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This superb third scale SE5a was flown by Anthony Hills at the Large Model Association's season opening event at East Kirkby. Besides scores of beautiful large model aeroplanes visitors also witnessed taxi trials of the Avro Lancaster 'Just Jane' following her recent re-paint. Read Neil Hutchinson's full show report, starting on page 54

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Continuing his review from the last issue, Martin Briggs gets the Roban Bell 212 airborne, starting with the hovering test flights. Martin was accompanied by flying buddy Steve Tew, who provided a calming influence for the test flights and, fortunately for us, he's a good photographer too!



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First brought to our attention by Gray in 'The Sport Channel' column in the January issue of RC Model World, Swedish aeromodeller Owe Carlson describes building his 48" span modernised version of a cabin style old-timer

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Inspired by a visit to Oshkosh, Dave Chinery strikes another entry off his aviation 'bucket list' by travelling to Reno to watch the famous National Championship Air Races. Dave had to 'roll his own' holiday but booking the flights and a hotel in downtown Reno proved to be a breeze

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When rooting around the roof space at home one afternoon, Matthew Poots unearthed an old Carl Goldberg Ultimate that his Dad built some 20 odd years ago. With some TLC and some new components it is now back in the air and flying better than ever

36 LEARNING TO USE LITHOPLATE

Lithoplate is thin aluminium sheet, about 0.2 mm thick, used in the printing industry. Scale modellers use it for detailing wherever the full size uses metal. Grahame Wren shows how to add realistic metal panels and other items to your scale model using discarded printing plates

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After a long lay-off from IC motors, John Rutter started looking closely at four-stroke engines. He eventually purchased a Saito FA-40 but needed a new aircraft for it. And so Yonju (Japanese for 40) came into being as a specially designed model for his shiny new engine

54 LMA AT EAST KIRKBY

The East Kirkby show is now established as the Large Model Association's season opener for their model shows. Neil Hutchinson takes up his regular spot on the flight-line for the Saturday and Monday airshows, which are open to the public, whilst the Sunday is an LMA fly in and BBQ



Pre-flight

Welcome to the August issue of RC Model World.

Wow, what a scorching time we been having. I am writing this in the middle of the June heatwave, which pretty much started in time for the Weston Park show. It makes a welcome change from this time last year when I had to keep a broly close to hand whilst touring the show. But being a typical Brit I'm not really a fan of the really hot stuff and it has certainly slowed down my modelling output this week. Plans to go flying have been put on hold and taking pictures for a kit review in a curtailed off room has proved to be a pretty miserable experience.

I've also kept my visits to the workshop short and sweet – it's like a sauna in there! Thankfully the model I have been building is a typical screw together foam affair so there's not been any need to use lots of tools or to get the glue out. Setting times would have been impressively short though, I'd wager!

My biggest concern in this heat is for my LiPo packs because I store them separate from the house. Like all outbuildings in this heat it's pretty sweltering in there too, so I've made sure that the battery packs are bagged up in safe bags close to the floor where it should be the coolest. I've also taken the precaution of stacking the safe bags inside a couple of old ammo boxes, more in the belief that the thick metal boxes will help keep the temperature down than contain any issues with the batteries.

It would be interesting to know how our readers in hot climates cope with LiPo storage, so please write in with any useful tips that you may have.

Time now to take our regular brief look at the contents of this month's magazine. Our Feature Plan is for Radio Rock 2, a vintage style cabin model that Owe Carlson designed based on his memories of a plan that he scaled up from an old library book back in the late 1950s.

John Rutter has spent his modelling time recently by designing, building and flying electric models, but he has now returned to the IC fold by purchasing a Saito four-stroke engine. Yonju, this month's Free Plan, is the sleek airframe that he designed especially for this engine, although other similar size .40 motors will of course be suitable for it too.

Other features include the restoration of a Carl Goldberg Ultimate biplane by leading aerobatic pilot, Matthew Poots, while scale maestro Grahame Wren reveals the tricks of the trade when simulating metal panels with lithoplate. Neil Hutchinson kicks off the first of this year's large model show reports by visiting the LMA's East Kirkby airshow and Dave Chinery ticks off an entry that must be high on every aviation enthusiasts bucket list by attending the Reno air races. Finally, Martin Briggs gets to fly his new Roban Bell 212, the construction of which was detailed in the last issue.

Add in a couple of regular columns, Light Flight and Soarers Slot, and it's a broad read, we hope that you will agree. So until next time...

Happy flying – and stay cool!

Kevin

Kevin



Kevin Crozier

Editor | Radio Control Model World

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Take Off R/C News and Views

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

MyHobbyStore Website Relocates

Readers who are interested in buying plans, parts and products from the RCM&E and Radio Modeller plans ranges etc. using the MyHobbyStore website may be interested to know that the domain Myhobbystore.co.uk is now directed to Trapletshop.com

So the MyHobbyStore website no longer exists, but the address still works and it now goes to the Traplet Shop.

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Fill It With Dust!

Jan Leeuwestein from the Radio Vliegclub Dordrecht in the Netherlands writes:

"Hello Kevin,

In the article on cyanoacrylates in the June RCMW magazine they used filling powder as gap filling material. One can also use the balsa dust leftover from sanding balsa and a few drops of cyano. This works very nice and easy."

Thanks for the tip, Jan.

So next time you do a bit of sanding, why not scoop up all that precious balsa dust and put it in an old jam jar or similar for future use, rather than dumping it in the bin? Mind you, if your building board is anything like mine then maybe it would be worth brushing away all the other detritus beforehand otherwise your filler could get a bit lumpy...

70 Up And Still Going Strong!

This summer The Airbrush Company celebrates 70 years in the airbrush industry.

This family owned company is the first port of call for many modellers when it comes to their airbrushing needs, thanks to their large range of products and their highly rated customer service.

Over the last few years the company has expanded to stock paints, instructional DVDs and masking tools. They also provide an excellent training programme, with tuition by some of their most expert resellers and other customers. Courses cover almost every application of airbrushing, such as art and graphics, custom

automotive, scale models, fingernail art, body art, textiles, cakes and crafts.

To celebrate their 70th anniversary the company is having a Summer Sale throughout July and August on equipment, including airbrushes, compressors and accessories. For more information check out their website at www.airbrushes.com and follow the link to their sale offers.

Here at RC Model World, we wish the team and everyone involved at the Airbrush Company continued success over the next 70 years!



The Airbrush Company's latest model finishing products are a range of Weathering Oils by Wilder

Mike Trew T-21

Regular readers will need no introduction to Frank Skilbeck, who is a regular contributor and kit reviewer for RCMW. Frank is also a leading light at the Newent & District Model Aircraft Club, who enjoy regular collaborative club building sessions in a dedicated room at the local youth and community centre.

Frank has sent in details of the club's latest group build:

"Around 30 years ago I bought plans from RC Model World for the Keith Humber Tow Rag and Mike Trew's 1/5th scale Breguet Br 905 Fauvette and Slingsby T-21. After a club build of an electrified Tow Rag in early 2016 we were looking for another collaborative build and also one that we could hook up behind the Tow Rag. I showed my fellow builders the plans and we agreed on the T-21.

We meet two evenings a week in winter and one evening in summer so the build proceeded at a leisurely pace, finally being ready for flight testing at the Middle Wallop Aerotow on the 23rd April, 2017. It flew superbly and even hooked up to 1,500 feet in a couple of thermals from a 1,000 foot tow.

We copied an Air Cadets scheme from the internet and decided to show the finished model to our local Air Cadets squadron, who share the same building where we have our club room. They were delighted when they noticed that the registration number matched their squadron number! I hope you like the photos of it at Middle Wallop.

For our next model the group have decided to go for a home build, but the Fauvette is now next on my home building list."

Many thanks for sending in details of the T-21, Frank. Congratulations to you and the rest of the building group on completing such a lovely model.

If you are interested in building your own Slingsby T-21 then copies of plan MW2208 (RRP: £22.50) are available from the Traplet Shop using the following contacts:



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Morane Saulnier Rediscovered

Bill Bowne, one of our most popular sport/scale model designers, writes:

"Hi Kevin,

I thought you might enjoy this...

Micki and I went to the Jersey Coast Sport Fliers meet in Colts Neck, New Jersey. They run a really great meeting and they also sponsor and run several events at the NEAT Fair

At this JCSF meet we saw a familiar model on the flight line – the Morane Saulnier stand-off scale model that was run in RCMW, July 2014.

In 2016, I sold the original to Bill Sawn, owner/operator of SawnCraft Models. He did some nice work on it, improving its looks and scale flying characteristics. First off he replaced the original Power 25 motor with a Power 15 (960 KV) equivalent, added a replacement spinner from an E-flite Albatross ARF and purchased a speciality WW1 hand-painted prop. (He won't tell me how much the prop cost but he did say he's very careful on landings with it!)

He also changed from a 3S-3000 LiPo to a 2S-2200, dropping some weight and allowing for the bigger prop. Watching the model fly, I was delighted by how slowly and scale like it manoeuvred, whilst still maintaining a safe power reserve. Bill is very happy with the plane, which makes me, as the original designer/builder, very happy, too!"



Bill's plan for the Morane Saulnier N are available from the Traplet Shop using the contacts previously listed (see Mike Trew T-21). The plan number is MW 3713 (RRP: £13.50).



It's A Globemaster!

Whilst our readers, who are usually aviation enthusiasts as well as aeromodellers, seem to enjoy our occasional full-size related articles, publishing such features is fraught with risk as the topic is so vast it is difficult to get everything absolutely correct.



Our thanks, then, to John Read, who spotted an error with the caption right at the start of Bill Bowne's visit to the National Museum of the USAF, as featured in the July issue. John writes:

"Just a note to say that the heading picture to the USAF Museum article should refer to the C-124 Globemaster 2. The C-133 was the CargoMaster and it had a similar configuration to the Short Belfast."

Bill confirmed John's aircraft recognition skills:

"He's right! I looked at my notes and saw I'd mixed the two."

The C-133 looks like a giant C-130, whilst the C-124 (seen in the movie Strategic Air Command with its massive nose doors opening to swallow whole tanker trucks) is low-winged and slab-sided. The caption should say that the aircraft is the 'C-124 Globemaster II'.

A few side notes:

1. Boeing bought out Douglas (sob!) so the C-17 is the 'Globemaster III'.
2. When Micki and I were dating, we saw the last C-124 in service being flown over, en-route to a museum. What a wonderful sound! That's what makes my goof especially embarrassing!
3. I worked in the Elmendorf, Alaska (outside Anchorage) Base Weather Station between 1981 and 84. We briefed both military flights and civilian contractors flying deliveries to radar sites, etc. around Alaska. The biggest of the contractors was Northern Air Cargo, who'd purchased a few C-133s and were bringing them to Alaska to augment their fleet of DC-6 and C-82 transports."

Gravity Jetman



You may well have seen this daring model turbine powered jetman in action on the TV by now, hovering at tech shows using his amazing Daedalus body suit.

We first became aware of Richard Browning and his marvellous invention courtesy of Dave Wilshere at Motors & Rotors. Dave has been working with Richard for over a year now, with Motors & Rotors supplying all his turbines and engine support equipment.

Here's some more information about the Daedalus project:

Launched in March 2017, Gravity is a British technology start up that has invented, built, flown and filed a patent for a human propulsion technology that re-imagines manned flight. Gravity's technology combines body mounted miniaturised jet engines with a specially designed exo-skeletal suit, allowing the pilot to vertically take-off and fly

using the human body as its thrust control.

www.Gravity.co has already secured hundreds of thousands of pounds of investment and is working alongside brand partner Red Bull to document the build of its first system and the evolution of human propulsion flights.

This video, created by Red Bull, highlights the Daedalus suit:

www.redbull.com/gb-en/real-life-iron-man-suit

Founded by British entrepreneur and inventor Richard Browning, Gravity is launching the 'Daedalus', its Mark 1 propulsion suit. In doing so the company is inventing an entirely new aviation category. This video charts the suit's development: youtu.be/iZ05iAulA1c

The 'Daedalus' suit has been built by hand through relentless testing and phased flights. Gravity founder, Richard Browning said:

"I have aeronautics in my blood. My grandfather instructed on WW2 Hurricanes and the other was Chairman of Westland Helicopters. My father was an aeronautical engineer and an innovator, too."

We've already had a few comparisons to Tony Stark, but this is real-world aeronautical innovation. We are serious about building a world-changing technology business. We stand at the very beginning of what human propulsion systems will do. It's at the same point as the mobile phone was in the early to mid-80s, or the internet of the early 90s and it's phenomenally exciting."

Visit www.Gravity.co to find out more.

Of course, if you are interested in model jet engines you may have your sights set on something a little more conventional (a nice scale model jet, perhaps?) and here at RC Model World we can highly recommend Dave Wilshere at Motors & Rotors as being one of the best guys to talk to about jet models and how to become involved in this exciting part of the R/C hobby. Phone Dave on 01923 270405 or email: motrot@aol.com

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New kits and accessories

GAMMA PRO V2



Check out the latest aileron-equipped, fully aerobatic Ares Gamma Pro V2 from J. Perkins. Spanning 37" (940 mm) it features brushless power, beginner-friendly Aegis NFP (Natural Flight Progression), Hitec Red 2.4 GHz radio protocol, an HD camera mount, float option and numerous other subtle upgrades, as well as a stylish new paint job.

www.jperkins.com



SPARMAX AIRBRUSHES

The Airbrush Company have introduced three new airbrushes to the Sparmax range that they stock. The Sparmax GP Pistol Trigger airbrushes (35 and 50) offer simple, ergonomic operation. With a pre-set handle these airbrushes allow even beginners to spray consistent coverage or consistent lines and it prevents accidentally pulling back too far to flood the surface that you are spraying.

The Sparmax GP-850 features both a fan pattern and round pattern air cap. Based on preference you can switch between caps. The fan pattern delivers with minimum overspray, giving it a unique advantage over mini touch up guns. Great for small areas, it is also ideal for airbrushing R/C mouldings and larger scale models.

www.airbrushes.com



RBC KITS DOUGLAS F4D-SKYRAY



RBC Kits have introduced a new EDF jet kit to the market, the Douglas F4D-Skyray. This 90 mm kit features all CNC cut formers and ribs, using a unique tab lock and one piece design. The kit includes photo instructions on CD, full size CAD plans and a vac-formed canopy, fairings and nose cone. It will need a receiver and servos etc. to complete. Wingspan is 976 mm and flight weight starts at 2900 g.

www.rbckits.com

X-VERT VTOL



The 504 mm wingspan X-VERT gives the fun and versatility of a Vertical Take-Off and Landing aircraft without the need for complex mechanics or fancy programming. It also makes the transition between multirotor and fixed wing flight as easy as flipping a switch. There's also an optional and patent-pending FPV camera and servo-driven mechanism that transitions automatically when the X-VERT does (the FPV gear is sold separately). Combining multirotor versatility and sport plane agility, X-VERT takes off and lands vertically in small areas, or it can be hand launched and belly-landed like a conventional aeroplane. The 280 size brushless motors are compatible with 2S 450-800 mAh LiPo batteries, giving high speed and climb performance.

www.horizonhobby.de

HACKER COOL MASTER RTF



This 1650 mm wingspan advanced trainer from Hacker is made of EPP and plywood, which eliminates twisting and provides the necessary rigidity and structural resistance. Controlled by ailerons, elevator, rudder, engine and flaps, the Cool Master's control surfaces are optimally designed to provide a durable and safe flight package that satisfies all modellers from beginners to professionals. A controlled tow hook is included, and you can even insert a cargo box (No. HC5769) or you can fly off water with floats (No. HC1812F). To complete the model you will need: Radio, servos, electric motor, LiPo, prop and small tools to aid completion.

www.hacker-model.eu

PARROT ADVENTURER PACKS

Parrot have released these limited edition Adventurer Packs for the Parrot Bebop 2 Adventurer and Parrot Disco. Both packs are equipped with lightweight ergonomic backpacks that include all the flying essentials, allowing you to take pictures of the world around you from new heights. Both packs include the Parrot Skycontroller 2 and Parrot Cockpit glasses FPV goggles. The Bebop 2 also has a battery with 25 minutes of flight time and the Follow Me GPS and

visual tracking app. The Disco has two batteries offering 90 minutes of flight time and the Flight Plan app. Both drones are controlled directly from a smartphone or tablet using the dedicated FreeFlight Pro app, so set off into the great outdoors and discover your own new horizons!

