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GET CLOSER TO THE EDGE

The new FMS Edge 540 is without doubt one of the best planes to come out of the FMS factory.

It has lots of carbon spars moulded into the wing and fuselage to give this aircraft excellent levels of rigidity. The latest high torque digital metal gear servos are used throughout this aircraft to give new levels of control and crispness. Hovering, harriers, knife edge flight and outside loops can be performed with relative ease. With the addition of a strong landing gear and realistic scale tyres the Edge is forgiving should you not have a perfect landing. The receiver is located in its own compartment to help keep the inside of this aircraft clutter free and as usual the battery is easy to change with a velcro strap and strong magnetic hatch to keep everything in place.

Fullsize: The Zivko Edge 540 manufactured by Zivko Aeronautics is a highly aerobatic aircraft. Capable of a 420 degree per second roll rate and a 3,700 foot per minute climb rate, it has been flown to victory on the international Unlimited aerobatics circuit several times since the mid-1990s. A tandem-seat version is sold as the Edge 540T. The Zivko Edge 540 is the most common aircraft used in the Red Bull Air Race World Series – in fact all champions of the World Series have flown this aircraft

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PRE-FLIGHT

Kevin Crozier
Editor | Radio Control Model World

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Welcome to the September issue of RC Model World.

I had a nice surprise recently when I returned to work after a birthday weekend to find sitting on my desk a selection of bottles of fine ales with which to slake my thirst. And very nice they were too. My thanks to all the folks at Traplet who contributed to this excellent pressie – you know who you are!

The aforementioned bottles of amber nectar were presented to me in a supermarket wine carrier, which served its purpose well as I transported them home. When all had been consumed my wife consigned the cardboard carrier to the utility room cupboard, knowing full well that I would probably find a good use for it. She was not wrong!

A few weeks later the weather had turned and here in the UK we were enjoying a well deserved period of summer sun and low winds. Perfect for a spot of small model flying after work. I dug out a few suitable models, charged their 1S and 2S LiPo's and checked over the DX6i transmitter that I keep for flying such models. It struck me that rather than taking along my normal flight box, full of tools and at least two transmitters in their carry cases, I would do much better to find an alternative way of carrying just the one Tx and a servo box containing the small batteries. Looking around my workshop nothing came to hand, but time was pressing to get out to the flying field before the sun started to set.

So in desperation I decided to just put it all in carrier bag and to sort something better out upon my return. Opening the cupboard door to retrieve a carrier bag from our temporary stash of such items my eyes fell upon the wine carrier, which has three compartments either side of a cardboard handle. I had struck gold! A quick bit of 'oragami' and I had removed a couple of partitions, creating space for my Tx and the battery box. The remaining compartments still maintained the shape of the wine carrier and gave me storage areas for a couple more vital summer flying accessories – my RCMW bush hat and a bottle of sun cream!

A successful bit of recycling, then. Although not as robust as a purpose made small flight box, it will do the job for a few weeks over the summer. In the meantime, if any suppliers out there have a lightweight flight box that they want to bring to our readers' attention then do let us know and we will pass your information on.

Time now to move on to what you will find in this month's issue of RC Model World.

Features first, we continue with the next instalment of Peter Maw's short series on scale model building, with the Fokker DVIII coming along nicely. Staying on the subject of WWI models, we take a detailed look at a highly detailed SE5a scout before coming right up to date with the latest in R/C pulse jets, as seen at the Days Of Speed And Thunder show in Germany. And these fire-spitting engines are not the only pyrotechincs we have lined up for you, as we take a look at the amazing world of scale rockets.

Our free pull-out plan this month is the latest design from Anthony Wright, who presents a neat little low wing trainer called Lowbo. And for our feature plan we turn to Bill Bowne and his 48.5 inch span EP sports aerobat, the Senior Sassy.

On test we have the fabulous Wots Wot in its ARTF form, courtesy of Ripmax. And from the CML stable we take a look at Dynam's take on the T-28 Trojan, another well detailed foam scale kit.

There's plenty more besides, and a couple of regular columns too. So all in all we hope to bring you another fulsome read.

Happy flying!

Kevin

RC MODEL WORLD

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THREE TIPS FROM OZ

Regular Australian correspondent, Peter Kraus, writes in after reading Peter Miller's article on working with piano wire (RCMW June 2015, 'Some Notes On Piano Wire', page 24):

"Regarding Peter Miller's excellent article on piano wire:

1) Peter describes the technique we all used in the old days to hold wheels on, i.e. soldering a washer onto the axle. However, as in his illustrations, the wheels are plastic.

My trick, learned long ago and not invented by me, is to make a hole in a small piece of thin, scrap balsa sheet, usually 1/16", and put that between the wheel and the washer to be soldered on. This protects the plastic wheel from the heat of the soldering iron. The balsa can be wetted if you like, to provide additional protection, and is just broken away when the soldering is done.

2) I have been reading in various places about tips to start a nut onto a bolt in an inaccessible place. The simplest is the old trick of getting a piece of scrap balsa long enough to reach where you want it to go, whittling down the end so it can be forced halfway into the nut, then you can reach into the inaccessible spot, start the nut and pull the bit of balsa out. I have included a photo illustrating this.

3) In the UK do you have those plastic clips holding bread wrappers closed? After bread duty they are great to put onto the wires of LiPo batteries to identify fully charged ones (or discharged ones if you prefer). Simple and costs nothing, but very handy!"

Thank you, Peter. The old, simple tricks are always well worth repeating for our newer readers, who may not have been involved with aeromodelling for very long.

ROYAL AERO CLUB TRUST BURSARIES

Forty three bursaries have been awarded by the Royal Aero Club Trust to enable young air sport enthusiasts to advance their existing air sport qualifications. The significant increase both in the number of applications and awards made follows a decision by the Trust to accept applications from light aircraft trainee pilots who have flown solo, and trainee balloon pilots who need help with the costs of mandatory examinations. The Trust has also widened the age range for eligibility and introduced follow-on awards to enable previous award winners to continue to make progress in their chosen air sport, which includes aeromodelling.

The Trust is most grateful to its benefactors, such as the Royal Aeronautical Society, which does so much to encourage young people to develop their potential through air sports. Moreover, the Peter Cruddas Foundation awards, the Bramson bursaries, the Breitling bursaries and the MacRobert Trust bursaries have been of enormous help in making it possible for the Royal Aero Club Trust to provide these awards to deserving young people who have already demonstrated enthusiasm and proficiency and who wish to progress further in their chosen air sport.

The 'named' bursaries were awarded to:

President's Scholar: Joshua Carratt, a skydiver

The Peter Cruddas Foundation Scholarship: Liam Vile, a glider pilot

The Bramson Bursary: Matthew Davis, an aeromodeller

The Breitling Bursary: award winner subsequently received sponsorship from another trust; matter under review

The MacRobert Trust Bursaries: Lucy Westgarth, a skydiver and Martin Swindle, also a skydiver

Additionally, Special Awards were made to Richard Smith, a fixed-wing pilot and Theo Warden, a paraglider pilot.

The scheme includes Aeromodelling Bursaries to enable model flyers to upgrade their equipment or to gain further qualifications. For more details visit the RaeC website: www.royalaeroclubtrust.org/bursaries

PARROT SKYCONTROLLER

David Rawlins of Flying Toys, the UK distributor of Parrot drones, and who kindly loaned us a Bebop Drone to review in the April and May 2015 issues of RC Model World, has sent in this information about a Bebop related product:

"Further to your recent Bebop Drone product review, please note the Parrot Skycontroller will be sold separately soon. This will allow enthusiasts buy a Bebop Drone and purchase the Parrot Skycontroller later, if they prefer. Available in a choice of red, yellow or blue, our Suggested Retail Price is £429.99 including VAT.

Whilst writing, I understand from our tech guy, Nigel, that the Bebop Drone automatically seeks the 2.4 GHz frequency, rather than the 5 GHz band, if you select outdoor mode under the settings menu when registered in the UK.

Hopefully this update may prove helpful to your readers."

Equipped with an amplified WiFi radio and four antennas, the Parrot Skycontroller extends the Bebop WiFi range up to 2 km, subject to your local WiFi regulations. You can pilot it with a smartphone or tablet fixed into an integrated shelf and it is compatible with the majority of tablets available on the market. The pilot controls the drone with the help of two, R/C style joysticks. For a more immersed experience connect FPV (First Person View) glasses and once connected your head movements will position the 180° fish-eye camera of the Bebop Drone.

MULTI-BLADE OPTIONS

Like many modellers, David Bliss was a bit stumped when it came to selecting a multi-blade prop for his new model:

"Please could you be kind enough to give me some advice as to which size prop to use?

I have just finished a Cambrian Spitfire and I have an ASP 61 four-stroke. I would like to use a three or four-blade propeller. Your advice would be much appreciated."

Good question, David. One of the easiest brands of multi-blade props to source, and which are available from a wide selection of model shops are those from APC. Visit their website at www.apcprop.com and click on Downloads/Excel Prop Data/Propeller Technical Data.

Here you will find a spreadsheet that details all the technical information about their propellers, including multis. The information about multi-blade props starts on line 529.

If you do not have access to a spreadsheet program then here is the relevant info:

LP3150130W	15x13W-3	3 Blade 120 Pattern
LP3150135	15x13.5-3	3 Blade 120 Pattern
LP3157513	15.75x13-3	3 Blade 120 Pattern
LP409060	9x6-4	4 Blade 40-50 2 Cycle
LP410060	10x6-4	4 Blade 50-60 2 Cycle
LP411060	11x6-4	4 Blade 60-65 2 Cycle
LP411090	11x9-4	4 Blade 65-75 2 Cycle
LP414512	14.5x12-4	4 Blade 140 Pattern
LP415512	15.5x12-4	4 Blade 140 Pattern

For your size of four-stroke we would think that one of the 9-inch four-blade types would work well. It may be worth trying both, although we appreciate that these props are more expensive than normal two blade types.

Other brands of multi - blade propellers are of course available, so if any importers or distributors would like to send us some information on their products then we will be pleased to pass it on.

SOUTHERN MODEL SHOW

This year's Southern Model Show at Headcorn Aerodrome on 12th and 13th September will include synchronised flying by full size and model aeroplanes, when Chris Burkett and Mike Williams will display their 'Little and Large' routine. Chris will perform acrobatics in an Extra 300 overhead, while Mike pilots a scale model of the same aeroplane following the same routine.

Chris said: *"We really enjoyed participating last year with our Extra Duo Display at the Southern Model Show. It's always a good crowd to perform our routine to."*

Mike starting model flying at the age of nine, his achievements include: Freestyle Champion, Top Gun Aerobatic Champion, F3A Advanced Class National Champion and Unlimited Class UK Shoot-Out Champion.

The Southern Model Show will feature a large display of models and an exciting flying programme of models from the UK and Europe. There will also be marine models, including paddle steamers, battleships, lifeboats and submarines.

Besides the displays and a good selection of model traders there will also be a full range of activities to interest the whole family, plus food outlets.

Weekend camping is available at the aerodrome and includes entry into the show on both days for two adults and two children. Tickets can be purchased in advance at a discounted rate. Gates open at 10 am on both days.

For further information and to book tickets, please go to: www.headcornevents.co.uk

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This superb looking, 1470 mm wingspan C-47 really looks the part finished in its classic olive/grey scheme complete with invasion stripes. Being made from EPO it is tough and being plug and fly, it is quick and simple to assemble. The pre-fitted 1100 KV outrunner motors give the C-47 plenty of power to get off from even the roughest of strips and the scale landing gear is very sturdy. Required for completion: 2.4 GHz radio system, 2200 mAh 3S LiPo and charger. £149.99

FMS FW190-Y6 ARTF CAMO

FMS have updated their Fw 190 with this new 1400 mm wingspan Yellow 6 variant as flown over the skies of Holland in 1944. The powerful 580 KV motor and scale 15" x 8" 3-blade propeller will eat up the airspace without the slightest hint of running out of power. The Y6 features worm drive electronic retracts, LED nav lights, removable bomb, durable resin cowl, exhaust vents, and air inlets. Required to complete: 6-channel radio, 6-channel Rx, 4-cell 14.8 V 3000 mAh LiPo and charger. £279.99

ROC HOBBY 830 MM SUPER SCORPION EDF JET

The new Roc Hobby Super Scorpion is ready to get that adrenaline pumping for you Jet Junkies with a 2845-2750 KV motor, 70 A heavy-duty ESC, digital metal gear servos, 12-blade EDF, and ball links on all control surfaces. This jet runs on a common 4S 2200 mAh LiPo pack and can reach speeds in excess of 80 mph! Requires 4+ channel full range radio, 4-6 channel full range Rx, 4-cell 14.8 V 2200 mAh LiPo and charger.

For more info visit www.cmldistribution.co.uk

350 QX QUADCOPTER FLIGHT CASE

This large, protective flight case has a specifically designed foam insert to store the 350 QX Quadcopter and all relevant gear. The 515 x 490 x 280 mm case includes a pre-cut specifically designed protective foam housing for the 350 QX Quadcopter, quick catch mechanism with padlock loops, improved protective corners making the case extra robust and egg foam lid for added protection. Cases for other models also available. £42.00

www.cases-and-enclosures.co.uk/catalogsearch/result/?q=quad

PARROT MINIDRONES

Representing an exciting new collection of thirteen innovative connected toys and miniature robots, piloted with a Smartphone or Tablet via the FreeFlight 3 application. Compatible with both iOS and Android devices, and developed with additional new capabilities, these amazing drone toys are ready to join the Parrot team for action on the ground, in the air and even on water! New drones include Airborne Cargo, Airborne Night, Jumping Race, Jumping Night, and Hydrofoil.

www.flyingtoys.com

GRAUPNER HOTT BADGER

Graupner's Badger is an ARTF model produced from Solidpor foam, featuring a two-piece wing. No adhesive is needed the model parts such as fin and tailplane are simply inserted and held in place magnetically on this 1280 mm wingspan model. The Badger comes with spinner and prop, 750 KV motor, servos, 20C LiPo, and a tricycle landing gear with foam rubber wheels.

www. graupner.de/en

Our pick of the latest R/C kits and accessories

JR PROPO BALL ENDED HEX DRIVER SET

Developed in conjunction with a skilled Japanese tooling manufacturer to include features useful to modellers, these ball ended hex drivers are a very useful tool for model helicopter assembly. They have the ability to access narrow spaces, and successfully tighten hard to reach bolts. The bit size is easily identified by the colour markings. The set includes the following sizes: 1.5 mm, 2.0 mm, 2.5 mm, 3.0 mm, 4.0 mm. Made from high quality industrial steel, with special heat treated bits and a unique non-Chromium surface treatment.
www.macgregor.co.uk

PARROT SKYCONTROLLER

Parrot's Skycontroller is now available separately to the popular Bebop Drone. Equipped with an amplified WiFi radio and four antennas, the Parrot Skycontroller extends the WiFi range up to 2 km, subject to your local WiFi regulations. Pilot with a Smartphone or Tablet fixed into an integrated shelf that is compatible with the majority of tablets available on the market. For more extreme sensations, connect FPV glasses to the Parrot Skycontroller and your head movements will position the camera of the Bebop Drone! £429.99 SRP
www.flyingtoys.com

MAX-THRUST MINI VIPER PNP

This latest release from Max-Thrust is a real stunner with its high visibility colour scheme and it has the flight performance to match. Featuring a highly efficient 5-bladed ducted fan set up that is powered by a powerful brushless motor the Mini Viper Jet is sure to put a smile on your face. The 705 mm wingspan Mini Viper Jet is constructed from Epoflexy and is small enough to fit in the car assembled. Comes with pre-installed electrics and a knock-off nose cone. £99.99
www.centuryuk.com

ARES OPTIM 80 CP RTF

From sport flying to 3-D, take your first aerobatic steps safe in the knowledge that 6-axis return-to-level flight stabilisation is there to help. The Ares Optim 80 CP comes 100% factory-assembled in a choice of two attractive, highly visible colour schemes and is powered by a coreless motor and a 150 mAh 25C battery, with a 2.4 GHz transmitter included. £99.99 SRP

MULTIPLEX RR FUNGLIDER

A fantastic model for the weekend pilot the 1300 mm wingspan RR FunGlider is supplied 100% factory-assembled leaving you to simply install your own receiver, charge the flight battery, plug in the wings and tailplane, and go flying. With its friendly flight handling characteristics it's a sheer pleasure to fly, being compact, agile and highly manoeuvrable.

ARES SOPWITH PUP RTF

The Ares Sopwith Pup is a lightweight, 352 mm wingspan, 3-channel ultra-micro, semi-scale model of the original. It features durable foam construction and numerous scale touches such as moulded wing rib detail, authentic trim scheme plus a wood texture and colour propeller and interplane struts. It comes ready-to-fly straight out of the box and is supplied with proportional 2.4 GHz radio equipment that controls throttle, elevator and rudder. Weighing less than an ounce, the Sopwith Pup is ideal for indoor flight or outdoor flight in calm conditions. £59.99 SRP

For more info visit www.jperkins.com

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WOTS WOT

Frank Skilbeck gets the job of assembling an ARTF version of the much-loved sport aerobatic biplane, originally designed by Chris Foss

Like the majority of modellers of my vintage I've owned a few Chris Foss models, including a much loved – and abused – Wot4 with a Laser 61, and a Phase 6 slope soarer. And as anybody who has flown these models will testify, they just fly right. I've never sampled the ARTF offerings from Ripmax though so I was delighted when the Editor asked if I could review the ARTF Wots Wot, together with a Thunder Tiger 75 four-stroke motor. The Wots Wot is a 50 inch wingspan biplane from the Chris Foss stable featuring an Acrowot style fuselage and thick section wings similar to those employed on the Wot 4.

All the good bits in a biplane, so what's not to like?

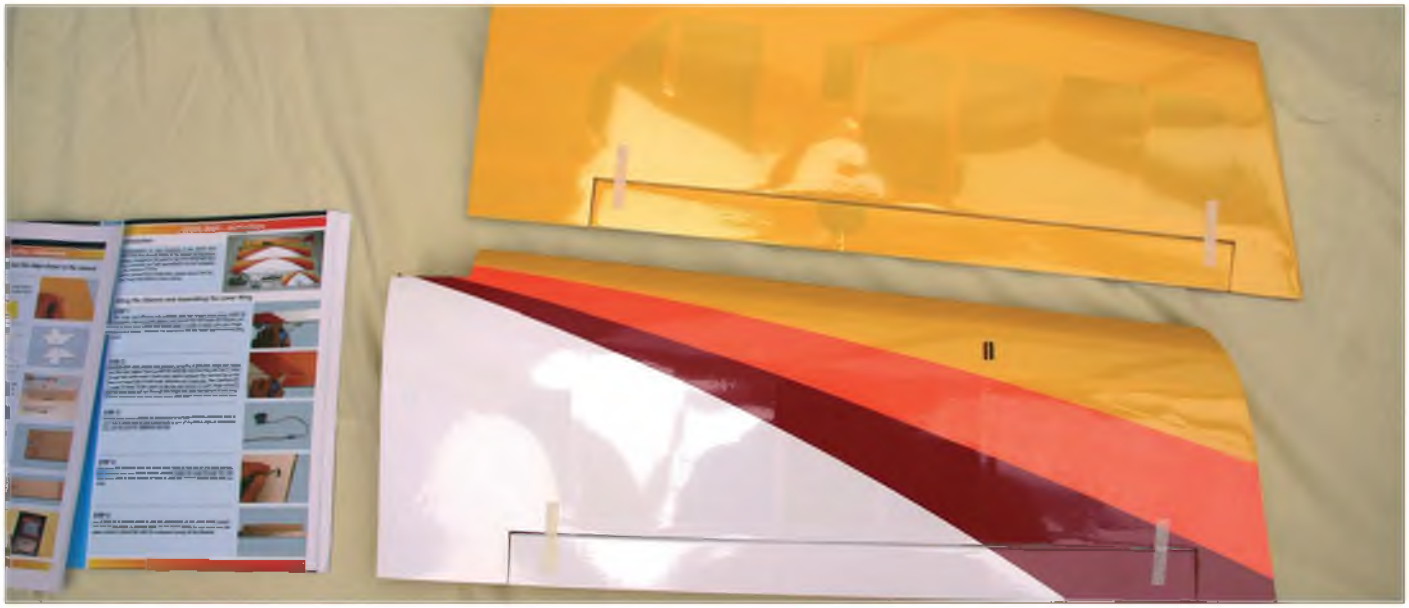
Let's Get Started

Opening the box reveals the fuselage, wings and tail feathers, all well-built and covered, and decorated in the 'standard' Chris Foss white, yellow, red and orange scheme. The covering is nicely applied, with just a couple of minor sags needing a light touch with the iron. The kit model comes as an airframe only with optional I/C or electric fitting packs. The review model was supplied with the I/C pack, which included an engine mount, fuel tank, throttle linkage and spinner suitable for an I/C engine. The optional electric pack contains all parts required to fit your electric motor, ESC and flight battery.

Other parts included a lovely painted cowl, tinted canopy, pilot, top wing joining tube, inter-wing struts and all the hardware required to fit your own servos and radio. A full step by step instruction manual for the I/C and electric versions is provided, with colour photos accompanying each step, plus an addendum sheet for those steps where the supplied model differs from the instruction manual.

Starting with the lower wings, first the ailerons are hinged to the wing using mylar furry hinges and cyano. Then the two wing halves are epoxied together

Chris Foss standard colour scheme is very distinctive. Decals are easy to apply and they finish the model off nicely



Upper and under sides of lower wings, with well illustrated instruction manual. The ailerons are taped to wing for shipping, but need to be hinged with furry type mylar hinges and cyano

Lower wing halves are held with a substantial hardwood joiner, all epoxied together

Upper and lower ailerons are connected using fibre board horns, which are glued into respective slots in the ailerons

Inter-wing struts are held in place by some neat holders which are epoxied into slots in the wings

using a substantial hardwood profiled wing joiner with some alignment dowels, and the wing is held together while the epoxy sets. Once dry the aileron servos are fitted in the bay in each wing after cutting away the film, as shown in the instructions I used Futaba standard servos and these dropped right in place, with the servo lead being pulled through the built up wing using the preinstalled draw strings. The control horns are screwed into each aileron and hooked up to the servo using a clevis at the control horn. The control rod is bent and cut to length at the servo arm and held in place with a keeper. The upper wing ailerons are connected to the lower wing ailerons by interconnecting control rods and fibreboard control horns have to be epoxied into the lower wing ailerons for these.

The upper wings only need the ailerons hinging and the horns fitted to connect them to the lower ailerons. The inter-wing struts are held in place by some plastic mouldings that are glued into slots built into the wings. A minor word of caution here – the struts are a very good fit and I didn't clean the epoxy out of the bottom on the strut mounts before it set, so the struts then wouldn't seat fully. This was only a minor problem as it was possible to sand a little off the struts to get a good fit without compromising their installation or function.

Fuselage Fit Out

First job is to fit the cabane strut for the upper wing. This is epoxied into the fuselage after cutting away the film to reveal the mounting slot. The strut has flats which align with the top of the fuselage to ensure the correct upper wing incidence.

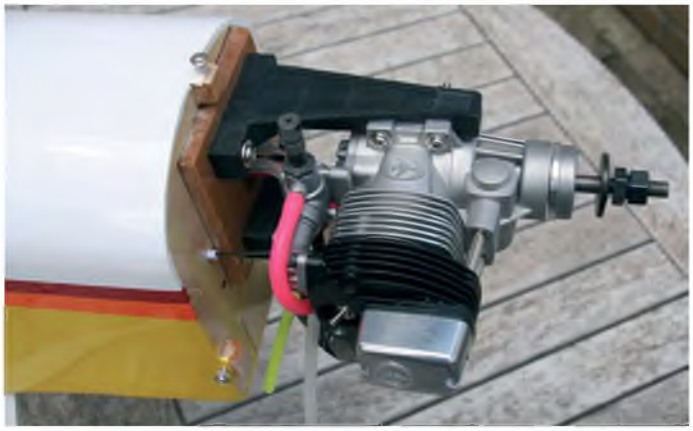
I then deviated from the instructions and did the engine installation before fitting the tail feathers and canopy etc., mainly to prevent damage to these items while moving the fuselage around when fitting the engine. The Thunder Tiger 75 four-stroke dropped straight in using the supplied engine mounts, after drilling the mounts to ensure that the prop driver was 127 mm from the bulkhead, as shown in the instructions.

The fuel tank and throttle linkage were fitted next. Note that the former at the wing leading edge is not full depth, as shown in the instructions at this point, and this makes fitting the receiver battery impossible after the fuel tank has been installed. To fit the Thunder Tiger 75 meant

Upper wing cabane support is epoxied into a slot in the fuselage. Note use of masking tape to stop epoxy marking the fuselage

Tailplane and vertical stabiliser glued in place. The elevator joiner and tail wheel have to be fitted before fitting the corresponding control surfaces

Canopy held with masking tape while the canopy glue dries. The canopy was a very good fit. Make sure the pilot is well secured!



Thunder Tiger 75 four-stroke installed. The throttle control rod was raised to line up with the carb on this engine

Cowl fitted to engine after cutting to clear the cylinder head, needle valve, exhaust header and silencer. Final installation looks quite neat

Standard control horns are used for the elevator and ailerons. The rudder uses a closed loop control system

reversing the carb and drilling an additional throttle linkage hole in the bulkhead but this gave a smooth throttle operation. By rotating the silencer it was possible to have it enclosed within the cowl, with the exhaust exiting in the air outlet on the bottom of the cowl, giving a very tidy installation.

The cowl was offered up next and it needed trimming to clear the cylinder head and a small section of the exhaust header. I also opened it up behind the cylinder head to give access to the glow plug and to provide an air exit for hot air coming off the cylinder head. The end result is quite neat. I did all the trimming using a Dremel cutting disc and rotary sanding attachment to fine - tune the fit. This creates quite a bit of fibreglass dust so please do this in a well ventilated area and take the necessary precautions.

Once complete the undercarriage was fitted next. This is a one piece steel assembly with curved legs and bolt on wheel axles, with the wheels held on by collets. The tailwheel assembly is attached to the fuselage using self-tapping screws.

Tail feathers were fitted next. The tailplane is fitted through a slot in the fuselage so the elevator joiner needs to be installed at this point too. The vertical stabiliser is then glued into place before the rudder and elevators are hinged. Elevator operation is by a pushrod acting on a conventional horn and the rudder by closed loop. The hardware supplied for these was well up to the job.

The servos are fitted in place above the lower wing and the preinstalled ply plate is cut out for standard size servos; I used Futaba standard servos throughout. Note the mount for the rudder servo is raised to prevent the rudder closed loop from fouling the elevator or throttle controls. As this was an I/C model the receiver was installed in front of the servos, packed in foam to protect it from vibration, as recommended by the receiver manufacturer, and with a 2S LiFe battery wrapped in bubble wrap and installed in front of the forward wing mount former. A cut out has to be made in the fuselage side for your chosen receiver switch.

Finally the pilot and canopy were glued into place. Please make sure, on the I/C version especially, that the pilot is firmly secured. Mine came loose on the second flight and I had to perform some keyhole surgery to re-secure him, using a-self tapping screw and glue this time.

Once complete the model weight and centre of gravity were checked. The C of G was spot on without the need to add

Linkages to the ailerons on the lower wing are short and direct, giving precise control

Wots Wot at the strip and itching to get in the air

The pretty biplane commits to the air after a short take-off run

Aerobatics are easy with the Wots Wot, seen here banking away and showing her clean underside

any nose weight, and the model weighed 3.5 kg without fuel, just slightly above the quoted 3.2 kg. But quite a low wing load all the same.

Assembly

Although the Wots Wot is pretty compact and goes into my car in one piece with ease, Ripmax claim it has been optimised for rapid assembly and disassembly. So how does this stack up? Pretty well in fact; assembly is simply a matter of sliding the top wing halves onto the cabane using the large diameter wing joining tube and then stopping the wings from coming apart by installing a self-tapping screw. The Wots Wot is then laid on its back, the inter-wing struts slotted into the top wing, and the bottom wing fitted into position and screwed in place with the two plastic wing retaining bolts, making sure you've hooked up the aileron servos first. Then four bolts secure the inter-wing struts. A 4 mm spanner helps here to hold the nuts while the bolts are tightened. Connecting the lower wing ailerons to the upper wing ailerons completes the job.

More work than a monoplane for sure, but as biplanes go it's pretty quick. Just make sure you've taken all the nuts and bolts with you, and you don't drop any of them in the grass!

Let's Groove

On my radio, rather than use dual rates I set up three flight modes: Landing, Normal and Acro. Control throws were set as per the manual in normal mode, maxed out on Acro and Landing was with the manual's settings but with a lower throttle trim and a bit more expo.

After running a couple of tanks through the engine to run it in a bit the propeller was changed for a 13" x 6". Then, with the engine running slightly rich, the Wots Wot lined up on our runway. Advancing the throttle saw the Wots Wot leap away and into the air in no time. A few clicks of trim and the Wots Wot was flying round nicely at around a 1/3rd throttle. Controls were responsive but not twitchy.

After a few low passes for the camera it was time to give her a wring out. As expected loops and rolls can be as fast, tight or large as required, inverted flight hardly needs any down elevator, stall turns are a delight, and flicks turns and tumbles with the sticks in the corners are very entertaining, with the Wots Wot coming straight out of these manoeuvres once the sticks are centralised. It's not a precision aerobat but the Wots Wot will do the book and bring a big smile to the pilot's face while doing it.

The Thunder Tiger 75FS with the 13" x 6" prop seems an ideal match, providing plenty of grunt but rarely needing full power. I had set my flight timer at 10 minutes, but refilling after this was only taking around 2/3rds of a tank. And this was with the engine still running slightly rich, which had the added bonus of a nice smoke trail!

Landing was easy to control, with the Wots Wot settling into a nice approach and floating onto the runway with the engine burbling away at tick over – very satisfying.

On the second flight, however, the vibration caused my pilot to come adrift, so as noted above do make sure you have properly secured yours. After re-attaching him we reconvened for some further fun.

After a total of four 10 minute flights I noticed some play in the lower wing and on inspection this showed that the leading edge ply retaining tab was getting worn. A few measurements showed that the tab was slightly free to move in the corresponding slot and this was allowing the engine vibration to cause the tab to vibrate in the slot, causing some fretting on the tab. I've added a fibreboard plate to prevent this, and while this should not be a problem with the electric version I would recommend that you either harden up the ply tab with, say, cyano or pack the tab width out slightly to stop it from fretting if

you are going the I/C route. We mentioned this to Ripmax and they concurred that the wing tab on our example may have been finished slightly too thin, allowing it to move and fret causing the wear. But they noted that they have sold over 1,000 Wots Wots to date and this was the first time this had been noted.

Summary

I don't think Chris Foss has ever designed a plane that doesn't have excellent flying characteristics, but I'd say this is one of the best yet. And, wing ply tab apart, on our example the Ripmax execution is first class.

While not a model for the inexperienced, anybody who has flown an aileron equipped low wing plane, or who can aerobat a high winger, should have no issues with the Wots Wot – apart from the jaw ache through grinning!

If you are looking for a ARTF sports biplane then the Wots Wot is highly recommended. **RCMW**

The bright colour scheme shows up well. All flying photos by Gary Peachey and Andy Parsons

Wots Wot is easy to land smoothly

The lower wing retaining tab wore after a few flights (left), so a small fibreboard plate has been added to provide a harder wearing surface (right). If building the I/C version it's probably worth hardening the tab with cyano before the first flight

Taxiing back after another aerobatic display, with the 75 FS puttering away

RC MODEL WORLD DETAILS

MODEL INFORMATION

NAME:	Wots Wot ARTF
MANUFACTURER:	Ripmax
DISTRIBUTOR:	Ripmax
WEBSITE:	www2.ripmax.net
PRICE UK:	Aircraft – £159.99, I/C fitting pack – £12.99, Electric fitting pack – £19.99
MODEL TYPE:	Sports aerobatic biplane
IC ENGINE:	.70 – .81 four - stroke recommended
TEST ENGINE:	Thunder Tiger 75 glow four-stroke
OPTIONAL ELECTRIC SETUP:	Quantum 55 motor, 60 A ESC, 5S 3200 – 5000 mAh LiPo
CONSTRUCTION:	Film covered ply and balsa

R/C FUNCTIONS

1: Aileron	3: Throttle
2: Elevator	4: Rudder

MODEL SPECIFICATIONS

WINGSPAN:	1,280 mm (50")
LENGTH:	1,150 mm (45")
QUOTED WEIGHT:	3,200 g (7 lb)
ACTUAL WEIGHT :	3,500 g (7 lb 11 oz) with Thunder Tiger 75 FS

DISLIKES

Lower wing retaining tab became worn

LIKES

Well built and covered • Instruction manual
Ease of field assembly• Flying performance

Reviewer looking relaxed with the Wots Wot after the maiden flight

NX Series Digital Servo with XBus

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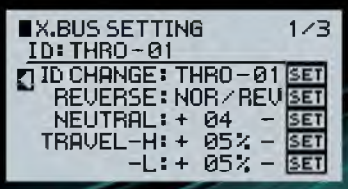

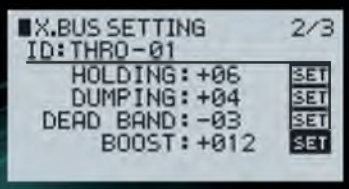

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ID CHANGE: Used for changing ID
REVERSE: Reverse setting
NEUTRAL: Used for adjusting the centre point
TRAVEL: End point adjust

HOLDING: Retaining force
DAMPING: Stopping characteristic
DEAD BAND: Dead band setting
BOOST: Power to start motor

ALARM LEVEL: A beep sound provides feedback on servo load
ALARM DELAY: Delay setting of beep sound after sensing the load
ANGLE: Switching the angle of 120° or 180°
SLOW START: Selecting enable/ disable of slow start
STOP MODE: Select the servo action if receiver signal is lost

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JRC588NX
AERO CAR
WV BB S

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JRC3421NX
AERO
WV BB W

26.5 x 15 x 33mm / 30g

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7.4V	T	6.6	S	0.16

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JRC3425NX
AERO CAR HELI
WV BB W

26.5 x 15 x 33mm / 30g

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6.6V	T	3.8	S	0.11
7.4V	T	4.3	S	0.10

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NX8921
JRC8921NX
AERO
WV BB W

35 x 21 x 40.5mm / 72g

4.8V	T	23.0	S	0.20
6.6V	T	29.6	S	0.16
7.4V	T	36.5	S	0.13

£99.95

NX8925
JRC8925NX
AERO CAR HELI
WV BB W

35 x 21 x 40.5mm / 72g

4.8V	T	11.7	S	0.10
6.6V	T	16.0	S	0.07
7.4V	T	17.8	S	0.06

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NX6421
JRC6421NX
AERO
WV BB W

40 x 22 x 43.5mm / 96g

4.8V	T	25.7	S	0.21
6.6V	T	32.0	S	0.16
7.4V	T	37.5	S	0.15

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SCALE MODEL BUILDING FOR FUN

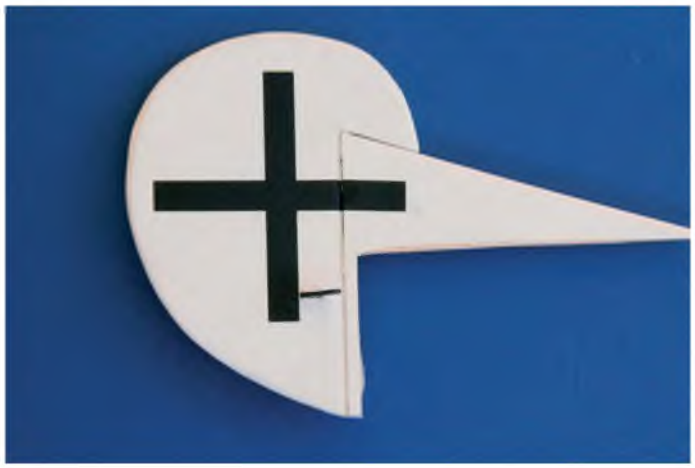
Peter Maw continues his short series on building a first scale model from plans

We left the Fokker last month with the fuselage structure mostly complete, as well as the fin and tail complete, ready to cover. Covering components before assembling the model is convenient and simple. They are easy to handle and markings can be placed accurately. It is essential that the covering does not get anywhere near glue joints that are integral to the structure of the plane.

For the era in which it was designed the Fokker's wing is a complex shape, with leading edge and trailing edge sweep and significant taper towards the tip; it would have been as innovative in its day as the Spitfire was 20 years later. On the full size plane the wing shape is more aerobatic, giving it tighter turns and greater speed for any engine size.

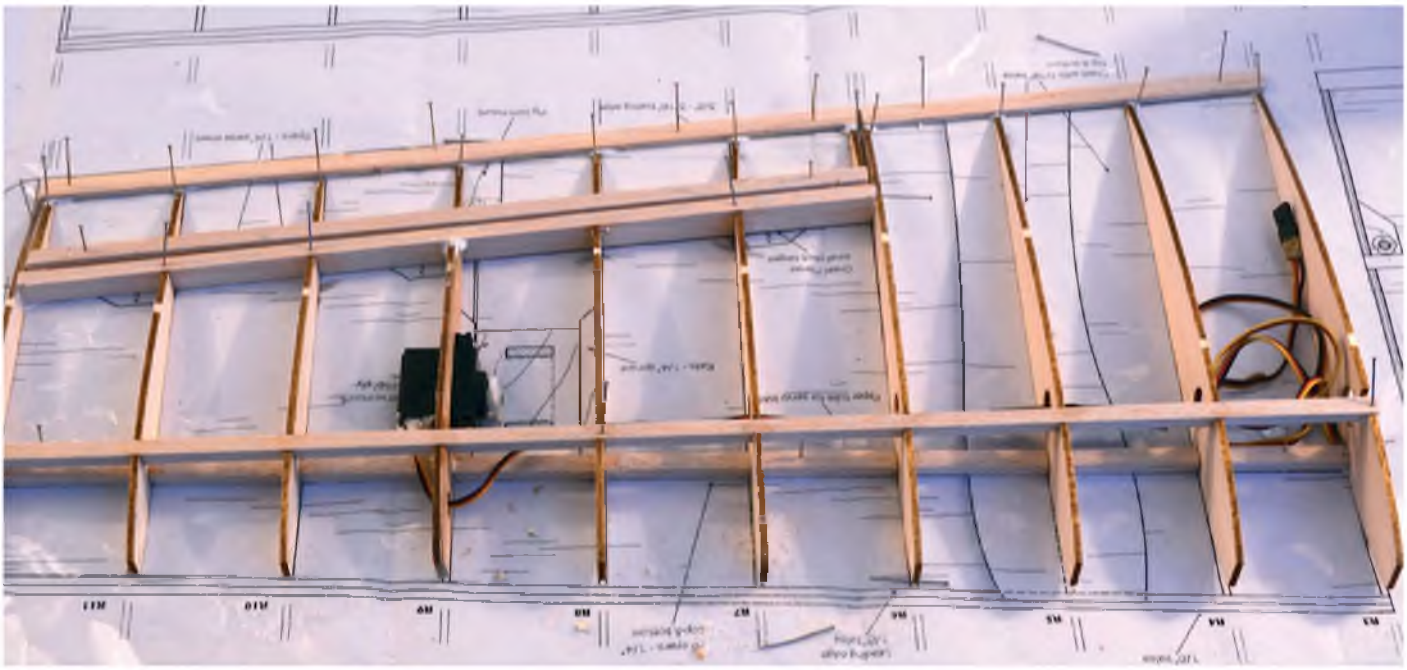
From a modeller's point of view all of these characteristics increase the speed at which the plane will stall, which could make the model more difficult to fly. If you want to be ultra-cautious it is possible to add washout to the wings. Washout changes the angle of the wing ribs at the tip so that they are pointing slightly downwards when the centre ribs are horizontal. This means that as the wing angle of attack increases when the model is on final approach the wingtip ribs actually increase their lifting capacity. Only a couple of degrees of washout is needed.

