2 Compact Mechanics. You can see how compact they are!



Left: These are the AH-1 Cobra mechanics; you can see how the upper section is equally compact while the tail section is much longer for the lower tail drive

Right: Here you can see the white tail speed up gears and the tail gearbox that's used to drive the tail tube drive; the bearing block supports the bottom of the main shaft

Mechanics

As mentioned the mechanics are supplied assembled ready to accept the motor, servos, rotor head and the tail boom. These mechanics use a two-stage reduction with a toothed belt drive from the motor to a lay shaft behind the main shaft that drives the main gear through a second reduction gear set. The lay shaft also drives a set of speed up gears for a second shaft running down to a gearbox that then drives the tail driveshaft. This lower gearbox is a tail drive gearbox cleverly rotated so the 'output' shaft is used as the input, which means the shaft is properly supported both sides of the bevel gear.

The side frames are carbon sheet with metal bearing blocks and motor mount, with further carbon spacer plates bracing the assembly. This layout means that the main drive components are very compact and will therefore fit into the 'doghouse' with the tail drive dropping down behind.

These SM2 'compact mechanics' are used throughout Roban's super scale range of 12+ models, with the only difference being the position of the tail drive and boom clamps. As a comparison I have included a photo of the AH-1 Cobra mechanics where the vertical section of the side frame is much longer, taking the tail drive lower to suit the low slung tail on the Cobra.

The four-blade rotor head is supplied fully assembled. All you need do is check the length of the pitch control rods. Having said that I did check that the screws were all tight and the blade grips rotate smoothly without axial play – they passed my tests. The all-metal swashplate is also supplied ready to fit; the manual says to fit these to the mechanics at this point but I decided to do this later.

Attention turns to the tail boom, which is supplied cut to length and so just needs the tail tube drive installing – use oil on the bearing supports to help them slide in. The boom support clamps can be removed from the frames and fitted to the boom. A screw into the boom locates the rear one, while the front support is recessed to accept the boom, all of which makes it easy to fit. The servo support, control rod supports and boom stay support are slid in place and the boom assembly reinstalled into the mechanics.

Electrics

Powerful metal-geared servos are recommended and I chose Spektrum H6040s, which match the spec, three for the eCCPM and another for tail control. The servos dropped into place and I chose

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Fully assembled four blade rotor head. I checked all the screws, which were secure. All you need do is check the length of the control rods

4 mm bolt and two pinch bolts secure the rotor head to the 12 mm main shaft

Tail tube and driveshaft are ready to fit

eCCPM servos fit behind the main shaft – it is best to use short servo arms

The tail rotor gearbox is supplied ready to fit

Fit the boom so you can set up the tail – note the boom supports need to be under the boom

The boom stays need spacers to clear the boom

KONTRONIK Pyro 700-45L with JIVE Pro 120+ HV is ideal

to use JR heavy-duty arms, with the ball on the inner hole. The reason for using the inner hole (11 mm radius) is that the servo control rods run to bellcranks that double the output, making the controls very aggressive. I believe this is to help keep the control assembly as compact as possible but it's a good idea to compensate by using short servo arms.

I decided to use a Spektrum AR7200BX receiver that includes a BeastX 3-axis gyro. It is mounted on a tray at the rear of the mechanics. I mentioned that removing the rear cowl on the Bell 407 provides full access so it's easy to access the gyro should any fine-tuning be needed – with the Cobra and Apache the gyro is completely buried inside the fuselage…

The next job was to run through the BeastX set up so I could adjust the pushrods, etc. I was pleased to discover that when setting the Cyclic Pitch Geometry on the BeastX, 6º cyclic gave a blue LED, showing the geometry was correct.

It is also a good idea to fit the tail rotor gearbox so that you can set up the tail control and check the gyro response. You will find that the tail rotor rotates with the leading edge running down through the main rotor downwash. The boom stays need to be fitted with the boom clamp under the boom; I made a couple of spacers so the carbon stays would pass the boom.

Motor And ESC

All Roban 700-size super scale models are designed for 12S LiPo power. And in this case, with the four-blade rotor head, they specify a 450 KV motor, which with the standard gear ratio of 13.83:1 will give a governed rotor rpm of about 1300. I chose a KONTRONIK PYRO 700-45L (you ideally need the long shaft version) and a KONTRONIK JIVE Pro 120+ HV ESC, which includes their excellent governor, as well as their very reliable 5-8 V BEC that's rated 8 A continuous and for 20 A peaks – plenty for this and any model!

Another benefit of using the JIVE Pro for this scale model is that the optional KONTRONIK ProgUNIT allows you to vary the spool up time (8-60 sec) and it also has an internal log that can be accessed by optional modules that are plugged into the sensor port (www.kontronik.com).

The motor slides into place and the primary drive belt pulley is added. I suggest using a good quality ball ended hex driver for tightening the securing M4 screws. The belt is tensioned by a pair of screws that pull the motor mount forward before tightening the motor securing screws that also lock the mount in place. It is worth checking the belt tension after a few flights.

I always like to use a EMCOTEC SPS (Safety Power Switch) that operates as an electronic switch between the LiPo packs and ESC, operated by a remote switch. I use the magnetic 'remove before flight' plug version. The advantage of the SPS is that you can connect the packs in complete safety and the system is only live when you pull the plug. It also includes an anti-flash circuit that prevents the spark when connecting some ESCs – the JIVE has its own circuit for this… ***RCMW***

Next Issue – completing the build and flying the Bell 407.

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Left: A pair of M3 screws pull the motor mount forward to tension the belt before securing the motor mount screws

Right: EMCOTEC offer these Safety Power Switches (SPS) that isolate the battery pack until needed. Three 70 V versions are available, 60/120 A, 100/200 A and 140/280 A all with a choice of magnetic, pin or R/C switches

In the next issue Jon completes the build and reports on the flying characteristics of this lovely scale electric helicopter

The four - bladed head really adds to the scale effect

RC MODEL WORLD

MODEL INFORMATION

MANUFACTURER:	Roban Model
WEBSITE:	www.robanmodel.com
DISTRIBUTOR:	Quick UK – www.quickuk.co.uk
MODEL TYPE:	700-size Scale model
MAIN ROTOR DIAMETER:	1560 mm
TAIL ROTOR DIAMETER:	280 mm
OVERALL LENGTH:	1680 mm
OVERALL WIDTH:	415 mm
WEIGHT, INCLUDING FLIGHT PACKS AND BLADES:	7822 g (17 lb 4 oz)
GEAR RATIO, USING SUPPLIED 22T PINION PULLEY:	13.82:1:4.68
UK RRP:	£1349.99

MODEL SPECIFICATIONS

BODY LENGTH:	1680 mm
WIDTH:	415 mm
HEIGHT:	510 mm
MAIN ROTOR DIAMETER:	1560 mm
MAIN BLADE LENGTH:	700 mm
TAIL ROTOR DIAMETER:	280 mm
TAIL BLADE LENGTH:	105 mm
MAIN SHAFT DIAMETER:	12 mm
TAIL SHAFT DIAMETER:	5 mm
SPINDLE DIAMETER:	8 mm
BATTERY COMPARTMENT:	120 x 60 x 180 mm
FLIGHT TIME:	+ 5 minutes
TAKE OFF WEIGHT:	8500 g

ADDITIONAL/OPTIONAL PARTS:

MOTOR:	750MX 450 KV brushless outrunner, 12S capable
SPEED CONTROLLER:	120 A brushless, 12S capable
SERVOS:	3 x metal gear cyclic, 1 x metal gear tail servo
LIPO:	44.4 V 5000 mAh 35C
FLIGHT STABILISATION:	3-axis flybarless gyro
RADIO CONTROL:	Minimum six channel with pitch and throttle curves

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Sky RC Sokar

FPV racing is becoming the next big thing. James Crozier jumps aboard the hype train to see what Sky RC's latest creation is made of

Sokar is Sky RC's initial skirmish into the FPV battlefield and it's designed to give you everything you need to give this burgeoning discipline a go yourself. The model has a fair amount of grunt and has a 'NASCAR-esque' vibe in terms of aesthetics. It's totally tuned for FPV racing so if you're looking for a sedate all rounder, steer clear. This one's a speed demon!

hobbymagazines.org

Sokar comes in a tidy, colourful box

Who doesn't love racing stripes?

In The Box

As previously mentioned the Sokar is Ready-To-Fly.

The box shows the Sokar flying in various stylish locations such as Stonehenge, and over the River Thames in front of the London Eye (don't be tempted to recreate this – make sure you check the BMFA & CAA Drone Aware guidelines if you're unsure about where you can fly).

Inside, all the contents are within two separate polystyrene boxes – one for the model and one for the rest of the kit. The airframe is a very snug fit and requires a bit of imaginative bending of the polystyrene to remove it without putting stress on the arms. This is a minor annoyance if you want to keep the polystyrene intact for tidy storage of the model but if done with enough care it won't rip apart.

The included monitor has a very stable video connection

The drone itself is fully assembled and only requires the installation of the blades; a simple task of unscrewing the nuts, pushing the correct blade on the right motor (there are simple icons on the blades which make this quite straightforward) and screwing the nuts back on. A small L-wrench is also supplied, which allows you to tighten the nuts up.

Also in the box is a 'race-car' style canopy, a 3S 2000 mAh LiPo battery and charger, a domed cloverleaf antenna, spare propellers and a 2.4 GHz transmitter.

The supplied transmitter will feel very comfortable in the hands of modellers used to 'traditional' handsets. Having grown up using JR transmitters this one felt quite comfortable and allowed me to fly using my preferred 'thumb and forefinger' style – something those of you into R/C helicopters will undoubtedly be familiar with. This is great, as the Sokar is of course a racer and it really does have some grunt, so precision control is paramount.

Lastly, there is the 4.3" LCD Monitor, which clips on to the transmitter. The monitor itself also needs charging, alongside the battery, using a Micro USB cable. Unfortunately, there wasn't a Micro USB cable included in our box; you'll have to find a suitable cable yourself.

All the gear you'll need to get your first fix of FPV flying

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The transmitter is small but perfectly formed using true R/C styling

Underside of the airframe

Let's Race!