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Sbach 342



Josh Spiers flies in small circles with a smart looking profile aerobat from Tech One that features a horizontal vectored motor system

I have only seen one other model aircraft that featured a vectored thrust system on the motor and, unlike this one from Century UK, it was an all balsa model. I remember being intrigued with the different flying manoeuvres you would be able to explore using this vectored motor system.

Well, it seems that I am at last going to find out having taken delivery of this foam Sbach. The model came safely packed in a protective cradle and it is a profile style model moulded from EPOFLEXY foam. It has a wingspan of 33.1 inches, or 840 mm if you prefer metric.

There are four main parts that make up the airframe, namely the moulded and sculptured fuselage with the motor and vector system already installed, as are the three servos for the control surfaces. Next there is a nicely moulded, one-piece wing with the ailerons already hinged, followed by the tailplane and rudder. The rudder is the only component

you have to hinge yourself following the tailplane fitment.

The airframe is decorated with swoopy red and black decals of the water-slide type; on flat surfaces like the wing and the tail these are no problem but when it comes to the fuselage, which is heavily sculptured, some of the decals are just partially sitting in mid air. One touch and part of the decal falls away leaving an unsightly hole in the decal. I am puzzled why this is because in other areas the decal has been carefully moulded around the foam, fitting perfectly in place. My solution was to paint some canopy glue into the gap and stick the missing pieces back in place.

There is, as is usual with these models, a comprehensive bag of accessories for completing the aeroplane, plus nine lengths of thin carbon fibre rod that are used for bracing and pushrods. The glossy magazine style manual covers all aspects of the build using black and white pictures, confirming that assembly is going to be fairly quick and easy.



Airframe parts are protected in transit by this neat carry tray that slips inside the outer box



The reinforced EPOFLEXY airframe has high strength for 3D manoeuvres whilst keeping weight to a minimum



Unpacking the model reveals just a few parts that require assembly



Underside view showing the main plane bracing



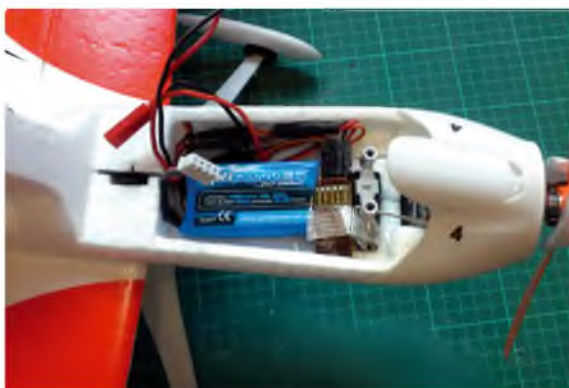
Right: The aileron linkages are short and slop free. Josh replaced the carbon pushrods supplied with alloy ones from his scrap box after the ends of the original rods became crushed when nipping up the screw keepers. Wicking some cyano into the ends of the carbon rods before assembly would help firm them up

Left: More carbon rods are used to brace the tailplane during extreme 3D manoeuvres



Left: At the front of the battery bay are the pushrods and servo connected to the variable vector motor system. There's just enough room behind for a mini Rx and a small 3S LiPo

Right: Care needs to be taken when fitting the foam spinner to make sure that it is properly aligned. Note the generous clearance around the motor to allow it to swing sideways when the vectored system is switched on



Putting It Together

I used medium cyano for all of the construction. With judicious use of kicker this made short work of the assembly and added very little weight.

The only fiddly bit is connecting the rudder to the servo via a closed loop using the supplied thread. Nimble fingers are required for this job but if you follow the instructions in the manual to centralise the rudder, then prevent it from moving so that you can tighten the thread equally on both sides, all will be well.

With the airframe complete and the trouser and be-spatted undercarriage glued in place, you need to fit a mini receiver and connect up the servos so that they can be centralised before you fit the carbon fibre pushrods and the screw clamp clevises. All of the pushrods are cut to the correct length, with the screw keeper in the end of the clevis allowing for fine adjustments.

The carbon pushrods are very thin and are easily broken by the screw in the end of the clevis as you tighten the screw. Both of the pushrods on the large ailerons failed in the

air during extreme manoeuvres, although I was forewarned by the model's extreme mushiness before they failed completely. Upping the pushrods' diameter would add very little weight and increase the level of safety, so I replaced the thin carbon fibre pushrods with some light alloy pushrod material from my stock, with adjustable swing keepers on the aileron horns. They have proven to be perfect for the job and I have included a photo of the mod in my review.

The last bit of the assembly is the fitting of the carbon bracing rods to the underside of the wing and tailplane. This really stiffens up the airframe and they slot into some beautifully moulded little brackets that hold them securely in place. The manual shows fitting these before connecting up the servos but if you do you will find that they get in the way and make the job more difficult than it needs to be. I also inserted a piece of carbon fibre rod as a tailskid to save wear on the foam when taxiing.

On the front of the fuselage is the battery and receiver hatch, which pushes under the top of the combined plastic nose cone and

motor mount; it is kept in place by a push fit plastic clip at the back. This offers a very secure and positive fit, with no chance of in-flight departure! The specified LiPo is a 3S 350/400 mAh, which fits snugly into the bay and is why you need to use the smallest size receiver you can get.

There is no chance of removing any foam to enlarge the bay because the vector servo is fitted at the front and the plastic hatch clip is glued centrally in the foam at the rear. This size battery also sets up the Centre of Gravity right on the money at close to its rearmost point, 70 mm back from the leading edge of the wing.

At the front of the battery bay is the 9 g servo for vectoring the motor, using two short pushrods. And in front of that is the 10 amp ESC, which is slotted into a narrow gap just behind the moulded nose cone/motor mount. Space is a little bit tight and busy but it all fits and works perfectly.

In front of all this is the 'Tech One' Hobby 2206 outrunner with a KV of 1500, swinging an 8 x 4 slo-fly prop, which is held in place with a rubber 'O' ring. A small foam spinner is



Fresh from the workshop and raring to go!



Josh likes the handy size of this pretty 3D model



Preparing for a vertical take-off, Josh supports the Sbach until the thrust matches the model's weight...



After a gentle release the Sbach powers up and away



Inverted flight is easy with this one



Simple stripes on the underside stand out well during aeros to aid orientation

supplied into which you glue a short piece of carbon rod that locates with an interference fit into the central hole of the prop.

Great care is needed to get this in straight so that no undue vibration is caused when the motor is running. Any sideways pressure on the spinner, say during storage, will distort the foam causing the spinner to depart in flight; we have a new game in our club called hunt the Sbach spinner!

So with all of the assembly done, the C of G checked and the controls set up with LOTS of movement, plus 50% expo on the ailerons, it was time to get her in the air and see what this puppy can do!

Flight Test

Bearing in mind the size and weight of the Sbach, 300 grams all up, we needed a bright and sunny day with very little or no wind for its maiden. How long can you wait? This is England after all but model flyers develop a large optimism gland which, with a gentle squeeze, delivered us just the day we needed!

With Roger handling the camera as per usual the motor was fired up and a gentle underhand lob got her away for the first flight. I had set all of the surfaces at neutral so I was not expecting any drama on the first circuit. And so it proved, just two clicks

of up was all that was required for hands off straight and level.

As I was using a very small indoor style receiver with only four channels I had the vector servo connected via a Y lead so that the vector system was active all the time with the rudder. This to me was not a problem, just needing a gentle touch on the rudder stick to allow for the added lateral thrust being developed. Having now had many flights with this set up I probably wouldn't bother with switching the vector system on and off anyway as I prefer the way it flies as it is.



Loops can be as big or small as you like!



With excellent servos and the vectored prop fitted the Tech One Sbach has an astonishing aerobatic repertoire



Left: With the weight kept to a minimum all the power from the brushless drive train can be used for prop hanging and vertical climbs. When you are well practised you can even try plucking her out of the air! (Just mind the prop...)

With the trimming done the first flight was kept fairly tight and slow for the camera to do its job, with just the odd roll (fast and slow), inverted and a couple of loops and bunts. The Optipower 400 mAh 3S LiPo that I was using gave me five to six minutes in the air before showing any sign of sagging, which enabled me to set my timer at five minutes for subsequent flights.

Bearing in mind the load on the vector system servo in the air, the more you use it the more it sucks out of the LiPo. So with my set-up I consider the duration I get is pretty good, considering how much flicky/spinny stuff I put it through in the air.

The next few flights enabled me to explore the repertoire more fully, with lots of stick banging and heart thumping chucking about. Wow!

This is the first plane I have flown that will knife-edge in its own length, left or right side, looking like a Catherine wheel. Flat spins can be tight or loose, upright or inverted, and one manoeuvre I got into from an inverted flat spin (don't ask me how!) was with the model rotating to the left, alternately raising and lowering its nose quite dramatically without any height loss!

Of course, it goes without saying that the model will fly in a more gentle manner when not in hooligan mode. Lovely smooth aerobatics close in are just as fulfilling as trying to thrash it to pieces and it gives the old heart rate a chance to come down a bit.

Flat turns either way up can be large or small on my set up and knife-edge can

almost be done with no positive stick input whatsoever. I have now mastered horizontal knife-edge figure of eights but have yet to summon up the nerve to try it in the vertical plane. What's that clucking noise I hear from behind me...?

Undercarriage Mod

I have also had the chance to review this model's bigger sister ship, the Revolution. With that model I had a problem with the white plastic U/C mount snapping off while taxiing. Unfortunately exactly the same thing has happened with the Sbach, in exactly the same circumstances, when taxiing back to the pits on a tarmac runway. I suspect that the plastic used is too brittle for the job. I know some pilots may well never have this problem but I suspect that any landing that isn't feather like will eventually cause the same result.

I have effected a repair, which seems to have done the trick. Using the same soft alloy pushrod material as before, I passed it through a short length of the white plastic inner. After carefully measuring the length I needed, I cut it off and bent a half loop on each end which I glued round each U/C leg. As you can see, I let the brace into the lower fuselage by cutting a slot and then replacing the removed foam afterwards. Time will tell if this will last.

Summing Up

The issues with the decals, the flimsy carbon pushrods and the brittle U/C mount

Right: After the U/C mount broke whilst taxiing, Josh fitted a cross strut to brace the legs. A quick, simple fix



MODEL WORLD

MODEL INFORMATION

NAME:	Sbach 342 PNP
MANUFACTURER:	Tech One
DISTRIBUTOR:	Century UK
PRICE:	RRP £129.95
WEBSITE:	www.centuryuk.com (search 1-TECHONE-SBACH342)
MODEL TYPE:	Profile aerobatic and 3D
CONSTRUCTION:	Moulded EPOFLEX foam
PARTS SUPPLIED:	Airframe, brushless motor, ESC, four servos
PARTS REQUIRED:	LiPo, receiver, transmitter

R/C FUNCTIONS

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

MODEL SPECIFICATIONS

WINGSPAN:	33.1" (840 mm)
OVERALL LENGTH:	37.8" (960 mm)
FLYING WEIGHT:	300 g (10.6 oz)
MOTOR SIZE:	AT2206V2, 1500 KV
ESC:	10 A BEC
SERVO:	4 x 8 g
RADIO:	4 channel
PROPELLER:	8 x 4 in Slo-Fly
BATTERY:	3S 400 mAh LiPo

do just take the shine of what would be perfection. But otherwise this pretty model has many plus points.

The Tech One Sbach 342 PNP is an excellent little park fly/indoor model that looks fantastic, is beautifully moulded and the powertrain is spot on. With excellent servos and the vectored prop fitted it has an astonishing aerobatic repertoire, plus it is of a handy take-anywhere size. **RCMW**



Radio Rock 2

MODEL WORLD

At A Glance

WINGSPAN:	48" (1220 mm)
WING AREA:	278 sq in
WING LOADING:	39.6 oz/sq ft
LENGTH:	35.5" (900 mm)
WEIGHT:	900 g
RADIO FUNCTIONS:	Throttle, Elevator, Rudder
SERVOS:	Hextronic 9 g
BASIC CONSTRUCTION	
MATERIALS:	Balsa, Ply, Spruce, Depron (optional)
COVERING	
MATERIAL:	Solarfilm
IC ENGINE RANGE:	.15-.25 cu in glow or diesel
IC ENGINE USED:	Elfin .15 diesel (1959)
PROPELLER:	9 x 6 or 10 x 5
ELECTRIC MOTOR:	Emax 2218/11, 930 KV
PROPELLER:	10 x 5 or 11 x 5
ESC:	30 A
LIPO:	3S 1800-2300 mAh, 11.1 V, 20C
C OF G:	80-90 mm back from LE
RUDDER:	+/- 25 mm
ELEVATOR:	+/- 10 mm

First brought to our attention by Gray in 'The Sport Channel' column in the January issue of RC Model World, Swedish aeromodeller Owe Carlson has sent in full details of his 48" span modernised version of a cabin style old-timer



Radio Rock has a classic R/C cabin model layout and planform

In his original message to Gray, Owe writes:
"I have a small Vintage/Old timer story to tell and maybe find a place in your magazine. The year was 1959. When I was visiting my town's library I found an English book dealing with R/C models. In the book there was also a plan of a model called 'Radio Rock', suitable for beginners. I borrowed the book, copied the drawing to full scale and decided to build the Radio Rock.

This was my second R/C model and it was, of course, rudder only controlled. I had an .15 Elfin diesel, which could be used for the model. The R/C equipment was from Sweden (Telepilot Tx and Rx) and a 'bang-

bang' actuator from England. Radio Rock was easy to fly and I learned to fly with one push-button. It had had a lot of flying time when it crashed due to interference from the radio phone of a passing taxi. The crash was total and Radio Rock did not exist any more.

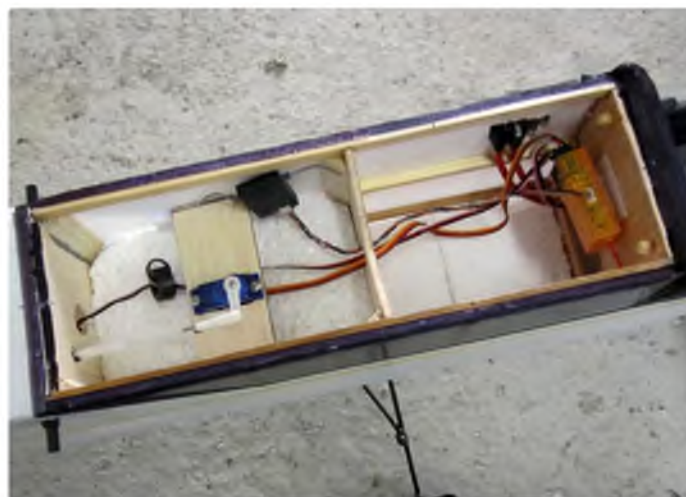
One winter's day in 2013 I was looking in my album where I have all my R/C models pictured and numbered. At the moment there are 160 models. There was No.2 Radio Rock, 1959/03, of 1480 mm wingspan, 800 mm length and 1.3 kg in weight. I decided to build it again (nostalgic memories...) but my drawing was lost and I couldn't find one. So from the data I had, and some images, a new drawing was made.