Various methods of creating washout are available. Firstly it can be done by raising the rear of the tip rib by 1.5 mm and the other ribs pro rata. A less sophisticated, but more flexible arrangement is to set both ailerons with a couple of millimetres of up offset before the first flight. If the plane shows no tendency to stall at slow speed then the offset can be reduced slightly and you keep experimenting until the slow speed flying becomes uncomfortable. Obviously do these experiments at a height where you can easily recover the plane by putting it into a dive. Trial flights indicated that a couple of millimetres of up aileron on both wings will be beneficial to counteract the stall. The plane needs to land fairly fast to avoid a low speed stall close to the ground. It will not be possible to float the plane in without power. If you suffer engine failure it needs a steep, fast descent and you will need to keep it flying until the wheels touch down. An underpowered flare on approach will lead to a stall.



It is easier to cover and decorate individual parts of the plane before joining it all together

Make sure that none of the bits that will be glued have any covering near them. Here you can see that the tailplane mount is left as bare wood



Wing and aileron framework built over the plan

Let's Make Wings

Wing construction is quite simple and the basic framework can be built as quickly as the glue can be applied. Being flat bottomed behind the front spar the wing can be built directly over the plan without any packing up of the ribs. Just pin the lower spars to the plan and the ribs should be an interference fit over the spar. Then they can be dry fitted and once you have made sure that each rib is vertical cyano can be run into each joint. Fit the top spar in the same way and the first bit of the wing can be built in ten minutes. The aileron framework should be built at the same time because then they can be guaranteed to fit in the space allocated.

Wing ribs are an interference fit over the spars and can be cyanoed in place when they are vertical

Mysterious Ailerons

Most full size ailerons do not appear to have any gap between their leading edge and the wing. The generic term for these is shrouded ailerons. Construction is a straightforward affair providing that you think about the order of assembly. If you decide to make this type of aileron it makes sense to go the whole hog and make the control horns as well. They are easy and quick to make and look better.

Use the templates to mark out and make your own control horns from epoxy sheet

Full size template for the aileron control horns. But do check them against the plan before using them to cut out the epoxy board!

The ailerons are of simple construction

Made from either 2 mm Tufnol sheet or epoxy board, about £5 worth of either will give you enough material for dozens of models in the future. Either material can be cut with a fret saw. The shape of the control horns is shown in one of the pictures. Each control arm extends 20 mm above and below the aileron. Copy the full size template and print out a couple of copies, which can be stuck onto the epoxy board or Tufnol.

Once the basic aileron framework has been built then add the bottom sheeting and about a 6 mm width of sheeting to the top leading edge of the aileron. Then sand or plane the leading edge of the aileron into a 'C' shape. Cut a hole in the lower sheeting to accept the control horn and add a mounting block between the nearest rib and the control horn. Rough up the part of the control horn that is going to be glued inside the aileron, epoxy the horn to the support block and secure with a cocktail stick. Add a support block to the bare side of the horn and that's it. The pictures show it all. Don't add the top sheeting at this stage because the Robart hinge point still needs to be secured.

To create the joint shield on the wing it will be easier to shape the rear wing sheets before they are glued. The sheeting in the aileron recess needs to extend 3 mm beyond the rear spar. It also needs to be chamfered to allow the aileron to sit inside them and it is easier to do this before the sheeting is glued.

Hinge Points

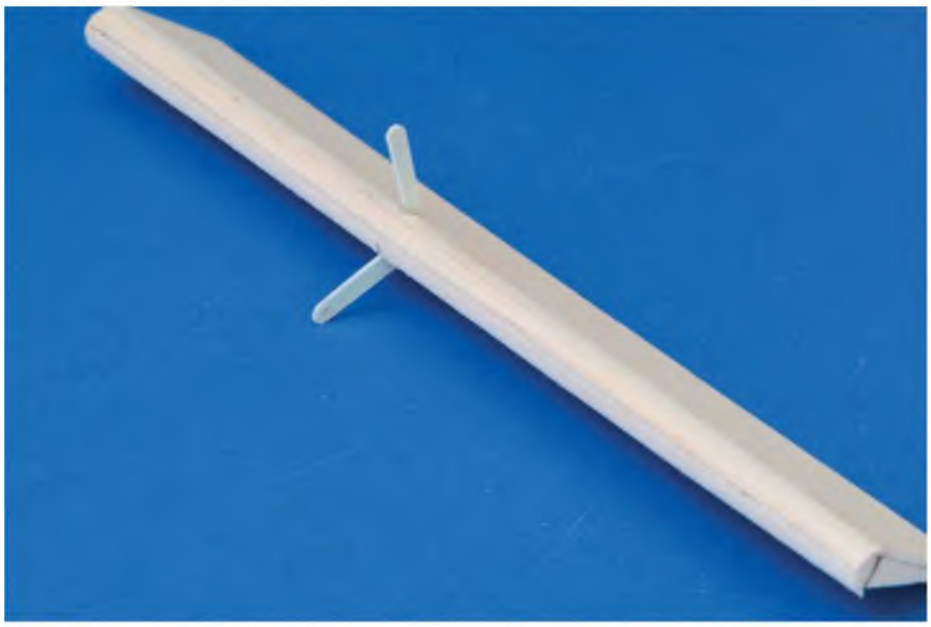
These clever little hinges are marketed by Robart and are available from all good model shops. Their smallest size is fine for this size model. There are two important things to note when they are being used:

Firstly they use barbs to keep them in place, which are very efficient. The problem here is that if they are trial fitted to the wing and aileron, and then pulled out before gluing in place the barbs will rip out a lot of wood, making the positioning holes quite loose. Gorilla Glue is the answer to that problem as it expands slightly when it dries and it is super-sticky.

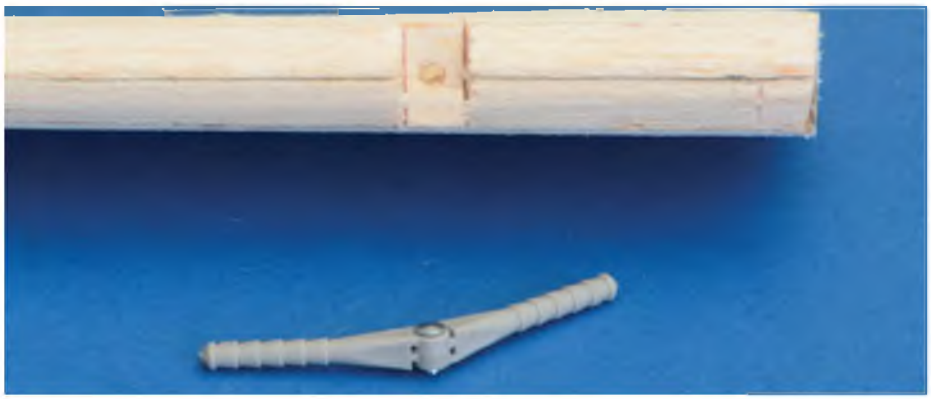
The second thing to be aware of is that the fulcrum or bend point of the hinge is not between the leading edge of the aileron and the trailing edge of the wing; it is several millimetres behind the leading edge of the aileron. This means that when the aileron is deflected up the area in front of the hinge point dips down into the wing, giving a smooth airflow over the control surface.

Recess the aileron leading edge as shown and trial fit everything. Then glue the hinges in place, sand down the expanded glue and add top sheeting. It would be very useful if your colour scheme has been decided by now (it is normally the first thing to do when building a scale model so that you have a goal), because the ailerons and wing recesses need covering and finishing before the ailerons are permanently attached to the wing to avoid a burst of profanities!

Balsa blocks are used to support the control horns



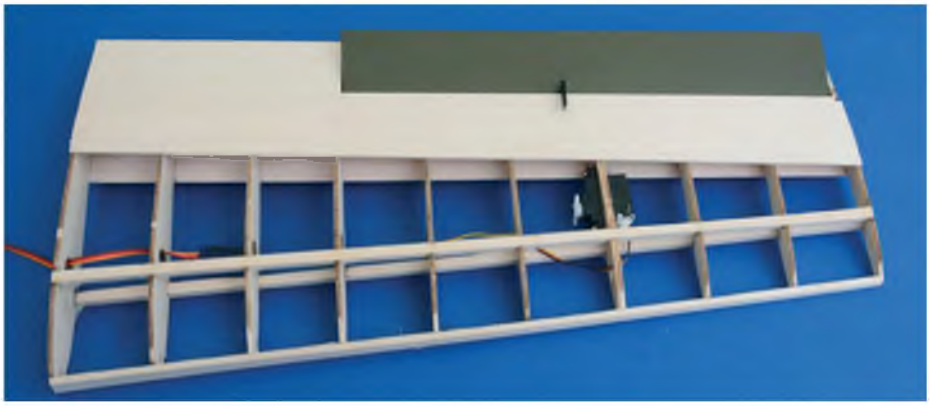
Each control arm extends 20 mm above and below the aileron



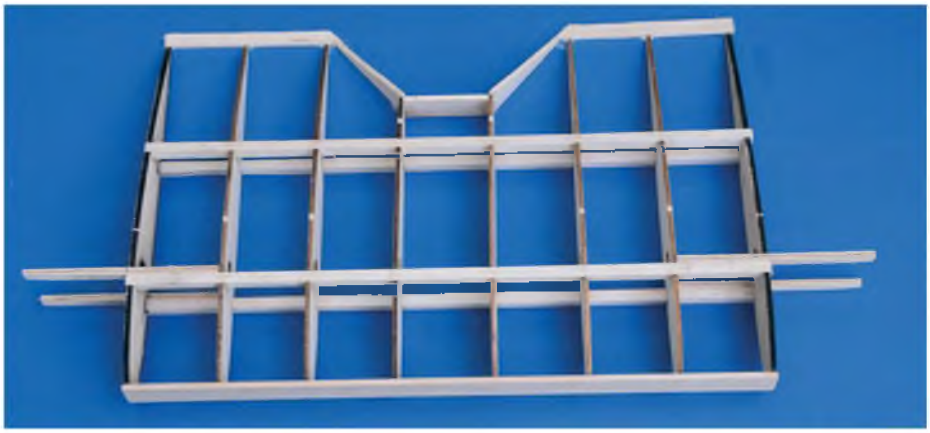
Recess the aileron leading edges to accommodate the fulcrum or bend point of the Robart hinges

During trial fitting the barbs of the hinge will rip away at the surrounding wood. A blob of Gorilla Glue locks the hinge securely in place when you are happy with its final position

When the aileron is deflected up the area in front of the hinge point dips down into the wing, giving a smooth airflow over the control surface



To avoid frustration the ailerons and wing recesses can be covered and finished before the ailerons are permanently attached to the wing



Easy, lightweight construction of the wing centre section, which is built over the plan

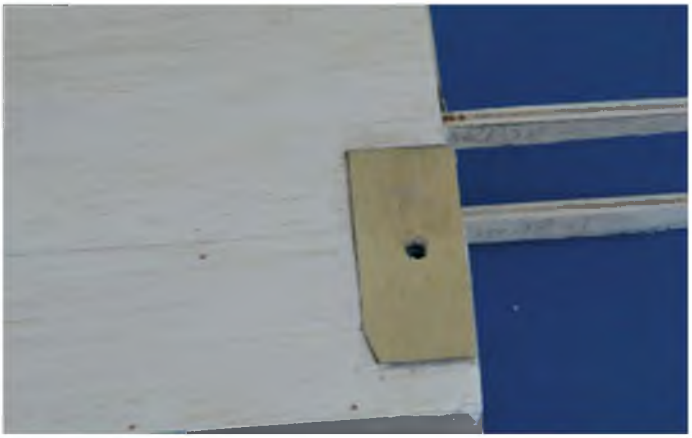
Progress

All the wing panels should now have one plank of sheeting going from the trailing edge towards the centre of the wing on the top and bottom. The centre section can have all the bottom sheeting in place and added ply reinforcement where the wing will attach. The rest of the bottom sheeting can be added to the wing panels if their servos have been connected to the ailerons. Use a closed loop system (complicated) or a solid control rod on the top side of the wing and a fake connector made from black string on the underside (simple).

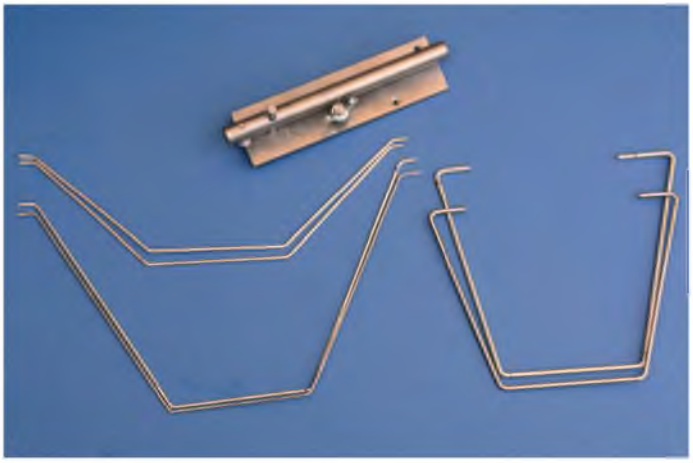
The reason for not adding the top sheet at this stage is because the wing panels will have to be added to the centre section. The safest and best way to do this will be to clamp everything together with spring clamps. This will not be possible if the top sheeting is in place. But we don't want to do that yet because it will be easier to build the wing mounting system and accurately position the parasol wing using only the centre section. Now we come to the bit that puts people off scale vintage planes – metal bashing. Don't panic, there is a solution.

Bent Wires

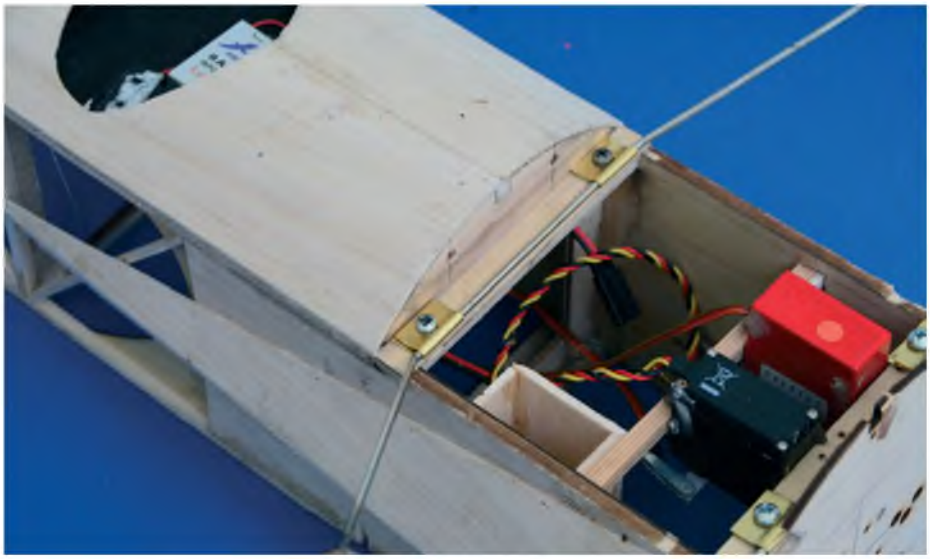
Over many years I have tended towards the neanderthal approach to piano wire bending – put it in a vice and hit it with a hammer! The results have been OK, but repeatability is difficult without practice.



Ply is recessed into the covering over the wing mounts to give durability to the model



This metal former gives consistent results and will last a lifetime



Thin brass sheet can easily be bent to shape to hold the wing tripod in the required shape

This plane needs five accurately formed pieces of wire so something better is needed.

An investigation of wire bending tools showed there are a couple of devices on the market. Expo Tools supply K&S lightweight wire benders, and Wirebenders of Norfolk (the clue is in the name) supply proper wire benders. Although the K&S tool creates a tight bend in the wire, which would be useful for the wing supports, it is not suitable for the thicker undercarriage wires. The Wirebender tool creates bends with a 6 mm radius and is built to last into the next century

If everything is bent to the plan all three wires forming the front tripod mount will meet in the correct place. Have a couple of practise goes to establish where the bend actually starts with the wire bender. Mark a piece of piano wire of the same gauge that will be used on the wing tripod and watch

where the bend starts when using the bender. That way results can be repeated.

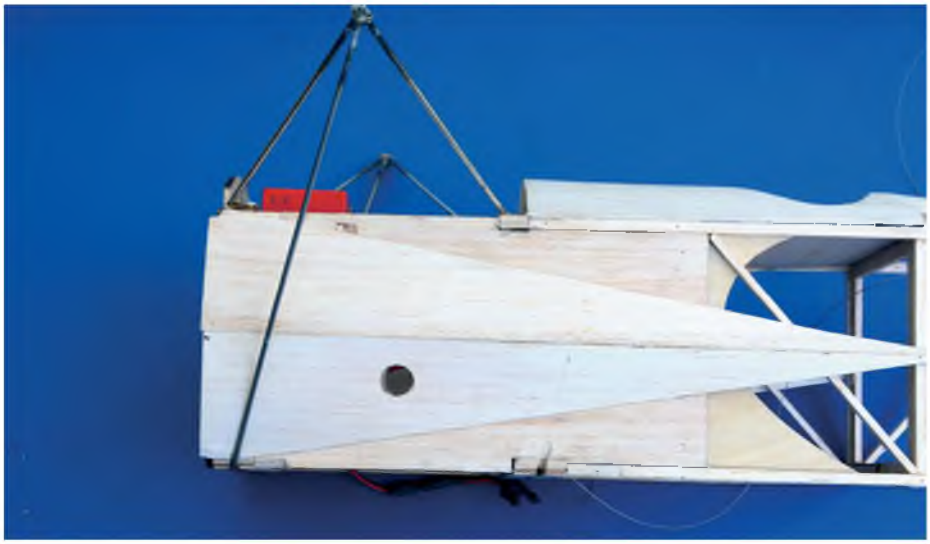
The same applies to the undercarriage legs. Both these assemblies will need to be soldered while they are attached to the fuselage. Fortunately the point where the wire is to be heated is a long way from the wooden bits.

All the wire bits are attached to the fuselage with thin brass sheet cut to size. These have proved to be more than adequate for general flying.

Coming Soon

Next time we will learn a new skill – silver soldering. In the meantime, research and buy a blow torch. It will be necessary to have a torch that can produce 650 degrees of heat over a range of tip sizes. Rothenberger make a simple to use torch, the Mini Concentrated 14 mm point burner, which is economical in use as well. Suppliers can be found easily on the Internet.

RCMW



The only way to accurately silver solder the mounting point for the wing is to assemble it and wrap it with fuse wire before soldering

The solder will only run where there is flux so don't stint when applying it. More on silver soldering next time!

CONTACTS

Tufnol – Direct Plastics
www.directplastics.co.uk

Epoxy Board – Hobbyplastic & Mick Reeves Models
www.hobbyplastic.co.uk
www.mickreevesmodels.co.uk

Wire Bender
www.ncsl.co.uk/wirebender

Silver Soldering Products
www.cupalloys.co.uk

Axi Motors
www.electricwingman.com

RC MODEL WORLD DETAILS

MODEL INFORMATION

MODEL TYPE:	Parasol wing, near scale monoplane
WING SPAN:	54" (1.37 m)
WING AREA:	437 sq in (0.28 m^2)
WING LOADING:	26 oz/sq ft (7.9 kg/m^2)
ENGINE/MOTOR:	0.40 cu in 4-stroke or equivalent electric motor (Axi 2826/12 used with 12" x 6" prop and 40 amp ESC)
CONSTRUCTION:	Balsa and ply
WEIGHT:	5 lb flying weight, including a 4S 3300 mAh LiPo (no weight difference compared to a 0.40 cu in 4-stroke)

R/C FUNCTIONS

1: Throttle
2: Rudder
3: Elevator
4: Aileron (2 servos)

PLAN DETAILS

NAME:	Fokker D.VIII
BUILD CATEGORY:	Intermediate
PLAN NUMBER:	MW3599
PLAN PRICE:	£20.99 ($33.99)
WOODPACK PRICE:	£50.99 ($86.99)

Plans and parts are subject to Postage and Packing charges at standard rates.
Copies of plan number MW3599 are available from RC Model World (Plans Service), Traplet Publications Limited, Traplet House, Willow End Park, Blackmore Park Road, Welland, WR13 6NN, England, Telephone: + 44 (0) 1684 588599, Fax: + 44 (0) 1684 578558, Email: orders@traplet.com or order online at www.trapletshop.com
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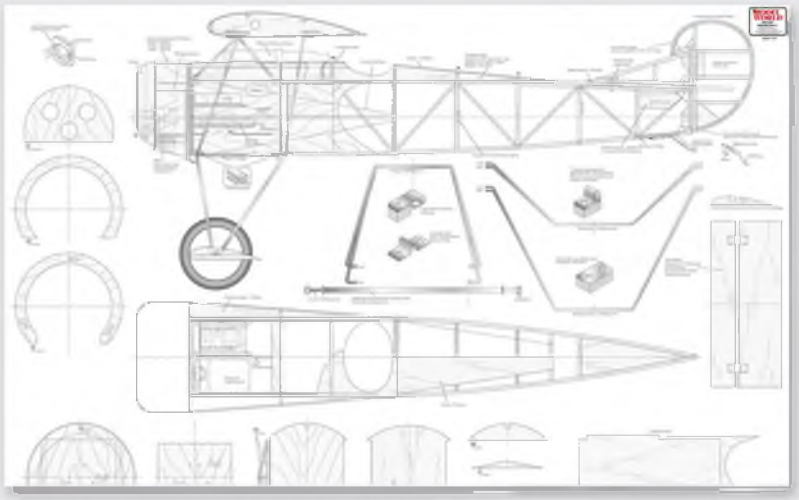

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DAYS OF SPEED

Above: Salamander is an extremely popular design for the bigger engines, as the model is perfectly laid out for carrying a decent fuel and equipment payload. It has superb flying and handling characteristics

There is a terrific museum on the former Eastern Bloc Cold War air base. As you may surmise there are lots of exhibits that are not normally seen at more commonplace aviation venues

Rothenburg is a pretty little rural town, smaller than some villages and unremarkable, albeit beautiful, save for its associated former Eastern Bloc Cold War military air base, where once upon a time MiG-21s thundered overhead and the town was part military because of that.

Today, Rothenburg airfield is a peaceful place, with the single track railway that runs alongside it now overgrown with weeds and clearly unused for a good while. But the venue plays host to a unique and very exciting aeromodelling event and one that has been held annually for the past decade. If you want to see pulse jets in action, this is the place to be in May every year, where enthusiasts from as far afield as Brazil and Australia pitch up to take part and enjoy the unique camaraderie shared by 'Pulso' enthusiasts like me!

Here you can see pulse jets from the diminutive to the truly huge, belching vicious tongues of flame as their owners light the fires and kick the tyres of anything and everything, from the predominant and very fast deltas powered by fuel injected large 'tubes', all the way up to man carrying trikes. And at the other end of the spectrum there are tiny jets strapped to the back of Multiplex Funjets and the like!

There are numerous experimental and static pulse jets running up or popping and banging at any given time. And with on site camping with electric hook ups, a bar and restaurant on site and use of the airfield's infrastructure for storage of models and equipment as well as charging of batteries and compressors, the event is now very well developed and sorted with typical German efficiency! Best of all is the truly cosmopolitan feel to the whole thing, with many Dutch, Austrian, German, Italian and Belgian participants in particular. I was the only British entrant in 2015 but together with a few friends I'm hoping to change that come 2016.

Sagittario!

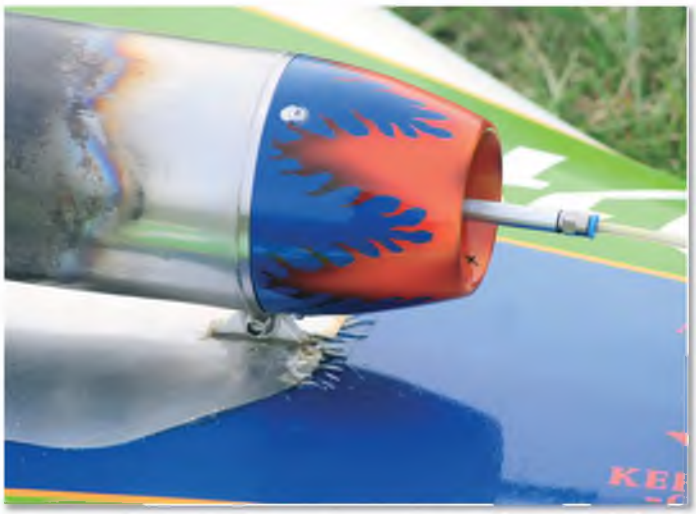
The run up to this event takes me back a few years, when after much procrastination I bought a few 'tubes' from those that had dabbled with this niche part of our hobby. Make no mistake, pulse jets are not for everyone, being extremely noisy and quite involving, with team participation pretty much essential where starting and handling these fascinating devices is involved. You will read and hear some absolute uninformed nonsense on the 'illegality' of pulse jets here in the UK, but in reality, they are just another engine, so if your club or field is willing then you can fly R/C or C/L pulse jets without issues, although the BMFA insurance scheme does draw the line at Free Flight..!

Back to my involvement. With four Zanins, including a trio of their excellent and most reliable Z 23 engines, and a slightly larger Z 24 in the workshop already, I then bought a pair of beautifully crafted Baily Sport Jets to go with those. Now I had engines aplenty, so it was time to build a suitable model or two. After a little procrastination and consideration I bought a Z Jet Sagittario kit, which is a purpose designed swept wing jet that was originally drawn up to accommodate a Zanin Z 23, with later variants popular as a turbine foil – perfect! And best of all, it was a proper and involving model aeroplane that I could build and detail myself.

I started that build about four years ago. The kit wasn't exactly great, which slowed progress, and then I was hit with

AND THUNDER 2015

The place – Rothenburg on the German Polish border, East of Dresden. The event - Days Of Speed And Thunder 2015. Our reporter – Steve Dorling



Now that's bling! Airbrushing the intake of your 'tube' to match the model. In this case a blisteringly fast Inferno all composite delta

Paul from Oz, 'I'm a little Kanguru (German spelling) in a big pulso family', carrying one of the big Salamanders back from the infield

a few life changing events, which saw me distracted until this year, when an even more focussing life changer hit me. So I determined that now was the time to get on with things! The Sagittario was pulled from the rafters and finished in about a month flat. There was a lot of work involved and for those raised on a diet of ARTFs I can tell you that fitting just one of its ten servos is more involving than putting a whole ARTF kit together!

On Our Way

Eventually, at the eleventh hour, my beautiful bird was ninety-nine percent complete and I tossed the remaining fettling work into my trusty Toyota camper, along with the mostly complete model, bunging a few teabags and some bedding into the back of the van, and we were off, having booked the DFDS ferry to Dunkirk one way only at the last minute too! I never buy returns when on the continent as I don't like to be pinned down. A seven hour drive from north Wales to Dover took care of day one.

Day two dawned bright and sunny at a Belgian truck stop where we had elected to rest overnight following our night crossing.

Day three saw us traversing what used to be the old East German border, using its splendid new autobahns that make the rest of Germany's road systems look decidedly second-hand. Progress was good, and save for a minor hitch at Dresden, with road works to blame, we pitched up at Rothenburg mid afternoon in brilliant weather.

Sorted, settled and with introductions and administration taken care of, the next job was to pitch camp and finish the Sagittario, with a pressure bagged tank to design and construct, and the final balance and set up of the control surfaces to be determined. Conversations followed with the Austrians, who were also flying a Sagittario. I can't over emphasise how generous and helpful the Austrian Pulso Team turned out to be and thanks to Hannas Shmidt and his friends, my Sagittario saw air under her wheels at the end of the week!

Memories

Notable 'events' over the five days I was there included the Italians lighting up a very big pulse jet powered tricycle, and with petrol spilling from the tailpipe, setting fire to a good bit of the concrete and safety fencing. But all quite nonchalantly and with the Italian guy from Z Jet, who was clearly in control of things, squatting in the melee with a lit cigarette hanging from one lip! Not recommended of course, but hugely entertaining!

Later on in the week one of our new friends managed to dump his Inferno – a very sleek, all moulded composite delta of extremely high performance – into the fascinating museum complex, narrowly missing a MiG-21 but fortunately doing little damage to the model and none at all to the MiG, fortunately.

A Scout, another popular delta of immense presence and performance, didn't fare quite so well when it undershot the landing area and bounced off a few solar panels that formed part of a huge solar farm at the end of the runway!

At the end of the meeting a semi-formal buffet meal of high quality and quantity was enjoyed by all. This was held in the airport's restaurant and here various awards were given for loudest and longest, fastest and most furious and so forth. My new mate, Aussie Paul, got a clock for the furthest travelled, but as his flight was a mere twenty-nine hours, which

A brightly hued and purposeful Salamander powered by one of Hubert Leubner's fiercely powerful fuel injected jet engines

The small but perfectly situated airside restaurant has a splendid terrace where one can sit with a cold beer and watch all the action in comfort

Turbine and pulse jet Salamanders – the best of both worlds!

The Scout design is very popular. This solid and simple delta has superb handling qualities, yet remains very fast and capable when suitably powered

Hubert Leubner starting one of his own new engines in the test area – always an entertaining time for onlookers, with plenty of noise and flames as the settings are optimised and a new valve is broken in. If you cross Hubert's palm with Euros, he'll build you an engine too!

Delphinio is a very old Italian canard design that was expressly drawn around its Zanin Z23 or Z24 engine. Both Zanin and model are very reliable performers, with the former starting faster and with less effort than your average glow engine

Hannes and friends in the Austrian Puslo Team were entertaining and experienced pulse jet exponents. The team provided me with a wealth of useful help and advice over the week

A beautiful Sagittario, which was completed at the eleventh hour. In retrospect perhaps I should have gone for a simple delta, given the time scale. But she made it into the air on the final day, having sorted fuelling and other details over the week

One of Hubert's brand new 'tubes' awaits its inaugural start in the test area. The small engine next to it is one of many home built types evident at the meeting

The Italians came to entertain, bringing with them this exquisitely engineered turbine powered tricycle. The guys from Z Jet (Zanin) are superb craftsmen

Guys from Holland were there in force. Horst Apollo 68 is a superbly run club from the south of the Netherlands and I called by on the way home for their big display day. 'Superb' doesn't even do this club justice!

Take-off ramps were favoured by most flyers, dispensing with the need for an undercarriage. A very strong, short bungee gets the plot airborne

That Italian engineering prowess I alluded to from the Z Jet guys – just take in the machine work on this detail of one of their large pulse jet powered vehicles

Preparing the Sagittario for flight. Thanks to Hannas and his friends my model saw air under her wheels at the end of the week

was well under my three days of driving time, I too was presented with a clock for distance travelled. Our clocks were specially commissioned, with a 'Days Of Speed' face, and were well received by both Paul and myself. They will be treasured and admired for years to come.

Fastest R/C Jet

The fastest remote-controlled jet-powered model aircraft (R/C) is a turbine-powered aeroplane created by Niels Herbrich (Germany), which reached a speed of 706.97 km/h (439.29 mph) at the WLP Ballenstedt airfield in Saxony-Anhalt, Germany, on 14th September 2013.

Niels pitched up with his Behotec 180 turbine powered composite delta and fast doesn't begin to describe it! To be honest it's a job to keep it in sight, even when flying it, as Niels confirmed.

Tenth Anniversary

Days Of Speed And Thunder 2015 was a tenth anniversary event for this unique meeting. And if you fancy something out of the rut, both in aeromodelling and holiday terms, then you could do a lot worse than put this one on your calendar for 2016.

It's not just a good meeting, it's a great one. But if you go start sorting your model out in good time – more than the rather optimistic month or so I left myself!

Driving there is easy, if fairly lengthy. Or, alternatively, you could fly to Dresden and hire a car. I made a true holiday of things and popped over the border to Poland after the event, then meandered down to the Czech Republic to take in the splendid architecture and culture of tourist packed Prague, before driving home in slow time across Europe, stopping and sleeping at random, as one can in a camper van – great fun!

They say a picture speaks a thousand words, so I'll let the photography do the rest of the talking at this juncture. You'll have to get on to YouTube for a mildly representative interpretation of the amazing sights and sounds of this event. www.pulsotriebwerk.de also has a wealth of information and images of this and previous events.

See you there in 2016, perhaps? **RCMW**

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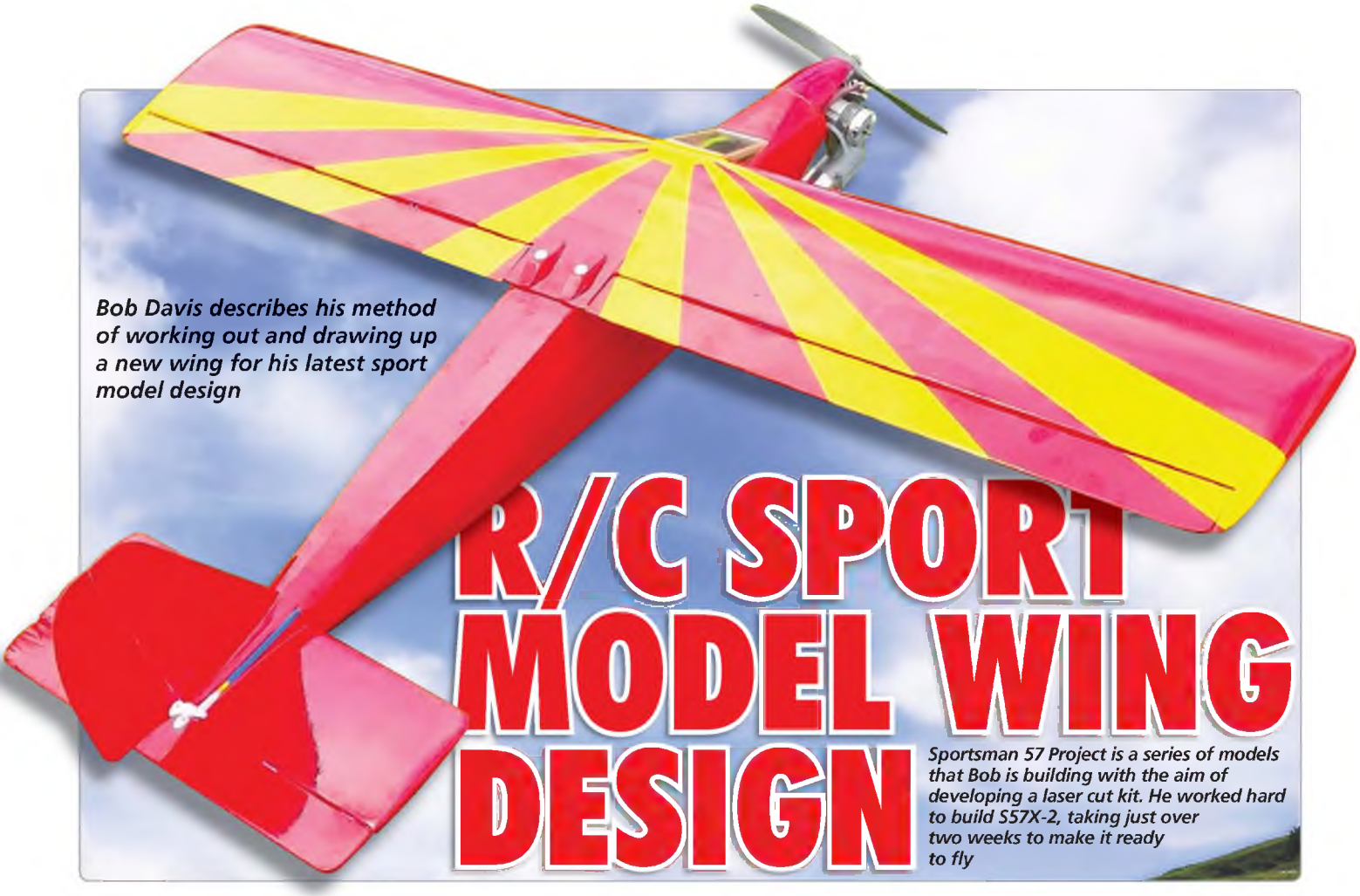


Bob Davis describes his method of working out and drawing up a new wing for his latest sport model design

R/C SPORT MODEL WING DESIGN

Sportsman 57 Project is a series of models that Bob is building with the aim of developing a laser cut kit. He worked hard to build S57X-2, taking just over two weeks to make it ready to fly

Wing Cross Section

If this is an article on wing design we had better start with a cross section – an aerofoil. You don't need to discover the co-ordinates of Eiffel this or NACA that. If any of these were based on one true law of physics they would look a lot more like each other than they do. They are shapes generated by mathematics that, prior to the binary computer file, enabled them to be defined. Then, having defined a profile that looked like it might be worth the wind tunnel time, a full set of lift drag data was produced. Full size designers need this data to predict the performance before they commit considerable amounts of time and money, not to say test pilots lives, to a project. For us the rules are simpler:

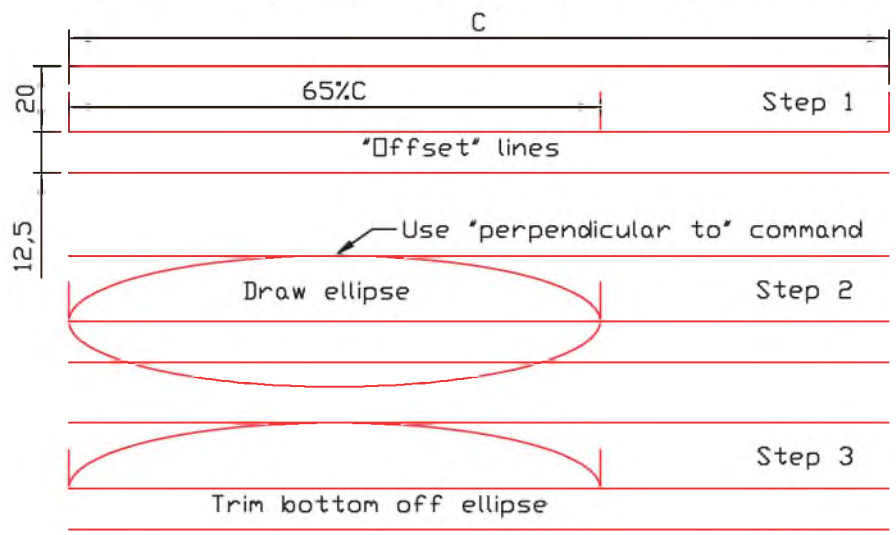
1. Progressive reduction of curvature from front to back on top and bottom surfaces.
2. Further round the top surface than the bottom.
3. For entirely practical reasons that we will come to later don't let the curvature of either top or bottom surface extend beyond 6" from the front. Straight taper to the trailing edge after that.
4. Keep both upper and lower surfaces SMOOTH – no sudden changes of profile.
5. Make sure you can replicate the aerofoil cross section as a real model wing.

So what chord do we want? Well, personally, I wouldn't go above an aspect ratio of 6 or below 5. So aim for a 10" (250 mm) chord, and an aspect ratio of 5.5 means a 55" (1375 mm) span and the model will be nicely visible in the air and fly well on a 30 to 40-size engine. Make it any size you want though.

OK, we've got a chord. Draw a horizontal line that long on a piece of paper. Now we have to decide on section thickness. Well if it's anywhere near 10% of chord you're going to have to start throwing weight at it to make it strong enough for the highest G loading you will, probably unintentionally, apply to it. If it's more than 15% then you will have a lot of curvature in not much chord and it might be a bit speed restricted. And the upwind and downwind speeds will be very different. 13% is good.