Here at Traplet HQ, we consider ourselves to be experienced R/C pilots. So we charged the batteries and the monitor, attached the props and strolled over to the flying field. We then gave the Sokar a test flight and flew it like a normal model – paying no attention to the monitor!

After realising what we'd done, we attempted another flight, this time making sure to look at the screen. This is easier said than done, as it goes against all your instincts of wanting to actually look at the model.

The Sokar has 'responsiveness' and 'stabilization' switches on the transmitter. Initially we kept to the low responsiveness mode with stabilisation on to get a feel for the model and even then it was flying at a good pace with loads of manoeuvrability. For those for whom this would be their first FPV drone I'd recommend that responsiveness stays firmly in the 'low' setting, at least initially.

Once I felt I had a good hang of the model I amassed the courage to switch stabilisation off and go into high responsiveness mode. This is where the Sokar truly comes to life, transforming from a relatively nippy drone into a real racer!

Manoeuvrability goes through the roof in this mode and you are able to change direction quite literally in a 'snap'.

This level of speed and agility was a bit of a reality check and at one stage trying to combine it with looking down at the screen caused me to lose my orientation slightly. Luckily I managed to recover and bring the model back into a hover, but I would definitely recommend copious amounts of simulator practise time before trying to go for full on 'FPV race mode' with this model.

The camera that's built in to the Sokar is very reliable and while the signal looks as if it's becoming weak from time to time, we had a solid connection all the way through our test flights. One downside is that there is no screen guard on the monitor, which makes it hard to see when the sun hits it, but for someone looking to get a taste of FPV this shouldn't be a deal-breaker.

Two bright 'headlights' either side of the camera help show the way when flying FPV in dim conditions

Sokar's speed and agility was a bit of a reality check

Rear view showing the video Tx board and the main XT style battery connector

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Final Thoughts

All in all, the Sky RC Sokar FPV is very enjoyable to fly and is a great starting point for anyone looking to get into the world of FPV racing. Aside from the strange lack of Micro USB cable to charge the monitor, you really do get everything you need and can be up and flying in no time at all.

As previously mentioned the Sokar FPV is very quick and agile. With the right pilot at the sticks this could be a formidable racer.

RCMW

A wide open flying field is definitely recommended at first!

The monitor clips nicely on to the transmitter

Showing off the sleek canopy

Heading up a bit higher for another round of FPV!

MODEL WORLD

MODEL INFORMATION

NAME:	Sokar FPV Drone
MANUFACTURER:	Sky RC
WEBSITE:	skyrc.com
DISTRIBUTOR:	Schumacher Racing
WEBSITE:	www.racing-cars.com
PRICE:	RRP £349.99
MODEL TYPE:	FPV Racer
PARTS SUPPLIED:	Airframe, Canopy, 5.8G Video Transmitter, Cloverleaf Antenna, 4.3" LCD FPV Monitor plus antenna, 2.4 GHz Transmitter, spare props and installation tool, LiPo battery charger, 3S 2000 mAh battery and 4 AA batteries

PRODUCT SPECIFICATIONS

CONNECTIVITY:	5.8G
CAMERA:	300,000 Pixel Sensor
BATTERY:	Lithium Polymer 2000 mAh
CPU:	32-bit ARM Processor
IMU:	Invensense 6050, 3 Axis Gyro, 3 Axis Accelerometer
DIMENSIONS:	222 mm x 173 mm

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Viper XXL

We take a close look at Simon Potter's big, beautiful Tomahawk jet

Jets abounded at the Long Marston air show in early June. But for us there was one model that managed to really stand out in the grey overcast sky that hung over the event on the Saturday when we visited the show and that was Simon Potter's awesome Tomahawk Viper XXL.

This 3.48 metre wingspan Viper is not new on the jet circuit, having been flown for the past two years, but it still manages to look good out on the flight line. It is powered by a JetCat P200 turbine and weighs 24 kg without fuel.

Radio control is courtesy of Simon's Futaba 18MZ transmitter, whilst a PowerBox Royal SRS system on-board provides the model with an iGyro triple-axis gyro system and serial bus support tailored in this instance to Futaba's S-Bus system. ***RCMW***

tomahawk-design.com
www.powerbox-systems.com
(search for Royal SRS)

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LMA At East Kirkby

The 2016 Large Model Association air show season began with its regular visit to the Lincolnshire Aviation Heritage Centre, East Kirkby on May Day Bank Holiday weekend. Neil Hutchinson, our regular LMA correspondent, reports from the flight line

The Greenley of Nigel Davies, with the LMA welcome banner at the start of the show

In the warbirds slot John Veasey flew his Hawker Hurricane, a Tony Nijhuis design of 104" wingspan. The detail on this model is excellent

Above & left:
Steve Rickett with his new de Havilland Dragonfly

Above & right:
CARF Corsair of Tony Hooper. The Corsair features a folding wing system, which Tony operates as the Corsair taxis out to the runway and the Moki five cylinder radial petrol engine sounds superb

Above & left:
An unusual looking aircraft, the Bede BD8 built by Doug Rigby and now owned by Paul Needham

It seems a very long time between the last large model show at Much Marcle and East Kirkby. The gap seems even longer with the demise of the Barkston Christmas fly-in! The show flying would follow the usual format, open to public viewing on the Saturday and the Bank Holiday Monday, Sunday is set aside for an LMA fly-in and barbeque. This is because of local site rules, which mean members of the public are not allowed on site. The barbeque is open to all LMA members and is put on by local members Paul Needham and his faithful team of helpers.

The weather forecast for the weekend was not good, so there was going to be some improvisation. As it turned out Saturday's weather was fairly good, apart from the odd rainstorm in the afternoon and so things ran along the normal display themes. Monday was very windy and pilots would fly 'off the peg'.

Being the first show of the season, as you might expect there would be one or two new models. This year's East Kirkby show was no exception. There were several new models and one or two old models that have not seen the light of day for some time but are now under new ownership.

Steve Carr debuted another huge aerobatic model of the Yak 54 built from the Pilot RC range of ARTF kits. Steve's Yak is one of the largest in their range, with a wingspan of 180 inches. However, you can start small and get a 53" version of this model. The 550 cc petrol engine was designed by Steven, using two 3W 275 cc pistons and cylinders. He's also constructed his own exhaust and smoke system too and there are also smoke canisters on each wing. One other interesting feature of the Yak is the pilot figure in the cockpit. The pilot is a 3D copy of Steve Carr himself!

Another new model was the de Havilland DH90 Dragonfly built by Steve Rickett. I'll openly admit to being a lover of all things de Havilland. They built such beautiful and elegant looking aircraft and Steve has captured that elegance with this superb model. Steve has put a lot of time and effort into this model, as usual. The majority of the model is standard wooden construction but there are fibreglass parts, such as the engine cowls, wheel spats etc. made by Steve from moulds that he made.

The engine cowls are, in particular, worth mentioning. The side panels open much like the real aircraft to give access to the Kohn EZ50 petrol engines. Steve also manufactured the undercarriage too. The 157" wingspan Dragonfly looks fabulous in flight and once Steve has finished off the cockpit it'll be hard to tell it from the real thing in the air!

Ian Turney-White is another builder of large – or perhaps I should say extremely large – models! Ian's latest is a 2/3rd scale Scheibe SF33 motor glider. It is based on the sole surviving SF33, which is still flying in Canada. The model building process has taken sometime because Ian tells me he started it 20 years ago!

The model is made to measure – it just fits into a Volkswagen Sprinter van and the fuselage makes it in by just one inch!

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The wings are 10 metres long but they do break down into four pieces to make transportation easier. The whole Scheibe is standard wood construction and weighs in at 113 lb. The engine is a King 190 cc flat twin, which has its own starter motor so that engine can be switched off and on again in flight.

Several older models made a reappearance onto the LMA show scene at East Kirkby, under new ownership. Neil Hyde is now the owner of the large MiG 29 that Harold Dowbekin built some time ago. This is a large jet with a 2.2 m wingspan and a 2.4 m long fuselage. Two ATJ 170 jet turbines power the MiG. Neil says the model flies very nice and smooth.

One of the more unusual models to be seen at the show was the ex-Doug Rigby Bede BD8. Doug always liked to build unusual looking models and the Bede easily fits that category. Paul Needham is now the owner of this model, which was flown by Dave Johnson.

Another model that caught my eye and that was the Lysander III of Barry Barker. This is an ARTF model from Seagull and Barry has fitted a Saito 60 cc three cylinder radial engine. Barry likes the way the 112" wingspan Lysander flies and he enjoys piloting it.

East Kirkby is a lovely venue just about any time of the year. Not only is there a working Lancaster based there but the small museum dedicated to the service personnel of RAF East Kirkby and RAF Spilsby makes the place something of a time capsule. Over the weekend there are several taxi runs by 'Just Jane'. Being so close to those huge R-R Merlin engines is glorious!

The Lincolnshire Aviation Heritage Museum team, led by Andrew Panton, always make the LMA very welcome and huge thanks go to them all. You can find out more details about the Museum and East Kirkby by visiting their website at: www.lincsaviation.co.uk **RCMW**

Built from a Dave Anderson plan by Brian Rawcliffe, this is a Mitsubishi Ki-15. The model has a 120" wingspan and weighs 36.5 lb

Display of the day! Michael Donnelly put on two fabulous demos with his superb quarter scale Airworld Aermacchi MB339

Lovely Seagull Lysander III flown by Barry Barker. The model looks great in flight and handles very well

Undoubtedly the biggest model of the weekend, Ian Turney-White's massive 10 m wingspan Scheibe SF33 motor glider

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Steve Carr put on another fabulous display of aerobatic flying with his new 180" wingspan Yak 54. The coloured smoke adds to the display

Steve Carr next to the Yak's cockpit. You can see the realistic 'mini-me' inside!