The No.141, Radio Rock 2 has a brushless electric motor and three channels. RR2 flies very well and is even softer than No.2. It is 54 years between these pictures and I still fly my No.141 Radio Rock sometimes, and I think what fantastic progress R/C flying has achieved since the 1950s."

Please note that the specifications that Owe mentions differ between the old and new versions. The latest version is CAD traced so we recommend using this plan to build from.

IC Or Electric?

The wing and tailplane for both versions are built in the usual way using ribs and spars made from balsa and pine (spruce), but the



Above: Radio layout in the cavernous fuselage

Left: Owe lends scale to his latest Radio Rock, now electric powered



Front end view. Note the dummy diesel engine and fuel tank on top of the battery bay hatch

Like the wing, the tailplane is banded on. You can either mount a micro servo on top or use a long pushrod to operate the elevator – your choice!

EP fuselage can be made of 6 mm Depron sheet with spruce longerons and 1/4" and 1/8" ply formers. However, instead of Depron one can also use balsa sheet.

If using glow or diesel engine power I recommend building the fuselage with balsa and covering it in Solarfilm. If electric powered no covering is needed on the Depron fuselage, although you can use coloured packing tape to add some decoration.

The landing gear is made from 1/8" (3 mm) diameter piano wire, fixed with saddle clamps to a plywood plate. The nose leg can be made steerable, linked to the rudder, but you should use a more powerful servo if you do this.

Wing

First, decide if you want to build the wing with or without slots. The slotted version is good for low speed handling and there is nearly no stall, but if you fly at normal speeds you can avoid making the slots, making it easier to build.

Cut out all ribs and, after covering the plan with transparent film, pin the main spar, rear spar and trailing edge balsa strip in place. Then place all the ribs over the plan.

If you decide to build the wing with slots then glue ribs W3 and W3A together as the plan shows. After the glue has dried, place

the upper spar on the ribs and glue. Now trim and glue on the wingtip. When dry glue the leading edge strip to the ribs and use pins to hold it tight. After the glue has dried, glue the front sheeting to the slot ribs, then cover these parts with 1/16" sheet up to main spar. Build the other wing half as above.

For the wing dihedral brace use 1/8" plywood, reaching out to rib W1 on each panel, and glue with 5 minute epoxy. After this is done you can cut and attach the sheeting for both panels. Remember the openings for the slots! Sand smooth all the holes with sandpaper before covering.

The wingtips can be covered separately.

Tailplane

Cut out the tailplane ribs. Note that they are in two pieces: A (top) and B (bottom). Lay down over the plan the leading edge strips of 1/8" x 3/8" balsa, the main spar from 1/4" x 1/4" hard balsa and the trailing edge strip, also from 1/4" square balsa

Now place ribs S1A to S5A over the plan and glue them in place. Also glue the tips to ribs S5A. After the glue is dry turn the structure over and glue the B ribs to the underside. Please leave a 1/8" space between the S1 ribs for the 1/8th ply under-fin to be glued into the slot after covering.

The elevator and rudder are made from 5/16" medium balsa, chamfered at the trailing edges.

Fin And Rudder

The fin is built up as a framework of 1/4" balsa strip and sheet. After covering it is glued on top of the fuselage in a slot between F6 and F7.

The rudder is from solid 1/4" medium sheet. Hinge the control surfaces using the type of hinge that you are most satisfied with.

Fuselage

Decide what material to use: Depron or balsa sheet.

If you choose balsa, glue two sheets together for each side. Cut out the sides and try to make them equal. The arrows on the drawing show the edges of the fuselage sides.

Now it's time to make the formers and to mark out their positions on the fuselage sides. Glue in the reinforcement strips from F1 to F3 before gluing F1-F4 to one side. Check that the formers are upright and at 90 degrees, then glue triangular strip behind F1, and that F1 also has some downthrust. When dry fit the other side and repeat the process.

When the glue has dried bend both sides together at the rear and glue the ends to F7. Be careful to make sure that it is straight and not bent like a banana! Use slow setting glue for this. Fill in F5-F6 and glue, checking again that there are 'no bananas'!

RADIO ROCK

Next, glue the underside sheeting between F2 and F6 and pin in place. Glue in the ply plate for the landing gear under F3 with epoxy.

Now it's time to complete the nose. Fill in the space between F1 and F2 to make a tray for the LiPo battery. Plank the bottom with a triple layer of Depron sheet or 1/8" balsa sheet. Round off the upper part between F1 and F2 with balsa blocks.

Leave an opening for loading the LiPo battery as shown on the drawing. Fix on the cabin glazing and glue in the dowels for fastening the wing with large rubber bands. Also, fit the dowels for banding on the tailplane.

Make a hatch from balsa sheet or Depron to cover the opening for the battery. This can be decorated with a dummy diesel engine head to make it look vintage.

Before planking the upper side between F4-F6, make up the pushrods to the rudder and elevator. However, I prefer to fix the elevator servo on top of the tailplane and have a long servo extension lead to the receiver. Glue on the upper deck and then glue the fin into the slot between F6 and F7, reinforcing it with triangular strips at the base.

Make up and fit the front and main landing gear to the fuselage.

R/C Installation

After mounting the brushless motor, connect it to the ESC, which can be placed in the battery bay. The receiver is placed in the space between F2 and F3, and the rudder and elevator servos (if using a pushrod for the elevator) can be mounted in the space between F3 and F4.

Check that the movement of both the rudder and elevator is full and free, and that they operate correctly from the sticks on the transmitter. Put in some expo (around 40-50%) and keep to the travel adjustments shown on the drawing. Then load up a fresh battery and wait for good weather to test fly your Radio Rock!

Easy To Fly

Radio Rock is like a trainer to fly but it can also perform simple aerobatics, such as loops, wing-overs, barrel rolls and slow flying. If treated well it will return the compliment and it will be nice back to you.

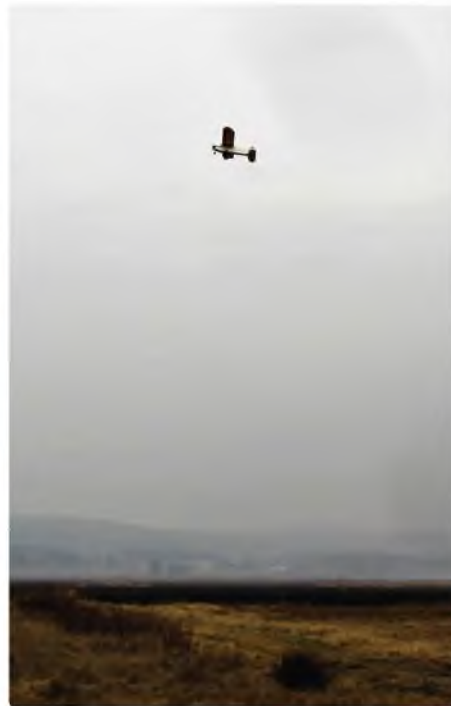
Happy Landings! **RCMW**



The dummy diesel engine looks convincing from this angle. Or simply fit a real one!



Owe prepares Radio Rock 2 for another flight in rather gloomy conditions that will be familiar to British readers...



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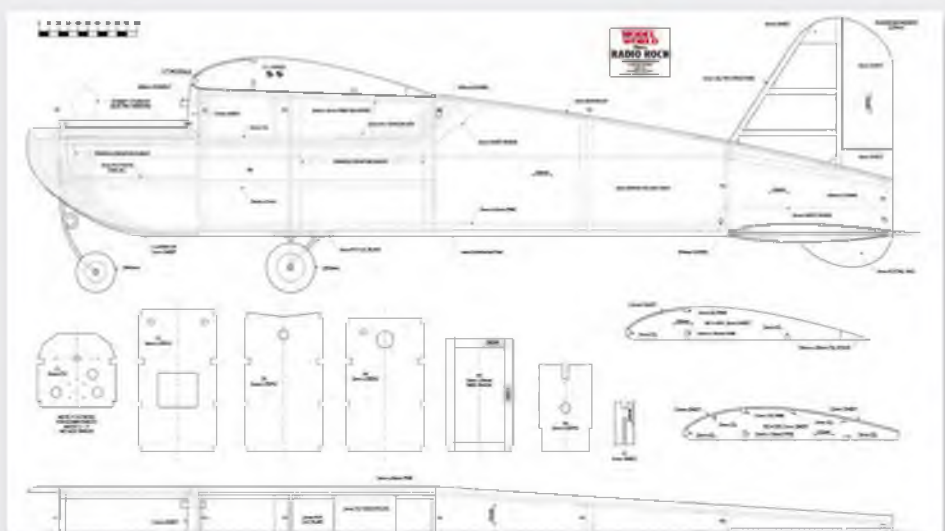
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Downtown Reno



Pylon Racing For Real!

Dave Chinery struck another entry off his aviation 'bucket list' when he travelled to Reno to watch the famous National Championship Air Races in 2016



Sea Fury 'Dreadnought' is an impressive sight



A T6 race is on!

Thanks to working with my son, Mark (who was a British Pylon Racing Champion at the age of 13!), I have been involved with the sport of R/C pylon racing on and off for a long time. I have been Team Manager at two F5D World Champs and have even competed myself in an International (non-Championship) event. And as an aviation enthusiast and pilot, I have long been interested in full size Air Racing, ever since I went to a British King's Cup race as a teenager.

I knew of the famous Reno Races in the States and having crossed off the big Oshkosh show from my 'bucket list' last year, the next item on the list was Reno. I went to Oshkosh the easy, but expensive way with Ian Allen Tours, but they don't cover Reno. So I had to 'roll my own' holiday. As it turned out this was quite easy and my trip went ahead without mishap. Booking flights and a hotel in downtown Reno was a breeze!

Having checked out the Championship Air Race website, I was intrigued to note that they run shuttle bus services from downtown, so ground transport was easy and I didn't have to rent a car. Even better, the No 7 bus from the 4th Street bus station also covered the 35 minute drive to Stead for just \$1 each way, while the Race Shuttle, which I used on the busy Sunday, charged \$21 return!

One benefit of arriving on the Wednesday was a relatively free choice of reserved seats in the grandstand. Considering the cost



Retrieving a Cassutt F1 after the race



Mile high tower



Pete Zaccagnino's ill-fated Vampire



The Jet Class pits



Only in America! Two 36 cylinder R3400 engines were 'Siamesed' to produce a 5,000 hp engine. It will need a very special airframe



A relatively 'stock' Yak 11 in the Unlimited Bronze race

of the rest of my trip, I invested \$155 in reserving a seat for five days near the top level and pretty much in line with the 'home' pylon and finish line – a premium location!

Venue

The races are held at Reno Stead Airport, about 10 miles outside Reno. The airport is situated in a natural amphitheatre of about five miles square of high desert 5,000 feet up in the Sierra Nevada. The race courses have varying sizes ranging from the three mile short oval for the Formula 1 and Biplane Classes to the maximum size eight mile course used for the Jet and Unlimited Classes.

All courses include the Start/Finish pylon beside the centre of Stead's runway 08/26, directly opposite the grandstand. The spectator enclosures are on the south side so you are always looking 'down sun' for the best visibility – unlike Oshkosh!

Starts

In addition to the variety of courses, various starting procedures are used. Of the 'normal' races, only the Formula 1 and Biplane Class use a conventional standing start from the runway. The 'novelty' T6 '1-on-1' Match Races also use a standing start. All the other classes use a rolling start, where the aircraft will form up line abreast when airborne on a pace plane, which will lead the field 'down the chute' and release them into the course with the call, "Gentlemen, we have a race!"

Up to eight racers will then continue towards the high-vis 'Guide Pylon' at the back of the course, remaining in grid order and line abreast until reaching it. The pole position plane, decided from qualifying or earlier races, is on the left and has the advantage at the guide pylon, with the others

pro rata. The exception is the T6 Harvard races, which enter the course airborne as described above, but from the West at the 08 threshold and they split after passing the 'home' pylon.

All overtaking aircraft must pass on the right and/or above in turns, with a 250 foot height limit.

Classes

Formula 1 aircraft are the well-known types that are often modelled, such as the Cassutt, Shoestring, Midget Mustang, etc. They use highly tuned four cylinder O-200 engines turning at up to 4000 rpm, compared to the normal limit of 2700 rpm! Speeds up to 230 mph are seen and very close racing can occur. Races last up to eight laps.

The Biplane Class mostly use Pitts S1s, but two seat S2s and Christen Eagles can compete (at a disadvantage), all using tuned versions of the six cylinder O-360 engine, again turning at up to 4000 rpm! Some aircraft are highly modified, being lightened and having the upper ailerons fixed and faired in to reduce drag. A purpose designed aircraft, the Mong Sport, is smaller and lighter than the Pitts and it won all its races and the Final (but see Incidents later). Again, races are up to 8 laps.

The Sport Class includes a wide variety of high performance piston singles, ranging from Lancaires and Legacys to 80% size Mustangs with converted car V8 engines. Race speeds of up to 360 mph were seen.

At the slower end, lots of Vans RV8s were raced and they had dedicated heats and a Medallion Final. The Sport Class had races of up to six laps of a longer and wider course.

The T6, SNJ, Harvard class had about a dozen entries, including the famous 'Big Red' and this was by far the noisiest class.

Entering the course airborne from 'stage left', the sound of up to eight props going supersonic was highly memorable! The noise was still clearly audible while the field was on the 'back stretch' of their mid-sized course. When approaching the home pylon, through the 'Valley of Speed', the rising Doppler effect was striking. Six lap races provided some exciting spectacles and close finishes at speeds of around 200 mph.

The Jet Class mostly comprises of East European jet trainers like the L-39, Delphin and PZL Iskra, and a rare Galeb G2A. We were treated to the sight of two Vampires as well; only one lasted until the final (see below) but it 'blew away' the opposition to win the Gold Final. Starting on the right end of the 'line abreast', he went round the guide pylon last but overhauled all the rest of field one by one to win the final. His speed excess was estimated at 30 knots and possibly more! For me, this was the stand out race of the whole event!

The Unlimited Class is famous for the spectacular and legendary machines like 'Rare Bear', 'Precious Metal' and 'Tsunami', etc. Unfortunately, due to mishaps those aircraft were absent this year and we only had two 'specials', 'Voodoo' and 'Czech Mate'. The field was completed with not one, not two, but four Sea Furies, including the famous 'Dreadnought'.

Voodoo is a highly modified Mustang, with a tuned Merlin reputed to deliver 3700 bhp, while Czech Mate is a Yak 11 fighter fitted with a P+W R3400 'Corncob' radial, said to produce 4000 bhp! Although using the only in-line engine in the class, Voodoo easily won the Final at about 485 mph, followed by Czech Mate and the various Sea Furies.