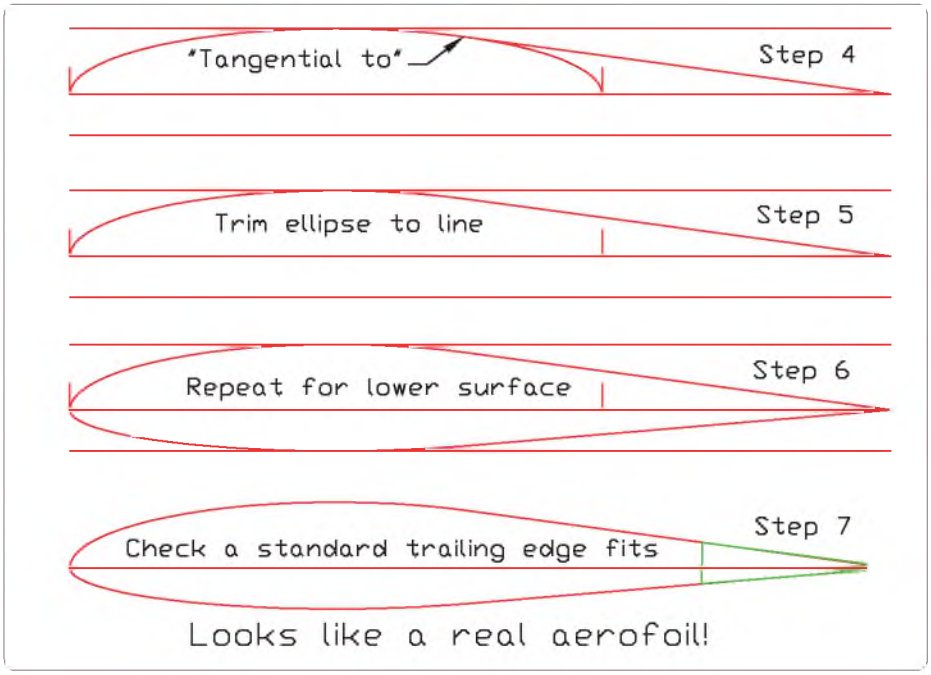
For my 250 mm example – and we are going to find it convenient to work in a combination of mm and inches – the section depth is 32.5 mm. Now we have to share it out above and below the chord line we've just drawn. Well, you can make a flat-bottomed aerofoil if you want but it will 'balloon' terribly into wind. I'm going for a 20 mm above the line, 12.5 mm below – a semi-symmetrical section. Draw parallel lines 20 mm above and 12.5 mm below your line. We've got to fit our aerofoil between those lines. For those that speak AutoCAD, Figure 1 shows a really neat way of creating an aerofoil between our lines. (There's a generic AutoCAD-like package called DrafSight free on the Internet but, of course, you've got to learn to use it.) For those that don't speak AutoCAD, buy a set of French curves off eBay and you'll come

Figure 1: SportFoil 1 drawn using AutoCad



up with something just as good.

In AutoCAD-speak then, referring to Figure 1, draw a vertical line from the front of the chord line, any length. Offset that line 65% of the chord (162 mm in my case) towards the trailing edge. Draw an ellipse with the major axis spanning the 65% and the minor axis just touching the upper line, using the AutoCAD command 'perpendicular to'. Trim the bottom half off the ellipse. Now offset the leading edge line 250 mm to generate the trailing edge line. AutoCAD will allow you to draw a (straight) line from the trailing edge 'tangential to' the ellipse. Trim off the unwanted part of the ellipse. That's the top of the aerofoil drawn. Repeat for the lower half. That's my wing section. I'm going to call it SportFoil 1. You can experiment with percentages either side of 65% – it's certainly not a hard and fast rule.



Before we rush on and build a structure within our profile we had better check there's a standard trailing edge section that will 'fit'. 2" x 1/2" fits mine nearly perfectly – what luck! This will be the aileron, of course. A quick check shows curvature ends well below the 6" limit (from the leading edge – see Rule 3). The eagle-eyed will notice that because the trailing edge section doesn't taper off to a sharp edge I've lost 7.6 mm off my chord. I could draw it all over again, starting with a 257.6 mm nominal chord, so as to end up with 250 mm actual. Or I could make do with 242.4 mm. 242.4 mm will be fine.

At this point I must emphasise that there's nothing magically good or bad about SportFoil 1. Please do your own SportFoil, build a model with it and send SportFoils 2, 3, etc. into RCMW with a note of the undoubtedly brilliant flying characteristic it produced. I'm going to build a wing, and indeed a whole model, with mine.

Anyone For Calculations?

It would be nice to do some terribly meaningful aerodynamic calculations at this point and it's not that hard to roll out the formulae. But there's always some factor or value you don't know and it just ends up as formulae for formulae's sake. Maybe we'll have a go at stalling speed though.

I make no excuse for presenting this in a mixture of units: Vstall = 19.8 x √ (W/ Clmax x A). Where A is the main wing area in ft, W is the model weight in lb, Clmax is the maximum lift coefficient for the wing section and Vstall is the stalling speed in mph.

Obviously Clmax is the big unknown. However, Ron Warring's excellent booklet 'Aerofoil Sections' (published 1946!) tells me that a really 'lifty' section like Clark Y has a (model scale) Clmax of 1.24, and for a fully symmetrical section the value is about 0.85. So I think a Clmax of 1.0 would be fair guess for my semi-symmetrical SportFoil1. I'm pretty sure, because I've built a few like it, that my model will weigh 2.3 kg (5.1 lb). I know the wing area is 3.4 ft. So putting all that into the formula above gives a stalling speed of 24 mph, which is going to be close to the landing speed and I can live with that. This seems almost worth working out – until you realise what a deadening effect the square root term has.

Let's say we really crank up the wing area by making it a biplane. So wing area = 6.8 ft. But, oh dear, Dave Boddington's book says we can only count 75% of a biplane wing area. Doh! Snakes and ladders - back to 5.1 ft. Never mind, we'll use a Clark Y section, so Clmax = 1.24. Of course the biplane wing will put the weight up to 3.1 kg (6.8 lb). Put all that back into the formula and we have a Vstall of 20.5mph. Sounds good, but you would have to be too, to fly Clark Y at the very exact angle of attack required to hold Clmax.

Taken at the Winterton Fly-In, this picture shows the Sportsman 57FS on the left (Enya 46-4C), the 57S trainer in the centre (Enya SS30) and the 57X on the right (Enya SS50)

All-Important Rule 3

Anyway, now we get to the justification for Rule 3 and, as a consequence, comply with Rules 4 and 5. The point where some of my fellow designers might get a bit ruffled. I call it the aerodynamics of the blindingly obvious.

Suppose we were to construct our wing in the fairly conventional manner of top and bottom spars at the point of maximum depth. Then sheet the upper and lower surfaces to the spar line but no further. The sheeting does a pretty good job of maintaining the profile where it exists. But, beyond the spar line, there is only the rib profile and the covering fabric or film the ribs support – and there is still plenty of curvature. So we cover the wing with whatever and we shrink it – by some means. It doesn't just shrink along the span, it also shrinks across the chord and halfway between ribs, so the cross-section looks more like the corrupted aerofoil shown in Figure 2 than the intended profile of the rib. Now, had I suggested we try to create that corrupted profile the reader would quite rightly have dismissed me as an idiot – even if the Editor had let it get that far. Are we going to tolerate it? I'm not. Now that I can get 6" wide 1/16" sheet from Orbit, I'm going to sheet to the end of the curvature.

To my mind this is where the serious designer faces up to reality and deals with it – or isn't a serious designer and doesn't. If you can see the rib capping strips bulging the covering on the top of the wing when you look along the span then the only place you have the aerofoil section you want is at the capping strips and everywhere else is corrupted. Yes, of course, it will fly; lots do, but not as well as if the aerofoil was accurately replicated along the whole span. Just where the wing should be generating lift most efficiently the flow stability will be a shambles. I'm absolutely certain that smooth, uncorrupted aerofoils do fly better.

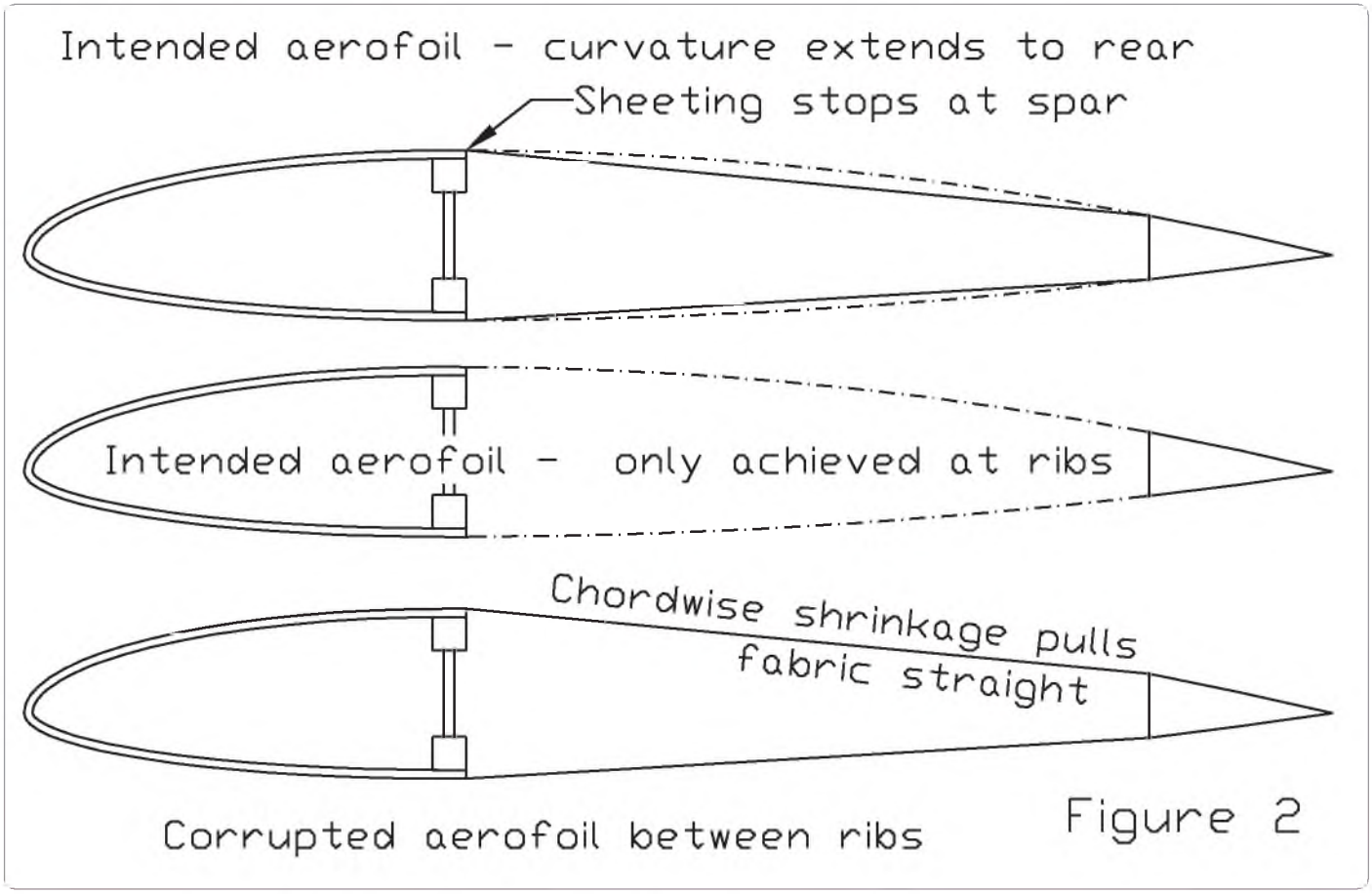


Figure 2

Rib Spacing

Full size fabric covered wings generally keep their spars clear of the surface – easy at full size, but not at model scale. They also have much closer rib spacing. The Antonov An-2 (the second most produced aeroplane in history, I believe) appears to have main ribs spaced at about 10% chord. That would translate to every 25 mm on my wing. There has to be an easier way because making ribs is a tedious business. The traditional sport design might have ribs spaced at 30% chord, and if you sheet to the end of the curvature and use a covering film that doesn't shrink that strongly that might be OK. But I usually cover with my beloved nylon and that gives a very powerful shrink. With ribs spaced at 30% chord it would start to flatten the sheeted curvature between the ribs, so I'm going for 25% chord – call it 60 mm. In fact on this model I'm going to try Sig Koverall, but I still expect a pretty powerful shrink. So I'm going to stick with 60 mm rib spacing.

We can put some structure in our cross-section now. Inset 1.5 mm (1/16") for the skinning and rib capping strips, then insert 1/4" x 1/4" top and bottom spars at the point of maximum depth (the spars are beneath the sheeting – they do not interrupt it). Sheet to the limit of curvature or slightly beyond. Add a 3/8" square leading edge fitted in so that it can be sanded to the nose profile we want and finish with a fairly conventional termination in front of the 2" x 1/2" aileron. My structure is shown in Figure 3.

OK, this is where I have to admit to one downside with my sheet-to-the-end-of-curvature approach: I have to put thin secondary webs in where the sheeting ends, otherwise the sheet edges would go all wobbly.

Do we want shear webs between spars? You bet we do. Read Part 2 next time to find out why they're so important. **RCMW**

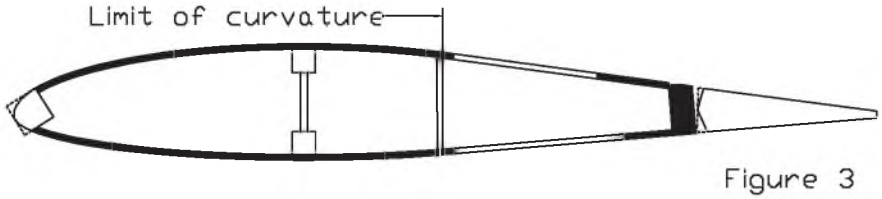


Figure 3

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Grahame Wren guides us through the build of his detailed replica of S.E.5a E5808

GREAT WAR SCOUT

The S.E.5a is a very popular subject for scale modellers and rightly so. It has ideal proportions for a model, there are many plans and kits available, masses of reference photos on the Internet and, of course, for the inevitable 'missing link' there's the Shuttleworth Collection. I couldn't find a plan that was both true scale and suitable for a Laser 70 so I bought a larger plan and had it reduced to 18% (1:5.6) giving a wingspan of 54". Small by today's standards I know, but easily transportable. My reason for choosing this odd scale is that it is the smallest that would enable the engine to be fully enclosed and also allow the use of commercially available wheels.

Before building starts it's a good idea to consider the amount of scale detailing intended, as it can sometimes necessitate changes to the basic construction of the airframe. I was building from scratch so I could let my imagination run riot! The cable and pulley aileron control system is very noticeable and after some experimentation I decided it could also be made functional, even at this size. The same could be said for the tailplane incidence adjuster and, of course, the fuselage framework and internal bracing wires are clearly visible through the open cockpit. These three things alone meant that the construction shown on the plan would need considerable modification. I decided it would be easier to start with a 'blank canvas' so I traced the outline and redesigned all the internal structure, even where it wasn't strictly necessary!

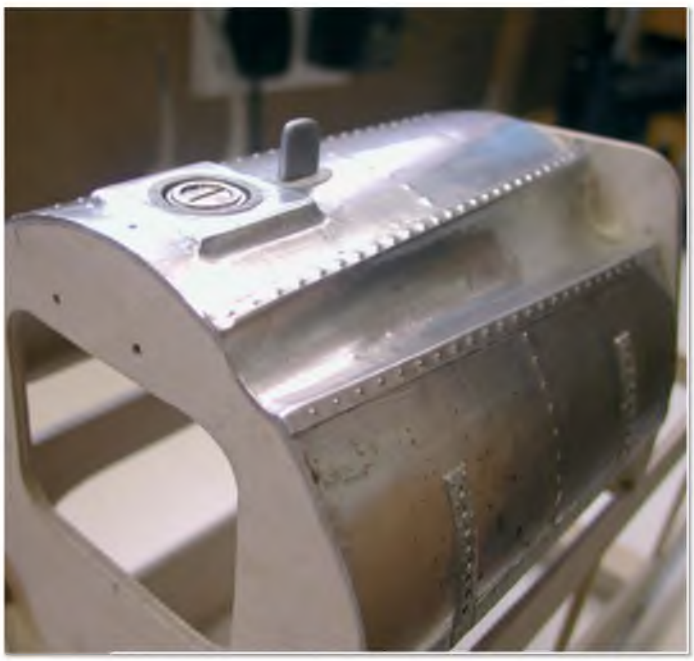
Fuselage Details

I started the construction with the undercarriage. It's easier to adjust the fuselage to fit the metalwork than vice versa! Producing the piano wire frame and the wood cladding was quite straightforward but as I really dislike working with fibreglass/resin I moulded the bungee covers from strips of paper and watered down PVA glue. I had to leave each individual part, four in all, overnight to dry out sufficiently to be removed from the mould so it wasn't a quick job. But the end result is both strong and light – and it didn't make the workshop uninhabitable with fumes.

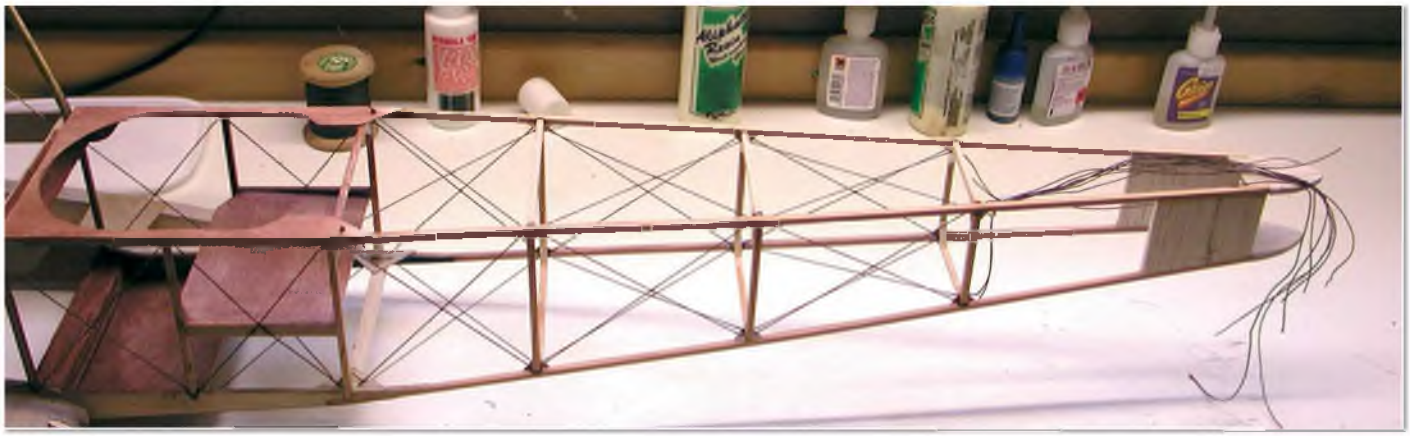
The tank cover is litho plate over 1/32" ply. Paper templates are made for each individual panel before cutting them from litho plate. The rivets are embossed using a dressmaker's tracing wheel, with alternate teeth removed to widen the spacing. Holes, such as those in the tank straps, are punched out; drilling only works for the smallest of holes.

Bungee covers are moulded from strips of paper and watered down PVA glue

Top & above: Front and rear views of the finished scale model



Tank cover during construction, and the finished article in place underneath the top wing



The rear fuselage really stiffened up when the internal bracing was added

Initially the rear fuselage, constructed from 1/8" square spruce, was quite flexible, not to say fragile! But it really stiffened up when the internal bracing was added; I used button thread and gave it a coat of shrinking dope. I left the rear bays until after the internal work had been completed because the bracing makes access very awkward. But the added strength made it a lot easier to work on the fuselage.

The S.E.5a has a complex cockpit for a WW1 aircraft; the modelling of it could easily take up a complete article. It can seem a bit daunting but taking it one 'instrument' at a time and interspersing other modelling jobs in-between is the way to go about it. The instrument dials are photos of the real thing, manipulated in Photoshop to remove the effects of parallax and perspective. The images, with a resolution of typically 1000 pixels per inch, are then reduced to the required size and printed on glossy photo paper. These are then sandwiched between discs of thin ply and acetate. The other fixtures and fittings use scraps of wood, wire, plastic and various bits and bobs from my 'that looks useful' box.

Instrument dials are photos of the real thing, printed on glossy photo paper then sandwiched between discs of thin ply and acetate

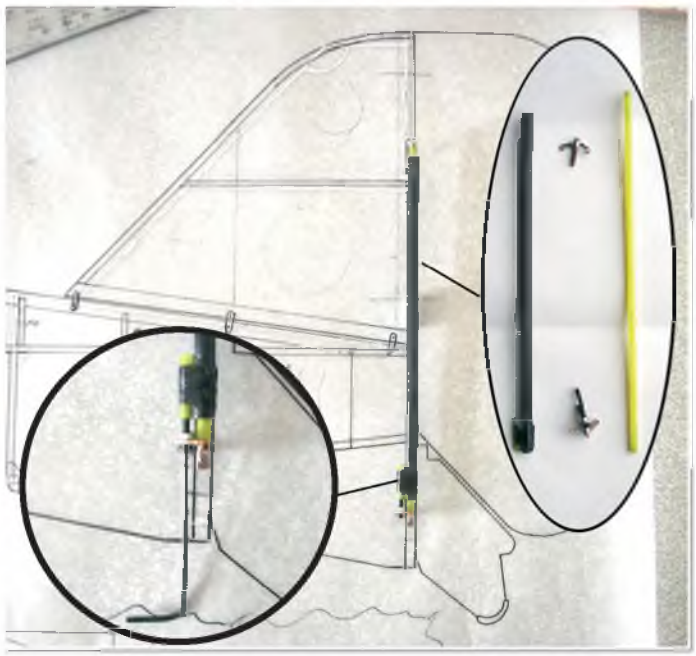
In the past I've tried various methods to produce things such as the brass identification plate but I've never been happy with the results; they never looked real. At last I've devised a method to produce quite realistic printed or engraved 'metal'. When the image is ready I erase all of the background leaving just the lettering and any screws or fixings, then flip the image horizontally.

Make the brass identification plate by flipping the image horizontally...

Print it out onto overhead projector transparency paper and leave to thoroughly dry before painting on the printed side with the appropriate metallic paint; I used Humbrol for brass and silver Solarlac for aluminium. The finished identification plate is only 8 mm wide yet the writing is quite clear. I also used this method for the pump selector plate and the compass faceplate. When set back inside the top decking the effect is quite realistic.

...Then print it out onto overhead projector transparency paper before painting on the printed side with metallic paint. The final effect is quite realistic

The fin incorporates the mechanism for adjusting the tailplane incidence. I think that if details such as this are going to be added they may as well work if possible. To do this a snake inner, with attachment points top and bottom, is adjusted by screwing the cap head bolt in or out via a hole in the tailskid. The snake outer has been replaced by a carbon fibre tube for added strength,



The fin incorporates a mechanism for adjusting tailplane incidence

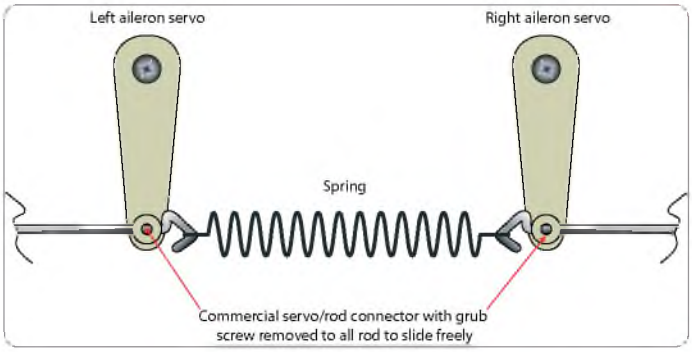
The tailplane spars are extended with piano wire pins that pivot in hardwood blocks in the fuselage. The bracing wires from the adjuster attach to the trailing edge and alter the incidence as the adjusting bolt is screwed in or out. The front bracing wires are attached to the spar so are not affected by any change in incidence.

Bracing wires from the adjuster attach to the trailing edge and alter the incidence as the adjusting bolt is screwed in or out

Closed Loop Controls

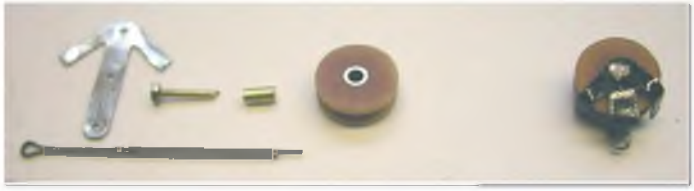
The 'closed loop' aileron control involved some experimentation, the problem being the need to ensure sufficient tension in the cable at all times to prevent it jumping out of the grooves in the pulleys. I also needed to be sure that there was no over tensioning of the cable putting strain on the servo etc. Even the slightest variation in the geometry of the control horns, aileron hinges or the pulleys would cause the tension in the cable to alter as the ailerons move from one extreme to the other and I didn't fool myself that I could make a perfect job of it!

My solution was to use two servos and incorporate a spring into the loop between the servo arms. As one servo pulls the cable the other end is free to slide thorough the coupling on the other servo, with the spring keeping a constant tension in the cable loop. The arrangement has been altered slightly to fit into the model but the principle remains the same. By using the aileron differential mix on the transmitter I ensured that there is always some 'slack' for the spring to take up. This means that each servo has to operate all four ailerons; one servo pulls when banking right and the other when banking left. To be on the safe side I bought a couple of high torque Futaba servos.



Using two servos and incorporating a spring into the loop between the servo arms maintains tension on the closed loops operating the ailerons

I searched the Internet for 8 mm pulleys but without luck. So in the end I turned them from paxolin sheet; the pulley is bushed with brass tube and the shackle is tinplate.



Pulleys are turned from paxolin sheet and bushed with brass tube. The shackle is from tinplate

The elevators also use a cable and pulley system but there just wasn't enough space to make it functional. So I resorted to a 'standard' set up. The operational control horns are pretty unobtrusive, whereas the non-functional cable and pulley system is very noticeable and it 'works' as the elevators move.

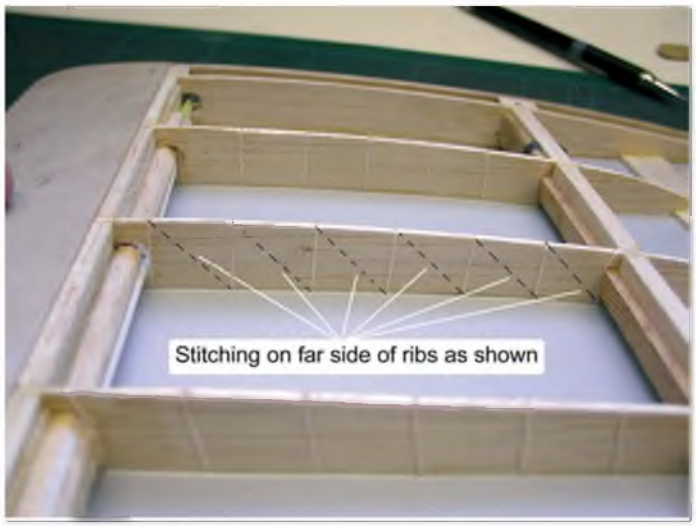
The elevators also use a cable and pulley system

The cables run in a plastic tube in both halves of the tailplane and through the fuselage. They connect the top control horn one side to the bottom control horn on the other side. Each of the cables has a spring to maintain tension, one in each of the plastic tubes.

The cables run in a plastic tube in both halves of the tailplane

Covering Up

The S.E.5a has an under-cambered wing section. I didn't want to risk the Solartex covering coming unstuck so rib stitching was required. I had never done this before so I made a small section of wing to experiment on. After trying various methods I got what I consider to be the best results from a simple 'loop' around the ribs. True rib stitching, with each loop knotted, just didn't look as good, most probably down to my lack of expertise! The photo shows the centre section stitching and this also illustrates the need to plan ahead; the bottom is fabric covered but the top is wood, back to the rear spar, so the bottom covering and rib stitching has to be done first. Incidentally, that is why the cotton is recessed into the ribs.



This photo shows the centre section stitching. The bottom covering and rib stitching has to be done first and is why the cotton is recessed into the ribs

The whole process consists of a thin strip of Solartex applied over the covering, along the rib line. Then, using a paper template, mark the spacing along the ribs and stitch around the ribs through the top and bottom covering. I soon discovered that an essential item, to enable you to miss spars etc., is a curved needle. Once I had one it proved to be a fairly easy, if not quick, job to complete. Finally a frayed rib tape covers the lot.

A frayed rib tape covers the stitching

Fuselage lacing is added after the fuselage has been covered in the usual manner. Two 'flaps' of Solartex are ironed in position on the fuselage side, then the positions for the stitches are marked. The 'flaps' are opened out to make access easier and about 6" is loosely stitched, only through the flaps (not the fuselage covering). About 4 inches of the stitches are then tightened and the process repeated until the lacing is complete.

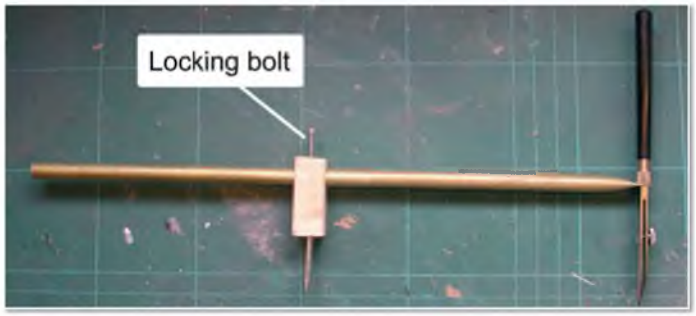
Fuselage lacing is added after the fuselage has been covered

I painted the model using WarbirdColors paint, available from fighteraces.co.uk; these are water based and fuel proof. I would certainly recommend them. One thing to remember when painting models of early aircraft is that they were hand painted, so a few brush marks won't go amiss. And lettering and insignia shouldn't be perfect, so transfers are definitely out. For lettering I use cardboard templates, which I tape to the model. I then draw the outline with an appropriately coloured marker pen, remove the template and infill with paint. In the past, when using enamel paint, I've used permanent marker pens. But for this paint I found non-permanent, i.e. water based marker pens much better.

For the lettering cardboard templates are taped to the model and the outline is drawn with an appropriately coloured marker pen

The end result is a fair representation of hand painted lettering – neat enough but not perfect!

Marking out roundels, even at this size, isn't really a job for your school geometry set. What's needed is a trammel; these can be quite expensive to buy but are cheap and easy to make. A brass tube, flattened and drilled at one end, holds a paint pen, available from art and craft suppliers. A hardwood block, which has a hole for the tube to slide through, a locking screw and a pointed length of piano wire, forms the radius adjuster.



A home made trammel was used to mark out the roundels

A small piece of Lite-Ply taped to the wing at the centre position protects the covering and makes a positive location for the trammel

Inspecting The Lewis

Both the guns, the Lewis in particular, are very prominent so they have to be modelled with a fair degree of accuracy. Whilst searching for reference material I began to wonder if it had been a mistake to go for a 'non-standard' scale of 18% as there are some excellent 1/5th scale gun kits available commercially.

However a visit to the Arizona Models website made my day. They provide the instructions for their gun kits for download in PDF format. These include a wealth of information and also a sheet showing the kit parts. Follow the links to: Aircraft Hardware > Guns & Ammo > Armament Sets. These gave me the wherewithal to make a start on my own guns and I'm very satisfied with the end results.

Guns were made by scaling up details found on the Internet


The end results are pleasingly realistic

With any scale model there is the problem of 'service' points. We don't want an ugly hole in the cowl for the glow plug driver and then there's the switch for the radio gear etc. Detailing and a bit of ingenuity can often help. There is almost bound to be an access hatch somewhere near the engine, so if this is made to open a remote glow connector leading to a jack plug can easily be concealed.

For the switch I used the pump for the Constantinesco synchronisation mechanism, which is visible just below the propeller hub. Connect the cog to the radio switch via a 'snake' and you have a remote switch; pull the cog and the radio is on, push for off. No chance of an accidental switch off as you carry the model from the pits. If you've still got all your fingers the radio is live!

The cog on the synchro pump mechanism just below the propeller hub acts as a disguised radio switch

At the very beginning of this article I said that detailing should not be an afterthought. But sometimes it is! Although I've lived near Durham for more than thirty years I'm still a 'southern softee' at heart and rarely venture out to the field before April, except perhaps with an electric sports model. But by mid December the S.E.5a was virtually finished, so what to do for the next three or four months?..

Bottom left & above: ***Details of the releasable bomb rack***

Make A Bomb Rack

I've no idea if S.E.5a E5808 was ever fitted with a Cooper bomb rack, but some were. I don't go in for competitions so documentation isn't a problem for me and I quite like the idea. I experimented with several ways to release the bombs in sequence, but most weren't practical. I eventually used a spring loaded release arm with different length pins for each bomb. The 'stepping' of the arm is controlled by a release trigger and indexing pins via a micro servo on the retract channel – wheels up, drop first bomb; wheels down, second bomb and so on.

The bombs themselves were turned from obechi wood, which is quite light but should be hard enough to withstand being dropped from a height. To be on the safe side I used rubber for the nose cones and the arming vanes are removable. I attached the finished bomb rack to a shelf and did a lot of testing to be sure that the bombs wouldn't release themselves unexpectedly.

When testing a new model I like to wait for 'perfect' conditions. I have no deadline to meet and I can't see any point in adding to the stress by battling against the elements. Bad weather meant that I only managed a few 'proving' flights. These have all been at a safe altitude so I have yet to drop bombs in anger. But at least I know she flies.

You can read a build thread on Grahame's SE5a at www.scale-models.co.uk

Acknowledgments

Finally I'd like to thank the Shuttleworth Collection for letting me get 'up close and personal' with their S.E.5a and my friends at www.scale-models.co.uk for their support during the build. You can read a build thread on my model at:

http://www.scale-models.co.uk/threads/S.E.a-construction-beginning-to.2417/

I hope this article has encouraged you to add that little extra detailing to your next model. Of necessity the descriptions in this article are brief, but if you'd like more details you can contact me via the Scale-Models website or at:

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BLUE MAX REPAIRS

Chris Bowler gives a veteran model some TLC after a too close encounter with the ground

It's emotional when you prang a model isn't it? It depends on circumstances to a large extent because you may be the only witness! But with this one it was full-on model meeting embarrassment! The best bit was the take-off – after that all modes of mayhem set in. No matter what I did the model was intent on doing its own thing!

Some control was regained and it was pointed away from anything that might be damaged, the throttle chopped and a fairly heavy impact on a wingtip resulted in the fuselage being cart-wheeled into the ground. It looked drastic with the wing off, the back broken and a fuselage sans empennage!

Inquest

The modelling sages gathered around and declared that there was nowt much to do to get it back in the air. I had my doubts, as often the first signs can look OK but investigation usually proves there is more damage than at first meets the eye. So it was packed away in the car and an enjoyable day watching others ensued, giving me time to take pictures and a report for RCMW (see Charlton Park, September 2014 issue) where I stated it was 'a sad end to a model'.

The model was not consigned to the bin though for sentimental reasons – yes, honestly!

It was propped against the workshop wall and every time I went in there it seemed to be silently castigating me for neglect. And it might have stayed that way but for the fact that a certain modelling friend was like a terrier with a trouser leg! Every time I saw him the question was asked: *'Have you mended Stan's model yet?'*

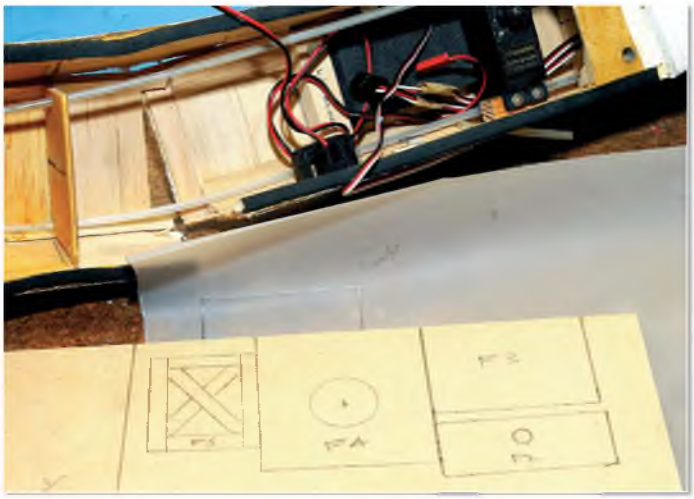
I think that is called guilt tripping, which the Oxford dictionary defines as, among other things: "guilt trip – make (someone) feel guilty, especially to induce them to do something."

Fast Forward

Actually not so fast! Post Christmas and New Year the weather was awful and I seemed to have time on my hands. So the Blue Max was dusted off and closely inspected.

Now this model has a history. It was originally a kit that was owned by Steve Holland, before it was passed on to Stan Harris, a member of my club and staunch supporter of vintage type models. Stan was a regular judge at club scale events and he built the Blue Max in the 1980s. He became a good friend and I occasionally flew the Blue Max with him at Chedworth. Stan

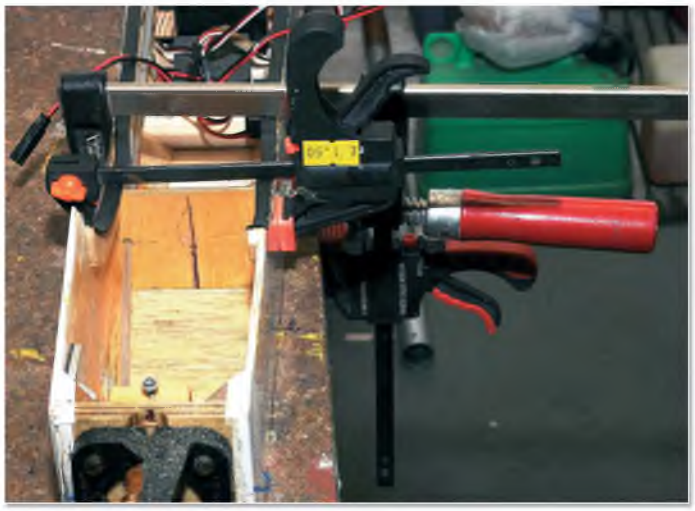
Damaged fuselage and tail areas



My first intention was to replace the bulkheads. They were traced onto ply but later were found not to be needed

Original instructions and plan. Maybe worth a scale up later? Don't hold your breath!

Carefully shaping the new 'doubler' on the fuselage



Fuselage sides clamped together to original bulkhead

Shaped plywood 'floor doubler' about to be placed onto the damaged fuselage. It was fixed with white glue and clamped firmly in place

New wing retaining plate, glued and clamped in place, with the wing in situ to ensure correct alignment

had passed the four score years mark by a few years and still managed to fly fairly regularly. But on his passing his modelling wares were offered to other members. I purchased the Blue Max and its 'pit trolley' and had enjoyed flying it for four years. Hence the sentimental reason bit – Stan was a lovely fella and I felt compelled to restore his 'plane.

To Work

The engine, battery and radio were removed, leaving the servos in place and the damage inspected. It was not fatal, so I decided to repair it, retaining as much of the original as I could. This was after I had traced the formers and sides from the plan that was discovered inside a tube of tracing paper included in the Blue Max bits that I purchased! The undercarriage was knocked off and survived (don't they always?), as was the wing, which was largely intact. The steerable nose-wheel was removed, along with the linkages, and the fuselage was very carefully eased back straight. It worked, with the break lining up perfectly. The firewall to fuselage joint had simply burst apart and before proceeding with the other problems, I made sure this repair was done first and was sound. Part of the top left front side was gone, but this was easily replaced with a balsa fillet.

With a wooden block atop the fuselage to spread the load it was clamped to the bench, the break opened up and fast setting epoxy worked into the break on the bottom and side. It was then eased back into place to glue, clamping it at the front as well.

The resulting joint was strong, but I didn't have that much faith in it, so I added some strengthening. A Lite-Ply former was made as a doubler to fit the fuselage floor, and a similar one for the side crack. The floor pan was given a liberal coating of white glue and the new former was clamped in place, as was the side former. The result was a strong repair.

The engine, an Irvine 40 that was undamaged despite its slight subterranean adventure, was cleaned up and refitted. The original fuel tank was put back in and packed with parcel foam that most items ordered by post seem to arrive in these days. The original front hatch was simply cyano glued back together, with a reinforcing balsa strip added over the joint to firm it up.

Radio Installation

Stan had used a 35 MHz Futaba radio and I opted to keep it on that frequency band. But I replaced the Rx. I used a Futaba R1600 dual conversion set that had seen very little use and everything worked well once connected. Except it was all reversed. Hmmm! Wonder if that was the cause. But all pre-flight checks had been done and supervised.

All this was done before the undercarriage was replaced, purely for ease of handling.

That brings us on to bolts that have snapped off on impact. Undoubtedly these saved the airframe as they are the 'weak stress points', but flush broken bolt stubs remained in the holes.

Now sometimes these can be difficult to remove, especially in older builds like this where the threads are in the wooden retaining blocks. A set of bits that I have always known as Easy Outs makes this task easier (pun intended!).