Ken Bones put on a lovely scale display with his Flying Legends Supermarine Spitfire

This was the first show for the Cessna 172 of Ken Richie after it was restored and repainted over the winter

Neil Hyde is now the owner of the huge MiG 29 built by Harold Dowbekin. Unlike many of today's composite jets the MiG was built from scratch by Harold

Left: Mark Hinton always puts on a good display with his Skymaster Grumman F9F Cougar. A JetCat P120 jet turbine powers the 16.5 kg model

Right: One of Steve Carr's smaller models, the 120" wingspan Extra 330 from the Pilot RC kit. The 3W 157 cc flat twin petrol has more than enough power for all the aerobatic manoeuvres that Steven puts the model through

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Dean Coxon is one of the newest members of the Horizon display team and showed why with a great display using his Hangar 9 Extra 330

Pilot RC Extra 330 flown by Matthew Scott. The model has a RCGF 111 cc flat twin petrol engine and flies beautifully, according to Matthew

Richard Scarbrough flew his old faithful P-47 in his usual dynamic way!

An aircraft with a difference, the Blohm and Voss BV141. This large scale model was built and flown by Ken Sheppard

Another model owned and flown by Steve Carr, the Bristol F2 Fighter. The model comes from the Kavan stable and has a 2.39 m wingspan. Flies very well but needs a lot of rudder

The 16 ft wingspan VC-10 is a popular model and looks very realistic in flight. It weighs 64 kg and has four Wren Supersport jet turbines. Dave Johnson is the usual pilot and says the model flies well

James Ladell's lovely DHC Chipmunk. 38% scale model uses a King 67 cc petrol engine, which has a 2.25:1 reduction gear fitted

Lovely de Havilland DH85 Leopard Moth built by John Rickett. The wings on John's model fold back for storage and transportation, just like the real DH85

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The Saito 60 cc 3 cylinder radial engine mounted to Barry Barker's Seagull Westland Lysander III

John (left) and Steve Rickett adjusting the petrol engine on John's DH85 Leopard Moth

Resident East Kirkby Lancaster 'Just Jane'. It is always fantastic to be so close to such an iconic and historic aircraft

Paul Williams brings his Sopwith Pup into land. A third scale model built from the BalsaUSA kit, it has a geared Zenoah 38 cc petrol engine

The Yak 3 of Paul Williams

A busy start up box. The Vickers Wellington of Phil Robertshaw is in the foreground with Richard Scarbrough's P-47 and Mark Hinton's P-51 behind

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Depron Diary

Anthony Bennett shows how he designs and makes R/C model aeroplanes using Depron as the main building material

Anthony's latest Depron model, an EE Lightning dwarfs his foam Zero when they are placed side by side, even though they are to the same scale

For full details of 3-Way please see the Plan Feature in the July issue of RC Model World

Hello and welcome to my first blog on my life with Depron. Why Depron you may ask? Now, that is a good question...

I suppose the main reason I chose to start using Depron was that it was cheaper than balsa wood and would be quicker to build with. As I am a 'buildaholic' I felt it would fit in well with my style.

As you may know, Depron is an extruded polystyrene insulation material suitable for use below wood or laminate floors, or even carpets. It is a thin insulation sheet manufactured of fully recycled material. The sheet is produced from foamed polystyrene, a material that does not age or degrade, and the cell structure in the sheet is built up of fine closed cells that give it its excellent physical and mechanical characteristics, with the added bonus of being very light – ideal for model building.

There are three types of Depron available:

Basic Grey

This is softer and curves easier than the others. This is the version I prefer to use.

White

This is harder and is good for formers and ribs but is more difficult to curve. Some modellers build using white for the structure and sheet with grey.

Aero Grade

This is the lightest of the three and combines the best points of the other two grades.

Glue

Glues to use are UHU-Por, foaming Pu glues, carpet glue and PVA. You are always advised to test an area with any glue you plan to use, just in case it dissolves the foam.

Being a constant builder of models (much to my wife's disgust), I thought I might show you some of the models I have built just recently.

3-Way (Images 1 - 3)

A multi configuration sports plane, which was the feature plan in the July issue of RC Model World. This was an idea I had one day as I loaded three separate models into the boot of the car to go flying. Why not have one fuselage and two sets of wings to enable you to set up three different models at the flying field, thus saving space and having to lug less gear around every time you go flying?

Spitfire (Image 4)

A 40" electric sports scale model. Again all Depron, apart from a few bits of balsa and ply where needed for strength.

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Mitsibushi Zero (Image 5)
11th scale, 42" wingspan model of the Japanese fighter. Again all Depron and for electric power.

Sea Hawk (Image 6)
An unfinished ninth scale EDF model of the Sea Hawk of 50 inch wingspan for a 4S LiPo and powered by a 70 mm fan unit. This is my first foray into EDF jets so it should be fun building and flying this!

Trent Meteor (Image 7)
This is the big one! A 10 foot wingspan, 1/4 scale all Depron monster. It is an experiment to see just how big you can go using Depron before it becomes too fragile.

I will talk more about this one in a future article as it is on hold for a while as I work my way through a few issues that have developed with the build. I aim to have it on its wheels and fully assembled before the end of this year.

Image 4

Depron is a good for replicating the curves of the Spitfire

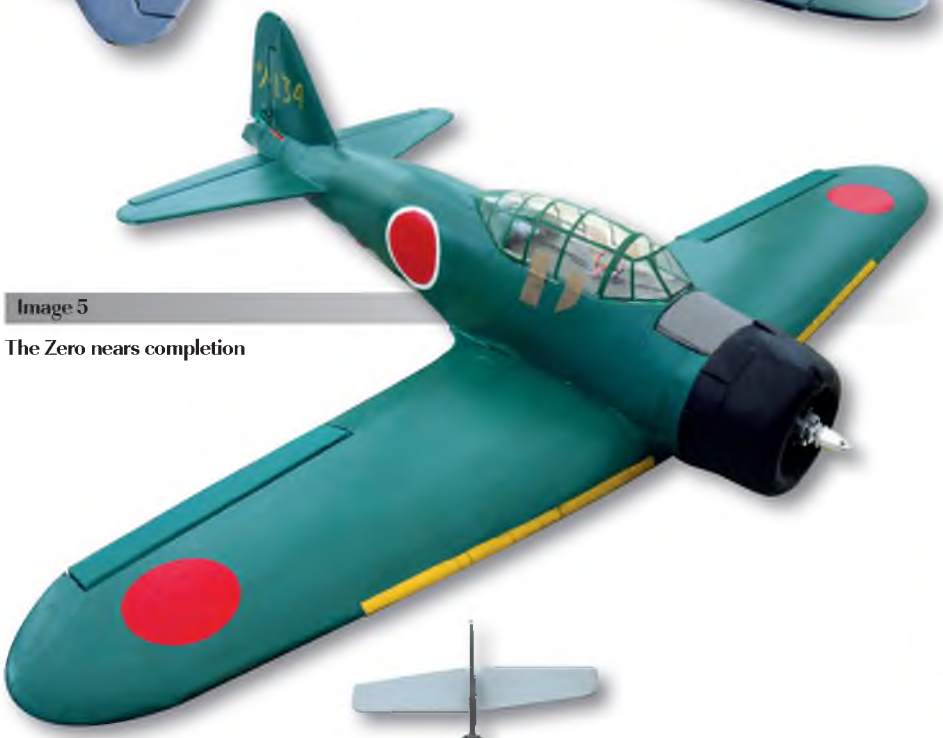


Image 5

The Zero nears completion

Image 6

My unfinished Sea Hawk

Stronger Hinge Points (Image 8)
I have been working on the Sea Hawk for the last month (on and off as other projects get in the way) and I have decided to change the way I fit the hinge points into the Depron core of the control surfaces.

Before, I would just stick a length of 6 mm balsa down the rear edge of the Depron with some UHU Por and call that it. The Depron outer skins would help hold it in place but I felt that the hinges did not have enough meat to hold them securely enough (although I have not had one fail with this method yet).

I now cut the balsa hinge support with three crenelations that project back into the Depron to give a greater gluing area for the foam to wood interface, and also to give some solid balsa for the hinges to be fitted into. Plus, I can use CA glue to hold the hinges in without fear of it melting the foam (as CA glue likes to eat Depron for breakfast).

Sparring Around (Image 9)
On larger models I have opted to glue 2 cm square balsa blocks into the 6 mm Depron core and sandwich them between 6 mm balsa spars. The spars can then be sanded to profile while still maintaining their strength. Depron is great but it is weak and needs the help of balsa, carbon, ply or aluminium to give it structural strength where needed.

Talking of strength, the normal way of building balsa wings with spars and sheer webs can be replaced in a Depron model with a balsa/Depron composite spar. What you do is to cut a Depron spar to the length you need but make it 6 mm thinner than required. You then stick some 3 mm balsa to the top and bottom of the spar, making a Balsa-Depron 'sandwich'. For smaller models this is a light and simple way of making a simple and quick spar. The ribs are

Image 7

Author with the monster size Trent Meteor

downloaded from HOBBYMAGAZINES.ORG

just stuck either side of the spar as normal and then the wing can be sheeted with 3 mm Depron sheet to finish it all off.

On the 1/4 scale Trent Meteor, I doubled up on the spars and made them out of two layers of 6 mm Depron, with 3 mm balsa caps top and bottom. I added a rear spar made in the same way. Seeing as the wing has a 6 mm foam central core the spars were doubled up by having a matching pair on the underside of the wing core as well. So far it looks to be strong and light. But with this monster only testing will tell if Depron can be used in such a large model.

Sea Hawk Tales (Images 10 & 11)

Anyway, back to the Sea Hawk tailplane. As this is a medium sized model I felt I could get away with a 3 mm Depron core and 3 mm outer skins. I am using two 6 x 3 mm balsa spars on each side of the core and the crenelated hinge point at the rear of the tailplane. This is sheeted over with no ribs at all as the skin, once glued down, curves to form the aerofoil section. Once I have sanded the leading edge profile in and covered it with tissue and a water based sealant it will be perfectly strong enough for normal flying.

The elevators will be made up from three layers of 3 mm Depron with another crenelated hinge spar and the leading edge, and gently sanded to profile before covering and painting.