T6 'Big Red' in the middle of the action



The winning Vampire of Zak McNeill



Into the course, with the Blue Angels parked below



Ruffled tail feathers after the Mong accident. Apologies for the picture quality but Dave's phone camera was on full stretch for this one! Maybe take a DSLR this year, Dave?



'Czech Mate', a Yak 11 with a 4,000 hp R-3400

Novelty Races

Two classes of these were flown. The T6 '1 on 1' Match Races are effectively aviation drag races. They had a standing start from the 08 threshold and the winner of each match was the first past the 'home' pylon after completing one lap of the T6 course. Eight aircraft started and each loser was eliminated and the winners went on to the next round and final. Some bouts were extremely close, requiring a photo finish!

The Slalom was new to the event, where Sport Class aircraft flew parallel 'Figure-8' courses around the pylons and returned to the centre pylon where the race finished. Any lead advantage of the winner was recorded, then the aircraft swapped courses for a rematch. Like the T6 Match Races, the loser was eliminated and the winner went on to the next round.

Incidents And Accidents

Pushing airframes and engines (and pilots) to the maximum in the 'hot-n-high' environment of Stead is bound to result in a few mishaps. Happily none of those I witnessed resulted in anything other than minor injuries to pilots and major assaults on their bank balances!

The saddest and most serious was the Vampire of Pete Zaccagnino (of satellite TV series 'Dangerous Flights' fame), which had an engine failure of some kind on the course. Trying to 'dead stick' it round onto runway 14, I was surprised to see he still had the trailing edge airbrakes out. Possibly because of this, he couldn't make it round all the way so he elected to belly land in the desert. Pete was fine and we hope the Vampire is repairable.

Sometimes, as also seen in F1 car races, there was a serious rear end shunt at the start of one of the F1 heats. There is a

standing start of three rows of three abreast planes. The engine of the central aircraft on the second row stalled and the pilot opened the canopy and put his hand up to signal this. Unfortunately the starter didn't see it and he dropped the green flag to start the race. The central machine in the third row couldn't see it either being a taildragger (nose up) and collided with the rear of the machine ahead, passing over the top and landing sideways on the runway with the right gear leg removed and sundry other damage. Both aircraft were severely damaged but the pilots got away fairly lightly. Check out the 'Hot Stuff F1 accident' on YouTube!

Next most serious was an RV8 in the Sport Class, which lost power on the course. The lady pilot landed it nicely dead-stick on Runway 14 but it caught fire spectacularly as she rolled out and she got clear as soon as it stopped. Fire services were at the scene quickly but it took at least 10 minutes to get it put out. A write-off, I should say!

Flying a Pitts, especially a racing one, requires skill and concentration all the time until you are back in the pits with the engine stopped. Another lady pilot had a spectacular ground-loop when rolling out from a landing without visible damage to the plane.

Two others were not so lucky! As the Biplane Race Champion, the Mong Sport was rolling out after landing from his winning flight, another Pitts was a bit close behind (to my judgement anyway!). Possibly distracted by thinking about his victory, the Mong pilot ground-looped at about 50 mph, losing his tailwheel in the process and ended up rolling backwards down the runway at undiminished speed. The now wheel-less tailskid caught in a runway joint and snapped the entire tail feathers off the fuselage! Probably distracted by the Mong's adventure, the too-close Pitts

also ground-looped and sustained wing damage, as did the Mong...

Conclusion

I started attending big aviation events in 1949 (with my Dad) and I have been to many superb airshows since then. This one is different and the racing was always exciting and sometimes epic. The arrangements I made myself worked out fine and I am already saving to go again next year.

Come and join me! **RCMW**

The National Championship Air Races

The Reno Air Racing Association aim to combine air racing with spectacular military and civilian air entertainment. Along with a small full-time staff, approximately 2,500 volunteers serve in various capacities ranging from course safety and air traffic control to race timing and scoring.

The National Championship Air Races carries on the tradition of the Cleveland Air Races of the 1920s through to the 1940s. In 1964, Bill Stead organised an air race near Reno, Nevada and the Reno National Championship Air Races were born. The event has only been interrupted once, in September of 2001 when all aircraft in the USA were grounded following the terrorists attacks in New York and Washington.

Held every September, the Reno Air Races have become an institution for aviation enthusiasts from around the world – including Dave! For one week the high desert north of Reno becomes home to hundreds of aircraft, their pilots and crews. In the past ten years, the event has attracted more than 150,000 spectators. Besides the six racing classes there is a large display of static aircraft and several military and civil flight demonstrations.

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Ultimate Restoration

Matthew Poots plucks an old biplane from the loft and gives it a new lease of life with modern petrol power and digital servos



Another old model gets released from the loft! Matthew shows off the Ultimate following its restoration

When routing through the roof space at home one afternoon I noticed an old Carl Goldberg Ultimate that I remember my Dad building and flying some 20 plus years ago. At the time it was considered a big club model and it attracted a lot more interest at the field than a Wot 4

or Panic. My memory of the plane was that it flew great compared to other models of its time, so the spark in my head was, 'What if we restored it or, rather, modernised it?'

It was still flyable, complete with its original engine, a Moki 120 two-stroke, and a Futaba 35 MHz PCM receiver, with Futaba 3001's all

round and a 6 V NiCad. It was covered in the classic blue Ultimate scheme, using Glosstex covering. Initial impressions when we laid it out on the workshop floor were that it was heavy, but everything was 20 years ago!

With some TLC and new components it would be back in the air better than ever.



Checking the Moki at full bore



Poots family Ultimate flying in its original colour scheme



The original radio and engine installations



Stripped of all its original equipment

Top & above: When first plucked from the loft the model was covered in dust and exhibited a few signs of 'hangar rash'



Fresh Start

With modernisation as the design brief, I began to choose the components. We all have models in the hangar that we don't fly and with two-stroke fuel prices soaring the new crop of small capacity petrol engines are excellent alternatives and perfect for this type of project.

A 1.20 cu in two-stroke is 20 cc, all said and done, so an Evolution 20 cc from Horizon Hobby was chosen. They have led the way in the small capacity petrol market, starting with a 10 cc motor a few years back. Their small engine range now starts at 8 cc and goes right up to 33 cc, before rising to the more standard (larger) 40 cc through to 152 cc petrol motors.

The 35 MHz receiver would be swapped out for a 2.4 GHz Spektrum Rx – the AR9350 to be precise. This receiver also has the added benefit of AS3X gyro stabilisation. Not a necessity on this type of model, by any stretch, but it would be interesting to see how giving this model a full modern make-over would affect the flying quality.

The Futaba 3001 servo was just over 3 kg torque in its day, so a Spektrum A5060, a modern High Voltage mid-sized servo with over 7 kg of torque, was used on the elevator and ailerons, with a standard Spektrum A6220HV used on the rudder.

The 6 V NiCad was replaced with a 7.4 V Optipower two cell 1350 mAh receiver pack, connected direct to the HV servos, so there was no need for regulators or fancy switches.



A 2.4 GHz radio system and digital servos give the old airframe a much crisper response

Left above & below: New engine installation based on the Evolution 20GX

Weighing It All Up

Our first job was to remove all the old equipment and start with a bare airframe. We made the conscious decision to weigh everything before we started and right throughout the build. When it was last flown, sometime in the late 90s/early 2000s, it weighed in at a generous 11 lb 6 oz. It would be good to see how much of this weight we could shift!

After all the components had been removed the next job was to strip off all the Glosstex covering. In its day Glosstex was a great product, which looked superb, but with that

came added weight and it also wasn't petrol proof. And as the airframe had been covered 20 years ago the Glosstex had gone a little sticky and it proved very time consuming to remove. But with a little gentle heat it was peeled off bit by bit.

With the airframe now bare we planned out exactly how the engine and servos would fit, whilst making any necessary alterations. We soon realised that the bare airframe was actually very light and we didn't need to remove any elements of the structure to save weight.

The simplest job was to resize the servo bays. The standard servo openings were partially filled and smaller mini servos were fitted.

On the old model the ailerons used two servos, one for each side. Each servo was connected to the bottom ailerons, with an M2 connecting rod to each of the top ailerons. However, with my IMAC experience, I was keen to have the ability to adjust each aileron digitally to get the set-up as perfect as possible. With the Spektrum AR9350 receiver each surface can be adjusted via a smartphone, so we modified each wing to accommodate an A5060 servo connected directly to each aileron.

Each elevator half got the same treatment but the servos were moved to the rear of the aircraft and short direct linkages were installed. Originally there was a single split rod running to a servo mounted in the middle of the aircraft, but again, from my experience, I prefer a direct short linkage for increased precision and consistency.

The rudder was kept on closed loop and a standard sized HV servo was installed in the original location.

The new petrol engine was mounted on a plastic mount, as per the instructions, and a HV servo was installed to operate the throttle. With the Evolution 20 cc no choke servo is required; it is primed much the same as a glow engine, by holding your thumb (with the ignition turned off) over the carb intake, whereby it draws the fuel in exactly as you'd expect with a glow engine.



Stripping away the Glosstex revealed a fairly light airframe that was in good condition



Each of the four ailerons is now driven by a wing mounted servo rather than by just two servos and connecting rods



The engine was fitted to a plastic mount, as recommended by Horizon



You can save weight in a petrol powered plane by using a much smaller fuel tank



Evolution's optical kill switch

The fuel tank used for a 20 cc petrol engine can be much smaller than that used for a similar size glow engine. For our original Ultimate we used a 14 ounce fuel tank to feed the thirsty Moki and from memory we got around 10 minutes run time when sport flying. The Evolution 20 cc uses an 8 oz tank and with that you can expect 12-15 minutes run time. However, in our experience that is a bit conservative and 18 minutes is more realistic. The petrol engine is much more efficient so we can save more weight here by reducing the amount of fuel that we need to carry.

The plumbing of a petrol tank is a little different from a glow model, but not a great deal. As the Evolution has a pumped carb you can afford to mount the tank closer to the C of G, giving a better balance across the whole flight. See the diagram nearby for the tank plumbing we used.

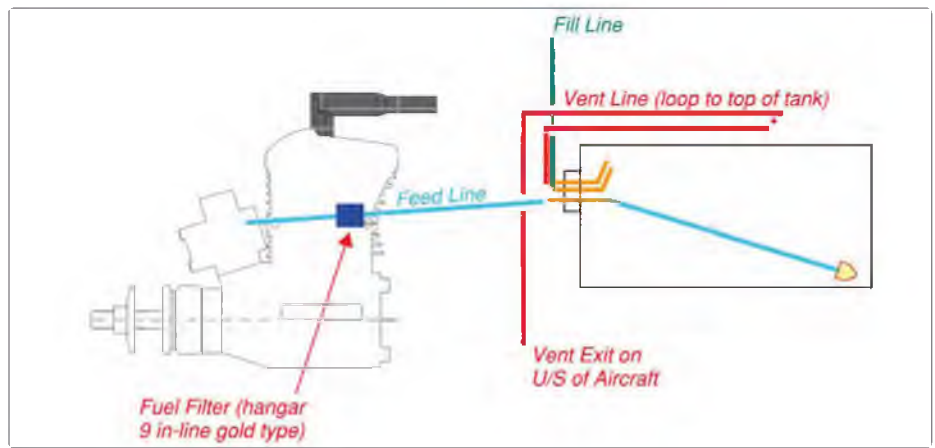
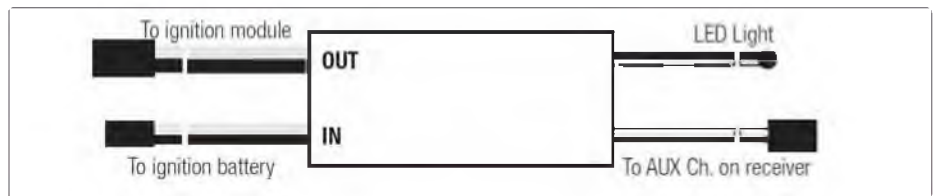


Fig 1 – Petrol fuel tank plumbing



Right: Fig 2 – Opti switch connections

We Have Ignition

With the tank plumbed and fitted the next job was to fit the ignition module. For those who may not know this is one of the major differences between a glow engine and a petrol motor. Traditional IC engines rely on a glow plug being ignited on start-up using a glow clip. Once the engine has been started the glow clip or power source can be removed and the engine should keep running until the fuel runs out.

As petrol is less combustible than glow fuel it relies on a constant spark. The spark is timed to ignite at a precise point by the magnet/sensor on the crankcase/prop driver. This requires an ignition module and a battery to be fitted, and this is why all modern petrol engines run using electronic ignition.

It is also wise to fit an ignition cut-off switch, which is a simple switch that is activated by a free channel on your transmitter. This gives you the chance to isolate the power to the ignition unit should your throttle servo fail in flight, for example. I chose to fit the Evolution Optical Electronic Ignition Kill Switch.

To power the ignition on this aircraft I used an Optipower 2S 800 mAh pack, which is ample for up to six flights. The opti switch connects to the input on the ignition module. The 2S LiPo feeds the switch and is turned on and off via the appointed receiver channel.

The final job was to install the AR9350 AS3X receiver and the new receiver battery. As I chose to use an AS3X stabilisation receiver it needed to be mounted on some double sided tape. The foam backed type is ideal.

As we were using High Voltage servos the switch used between them and the two cell opti receiver pack is just a good quality heavy duty switch, which provides a simple, trouble free set up.

Engine Break In

At this point it is wise to run a few tanks through the engine to break it in a little prior to taking it into the air for real. As the Evolution is a ringed engine it requires a 'run in' process to ensure that the seal is tight

between the ring and liner. This process requires you to heat and cool the engine under controlled conditions, running it slightly rich to ensure the ring component forms into the shape of the liner correctly. This will ensure a good seal for the lifetime of the engine.

The process is not complicated but it must be done correctly. Breaking in the piston ring and liner by running it too rich will not allow enough heat to build up. This restricts expansion of the piston ring and it won't seal to the liner efficiently. Conversely, using too lean a setting will cause the ring to overheat and it may be damaged. Thankfully, Evolution give some good tips on successful break-in technique, which you can perform with the engine mounted to your aeroplane. There is no need to bench run the engine prior to mounting it on your model.

Be sure to use the suggested break-in prop. This provides a light load and a high rpm that, when matched with the heat of the engine, will break in the engine properly. Be sure to also use the recommended fuel at a 20:1 petrol to oil ratio for the first gallon of operation.

The break-in procedure is to fly the aeroplane at full throttle through a series of figure of eight manoeuvres (i.e. Cuban Eight). These manoeuvres in particular benefit the engine because when climbing the additional load on the engine will increase the temperature, and when diving the lighter load and higher rpm will decrease the temperature. This provides the heating/cooling cycles required for the break-in process.

Break In Process

For the first tank of fuel set the high speed needle valve at a turn and a half out and use the suggested break-in prop. Run the engine on the ground for its first tank of fuel and do not go above half throttle. Cycle the throttle between idle and half throttle every minute.

For the second tank of fuel tune the needle valve to be slightly rich of the peak rpm at full throttle without a drop in rpm but do not run the engine at full throttle on the ground

for more than 30 seconds at a time. Tune the low speed needle valve for a smooth transition from idle to mid-range, then go back to full throttle to confirm the main needle valve setting. Then fly the model. During this flight you need to be conscious of extended periods of overheating the engine so be sure to mix in some cooling down dives and lower throttle flying.