They are a series of metal tap-like tools with a left-handed screw thread. A pilot hole is carefully drilled into the remnant then, using a tap handle the tool is screwed in. As it tightens into the hole the broken stud is simply unscrewed. Works a treat. My set was my father's and it has been used on many things from Francis Barnet two strokes and Triumph Speed Twin engines, and latterly model aircraft!

I've included a photograph of the set of BA taps and dies that supplied the handles. This is also useful as you can make your own screwed items and I would suggest it as essential in the toolkit. Metric versions are available!

The process was repeated for the wing bolts, replacements being sourced from the ubiquitous bits box and checked for fit.

Final Steps

The tailplane was replaced next. This hadn't suffered at all; it had simply broken off with the tail fin and skid on the underside. No hinges had been damaged and it was simply a case of relocating and fixing it back in place with epoxy. The undercarriage and nose-wheel steering were replaced. The fuselage looked set and ready to go once again. Repairs to the covering were achieved using a piece of similar covering on the hatch cover and some white on the fuselage side at the nose. The original colour scheme remained intact.

There were already a few dings on the wing leading edge as it was of very soft thin balsa sheet. The damage from the crash was cut out and a good edge formed. I intended cutting the sheet back to the butt joint at the leading edge, except there wasn't one! The LE consisted of slots in the wing ribs, with a basswood stringer glued into it. Thin balsa sheet was required in order to 'roll' it around the LE to form the section. Tracing paper was taped over the hole and a pencil outline made. This was transferred to the balsa sheet replacement, then cut out to form a very good fit. The hole was opened to reveal a wing rib and a slightly smaller false half rib was made to form a 'land' for the replacement sheet. Scrap balsa was cut into strips and cyanoed round the inside of the aperture to make a further land for the panel. I had a scrap piece of blue covering film and I used that to finish the job off. This was a contrast to the rest of the white leading edge – a 'battle scar' worn proudly. With the wing

Replacement receiver and battery. The throttle servo was replaced. The rudder and elevator servos are located in the rear of the fuselage and were undamaged

Removing a sheared bolt with the Easy Outs

A set of BA taps and dies is very useful

Damaged wood was removed from the wing and tracing paper was placed over the hole to obtain its shape. The replacement balsa panel was made from the tracing

On a low fly past. It is a very stable model

A perfect approach, ready for touchdown!

Above & Below: OK, the Blue Max II is not a beauty, but it is a very practical model

fixed in place the model was balanced and the front hatch replaced.

The whole thing took just a couple of days to have it in a flyable condition.

I waited for the weather to improve before taking it out for post repair flight trials. And I thwarted my persistent questioner with: *"Yes, I have repaired Stan's model!"* Because, as yet, no one knew that I had finally got round to it!

Like The Phoenix

At last the weather eased and I managed to get to the airfield for the post repair flight test. In view of the probable crash cause, I performed a rigorous range check with the aerial down (remember those days?) before doing the same with the engine running. That reliable Irvine fired up first time, by the way. Most gratifying.

All was well, so no putting it off!

The Blue Max handles very well on the ground, and with positive nose-wheel steering it was pointed into wind and the throttle eased forward. Gathering speed the model was rotated and up it went, needing just a tad of right aileron and a little up trim. Several careful circuits were followed by some simple loops and rolls and the airframe plus spare parts held together well! Landing is a non event with this model; simply fly a descending circuit and with a little power slow right down with the nose slightly up before touch down and it settles easily on to the runway. Job done. Relief was palpable! Honour restored and all that!

Several flights followed on that and the following day.

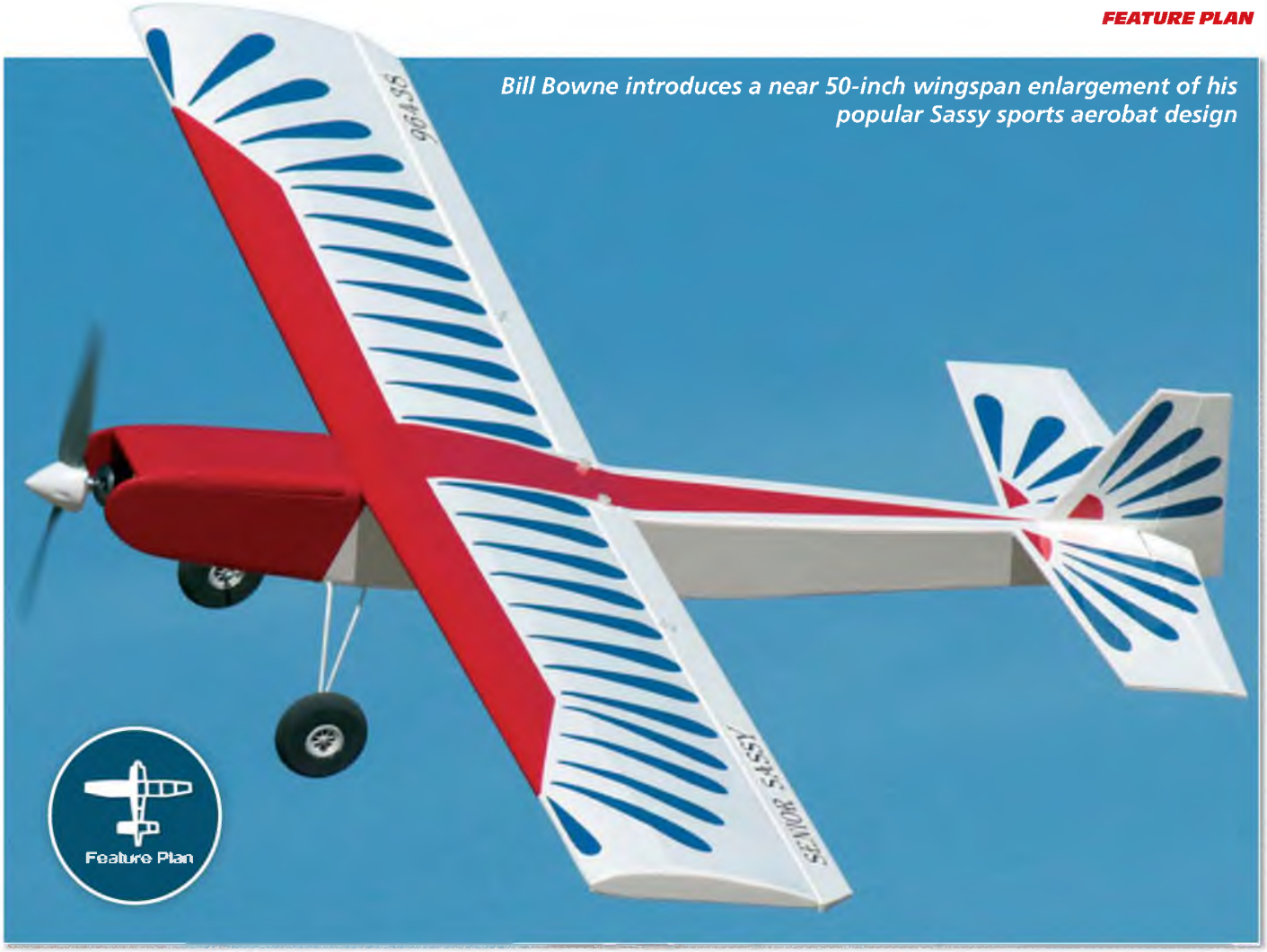
Photographs were required so Ashley Anderson was roped in to fly the model. A successful session followed and, without giving too much away, we discovered the model was actually a couple of years older than the pilot! He confessed to enjoying its performance, so I quote: *"A lovely little model, goes where you put it, vertical performance and knife edges are fine – what's not to like?"*

As a postscript, I think the original crash was due to trim levers not being centred on take-off. Modern sets have digital trims and these ones are simply levers. I think I may have inadvertently put full aileron trim on when I bent to put the model on the runway. Lesson learned! ***RCMW***

Footnote

The Blue Max II kit dates back to 1985. It was designed by Jim Allen Jr. of 'Off The Ground Models'.

In the build instructions, Jim states: "The Blue Max was designed two years ago when I decided to replace my K&B .40-powered Little Stik with a plane that would be more precise on the controls, especially at slow speeds. This new plane also had to have enough drag to make it slow down quickly when the throttle was pulled back, enabling it to land quickly. It had to be lightweight with enough power to be able to go straight up indefinitely from take-off."



Bill Bowne introduces a near 50-inch wingspan enlargement of his popular Sassy sports aerobat design

SENIOR SASSY

As you might expect, the Senior Sassy is the Sassy's big sister. Since the little Sassy worked so well as an advanced trainer, sport model and all-round utility design, scaling it up made sense. Just as the little Sassy is a dependable, comfortable, yet acrobatic flyer, so is the Senior Sassy. Plus, the Senior Sassy is decidedly less vulnerable to the wind and is a bit easier for these old eyes to see!

Construction is pretty straightforward. After all it's a workhorse, not a thoroughbred! Senior Sassy's bones are all balsa, ply and Lite-Ply, plus a bit of bass or spruce. And her covering and trimming is Ultracote (Profilm in the UK, I believe), although her name and AMA number were done on computer labels.

If you look closely at the Senior Sassy build pictures you'll notice a series of cuts in the aft fuselage bulkheads. I can explain it... Honest! I was a bit thick-headed when I drew up the aft fuselage top view, forcing the fuselage to taper abruptly aft of the wing. After I'd glued in the bulkheads, I realised how sharply the fuselage sides bent aft of the wing.

Bill says, "Just as the little Sassy is a dependable, comfortable, yet acrobatic flyer, so is the Senior Sassy"

Uh-oh, I was building in a stress point! Rather than rip out the bulkheads I cut them into two separate sides and let the fuselage sides expand as much as they wanted to (like loosening your belt after a big meal!) I then added in some 3/16" sq balsa as side-to-side braces. I've since updated the plans to show the 'corrected' bulkheads, which results in a more pleasing and less structurally demanding curve aft of the wing.

Wing

I prefer to build on either a wing jig (I've been using a long-out-of production Ajusto-Jig since 1981) or a flat, hinged board so I can do both panels at once. Both methods take up a bit of room but it's easier to build the dihedral in than it is to sand panels and join them.

Start by making up the trailing edges (TE). Glue the sub-TE to the TE and notch it for each rib. Sand the bottom spars and trailing edges to match the dihedral angle, and then glue them and the bottom centre section sheeting aft of the spar in place over the plans. Add a length of 1/8" scrap under the TE at each wingtip to build in washout. Don't omit this as it helps in keeping Senior Sassy docile on slow approaches!

Add the ribs and riblets, shear webbing, centre section ply brace and leading edge (LE). Sand the shear webbing to match the rib openings (a bit of spar sized stock with sandpaper glued to it works well for this) and then glue down the top spars on both sides. While this dries run strings from the centre section to the servo bays, taping them to the centre rib and to the far ribs in the servo bays. Why the far ribs? So the tape can slip and you'll still have chance to capture the thread before it falls irretrievably within the wing, and avoiding having to cut open a freshly covered wing... Don't ask!

On one panel glue the top LE sheeting to the back of the LE and let the glue dry completely.

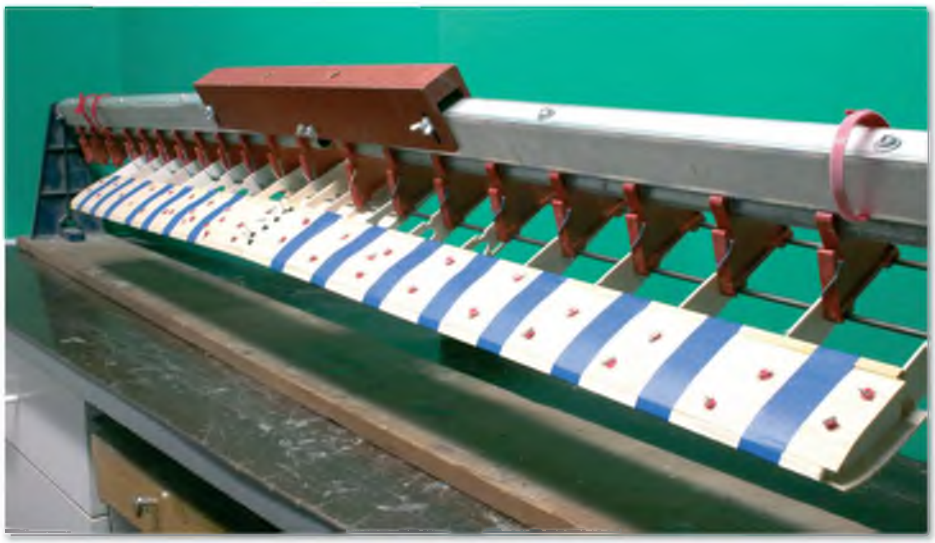
Dampen the top of the sheeting with warm tap water and it'll start curving away from the wet side. Apply slow-drying glue (aliphatic is great for this) to the rib tops and spar, and then gently bend the sheeting down and clamp it to the spar with spring clothes pegs or binder clamps.

DO NOT trim the sheet over the centre rib just yet. Instead repeat the process for the remaining wing panel. This time when you bend the sheet back over the rib fronts use a flexible straight edge to trim BOTH sheets to the same line at the same time.

Add the sheeting over the servo bays and the rest of the centre section sheeting. Cut a small hole in the centre section to allow access to the servo wire strings.

Remove the wing from the jig and sheet the bottom LE's. Add the 1/8" sq servo mount bases, servo mounts and covering anchors.

Glue the wingtips to the outermost ribs and fit the ailerons. Don't forget the 'anti-flutter' taper on the aileron tips. Then set the wing aside for a while.



Above & below: The original Senior Sassy was built on an old Ajusto-Jig. But it can be built on a conventional building board too

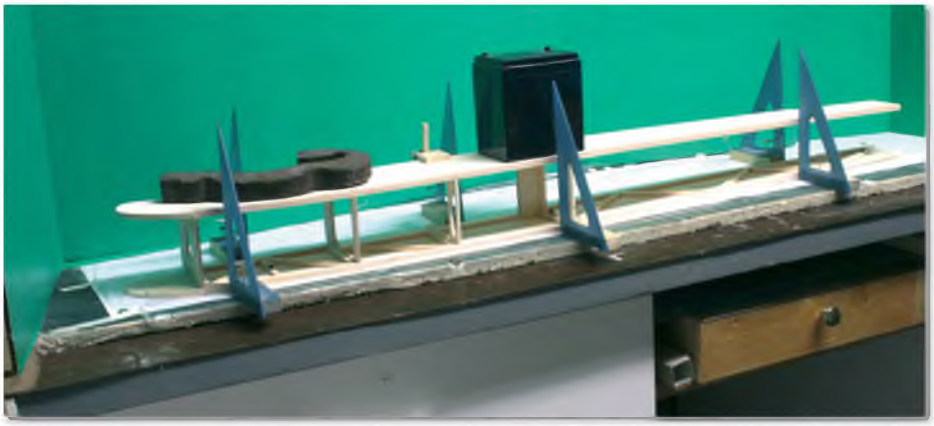
A good way to avoid building two of the same fuselage side is by building both sides at once, top to top or bottom to bottom. Red and black discs on the pins are pin clamps, which spread out the force of the pin and lessen any denting of the wood

Tail Surfaces

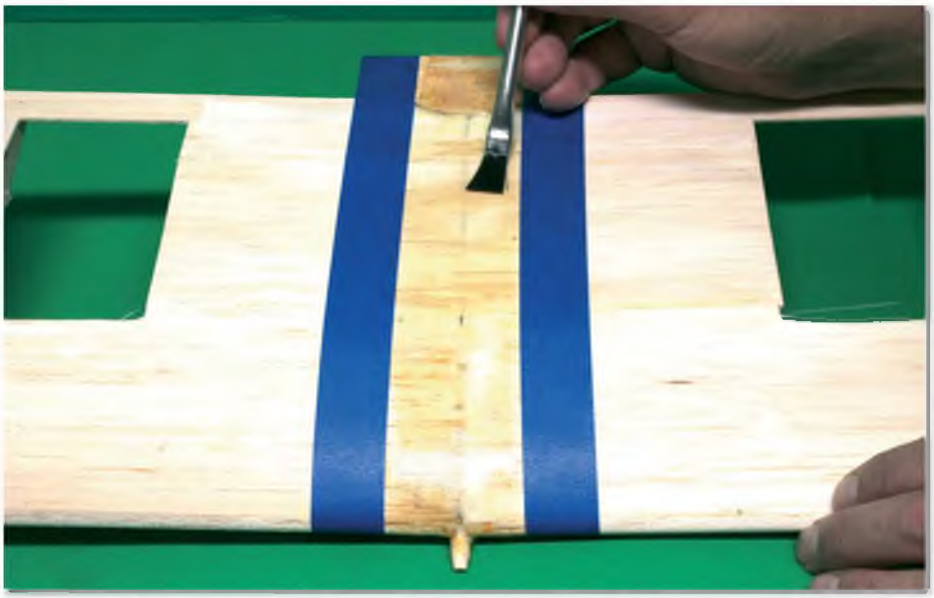
It's very simple here. Pin down the mainplane and fin trailing edges, and the rudder leading edge. Add V1, R1, and S1, then the remaining LE's and TE's, followed by the remaining perimeter parts. Remember to leave the fin LE a bit long to fit through S1. Now fill in the balsa 'ribs' and the gussets. A good sanding block with 120 to 220 grit paper makes trimming and fitting the 'ribs' quick and easy.

Block sand the tail fin and horizontal stab flat on the top and bottom, then round the leading edges of both. Don't round the tips or the trailing edges, but do sand bevels into the leading edges of the rudder and elevators and SLIGHTLY taper the trailing edges (i.e. down to no thinner than 1/8"). Fit the music wire joiner to the elevators but don't glue it in place yet.

Senior Sassy's fuselage is constant width from the wing TE forwards. So bulkheads 1 through 4 are all perpendicular to the fuselage sides. Blue triangles keep those bulkheads perpendicular as the glue dries



Picking up the odd scrap whilst out riding our bikes helps! The oddly-shaped bit of iron holding the second side in place as the glue dries was found along an abandoned railroad bed, whilst a long-dead battery amidships helps hold down the fuselage centre. Meanwhile the blue triangles are back, holding everything perpendicular as the glue dries



Use a strip of fibreglass tape (1.5" or so will do) to strengthen the wing centre section. Brush on a coat of slow-curing epoxy (not 5-minute, as it won't have time to soak in). Thin the epoxy per the instructions on the package, either by solvents or heat. Strips of masking tape flanking the fibreglass will keep the epoxy from running

Cut out the slot in S1 for the fin LE, but don't get finicky about fitting it for now.

Fuselage

Mark the bulkhead locations on the fuselage sides and pin the sides down, top to top (an easy way to avoid building two of the same side!). Add the wing saddles, 3/16" perimeter strips, nose doublers, and the bulkhead braces, followed by the rest of the bulkhead bracing. Installing the servo tray will be easier if you leave the 3/16" sq bracing for F4 a bit short on one side.

Epoxy the undercarriage/landing gear (UC/LG) plates together and epoxy the wing bolt plate into F4.

Glue bulkheads F1 through F4 to one side, bracing them to ensure they stay square with the fuselage side. When dry, glue the opposite fuselage side to the erect bulkheads. Add the assembled UC/LG plates and the bottom sheeting from the wing TE forward.

Sand the rudder post rear to a shallow 'V' shape and taper the aft fuselage ends around it. Clamp the fuselage trailing edges together around the rudder post and glue it in, and then glue in bulkheads F5 through F8.

Place the wing onto the fuselage, make it square and drill for the wing dowel. Remove the wing, finish the drilling and glue the wing dowel in place. Add the centre section TE filler and the ply bolt reinforcement, then wrap the wing centre section with fibreglass tape and soak it with slow-curing epoxy (NOT 5-minute!).

Top Tip

Rub a glue stick over the wing centre section, then press down the fibreglass tape. The glue stick will tack down the fibreglass and the epoxy will soak through both the glue and the fibreglass. A glue stick is much easier to control than a spray adhesive, plus it doesn't have a smell that'll annoy your wife!

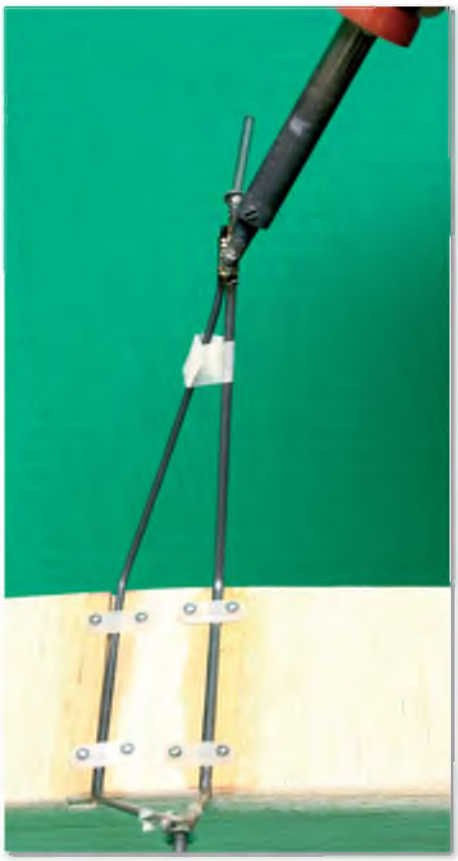
Return the wing to the fuselage, square it again and drill for the wing bolts. My preference is to drill and tap ONE bolt, leaving the bolt in place when drilling and tapping for the second. After tapping both, dribble a little thin CA into the threads and let it cure, then run the tap back through the bolt plate to clean up the threads. This hardens the threads and helps them last a lot longer.

Being that I live in the US, I used two 1/4 x 20 wing bolts. Where metric dominates I suggest using the closest (1/4" is about 6.35 mm, so something around 6 or 7 mm should work).

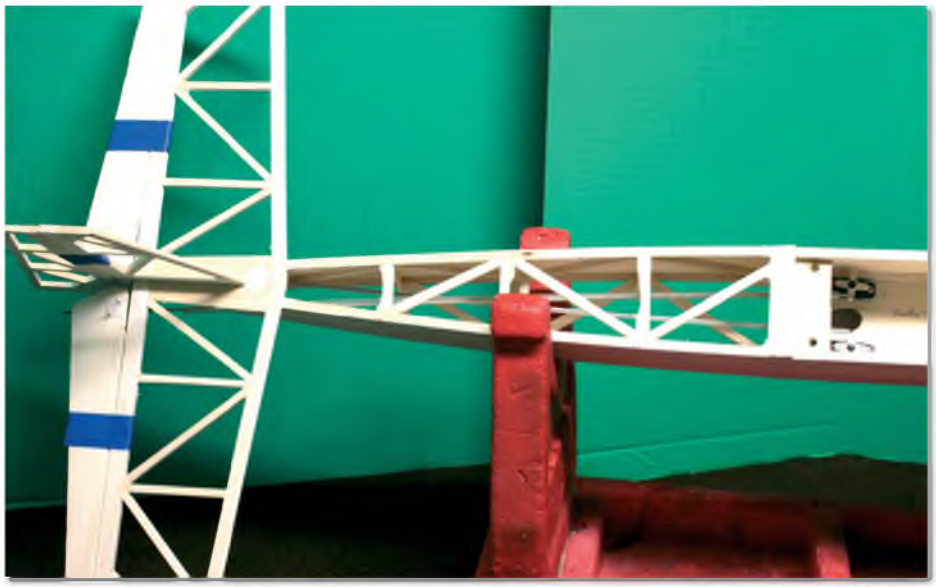
Glue the hatch magnet tri-stock block to the front of F2. Build up the hatch with the Lite-Ply base, scrap block and more tri-stock. Drape a sheet of plastic sandwich wrap over the hatch opening and pin two strips of 3/16" sq balsa to the fuselage sides by sticking the pins in through the outside of the fuselage. Make sure the tops of the strips are flush with the top of the fuselage side. Apply some thick CA to the tops of the strips and press the hatch in place and hold it until the CA cures. Remove the pins. If you've done it right you can lift the hatch off and remove the plastic sandwich wrap. You'll now have a perfectly fitted hatch.

Drill two holes in the bottom hatch block for the magnets and CA them into the holes, flush with the top of the wood. Now mark the magnet locations with bits of masking tape, sticky side out (yes, it's a pain, but it works!). Firmly set the hatch in place, then carefully lift it off and use the masking tape bits that should now be stuck to the inside of the hatch to mark where to put the second set of magnets. Make sure that you have the magnetic poles correct before you CA them in place! Protect the tops of F1 and F2 with a bit of masking tape, snap the hatch in place and sand it to match F1 and F2.

A bit of scrap behind the wing centre section TE helps fair it in, whilst sandwich wrap keeps the wing from being glued to the fuselage. One of the original, too narrow, bulkheads is visible, as are the cut through it and the reinforcement added to make up for the cut



It's easiest to solder the main gear together when it is temporarily installed on the plane. Use a bit of masking tape to tack the struts together and then wrap the joint with a length of thin copper wire before soldering. Please use acid-core solder for this and save the rosin-core for electronic soldering. But make sure you give the joint a good water rinse after soldering to clean off the excess acid!



Use masking tape to hold the surfaces in place whilst you install the pushrods and their plastic tube outers. Don't worry about getting the pushrods exactly to length. Just make sure there's a straight line from the servo arm to control horn

Now come the finicky bits. Mount the wing and set the aeroplane in a jig or brace, where it won't easily get jostled. Align it so that the wings are level side-to-side and nose-to-tail, then carefully sand the horizontal stab until that surface is also level and the tips are equidistant from the wingtips. Glue it in place. I prefer to use slow curing epoxy and microballoons, with masking tape on the areas adjacent to the joints; this makes it less likely that I'll slop extra epoxy onto the rest of the model! Let the epoxy cure.

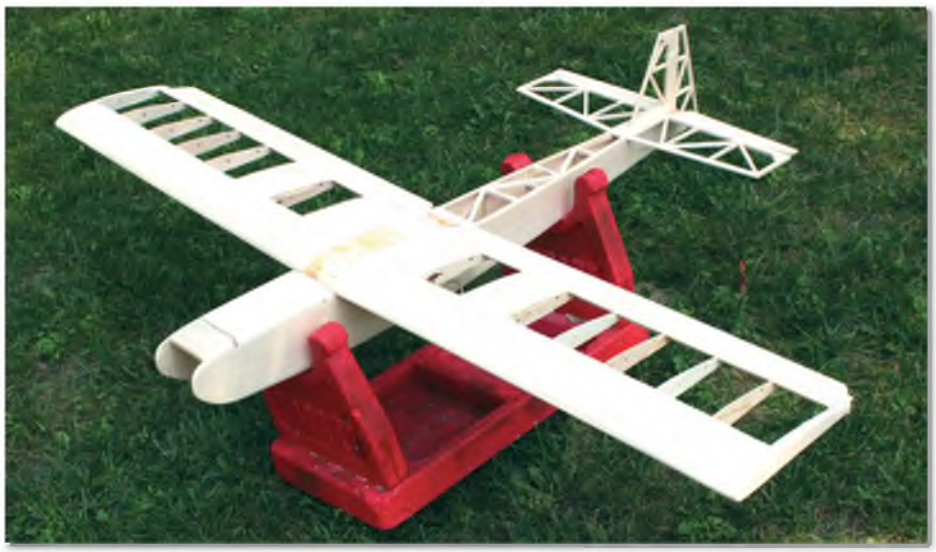
Top Tip

When aligning the wing and tailplane keep in mind that the bottom of the flat tailplane is parallel to the bottom of the rear 3/4 of the wing. As long as both are kept parallel to a reference surface (i.e. your building table) you'll be fine. Thanks to the shape of the aerofoil, that gives us about 2 degrees positive incidence in the wing.

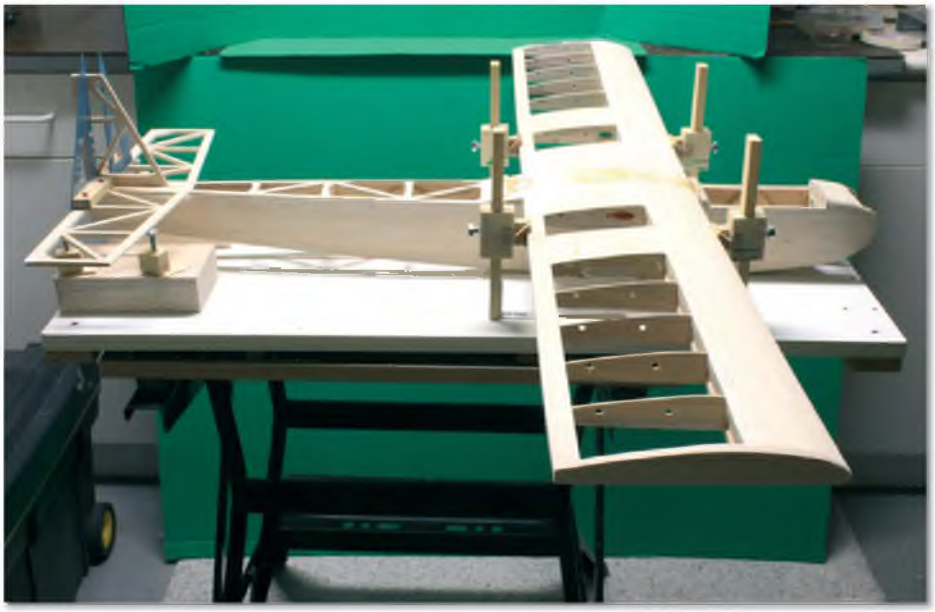
Notch the rudder post for the music wire joiner, then fit the vertical stab to the tailplane. Now is the time to get finicky about where the fin LE goes into the tailplane. Glue the fin to the tailplane (use drawing triangles or T-squares to keep it straight!). Once the glue is dry reach up from under the tail with a pin drill and make some 1/16" holes through S1 into V1. Smear the ends of the cocktail sticks with glue and shove them into V1. These will add extra strength to the vertical stab. For a bit more strength slit the bottom of the vertical stab TE and the top of the rudder post, and join them with a 3/4" (or so) by 3/16" strip of 1/32" ply. Round the edges of the strip to make it easier to insert it into the wood. Trial fit your commercial tailwheel assembly and drill for any extension into the rudder.

Remove the wing and place the fuselage in a model stand, upside down.

Cover the fuselage with scrap paper to keep dribbled solder off it and temporarily mount the front and rear gear struts.



Senior Sassy's bare bones, ready to cover and with the control surfaces masking taped in place. Before you ask... No, Robart stands don't come in red. I repainted mine as bare balsa doesn't show up well against the white foam



No matter how you do it, keeping the tail feathers straight with the wing solves most trimming issues before the model gets to the field. Here, Senior Sassy sits in the Frankenjig, as the slow cure epoxy and microballoons perform their magic

As I was cutting out the 'feathers', Editor Kevin asked if I'd like to review the Gyro-Cut from Crafty Products. I wish he'd asked me a lot sooner! Instead of the constant digging into the templates that I got with a hobby knife, the Gyro-Cut worked around the templates smoothly and easily

Clean the struts and then join them by wrapping them with fine copper wire (I get mine by stripping old automotive wire and separating the strands) and soldering them. Make sure the axle is under the wing LE and that the wheels either point straight ahead or SLIGHTLY inwards (i.e. towards each other). Remove the gear until after covering.

Top Tip

Painting the undercarriage wires adds a bit of class to a model and looks much nicer than oily, unpainted music wire and grey plastic hubs. I clean mine with acetone, buff with fine sandpaper, then I paint it and the wheel hubs a colour that either matches or complements the rest of the model. That's one reason I use a lot of white. It's much easier to match than 'Toasted Eggshell Almond'!

Above: A family portrait. The Sassy and her big sister, the Senior Sassy. Senior Sassy shares all the little Sassy's great flying characteristics, plus she's steadier in the wind

Sassy Senior, Micki holds HER Senior Sassy, saying "She's mine!" Oh well, I finally got her out from behind the camera!

Finishing Touches

I like to set up my pushrods with the model ready to cover and the control surfaces taped in place. This lets me get everything lined up and braced without worrying about cutting holes in the covering to adjust things. Install the servos (I used commercial aileron servo mounts). Make sure your motor wires pass easily through the firewall, then remove the motor until after covering.

After the control surfaces are set up, remove them and the control horns. Cover and trim the model with your favourite heat shrink film, then permanently hinge the control surfaces. Don't forget to put the music wire joiner through the rudder post BEFORE hinging the elevator and gluing the two sides together! Hinge the hatch front with covering film, both inside and out.

Micki knows the safest place to be when I'm flying is directly behind the model!

Mount the motor and ESC, making sure to add the 3 degrees downthrust called for on the plans. My usual habit is to omit the downthrust, get in a test flight or two, then adjust the downthrust as needed. So, I got an unwelcome adrenaline surge when the Senior Sassy pitched sharply up on her maiden launch… Thank heavens for excess power! On an E-flite Power 15 (or 25, as it uses the same size motor mount), that calls for a .07" thick washer under each of the top motor mount screws. So, a 1/16" (about 1.6 mm) thick washer is a good thickness to start with. After the maiden flight those washers proved to be the right cure.

Move the battery and tray around, as needed, to balance the model as shown. Then sand the tray mounts and glue in the battery tray. Smear epoxy (5-minute is okay here) on to the tray, ESC and the receiver mounting areas. When it cures add self-adhesive Velcro tape to hold the battery, receiver, and ESC in place.

For the maiden flight I recommend the throws be as follows:

It's lower than you think! Our runway is lined with dwarf pine trees that top out at around 20 feet. But despite the wind Senior Sassy is comfortable performing low passes

Ailerons: + 3/8"

Elevator: + 5/8" (measured at the aft point of the elevator)

Rudder: + 1 1/8" (measured at the aft point of the rudder)

Mix in 30% rudder/aileron throw to co-ordinate those turns. Alternatively angle the aileron servo horns to get differential aileron (more up than down).

Maiden Flight

Micki and I drove out to our field on the Saturday before Halloween, expecting it to be fairly empty as most of our club members prefer our club's other field. As we drove in Micki remembered that it was the day of our club's Halloween Fun Fly, which was at this field. So, we had a fairly large audience for the Senior Sassy's

It's not hard to tell which side is up! Senior Sassy will loop, roll and spin like a typical advanced trainer. But she's steady as a rock on landing

Nothing fancy, just a straightforward, good handling sports model

Those feathers take a bit of time to cut out but they really help this model to stand out against the blue sky

Senior Sassy's bones are all balsa, ply and Lite-Ply, all easily covered in Profilm

RC MODEL WORLD DETAILS

MODEL SPECIFICATIONS

WINGSPAN:	48.5" (1264 mm)
WING AREA:	443 sq in (2903 sq cm)
WING LOADING:	15.4 oz/sq ft
LENGTH:	40 in (1016 mm)
WEIGHT:	47.5 oz (1347 g)
RADIO FUNCTIONS:	Throttle, Rudder, Elevator, Ailerons (dual servos)
RECEIVER:	Spektrum AR6200
SERVOS:	Hitec HS-82MG (rudder and elevator), Hitec HS-81 (2 x ailerons)
BASIC CONSTRUCTION MATERIALS:	Balsa, Spruce, Ply and Lite-Ply
COVERING MATERIAL:	Ultracote covering and trim, with lettering done on computer labels
CENTRE OF GRAVITY:	Under main spar

CONTROL THROWS:
Ailerons: + 3/8"
Elevator: + 5/8" (measured at the aft point of the elevator)
Rudder: + 1 1/8" (measured at the aft point of the rudder)

MOTOR:	E-flite Power 25, 870 KV
PROP:	APC-E 11 x 7
ESC:	E-flite Switching 60 amp brushless
BATTERY:	3S-3000 mAh LiPo

am maiden flight. On the good side, the wind was almost straight down the runway and fairly light. As I said earlier, I had waited on adding downthrust – and that was a mistake... Rolling less than six feet before breaking ground, the Senior Sassy pitched up and started climbing at a better than 45 degree angle before I could push in down and reduce the climb to a more dignified rate. After a few clicks of down it was time to wring her out. Rolls were quick but not insanely so, and the loops were nice and round. Knife-edge is possible but requires a lot of rudder and a touch of down as she slowly loses altitude. With the C of G under the spars snaps are nice and slow, but she spins reluctantly and will easily drop out of the spin when the controls are relaxed. Stall turns, though, are a delight!

After the maiden flight the winds picked up and we packed up rather than push our luck on the first day. It took almost two weeks before we got another chance to fly her, but when we did Micki proclaimed her liking for the Senior Sassy. So, now that she has her Senior Sassy and her Cub, she has asked what I am going to fly?

Back to the drawing board!

RCMW

White spinner in the midst of the red wing, with the blue feathers facing front, all help make the Senior Sassy visible during the approach

PLAN DETAILS

NAME:	Senior Sassy
BUILD CATEGORY:	Intermediate
PLAN NUMBER:	MW3744
PLAN PRICE:	£13.99 ($23.99)

Plans and parts (if available) are subject to Postage and Packing charges at standard rates.
Copies of plan number MW3744 are available from RC Model World (Plans Service), Traplet Publications Limited, Traplet House, Willow End Park, Blackmore Park Road, Welland, WR13 6NN, England,
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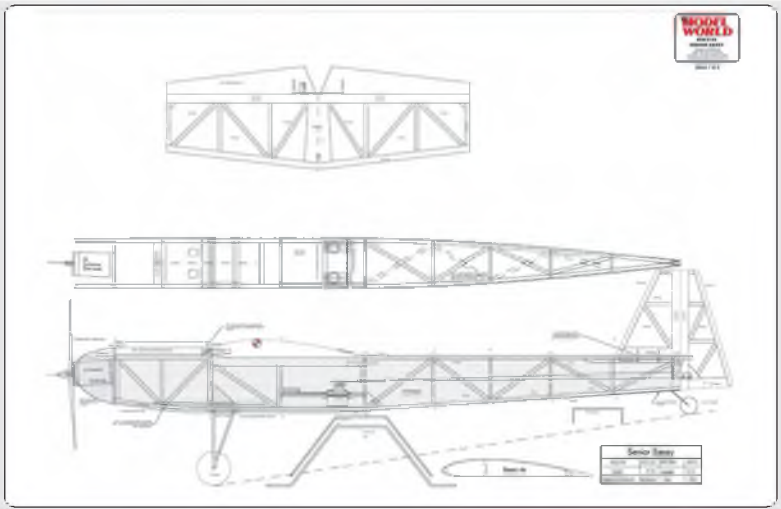

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LOWBO

Designed by Tony Wright as his daughter's second model, this delightful low wing sport model is a quick build and functions as the perfect aileron trainer and introduction to electric models

Tony Wright's daughter, Millie displays Lowbo, the low wing successor to the Millie Bob, a model designed specially for her

The Lowbo (Low Bob) is a low wing version of the Millie Bob (designed for my daughter, Millie). It follows almost the same structural methods as the Millie Bob, only the wing is now on the bottom of the fuselage and it is equipped with a set of ailerons. It was designed as a follow-on model as Millie has now learned to fly her Millie Bob, so this was a natural progression. It is equipped with the same electronics as Millie Bob, plus an additional servo to move the ailerons up and down.