When sanding Depron you are advised to wear a dust mask and do it outside if possible as the fine dust gets everywhere. You could do yourself some harm if it gets into your lungs – and the missus will do you more harm if you get the dust all over the furniture indoors!

Covering wise, I have edged towards tissue and watered down PolyC (I have been informed that Ronseal diamond hard floor varnish works just as well) as it gives the surface some protection from dings and makes a good base for painting. I have used brown paper on the bigger models for cost reasons, mainly as I am rather tight with my modelling budget.

On the Seahawk I plan to try spray painting with emulsion paints as it has no camouflage pattern that I can muck up. I tend to hand paint normally but it takes forever and does not always give a good finish. Also, with shaky hands, edges and markings can be interesting, to say the least!

The Seahawk is nearly finished now. I just have to fit the ESC and finish sheeting the underside of the fuselage. Then I can do the final covering and tidy up the paint work.

Of course a model is never really finished as you can always find things to fiddle with. But there comes a point when you have to say 'enough' and declare the model ready for test flying.

Lightning Strike (Image 12)

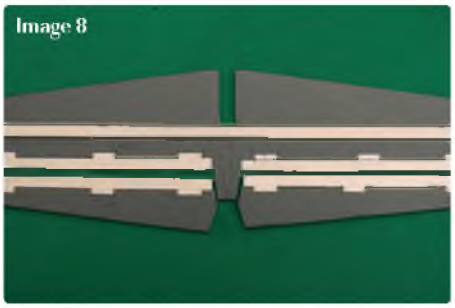
Still my mind has wandered again and the Sea Hawk has been to put to one side temporarily while I start and design yet another all Depron EDF powered model. This time I have decided to have a bash at the English Electric Lightning, a fast interceptor aircraft of the late 50s. (I seem to be developing a taste for 50s jets at the moment!) Mind you, Depron does lend itself well to building EDF powered jets as it is light enough to enable relatively low cost power set ups to be used, thus keeping the cost down to a manageable level.

This Lightning will be 11th scale to match the Spitfire and Zero that I have already built. Plus, I have both an Fw 190 and Hurricane in the drawing program at the moment as well.

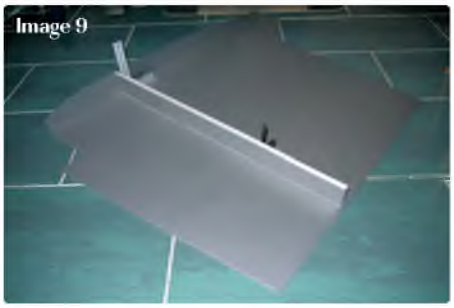
It is surprising how big jet fighters have become over the years, as both the Zero and Lighting are to the same scale and the Lightning dwarfs the Zero when they are placed side by side.

Well that's enough from me for now, so enjoy your building and flying.

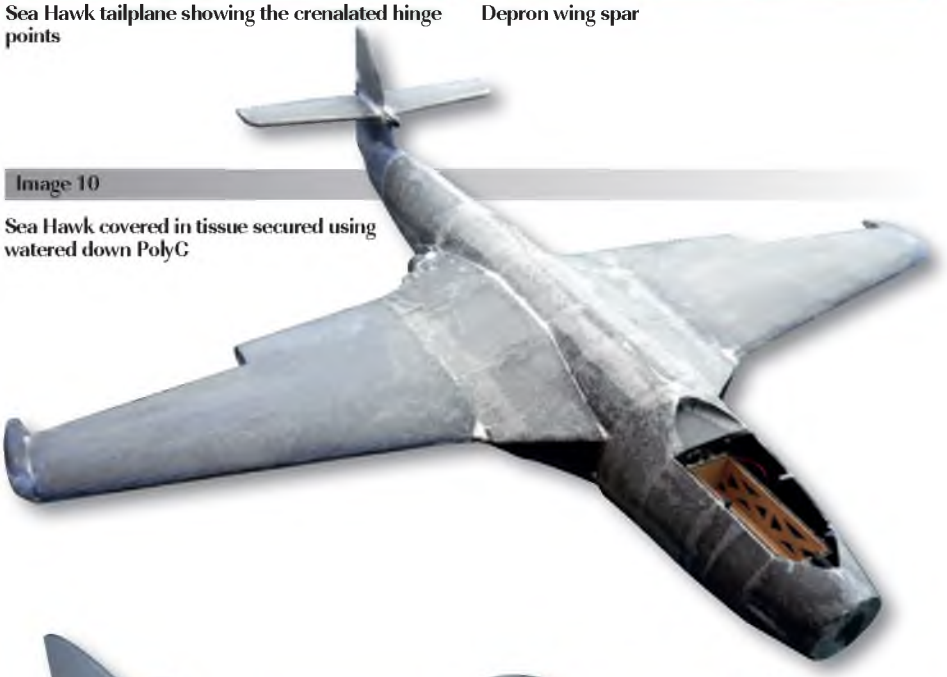
If you would like to have one of your Depron models or building tips included in the next article, feel free to write to me at arden48@gmail.com enclosing a good quality picture or two. ***RCMW***



Sea Hawk tailplane showing the crenelated hinge points

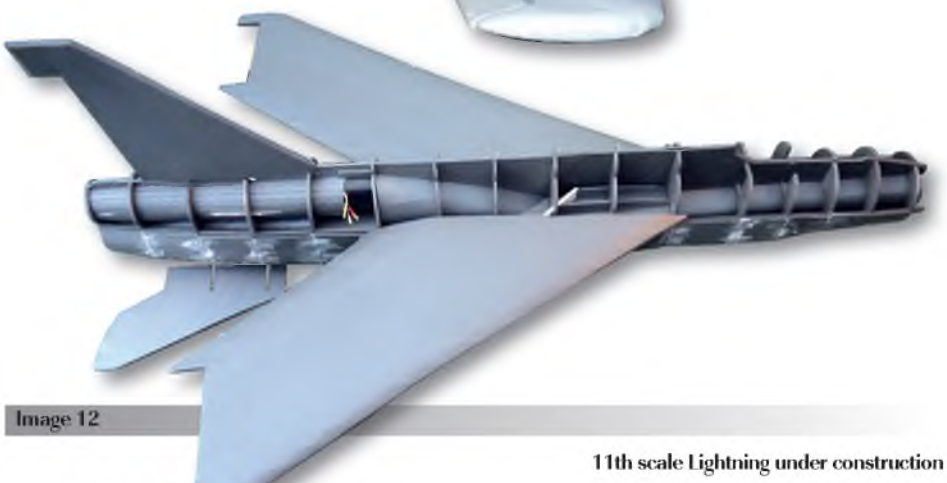


Depron wing spar



Sea Hawk covered in tissue secured using watered down PolyC

Finished Sea Hawk – well almost!



11th scale Lightning under construction

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Quick Quads

Continuing with his short series on sport flying with racing quadcopters, John Stennard looks at setting up a quad's flight controller

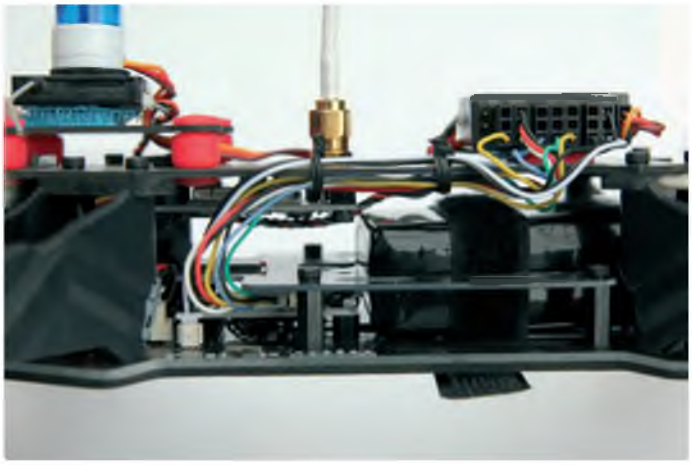
Decisions And Details

In 'Part 1' I tried to set the scene as far as racing quads are concerned for the average quad owing modeller. Racing quads are very attractive and not expensive, so in this feature I'm taking a closer look at the basics of the two sizes that I fly. I do particularly enjoy flying the 250-size outside as just a quad and without using FPV. For this type of flying having bright front and rear lights is a huge help, as is having a fairly stable quad. I deliberately choose a time to visit the flying site so I can fly it around a fairly low height without endangering circulating aircraft.

When I want to up my game by trying to do the same wearing goggles or a headset an observer is an essential bit of kit. The observer is there to make sure you are staying within visual flight range. It's surprisingly easy to fly further afield than you intended and the observer can warn of hazards etc. The goggles or headset do give you a very specific view dead ahead and you just have no awareness of other things that are happening outside of this view.

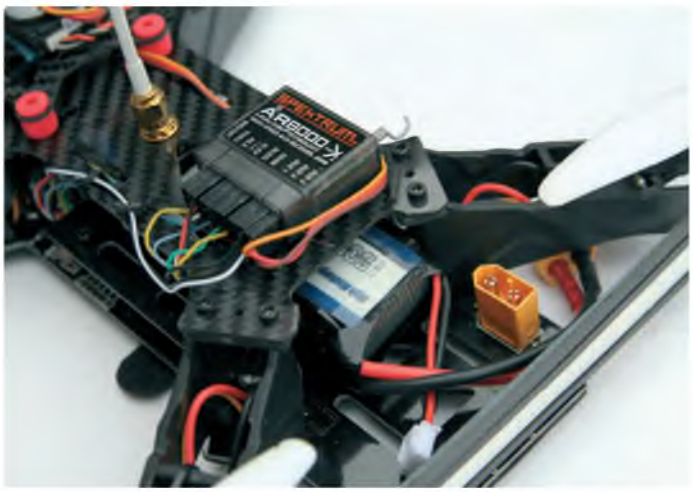
In this feature I can only cover the setting up and flying of my two racing quads. There are dozens of different designs available and new versions appear almost daily. Everyone looks different and will require slightly different settings. These two features on Quick Quads are intended to make you think whether owning and piloting one of these is for you and to provide basic information. There are numerous retailers selling racing quads and a very large selection is available.