On the third tank of fuel fly the engine at a high throttle while performing the recommended figure of eight manoeuvres. This will help the piston ring and cylinder liner to expand and contract, helping the breaking-in process. Tune the needle valve to be slightly rich of the peak rpm as necessary.

For the fourth tank of fuel select one of the recommended propellers for normal operation and mount it on your engine. Tune the main needle valve to be slightly rich of the peak rpm and the low speed needle valve for a smooth transition from idle to full throttle, and continue to break-in the engine in flight.

Do not worry about the engine setting being slightly rich during this process as when set correctly the engine will occasionally sound as if it is misfiring (which it is). During climbing manoeuvres this should go away but it might return during diving manoeuvres. If it does not go away during the climbs land the aeroplane and lean the high speed needle by one to two clicks, then take-off and fly again.

Continue to fly the aeroplane through the first gallon of fuel and then change the fuel mixture to 32:1 for continued operation.

If I'm totally honest, I ran the engine 3-4 times on the ground (on the rich side) and I then adjusted the mixture to ensure that I had a reliable throttle response. I kept these runs short, just 3-4 minutes each time. I then completed the break-in process in the air. However, the Evolution guide described above is certainly a great starting point.

I find the smaller capacity engines will take around 10-15 tanks of fuel to become what I would consider as properly run-in.

ULTIMATE RESTORATION

Receiver Set Up

The servos for each control surface are set up via the smartphone application, using a small amount of gyro rate gain to help the aircraft cope with the effects of wind. Care should be taken to minimise the amount of sub-trims used, so try where possible to mechanically adjust the control linkages to ensure the best centring and to gain maximum mechanical advantage.

The gyro gain chosen was very low and I stuck with Rate Gain for the early flights. Rate Gain will react only to bumps and gusts of air; it won't hold a heading so it is the least intrusive form of gyro compensation.

Right: The Ultimate looks good after its comprehensive restoration



Flying

Before we took to the air we weighed the finished Ultimate. The complete weight was 9 lb 10.5 oz. That's a saving of 1 lb 7 oz over the original model or a staggering 15%!

After the break-in procedure had been completed I was able to fly the aircraft through a wider range of manoeuvres. I was soon reminded that this Ultimate design, albeit 20 plus years old, had some pedigree.

It felt very neutral and predictable. The gyro compensation I added was barely noticeable and I intend to increase it, but for now I was happy with how the aircraft performed.

The upgrade to modern digital servos gave it a nice crisp feel on all surfaces. The rudder is incredibly powerful on this Ultimate, helped by the large side areas of the fuselage and the interplane struts so knife-edge is very flat. By that I mean that the nose isn't raised very

much to maintain knife-edge.

The Evolution 20 provides a lot more power than I remembered the Moki 120 giving out. Vertical performance is limitless and with every flight it just keeps getting better as the engine beds in a little more. The overall set up makes it a great sports model or an entry level IMAC aircraft (minus the gyro, of course!).



The weight saving post restoration was a very noticeable one pound and seven ounces!



The Ultimate has a large fin and rudder. Knife-edge beckons...



Up and away to break-in the new Evolution engine



Inverted is easy, using just a smidgen of down elevator

Success!

This project was intended to revamp a classic R/C model and after all the effort we put in I can report that it has improved the aircraft greatly. The Evolution engine is easy to operate, and is efficient and light. It transforms this old model aeroplane into an aircraft that is refreshing to see on the flight line, making it a welcome change to modern foam models.

For anyone considering a new aircraft why not recycle an older design you have in the loft? The range of Evolution petrol engines cover most older generation models and the savings you can make from not having to buy so much glow fuel makes it a really attractive investment.

Our thanks go to Horizon Hobby UK for supplying the great engine and radio products and also Optipower for supplying the LiPo packs used for our refurbishment. These two companies are some of the very best suppliers in the R/C model industry.

RCMW

The nose doesn't need to be raised by very much to maintain knife-edge flight



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Grahame Wren shows how to add realistic metal panels and other items to your scale model using discarded printing plates



Learning To Use... LITHOPLATE

One of my most favourite modelling materials, after balsa wood of course, is lithoplate. So what is it and what do we use it for?

Lithoplate is thin aluminium sheet, about 0.2 mm thick, used in the printing industry. Modellers use it for scale detailing wherever the full size uses metal, especially where double curves are involved. Where this is the case the lithoplate will need to be annealed before it can be formed into shape. The annealing process involves heating the lithoplate and allowing it to cool naturally. The important thing is to get it to the correct temperature and I'm sure there's a very technical way of doing this; but a simple method I've used successfully over the years is to smear ordinary hand soap thinly over one surface of the lithoplate, using plenty of water to ease the spreading but go slowly so as not to produce bubbles, then allow it to dry. We now need to apply heat, as evenly as possible, until the soap turns dark brown.

A blow torch is not really suitable for this as the heat is too concentrated. Instead use the largest ring on your hob (but maybe it's best to wait for the better half to go shopping!). I've always used gas but I see no reason why electric shouldn't be okay. Hold the lithoplate 'soap side' up with two pairs of forceps or pliers, one on either side, because when the lithoplate softens it will tend to slump under its own weight.

Also, be sure to keep it moving constantly over the heat, which should be on quite a low setting. Have a few layers of newspaper close by on the work surface and as soon as



An annealed square of lithoplate next to a forming jig



Soap residue cleaned off and cut oversize to make a wing stub

the soap turns dark brown put the lithoplate down onto it to cool.

When forming the shape it is not always possible to use the model itself. Depending on the complexity of the shape it is often necessary to work from several different angles, so it can be easier in the end to make a jig or mould. Cut the lithoplate to the rough shape but well over size, clean off the soap residue and start to form it using a piece of soft balsa as a tool.

The trick now is not to try and finish the piece in one go but to form some, trim, form some more, trim, form some more, and so on until the final shape is achieved.



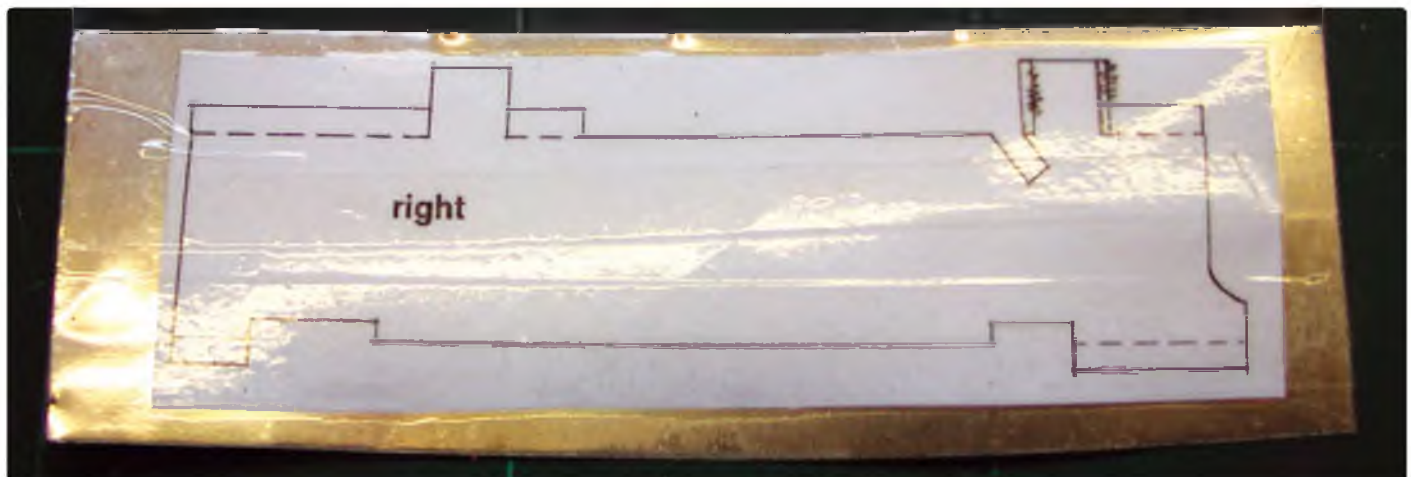
Initial forming



Form, trim and form some more...



Forming finished



Flat Panels

For flat panels with no double curves the lithoplate can be used without annealing as it will still take straight bends. In this case a paper pattern can be stuck to the lithoplate and the shape cut out with sharp scissors. You can even use a scalpel but the blade won't last long!

To make the 'hinges' I cut slots to produce the effect of the separate sections. Even using a scalpel the slots will be too wide (it would be a very sloppy hinge!) but it's an easy job to turn the piece over and close the slots up somewhat. The lithoplate is then folded around the piano wire 'hinge pin'.

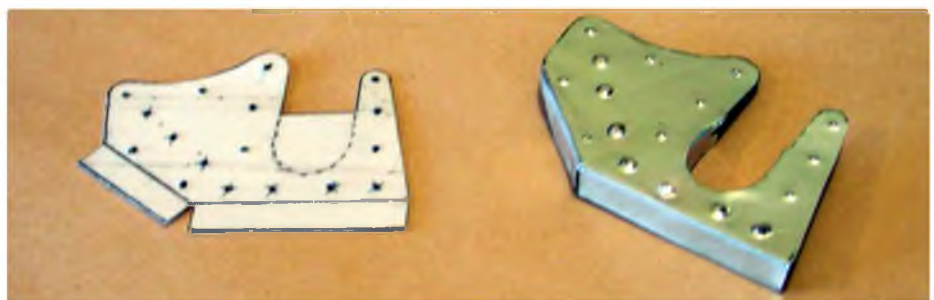
In many cases you'll need a combination of flat panel with a precise shape and double curves, such as on this undercarriage strengthening plate, so use a template and annealed lithoplate. Having cut around the template it's useful to turn the piece over and check the shape as it is quite easy to produce small irregularities in the outline which are 'masked' by the template outline.

The positions of the detailing to be embossed are marked on the template, and in this case they are added before the piece is finally bent and formed to the finished shape. Sometimes the part is formed or partly formed first; it all depends where the detailing is.

Above: Flat panel template



Flat panel with hinges formed over a piano wire pin



This undercarriage template shows the combination of a flat panel with a precise shape and double curves

LITHOPLATE

Tools For The Job

Some of the tools for adding various types of detailing are shown opposite:

A ball point pen, for individual raised 'rivets'.

Different sizes and shapes of raised detail can be formed using anything suitable as a die. The large 'bolt heads' were formed using a dome headed bolt and, in this case, a female die was needed to stop the lithoplate from bending out of shape. I made this by heating the bolt head until red hot and burning it into some beech.

Sharpened brass tube, for flush 'rivets', stamped into the lithoplate.

Screwdriver, to convert flush 'rivets' into countersunk 'set-screws'.

A dressmaker's pattern copy wheel, for rows of 'rivets'.

Dressmaker's pattern copy wheels are available from haberdashery stores; the one shown has had every other tooth removed to increase the spacing between 'rivets'; the spacing may not be true scale but it's near enough for me and they are evenly spaced!

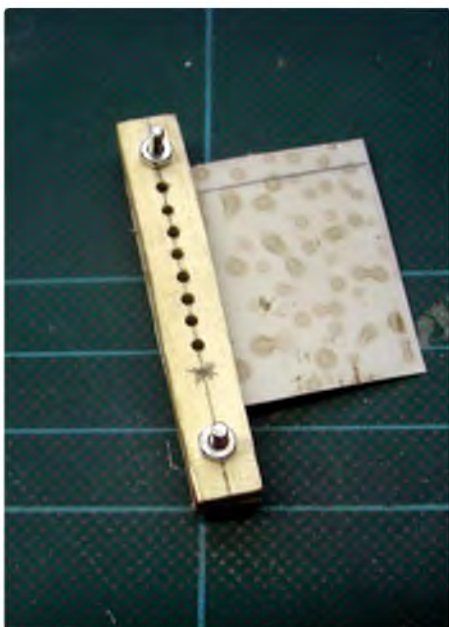


You only need a few basic tools: a dressmaker's wheel, a small screwdriver, brass tubing and a ball point pen

Making Holes

If the lithoplate needs holes there are two methods I use:

For smaller holes it's best to punch them out; the photo shows the jig to produce a row of 8 holes. There are in fact two identical pieces of ply with the lithoplate clamped in between. For the punch itself reverse the drill bit, protect the business end and give it a tap with a pin hammer.



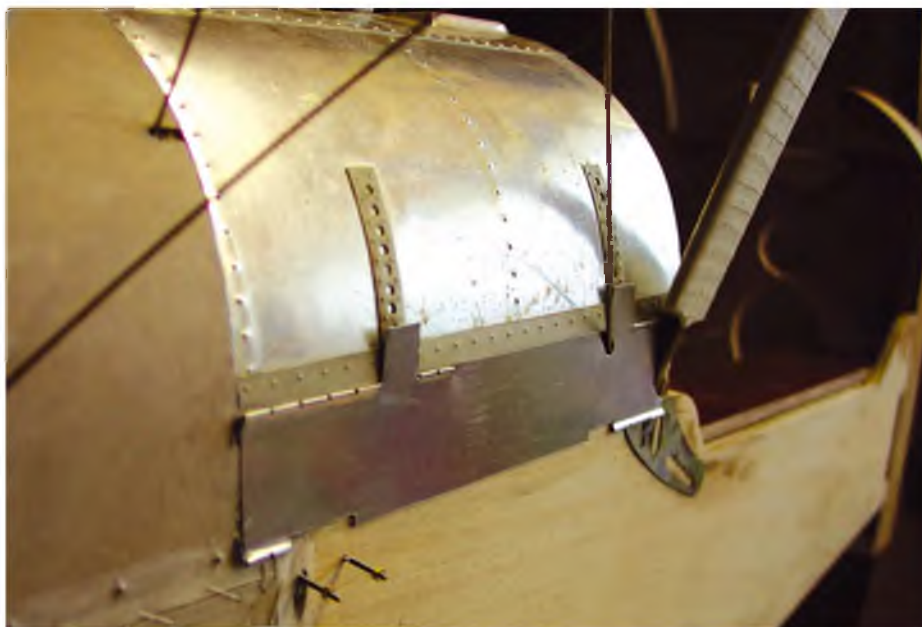
A simple hole jig

For larger holes, find a suitable washer or drill the right sized hole in thin sheet steel, form a hollow in the lithoplate and then file out with a rat tail file.

The tank cover for my SE5a shown in the picture nearby and in the header shot uses all of the above techniques.

The top panel has a raised section formed around a jig, then a hole for the filler cap was made using a washer and rat tail file.

The Vickers gun trough was formed on the model itself and has two rows of 'rivets' embossed with a dressmaker's pattern wheel. The straps have punched holes and individual 'rivets'. The flat side panel is not annealed and as such the lugs covering the strap attachments are much less prone to being bent out of shape; if they had a ply backing for strength they would have ended up being too thick to look the part.



Offering up the tank cover

Attaching To The Model

Having formed and detailed the part it needs fixing to the model and so long as the glue is suitable for metal it's pretty much down to your personal preference. For years I used epoxy but you have to be quite careful to apply an even thickness as any variation can deform the lithoplate as you smooth it down onto the model and any 'sticky' fingerprints need to be cleaned off before they cure.

R/C Modellers Canopy Glue by Deluxe Materials is easy to spread and when left to go tacky it has good grab and cleans up with water. So for now, at least, it is my glue of choice.

Now For Painting

Most paints do not adhere too well to aluminium so it's advisable to first give it a coat of self-etching primer, available from car paint suppliers. After that just about any paint will bond okay.