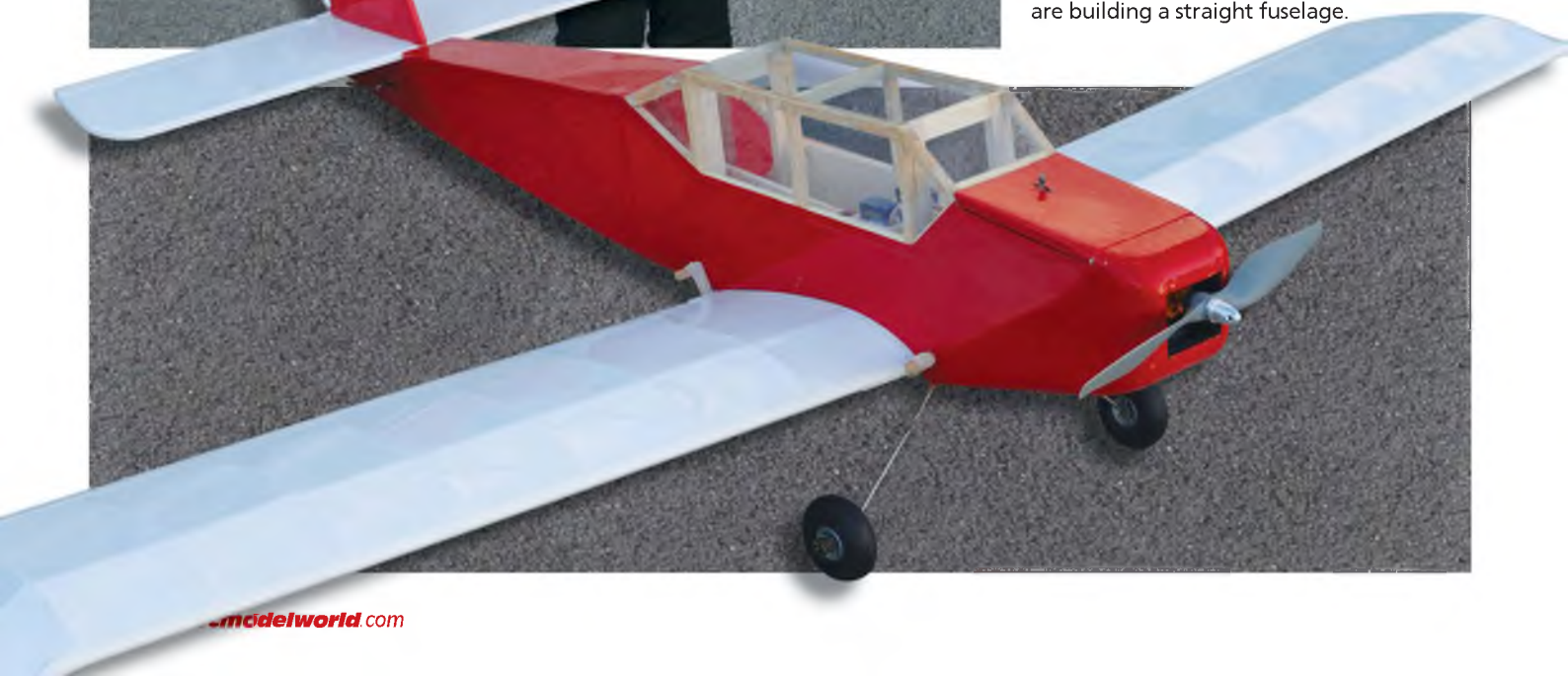
On With The Build

I build all my built up structures on a piece of kitchen unit worktop. It's nice and flat but doesn't take kindly to having pins pushed into it. Consequently, I use various weights to hold the parts in place whilst the adhesive sets (see photographs). Balsa wise, I prefer to use larger sections of light timber rather than small sections of harder wood. I think it makes a stronger, lighter job.

So starting with the fuselage, pick some nice light 1/4" balsa sheet and strip wood for the fuselage sides. Keep the rear end as light as you can. For adhesive I use cyano for most of my glue joints, but PVA would be a good alternative. If you cut all of the parts in pairs you should (hopefully) end up with two identical fuselage sides when you glue all the parts together. Using a length of the right diameter metal tube (I used an old aerial, suitably sharpened) drill holes for the wing band dowels. Next, bend the piano wire for the undercarriage. Only three bends are required so it should pose little problem even for the most ham-fisted metal worker.

Three formers are now required. F1 and F2 are both cut from 1/4" ply. F3 is built up from balsa (see plan). The piano wire undercarriage is affixed to F2 using glue and strong sewing thread. You are now ready to assemble the fuselage. Glue F2 to one side, followed by F3 to the other side. Ensure everything is nice and square. Now join the two sides together. F1 should be pre-drilled for the motor and then glued in place, noting the down and side thrust.

Join the tail end together, followed by the cross rails. If you possess a fuselage-building jig, please use it. If not, keep checking you are building a straight fuselage.



The front end is next. First add the 1/4" balsa lower sheeting. Note the air vent – use the sharpened tube for the corners. Next comes the nose, which is built up from balsa block, carved and sanded to shape (see photographs). The battery hatch is a simple rectangle of balsa sheet with a 1/16" ply tongue. A retaining catch can be constructed (see plan) or you can use a commercial product.

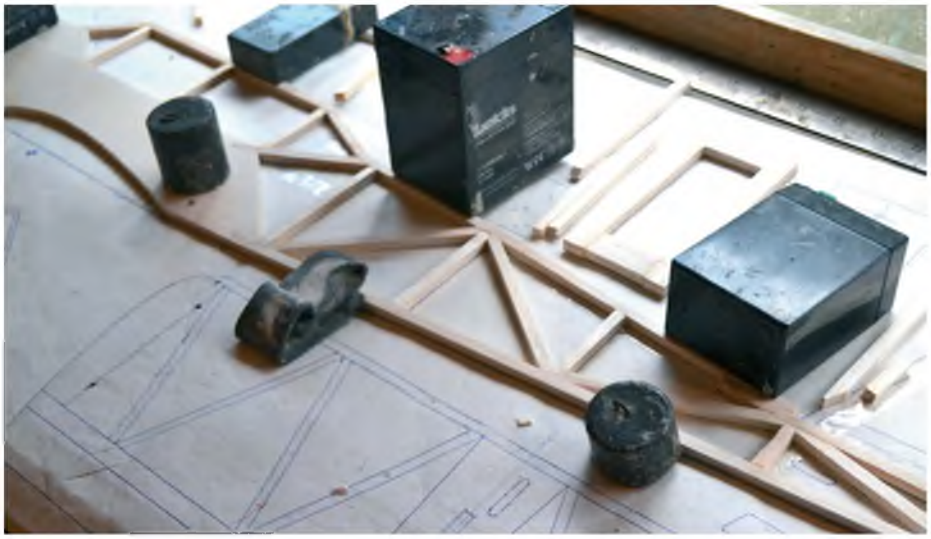
Next, let's move on to the wing.

The Wing

Nothing difficult here. Cut yourself a plywood rib template. Using the template as a guide cut yourself the requisite number of ribs. Cut the spars, LE (leading edge) and the false TE (trailing edge). Protect the plan using greaseproof paper or thin clear plastic, etc. Then position the TE over the drawing and hold in place with weights (or pins if you are using a softwood building board). Position the spar and leading edge using a rib or two (just in case there are any errors between the plan and your cutting out). Glue the ribs in place, plus the wing tips and top spar, etc. Angle the root rib to suit the dihedral angle.

The centre section is built in the same fashion, but incorporates dihedral braces. After cutting suitable slots in the wing for the dihedral braces, glue the wing halves together. Hold the centre section onto the building board using weights and glue the wing halves to it, supporting them at the correct dihedral angle. When the glue has set give the wing a careful overall sanding. The top of the centre section is skinned with 1/16" balsa sheet.

Lowbo and Millie Bob together. Both models make excellent trainers and are an ideal introduction to electric power

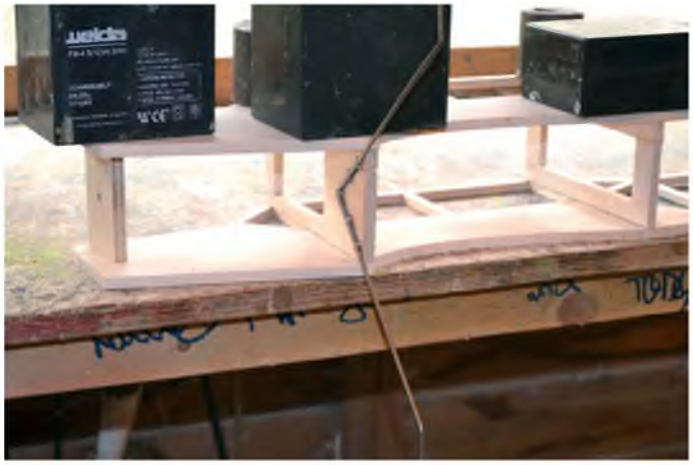


Parts held securely to the plans using weights, not pins

Choose light balsa wood for the aft fuselage and tail feathers

Undercarriage securely sewn and glued to former F2

Ensure the formers are glued in square



Weigh the fuselage down until the glue dries

The nose is carved from block balsa

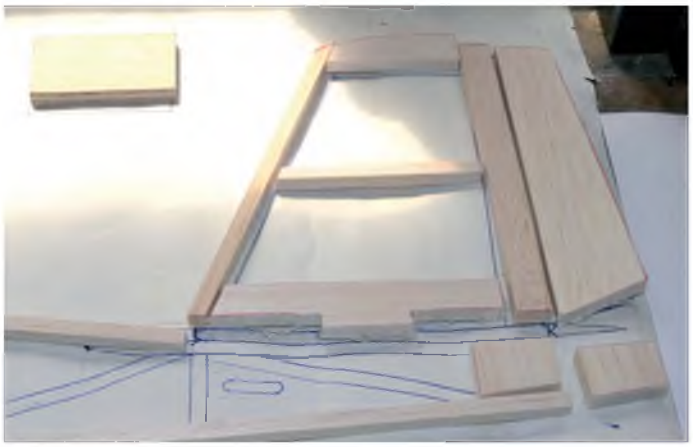
Ensure the fuselage sides are square and the fuselage is straight. Use a jig if you have one

Weights are used to ensure the wing is built flat on the board

Torque rod tube wrapped in masking tape and glued to trailing edge

Cut a hole in the wing top sheeting to fit the size of your aileron servo

Use suitable fittings to link the aileron servo to the threaded torque rod ends



Tailplane and rudder are built in a similar fashion. Use light balsa

Top view looking down into the fuselage. Note inverted tail servo mounting and balsa pushrods

Next, we need to make the ailerons. If you can obtain a pre-shaped balsa TE section, use it. But if not, carve the ailerons out of 3/8" balsa sheet. Make up the torque rods from a suitable length of bike spoke – don't forget the tubing. Carefully drill the aileron for the torque rod; it also needs a groove so that the rod fits neatly in the correct position (see plan). Temporarily hinge the aileron with Mylar or similar. Wrap the torque rod tube with a length of masking tape. This will make it easier to glue it to the TE (see photo). The fixed part of the aileron can be grooved to go over the torque rod. Glue it in place.

You might as well finish the aileron linkage while building the wing. Cut a suitable hole to suit your servo. Fix the servo in place by gluing small rectangles of scrap ply or similar to accept the mounting screws. I used a standard servo because that's all I had available at the time but a 9 g mini servo will do just as well, just so long as the ailerons are nice and free. Link the servo to the torque rod using threaded pushrods and suitable fittings (see photos).

Tail Group

The tailplane and fin are built up over the plan in the same manner as the fuselage sides. Please select light wood. The elevator and rudder require no explanation. Finish by sanding to profile.

Elevator pushrod exits out the side of the fuselage

Rudder pushrod exits out the top of the tailplane

Keep the cockpit glazing free of glue smears

The nose compartment has room for a small LiPo

Introduce The Electrics

If you have any experience with Millie Bob you know what to do regarding the electrics. If not, please read on. The motor I used is a Turnigy 22 x 28 outrunner with a 30 amp ESC, turning a 7" x 5" prop. The LiPo is a 3S 1500 mAh. I hope this description is simple enough for you to follow – when I started with electrics I was totally confused with the masses of info that confronted me! The rudder and elevator are controlled via balsa pushrods and a couple of 9 g servos. The receiver, ESC and battery are secured to the fuselage with self-adhesive Velcro. You might want to prime the balsa where the Velcro is attached. Just coat the area with a drop of cyano to improve adhesion. I recommend you fit the electrics before covering the model.

Nearly Finished

If you want a pilot, now is the time to fit one before you glaze the cabin. For the glazing any clear thin plastic sheet will do. If, like myself, you have small children, just about every toy comes in a glazed cardboard box that makes ideal material for cockpit glazing. I use epoxy to fix my windows. Please be neat as the pilot's 'office' is one of the first things people look at.

Covering

One word: Solarfilm. RIP, Mr. Hardman.

ARTF?

Finally, fit suitable wheels and check the C of G prior to flight. You may need to add a bit of lead at the front, but hopefully not if you have kept the back end light. I did say use light balsa at the back, remember?

Lowbo flies like a low wing trainer and will perform simple club aerobatics

Flying Lowbo

What can I say? Lowbo flies like a low wing trainer. On the very first flight I did all the manoeuvres I know how to do – loops, rolls, etc. My flying style is somewhat restricted due to arthritis but I had no bother with Lowbo. Landings are nice and predictable, as are take-offs.

If you have passed the trainer stage, why not build yourself a Lowbo? It won't break the bank and it is quick and easy to build.

I hope you like Lowbo. If you have any questions, please contact me at my email address: thepufango@gmail.com

RCMW

Lowbo shows off its clean and simple lines. Why not build one?

RC MODEL WORLD DETAILS

MODEL SPECIFICATIONS

WINGSPAN:	42" (1067 mm)
WING LOADING:	12.8 oz/sq ft
LENGTH:	33" (838 mm)
WEIGHT:	28 oz (794 g)
RADIO FUNCTIONS:	Throttle, Ailerons, Elevator, Rudder
SERVOS:	9 g minis
BASIC CONSTRUCTION MATERIALS:	Balsa, Ply
COVERING MATERIAL:	Solarfim
CENTRE OF GRAVITY:	59 mm from Leading Edge

CONTROL THROWS:
Ailerons: 3/8" up and down
Elevator: 3/8" up and down
Rudder: 3/4" each way

ELECTRIC POWER

MOTOR:	Turnigy 22 x 28 outrunner
PROP:	7" x 5"
ESC:	30 A
BATTERY:	3S 1500 mAh

PLAN DETAILS

NAME:	Lowbo
BUILD CATEGORY:	Beginner
PLAN NUMBER:	MW3768
PLAN PRICE:	£11.99 ($20.99)

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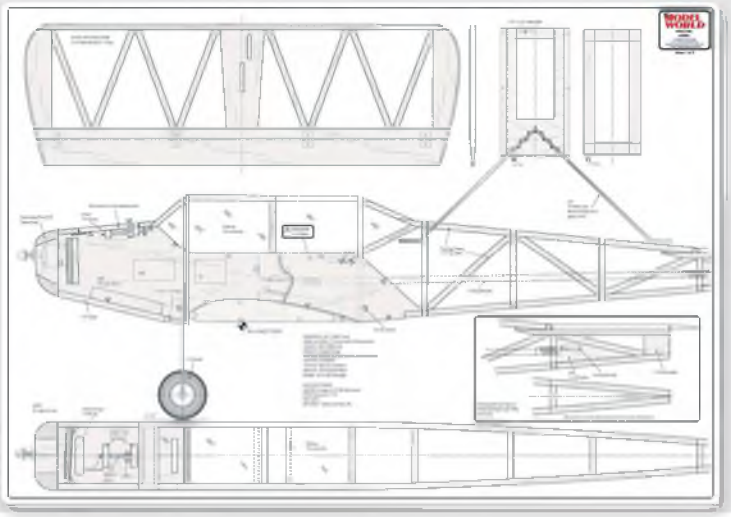


T28 TROJAN

Josh Spiers builds a scale trainer straight from the latest Dynam shipment to reach CML Distribution

Big box, few parts!

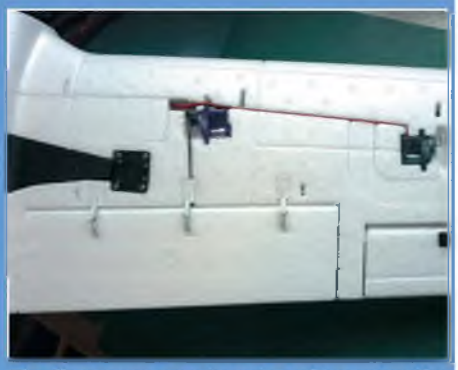
This is the second model from the Dynam stable that I have had the pleasure to review for this magazine, having previously reviewed the superb Me 262 EDF jet. I am still regularly flying the 262, which has even survived a loss of a LiPo that had the misfortune to abandon ship at the Colerne E-flight get together. But that's another story...

The above preamble is by way of saying that the models that Dynam sell to the model fraternity are more than up to the task, even though they are made of EPO foam. Having said that I was more than pleased to be offered the chance to get acquainted with this rather bullish looking, radial engined, multi role aircraft from the Dynam stable.

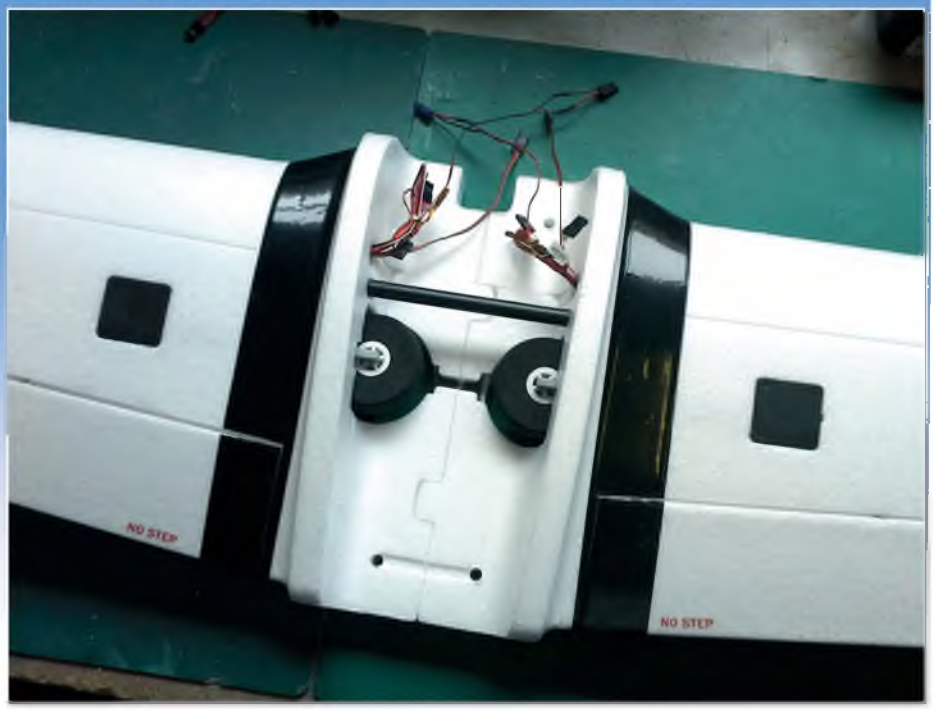
Make no mistake the T28 was no circuit and bumps plodder, although that was what was intended when it was created on the drawing board in around 1948/49. It was intended to be the replacement for the T6 as the basic trainer for the USAF, with the first deliveries taking place in January 1950 as the T28 A. And by 1953 nearly 1,200 had been delivered. From then on various developments took place, culminating in an interdiction ground attack version that was extensively used in the Vietnam War and also by other countries in various war zones, including over the deserts in Algeria.

So as we can see this was a tough, well designed airframe, perched on three legs,

Big cowl, small but punchy motor!



The flaps were easy to get working using the cantilever hinges supplied



Wing panels are joined by a carbon tube. The roots 'jigsaw' together

which went through various modifications and engine upgrades, culminating in the fitting of a Lycoming turboprop to the attack version, YAT28E 1963/68.

The model T28 supplied by CML Distribution for this review is the white and red navy version, which is particularly attractive on this size of model. It arrives in a well packed box,thus ensuring no airframe damage during transit. There are not many parts in the box, just the fuselage fitted with the outrunner motor, ESC and servos, and the two wing panels, again fully fitted out with electronic retracts and aileron servos, plus navigation lights on the wingtips, and the fin/rudder and tailplane parts.

As all the control horns are factory fitted, complete with swing keepers for the wire pushrods, there is not a lot to do to get the model assembled ready for the sticker fest, as effectively the whole airframe is held together with just seven screws – five for the wing to fuselage and two for the tailplane assembly.

In A Flap

"Hah!" I hear you say, "Where's the modelling in that?" Well, that's what I thought until I noticed that there was provision for scale looking flaps to be retro fitted. A look in a plastic bag at the bottom of the box revealed – cantilever flap hinges, no less, for the adventurous scalpel wielder servo fitters among us. Way to go, Dynam!

As you can guess from the above I sorted a couple of 9 g servos from stock, which fitted the pre-cut holes in the wing. And then, using a new blade scalpel, I released the flaps from the wing, which are held in place by tabs at each end. There are no instructions whatsoever on the folded instruction sheet for fitting the flaps, so you need a certain amount of confidence in your abilities to work out how it all fits, and to make up your own short pushrods.

Some dry fitting and flap drooping is required, as the central hinge has to be glued in place with the pushrod already fitted to it, where it disappears into the wing from the servo horn. And it also has to be the correct length. I used a 'Z' bend on the hinge itself and a metal threaded clevis on the servo arm, allowing adjustment when all the hinges were finally glued in place. I have attempted to show this as best I can with a photo of the flap up and then down.

I have to say this little bit of modelling was worth it, as the flaps do enhance the flight envelope, allowing steep, short descents onto the patch with virtually no trim change when fully deployed on the approach.

I will say this, though; the T28 will fly fine without flaps due to its relatively low wing loading. But for me their scale appearance and their effectiveness makes it all worthwhile, so I'm glad I took the time to do it.

You should also be able to see from my assembly shots that I have covered the servos and lead run cutouts with white Solartrim for a more scale look.

Putting It Together

Right, with all of the flap work done and bench tested, it was time to put the beast together. I started with the tail end, which as I previously mentioned required two long screws inserted from the fuselage bottom to hold it all firmly in place. I suppose you could opt to glue it all in place with thick cyano if you were happy with not being able to take it apart at some later stage, but I stuck with the plan in the interests of a fair and honest review.

That said I can now mention the small pushrod problem that I encountered in the fuselage.

With the tailplane assembly in place the supplied wire pushrods are then slid into two tubes leading to the rear control surfaces and the Z bends are attached to the servo arms. Only, they were too short by a few millimetres and did not reach the swing keeper on the elevator and rudder. No, I did not have the wrong one in the wrong tube – they were just too short. At that point a light went on... Turn the servos round so that the arm was closer to the rear, which I did and – 'Voila!' – they reached. A Friday jobbie was what went through my mind, but no harm was done and perhaps it was just a simple matter of the servos being inserted backwards at the factory anyway.

With the tail end sorted I could now fit the wings, which slide onto a nice hollow carbon rod that runs through a channel in the fuselage. All that is required, before inserting the four long screws that hold the wing on, is to feed the wire cables through the central hole into the fuselage interior for connection to the receiver. It is at this point that the accuracy of the mouldings become apparent as it all fits together like a glove, allowing the insertion of the four retaining screws and a lateral one across from each wheel well to hold the centre of the wing together.

Right, turn the airframe over and connect the relevant wires to the matching ports in the receiver. Bind it all together and connect up a 3S 2200 LiPo to check all is working. This, of course, is done without the prop fitted to the motor to avoid raising the casualty attendance figures at your local A&E.

Yep, all is okay and it is standing on its own three legs at last, which go up and down at a very nice scale speed, I have to say.

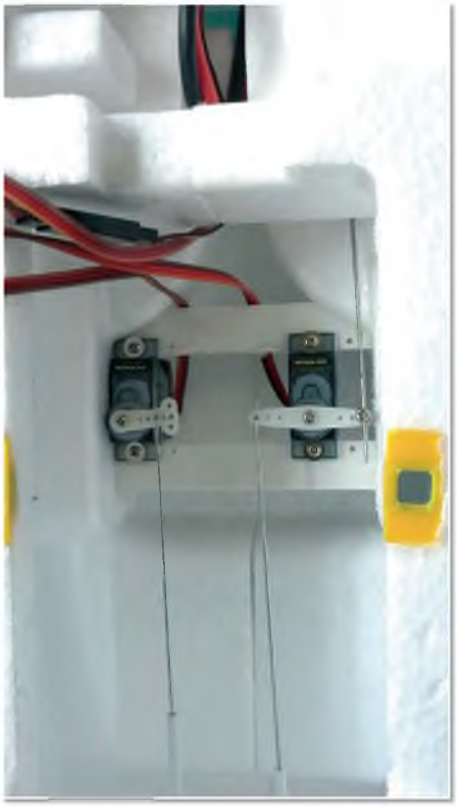
At this point I cut out and fitted all the supplied nomenclature at the points indicated in the schematic on the build sheet. This really brought the T28 alive, followed by the last job of measuring the Centre of Gravity position. I popped the OptiPower 3S 2150 mAh LiPo into the battery bay and moved it about to achieve the balance point shown on the instruction sheet at between 80 to 85 mm back from the lower leading edge. I marked this on the belly of the plane with a permanent marker pen to stop it moving or falling off!

Little People

Last, but not least, is to fit out the cockpit, which for me was the only area of disappointment with the T28. Let me explain...

Two pilots are supplied in the kit but they are of Lilliputian proportions, being much too small for the scale of the plane. In fact when you drop them in place in the tub they cannot even see over the instrument fascia! Still, all was not lost because a quick call to the 'we can fix it' department of CML Distribution describing the problem, resulted in a nearer to scale pilot bust from the FMS range arriving, which fitted the bill much better. CML also assured me that Dynam would be advised, with the hope that future kits would be supplied with a pilot bust of a more appropriate size.

A close look at the robust retractable noseleg



Tail servos needed to be turned around to reach the pushrods

Cavernous battery bay allows for plenty of experimentation with different battery packs

Close up on the optional flap linkage, using white film to cover the user supplied servo

When the new pilot arrived I painted the cockpit tub with grey Humbrol enamel, cut out and stuck on the instrument panels, and then I stuck the new pilot dude in place ready for attachment of the canopy. The fit of the canopy is perfect, so with a bead of Loctite Hybrid glue run around the canopy base, it was dropped in place and held lightly with low tack tape and left overnight to cure.

The next day I removed the tape from the firmly stuck canopy and did a final bench test of all the functions. With this completed I attached the supplied three bladed 11" x 7" prop and popped outside the workshop to do a motor check.

With the new and freshly charged OptiPower Ultra 2150, the wattmeter showed 22 amps/251 watts, which on an airframe weighing 3 lb 4 oz ready to go, I thought would be adequate but not sparkling. We would have to get into the air to see if my suspicions were correct.

While I was at it, and bearing in mind the 30 amp ESC fitted, I tried a 2200 4S pack to see what that would produce. Well 28 amps/430 watts was more like the figures I would have expected in the first place, but as I said we shall have to get her in the air to see.

In Flight Appraisal

The next sunny, warm and flyable day saw me at the field with Roger Laskey, the camera man, all lensed up and ready for the maiden flight. With the range check done on the Spektrum gear and all the flight functions cycled, the T28 was placed on the flight line into wind. And with no take-off flap selected, I pushed the go stick forward and away she went.

Bearing in mind the pebbled and grass surface we fly from, take-off was drama free and very short, the tricycle undercarriage handling the surface with no problems and retracting perfectly into the wheel wells.

The first circuit told me that the ailerons were spot on and needing no adjustment. But the elevator required six or so clicks of down to achieve level flight. This was not a C of G issue but possibly a small alignment difference between the wing and tailplane. Suffice to say it is not glaringly obvious to the eye when parked in the pits.

Right then, how does she fly? Very smooth and scale-like and so, so easy to position in the air for the flying shots. I had dialled in 50% expo on the ailerons and found no need to alter that after the eight flights with her prior to this write up. The elevator is not snatchy with the recommended C of G, so I have left it alone. Inverted flight is no problem, just needing a smidge of down on the elevator stick, and rolls to the left and right are brisk and fairly scale-like, as befits a model of this type. It will knife-edge but only with more power, which I shall come to shortly. So let's try a loop. Hmmm, she could only manage a small one and she crept over the top like she was towing an unused bag of political promises behind her. Yep, more power would definitely be better.

Time to try the flaps. Well it would be rude not to, after going to the trouble of

Although two pilot busts are supplied they are a bit too small for this aeroplane. A replacement FMS figure fills the cockpit better, although purists will say that he is a bit oversize – you can't win!

Despite running into the rough on occasions the T28's undercart soaks up the bumps

Returning overhead with the wheels tucked away

Dynam's Trojan is very smooth and scale like in the air

fitting them. So an overshoot was called, legs dangled and full flap selected. My, that's nice! There's no zoomy trim change, as long as you are down at half throttle or less, and it slows up nicely. So much so that it will hover quite safely in a stiff breeze while you play with the throttle. Fun or what?

Anyway, some throttle is required during the landing approach to keep it coming towards the patch, but watch out for ground effect as it will float across the strip forever if you are not careful. Oh, and this is another model that seems not to have been fitted with a stall in production, because to test it with full flap on and no throttle, applying full up elevator gives a fair rendition of a parachute, with no wing drop, at least on this particular model. It will stall eventually but you would have to be suffering a severe bout of inattention to do it!

With all of the required flying shots in the bag and the T28 back in the pits for a check over, all was okay. So I had a think about the flight and came to the conclusion that while it flew okay on the recommended 3S 2200 LiPo, it could definitely do with a bit more grunt. This would enable it to handle the windy conditions that are a feature of so many of our flying days.

So in the interest of this review I decided to have a go with a 4S 2200, bearing in mind the figures shown earlier on the Wattmeter (28 amps/430 watts), which the 30 amp ESC should be able to cope with.

Well, what a transformation! She fairly ripped across the strip into the air. And with the wheels tucked away she performed like a true warbird. We could now pull some nice large scale loops, followed by big climbs into a stall turn. Knife-edge was now possible – just (it is a small rudder after all). And the beloved beat up down the strip was much more imposing.

After about seven or eight minutes of self indulgent 'hooning' I popped the gear, dropped the flaps and brought her in for a check over. All seemed well with the power train; the motor and ESC were warm, but not in an overloaded way, so I shall continue to use the 4S for my flying sessions to see how it goes.

My thoughts on this matter are that the motor is well up to handling a 4S on the prop fitted, a three blade 11" x 7", but perhaps you should up the capacity of the ESC to a 35 amp version to give yourself a better safety margin.

Overall though this is a smashing rendition of a T28 Trojan. The look and sit in the air is just right, the retracts work well and are robust enough to handle the rough pebbled common that we fly from. The paint work is nicely done and is enhanced by the super decal sheet. The foam mouldings are crisp and fit together perfectly. So apart from my niggle about the undersized pilot figures and the servo switcheroo, this Trojan is well able to defend its position in the marketplace.

It is a perfect 'pop in the car, fully assembled' model that is ready to fly at anytime. Try one – you won't be disappointed! **RCMW**

T28 proved easy to position in the air for the flying shots. All flying pictures courtesy of Roger Laskey

Large scale-like loops are possible when using a 4S pack, but the ESC is close to the max

White and red navy colour scheme is particularly attractive on this size of model. With full flap the model can be flown very slowly

T28 excels at low beat-ups of the strip

Nose pointing skywards, the T28 revels in the blue sky conditions

The result of coming in a bit too low and catching the bushes at the far end of the patch!

Josh taxis the T28 in after another successful sortie

MODEL WORLD DETAILS

MODEL INFORMATION

NAME:	T28 Trojan W/Retracts 1270mm W/O Tx/Rx/Batt
MANUFACTURER:	Dynam
DISTRIBUTOR:	CML Distribution
WEBSITE:	www.cmldistribution.co.uk/ (Search for: DYN8940R)
PRICE UK:	£149.99
MODEL TYPE:	Semi Scale
MOTOR:	Brushless outrunner 890 KV
LIPO:	3S 2200 mAh
PROP:	11" x 7" three blade (two props supplied)
ESC:	30 A
CONSTRUCTION:	Moulded EPO foam

R/C FUNCTIONS

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

MODEL SPECIFICATIONS

WINGSPAN:	1270 mm (50")
LENGTH:	1000 mm (39")
FLYING WEIGHT:	1350 g (47.6 oz) Review model 3 lb 4 oz

DISLIKES

Pilots supplied are too small • Tail servos were fitted the wrong way round

LIKES

Look and sit in the air is just right • Retracts work well and are robust • Very smooth and scale-like • Optional flaps are worth fitting

SQUADDIE SURPRISES

More from our tame Brit in Brittany as Dave Goodenough writes on the perils with sharing a flying site with the French armed forces

We model wrecking piste punishers in the Broceliande of Brittany are not the only fly-boys to use the runway and grassland flying areas. The huge area of rough-cut grassland across the army camp road from our runway is not called 'the drop zone' for nothing and on the odd occasion we've had ground towed parachutists drifting about, mostly landing on their feet! At times we've also been forced to give up our home to the girt big, bloated, lolloping thing that is the tethered balloon used by the army camp for field instruction in radio transmission/reception. Only a few weekends ago we had a gaggle of squaddies wander into the pits and tell us "…you have to stop flying." So what now, then?

Rare Visitor

Using my patented 'Franglais' – a gibberish melange of at least three hitherto unknown languages – I finally twigged what our tame squaddie was saying. I learned that a plane was approaching from Rennes and that the guys needed to inspect the runway for damage, clods (us?) and stones, plus any loose model parts that may have accumulated over the last few months. That'll be lots, then? Back in Blighty it's called 'the FOD plod' and I've been involved with them a few times myself, both as an aeromodellist at RAF Waterbeach and Oakington, then later as a contractor on several East Anglian Air Force bases. The French crap collectors did their job in short order. After all, it's only a small 500 m runway (we'll hear more of this later!) and they found a mere two broken prop blades.

A focused drone in the distance signalled a plane approaching, rather than passing, and we caught sight of the ubiquitous 'spam can' in a descending circuit, flaps down and flying slower than I would have believed possible! The pilot lined-up over 'La Ville Bizzard' – the urban combat training 'village' just in sight from our pits – eased back on the throttle and plonked the Cessna 172 onto the runway with barely a squeak from the tyres. A dab or two on the brakes slowed the plane enough to taxy straight into the pits, swing round and cut the engine, close to our new and unforgiving concrete preparation tables.

Now I know a little about planes, but there was something 'not quite right' with the look of this one. Not the scrofulous condition of the Cessna, dotted with its multitude of can sprayed 'patch and scratch' paint blotches, but also what can only be described as… Guano. No, the 'look' was due to the fairly major bits that were missing from the plane. The lopsided undercart was care of a missing wheel spat, whilst the big hole in the fuselage side meant that a door was adrift somewhere!

Cessna 172 on finals over 'La Ville Bizzard'. Has a lop-sided 'something missing' look about it

It looks good from a distance but closer inspection uncovered some scruffy paint maintenance on this old workhorse

Portrait of hard use. Fretting stains, over-spray on the Rennes club logo and a couple of 'unfortunate' creases

'Les squaddies' don their parachutes and make mate-to-mate checks on each other's equipment – check twice, jump once! My Fly Baby waits patiently for air time

I also know that the corrugated ailerons are supposed to have a bit of wash-out built-in but the several spray painted dents and wrinkles gave the lie to the plane's fairly harsh life to date. Whilst I was 'blacking my nose' at the aircraft the squaddies were donning what looked like small hiking 'day packs' and strapping on bright red, close-fitting helmets.

Now I'm not known for my quick uptake. In fact it's been said that I'm '…as dim as a Toc-H lamp', but those small hiking sacs began to look just a bit like parachute packs, though much smaller than I've seen before. The clincher was when three of these large and sartorially challenged soldiers clambered into the cabin, filling and overflowing the available space – one was even jammed in the missing door opening! Pilot Michel Lerusse churned over the reluctant engine before it caught and settled into a fast tickover. And after a rapid pre-flight check, he rolled out onto the runway. I was doing my 'happy snapper' bit with the Nikon when Michel slowed, then turned the Cessna well short of the runway end. I peered round to see clubmate Jean-Michel looking somewhat perplexed, as he too thought that the pilot was leaving himself a short take-off run. With power ramped up, the well loaded plane roll forward, gathering speed somewhat slowly…

Smelly Cabin?

As the Cessna passed the runway mid-point the nosewheel was still firmly planted on the runway. It continued to gather pace like a flustered Granny before the nosewheel finally rose just a few inches off the tarmac, some 120 m or so from the end of the runway. Michel finally heaved a bit more on the elevator and the main wheels unstuck around 40 m from the grass run-off patch. Obviously 'on the edge' of the flight envelope, the 172 only very slowly gained height, using up a large part of the cleared land in front of the trees that bound that part of the runway. We watched, fascinated, as the pilot nursed the heavily loaded plane up across the leading edge of the trees with only a few metres to spare. You could imagine two things; one, that the passengers and pilot were testing both resolve and sphincter control, and two, the owner would be rather annoyed if he was called to extricate his plane from a huddled group of our Pinus Sylvestris specimens.

The last words spoken were Jean-Michel's. He was heard muttering, "Merde, merde, a la vache, mon dieu, merde…" whilst walking back to his models, shaking his head. For once I totally agreed with him!

The trouser testing pilot returned around an hour later and made another super and short landing, then chatted with the waiting big Jean-Jaques, our clubmate, ex para and WW2 vehicle nut. J-J told him how he also used to throw himself out of perfectly good aeroplanes in some fairly exotic locations, like Guadeloupe and Martinique in the West Indies. A typical ex-squaddie, he likes to yarn!

The jolly jumpers were returned by army truck and spent time checking and repacking canopies, before clambering back into the waiting Cessna. Were they barmy? Engine on, do the checks, then out onto the runway again, only this time pilot Lerusse trundled all the way to the very end of the runway before turning into the gentle East-West breeze. He 'gave it the beans' and used a very large part of the

Ok chaps, time to do it! The paras wedge themselves in

All in there somewhere! Three paras and a pilot jostle along towards take-off. A tight fit but they managed it

Just completing the turnaround in our pits, one of the paras preps in readiness. Look at that windsock – virtually dead calm!

After the paras have bailed out the well ventilated Cessna returns to the circuit above 'La Ville Bizzard'

Running at full chat, the 172 hares past with the nosewheel still firmly in contact with the runway

Jaques Splat's lidless T-28 Trojan awaits its first flight test. No, not a coupe, he didn't bother to fit the canopy!

tarmac in gaining velocity, before lifting-off and climbing at a more suitable speed and rate, clearing the trees by a sensible margin this time. Although we watched the first take-off with a touch of the horrors, Jean-Michel summed it all up well. "It's nice to know that it's not only us that screw up royally!"

Splat Does It Again!

'Jaques Splat' is a club character that will often crop up in my random musings. He is an expensive ARTF assembler, with a penchant for big petrol motors – well big to me that is! His latest purchase is a big North American T-28 'Trojan' in yellow US Navy training colours. It's a lovely model, I'll admit, but he'd elected to fly it 'canopy off' in case of whoopsies. Just as well, I suppose, in the light of what happened later. He admitted that during ground running he couldn't get a clean transition and a fast run from the new DLE 55 petrol engine, "... so I'll fly it and see what happens!" Well what happened were several rapid and unplanned dead-stick arrivals before he twigged – with all our assistance and nagging – that the carby simply won't adjust itself and he needed to enrich both the high and low needles just a tad. Another test confirmed the improved responses and a second tweak of the main jet gave a faultless short test flight.

Fully fuelled, JS rolled it out again, took off and threw the model into a super spirited flight with lots of low passes and 'usual suspect' manoeuvres. I'll give him his due, he's a good flyer – when the planes stay in the air. All very nice, but my own models needed attention so I turned back to the prep bench. A couple of minutes later I heard the bark of the big 50 change note. He had throttled back for a landing – I gotta see this!

Final fiddling and fettling before fuel-up and test flying – nervous times

The nosewheel retract unit lies canted back after the Trojan's 'arrival' whoopsie. You can clearly see the undersize screw that has pulled out

Jaques Splat, the man of the moment, gives the camera a smile. If he knew what I write about him it would be a different matter! Please don't tell him

The Trojan came in long and fast, bounced once and smote the runway lightly, whereupon the retracting nose wheel gave up the fight, folded back and let the DLE cylinder head act as a brake on the tarmac. The grating sound was awful.

Back at the pits the post-mortem was short and unkind to our puzzled chappie. Although the nosewheel retract was mounted on a seemingly substantial ply assembly, it was secured with minimal sized woodscrews – they'd pulled out of the ply blocks due to the landing shock load. There is room to get round to the back of the retract mount, so there was no excuse for not fitting nut and bolt fixings through the unit. Lesson learned? For him maybe, but I'm still on the up-slope of the learning curve when it comes to 'big stuff', especially petrol engines…

All Fall Down?

I can't leave it alone. In fact wife, Pat reckons I'll go blind if I keep playing with it! Big vibrators are a fact of modern model aeronautical life and the AGM-30 in my 2.4 m Bowers Fly Baby continues to fascinate and annoy me in equal measure, because of its shuddering propensities, of course. That big piston and hairy-chested torque output loves to shake, rattle and roll the model.