The 250 ready to fly. Watch out for wet grass as the electronics are all close to the ground



The flight controller is well protected but the micro USB not easy to get to. The leads use one multi connector on the flight controller board

The camera is very well protected at the nose. The 'eye' LED headlights are very bright



This 250 uses a 3S 1500 LiPo and there is not much room for anything bigger

The rear red LED light strip is very effective and helps a lot with orientation when non FPV flying

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If you want a separate light switch function an eight channel Rx is required. A manual on/off switch is mounted on the board

ESCs are very easy to access on racing quads and keep cool in the prop wash

The 180 racer is usefully small. There are now even smaller racing quads!

Inside the chassis is very crowded with just enough room for a small Rx

The flight pack is fixed underneath and acts as an undercarriage...

The camera is tilted but very exposed, so is a touch vulnerable

These DIP switches are used to set the 5.8 GHz video Tx channel

It's worth viewing the www.firstpersonview.co.uk website as they have lots of information about racing quads. Google 'quadcopter racing UK' and/or 'FPV' and you will bring up masses of info and numerous links to suppliers, etc. Collect all the information you can from owners and flyers within your club or locality and then do some browsing.

You can buy a chassis and choose your own motors, ESCs, flight control board, camera, 5.8 GHz video transmitter (Tx), etc. But for the modeller who is unlikely to be racing an RTF version is more practical. There are numerous 250 racing quads available with big brand names but also quite a few of the more basic budget type.

After lots of viewing I went for the Eachine 250 as it was a very good price and seemed to offer all I needed. As far as the 160-size is concerned the choice is more restricted and I purchased the X 160.

When you have chosen from the many racing quads available you will need to download a Flight Controller program from the web. The commonly used ones are 'BaseFight', 'CleanFlight' and 'OpenPilot', now called 'LibrePilot'. You will find that the flight controller on your chosen quad – both of mine have a CC3D – will already have an operating program installed. You need to know which it is before you do some downloading; my 250 uses OpenPilot while the 160 has CleanFlight.

There is nothing to stop you changing systems but it obviously speeds things up to download and use the one that is already installed. So when you order your racing quad you will know from the specs which flight controller is installed and so you can get ahead with the download. Often the website will offer versions of the program to suit a specific flight control board so care must be taken to download the correct version.

So with the racing quad in the post and a flight controller program downloaded you are one step nearer an exciting experience.

I Thought It Was ARTF?

With an aircraft, and particularly a helicopter, ARTF usually means a minimum, if any, assembly. After installing a receiver (Rx) and checking the controls it's off to the flying field. I have actually received a model in the post and had it in the air within a few hours and I'm sure that's not uncommon. If you start fitting 3-axis stabilisation, etc. then your ARTF may take a little longer to get ready but not much.

With an ARTF racing quad the only assembly task is to fit the props, which you don't do anyway until after the initial setting up has been done. The part that takes the time is setting up your Tx and quad via your downloaded flight controller program. You will probably have time to be able to explore the program while waiting for your quad to arrive. Some include manuals and some do not; this is where it's very useful to have a fellow club member who has had experience in setting up a racing quad. Alternatively, do some research on line, where you will find plenty of advice – just make sure the advice is up to date!

Anyway let's take a look at my two racers before getting on to the setting up.

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ESCs on this model are an integral part of the structure and could not be easily replaced

The props are safely secured with two bolts

My 250 and 180 racing quads for size comparison

The first page where you begin to set up your controls if using OpenPilot

With CleanFlight, if your quad connects up then you will see this screen display

Basic Bits

Due to their compact design racing quads come in amazingly small boxes. And, unfortunately, most are accompanied by amazingly small amounts of actual information on setting up, etc! The ARTF is only partially true as you cannot just install a receiver, a battery, the props and take to the air; you have to use the dedicated flight controller programme first. The instructions really only list the specs and everything else is up to you.

The basic specs of my two quads can be easily viewed online so I'll only mention a few points. Firstly, looking at the 250 version the listed flight battery is 3S 1300-2200 25C. The quad came with a 3S 1500 LiPo and this fits neatly inside the chassis. A 3S 2200 LiPo is unlikely to do this and will add weight. Both quads use the yellow XT60 connectors. The 5.8 GHz video Tx on both quads has 32 channels available so will work on most headsets and monitors, even if they are only 8 channel types.

There are now an additional eight 'racing' channels. These channels are more widely spaced to avoid interference. Goggles and headsets are now available with all 40 channels and most 5.8 GHz video transmitters can be set on different channels. The Tx features OSD (on screen display) for flight battery voltage, flight time and video channel.

A minimum 6 channel receiver is required and a PPM connecting lead is supplied. This plugs into the Flight Controller board and has six separate leads to connect to the Rx. One lead has a three-wire connector and the other five have single signal wires. Not all quads will use this system so may have the normal three wire connectors.

Rather unhelpfully the instructions do not mention this lead or which channels the connectors plug into! Some searching online came up with the solution, which was to look at the order the wires came out of the Flight Control connector and use the plugs in the same order, i.e. the first lead connects to CH1, which is throttle on my Spektrum AR 8000 Rx. This certainly works for me. A switch is provided to switch the lights on/off manually or, as I did, you can use a spare Rx channel if you have one to do this.

Apart from being smaller the 160 quad looks very similar to the 250, one major difference being that the flight pack is carried externally. There are no legs or skids so the quad sits on and lands on its 3S 800-1000 LiPo. I have found the Turnigy BOLT 3S 800 pack to give very good results.

The 5.8 GHz video Tx also has 32 channels and these are chosen using the settings on a dip switch. The channels are all listed so it's easy to select one to match your goggles or monitor. The lead from the Flight Controller has the same connector arrangement as the 250 except that this time the plugs are labelled. I used a small Spektrum AR6100E Rx, which fits neatly into the rear of the chassis. It is specifically mentioned that the ESC can be set using the BLHeli ONE SHOT firmware, which is part of the programming process.

One Step Nearer

Once you have downloaded the flight controller app required for your particular quad the next step is to fit your chosen Rx into the quad. With your Rx installed a couple of things can be checked before you connect the quad via a USB lead to your PC/Laptop. If you power up the quad (remember – no props on EVER when setting up and testing) it's extremely unlikely that your Tx will be able to power up the motors but you should hear the ESCs come to life. The camera should work and any switch you have set for light operation should function.

I have a monitor in addition to headsets and find the monitor very useful for checking cameras and 5.8 GHz transmitters. I find the headsets much easier to use than a monitor, although I do have a mount for a monitor on my Tx. Motor arming is usually done with the left stick fully over to the right, so you could try this. But don't be disappointed if nothing happens.

It's now time to connect up the quad to whichever flight controller program you have downloaded. All I can do here is describe briefly what you can expect to see on the screen when using CleanFlight and some of the inputs you will need to make. BaseFlight and LibrePilot will be visually different but offer similar choices.

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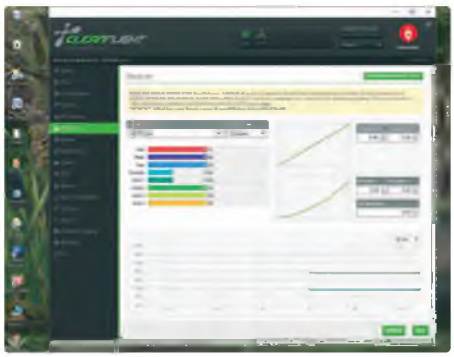
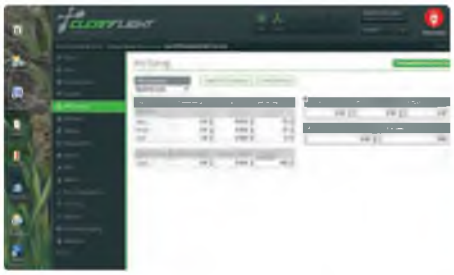
It's spooky but when you physically move your quad the movement is displayed on the screen



Your Tx control inputs, volume and direction, plus other Tx settings are shown on this screen. The control indicator bars move when you operate your Tx

This is the page for testing the motors individually and together, plus setting motor revs, if required

This screen shot shows the motors running, all at the same revs



The PID settings page, with just the main setting options shown

The options are now expanded and the 'tuning' options are more complex

The Blade Inductrix 200 FPV quad is very similar in size and weighs 185 g. The 180 quad weighs 223 g

This 250 racer is the same as mine but is a more recent model. It now has a variable colour and function LED tail light bar

Again every racing quad is going to need different settings to suit the quad and the pilot so I can only generalise. This is where it helps to have a same quad as a fellow club member who has done all the programming.

With the CleanFlight opening page on the screen, if you switch on your Tx and the quad, as though you were going to fly it, and then connect the flight controller board to your PC/Laptop with the USB lead, the program should recognise that your quad is there. Remember NO PROPS! If nothing happens use the 'connect' icon and switch on the 'auto-connect' function for future use. Sometimes it needs a USB unplug and re-plug to get things started.

If your quad is recognised a graphic of a quad will appear with a list of functions that can be modified as required. If you pick up and move the quad the image on the screen should track the movements. Personally I would not change any settings other than ones relating to travel volume, servo direction and arming until you have had a chance to fly the quad.

On the appropriate page you should find that when operating the Tx controls a moving bar on the screen will show you the travel volume and direction of the controls. You may need to reverse the control settings and adjust the travel volume on your Tx. I found that I needed to increase the right volume of the yaw stick to get the motors to arm. You can choose an arming switch but full right yaw is usually the favoured option. When you get to the motor testing you have to confirm on screen that there are no props fitted before you can check the motors individually and all together. Basically, change as little as possible until you have flown your quad. The main setting that you will perhaps have to eventually tweak is the PID (proportional integral derivative). The values define how aggressively the controller tries to control attitude and orientation. The P-gain controls how much the board reacts to rotation and the I-gain counteracts drift. Too large a value usually results in a wobble, while too low makes the quad feel and react in a sluggish manner.

The best settings depend on individual pilot preferences and, of course, to change the settings you have to connect up the quad to your PC.