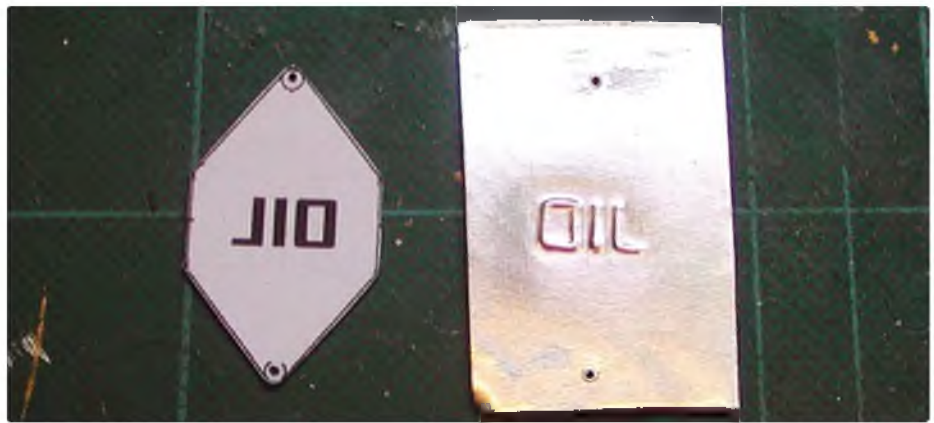
Use Your Imagination

So that's about all there is to lithoplate: annealing, forming, stamping and embossing – once you've mastered these four techniques the rest is down to your imagination as to how you can use and modify them

A couple of items I've made using 'variations on a theme' are shown opposite.

Oil Filler

To make this oil filler cover the template was 'flipped' and the raised lettering 'OIL' was embossed with a ballpoint pen before gluing the template to some thin ply. Then, using pins to hold the lithoplate in the correct position, the lithoplate was formed around the ply.



Right: Oil template and embossed lithoplate



Oil filler cap formed



The finished oil filler

Cockpit Edging

The problem with this SE5a aluminium cockpit edging was to produce a small even lip. After several failed attempts I finally used a variation of the washer and file used for the larger holes; instead I used a steel rule and file.

In Summary

I hope this article has gone some way towards showing the versatility of lithoplate and provided you with the motivation to have a go. If so there is one problem that I've not mentioned – getting hold of the stuff in the first place! With the rise and rise of digital printing it's only going to get worse, so if you are tempted now is the time to acquire some. I would suggest finding a small, local printing firm so you can talk to 'the main man', and always visit in person.

If all else fails there is an alternative source of thin aluminium, which I've been told is suitable, and that is drink cans. I haven't personally tried them but I am collecting samples for future experiments.

So far I've got Foster's, Carling, Heineken, John Smith's, John Smith's Extra Smooth, John Smith's Golden Ale...

(I like John Smith's!) **RCMW**



Making cockpit coaming. First clamp the material to a steel rule



Form a small, even lip



Finished cockpit coaming

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Yonju

John Rutter offers up his 54 inch wingspan sports aerobatic model for a .40 four-stroke engine (yon-ju is Japanese for 40)



Yonju takes-off from John's less than smooth flying strip

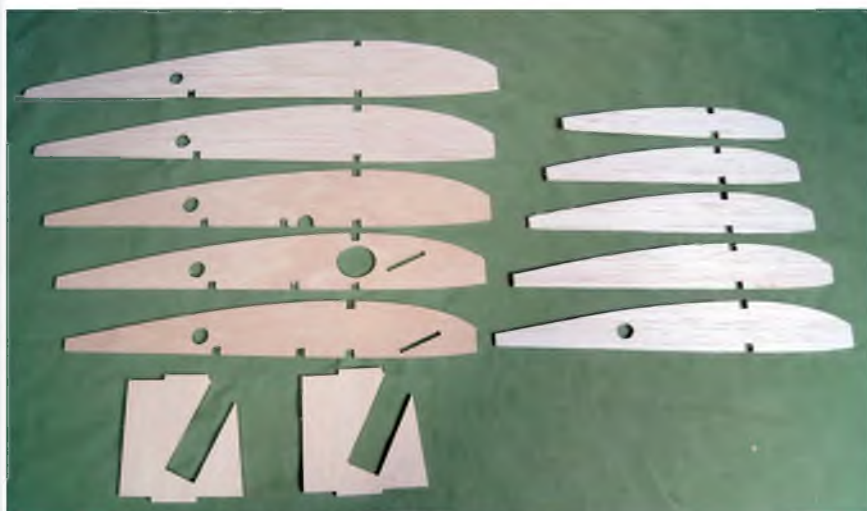
MODEL WORLD

At A Glance

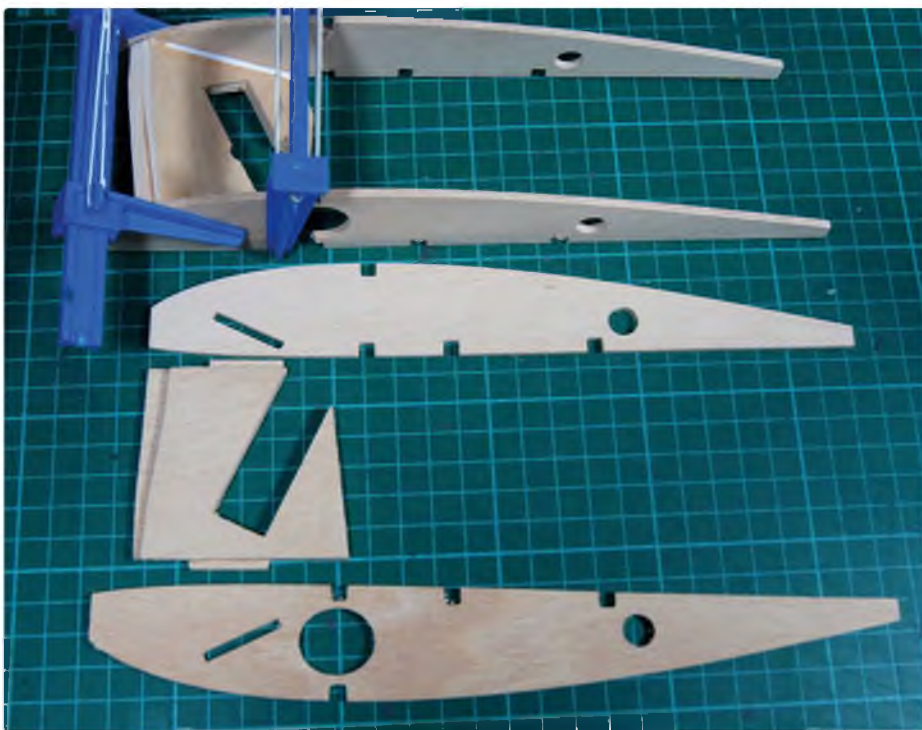
WINGSPAN:	54" (1320 mm)
WING AREA:	582 sq in
WING LOADING:	15 oz/sq ft
LENGTH:	50.25" (1277 mm)
WEIGHT:	60 oz
RADIO FUNCTIONS:	Throttle, Ailerons, Elevator, Rudder, Retracts
SERVOs:	Ailerons – Corona 939, 2.5 kg torque, 12.5 g Elevator & Rudder – Corona 339, 4.4 kg torque, 32 g
BASIC CONSTRUCTION MATERIALS:	Balsa, Lite-ply
COVERING MATERIAL:	Fuselage – glassed and painted Wings & Tail – heat-shrink film
ENGINE RANGE:	.40 - .52 cu in (7.5-9.5 cc)
ENGINE USED:	Saito FA-40
PROPELLER:	10 x 6
C OF G:	5.5" (139 mm) back from LE at wing root
CONTROL THROWS:	Rudder: +/- 40 mm Elevator: +/- 20 mm Ailerons: +/- 18 mm

After a long lay-off from IC engines I started to play with them once more towards the end of 2015. In particular, I looked more closely at four-stroke engines, eventually buying a Saito FA-40 (amongst others). Now, while it sounded lovely pulling an old hack model around, I thought it deserved something better. So Yonju (based on the Japanese for 40 – not terribly original, I'm afraid) came into being.

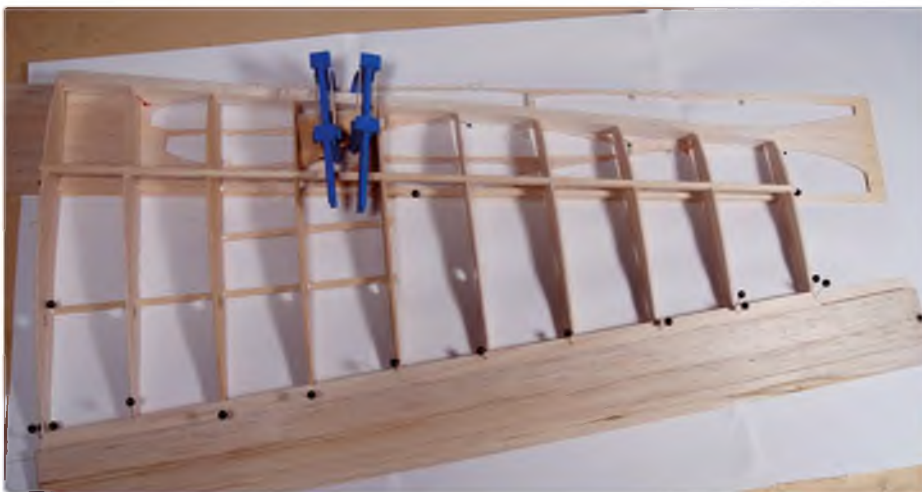
I quite fancied a low wing design but as my usual flying site is very rough, I thought I might be better off belly landing her in the long grass. The trouble is that a .40-size model is getting a bit big for hand launching, so retracts were the order of the day. Some compromises in construction were needed, so the wing is thicker than I'd normally use, to get the units into the LE of the wing, and I had to cut through a spar (hence the short sub spars) to allow the U/C to retract. You could, of course, just fit a fixed U/C in place of the retracts.



Make up a set of wing ribs, or use the parts from Traplet's laser cut wood pack



Constructing the mounts for the electric retracts



Wing construction is conventional stuff



Retract units are mounted at an angle, fore and aft and vertically too!



Use a card template to cut neat holes for the wheel wells

Wing First

As it's the tricky bit, I started with the wing. Glue together the U/C plates (make sure you produce a handed pair) and the R4, R5 assemblies, shaping the plates top and bottom to fit the rib profiles and spars. Drill for the retract units and check fit them.

Once this is done the rest of the construction is conventional enough. As is usual for me, I produced the wide trailing edge by cutting it from block on my bandsaw, but it could be cut from 3/8" sheet and planed/sanded to shape. A 1/2" wide strip of 1/16" is glued to the bottom of this TE piece; tape it in place first, bend the joint open, then glue and bend the joint closed and weigh the lot down until set. Then pin it over the plan.

Pin the spars in position and add the ribs, including the ones with the U/C plates, gluing to both spars and the TE assembly. The root rib is slightly off vertical to allow for dihedral later. Once all the ribs are on the spars lift the main spar a little and slide a bit of scrap 1/16" under it before pinning it down again; this is to keep the TE at the correct level. Add the top TE strip and LE (cut from 3/8" sheet) and allow to set completely. Remove from the board and check fit the U/C to make sure that it will retract and extend without binding.

Use scrap sheet to block around the unit, legs and wheel well to give a neater finish and help support the wing sheeting. Don't make things too tight though; remember that the legs can get bent on take-off or landing, which can cause jamming and the 25 degree angle makes things seem tighter, so put the sheet in there at 25 degrees, not vertical.

Fit the lower leading edge sheeting. I generally use Evo Stick type contact adhesive. Add the rest of the lower sheeting, carefully cutting away for the U/C as you go and add cap strips.

Cut away just enough of the wheel hole to be able to line up the centre of the axle with the ply template, then move it forwards about 3/8" and to the root slightly to allow for the strange retract angle before cutting it out carefully with a rotary drum in a Dremel or on a flexi lead from a drill press. Keep sanding until the retract works without catching, then remove the retract unit.

Sand the lower side to keep everything reasonably flat and bump free for now, then give the panel a light spray of water and pin it back to the board with a scrap of 1/4" balsa under the outboard TE in order to build in a little washout. Plane or sand the LE to follow the line of the ribs, make sure that the U/C plate also conforms, then add the LE sheeting using impact glue. Add the rest of the top sheeting and cap strips to the ribs. Remove from the board when set and dry, ideally overnight. Finish the shaping of the LE and TE. Note that the section has a concave section at the rear so make up a slightly rounded sanding block to replicate

this and smooth off any lumps and bumps.

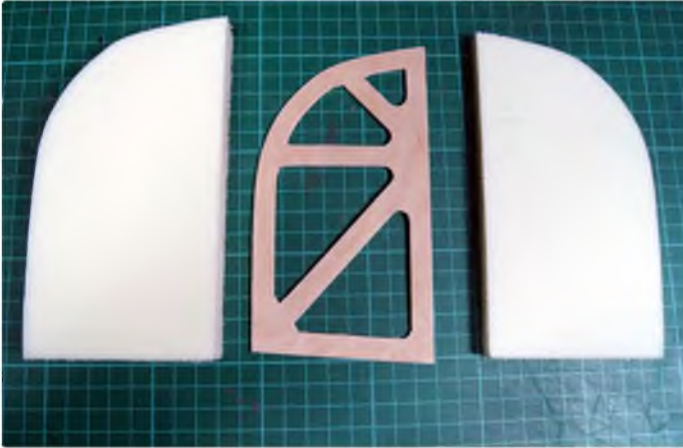
Start the second panel by gluing the second R1 to the first; that way you guarantee a good join between panels. The first panel should be pinned to the board ready to join the second, but with R10 about 1 1/4" (32 mm) off the board. After that the process is much the same as the first panel but make sure the joints between the LE, spars and TE are good. The sheeting should complete a close and well glued join and if done properly you don't need to use a dihedral brace.

Tip blocks can be solid balsa, solid foam or foam with a ply centre. If using the latter do remember to make a handed pair. I glued

the parts together with foam safe cyano and then glued the blocks to the model with PU expanding glue to make sure that it filled any gaps.

Fit the servo mounts and block around them to give the covering something to stick to. Cut away the ailerons and plane the leading edges for top hinging (or centre hinging if you prefer) before fitting horns and making up pushrods. Test fit the ailerons but don't fit them permanently just yet.

If you fancy them, flaps could also be cut from the TE and extra servo bays fitted further inboard.



Wingtips can be made from a wooden core and foam sandwich

Tail Feathers

I decided to make the tail using the balsa core method, with 3/16" pieces over a 1/16" sheet core. Use harder sheet for the elevator and rudder cores as it forms the TE of these, and softer sheet for the fin and tail as really it's only there to make up the thickness. If you think this is too boring then very light 3/8" solid sheet could also be used.

I find it easiest to extend the lines of the parts on the drawings so that when the roughly shaped cores are pinned to the drawing, I know where to pin the ribs. Start with the thicker LE, tips and centre part

before moving on to the ribs. Don't forget to prepare two sets of the thicker material as once the first side is dry it's sanded flat and inverted to build up the other side. Once both sides are thoroughly set the TE taper is easily planed and sanded, as is the rounding and slight tapering of the LE, along with final external shaping. The core gives a very precise centreline, of course.