Having had the motor almost shrug off the model it was originally attached to, and hang only by the threads of the choke actuator and ignition sensor wire, I thought that my strict regime of 'check all fixings and if in doubt add Loctite' had borne the fruit of past experience. I'd had several superb flights, dialled-out the end point adjustments made to the transmitter to enliven the next flights a bit, then gone on to make friends with the new settings.

Absolutely wonderful. The Baby flew so much better once the original 'soft' settings were gone and I was really enjoying the last flight of the day when all went a bit 'Pete Tong'. Baby was having a tantrum, rearing up in reaction to minimal elevator responses, then becoming 'stall happy' as soon as the throttle was closed. I called 'pose' (French slang for 'putting it down quick') to the other pilots, got their muttered oui's and ok's, then chopped the throttle back and nursed the fractious infant back to the runway, fighting all the way. The landing was interesting rather than good, but the big AGM was still turning and dragged the terrible toddler back to the pits.

Engine off, now what the blundering heck was going on? The control surfaces were checked – all secure and no sloppiness. The engine was leaned on, but it was still rock solid on the mounts. Perplexed, I put the big Bowers beastie up on the prep table and took a closer look.

The 'stall happy' model attitude should have told me straight away – there was no nose weight! But I checked it before the last flight, didn't I? Check it I might have done, and apparently solid it may have been, but that great shaky lump on the front of the plane takes no prisoners. Somewhere over the heathland leg of our flight circuit, 500 g of church roof had shaken loose and succumbed to gravity. Gravity of a different sense was what I understood when pondering the situation and what could have happened – the end result would have been very serious indeed. Over 1 lb of lead falling from several hundred feet makes a small, deep hole in open heathland. But put a car, or worse still, a person on the receiving end and then let your imagination run riot! I went cold thinking about it and resolved to rethink my ballast securing strategies in the future.

So what was the original fixing? Four large woodscrews and a half-pack of epoxy adhesive. But it was all for naught. Next comes M6 bolts, Nyloc nuts, Loctite and more epoxy – belt, braces and buttons!

A valuable lesson learned that many of us should heed. And don't tell me 'fall-offs' have never happened to you, 'cos I know better!

Jack-Jack Reigns Supreme!

'Dane' is a mate and debutant (beginner). He continues to tussle with my old, donated 'Baron' trainer, though he's gradually married his experiences on the simulator to the terror he feels when the breeze blows at the piste and a 'real' model lies before him.

That was close! Dane gets Jack-Jack to 'rotate' just in time

Baby 'Incredible' proves his worth as the Baron wafts by under full control – Dane was sooo chuffed!

A thing of beauty! How can you not love a well-designed trainer and its gorgeous traditional structure. Pretty as a picture

A couple of times now he's shrugged-off the offer of a mentor and done the deed himself. That the Baron remains generally in one piece is a testament to both the plane's design and his increasing abilities! The plane's plastic pilot would horrify scale wannabes but the 'Incredible' Jack-Jack (from the cartoon film) suits Dane's whimsy, as he reckons it's incredible that he's learned to fly a model so quickly, and the baby bit reflects his place in the pilot rankings!

Never mind the scars – model, finger and mental – he's now well on the way to pilothood. And with only one thoroughly dismantled model in the inventory (and being of EPO foam it won't be long before the Easy Glider is back in the air) it just depends on how much cyano glue he needs!

Ruddering Thing!

One of the guys brought a 'Grob' looking electro-foamie motor-glider along to the most recent weekly model battering session. A pretty thing of around 2 metres, I have no idea where he found it, though he mentioned 'old stock' in the conversation. Lots of chatting, playing with the waggly bits on the preparation table, then the nerve jangling, knee knocking, first walk out to the runway.

Last check on the waving around bits, push the power on and… chop the throttle! He returned to the pits, hunch-shouldered and thoroughly dejected, carrying the model. 'Bottled it?' we asked. No, he replied – the damn rudder servo had died! It goes to show that even the best of us can suffer from 'Murphy's Law', however thoroughly we prepare. Oh well… **RCMW**

A very happy bunny! Having got it down without damage for once, Dane proves that his improvement is no fluke

First 'arrival' of the day. A nose over embarrasses the pilot but it only caused minor scuffs

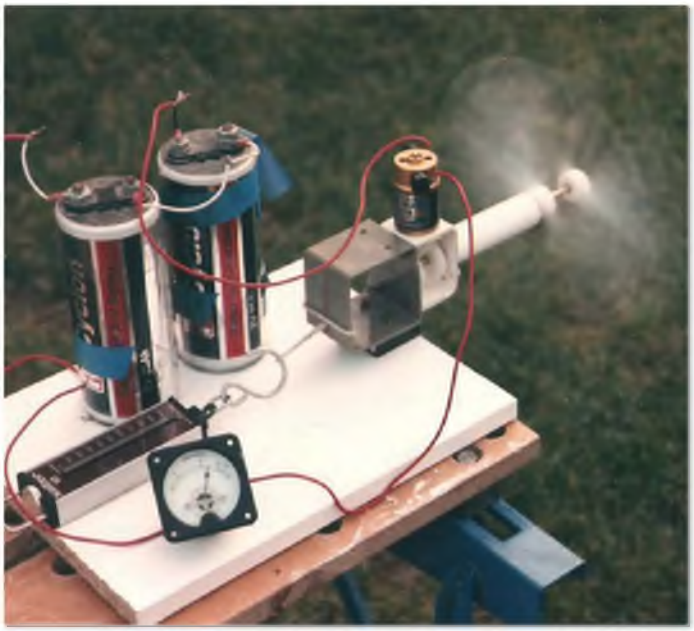
Ready to fly! Foam Spitfire with contra rotating prop assembly

ON THE CONTRARY

Dave Chinery sets out to have it both ways in order to fit brushless contra-rotating prop units to his long-built Brabazon. Here's his story so far

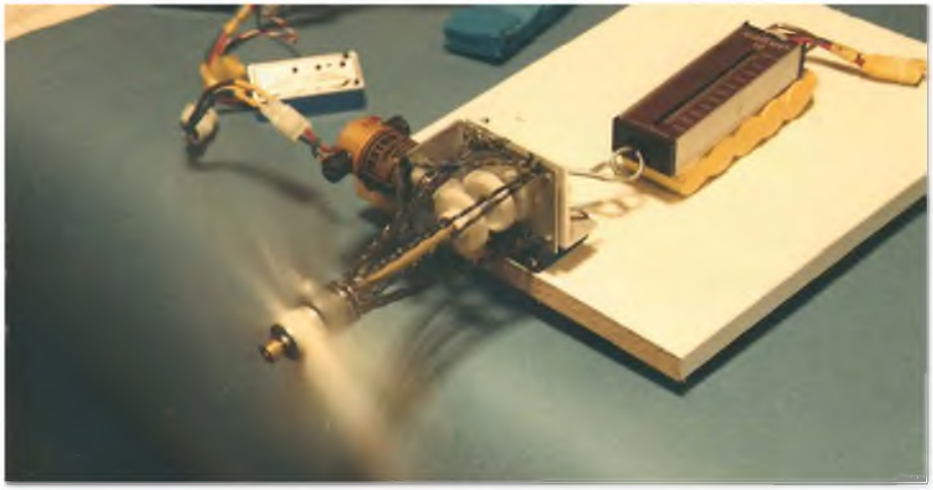
I have always been fascinated by aircraft with contra-rotating propellers since my father worked on the Fairey Gannet in the 1950s. At the time many of the latest propeller-driven prototypes, from many nations, sported the sexy dual-disc propulsor. This was done for a variety of reasons. The last generation of piston-engined fighters, such as the Sea Fury and Bearcat, had major problems with swing on take-off. This was due to the massive torque of the huge propellers on the relatively small, light airframes. The large propeller diameter needed to absorb over 2,000 hp also caused problems with ground clearance and the Bearcat had to have a complicated double-folding undercart to solve the problem. The five-bladed prop used on the Sea Fury was one solution but it didn't solve the torque problem.

Another solution was to fit a contra-rotating propeller, which not only eliminated torque reaction entirely but could also absorb the engine power at a smaller overall diameter. This advantage alone merited fitment to a large number of multi-engined types. Here, propeller clearance to the airframe or other propellers was limited. The Shackleton, Brabazon, Princess flying boat, Short Sturgeon and even the Supermarine Seagull amphibian all had contra-props. More single applications were found in the Martin Baker MB-5, Westland Wyvern, Fairey Gannet and Blackburn YB-5. The latter two were both twin-engined with the Double Mamba; one engine could be shut down in flight and its propeller disc feathered for economical cruise. In the States, the XB-35 flying wing had four, and the Fisher Eagle and Boeing 400 F8-B were single engine examples, among many. Pushers like the Curtis Ascender (A---ender?) and twin boom Swoose Goose (yes, really!) also had contra props.



Prototype contra unit on test

A 'production' unit and parts



A 'production' unit on test

Building the pusher props

Contra-props were absolutely essential for the experimental 'tail-sitter' fighters, the Lockheed Salmon and Convair Pogo. In Russia the Tu-95 Bear had four, each absorbing a claimed 15,000 hp at 0.8 Mach, and it is still in service. What a lovely noise they make, too!

The downsides of fitting a contra-prop are weight and complication. The contra-prop equipped Griffon-engined later Spitfire marks were said to have 300 lb of concrete in the tail to balance the weight of the big engine and prop! The complication of leading two lots of hydraulic controls for the propeller pitch controls through the two shafts was not trivial and required a lot of clever engineering. Problems with the translation bearing, which absorbed the thrust between the opposite-rotating shafts at double the rpm, were also severe initially.

Before leaving full size aircraft it would be remiss of me not to mention a couple of 1930's examples. The Bugatti racer and the Macchi-Castoldi Schneider Trophy racer had contras, but these only had pairs of fixed-pitch, two-blade propellers.

Brabazon airborne! (Tony Smith picture)

Contra-rotating Team Gear unit on test stand

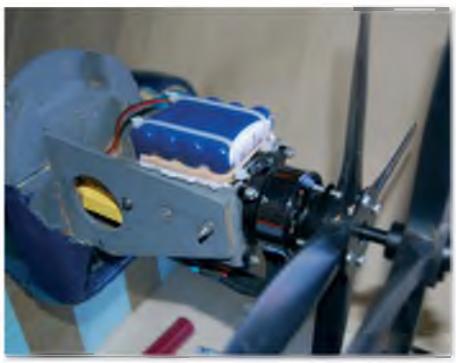
My Boeing Model 400 F-8b, 150 cm span, 3 kg weight

Little Differences!

My first foray into models with contra-props was to start at the top with my Brabazon. Having successfully built and flown two four-engined airliner models, the A W Atalanta and DH Albatross, I chose the Bristol Brabazon as my next challenge. Research with a single contra unit flown as a power-pod on a glider showed it was possible to obtain reasonable thrust. Plans were drawn for a 1/24th scale Brab spanning 285 cm (115 inches) (yes, the real one spanned 230 ft!). Over a period of two years, four 'production' gearbox units were built and tested. Pairs of three-bladed 8" x 6" (Tornado nylon) propellers were added. The 'pusher' halves had to be made from two-bladers as three-bladers didn't exist.

After about two years' work the model eventually flew and continued in service, until one day in 2003. At the Woodspring Electric meeting the model's realism (even the sound!) had several local ex-Bristol workers near to tears. This was a state that I was also to achieve after a badly-judged landing caused damage to the by-now irreplaceable propellers!

Left: Team Gear unit mounted in the Boeing



The new brushless unit mounted in the Boeing. Note the Rx NiCad and ballast added to restore balance

Spitfire contra motor with props alongside the original Spitfire motor

Contra motor on mount

The model has been in the roof of my garage ever since but help is now at hand and I have a supply of new propellers for it, of which more later!

Boeing-Boeing!

A few years later, I was in production of my Team Gear units, which combined two or more standard 'buggy' motors geared together to drive a large propeller for models over about 150 cm. I adapted one of these units to drive a contra prop through two co-axial shafts. I made a pair of 11" x 8" four-blade props by cross-halving wooden Zinger two-bladers, and the completed unit worked very well. Looking round for a model subject to put the new unit in, I wanted something different from the more obvious Gannet or Wyvern. I discovered the Boeing Model 400 F-8B, which had handsome proportions and a huge tailplane.

The resulting model spans 150 cm (60") and features vintage Goldberg mechanical retracts, slotted flaps and a working tail-hook. A non-scale all-moving tail was fitted to overcome any trim problems from the powerful flaps. With the original brushed motor unit it had reasonable performance for the time and was flown at numerous rallies and on the Nationals Showline. Over time newer models appeared and the Boeing went into the loft.

In late 2013 my attention was electrified by an item on the Hobbyking website. They were offering a brushless outrunner contra-rotating motor that looked about the right size for the Boeing. Paying a very reasonable price, I bought one and looked at fitting it to the Boeing. The original power unit was fitted between two ply cheeks, which were adapted by using metal brackets to fit the totally-different brushless unit. The propellers were modified to fit the new motor and re-fitted with a small spinner.

Replacing the original unit and two seven-cell NiCad packs with the brushless motor and two 3S LiPos left the model tail heavy and it needed about 400 grams (12 oz) of weight in the nose to restore the balance.

Hooked up to two ESCs and two 3S LiPos performance is now almost vertical. The 'howl' of the twin props is a unique sound, enhanced considerably when throttling back in a steep fast dive!

Achtung Spitfire!

Being very satisfied with the motor in the Boeing, I looked to buy another one but found they had been discontinued. Instead those now available are at the extremes. A very large unit is rated to fly on two 8S packs, which would be ideal for a two metre span Gannet. A smaller 280 watt CR23MCB-1550 unit is also available. Being inexpensive, I bought a couple of these (in case they also go out of supply) and looked for a suitable application. What I fancied was a late model Spitfire, taking me back to paragraph three above. The new motor is rather small and comes with a pair of 8" x 4" two-blader props. I needed a model of around 1 metre span to suit the motor and was intrigued to discover the Durafly Mk.24 Spitfire, again at Hobbyking. At 110 cm span the model is slightly larger than ideal, but I bought one anyway and removed the standard motor, controller and scale four-bladed prop and spinner.

I made an adaptor to mount the contra motor to the existing plastic motor mount. The only modification to the standard model was to temporarily remove the bottom of the cowl section to expose the cooling duct for the controller, as the two new controllers wouldn't go through without its removal. After refitting the cowl bottom it was time to sort out the propellers!

At the recent LMA show at Gaydon I toured the trade hall and noticed something very interesting. The Flight Loft stand had a selection of opposite pairs of three-bladed propellers of around the size I was looking for. For this 'manna from heaven', I have the 'drone' movement to thank, as these require pairs of opposite-handed propellers. Although the blade shapes were 'modern' and only available in violent dayglow colours, I bought some 7" x 4.5" to absorb approximately the same power as the 8" x 4" two-bladers that came with the motors. Bench tests showed the current drain to be within limits. Using APC type hub adaptors they were easy to fit to the contra motors and the violent colours were covered by matt black paint with yellow tips. A nylon spinner was fitted to the front propeller. The rear 'pusher' prop was left bare to allow some cooling air to the motors. A rear spinner can be added later if cooling allows.

Limited by the available motors, the contra props on the Spitfire are undersized in proportion but still provide enough thrust. If motor temperatures allow, I will fit propellers the next size up, at 8" x 4.5", which are also sold by Flight Loft. Interestingly, this is exactly the right size for the Brabazon, so watch this space! **RCMW**

Contra motor installed in the Spitfire. The cooling duct was removed to fit the controllers and then glued back on afterwards

ROTARY WINGS

Richard Morris puts together the small sister of the SAB Goblin family

First flight and looking good the small Goblin 380 is certainly different to what I am used to

By way of a change, recently I have been enjoying flying some pod and boom models, which are a stark contract to my usual large scale helicopters. My rekindled interest in flying more sport style models was fuelled by the SAB Goblin 570, which I reviewed last year. So when I heard that a smaller Goblin was to be released I decided that perhaps now would be a good time to rationalise my collection of small micro indoor machines, which I have to admit do not get very much use, and invest in the new SAB Goblin 380. Although this model has been designed with the serious 3-D pilot in mind, I decided to take the plunge and invest as I appreciate the precision and accuracy of its predecessor.

It was not long before a package arrived on my doorstep, inside which was my green and blue Goblin 380. As we have now come to expect with most kits every component is safely packed in sealed bags, labelled to correspond to the assembly sequence in the instruction manual. Building commences with the removal of all sharp edges from the carbon fibre components, such as the side frames, so as to avoid any chance of electrical wires becoming chaffed or cut when the model is in operation. Once this has been done the battery tray and tail servo support are fitted to one side frame. I elected at this stage to fit the tail servo, although it is not essential, but it is easier to fix the servo in place, along with the servo arm and linkage ball. I then fitted the aluminium battery block to the other frame and brought the two frames together, along with the rear landing gear. The front part of the landing gear is made up of two feet that are integral to the side frames, while the rear comprises of a wider cross member with two larger feet. This raises the rear of the helicopter, giving a pronounced nose down stance to the model.

Main Mechanics

With the front frames completed I was ready to start assembly of the main mechanics. An aluminium CNC-machined plate is at the heart of things. The 8 mm diameter hollow main shaft runs through the middle of this plate. The main shaft

The first stage is removing any sharp edges from the carbon side frames

Here we have the battery tray tail servo support and a side frame ready to be assembled

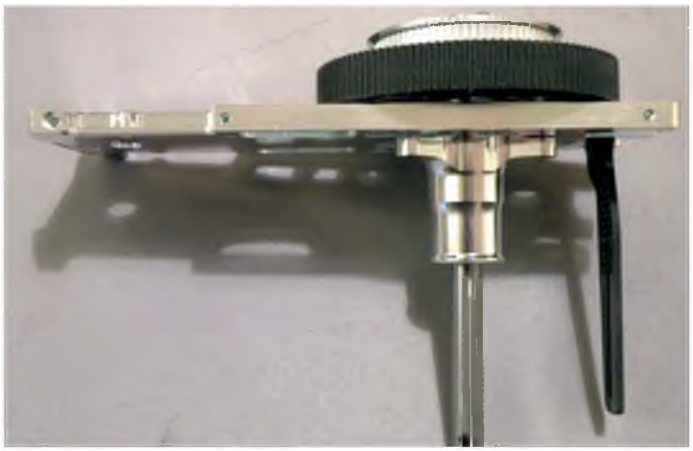
The main shaft is hollow and is located between bearings on the two larger diameters, with any free movement being taken up by shims

Here we see the main shaft located in place and its support attached to the main mechanics plate. Note the serial number on the plate

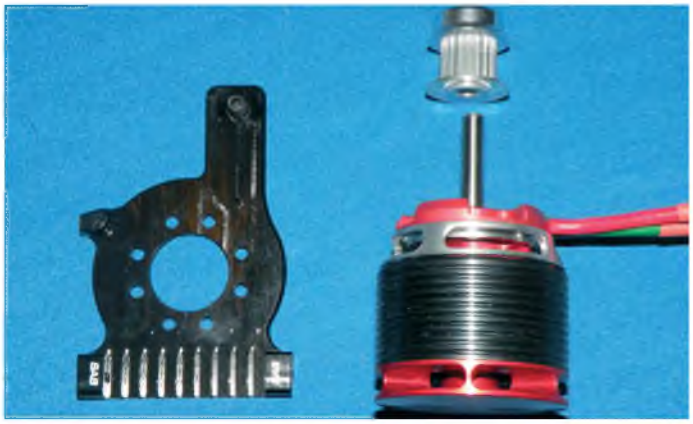
Each blade grip is made up of two parts held together by a single bolt and a tenon joint

The metal blade grips are fixed to the feathering spindle, which passes through the metal rotor head hub

The main and tail front pulleys are fitted to the main shaft and contain the autorotation unit



From the side we see the pulleys and the anti-rotation plate fitted



Power to drive the helicopter is provided by the Kontronik Pyro 380-09 once fitted to its mount and the pulley added

has two collars machined on it. These are supported between bearings and any play eliminated by adding shims. Around the main shaft the three plastic cyclic servo mounts are mounted into their machined recesses and held in place by M2 cap screws. At the front of the main shaft is the swash-plate anti-rotation post, while on the bottom of the main shaft, below the main support plate, the 120 tooth main pulley is mounted with its integral auto-rotation hub and front tail drive pulley. Some free movement of this pulley assembly is required, so some shims are added until you achieve between 0.2 – 0.4 mm of play. Once this has been done you can turn your attention to the rotor head.

Firstly, the plastic radius arm ends are fitted to the metal radius arms. At each end of the metal radius arms are two flanged bearings, which should assure free movement, even under high loads. The radius arms are fitted to the metal centre hub, which carries the 5 mm feathering spindle on two 'O' rings and dampers.

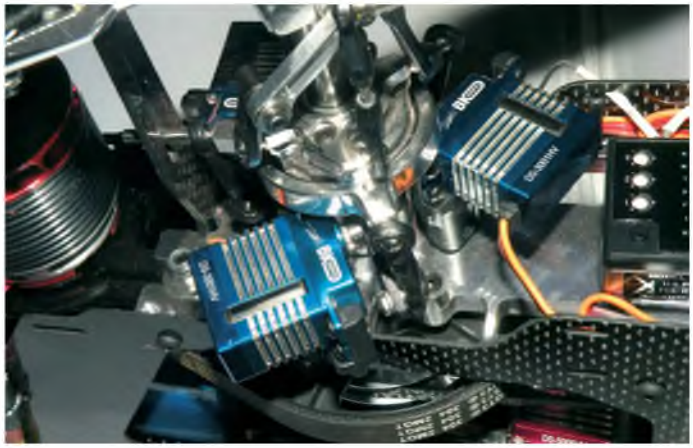
The blade grips are metal and require the fitting of the blade grip arm, which is located on each grip and held in place by a single M2 bolt. Each metal blade grip assembly is carried on two bearings, with end loads being taken care of by a single thrust bearing. It is possible to fit shims between each blade grip and rotor head damper, to adjust the rotor damping to suit your particular style of flying. For sports flying it is suggested that no shims are fitted, while for 3-D flight, with higher rotor speeds, at least one shim should be fitted.

With the rotor head completed I fitted the linkage balls to the metal swash-plate and slid this onto the main shaft, before fitting the rotor head assembly. The completed mechanics are then fitted to the frame assembly built earlier. I then fitted my cyclic servos, having firstly centred them on my radio, and fitted their output arms and linkage balls. It is important to ensure the linkage balls are all set at the same radius from the servo centre. In this case a radius of 13.5 mm, so that equal control throws are provided by each servo.

Fitting The Motor

With my servos fitted, I was ready to turn my attention to the motor, which is fitted onto its mount and the output pulley added. Obviously, which pulley you fit will depend upon the motor you fit, but in my case the standard 21 tooth pulley supplied with the kit was correct for the Kontronik Pyro 380-09 motor I had elected to use. This combination of motor and pulley gives me a ratio of 5.7:1 and a maximum rotor head speed of 3400 rpm. It is important to orientate the motor correctly on the motor support and attach the pulley to the motor shaft so that the pulley stands off from the motor support by a distance of no more than 18.5 mm. This set up should allow the toothed drive belt to sit centrally on the main drive pulley.

With the motor fitted to the support plate, it can be added to the main mechanics and frame, not forgetting to



Arranged around the rotor head are the three cyclic servos operating the metal swash-plate

The front part of the mechanics are simple, although the undercarriage looks a little strange

The tail assembly is quite conventional, being belt driven through a carbon fibre boom

fit the drive belt and adjust it correctly, before tightening the screws that hold it in place. Next, I assembled the tail hub, adding the metal blade grips to the tail spindle, which is supported on 'O' rings in the tail hub, allowing it to teeter. Each blade grip is carried on two bearings, with end loads being carried by a single thrust race on each grip. The tail pitch slider is supplied ready assembled, with only the tail pitch links requiring to be added. These are marked on one side with an 'S', which should be visible when attached to the blade grips.

Once the tail hub and slider assembly is complete you are ready to attach these to the tail boom. This complete assembly is carried between two bearings, one mounted in the vertical fin while the other is mounted in a metal plate that fits to the tail boom opposite the vertical fin. Before fitting the complete tail assembly to the tail carbon boom, do not forget to add the tail drive belt. Once this has been done you are ready to add the tail to the front frames of the helicopter. In common with its larger siblings the tail boom is a single piece, rigid carbon structure, fixed to the main mechanics with a single M8 nylon bolt. The nylon bolt is sacrificial and in the case of a crash it is hoped that the boom will separate from the mechanics, keeping damage to a minimum. With the tail boom in place the M8 nylon bolt is tightened with the plastic tool provided and the anti-rotation block added to ensure it does not become loose. All that now remains is the fitting of the canopy, which entails opening up some holes to take the rubber grommets and adding some self-adhesive edging strip.

Next Time

That concludes the building of the mechanics, allowing me to move on to the installation of the avionics and setting up. This is where I will leave things until next time, when I will go through the set up and flying, along with a rundown of the batteries that I found to be best. So until then, fly safely. **RCMW**

Ready for action, the Goblin 380 has everything installed and set up

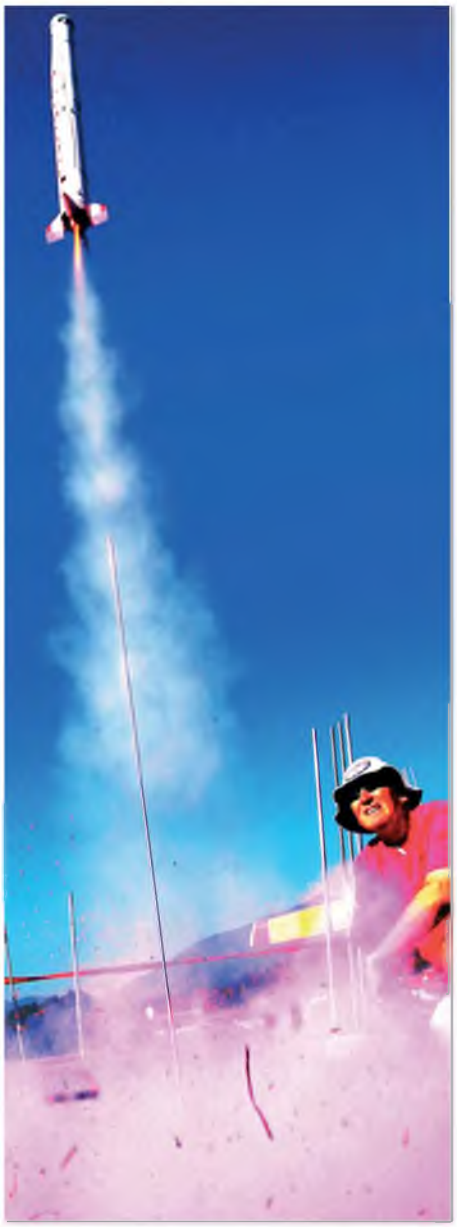
The Goblin 380 may only be a small helicopter but it certainly has presence in the air

SCALE ROCKETS VERSUS SCALE AIRCRAFT

Looking for your next scale model challenge? How about trying your hand at a scale model rocket? Stuart Lodge provides some background information

Stuart Lodge (GBR) prepares V-5-V Vertikal 1 for its qualification flight at the 28th Ljubljana Cup in Slovenia. This result clinched the Bronze medal in the overall S7-Scale World Cup in 2006 (Jan Prpic photo)

Books, journals, drawings, photos, colour details, decals. All are needed to scratch-build scale model rockets



5-4-3-2-1-START! Your scribe pushes the button to boost Vertikal away at yet another Ljubljana Cup, which is always the best event of the FAI space modelling season (Jan Prpic photo)

Scale rockets mimic scale model aircraft; how can there be any difference? What is identical is that the satisfaction of building/flying a scale replica is unequalled and it's what the general public loves to see. We need to study the two generics, as there are some fundamental contrasts. In popular jargon, model rocketry is the generic term for the activity in the UK and United States, and space modelling for the rest of the World. There is free and full use of both in this piece! Time for a historical snapshot…

History Lesson

Full sized aircraft became a reality in the 20th century, just over 100 years ago. Rockets are centuries old, having been invented by the Chinese – in the wake of the development of gunpowder – in the 13th century. These became rudimentary weapons and Pien Ping city was sieged with rockets in 1232. Ceremonial rockets and fireworks became popular throughout this time but it took the late 19th and 20th centuries to develop rockets into effective weapons' systems, research devices and payload/satellite carriers.

Compare And Contrast

Practically all aircraft from 1900 onwards – greater than 99.9% – evolved to carry people, from a single pilot to hundreds of passengers. Cruise missiles and drones are the odd men out! Rockets are not 'people carriers', with about a dozen exceptions and these include, Vostok, Soyuz, N1, Energia-Buran (former Soviet Union and Russia); Mercury Redstone, Atlas Friendship 7, Gemini Titan, Saturn 1B, Saturn 5, Space Shuttle (United States); Shenzou (China).

The fundamental difference is size and related 'Orders of Magnitude'. An aircraft's size focuses on people; a rocket's size focuses on function. As an example the full size Saturn 5 moon rocket was more than 100 m long and as wide as a dual carriageway! Contrast that with a real Sako anti-hail rocket, conceived to spray potassium iodide into freezing clouds, which is less than 30 cm (~12 inches) long. Your scribe has judged a 1:100 scale, 1 metre (39") long Saturn 5 and a 1:1 scale, 30 cm Sako in the same World Cup hall in recent times.

Aircraft, almost without exception, are designed to be used again and again, with maintainability built in. Rockets are generally boosted once, before digging their own grave or splashing down! The Space Shuttle was 'reusable', with the orbiter and solid rocket boosters being recovered and refurbished. But the main fuel tank always needed to be replaced after every flight.

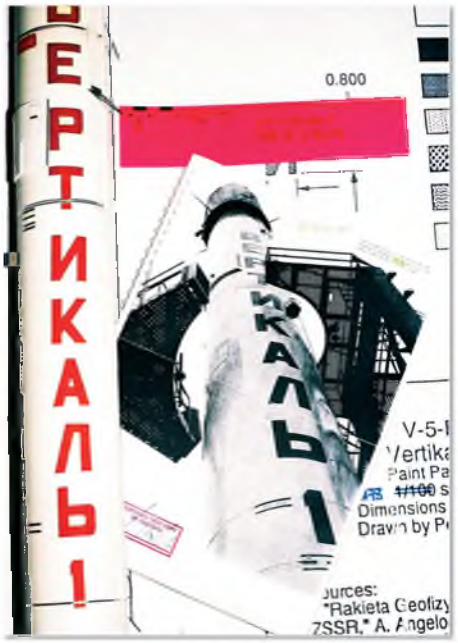
This is a challenge for scale rocket modellers as it is practically impossible to find a rocket prototype that's actually flown! Images and drawings in textbooks are great but that rocket in the museum might not be exactly like those that were launched. When modelling full sized aircraft this side of life is much easier.

Construction

Scale model rockets tend to be traditional in construction, using cardboard tubes, balsa and plywood, clear and coloured dopes, complementing contemporary composites, resins, extruded plastics et al. Space modelling is very good at layering traditional and contemporary methodologies together.

Finishing techniques normally involve bringing all the varied constructional materials to the same state prior to the application of finishing layers. Lettering and numbers are designed, and handed over to specialists who prepare accurate decal sheets.

Estes, Apogee Components, North Coast Rocketry and others have always carried scale models in their kit ranges and this is where most will start. The big plus with taking this route is that successful flights are normally guaranteed, providing the instructions are followed and the model is competently built.



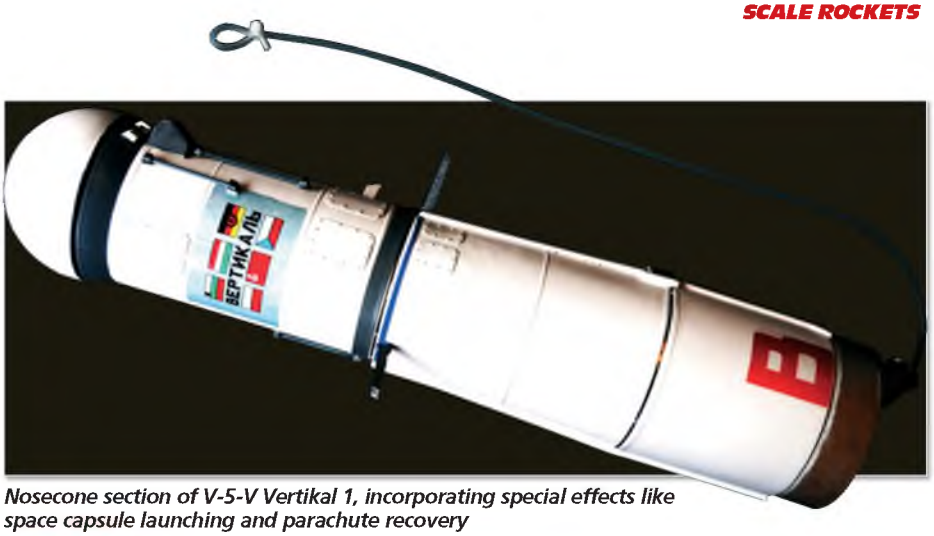
Good photos and colour data are needed to produce a model like Vertikal from scratch. The 1:25 scale prototype poses beside a picture of the real thing

In contrast, in Eastern Europe, a number of prototypes have been kitted, often employing contemporary composite materials. The Serbian manufacturer, Ultra produces a number of single and two-stage prototypes, often for FAI class S5-Scale Altitude (see below) and it is even possible to get a quote on a 1:50 scale Saturn 1B! It's almost like buying ARTF scale aircraft in the hobby shops.

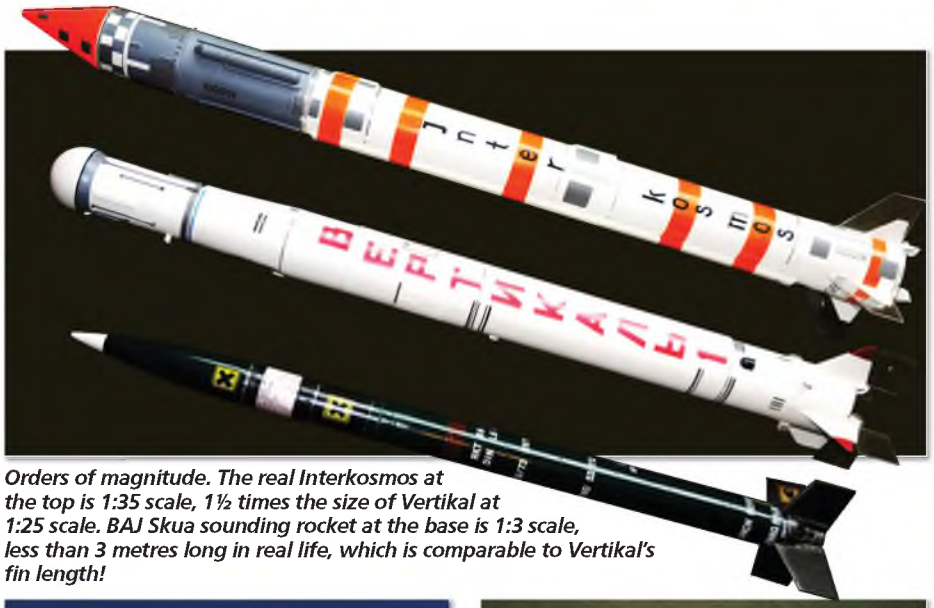
Scratch Building

When scratch building, what should you choose?

Your scribe will always recommend choosing a single-stage sounding rocket for a first scratch build rather than the Space Shuttle. Why? Sounding rockets were conceived to boost high into the stratosphere and beyond, to collect meteorological data and transmit this back to the ground. These prototypes normally resemble basic Estes kits; they are fairly



Nosecone section of V-5-V Vertikal 1, incorporating special effects like space capsule launching and parachute recovery



Orders of magnitude. The real Interkosmos at the top is 1:35 scale, 1½ times the size of Vertikal at 1:25 scale. BAJ Skua sounding rocket at the base is 1:3 scale, less than 3 metres long in real life, which is comparable to Vertikal's fin length!

Bedrich Pavka's (CZE) Ariane 44LP boosts away on the Kamniska Polygon at the 2008 Ljubljana Cup. Super multistage model with plenty of special effects. Note that S8E/P-RC Rocket Glider was being flown at the same time as S7-Scale at this World Cup

Is the doctor in? Simple scale models should be easy to make from basic body tubes and nosecones. The dissection kit shown provided virtually all the tools needed back in 1986!

Re-entry mode! The author's BAJ Skua – in her 'red phase' – recovers from a glorious sky at a Southern England Rocket Flyers (SERFs) meeting at Yatesbury, Wilts. Spectacular!

simple and will normally boost/recover perfectly. Examples include: BAJ Skua (mine is 1986 vintage!), Viking, Terrapin, ASP and others.

Unfamiliar? Then it's time to do some…

Research!

…And how big and how high?

Scratch building involves obtaining information – scale data – on the beast to be modelled. There are plenty of sources and the basics are: prototype length; diameter(s); fin size(s); nosecone shape and colour/graphic details.

How big should it be? What propellant specific impulse? How high will it go?

Rule 1, the major body tube diameter determines the scale. Estes stock a very wide range of body tubes, with matching nosecones, rocket motor mounting tubes, centring rings etc.

Motors come in a wide range of specific impulses; time-thrust curves, ignition spikes, thrust-delay combinations. This gives the clue that the building and flying of advanced scale model rockets is no easier than scale model aircraft. Get it wrong and there's the prospect of hundreds of hours of work getting splatted! Fin area and nosecone shape are big players in the stability equation and many full size rockets have little fin area or none at all.

Centre of Gravity (C of G) and Centre of Pressure (C of P) relationships, C of P migration, instability et al, are all very important for the successful boosting of scale rockets. But it's all getting a bit technical, so we'll stop and suggest a read of a couple of titles by a guy with a name like mine:

Model Rocketry-Space Modelling – Traplet Publications, ISBN 978-1-907712-00-5

Zika Josipovic (SRB) displays his Saturn 1B, serial number SA-205. Note the cluster of motors employed at the base, which splits during the boost to launch the second stage. This model employs contemporary composite construction

BAJ Skuas 1:3 and 1:5 scales pose atop a real Skua payload section, plus plans and photos. It's all about the data!

Staging! Dimitar Vachkov's (BUL) Soyuz TMA sheds its boosters at the 35th Ljubljana Cup in 2013. This is called 'Korolev Cross' in real life – fantastic!

The best scale space model ever? Oleksandr Levikh (RUS) has been World and European Champion on several occasions with this replica. In real life, Soyuz TM12 boosted Briton, Helen Sharman into space. Awesome is not a big enough word

Super Saturn 1B, plus Zika Josipovic (SRB) normally means a podium! This was at the 2nd Fenix Cup, Vincovci, Croatia in 2012

Dimitar Vachkov (BUL) jealously guards his Soyuz TMA at the 35th Ljubjana Cup in 2013!

Mihael Noritsin (RUS) poses with his BIG 1:40 scale Soyuz TMA at the 35th Ljubljana Cup. He then went on to deliver the best flight your scribe has ever seen. Golden Dragon!

The Model Rocketry Handbook – Special Interest Model Books, ISBN 1-85486-229-4

FAI Scale Events

The FAI scale events are S7-Scale and S5-Scale Altitude.

When the world comes together to fly scale rockets, watch out for fireworks! Not literally, but the standard is very high indeed and, yes, there are TWO scale classes carded:

S7-Scale

Equates to FAI class F4 – Scale model aircraft. Choose a prototype, research it, model it down to the last rivet and compose a documentation pack. Then execute a qualification flight packed with special effects (SFX). Scale judging parameters include, Degree of Difficulty, Scale Adherence, Workmanship and Finish, with the documentation pack scrutinised for completeness… But it is not scored these days.

Simplistically, the more complex the prototype - more details; more accuracy; more motors; better finish; best flight with the most SFX; more parachutes/streamers – the higher the score. But only if it all works!

Problems with this class are that there are too few prototypes to model, with far too many Arianes and Saturn 1Bs in most entries. It gets worse as only prototypes that have actually boosted may be entered in FAI events, so you can't copy the one in the museum, either at Cape Canaveral or the Kosmodrome!

By the time you read this, your scribe will have judged scale at the World Champs in Bulgaria, where there will be over a dozen Saturn 1Bs. Specifically, serial number: SA-205, which was well documented/photographed before it flew! Recent FAI Sporting Code changes, including not scoring the docs packs and having an 'originality bonus' for prototypes unique in the hall, have gone some way to increasing both diversity and numbers at a typical World Cup event. S7-Scale had become too academic and far too restricted in content and innovative changes were needed to ensure the future.