Next Time

I have only really been able to give very basic advice here as different quads and controllers will all require their own settings and there are many flight parameters that can be changed. As I said earlier the web/YouTube is a good source of help provided you log on to the most recent entries.

Ideally, in the early stages of flying a racing quad for fun you want a steady hover and reasonably quick reaction time for stabilising the quad when the controls are centred. I have been looking at a fairly basic type of racing quad in this feature and not only are much more complex and sophisticated versions readily available but new types and sizes appear continuously. However, if you do not intend to go racing and want your racing quad to be a sort of sports car then a simple version may be the best introduction.

In the next part of Quick Quads I will look at flying a racer quad, and using goggles and headsets for FPV.

RCMW

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Plan (MW3764) **£31.50**
Lasercut Woodpack (WP3764) **£125.00**
Canopy set (CA3764SET) **£12.99**
FULL SET (SET3764) **£152.54**

Designer: Chris Golds
Wingspan: 72" / 1830mm
Power Source: Emax BL 4030/10 (1386 Watt/385 Kv) Brushless Outrunner

SLINGSBY EAGLE — MW2211 ●●●●

Plan (MW2211) **£22.50**
Canopy D Type (CA2211CY) **£6.50**
FULL SET (SET2211) **£26.10**

Designer: Mike Trew
Wingspan:140" / 3555mm
Power Source: 2-3

SCHLEICHER ASK-11 — MW3657 ●●●

Plan (MW3657) **£22.50**
Lasercut Woodpack (WP3657) **£112.99**
Canopy (CA3657CY **£22.50**
FULL SET (SET3657) **£140.37**

Designer: Chris Williams
Wingspan 126" / 3.21m
Power Source E-Power BL4030 385 KV Brushless Outrunner

BKB-1 SAILPLANE — MW3570 ●●●

Plan (MW3570) **£21.50**
Lasercut Woodpack (WP3570) **£98.99**
FULL SET (SET3570) **£108.44**

Designer: Laddie Mikulasko
Wingspan: 120" / 3048mm

HW-4 FLAMINGO — MW3463 ●●●

Plan (MW3463) **£32.50**
Lasercut Woodpack (WP3463) **£141.99**
Canopy (CA3463CY) **£28.50**
FULL SET (SET3463) £182.69

Designer: Chris Williams
Wingspan: 196.85"/ 5m

GÖPPINGEN GÖ-1 WOLF — MW3465 ●●●

Plan (MW3465) **£32.50**
Lasercut Woodpack (WP3465) **£95.99**
FULL SET (SET3465) **£115.64**

Designer: Vic Steel
Wingspan: 138" / 3.50m

SLINGSBY T-41 SKYLARK 2 — MW3274 ●●

Plan (MW3274) **£22.50**
Lasercut Woodpack (WP3274) **£60.99**
Canopy (CA3274CY) **£8.50**
FULL SET (SET3274) **£82.79**

Designer: Keith Humber
Wingspan: 109" / 2.75 mm

SLINGSBY T-21 — MW2706 ●●●●

Plan (MW2706) **£24.50**
Lasercut Woodpack (WP2706) **£188.99**
FULL SET (SET2706) **£192.14**

Designer: Chris Williams
Wingspan: 163.375" / 4115 mm

MINIMOA (167") — MW2669 ●●●●

Plan (MW2669) **£23.50**
Lasercut Woodpack (WP2669) **£121.99**
FULL SET (SET2669) **£130.94**

Designer: Chris Williams
Wingspan: 167" / 4240mm

SLINGSBY T-45 SWALLOW — MW2320 ●●●

Plan (MW2320) **£22.50**
Lasercut Woodpack (WP2320) **£100.99**
FULL SET (SET2320) **£111.14**

Designer: Tony Slocombe
Wingspan: 129" / 3280 mm

LAPWING 60 — MW3418 ●●●●

Plan (MW3418) **£14.50**
Lasercut Woodpack (WP3418) **£23.99**
FULL SET (SET3418) **£34.64**

Designer: Andy Reid
Wingspan: 61" - 72"

BRUHA (51") — MW3400 ●●●

Plan (MW3400) **£20.50**
Lasercut Woodpack (WP3400) **£49.99**
FULL SET (SET3400) **£63.44**

Designer: Graham Legg
Wingspan: 51" / 1295 mm
Power Source: .36 - .46 2-strokes, .36 - .42 4-strokes

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LAZY KITTEN — MW2294 ●

Plan (MW2294) **£15.50**
Lasercut Woodpack (WP2294) **£42.99**
FULL SET (SET2294) **£52.64**

Designer: Harry Gilkes
Wingspan: 72"/ 1830 mm

SR-71 BLACKBIRD — MW3769 ●

Plan (MW3769) **£15.50**
Lasercut Depron Pack (DP3769) **£22.99**
FULL SET (SET3769) **£31.17**

Designer: Laddie Mikulasko
Wingspan: 27 ¼ " / 693 mm
Power Source: BL2212/06 2200KV (190 Watt) brushless outrunner 40 Amp ESC

DIVERSION — MW3607 ●●●

Plan (MW3607) **£19.50**
Lasercut Woodpack (WP3607) **£61.99**
FULL SET (SET3607) **£72.05**

Designer: John Newton
Wingspan: 47.5" / 1200 mm
Power Source: PPO-3530-1400 brushless (350W) 40 Amp ESC (BEC or UBEC)

MINNOW — MW3571

Plan (MW3571) **£18.50**
Lasercut Woodpack (WP3571) **£102.99**
FULL SET (SET3571) **£109.34**

Designer: Peter Miller
Wingspan: 53" / 1346 mm
Power Source: .25 to .35 cu.in. 2-stroke

CENTAUR — MW3542 ●●

Plan (MW3542) **£22.50**
Lasercut Woodpack (WP3542) **£49.99**
FULL SET (SET3542) **£65.24**

Designer: Peter Allanson
Wingspan: 78 in / 1980 mm
Power Source: IC Propeller

SUPER STIK — MW3528 ●●

Plan (MW3528) **£19.50**
Lasercut Woodpack (WP3528) **£73.99**
FULL SET (SET3528) **£84.14**

Designer: Peter Allanson
Wingspan: 56" / 1422 mm
Power Source: Webra 50 .46-.60 cu.in 2-stroke; .52-.70 4-stroke

SWIZZLE STICK — MW3485 ●●

Plan (MW3485) **£14.50**
Lasercut Woodpack (WP3485) **£49.99**
FULL SET (SET3485) **£58.04**

Designer: Peter Miller
Wingspan: 40" / 1 metre
Power Source: .25 to .30 cu. in 2-stroke

MARQUESS 33 — MW3417 ●

Plan (MW3417) **£13.50**
Lasercut Woodpack (WP3417) **£31.99**
FULL SET (SET3417) **£40.94**

Designer: Derek Benstead
Wingspan: 33" / 840 mm
Power Source: .12-.15 cu. in. two-stroke or diesel equiv.

GOLDIE — MW3123 ●●

Plan (MW3123) **£14.50**
Lasercut Woodpack (WP3123) **£51.99**
FG Cowl (CF3123CL) **£12.50**
FULL SET (SET3123) **£71.09**

Designer: Mike Keay
Wingspan: 50" / 1270 mm
Power Source: .20 - .30. 2-stroke / .25 - .40 4-stroke

JIANT JABBERWOCK — MW2615 ●●●

Plan (MW2615) **£24.50**
FG Spats (CF2615ST) **£23.50**
FG Cowl (CF2615CL) **£23.50**
FULL SET (SET2615) **£64.35**

Designer: Don Stothers
Wingspan: 66" / 1677 mm
Power Source: 1.20 - 2.10 2-stroke / 20-35 cc

DE HAVILLAND DH.34 — MW3590 ●●

Plan (MW3590) **£13.50**
Lasercut Woodpack (WP3590) **£57.99**
FULL SET (SET3590) **£64.34**

Designer: Christian Moes
Wingspan: 41" / 1041 mm
Power Source: E-flite Park 300 (1380 rpm/V) brushless

PERCIVAL Q6 PETREL — MW3514 ●●●●

Plan (MW3514) **£37.50**
Lasercut Woodpack (WP3514) **£193.99**
FULL SET (SET3514) **£208.34**

Designer: Robin Fowler
Wingspan: 112" / 2.845 m
Power Source: Twin electric motor - TowerPro 3520-670 rpm/V

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WESTLAND-HILL PTERODACTYL MK.IV — MW3501 ●●●

Plan (MW3501) **£32.50**
Lasercut Woodpack (WP3501) **£88.99**
FULL SET (SET3501) **£109.34**

Designer: Chris Golds
Wingspan: 60" / 1525 mm
Power Source: single brushless motor

SUPERMARINE S.6B — MW3224 ●●●

Plan (MW3224) **£22.50**
Lasercut Woodpack (WP3224) **£39.99**
FULL SET (SET3224) **£54.88**

Designer: Tony Nijhuis
Wingspan: 54" / 1372 mm
Power Source: .65 - .80 4-stroke

BOMBARDIER CL 415 (72") — MW3414 ●●●

Plan (MW3414) **£28.50**
Lasercut Woodpack (WP3414) **£42.99**
Cowl (pr) (CA3414CL) **£10.50**
FULL SET (SET3414) **£73.79**

Designer: Mike Roach
Wingspan: 72" / 1830 mm
Power Source: 2 Keda 2217/20 brushless outrunners

AQUABIRD — MW3179 ●●

Plan (MW3179) **£27.50**
FG Cowl (CF3179CL) **£17.50**
Lasercut Woodpack (WP3179) **£81.99**
FULL SET (SET3179) **£114.29**

Designer: Laddie Mikulasko
Wingspan: 60" / 1525 mm
Power Source: .40 - .45 cu. in. two-stroke

BELL XP-59 'BELLE' — MW3782 ●●

Plan (MW3782) **£14.99**
Lasercut woodpack (WP3782) **£54.00**
FULL SET (SET3782) **£62.09**

Wingspan: 37" - 48"
Power Source: D2826-6 2200KV brushless outrunner 30 Amp ESC Switch-mode