I built the fin and rudder together, as I did with the tail and elevators, but don't shape the leading edge of the fin just yet as it needs the dorsal fairing when in place on

the fuselage. Once shaped they can be separated before planing the rudder and elevator halves for centre hinging. I attached a small wheel on a piano wire leg, set into the bottom of the rudder. Elevators are joined with 14 SWG piano wire, which has a brass horn silver soldered to its centre. You could simply use the joiner and fit an external horn, of course. Either way, the dividing part between the elevators has to be relieved for the wire and the horn. Alternatively, given the size and power of modern servos, move each half with a small, separate servo.



Tail feathers are built using a thin balsa core with a lightweight structure glued on either side

So To The Fuselage

Make all the formers, except F1, from 3 mm lite-ply, F1 being 1/16" ply. The fuselage is too long to cut from a standard 3-foot long sheet so I arranged a scarf joint toward the rear and glued three sheets of 1/8", fairly heavy, balsa side by side to cut the parts from. They won't quite fit on two sheets, unfortunately.

Once cut out the front and rear parts are joined. I used a pre-glued joint with balsa

cement here – a lovely smell compared to cyano! I'm not a great believer in the 'traditional ply nose reinforcement, so I didn't use any, but feel free to add some if you prefer. Just remember to modify the formers to suit.

Fit the engine onto its bearers and fit F2 and F3 to the bearers. If you use anything other than the Saito FA-40 I fitted then you'll have to adjust the gap between the bearers and hole spacings. I used slightly different

sized bearers to those drawn and managed to bungle the trimming of the formers so no doubt yours will be neater than mine! Note that side and down thrust means the bearers are not in the centre of the formers, and do be careful to get right side thrust, not left!

Formers F2 to F5a (F5 and F6 are glued together) are glued to one side and when set the other side is glued to the first, ensuring alignment with the use of squares. At this point my trusty SLEC building jig came out to

play, with the fuselage set on the centreline before bringing the tail together and gluing it to a wedge shaped spacer that ends up about 3/16" thick at the extreme rear. This is to make the rear fuselage match the thickness of the fin post. I forgot this and had to thicken the rear fuselage after fitting the fin – oops!

F7 and F8 can now be glued in place.

Fit the intended prop and spinner to the engine, then remove enough of the starboard side of the front fuselage to allow the engine to fit, then install it.

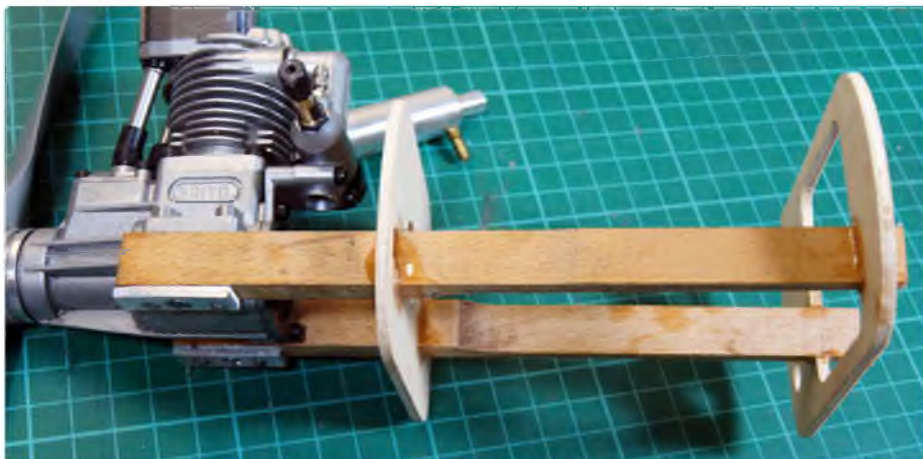
Glue F1 and F1a together and cut away enough to allow it to fit past the engine. I tacked a 'spare' F1 to the real one to act as a spacer and taped and clamped the F1 assembly and spinner together. I then

trimmed enough of the port fuselage side to allow it to be pulled in and glued it to F1.

Back in the jig, you can plank the top of the nose, starting from the centre top and working your way down either side. Do about seven planks, 1/4" wide, then leave to set. Remove from the jig, invert, replace in the jig and do the bottom of the nose in a similar fashion. When set the engine can be removed again and the rest of the planking done, this time starting from the fuselage sides upwards. The jig isn't needed for this. This gives the strange tapered joints part way up the rounded edges, where they seem the easiest to hide. Once the pins are removed the tail can be fitted (the jig makes this easy) and when this is set the fin can be added before doing the rear planking in similar fashion to the front. Plane and sand the planking to finish, add the dorsal fillet and finish it and the front of the fin.

Put F3a in position in the fuselage, making sure that the dowel holes line up correctly, and check fit the wing to ensure that it is 'square' in both directions to the fuselage and with a close fitting joint. You'll have to sand the front of the wing flat to get it in the correct position. Use cyano to tack F3a to the wing. Remove the wing, glue the retaining bolt plate into the fuselage, then glue the ply reinforcing plate to the wing (I tapered the edges first) before drilling through it and the dowel plate with a small drill (a 3 mm, for example).

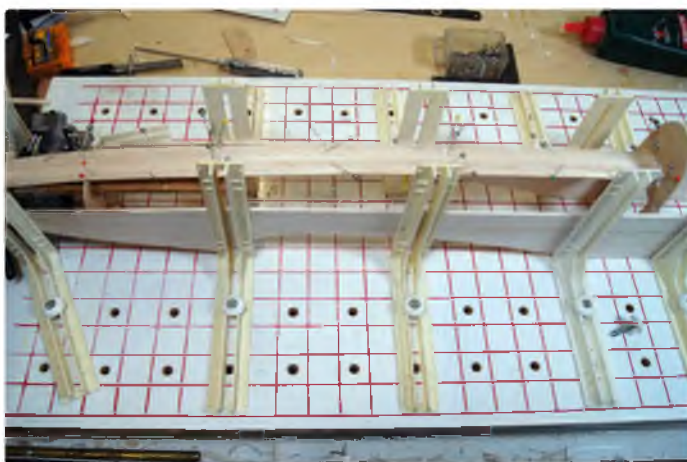
Remove the wing again and enlarge the hole to take a 2BA nylon bolt. The retaining plate is drilled for a matching blind nut, squeezed into place with a G-cramp. Use scrap balsa around the plate to increase the gluing surface area, then check fit the wing again before removing it once more.



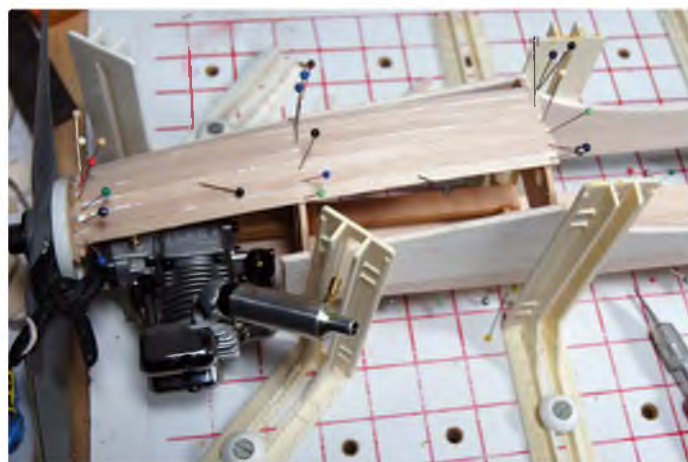
First construction job with the fuselage is to make up the engine bearers



Adding the formers to one fuselage side before adding the second side



A jig helps keep everything square while building up the top planking



Underside nose planking in progress



Fairing in the fin after adding the tailplane



A smooth job!

Fitting Out

In the fuselage I decided to use Corona 339 metal gear digital servos for the rudder and elevator, although the 939s I used for the ailerons (2.5 kg torque) would be more than enough and lighter. To make up for the extra little bit of weight with these servos, I used a little Blue Arrow D0510MG (digital, metal gear) for the throttle, which is more than enough to move a throttle arm, but not without problems – see the flying section!

The servos are screwed to their mounting plate, which is then glued into the fuselage just forward of the wing retainer. The link to the internal elevator horn is via a pushrod where I used some 1/4" square pine with a piano wire Z-bend on the servo end and a 2 mm threaded wire rod and metal quick link on the elevator end. Both metal wires have an L shape that hooks into the wood and which is then bound and glued to it.

For the rudder I used a SLEC snake outer

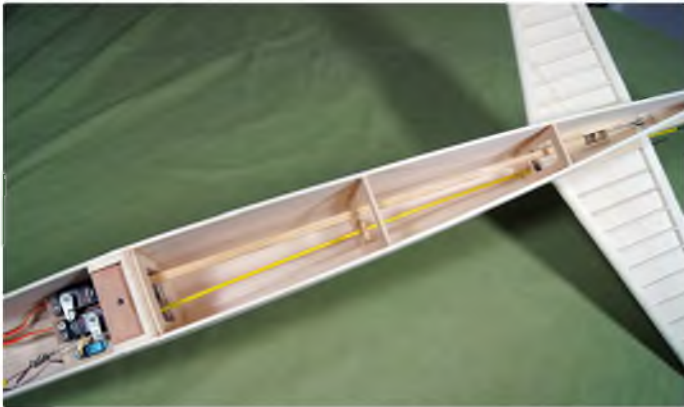
with a 2 mm C/F rod inner. The latter has a threaded joiner and a metal quick link on the rudder end, where I used a ply horn, although a commercial horn could also be used. Temporarily fit the rudder on its hinges for a rough set up. At the servo end I used a piano wire Z-bend again, which is attached to the C/F rod by a length of heat shrink tubing; after final set up this is glued using thin cyano.

The throttle link on the Saito is slightly odd in that it is on the right of centre, not to the left of the engine, and the throttle barrel moves in and out as it rotates. To make matters worse it's very close to the rear bulkhead and the tip of the arm is well outside the outer line of the fuselage. For this one I used a SLEC snake outer again, glued to the inside of the fuselage side, but this time with a piano wire inner that has an extended Z on the carb end to allow some sideways movement.

A second length of piano wire on the servo end also has a Z-bend and the pair are joined together with the metal section of an electrical 'chocolate block' connector where they overlap in length. My method of setting this up was to put the throttle in the full 'slow' position with the radio on and the throttle cut activated before tightening the link.

Full throttle will likely need as much throw as you can get on the Tx, but the last little bit of opening doesn't make a lot of difference, while at the other end you definitely want to be able to cut the engine. Final set-up of throws can only take place with the engine running in the completed model and you may find the throttle arm doesn't have to close completely to stop the engine.

Once you are happy with the fuselage servos the rear ventral sheeting can be glued in place and shaped to fit.



Rear control runs



The throttle is controlled by a small servo and snake – just make sure the servo is well secured!



Faired In

I decided a wing fillet fairing would look good and it would stiffen the open fuselage underside. To do this the wing is fitted to the fuselage once more and a shaped piece of 1/64" ply is slotted into the joint. It helps to mark the thickness of the fuselage sides onto the ply to ensure sliding it into the correct position. Thin cyano is run along the joint and the rear is also glued to the fuselage sides. Don't worry if the fit isn't perfect, as once the glue has gone off the wing can be removed again and thicker glue used to fill any gaps. But do try to make sure the fairing is tight to the wing itself. The fillet is then made up with at least two layers of light filler (which is better than trying to do it all in one go, which is harder to do and takes ages to dry out) before smoothing the shape with abrasives.

Photo sequence showing how the wing fairing is built up



Finishing Off

Remove the servos and engine and give the whole model a coat of acrylic varnish, sanding when dry. I used epoxy/glass and paint to finish the fuselage (don't forget to fuel proof the engine and tank bays) and here the varnish stops excess soaking in of the resin. I used film for the flying surfaces and here the varnish greatly aids adhesion. Don't forget to paint the wheel wells. It helps to do the film on the bottom of the wing first, then fit the U/C and aileron servos with their extensions while they're still accessible before covering the top of the wing.

When the paint is dry a canopy can be fitted. I made mine from silver plastic with a vac-former but you could mould your own using a lemonade bottle or buy something similar. As it was sort of Japanese themed and looked vaguely Kawasaki Hein(ish), if you squint, I chose an orange and white scheme similar to the Japanese 'prototype' colours and gave it a couple of roundels and a fin flash with Japanese kanji numbers, all cut from sticky vinyl.



Direct aileron connections make for snappier control responses

Radio Fit

Re-fit the remaining servos, linkages etc. and finally glue the control surface hinges in place. Check for correct direction of movement and throws. I always use 60% exponential on rates 'out' and 60% of this throw on rates 'in'. Full throw on ailerons is about 18 mm each way, elevator 20 mm each way and rudder 40 mm each way, all measured at the widest points.

Fit a switch in the fuselage side opposite to the engine. I used a four-cell AA NiMH flat pack initially but ended up using a 3A UBEC with a 2S 1 Ah LiPo. This might seem like a

retrograde step from 1.5 Ah NiMH but I found my (old) NiMHs were giving far less than their ratings and in any case would quickly drop volts under load. Using HV servos and a compatible Rx would let you use a 2S LiPo directly, without a UBEC.

Check the balance and ballast if need be. The aft balance point on the plan is where I'm flying the model at the minute, with just about 2 ounces of ballast in the nose. The Saito FA-40 is very light at about 300 g (10.5 oz), which is similar to a two-stroke .30; in fact an ASP 32A should pretty much drop into the same holes in the bearers. A typical

two-stroke .40 is about 450 g (16 oz) with silencer, so if fitted with a .40 you shouldn't need the nose weight and you may even need some tail ballast.

I only used a four ounce tank as this will give at least 10 minutes flying, more than enough for me. But I'm sure a similar shaped six ounce tank could be squeezed into the space without too much modification if using a two-stroke. Once you're happy with everything else get the engine set up to idle reliably, then perform a final range check before flying.



Cover the bottom of the wing first, then fit the U/C and aileron servos with their extension leads while they're still accessible

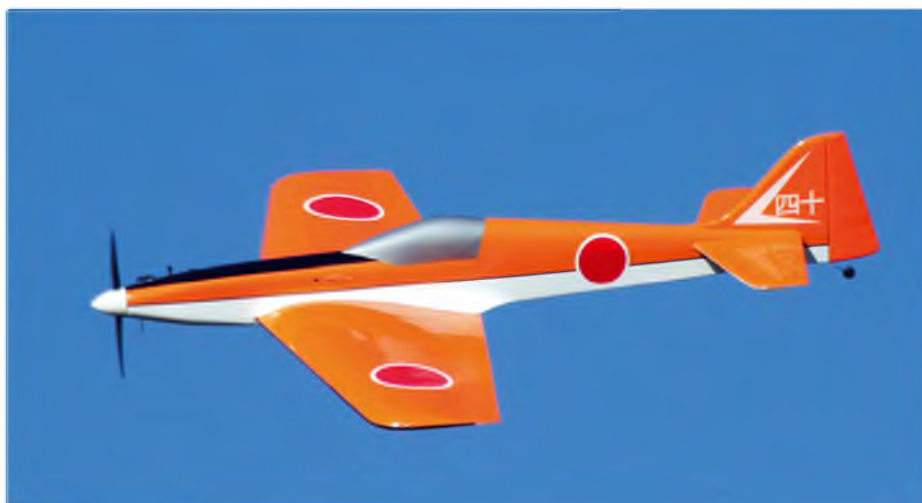


The Saito FA-40 four-stroke is neatly faired in

Interesting First Flight!