S5-Scale Altitude

How high do they go? Re-read the S7-Scale section, add minimum model dimensional specifications and propellant specific impulse limits, plus an electronic altimeter (eAltimeter) and we have the potential for an attractive performance event. The class is best flown two-staged, which is more efficient, with prototypes including the WAC Bumper, Taurus Tomahawk, Nike Apache/Cajun/ASP.

To explain the jargon, on a two-staged rocket the first part of the name, e.g. Taurus and Nike, is the first stage bottom booster. The second part, e.g. Apache, Bumper, is the top stage. Juniors fly smaller models using half the specific impulse. Like S7 Scale diversity is not as good as it might be. But it is very spectacular and spectators enjoy watching. As for scoring, take the static points score and add the eAltimeter reading in metres… Simple!

Back To The Future

Space modellers have contributed significantly to aerospace history.

So much of the information relating to former-CCCP rockets was top secret and it would have remained that way – and lost – but for the commitment of devotees. Most notable is Vladimir Minakov, who has documented an enormous array of former Soviet prototypes, including: V-5-V Vertikal, Interkosmos, Vostok and Soyuz generics.

Similar work has occurred in the USA and Western Europe. Much of this is aggregated together in Peter Alway's 'Rockets of the World', Saturn Press, ISBN 0-9627876-5-5.

And that's where we all start!

Recovery Phase

Building and boosting scale prototypes is demanding, challenging and difficult at times. But there's nothing more satisfying than pushing the button and watching the perfect scale boost, complete with multi-staging, SFX and a perfect recovery. This is what makes scale rocket modelling and scale aircraft the same…

We share the passion, commitment, focus, frustration, nerves, the agony and the ecstasy! **RCMW**

Staging! Geeks Constantinescu's (ROM) Ariane 3 sheds its bottom section against an azure sky

Ariane 44LP by Pavel Brony (CZE) zooms skywards at yet another Ljubljana Cup. A marvellous model but there are just too many Arianes! It's a marvellous flying site too on the Kamniska Polygon

Your scribe's V-5-V Vertikal 1 in re-entry mode at the 25th Ljubljana Cup in 2003. It floated right back to the top step of the podium… Another Ljubljana Dragon!

This is what the scale hall looks like at a major champs! This is the 2010 18th World Space Modelling Champs. Note the S5-Scale Altitude models on the middle table, with S7-Scale birds around the perimeter. The toughest week of the year!

ESTES RIPTIDE ROCKET LAUNCH SET

Vaughn Entwistle tests rockets to infinity and beyond!

The Estes Riptide rocket, launch pad, and ancillary equipment all come cleverly packaged in this small box

For decades, model rocketry has been a huge hobby in North America and across Europe. Now, thanks to availability of inexpensive and well-designed model rocket kits, this space age hobby is blasting off in the UK.

Estes And Logic RC

From its beginnings in Denver, Colorado, USA, Estes was the first company to mass-produce model rocket engines that delivered safe, consistent and reliable performance. While the company has changed hands over the years, Estes has consistently been the dominant producer of model rocket kits, launch equipment and ancillary equipment.

Logic RC is the UK distributor, offering the entire catalogue of Estes products on its website: www.logicrc.com

Do I Need Insurance?

Model rocketry has an exemplary safety record, both here in the UK and throughout the world. There are rocketry clubs across the country affiliated under the UK Rocketry Association (UKRA), which operate under the association's safety guidelines. Insurance is available through UKRA, but BMFA members are already are insured to fly rockets up to G impulse (a rating of rocket power). Most of the smaller rockets that Estes supplies fall below the G impulse rating.

The rocket is ARTF with little to assemble. The launch pad is an ingenious three-legged design that locks together in seconds

The only extra items you will need to launch your rocket are a packet of flameproof recovery wadding and a box of rocket motors. Each box contains three (3) rocket motors and four (4) igniters

Actually, It Is Rocket Science

One of the best ways to get involved in model rocketry is by purchasing an ES2 launch kit, such as the Estes Riptide ARTF launch set, which comes with most everything you need to become a rocketeer. The kit includes a very neat Riptide rocket and a bright orange launch pad and launch controller. Logic RC stocks a total of 20 different varieties of these ES2 launch kits.

Logic RC very kindly supplied Traplet with a review rocket kit and here are my impressions.

You wouldn't think there would be much in the colourful box, but you'd be wrong, and a photograph of the parts inside reveals what a clever job Estes' engineers did in packaging the kit.

All parts come carefully packaged in their own plastic bag, and include the Riptide rocket with its chrome blue plastic nose cone and fins, a plastic bag containing the bright orange recovery chute and instructions, a round metal heat shield, three plastic legs that slot together to form the launch platform, and a bright orange launch controller. The only necessary items not included are rocket motors (which come with igniters), flame proof wadding, and a 9 volt battery to power the launch controller. (Rocket motors and wadding can be purchased from model shops supplied by Logic RC.)

There's no real building involved with the Riptide kit, just minor assembly in attaching the parachute to the rubber shock cord and then slotting the bright orange plastic legs of the launch pad together. Less than ten minutes and you are ready to boldly go…

How Model Rockets Work

Model rockets are powered by disposable, one-time use rocket motors. Powerful and simple in design, these motors are manufactured to precise tolerances to ensure reliability and safety. A typical motor consists of a paper tube filled with a propellant (small rockets motors most commonly use black powder). At one end is a ceramic exhaust nozzle. This is the exciting bit, which produces high-thrust rocket efflux when the propellant is burned. Just as the propellant burns out, it ignites a delay charge that emits tracking smoke and allows time for the rocket to decelerate as it continues to coast skyward.

Finally, the motor sets off a powerful ejection charge that produces a rush of hot expanding gases that pops off the nose cone and deploys the parachute recovery system. (Before launch, a few sheets of flameproof recovery wadding are placed in the rocket tube to protect the parachute.)

Each rocket motor has a letter-number code (for example, C6-5). The first letter indicates the total impulse power (in Newton-seconds) produced by the motor. Each succeeding letter has up to twice the total power as the previous letter. For example, a 'B' motor has twice the power of an 'A' engine, a 'C' motor has twice the power of a 'B' motor, and so on. The first number in the code refers to the average thrust of the motor, which determines how fast the rocket will travel. In general, the higher the number, the faster the speed. In all cases, it's important to follow the manufacturer's recommendations to select the correct motor for your rocket.

Rocket motors are ignited by special igniter wires that glow red-hot when current is passed through them. Estes uses a clever design whereby the igniters are held in place by tiny disposable plastic plugs. The plugs ensure that the metal igniter element is pressed tight against the propellant and also prevents the igniter from falling out. Estes thoughtfully provides four igniters for each box of three rocket motors, so you have a spare.

The rocket on its launch pad, ready for the count down

Electrical leads with crocodile clips attach to the igniter wires

Model rockets are light and when descending by parachute will drift at the speed of the wind. You will therefore need a large area to launch your rocket and relatively calm winds.

Zero Hour; 5 am

On launch day, I deliberately got up early before the winds kicked up and drove to the largest local field I have access to: two side-by-side rugby pitches.

After setting up my camera on a tripod and attaching a remote release, I installed a rocket motor and igniter in the Riptide and slid the rocket onto its launch rod. For added safety, the Estes launch controller has a safety key and a launch button. Both must be pressed simultaneously to launch the rocket. Inserting and pressing the safety key causes a bright LED to light up, showing that current is flowing through the igniter wires. The safety key must be held depressed while the launch button is pushed.

As I needed to take photos for the review article, this required me to press both buttons on the controller with one hand while simultaneously pressing a camera release button with the other hand. (I had forgotten to bring my third hand from home.)

The launch controller has two buttons. This photo shows a thumb pressing down the removable safety button/key. The second button (in the middle) is then pressed to launch the rocket

Blast off! Riptide rips off the launch pad on a jet of flame

So Zero Hour arrived and after the requisite ten-second countdown (is there any other way to launch a rocket?) I pressed both buttons and fired off the camera. There was a brief delay caused by the time required for the igniter to heat up and the propellant to ignite, and then… WHOOOOSH! Riptide streaked off the launch pad with an impressively rockety roar and ripped skyward trailing a nimbus of smoke.

Within seconds it had reached around six/seven hundred feet in altitude, whereupon the motor burned out and the rocket released a plume of tracking smoke as it continued to coast skyward. Then the nose cone popped off and the orange parachute tumbled free and blossomed. Brilliant!

It worked just as advertised. I have flown lots of R/C models in my time, but I must admit that launching a model rocket really gives one a sense of power.

The box claims that Riptide is capable of flights of 600 feet in altitude and higher, and it certainly seemed to go at least that high. Now my decision to launch in the early hours before the winds picked up proved to be wise, as the rocket descended almost vertically, sunlight flashing off the chrome fins and nose cone, and very nearly landed back on the launch pad!

I had three 'B' rocket motors with me, and Riptide performed flawlessly on each launch. The rocket leaves the pad so fast that I only managed to capture the launch in two out of three photographs, and that was shooting at shutter speed of 1/4000 of a second. These rockets may be small, but they are b****y fast!

Using a powerful telephoto, this shot captures the Riptide at altitude. At this stage the rocket motor has burned out and the nose cone has popped but the parachute has yet to open. Notice the white trail of tracking smoke released by the rocket motor in the last few seconds before burn out

Riptide floats back to earth on its recovery parachute

Mars Ain't The Kind Of Place To Raise Your Kids

I highly recommend having a bash at model rockets. They are brilliant fun, surprisingly spectacular, and provide a great family activity to share with the wife and kids. If the rocketry bug bites deep (and I have to admit, launching model rockets is surprisingly addictive) Logic RC stocks the full Estes catalogue of rockets for all skill levels, as well as rocket motors and other equipment.

Some more advanced kits include scale model rockets, such as the V2; boost gliders such as the Astron Sky Dart II and Tercel; and payload gliders such as the Eggscalibur, which can loft an egg into the sky and return it to earth (hopefully unscrambled and in time for breakfast).

So there you have it. Since I was a child I always wanted to be an astronaut. I never realized that dream, but at least now I am a fully certifiable space case. Now if only this goldfish bowl on my head would stop fogging up! **RCMW**

Almost down, the final few seconds of the parachute's descent

Whoosh! Another launch. Rockets are extremely fast. This launch was frozen at 1/4000 of a second shutter speed!

CONTACTS

www.logicrc.com
www.ukra.org.uk

RC MODEL WORLD DETAILS

MODEL INFORMATION

NAME:	Riptide
MANUFACTURER:	Estes
DISTRIBUTOR:	Logic RC
WEBSITE:	www.logicrc.com
PRICE:	£21.99
MODEL TYPE:	Rocket
CONSTRUCTION:	Paperboard tube, plastic fins and nose cone
PARTS SUPPLIED:	Rocket tube, nose cone, launch pad and launch switch
PARTS REQUIRED:	Recovery wadding; rocket motors, 9 volt battery

MODEL SPECIFICATIONS

ROCKET LENGTH:	457 mm
PARACHUTE DIAMETER:	30.5 cm

DISLIKES

None

LIKES

Ready to fly – no building required • Igniters worked reliably • Clever design of collapsible launch pad and safety of two-button launch control

Wanna Be A Rocket Man? (Or Woman?)

WIN! One Of Six Estes Riptide Launch Sets (Courtesy of Logic RC)

The Estes Riptide launch set comes with a Riptide rocket, launch pad and controller. The only additional items you need to join the British space race are rocket motors (which come with igniters) and a packet of rocket recovery wadding – all available from Logic RC. You can watch a video on Estes at Logic RC's website and also browse their full catalogue of Estes products.

To enter the Riptide Giveaway answer the simple question below. The information can be found in the preceding article or on the Rocket section of the Logic RC website:

1. How many ES2 launch sets does Logic RC stock?

Please email your answer along with your full name, phone number and mailing address) to Traplet publications at: competitions@traplet.com

The competition will run from 20/08/2015 until 20/09/2015. The first six correct answers will be drawn at random and the winners notified.

RE-ENGINING A POWER MODEL

Sometimes you need to swap an old engine for a shiny new power plant. Loris Goring shows how

There are many good reasons to re-engine a power model. Sometimes you may need to fit a new engine to replace one that is worn out or severely damaged in a crash. You may even want to replace an electric motor to bring a vintage model back to its original concept. In my case it was to put a smaller engine into an over-powered plane.

Normally pilots like to have plenty of power available for snappy take-offs. But to hand over an excessively powered plane to a novice is foolish and even dangerous. It is equally foolish to over-power a plane excessively so that it falls apart in the sky. When kit or ARTF manufacturers specify a range of I/C engines or electric motors to power their planes they have tested them for safety.

Model aircraft can suffer from over stressing the structure, as can any full sized aircraft. Over-powering has caused more than one model to break up in the sky. Experienced modellers even beef up construction in areas like the main spars and landing gear to ensure safe aerobatics and reliable landings.

Chris Foss designed my Uno-Wot for .25 or .30 I/C glow engines, but I had been flying it gently throttled for years with a BB40 Enya and, later still with an old Irvine 40. It performed perfectly to my liking but when

A few stock engine mounts will not break the bank

I had moved onto a Wot 4 needing a .40 it was time to downsize the power for the Uno-Wot. Yes, it would be more sedate but it would be ideal for club training purposes.

It is not simply a matter of bolting on a new motor. Engine mounts and bulkheads are often different. It may be necessary to fit a new engine mount. Mounts for smaller motors do not break the bank, so as a prolific builder I keep a small stock of Radio Active long and short reach engine mounts. I even keep old ones in case I need to revert back to the originals.

Maintain The Centre Of Gravity

Though not entirely necessary, I do weigh the old engine against the weight of the new, just to get some idea of how a new engine will affect the Centre of Gravity. No matter what the C of G must remain precisely where it was originally designed to be.

There are various ways of achieving this. A lighter engine may need to move more forward on the engine mount, while a heavier one might need to move tight back against the firewall bulkhead. The receiver battery can be moved to compensate. If it was positioned dead on the C of G then it can usually be moved forward or backwards. The fuel tank can often be slightly moved, or if the engine is being downsized a smaller tank can be safely fitted.

My ancient Irvine weighed a whopping

Weighing the old and new engines

Removing an old engine mount

Clean the tank before reinstalling the fuel system

Use thread sealant on mounting bolts or use locking nuts

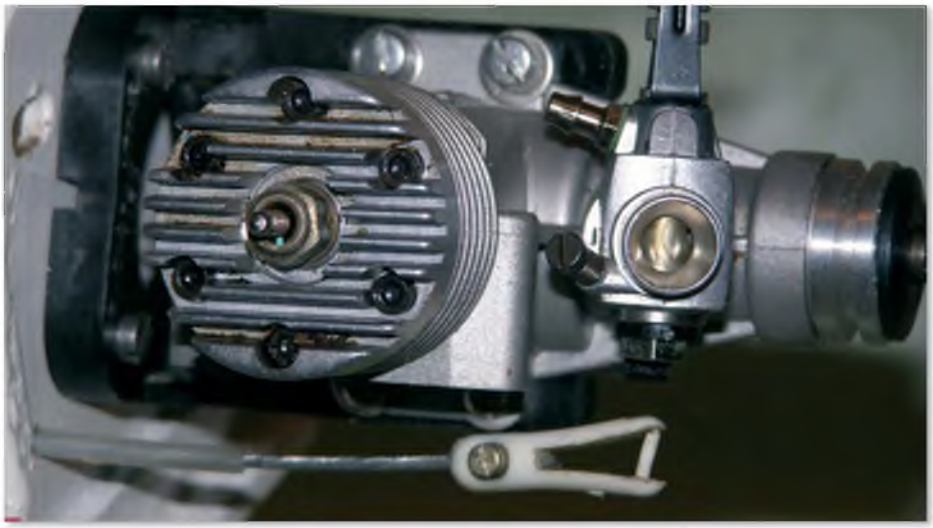
341 grams, while the new OS is a mere 226 grams. The approximate 100 g difference would mean that the new OS could be fitted well forward on a new engine mount. But I then needed to remove the old mount as its beams were too wide for the new engine.

Whenever you remove a fuel tank ensure that the gooey old oil that is invariably left in it is completely cleaned out. Even the best pumps do not get the last drops of fuel out and evaporation will ensure that the old oil is as thick as porridge. Reliability and easy starting is the name of the game and this job uses little time and only a bit of paraffin. When replacing a tank sit it on fairly rigid foam, which reduces foaming but still ensures that it can never move and upset the C of G. In any case, as fuel is used in flight there is always a very slight change in the C of G.

Most club flyers seem to favour flights of around ten minutes or so, plus of course a good safety margin. Changing engines and/or tanks is the ideal opportunity to check this and then you will know exactly what safe maximum flight times you can expect. Run a full tank through and time the run. I was downsizing so the original 6 oz tank would simply give longer flight times.

No matter whether upsizing or downsizing, a new engine will need, according to Murphy's Law, an engine mount whose bolt holes are different from the previous one. If captive T-nuts were used for the original mount then this is a nuisance, but they can usually be removed by inserting a narrow chisel (1/8") under the flange. This is not all that difficult and most plywood firewalls will not be weakened when four more extra holes are drilled in them.

A model fitted with a large engine using mounting beams that are wide apart can be fitted with a smaller, narrower engine by making a drilled metal plate that is bolted onto the old mount.



A Radio Active link is ideal for connecting the carb lever to a Bowden throttle cable

Down And Side Thrust

Will re-engining affect the old down and side thrust lines? Of course it will, but generally speaking – and provided there is not an enormous discrepancy between the old and new power outputs – it is safe to leave things as they were originally designed. If trim is uncomfortable following the test flights then it is quite easy to use a washer or two behind the back of the engine mount on the top bolts to increase down thrust or, looking toward the nose, fit another washer to the left side to increase side thrust.

The throttle cable may also need adapting but it is a simple job to increase the length of the cable between the servo and the throttle arm on the engine. I use a Radio Active solderless nipple link and their Bowden cable. When a longer length of cable is needed in the link then it is easy to undo the screws on their CA107 Nipple Link and fit a new length of cable.

In Summary

Yes, refitting a model with a different power plant is a bit of a juggling game. But it is well worth the time taken in the workshop to bring an old model back onto the flight line.

A final tip: to make certain that engine bolts will not loosen, use a little Loctite thread sealant to make sure that the bolts are well secured. Or use an extra nut behind the original one to lock them onto the bolt.

RCMW

SMALL MODEL TORQUE RODS

Twin aileron servos are all the rage but torque rods still have their place when building R/C models, especially of the smaller variety. Bill Bowne shows how to make a pair of pivoting rods

Modellers have been using torque rods to operate strip ailerons for a long, long time. So model hardware manufacturers make them for us in several sizes in order that we can easily install them in our models. Well, most models that is...

The problem is that there's a dearth of ready made torque rods for models weighing around a pound. So, we have to make them. It's really quite easy.

All we need is some music wire, brass tubing and plastic tubing. The music wire should be around 1/16" (about 1.6 mm) and the brass tubing should be a slip fit over the music wire, and be easy to flatten. The plastic tubing should also slide over the tubing BUT there should be very little leeway. This is the bearing for the torque rod and it needs to be snug, not loose, as loose fits produce flutter. And flutter is fine for butterflies and hummingbirds but not for model aeroplanes!

Yes, you can substitute aluminium or brass tubing for the plastic but be careful when gluing the torque rods in place – it's hard to glue the plastic tube to the music wire, but you CAN glue a metal tube to the wire! Doing so usually requires major surgery, as I've found to my dismay. So, I always use plastic tubing.

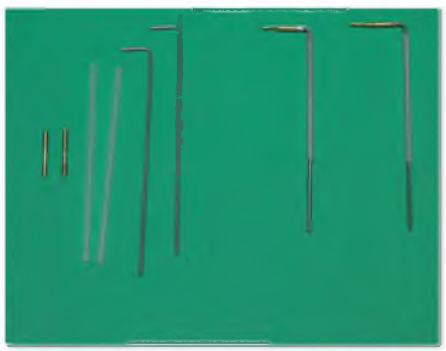
How long to make the wire? Leave a small gap (at least 1/8") between them at the wing centre, otherwise the pushrods and torque rods may interfere with each other. So, cut the wire long enough for the 1/4" 'leg' near the centre, plus the distance to the bend into the aileron, plus about 1/2 of the aileron chord.

Let's gin up a set of small model torque rods, shall we? **RCMW**

CONTACTS

K&S Metals
http://ksmetals.com/

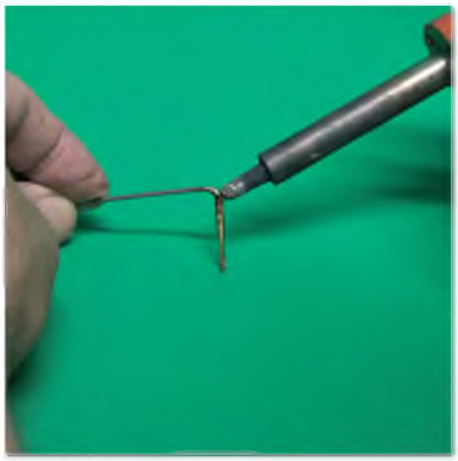
Supplies and tools needed to make a pair of torque rods (from left; top row): solder flux, acid-core solder and a soldering iron. Middle row (from left): brass tubing (about 1"), music wire, plastic tubing, a pair of almost completed torque rods, plus a drill and bit. Bottom row (from left): strong pliers and fine grit sandpaper. Not shown is a music wire cutter



Three parts per rod: 1" brass tubes, 1/16" music wire and plastic tubing to the left, with a pair of almost ready to use rods on the right

One length of brass tubing has been flattened by about a third with those strong pliers

Yes, this is staged, otherwise there'd be a clamp holding down the tubing. Drill the flattened tubing for the clevis. Please, use a METAL, not a plastic clevis, otherwise the brass tubing can cut through the clevis pin! (Alternatively, put the clevis at the servo end and use a Z-bend on this end.) Either way, a scrap block under the work protects the workbench and helps keep the work being drilled from trying to run and hide under my wife's truck!



Use sandpaper to clean the short end of the bent music wire, and then add flux and tin with acid-core solder. Slide the tubing over the wire (you'll probably have to heat it) and solder it in place. Make sure the flattened bit of the tubing is perpendicular to the long axis of the music wire! When cooled, rinse with tap water to remove excess acid

Slide on the plastic tubing, then bend the wire and cut off excess. Double check before you bend the second torque rod, to ensure you make a right and a left side! Unless you plan to add differential movement to your ailerons, make sure all the bends in the 1/16" music wire are as close to 90 degrees as you can make them

25 YEARS OF HACKER MODEL PRODUCTION KITS

Hacker Model Production celebrate 25 years of model production

Ondrej and Karel Hacker, F5D World Champions

The Hacker factory in Revnicov in the Czech Republic

On 1st January 1990, Karel Hacker founded Hacker Model Production, so fulfilling his dream to have his own company that would deal with the development and manufacture of aircraft models and modelling accessories. Karel wanted to apply his lifelong experience in the development and manufacture of model aircraft, especially successful racing models made for F3D pylon racing.

These days you can find kits with the red Hacker logo in model shops around the world, not only in Europe but also the USA, Canada, Japan, South Africa, Australia and Hong Kong.

A Humble Start

Karel started to make planes in his garage with the help of his father. The first ARF plane that they manufactured was the Helio Courier, a high wing trainer and they were amongst the first companies to make 'Almost Ready To Fly' aeroplanes. They manufactured in a leased space for over 10 years, but in 2000 they purchased their own building in Revnicov in the Czech Republic.

After his college graduation in 2003, Karel's son Ondrej joined the family business and is now Director of Production. During his studies, Ondrej actively participated in developing and testing new models, as well as racing with pylon models.

The company now produces more than 100 different types of planes and is constantly preparing new and enhanced models. Starting from rubber powered aeroplanes, through sailplanes, all the way to 'Ready To Fly' power planes, Hacker models are enjoyed by beginners as well as extreme aerobatic enthusiasts. A lot of models are made from a near to indestructible EPP material (polypropylene) but for advanced model-makers Hacker also offer aeroplanes made out of balsa and fibreglass. The largest models span more than three metres, powered using petrol engines of up to 100 cc.

Scale pylon racers from Hacker Model Production

Helio Courier, the first Hacker ARTF kit

In recent years production has expanded to include marine models, from speedboats to scale models, with many fine details made on a 3-D laser printer.

Hacker are also developing UAVs (Unmanned Aerial Vehicles) for paramedics, police forces and army use. Intended to monitor traffic, fires or floods, the aircraft can transmit to the ground and help to search for missing persons.

During recent years, Hacker have upgraded their production technology, buying several computer controlled machines, such as a laser-cutter and a 3-D laser printer, from which most of the parts are now produced. As a result product quality has improved, as well as reducing production costs and thus the prices of the company's products.

Let's Go Racing!

The quality of Hacker models is based on Karel's personal experience in making models of R/C gliders, semi-scale and combat planes, but especially for FAI pylon racing classes F3D and F5D. Karel Hacker flew in F3D pylon races and last won the European Cup in June 1990. Then he went into business and had to give racing a break. He successfully returned to pylon racing in 2005 in the Hacker Pylon Racing category, which is for models powered by 50 cc engines.

In September 2012, Karel Hacker, in the role of caller, and his son Ondrej as the pilot, returned from Buzau, Romania with gold medals and as F5D World Champions. As a caller Karel made good use of his life long experience in pylon racing and the title of World Champions was a huge reward for them both. Karel and Ondrej then successfully defended their title in 2014 in Austria, and then they went and broke the speed world records in F5D FAI with a time of 54.25 seconds. They then beat it the next day with an incredible new world record time of 52.93 seconds!

Our congratulations go to Karel, Ondrej and all at Hacker Model Production on their 25th Anniversary. We are sure that they will make many more generations of modellers happy for years to come! **RCMW**

CONTACTS

Hacker Model Production
www.hacker-model.com/ind_eng.html

Drone's eye view of Wings & Wheels 2015. Photo kindly supplied by Stuart Marsh of SKM Aerial Filming

WINGS & WHEELS MODEL SPECTACULAR 2015

Vaughn Entwistle attends his first Wheels & Wings Model Spectacular and finds much to goggle at!

Les Eagle's gorgeous 1/4 scale de Havilland Vampire built from a Kerry Sterner plan

The Willis Warbirds team show off their Yak 50s

Mick Burrell's mighty Sea Vixen, an eighteen-year veteran of the show circuit with bucketfuls of gravitas

Billed as 'The UK's Longest Running Radio Control Model Show', Wings & Wheels took place over the last weekend in June at its usual venue, North Weald airfield in Epping, Essex. Formerly RAF North Weald, this is a famous Battle of Britain site and also the current home of the North Weald Airfield Museum, which features a collection of classic and WWII aeroplanes, two of which put in a special guest appearance during the show. (That's a teaser – more on this later!)

I arrived bright and early on Saturday morning and headed straight to the flight line to get a preview of what was in store for the day. One of the first models I encountered was a gorgeous 1/4 scale de Havilland D.H. 100 Vampire in Swiss air force colours. Keeping with the de Havilland theme, the next model up was a Sea Vixen owned and built by Mick Burrell. Powered by twin JetCat turbines, the Sea Vixen has been punching jet-size holes in the atmosphere for 18 years! Mick was third up in the display rota and put on a great show. More gorgeousness awaited, including a red Hellcat that I promptly nicknamed 'Lady in Red'.

Show Time

The show kicked off promptly with Dave 'Golden Throat' Bishop (of DB sound) who kept the action lubricated with his effortless commentary.

Jets, jets, jets! This year's show delivered a mix of classic scale jet models scratch-built from balsa and ply to the latest all-composite 'hot ships', including a brace of Tomahawk Futuras, whose low and smoky passes defined the word 'fast' as only jets can. My personal favourite was the Futura with the Ferrari colour scheme. It even boasted a very realistic pilot, personalised with the owner's likeness. Now that's just showing off!

But the prop planes were not to be outdone. Steve Carr and his huuuuuge Red Bull Yak 54 did Grievous Bodily Harm to the air molecules as he flung his plane about the unsuspecting skies of North Weald. Steve ended by going 'smoke on' and

Tomahawk Futura in Ferrari red. Note the heat signature and personalised pilot

Super-scale Spit? I'll say – it's the real thing!

'Break right!' The Sea Fury takes evasive action as a B-17 rolls onto its six

Blue skies and white smoke. The Christen Eagle goes skywriting

Tomahawk Futura banked up for the camera

How low can he go? Steve Carr's Red Bull Yak 54 hovers in its own smoke cloud

firing up the coloured smoke canisters on the Yak's wingtips. Beginning in a vertical tail-stand, he hovered the big Yak down to within rudder-kissing distance of the runway.

What do you get when you bolt a jet engine on a training glider? If you're Motors & Rotors you get the makings of a terrific show team with their duo of JetCat powered L-13 Blaniks. Exciting in a jet way, while still graceful in a glider way, the Blaniks performed a coordinated sky dance, complete with smoke trails.

When the jet smoke dissipated, it was time for some aerial levity as the Multiplex team and their foam Fun Fighters churned the sky like a handful of green and white confetti tossed in a blender. I really need to get one of these planes!

Large model enthusiasts were well served by Ludo Luyten and his Belgian teammates as their massive (50%) Christen Eagle put on an acro display filled with smoke and fury. Later, Ludo flew his even bigger (52%) Stearman biplane. Once airborne, the Stearman looked and flew in a manner indistinguishable from a full size aeroplane.

And remember those 'special guests' I mentioned up front? The first was a high noon fly-by and landing by a Spitfire. And then toward the end of the show a Curtiss Kittyhawk swooped in and landed for another crowd-pleasing moment.

The Vendors

At one point in the proceedings, Dave Bishop announced that the Wings & Wheels event was host to the largest assemblage of vendors in Europe!

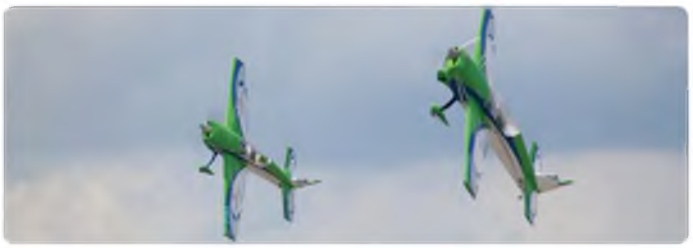
Walking past the seemingly endless procession of tents it was not hard to see the truth of that claim. Everywhere you went you'd pass smiling chaps and chapesses toting giant cardboard boxes bulging with RTF happiness. So if you couldn't make it, you missed a terrific event.

This was my first Wings & Wheels show, but it definitely won't be my last. See you all in 2016.

RCMW

Half-scale Christen Eagle blazes past

Big and menacing Me 109 roars overhead



The Horizon Hobby's team's Extras in knife-edge mirror flight

A trio of Laser powered warbirds. From left to right: Tempest Mk2, Laser 300V motor, by Richard Ginger from the Jerry Bates design; Lavochkin La-7, Laser 300V motor; Sea Fury 80" by YT International, Laser 360V motor. Both built by Jon Harper

MPX Fun Fighter team. Their aerial cavortings were a hoot to watch

Belgian Ludo Luyten's 52% Stearman biplane looks and flies like the real thing

From Russia, with love. Lavochkin La-7 coming in low and hot

Republic P-47 Thunderbolt. In any colour, it's a classic

Sea Fury in Irish colours heads for the deck

Lady in red. Hellcat in an unusual colour scheme

A jet engine on a glider? Is that a good idea?

Apparently it's a great idea. Motor & Rotors' jet Blaniks smoking the sky

The Fw 190 still looks menacing on the ground

Full size Curtiss Kittyhawk comes in for a landing

Flashback from 1942: a Spitfire landing at this famous Battle of Britain airfield

Lovely example of a less-commonly modelled aeroplane, the Reggiane RD-2000 waits its turn on the flight line

B-17 off on another bombing run

Ouch! Much like the real B-17, sometimes models suffer undercarriage failures

Fireblade strafes the runway

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AN ITCH TO SCRATCH?

In the final part of his series on scratch building, Bill Bowne ties up some loose ends

This Cub's flat-bottomed aerofoil (modified Clark YH) flies more slowly but has a great glide and is quite nimble. Just don't try to fly her inverted for long as she'll try to drop out of the sky!

Here is a smattering of topics, as we bring our discussion to a close.

Aerofoils

If you think discussing 'downwind turns' or the take-off speed of a model launched from a conveyor belt can result in a heated discussion, well, discussing aerofoils can make that 'heated' bit turn hotter than the surface of the Sun. Well, we still need to talk about them, but as practical amateurs, not professionals.

To begin, the terms 'flat-bottomed', 'semi-symmetrical' and 'symmetrical' aerofoils don't exist in the professional aerodynamicist's lexicon. My apologies, but those are the terms thousands of modellers know, so we're going to use them. (As a professional meteorologist, I long ago learned that there is no such thing as 'sleet' – it's properly called 'ice pellets'. But, we professional meteorologists are vastly outnumbered by ordinary folks, to whom sleet has a real (and chilly!) meaning. So, we grit our teeth and call it sleet.)

Once again, we have to make sure we're speaking a common language. So, a few definitions:

- Chord - the straight line distance from the leading edge to the trailing edge of an aerofoil.
- Chord line - A straight line from the foremost point on the leading edge to the rear of the trailing edge.
- Camber line - a line that fits between the top and bottom surfaces of an aerofoil.
- Thickness - the distance between the airfoil's top and bottom surfaces, expressed as a percentage of the aerofoil's chord.

We're going to break aerofoils into five categories: symmetrical, semi-symmetrical, flat bottomed, undercambered and reflex.

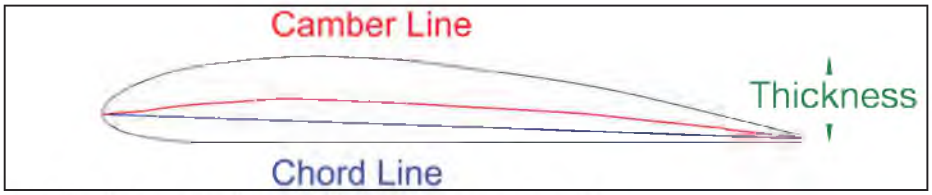

Fig 1: Camber and chord (not cord!) lines on a sample aerofoil

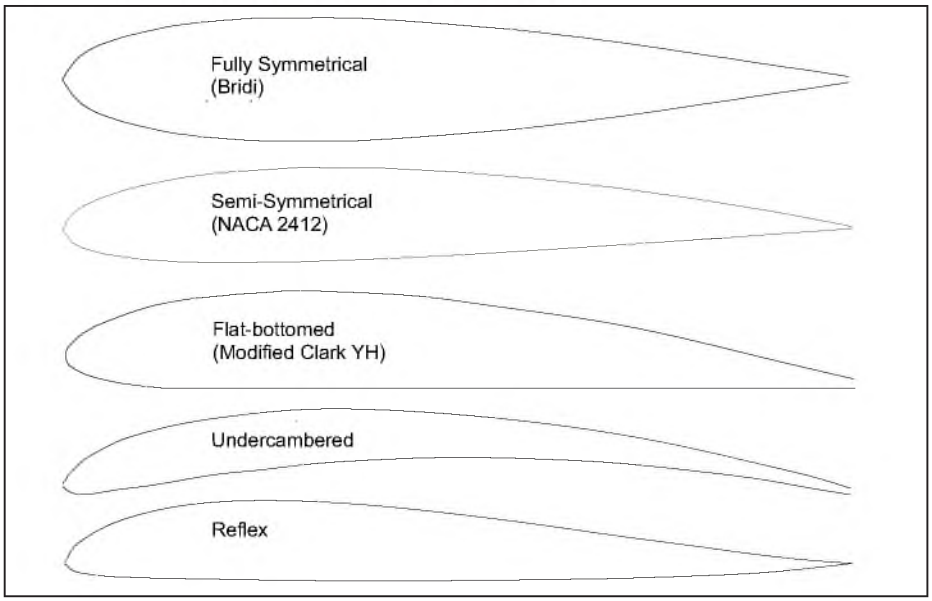

Fig 2: The main categories of aerofoils. My favourite is the modified Clark YH – easy to build on a flat surface and with excellent upright performance

- Symmetrical - the top curve is exactly the same as the bottom curve, so the camber and chord lines are equal. Symmetrical aerofoils are great for precision aerobatics as they work the same upright and inverted. They are not very good for thermalling gliders though. Depending on their thickness they can go from producing very gentle stalls to being suitable only for advanced fighter-type models. Flat-plate aerofoils used by foamies are usually considered to be a form of symmetrical aerofoil (even though you could call them 'flat bottomed', too).
- Semi-symmetrical - the curve on the top is the same but the bottom curve is shallower, making the camber line rise above the chord line. Not as good as symmetrical for inverted flight, but very good for sport aerobatics. Semi-symmetrical aerofoils can be surprisingly good for gliders, especially the faster ones.
- Flat-bottomed - the top of the aerofoil has a classical curve and the bottom surface has at least some flat (i.e. uncurved) surface. The best flat-bottomed aerofoils have at least some curvature, preferably between the thickest part of the aerofoil and the leading edge. The boundary between semi-symmetrical and flat-bottomed is pretty vague.
- Undercambered – again the same top surface, but this time the bottom surface curves upwards and may cross through the mean chord line. These are typical of very low-speed aircraft, such as pre-1920s full scale aircraft and indoor/micro models. Their lift is high but so is their drag, producing steep (but slow!) gliding descents and almost no inverted flight ability.
- Reflex - to counter an aerofoil's tendency to pitch forwards and down the rear of an aerofoil may 'kink' upwards to provide a bit of built-in 'up' elevator. Very common on flying wings and other tail-less designs.

From my experience a handful of aerofoils will fit the needs of most modellers. Let me put it this way: I've copied over 100 aerofoils from books, etc. and laboriously put each one into CAD (more than once… darned failing hard drives!). Yet, just about every model I've designed in the last 30 years uses one of only three aerofoils. For those of us with more demanding applications – yes, there will be exceptions. For example, thermal duration gliders need specific, high efficiency aerofoils. But most sport models will handle well with a limited number of aerofoils. Here are a few I can recommend for sport and sport-scale models:

- NACA 2412: semi-symmetrical, good for faster models. Works surprisingly well inverted.
- Clark YH: another semi-symmetrical aerofoil but with a 'kick-up' at the trailing edge to reduce the forwards and down pitching moment. A flat area under the centre of the aerofoil makes it easier to use on a flat building board. My personal favorite is the Clark YH with the duck-tail removed. I've used this successfully on a slew of Speed 400 through to .25 sized models. It is not as good inverted as the NACA 2412 but has a very nice glide and is very reluctant to stall.
- NACA 0018: fully symmetrical aerofoil with a gently rounded leading edge. Lots of drag but almost unstallable under most conditions. Increasing the aerofoil's thickness can result in a fun, hard to stall model, but it will require more power to drag the wing through the air.

Once again, I recommend looking at other folks' models to pick an aerofoil. If it worked for them, it should work for you. Consider the kind of flying you're going to do, plus how easy it'll be to build and cover a wing with that aerofoil.

After you've chosen an aerofoil, how do you get it into your drawing? If you're using CAD software you can import it from a computer program (such as Compufoil or Profili). Or, you can enter it in by plotting it, point by point. Laborious, yes, but doable (a good French curve is a big help here). One way to get around that is by photocopying the aerofoil from a good source, then enlarging/shrinking it as needed.