3-WAY — MW3781

Plan (MW3781) **£13.99**
Lasercut woodpack (WDP3781) **£59.99**
FULL SET (SET3781) **£66.58**

Designer: Anthony Bennett
Wingspan: 49" - 60"
Power Source: 400 Watt Outrunner 40 Amp ESC

WIDGEON X2 — MW3791 ●

Plan (MW3791) **£11.99**
Lasercut woodpack (WP3791) **£34.99**
FULL SET (SET3791) **£42.28**

Designer: George Stringwell
Wingspan: 25" - 36"
Power Source: BL2212/10 (150 Watt) brushless outrunner 20 Amp ESC

RAFALROO — MW3424 ●●●

Plan (MW3424) **£13.50**
Lasercut woodpack (WP3424) **£42.99**
FULL SET (SET3424) **£50.84**

Designer: Shaun Gilbert
Wingspan: 36" / 915 mm
Power Source: .36-.48 cu. in. 2-stroke

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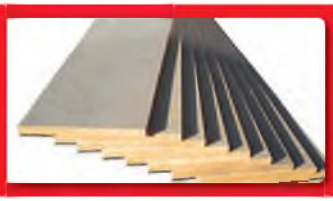

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Strip Wood - Pack B
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- 10 x 3/32" (2.4 mm)
- 6 x 1/8"X1/4" (3.2x6.5 mm)
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- 2 x 1/4" (6.5 mm)

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Sheet Wood - Pack C
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- 6 x 3/32" (2.4 mm)
- 6 x 3/16" (5 mm)
- 10 x 1/16" (1.6 mm)
- 4 x 1/4" (6.5 mm)

RRP £50.56 + p&p/s&h

Sheet Wood - Pack D
- 10 x 1/8" (3.2 mm)
- 10 x 3/32" (2.4 mm)
- 10 x 3/16" (5 mm)
- 14 x 1/16" (1.6 mm)
- 6 x 1/4" (6.5 mm)

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The Sport Channel

This month Gray finds that not everyone has heard of this great hobby and we check out the attempts of single-channel flying from South Africa

"Excuse me, do all these fly...?" (Traditional spectator enquiry!)

This Month's Wise Words

Our quote is recycled from an early edition of SC, some fifteen years ago, from an item on my club's regular appearances at village fêtes and shows during the summer.

We had a regular 'gigging' schedule back then, often with a display every weekend. Even when we were unable to fly our static shows always created a lot of interest in the club and the hobby in general. The question in this month's header was the one asked by more than 50% of our audience.

Over the years interests changed and the fête circuit fell by the wayside. But this year a new fête committee in a neighbouring village rediscovered our details and got in touch to see if we could provide a static display as we'd once done.

Our membership and new secretarial team rose to the challenge and turned up on the village green with a fine collection of models, from a large gas turbine F-16, through vintage, sport, scale and gliders, all of which proved a great hit.

Inevitably, we were asked if they flew, but generally the public's questions were more intelligent and informed than ever before. But during the afternoon, we experienced 'parallel universe' moments that almost equalled our 'misidentified Vulcan' of a few issues ago.

We met four unrelated members of the public who not only had never seen, but had literally never heard of flying model aircraft. Two of them could not imagine how such a thing was even possible, so we were more than pleased to further enlighten them by inviting them to our flying site.

At a club debrief later, we wondered how, in an age of near limitless communication and when RTFs and drones can now be bought in supermarkets, could such a basic message about us could pass anyone by? I'm sure there are many other hobbies whose technicalities are beyond us, but we do at least know that those hobbies exist! Any thoughts?

Your author's club, the North Cotswold MAC returned to that most British of institutions, the village fête this year. Static display went well, but we heard some of the strangest public perceptions of aeromodelling yet! See text

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Electrified Vintage fleet by Chris Freeman in South Africa. At the back, two Bowers Fly Babies, at the front, a KK Outlaw and Smeed Tomboy. A Technostalgia Dream Team if ever there was one

Fleet Follow-Up

We last heard from reader Chris Freeman in South Africa when he sent in one of our most interesting and furthest-flung model fleet photos. He's now augmented his collection via the fine arts of electrifying Vintage models and Single Channel.

Chris wrote: *"I thought I must update you on some of the progress I have made in the last two years and send some details of my attempt at single channel! The Fly Baby is a 50% larger than the original by Pete Bowers who did the homebuilt aircraft of the same name. I did two, one to check the design and the second to check the parts fit for laser cut parts that we had done for our Old Timer group.*

This is a 72 inch aircraft that flies very well on a Park 480 electric motor. The Keil Kraft Outlaw is enlarged from the original to around 60" wingspan; this is a good flyer but quite fast and not as good on the glide as the Fly Baby.

The Tomboy is 10% larger than the original and is what we use in our one design competition. We had 12 aircraft in a mass take-off with a 20 second motor run and longest glide wins. I managed 16 minutes total in 3 flights, the winner had 21.45 total time. The winner was also the only lady pilot on the day!

Now for the good part, the little Single Channel plane was started at 14:00 Saturday afternoon and test flown at 08:00 Sunday morning and was built as a trainer for a push button 2.4 radio. 1 push for left, 2 for right and 3 for up. The transmitter was built by a friend from information received via the Internet and uses a Spectrum module and is also programmable, so you can set up the trims and servo throws. The motor has a timer and can be stopped or started with the joystick.

I test flew the trainer with a normal radio to set it up and once happy the radio was switched to push button. Luckily not much trimming was needed. The plan was drawn on the balsa before it was cut. The wing is foam, sliced about 6 mm thick with ply spars glued into it with balsa leading and trailing edges also having a .8 mm ply strip glued on.

The flight performance is slow and stable with very little pitch change with motor on and off. It can be left to climb with a gentle turn and then you can interrupt the flight path with a push of the buttons.

Not sure how the guys ever managed with the original radios that needed mechanical set ups and then trim flights. It took me a while to figure out what was needed as 'push the button and then hold' can be confusing at times, especially as the club has trees and reeds to be avoided. I think that the name of the radio is quite apt: Heath Robinson!"

Thanks Chris. Good to see Technostalgia and Single Channel flourishing in SA. As it's that time of year – any more fleet pictures out there?

Chris Freeman's O/D Single Channel trainer was designed, built and flown in a weekend. Balsa and foam construction. A stable and reliable subject for learning the arcane art of Rudder Only. Inset: we think SC's readers will approve of Chris's transmitter!

Park Life

Shortly after the events in our opener, a couple of incidents suggested themselves as supplements to the theme of general awareness of model flying.

After my club's village fête gig, I attended a nearby free flight rally and while sheltering from the summer showers that had disrupted flying all day, I chatted to a competitor who had a nice fleet of vintage rubber and glider models.

When I told him the strange tale of our spectators' total lack of knowledge of model aeroplanes, he nodded sympathetically and recalled a recent flying session he'd had at his regular local park site in the South East of the UK.

He was flying a large, free flight rubber powered scale model. He had a few short trim flights, then wound on some extra turns. The model climbed steadily and made several large, serene circuits of the site.

While it flew, the modeller noticed one of the park's many cyclists stopping by to watch. Eventually, the model touched down and the modeller went off to retrieve it. As he returned to his launching spot, he noticed the cyclist first looking at him, then scanning the field with a perplexed expression.

As the modeller prepared for another flight, the cyclist came over. My informant told me that he was typical of many of the sporty types using the park; professional 'City' type, mid 40's-ish, well spoken and articulate.

"Excuse me", he began, "Who was controlling that aeroplane?"

"Well, no-one!" replied the modeller. "It's what we call a 'free flight' model, they fly on their own, completely unaided."

At this, the cyclist was dumbfounded and continued to scan the park for a concealed pilot.

"But...", he countered, "How can it fly? I didn't hear an engine."

"That's because it doesn't have one", the modeller explained. "It's silent because it's rubber powered. The propeller is driven by a 'motor' driven by strands of rubber, rather like rubber bands, but bigger and much stronger."

The modeller showed his spectator the motor as he prepared to wind, but this produced more confusion. "But how does that make the propeller work?", he asked.

The modeller showed him the procedure of winding the motor ready for a flight, but it

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became obvious that the cyclist's increasing incomprehension was due to his never having encountered the simple principle of a twisted rubber band storing energy!

As the model was sent off on another flight, the by now thoroughly mystified cyclist asked, "So where did you buy it?" The modeller replied "I didn't exactly buy it; I built it myself, from a kit!" And with that, the cyclist vanished in a blur of Lycra!

While I was typing these words, a friend who also flies in a park described a recent session when he was flying a micro hand launch glider. As he discus-launched his chuckie again and again, a young drone pilot nearby stopped flying and came over to watch.

After a short flight due to lack of lift, the drone flyer asked my friend, "Why do you keep throwing it like that? Why don't you just use the throttle?" You guessed it – he'd never heard of unpowered aircraft or how they might work. Discuss!

In Memoriam – Gary Henshaw

Just days after our club's successful public display, our cheer was short-lived as some bleak news arrived. We heard that one of our longest-serving club and committee members, Gary Henshaw of Moreton-in-Marsh, had died suddenly, aged 69.

With Gary's passing, the North Cotswold MAC loses its last direct link with its origins. Gary's father Don was a founder member in 1949 and Gary became a lifelong 'allrounder' aeromodeller. His dedicated work for the club over decades was appreciated by all and his efforts for our annual Fly For Fun event, laying on his legendary barbeque, made him a local celebrity with our visitors.

An engineer by training, Gary spent much of his career as works manager of the innovative packaging company Cotek Papers in Gloucestershire. In his youth, Gary served an engineering apprenticeship at the Royal Aircraft Establishment at Farnborough. Gary told me that at the time, his department serviced equipment for the RAF's English Electric Lightning fighters.

It was common practice for the Lightnings' pilots to offer the RAE lads a ride in the back seat during the check flights with their overhauled avionics. As such, they were among the few civilians to get to fly in the Lightning.