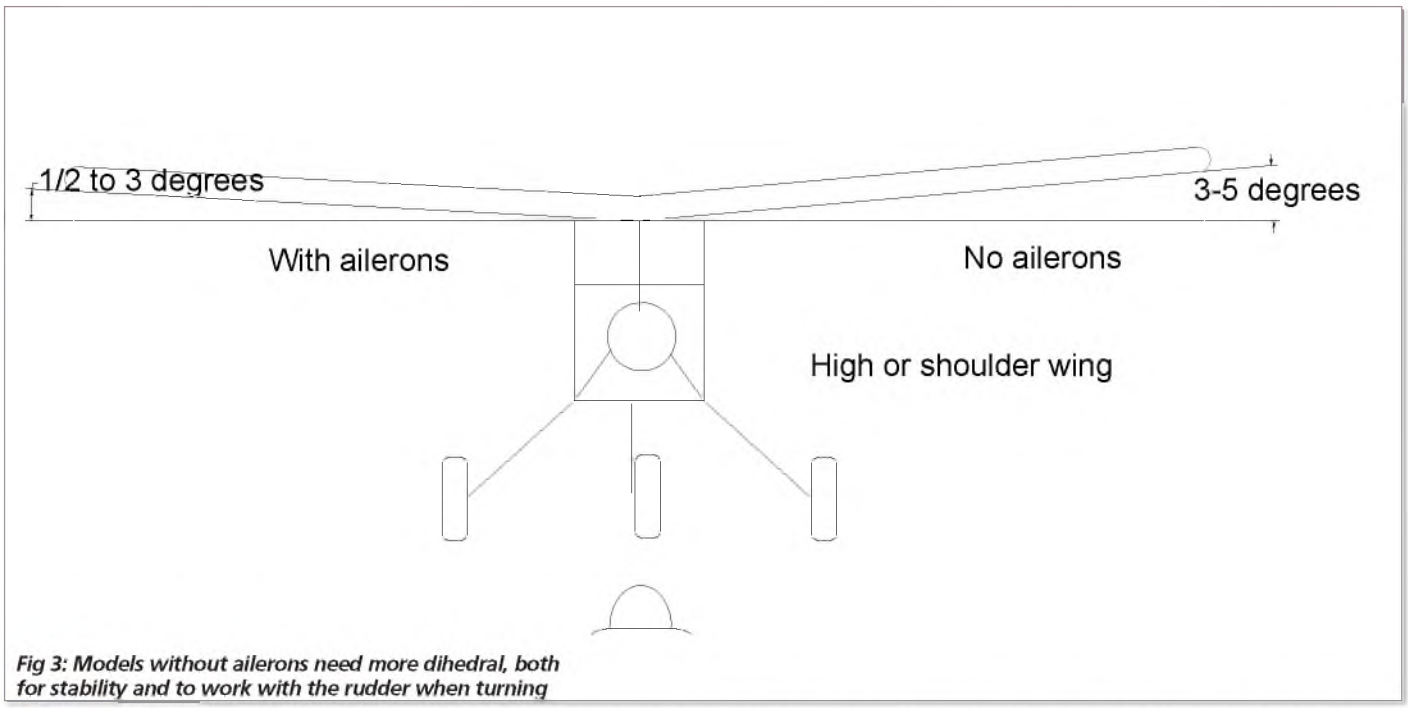

Fig 3: Models without ailerons need more dihedral, both for stability and to work with the rudder when turning

Dihedral

For high or shoulder winged planes without ailerons use 3 to 5 degrees of dihedral per side. Rudder plus dihedral makes for a powerful turning influence.

On the other hand, for shoulder or high-winged models with ailerons use 1/2 to 3 degrees of dihedral per side. Less is better, but don't omit dihedral unless you have wing sweep, as it makes the wings appear to droop.

For low-winged models, I like 1-2 degrees of dihedral, or a mix of dihedral and wing LE sweep.

If you use wing LE sweep the rule of thumb is that 1 degree of sweep will equal 1 degree of dihedral. But if you use a constant chord wing never use zero dihedral on a low-winged model. It can work but it won't be comfortably stable and it looks like the wings are drooping in an unsightly manner.

One trick with tapering wings is to join the two halves of the wing with the wing upside down on a flat surface. This keeps the wing completely flat on the top from tip to tip. At the same time, the taper in the bottom of the wing from root to tip acts as dihedral. Combining bottom taper with LE sweep gives us a wing that provides stability both right-side up and upside-down.

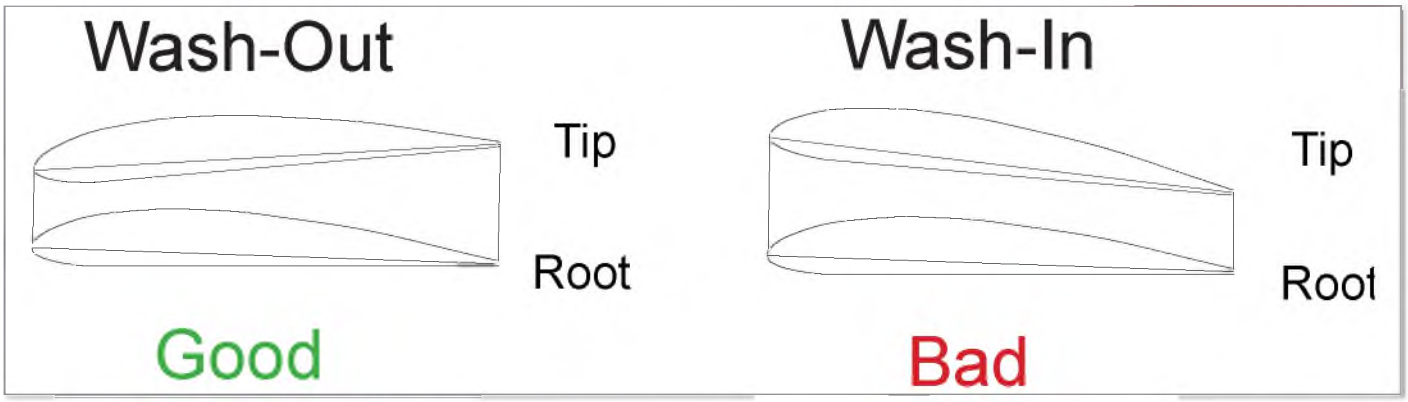

Fig 4: Wash-out increases stability by keeping the wingtips from stalling before the root; Wash-in does the opposite and should be avoided! (Note: the wing twist angles are exaggerated for clarity)

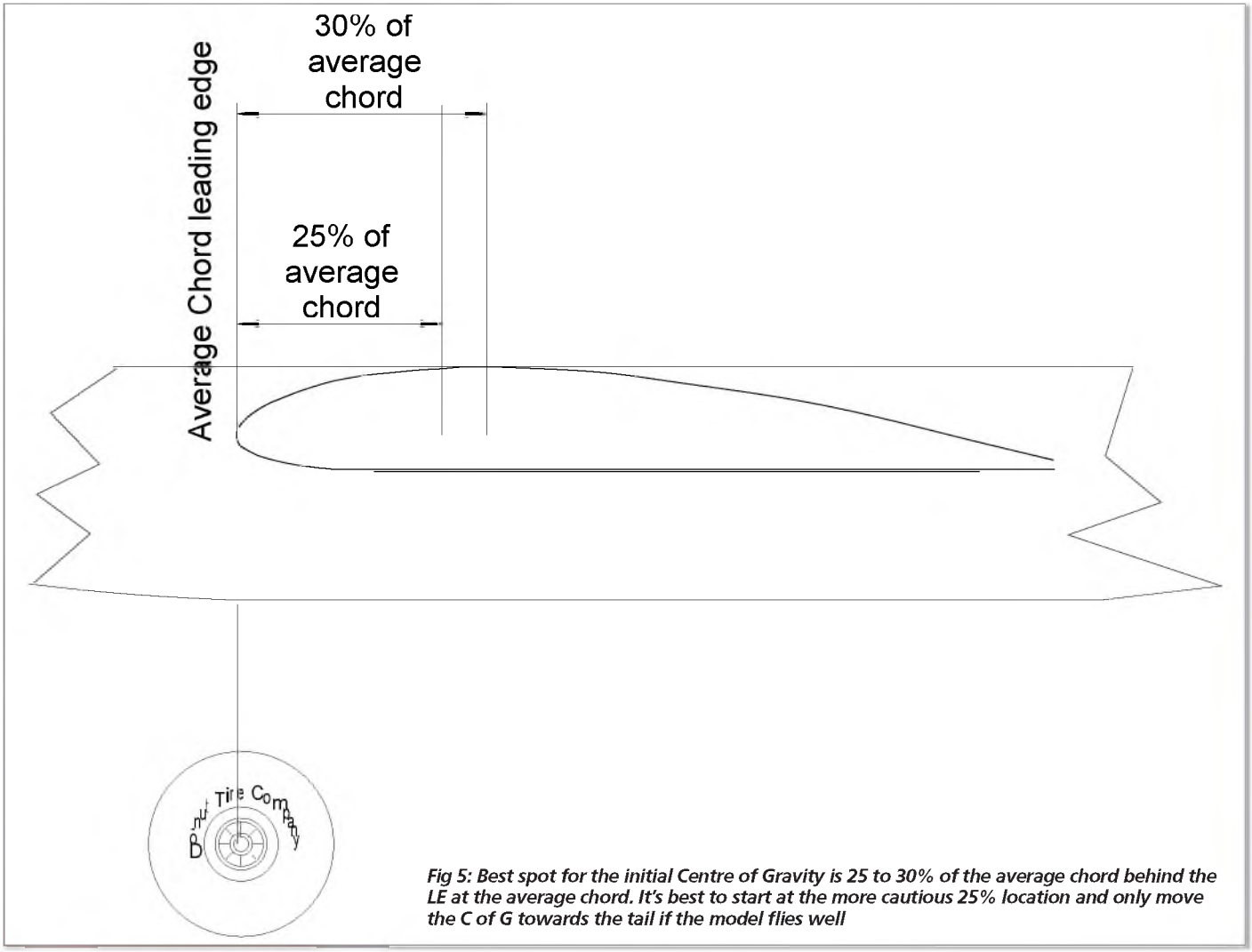

Fig 5: Best spot for the initial Centre of Gravity is 25 to 30% of the average chord behind the LE at the average chord. It's best to start at the more cautious 25% location and only move the C of G towards the tail if the model flies well

Some Tips On Tip Stability!

One way to increase the stall resistance of a model is by twisting the wing at the tip so that the trailing edge at the tip is slightly higher than the trailing edge at the root (i.e. washout). This lowers the wingtip's angle of attack, allowing the wing centre section to stall before the wingtip. This is one point in favour of barn door ailerons as more of the aileron is then in the part of the wing still flying, giving you better roll control well into the stall. The only disadvantages to this intentional warping are: (1) It decreases the model's stability when it is inverted and (2) it makes the wing slightly draggier and slightly less efficient, thereby slightly reducing the model's top speed. In my opinion safer landings are well worth the sacrifices!

Another way to gain stability is by slightly changing the aerofoil thicknesses from the root to the tip. This does take more effort, even with computer assistance. My preference is to thin the aerofoil to 90% of its original thickness at the root, and then increase it to 110% of its original thickness at the tip. It doesn't matter what the chord is – you are changing the relative thickness of the wing, making it less likely to stall.

This is pretty easy to do with a foam wing as you only have two templates to modify. If you're doing a complex wing, though, it can be quite a task, especially if all you have is a pocket calculator. Since it's beyond the scope of this article, I'm going to leave it for now. If we get enough questions, I'm sure Editor Kevin will ask for an article on the subject – beware though, it requires algebra!

Centre Of Gravity

What about that darned C of G? For most models a C of G position of 25% of the Average Chord behind the root LE is a good place to start. Usually that's the thickest point of the wing (which is also the best place to put the spars, to produce the strongest wing). If in doubt make the plane just slightly nose heavy with an empty tank. If it is a pusher with the tank behind the C of G, make it slightly nose heavy with a full tank.

Designed for pattern-type acrobatics, the Ulu series uses a fully-symmetrical aerofoil. It flies the same upright and inverted. Wing LE sweep back takes the place of some dihedral, making the Ulu stable when both upright and inverted

It's A Wrap!

Have you noticed that we haven't once mentioned engine or motor type? That's because it isn't important! The prop doesn't care what power source is turning it, be it glow fuel, gasoline, electrons or hamsters on flywheels. There are some internal structural differences due to the different power sources, but no major external aerodynamic differences. The biggest aerodynamic difference between internal combustion and electrics is mainly the locations and sizes of battery, and motor cooling vents versus exposed cylinder heads.

Okay, that's about it. Over recent issues we've talked about kit bashing, scratching sport ships and designing stand-off scale models. I hope you're inspired enough now to go out and design some of your own models. It doesn't matter if they're scale or sport, or if they're glow, gas, or electric. What matters is that you create your own design, so you too can enjoy answering the question, "Where did you buy it?" with, "I designed and built it myself!"

Oh, and after you've built it don't forget to write it up and share it with the rest of us in RC Model World! **RCMW**

Above & below: Miss Bikini boasts a large amount of dihedral, which makes her more stable during those long gliding flights as she seeks thermals. Since she has no ailerons the dihedral has to work with her rudder for turning

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* Image shows finished replica of model. Additional parts are required.

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WINGSPAN	88"

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LENGTH	42.5"
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WEIGHT	4LB
SCALE	1:9.5

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WINGSPAN	53"
SCALE	01:09

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Designer: Mick Harris	Difficulty ****
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RADIO FUNCTIONS	4
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SCALE	1:6

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Designer: Gordon E. Whitehead	
WINGSPAN	52"
RADIO FUNCTIONS	3-4
ENGINE	2 X 1.5 - .25 2 STROKE

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Designer: John Lockwood	
WINGSPAN	49"
RADIO FUNCTIONS	4
WEIGHT	4LB 140Z

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JHURRICANE

Difficulty ***

Designer: Giles Fowler	
WINGSPAN	36"
RADIO FUNCTIONS	4
ENGINE	.12 - .20 2-STROKE

PLAN MW3137	£11.99 / $19.99

HEINKEL HE 51

Difficulty ***

Designer: Fred W Holdstock	
SCALE	1:8
RADIO FUNCTIONS	8
WINGSPAN	54"

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Difficulty ****

Designer: Brian Taylor	
WINGSPAN	71"
RADIO FUNCTIONS	4
SCALE	1:9

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Designer: Brian Taylor	
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SCALE	1:7.86

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10th Oct, 14th Nov, 12th Dec '15
North London MFC Indoor Radio Control Meetings 2014. Furzefield Sports Centre, Potters Bar, Hertfordshire EN6 3BW. Saturdays, 6 pm to 10 pm. All up weight for fixed wing 225 g, 36" span and helicopters 400 g. BMFA insurance required. Flyers £9, spectators £2.50. Contact Peter Elliot, Tel: 01707 336982

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

29th Sep, 27th Oct, 24th Nov, 29th Dec, 26th Jan '16, 23rd Feb, 29th Mar, 26th Apr, 31st May, 28th Jun
Indoor R/C Small Models Meets, in the Main Hall at Wickham Community Centre, Mill Lane, Wickham, Hants PO17 5AL. All meetings will run from 7.00 pm to 9.30 pm. Models to be flown at these meetings are to be limited to a maximum weight of 95 grams (3.5 ounces) for fixed wing aircraft, in flight trim, including battery (not to exceed a 2-cell LiPo pack). Helicopters are to be limited to a rotor diameter of 12" (305 mm). All models will be weighed before flight, and will be judged on their suitability for the venue on the evening. Admission to the meetings will be £4 for fliers and £1 for spectators. Flyers will be required to show proof of insurance. For further details please contact: Alan Wallington, "Wrenbeck", Bull Lane, Waltham Chase, Southampton, Hants. (Tel. 01489 895157) or see our website: www.wcaero.co.uk

GENERAL

22nd/23rd Aug '15
The Balbedie Loch Leven Splash-In, at Kirkgate Park, Loch Leven, Kinross Scotland, from 10 am till 4 pm. All Waterplanes and visitors welcome. BAC's great BBQ and refreshments available. Bring your friends and family. Toilets provided. Proof of Insurance to fly please. Balbedie Aeromodelling Club www.balbedie-aeromodelling-club.co.uk, contact club secretary Colin Morrison at secretary@balbedie-aeromodelling-club.co.uk for more info

23rd Aug '15
Haverfordwest Model Club Fly-In, at Templeton Airfield, Pembrokeshire at the site owned by the MOD, starting at 10 am and finishing at 5 pm. The event is open to flyers of radio control model planes, electric, IC or turbine, and model helicopters. Flyers please bring your BMFA Membership Card with you; you will be afforded a warm welcome by our members to our popular flying site. A space will be set a side for people to sell their surplus planes, engines, spares etc. There will be refreshments available in the way of a burger van and an ice cream van. There will be limited toilet facilities available. For further information please contact Greg Highfield on 01437 899 843 or 07913 781 150, or by email at greghighfield@hotmail.co.uk

23rd Aug '15
Woodspring E-fly 2015. Come and check out the latest developments in electric powered aircraft flown by some of the best pilots around. We are hoping to get more E-traders this year, but the event will be, as previously, about meeting e-flyers like yourself, showing your best electric models and having a really great time! More info please check out www.woodspringwings.co.uk/

29th to 31st Aug '15
F3A at the BMFA British National Championships, Barkston Heath. F3A P and F schedules and GBR/CAA league competition for 'P' Only, Masters, Intermediate and Clubman schedules. Entries to BMFA. Contact F3A Flight Line Director Matt Hoyland on 0773 9840498 or Ashley Hoyland on 0114 2873432 for more details

29th to 31st Aug '15
IMAC UK Nationals, Barkston Heath, Nr Grantham, Lincs. Contact Mal Green: mcgreen65@hotmail.com

1st/2nd Sep '15
Hastings Model Flying Club show/fly-in at Middle Bridge (A259) between Bexhill and Pevensey, East Sussex. Includes BMFA scale competition. All types of aircraft welcome including turbines. Camping available from Monday 27th August. Charge to non-HMFC members £25 includes unlimited flying, non-campers £5. Public also welcome, programme £5 per car. Trade space available. To book contact Les Eagle on 01634 327228. See us on Facebook and HMFC.org

4th to 6th Sep '15
Scale Gliderfest 2015, hosted by the Clywd Soaring Association, centring around the picturesque town of Llangollen, amongst the magnificent scenery of North Wales. Proof of insurance required. ALL FLYERS please book in at the Ponderosa Café at the top of the Horseshoe pass before proceeding to the flying sites. The agenda for the weekend is available on the club's website, www.clwydsoaring.co.uk, or for more information contact vicsteel@modelmaker.orangehome.co.uk or tel: 01516 786920, mobile 07742 727881

5th/6th Sep '15
LMA Much Marcle, Herefordshire (HR8 2LX) further details from Paul Needham 07949 214282, Email: mail@paulneedham.plus.com

6th Sep '15
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, Peter Scoles on 01472 507039 for details

6th Sep '15
Salisbury Model Flying Club Annual Scale Fly-In, starts 10 am at Flamstone Farm Salisbury Wiltshire SP5 4DN. This is Open Scale, No turbines or helicopters. Only 2.4 GHz No 35 MHz. Contact Kevin Easter 01725 552873,
Email: easterislandbb@tiscali.co.uk or Ron Hughes 01722 712760

12th Sep '15
Wolves Scale Glider Fly-in, Long Mynd, Church Stretton, start 9.30 am. £3.00 entry fee, proof of insurance cover required. More details, Mark H. Richards, 6, Saxon Road, Penkridge, Stafford, ST19 5EP. Tel: 01785 712445. Mobile 07921 210629. Email: markhrichards@yahoo.co.uk

12th/13th Sep '15
F3A Triple Crown. Invitational team competition: England, Ireland, Scotland, Dumfries Scotland. Visitors welcome but please contact Contest Director Adrian Harrison on 07976 244004 for details

12th/13th Sep '15
Shilton Vintage event, for further details contact Nick Blackwell,
Email: nick@nickblackwell.co.uk,
Tel: 01285 657610

12th/13th Sep '15
Southern Model Show, at Headcorn Aerodrome, Shenley Road, Ashford. Kent TN27 9HX, doors open from 10 am. The show will feature a huge display of models and an exciting flying program of models from the UK and Europe. There will also be a range of models on the water from paddle steamers, battleships, lifeboats and submarines. There is a full range of activities to suit all the family from children's amusements, crafts, traders, a huge range of food outlets and much, much more. Tickets are priced at £10 per adult, £8 per child (£25 for a family ticket, two adults and two children). Weekend camping is available at the aerodrome site for £60 for any motorhome, caravan or tent, which includes entry to the show. For more information and to book tickets please go to www.headcornevents.co.uk

13th Sep '15
North London MFC Electric Day, Warren Lane, Baldock, Herts, SG7 6RR. Flying from 10 am. BBQ and drinks available. All pilots need BMFA A certificate or LMA proficiency, those flying >7 kg models need BMFA B certificate or LMA proficiency. Proof of insurance required. £5 pilots entry fee. Contact Maurice Northcott on 07866 105721 or Email: mail@mpnltd.fsnet.co.uk

18th to 25th Sep '15
Devon 2015 Modelling Holiday, Ladram Holiday Centre. A weeklong residential pre-bookable event – only persons booked through the MAA and staying at Ladram able to participate. All types of models are welcome and power flying will take place on a full size airfield in the locality. All participants must be covered by adequate third party insurance. Caroline Scoles, Tel: 01472 322874, Email: carolinescoles@hotmail.co.uk

19th/20th Sep '15
The Balbedie Funfly Event, hosted by the Balbedie Aeromodelling Club, Balbedie Farm Nr Kinglassie, Fife, KY5 0UE Scotland. Open Event all aircraft welcome. BAC's great BBQ and refreshments available, bring your friends and family. Toilets provided. Proof of Insurance to fly please. Balbedie Aeromodelling Club, www.balbedie-aeromodelling-club.co.uk, contact club secretary Colin Morrison at secretary@balbedie-aeromodelling-club.co.uk for more info

25th to 27th Sep '15
Annual Bring and Fly, hosted by the Lleyn Model Aero Club, at Penrhos (ex RAF), pwllheli, Gwynedd LL53 7HG. As well as an excellent power site we have fantastic slope sites for the three-day event. We have refreshments and there's a good campsite adjacent to our power site. BMFA insurance is required or similar. On Saturday night we get together in the local pub, so come and join us for a damn good weekend! For more info contact: secretary@lleynmac.org.uk

26th Sep '15
GBR/CAA F3A League competition. Skelbrooke. All schedules. See gbrcaa.org then forum 'Competition News' for details and 'Competition Entry Form' for fees and payment. Visitors welcome but please contact Contest Director Bob Rowland on 07969 456441 for details

26th/27th Sep '15
Festival of Flight including the Vic Smeed Memorial Day (bring and fly one of his designs). Vintage R/C models welcome, all disciplines of sport flying also welcome. Directions: Old Warden Airfield, Beds.SG18 9EP. BMFA 'B' certificate to fly on the R/C flightline at these events. All pilots are required to show proof of insurance and BMFA membership, which shows 'B' certification. Please carry these documents with you on the airfield, as you will not be allowed to fly without them. This is a requirement of the Shuttleworth management. All types of model are welcome at all events (maximum weight 10 kg). Contact: Ken and Sheila Sheppard; Email: modelair.oldwarden@gmail.com or phone 07799 132999

3rd Oct '15
Huddersfield & District MAC Swap Meet, at Shepley Methodist Church Hall, Penistone Road, Shepley, Nr. Huddersfield, West Yorkshire HD8 8DB, 9 am to 12 pm. The Church Hall is situated on the A629, approximately half a mile North of Sovereign crossroads (A629 and A635), on the outskirts of Shepley village. Entrance Fee £3, tables FREE to sellers, 20 tables, plus bring your own camping tables. No table bookings. Parking for 30+ cars to rear of Church Hall. Refreshments available; tea, coffee and bacon sandwiches!
Contct: 01226 766636,
Mobile (3rd Oct. ONLY) 07790 647827

3rd Oct '15
Swapmeet at Waltham Chase Village Hall, Winchester Road, Waltham Chase, Hants., SO32 2LX, hosted by the Waltham Chase Aeromodellers, from 10 am to 12 noon. Waltham Chase Village Hall is located on the B2177 between Wickham and Bishops Waltham, and is 15 minutes' drive from Junction 11 on the M3. The village hall has a free car park. Admission to the swapmeet will be £2 for adults, whilst accompanied children will be admitted free. Tables can be booked for £7 each (to include admission for two people). Please contact Alan Wallington (details below) for table bookings. Refreshments will be available throughout the event. Alan Wallington, 'Wrenbeck', Bull Lane, Waltham Chase, Southampton, Hants. (Tel. 01489 895157) or see our website: www.wcaero.co.uk

4th Oct '15
GBR/CAA F3A League competition. Hurley. All schedules. See gbrcaa.org then forum 'Competition News' for details and 'Competition Entry Form' for fees and payment. Visitors welcome but please contact Contest Director Adrian Harrison on 07976 244004 for details

4th Oct '15
North London MFC Large Model Day, Warren Lane, Baldock, Herts, SG7 6RR. Flying from 10 am. BBQ and drinks available. All pilots need BMFA A certificate or LMA proficiency, those flying >7 kg models need BMFA B certificate or LMA proficiency. Proof of insurance required. No noisy models please. £5 pilots entry fee. Contact Maurice Northcott on 07866 105721 or Email: mail@mpnltd.fsnet.co.uk

10th Oct '15
Mega Swapmeet, at Meir Community Centre, Stoke-on-Trent, Staffs ST3 7DY, 9.30 am till 1 am. Tables £7, Entrance £2. Contact Steve Ogden on 01782 853883 or 07504 287526. Email: topgun@modelpilot.co.uk www.modelpilot.co.uk

10th/11th Oct '15
PSSA Fly-In, The Great Orme, Llandudno, meet at the 'Tank Track' car park for 10 am each day. Open to non-PSSA members – proof of insurance required. Usual 'Fly for Fun' format. For more information contact Phil Cooke on 07772 224719 or email: webmaster@pssaonline.co.uk

11th Oct '15
King's Lynn Aero Modelling Club 2015 Annual Swap Meet, at West Winch Village Hall, Watering Lane, West Winch, King's Lynn. Norfolk PE33 0JY. All manner of Aeronautical Radio Control paraphernalia for sale! Teas, coffee and bacon rolls available. £5.00 per table – bookable in advance. Additional helpers £1.00. Doors open to sellers from 8.30 am, open to public from 9 am. Admission £1.00. Booking form,
Email: klamc.2009@btinternet.com
Tel: 01945 582023

11th Oct '15
Beverley and District Model Aircraft Club Autumn Swapmeet, at Tickton Village Hall, near Beverley, HU17 9RZ. 9 am till 12 noon, Entry £1.00, Tables £5.00. Contact Brian Jenkins, Emal: 2bee.jays@live.com, 07970 959875 or www.badmac.btck.co.uk

21st Oct '15
Phoenix MAC NW Area Autumn Swap Meet, Deanwater Hotel, Woodford, Cheshire SK7 1RJ. (On A5012 Wilmslow to Poynton Road) Bar and seating in swap meet room. Food available. Entry £2, tables £3. Doors open 7.30 pm. Table holders 7 pm. Contact Terry Mason, 07950 052039 or 0161 439 3816. Email: pmaccheshire@aol.com

25th Oct '15
LMA Gaydon, Warwickshire (CV35 0BJ), further details from Paul Needham 07949 214282, Email: mail@paulneedham.plus.com

1st Nov '15
Retford Model Flying Club Winter Swapmeet. At the Babworth Road Sports & Social Club, Babworth Road, Retford, Nottinghamshire DN22 7NJ. Table set up from 9.30 am (small table £4 book in advance, £5 on the day. Large table £6 or £7 on the day) includes 1 helper. Doors open 10 am – 1 pm, Admission £3. Hot sandwiches, tea and coffee available from 10 am. For further information and bookings contact, Chris: 07966 764803, Gerald: 07941 867130.
Website: www.rmfc.org.uk

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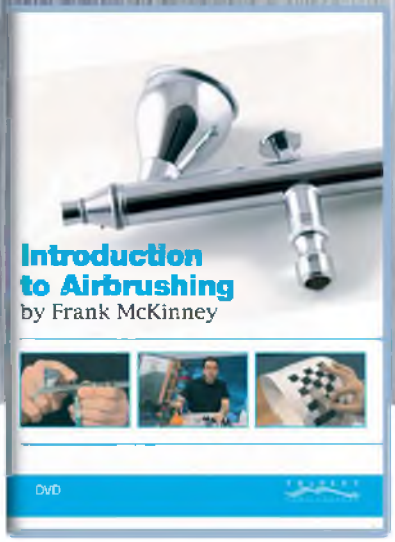

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THE SPORT CHANNEL

Gray presents another eclectic mix of sport modelling topics

Taken just after the test flight, this is Mike White's latest O/D, the 'Gulp', an 80" electric flying wing. Motor: BL 2820/07; ESC: 60 amp; Battery: 4S 2450 mAh; Prop: 10" x 5" APC (E). Very aerobatic with great soaring ability, even from the slope. Plans soon, Mike?

"LATET ANGUIS IN HERBA!"* (VIRGIL)

This Month's Wise Words

(*There's a snake hidden in the grass!) Our classical poet this month had little exposure in the model press in his day, so we're happy to help out. As proved here so often, it's never possible to predict where any of the items we feature in SC are going to lead or how they might even join up unexpectedly. The item we ran on the Radiosailplanes Releasable Towhook continues to bring in mail from past, satisfied customers who, like me, admired its design.

We hadn't heard from Mike White, the Isle of Man's top model designer, for a while, but the RS hook recalled for him of what sounds like a seriously dramatic flying site.

Mike writes: *"The releasable tow hook brings back memories of a similar item I did back in 1969. This hook was used in my gliders right up to the Haurus IV, which was a plan article in the Radio Modeller of October 1991. The base was from 3/32" dural, with the tube in which the release rod runs soldered to tinplate then bolted to the base, size dimensioned to fit the glider. It really worked well, kiting the glider, holding it directly over one's head and making some very effective 'pings' off the line.*

A piece of true aeromodelling/engineering. Mike White's homebrewed releasable towhook, developed from the late 1960s and flown on-board soarers under 'challenging' conditions

It was used quite successfully while I was living in Nairobi, Kenya. Great thermals with huge birds in them, which occasionally would follow the glider right down to a final approach and, just as it went in for the kill, indicated by legs stretching forward and talons going out, one had to ditch the glider into the long puff adder-infested grass to prevent the act. Snake boots were an absolute necessity!

One day I was out in the Vlei (field) with a 100 inch sailplane, which was on the approach at about 8-10 feet, with me standing about 25 yards away from the approach path. Following the glider was a huge eagle hawk with a span of several feet. It was, perhaps, 25 yards or less from the model and hadn't seen me. Quite a sight! As it passed me it dropped its huge talons, gave a small movement with its wings, increased speed a little and was

about to pounce. That's when I dumped the glider in the long grass and the bird flew off.

Yes, there were plenty of snakes about and one day I was standing in the long grass flying the glider, moved just a fraction, and felt a strike on the top of my left foot. I had been hit by a puff adder, small thankfully, which had left its venom on my new snake boots without puncturing them. It stained them forever!

Your mention of workshops brought on a view of my 'Man Cave'. Cluttered, I know, but you can see all the good stuff is there - BBQ gear, fishing gear and a box of brews on my drawing board. My Air Force Chiefy once said that a tidy workshop was a sign of too much wasted time! Someone else also said, "If a cluttered bench is a sign of an untidy mind, what then is an empty bench a sign of?" That's 25 years of clutter in there!"

Good to hear from you again, Mike. If that was a regular day at the flying site, it sounds tremendous! Let's hear from any readers who out of necessity, or just for the challenge, fly in extreme and wild places.

Also, it is great to see a 'proper' workshop (especially poignant for me as I don't currently have one!); it looks lived-in and loved. In fact it's time we ran a few more readers' workshop shots; let's see where you make the magic happen. Likewise, with last year's surprise hit, the Fleet Gallery, it's that time of year when you can line up all your new builds and acquisitions on the lawn and share them with an expectant world.

Mike's workshop has been as busy as ever and it's good to see his latest O/D output, the 'Gulp' and the 'Pipe Dream'. I take it we'll be seeing the plans in print before long?

Mike White's 'Pipedream', a fast aerobatic wing and new out of the workshop. Power from a Turnigy 3536/8, 1000 KV, 9" x 6" prop, 4S, drawing 33 amps/410 watts output. Weight 2 lb 12 oz. Flies from this dolly, which has its own Rx and steers off the model's rudder channel

In case there's any uncertainty about the issue, this is what a healthy model workshop should look like. Mike White's 'Man Cave' on the Isle of Man

Grande Designs

Two more current and extremely popular topics recently seen here are George Stringwell's tissue-over-mylar covering skills and my favourite thermal soarer of the 1970s, the 'Aquila'.

George has inspired so many readers to try the toughness and aesthetic possibilities of tissue/mylar that we've had string of requests for a 'how to' article on the technique that we found, and it seems it is proving very helpful. The photo of my Aquila in 1977 brought in more mail, full of warm nostalgia and praise for an exceptional design of its genre. Aquila fans have taken advantage of my offer of a downloadable plan; some of them may be building as we speak.

But George himself made some surprising connections after I mentioned the involvement of BARCS soaring club members in my own Aquila.

George wrote: *"Another coincidence . I built the 126" version, the Aquila Grande, as a kit review in 1985 and used it in tandem with my beloved Hi-Phase contest soarers for the next five years. This model provided one of the best results of my contest career when I won the Open at BARCS Radioglide 1986 at Oxford with it from a field of 140, which included all sorts of National champions (Foss, Worral, etc.) and even one World Champion. A lovely model, especially in light conditions. It is the model I am holding in the frontispiece photo in the second (1986) edition of my 'Thermal Soaring' book".*

I've had a copy of the book for a long time, George. It's a prized possession and still a great, informative read, even through changing times and technology. Track it down on book collectors' websites and get a copy!

Yet another coincidence emerged as I started this month's edition; I'd been sorting through some issues of vintage group SAM 1066's 'Clarion' newsletter from the early 1990s. It in turn quoted none other than George Stringwell, who at the time was writing a column in 'SAM 35 Speaks'. It seems that at the time, George had just discovered tissue and mylar and his first attempt involved re-covering the wings of... his Aquila Grande!

And this just in! In addition to the Aquila plan download (still on offer), I now have the kit plan for the Aquila Grande. The plan shows the glass fibre fuselage supplied in the kit, but all of the structure of the stretched wing. All plan requests to the address at the end of this column.

George Stringwell, renowned for his artistically re-imagined electric 'Technostalgia' models and covering skills is also a fan of our favourite 70's soarer, the Aquila. George had great success with the stretched-wing 'Aquila Grande' (copyright and acknowledgement, George Stringwell)

Flapping Around

(And Around)...

One unfortunate side effect of my relocation at the beginning of this year has been the lack of opportunities to catch up with some of our valued regular contributors and see what they've been up to.

I was lucky enough recently though to bump into my Warwickshire pal, Simon Rogers, who can be relied upon to have some genuinely out of the ordinary project underway at any given time. When I bumped into Simon, he happened to have his latest creation with him. I think it's fair to say that this is probably one of the strangest models we've ever featured in this column. I mean, I barely know how to describe or classify this device...

Where to start? At first glance it looks superficially like some kind of control line flying wing, probably an early 1/2A sport aerobatic design, with a Cox Babe Bee .049 up front. But notice the structure. It has a short, built-up centre section, like a normal combat/stunt wing. But what's going on with those large, solid sheet wingtips? These are hinged at their roots and can actually 'flap', giving extremes of dihedral and anhedral.

So, we're confronted with a bizarre crossbreed of control-liner and ornithopter and are still none the wiser. What can it possibly be and how does work?

Simon has once again discovered an ingeniously original subject from one of our hobby's most creative periods. The 'Flapalong' dates from 1951 and was designed by Henry Cole Jr. The early 50s saw a huge explosion in small glow engines and the early versions of the ubiquitous Cox .049s and there like were the small power plants of choice for experimenters.

The wing-flapping feature is actually not ornithopter-related at all; the model is obviously driven along by the .049 on the front and the variable-dihedral wingtips actually form a truly cunning control system.

Examining the model close-up, the hinge line of the flapping wingtips on the centre section is angled sharply in at the trailing edge. Due to this angle, as the wingtip travels to the extremes of its movement, its rear section presents more and more area to the airflow, producing elevator effect. (F/F HLG flyers will be familiar with the trick of cutting a tip dihedral joint at an angle to give built-in washout).

On the inboard wing a vertical tiller arm at the root directly connects the wing to the lines. A pushrod through the wing connects the movement of the inboard tip to the outer. Up and down movements of the control handle are the same as for regular C/L.

Does the system work? Does the Flapalong fly? Right now, your guess is as good as mine. We've heard of no other examples of this design and reactions to variable tip dihedral control have ranged from bewilderment to outright scepticism. But in the Flapalong's favour, its creator Hank Cole went on to become a highly prolific and successful designer in most fields of model flying.

By next time, it may well have flown and we'll endeavour to bring you the evidence. Meanwhile, if you fancy a Flapalong of your own, I'll be happy to provide a download of the plan if you email me at the address at the end of the column. T&C's apply as always; if you built it, send us the first photos!

Easily the best hybrid control liner/ornithopter we've ever featured. Well, yes, it's also the only one... Simon Roger's bizarre 'Flapalong' from 1951 uses its articulated wingtips for elevator control. (Eh? – See text)

Successful first venture into all things 'stick and tissue' by John Chapman. 20" span 'Sparrowhawk' rubber sport design is by The Vintage Model Company, who do 'real aeromodelling' extremely well. Check them out!

Trad Tailpiece...

Lastly, a nice piece of traditional building, which came in off the back of requests for the Whimsy rubber bipe. One of them was from reader John Chapman, who was just getting acquainted with stick and tissue construction. John's first project is from a manufacturer I don't think we've featured before, the Vintage Model Company.

His 20" span 'Sparrowhawk' sport rubber model is one of an extensive range of Vintage, Vintage Style and classic reproduction kits covering F/F, R/C and C/L. Their website lists designs from several big names of the past like Keil Kraft, Veron and Mercury and some very attractive original designs of their own, like the Sparrowhawk. Please pay them a visit, tell them SC sent you, then report back!

Contributions, please to The Sport Channel, c/o the Traplet Publications address. All email correspondence to: gray_rcmag@hotmail.com **RCMW**

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VARIOUS RC aircraft, some vintage for restoration, one large CL, never flown, minus engine, lots of equipment, all for £150. 01404 891707, Devon.
1/3 S1 Mike Smart Pitts Special, £250. 1/3 S2 Great Planes Pitts Special, £250. Yellow 101" AT6 and motor, £750 Ziroli Ju87 and motor, 110", £750. Topflite P51, 85" and motor, £450. 07477 532752.

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NEXT ISSUE

Mark Beacham kicks off the first in a new series of spotlight features on interesting model aircraft. He starts with a Grumman Hellcat finished in an unusual colour scheme, which is being flown around the shows as part of the TJD Models Display Team. This stunning 105" span, 1/5 scale model is owned by Nigel I'anson of Enfield. Nigel built the Hellcat from a Nick Ziroli plan, finishing it in March 2015, just in time for the summer show season. Thanks to its livery the Hellcat is a real head turner but you'll have to wait until the next issue to find out why it is painted red!

When designing this model the main criteria for Terje Gimming's new DH Beaver was that it should fit inside his small car without dismantling and be suitable to fly at his park size flying site. The car criteria limited the wingspan to 1.3 metres, for which a 1000 KV brushless motor and a 3S 2100 mAh LiPo provides good performance. Terje wanted to build the plane as light as possible but it was also designed to tolerate rather heavy landings without structural damage. Therefore his semi-scale model takes advantage of the Beaver's spacious fuselage to build in a box cage to help absorb the stresses and strains of heavy landings

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Joining the quest for subjects for scale R/C aircraft, Neil Hutchinson visits the Military Aviation Museum, near the beach resort of Virginia Beach in the USA. Getting close to the hangars you will almost certainly see World War 2 fighters parked on the 'hot pan' outside if the weather is good. The MAM is divided into two sections – the museum itself and the Fighter Factory, which is dedicated to keeping this squadron of pristine warbirds fully operational. When you see Neil's pictures you are sure to want to want to add a few more aeroplanes to your scale wish list!

PLUS...

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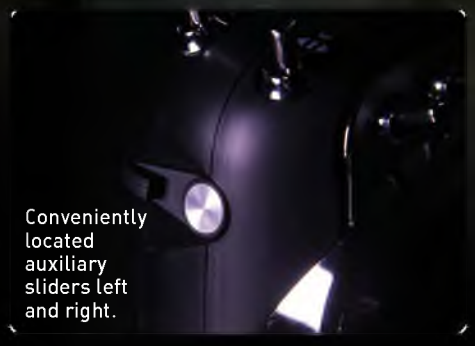

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