Gary related how he jumped at the chance but had doubts as his pilot blasted off into a classic Lightning vertical climb. As the earth fell away beneath him, Gary felt a paralysing fear which didn't improve as the pilot gave his aircraft a tough workout. Just as Gary was thinking that the acceleration and G-forces couldn't get any worse, his pilot rolled inverted and performed a low pass 50 ft above the runway. Gary recalled that he suddenly realised that if anything went wrong, it would all be over in a split second. And with that, all fear left him and he hung on and just enjoyed the ride.

For me, this story summed up Gary's love of life and great sense of adventure. Our condolences go to his wife Sheila and the family, and to brother Richard.

Gary will be truly missed at our flying field and our Fly For Fun show in August will be dedicated to his memory.

Contributions, please to The Sport Channel c/o the Traplet Publications address. All email correspondence to: gray_rcmag@hotmail.com

RCMW

Another approach to Indoor Scale Glider was this all-foam WACO Hadrian seen at the Nats. Flew hand-launched from the upstairs gallery. If any readers would like a selection of scale F/F glider plan downloads for free, just drop your author an email

The North Cotswold MAC has lost one of its most dedicated and well-liked members. Gary Henshaw who died in June. Seen here at the club's 50th anniversary in 1999

Our item on Indoor Scale gliders continues to attract interest. Simon Rogers flew his Slingsby Falcon and 1920s tandem wing Peyret at the Indoor Scale Nationals. Simon thinks these larger models are better suited to the outdoors

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INDOOR

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

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

GENERAL

24th July '16
GBR/CAA F3A League Competition, Mansfield. All schedules. See gbrcaa.org – then forum 'Competition News' for details and 'Competition Entry Form' for fees and payment. Visitors welcome but please contact Contest Director, Stuart Mellor on 01246 568043 for details

24th Jul '16
Wealden Warbirds, at Berwick Flying site, nr Drusilla's on the A27. Flying from 10:30am, pilots briefing at 10 am. Noise testing will be available on the day. Proof of insurance and BMFA 'A' min req'd to fly. £5 to fly, raffle and refreshments. Prop warbirds only, sorry no jets.
Contact Mark@wealdenflyers.co.uk or 01825 744127, or Bob@wealdeanflyers.co.uk or 01892 852137

31st Jul '16
GBR/CAA F3A League Competition, Warboys. All schedules. See gbrcaa.org – then forum 'Competition News' for details and 'Competition Entry Form' for fees and payment. Visitors welcome but please contact Contest Director, Clive Whitwood on 01487 832195 for details

31st Jul '16
Bath SPARCS All Electric Fly-In, at RAF Colerne Wiltshire. Airfield site with grass and tarmac runways. Proof of BMFA insurance required. Regret no facilities for spectators. Pilots briefing at 10 am.
Contact: Bob Partington 01225 891441, Email: grpartington@gmail.com

31st Jul '16
Haverfordwest Model Club Fly-In at Templeton Airfield, Pembrokeshire. Flying starts at 10 am following Pilots' Briefing. There is no charge for admission. Flyers please bring BMFA Membership Card with you. Event open for flyers of radio control model aeroplanes and helicopters. We have an attractive setting, friendly members offering a warm welcome, refreshments in the way of a burger and an ice cream van, both excellent, an area also set aside for people to sell their surplus models and hobby related engines, spares etc.
For further information please contact Greg Highfield, 01437 899 843 or 07913 781 150 or Email: greghighfield@hotmail.co.uk

28th Jul to 6th Aug 2016
F3A European Championships, Untermünkheim – Germany. See www.ec-f3a-2016.de/ If you need more details contact Ashley Hoyland on 0114 2873432

6th & 7th Aug '16
The Robert Mahoney Memorial Electric Fly-In, at Middle Wallop, Wiltshire. Entry from 9.30 am via Museum gate, flying from 10 am to 4.30 pm (Field must be vacated by 5.30 pm). Electric R/C models only, NO IC or F/F. BMFA 'A' certificate or better required to fly, no spectators. Further details from Dave Chinery, Email: daviddchinery@aol.com Mobile: 07702 455777

6th & 7th Aug '16
Redruth & District Model Flying Club 25th Annual Summer Show, 10 am to 5 pm, both days, along with our club pilots there will be again a number of local club pilots and guests, a small number of trade stands, and we can cater for a small number of campers wishing to make a week or weekend holidaying visit. There will be barbecue catering on site. Modellers wishing to fly at the show, contact Steve for available forms and to download attachment.
Contacts: Steve Polkinghorne 01209313263, or Email: stevewings55@tiscali.co.uk Alan Greenfield on 07706 929494, or check out the the club website on www.rdmfc.co.uk

7th Aug '16
***CHANGE IN VENUE* Traplet Open Scale Competition Round 2**, hosted by Wirral Radio Control Flying Society, at their Arrowe Park field, Birkenhead (postcode CH49 5LN).
10 am – 5 pm. Sponsored with prizes by Traplet. The only requirement is that the plane is a recognisable version of a full size fixed-wing aircraft. There is no builder of the model rule so ARTF's and ready-made models can be used. Pilots of models weighing over 7 kg need a 'B' certificate to fly. Flying schedules and further information from Peter Maw at: secretary@bickershawmfc.co.uk

13th & 14th Aug '16
PSSA 'Fly for Fun' Event with the Lleyn MAC, Nr Abersoch, North Wales. Meet at the Londis car park in Llanbedrog for 10 am each day. Open to non-PSSA members. Proof of insurance required. For more information contact
Phil Cooke on 07772 224719 or
Email: webmaster@pssaonline.co.uk

13th & 14th Aug '16
LMA Swap Meet, at the Elvington show. This popular addition to the flying programme does not need to be booked but tables will be allocated on a first come first served basis. Table will cost £10 for 2 days or part thereof. All money raised will be donated to the Vulcan charity. Further details can be obtained from Steve Ogden 01782 853883, Email: topgun@modelpilot.co.uk

13th & 14th Aug '16
IMAC UK Competition, Clitheroe, Lancashire. Point of contact for information etc. is Mal Green at mcgreen65@hotmail.com

14th Aug '16
GBR/CAA F3A League Competition, Ashbourne. All schedules. See gbrcaa.org – then forum 'Competition News' for details and 'Competition Entry Form' for fees and payment. Visitors welcome but please contact Contest Director, Adrian Harrison on 07976 244004 for details

21st Aug '16
Deeside M.A.C. Open Event, Broken Bank flying site off the A548 Flintshire. Start time 9 am. All flyers must be B.M.F.A. members be insured with proof of insurance. Max weight of models 30 kg. Models over 20 kg to have C.A.A./L.M.A certification. Models over 7 kg will require a B certificate. The event is a family fun day for the following classes: Fixed wing, I.C./Electric, Turbine. Helicopter, IC/Electric, Turbine. On site Toilet, Barbeque and a 230 V AC charging facility, and the site has a take-off strip suitable for large models. The gates will be open from 8.30 am and locked at 10.30 am, however a phone number will displayed on the gate for latecomers. Contact: George Robson for further information and directions. Email: zen219506@zen.co.uk, Tel: 01352761814 or check out the website at www.deesidemac.co.uk

3rd & 4th Sep '16
LMA Swap Meet, at the Much Marcle show, this popular addition to the flying programme does not need to be booked but tables will be allocated on a first come first served basis. Table will cost £10 for 2 days or part thereof. All money raised will be donated to the Vulcan charity. Further details can be obtained from Steve Ogden 01782 853883, Email: topgun@modelpilot.co.uk

4th Sep '16
GBR/CAA F3A League Competition, Grimsby. All schedules. See gbrcaa.org – then forum 'Competition News' for details and 'Competition Entry Form' for fees and payment. Visitors welcome but please contact Contest Director, Dave Tofton on 07890 490847 for details

4th Sep '16
Salisbury Model Flying Club Scale Day, open to all clubs, for more information check out www.salisburymodelflyingclub.co.uk, or Email: spikespencer707@btinternet.com

4th Sep '16
White Sheet Scale Fly-In, to be held at the White Sheet Club slopes near Mere, Somerset (back up date 18th Sept). No competition, just a friendly fly-in. Proof of insurance, please. Further information from: c_williams30 @sky.com. Go-No-Go decision the evening before on the WS and SSUK forums, www.whitesheet.org.uk, scalesoaring.co.uk

9th to 11th Sep '16
F3A Triple Crown Invitational Team Competition: England, Ireland, Scotland. Venue Enniscorthy, Co Wexford, Ireland. Visitors welcome but please contact Competition Secretary, Adrian Harrison on 07976 244004 for details

10th & 11th Sep '16
PSSA 'A-4 Skyhawk Mass Build' Fly-In Event, The Great Orme, Llandudno, North Wales. Meet at the 'Tank Track' car park for 10 am each day. Open to non-PSSA members. Proof of insurance required. For more information contact Phil Cooke on 07772 224719 or
Email: webmaster@pssaonline.co.uk

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MODEL WORLD Next Issue

DON'T MISS OUR SEPTEMBER 2016 ISSUE!

In the second of his two-part plan feature, Chris Williams completes the build of his 1/4 scale classic sailplane for five-function R/C. After describing the construction of the fuselage and canopies in this issue, Chris continues with making the flying surfaces and covering the 174 inch wingspan model before concluding with details of the all-important maiden flight.

From the design bureau of master aeromodeller Chris Golds comes this 76" span model of the USAAF 'Pursuit Fighter' for a C63-32 outrunner and an 8S 5000 mAh LiPo. Chris has designed the chunky monoplane for a four function R/C system, so nothing fancy is required other than a bit of time and lots of lovely balsa wood to complete this real model builder's project.

THE SEPTEMBER ISSUE WILL BE ON SALE THURSDAY, AUGUST 18TH, 2016.

Barry Vaught reports from the inaugural Red Flag R/C Jet Aerobatic Competition held at Sunny Paradise Field, Lakeland, Florida, USA. Italian pilot Sebastiano Silvestri of SebArt models fame was one of the 46 world class pilots invited to attend this new event, which organiser Frank Tiano created to generate interest in model jet aircraft by people who don't usually fly jets. He also wanted to attract pattern pilots and have something unique for the fans to see and appreciate. Frank's team approach worked very smoothly and Red Flag proved to be a huge success.

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