My first flight was 'interesting'. The engine ran well once warmed up and everything checked out OK on the ground, so full throttle was given and the model was released by my pal Malcolm, while I gave a bit of up elevator to avoid nosing over on the rough ground.

Yonju took off after a very short run and proceeded to climb steeply until I applied some down trim, but no other trims were needed. After that the model proved a real pussycat. It flew well either way up, with a little down needed when inverted, rolled reasonably quickly (more throw will speed it up) and was pretty quick in a straight line. It didn't have a real stall but it wouldn't really spin either. Yaw with rudder was pretty much just that; it won't roll with the yaw into a turn (which is what I wanted for aerobatics) but stall turns seemed disappointing, the reason for which will be explained shortly.



Should you want to replicate John's colour scheme the film is Jacinth Orange and the fuselage is painted in Ford Phoenix Orange

After about six minutes of flying I decided to check out the U/C and flicked the switch. Down it came but it looked to be at an odd angle. As the patch of waste ground I fly from is very rough it's possible that it was bent on take-off, so we decided that a wheels up landing in the long grass would be the better bet.

On landing there was a 'click' from the model, which turned out to be a snapped wing bolt. On inspection it showed the reason the throttle didn't work was because one of the servo retaining screws had gone AWOL, while the other was loose and the rudder didn't work because the servo arm retaining screw had also disappeared and the rudder was no longer connected to the servo – suddenly those poor stall turns were explained!

Back home for repairs I decided the little throttle servo had to be replaced with something bigger, simply because the tiny mounting screws and lack of rubber grommets were obviously not a good idea.

I used instead another 9 g servo. The rudder servo arm was refitted and the retaining screw securely tightened (I checked the elevator servo too, while I was at it). I mechanically increased the rudder throw before realising I'd been flying the model with rudder rate 'in', so it was only giving 40% travel – there are too many darned switches on modern transmitters! The ailerons had been on full throw however, so I mechanically increased their travel a little for faster rolls. *(Maybe use Flight Modes instead of separate Dual Rate switches to cut down the number of switches? - KC)*

Finally, I removed some of the nose weight to see if the model would perform spins better with the balance a little further aft, it having proven to be very stable in flight originally.

After weeks of waiting for the wind and rain to stop, I settled on a blustery but sunny day for the next flights in order to get some ground to air photographs. Considering the light loading of the model it handled the 15

mph winds well, though I wasn't too bold on the inverted passes! The glide of the model is so good that I began to wish I'd fitted flaps, as even landing into a strong wind with the engine on a low tickover, I had to eventually cut the engine to get the model down – it just wanted to float on and on.

More flying on nicer days showed that this is just one of those models that's fun to fly. It isn't going to rip through a 3D sequence or show the pattern boys what to do, but it handles very 'lightly', is smooth and easy to fly accurately, and is quite fast enough, thank you very much. Landings are 'floaty' but just let it hang in there and it'll settle down, maybe with the odd bounce. Stall turns with full rudder throw (and the servo connected!) are easily done too and when balanced at the aft point Yonju does a reasonable flick and spin whilst coming out of either as soon as the controls are neutralised. It's just a thoroughly nice model to fly. **RCMW**



Showing off Yonju's clean underside



Wheels down, ready for landing



Rolling out in the rough at the end of the strip



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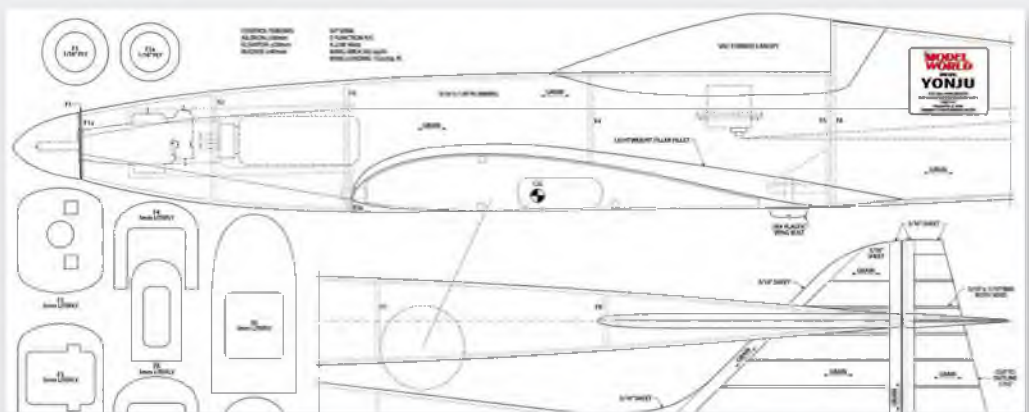
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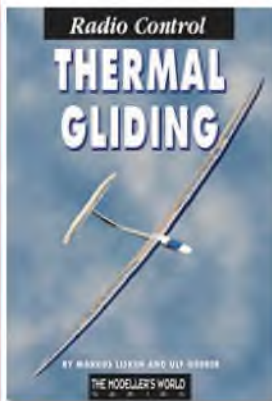
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Bell 212

Continuing his review from the last issue, Martin Briggs gets the Roban Bell 212 airborne, starting with the hovering test flights



Banking overhead shows off the clean underside of the Bell 212



With the hinged front doors open there's a good view of the supplied cabin detail, which is remarkable for an ARTF helicopter of this value. The kit includes a full layout of instruments on the vertical and centre consoles, which are all illuminated by the supplied lighting set. There's also a full complement of rudder pedals, cyclic pitch sticks and collective pitch levers

I've been flying R/C helicopters for over 40 years now but I still get a little anxious prior to test flying a new model and I get more anxious when it's a review model. I like to do any test flights when the flying field is at its quietest but, of course, I would never carry out this exercise without having someone with me. On this occasion, I got Steve Tew to accompany me; he's always a calming influence and, fortunately, a good photographer too.

After re-checking that all systems were operating as they should, we did a range check. I fly with a JR DSX 9 II transmitter, which uses the Spektrum DSMX protocol and a range check of 30 metres is considered adequate with the button depressed but I usually stretch that to 60-70 metres if I can. As usual, I had no problem getting this, with the transmitter pointing towards the model and the aerial folded at right angles. Try pointing the aerial straight at the model and you will be surprised to find a reduced range, but try turning your back on the model and the range is dramatically reduced!

With helicopters, as far as fail-safe settings are concerned, I programme the motor to off and the dynamic controls to neutral. The only way to safely put this to the test is to remove the main and tail blades then spool up to about 25% throttle. If the fail-safe settings have been set correctly, on switching off the transmitter the motor should shut off – and it did.

A lot of discussion has taken place in my club regarding fail-safe settings for helicopters and this is best option we could come up with for all-round safety. If anyone knows better, please contact me via the Editor. So, with main and tail blades bolted back on we were ready to go and I connected one of my 5000 mAh 12S OptiPower packs.

As it happened, all went well. Lift off was at the expected 60% throttle and she was hovering without any vibration. However, whilst there was no vibration, there was a slight 'wallow' going on, which I guessed was caused by a lower than ideal head speed.

Fortunately, I had programmed the Talon to give me three different speeds, selectable from the flight mode switch, and moving up to its second position gave me an increase in speed that was sufficient to eliminate the wallow. I had gone from 1150 rpm to 1200 rpm and that small difference was enough to put a smile on my face.

I hovered her until the timer alarm sounded and then landed to check the battery capacity. 50% capacity remained after 6 minutes and that was enough for me to confidently alter the timer to 8 minutes – more than enough for me. Subsequent 8 minute flights have shown a terminal capacity of between 30% and 40%; it would seem that the more I hover the less capacity I end up with...



A view of the central instrument console prior to fitting the pilot and co-pilot seats



The cabin top 'wire-cutter' is well simulated and far less vulnerable than its lower mounted counterpart, which I've had to glue back on several times due to workshop incidents



The simple but effective airbrush treatment of the twin turbine exhaust stacks adds to the scale effect. When I checked photos of the full size aircraft on the internet they showed a wind blown 'Stars & Stripes' flag adjacent to the exhausts, which Roban had not included in their otherwise excellent water slide decal set. However, a thorough search through my extensive decal collection gave me a mirror image pair of vinyl stickers, which were remarkably close to scale

Circuit Flying

On the day of the test flights I had taken three battery packs with me. So after the usual post test flight checks I installed another pack for a brief hover before going into a few circuits. This was mostly good and all the controls were quite gentle (scale like) but also powerful and precise. Power from my chosen motor/ESC/battery was a lot more than adequate! The 212 and its distinctive colour scheme was very easy to see at a distance, which instils a great deal of confidence.

The only problem I could see was a very visible porpoising in forward flight, which was most undesirable and very unattractive. I switched to Flight Mode 3 to increase the head speed to 1250 rpm, in the hope it was another head speed associated problem, but to no avail. So with 8 minutes approaching I landed and prepared myself for a head scratching session.

The fact that she hovered without problems suggested that it wasn't a mechanical problem but possibly a programming issue with the BeastX stabiliser. Fortunately, I had its operating manual with me but I had a slight concern that this is the later 7210 version (all my others being 7200s) and I didn't have Andy on hand to advise me. After perusing the manual for a while I decided to try one of the manual setting changes. On the BeastX control box there are three pot adjusters, which I have never had to play with in the past, and the first, marked '1', I thought could be my salvation. This sets the cyclic gyros' speed responses and I was sure an adjustment here would smooth things out.

Well, I chased that little pot up and down for the duration of a battery, which showed no discernible improvement at all. So I returned home, put the batteries on charge and called Andy, who agreed to meet me later at the field (I could sense the smug smile on his face!). When we met he had already identified one probable cure, which was to reduce the servo dead band (programmable in the BeastX) in small increments until, hopefully, the issue was resolved.



Sweeping round for a fast flypast, the Roban Bell 212 not only looks the part but it sound great too!

The first small adjustment showed we were going in the right direction but it took another two to achieve perfection. However, she was now flying beautifully, which gave me another boost in confidence.

Often, when I'm flying my large, scale helicopters at shows or fly-ins, spectators will approach me when I've completed my flight and ask me how I have enough confidence to fly such a valuable model at such heights and distances. All I can say to them is that I would never fly a model in public until I'm 100% happy with it, then I have no inhibitions at all. Even the slightest issue must be resolved before it goes public. I was now at a position to do that, except for the small matter that I hadn't completed the scale detail.

Finals

So, in the next workshop session I fitted the extensive seating set (a simple slot and glue job) and made up a compressible foam insert to stop the battery packs from sliding around in their generous under floor compartment. Although, during the initial stages of assembly, I had installed the full lighting system (which includes back lighting for the instrument panels) I have yet to hook all that up. Likewise, I have yet to assemble and paint my two pilots, and install them.

Moving outside, I fitted all the external appendages such as aerials, wire cutters and tail-skid etc. Only the rear boom mounted aerials gave me a headache. The left hand one was glued in place, in the two provided holes, but when it came to the one on the right, one mounting hole was in the main fuselage body and the other was in the removable hatch, which gives access to the 40 degree gearbox, and I could see that gluing the aerial in place would make it impossible to remove the hatch. So, I enlarged the mounting hole in the fuselage sufficient to insert a Futaba servo mounting grommet, the hole of which was a tight-ish fit for the aerial spigot. I then glued one spigot into the hole in the hatch while inserting the other into its snug home in the fuselage,

making it easily removable for future maintenance.

This just left the decal sheet as the only remaining item to be dealt with. As this is an electric powered model, which doesn't suffer from exhaust residue, Roban has been able to use water-slide decals, which conform to the shape of rivets and panel lines with ease, and they look much better for it. Application was easy and I was pleased to see that there was no visible sign of the carrier layer once all the soapy water used to apply them had been removed.

Having checked some internet images, I could see a small omission on the decal sheet in the form of a flying Stars & Stripes flag at the rear of both sides of the doghouse. Luckily, I found just such a decal in my collection, amassed over a lifetime of modelling, and these were a perfect size and pattern. I think they were the remains of a Miniature Aircraft decal sheet?

My 212 was now ready for another meeting with Steve Tew, this time with his camera. The photo session went without issue and with the 212 in perfect trim I could accommodate the most extreme of Steve's positional demands with ease. With photography out of the way I used my remaining battery packs to have some enjoyable flying. The BeastX now seems to be the perfect partner for my 212 and I have no need to make further programming changes.

Now I have gained confidence in its controlling ability, even on windy days this model remains real a pleasure to fly. I especially like the blade noise I can get from it, either in a steep spiral descent or during a 45 degree approach to landing. The latter, I think, is better known in these parts as 'The Davey Slap'! I even took it to a fixed wing scale fly-in and received a warm reception, with the comment that, "It's nice to see some real helicopter flying".

Apart from very minor issues I had during assembly, which I mention only because it may help others, the whole experience of reviewing this model has been a positive

exercise from start to finish. I hope I this review will encourage interested readers to give some consideration to the Roban range should they ever think of getting into large, electric, scale R/C helicopters.

Over the coming months I must install the pilots and connect the lighting set. I must also work myself up to an auto, which is something I've been reluctant to tackle before finishing this review. Now I have no excuse! **RCMW**

MODEL WORLD

MODEL INFORMATION

NAME:	Bell 212
MANUFACTURER:	Roban
DISTRIBUTOR:	Quick UK
WEBSITE:	www.quickuk.eu/cat/roban_scale_helicopters.html
PRICE:	£1399.94
MODEL TYPE:	Scale helicopter
PARTS SUPPLIED:	Mechanics and scale body
PARTS REQUIRED:	Radio system, brushless motor, servos and flybarless controller

MODEL SPECIFICATIONS

ROTOR DIAMETER:	765 mm
LENGTH:	1940 mm
WIDTH:	355 mm
HEIGHT:	510 mm
POWER REQUIREMENTS:	500 KV motor (750 MX or similar) and 120 HV ESC

DISLIKES

What's not to like?

LIKES

High quality • Comprehensive prefabrication
Realistic performance and appearance



The 212 and its distinctive colour scheme is easy to see at a distance, which instils a great deal of confidence



ARTF kits don't come much bigger than Steve Carr's Fokker DR.1

LMA At East Kirkby

The East Kirkby show is now the regular start for the Large Model Association's airshow season. Neil Hutchinson takes up his regular spot on the flight-line



It seemed very surreal seeing a Fokker Triplane doing 3D aerobatics. Steve Carr put on another superb display



Prop hanging a huge model like the DR-1 takes plenty of power from the engine. Steve Carr uses his own design 550 cc petrol engine

This year the East Kirkby show took place on the May Day Bank Holiday. As usual there were air shows on the Saturday and Monday, which were open to the public, and the Sunday was an LMA fly in and barbeque. This year the weather gods looked on favourably, with lots of sunshine, although there was a good breeze blowing. East Kirkby is, as most will know, the home of a Lancaster Mk VII, NX611, Just Jane. There was a lot of extra interest in Just Jane this year because she'd just come out of the paint shop. The whole airframe had had all the old paint removed, right down to the bare metal. Various panels and worn parts have been replaced and the Lancaster was repainted. A considerable amount of paint is needed – 20 litres of both brown and green and another 60 litres of black to complete the airframe. The result is superb! Just Jane

looks like she had just left the Avro factory. All this work is part of getting the Lancaster back to airworthy status and we were treated to several taxi runs of this magnificent aircraft. There is one thing I should mention now, because I think it will have an impact on future shows. New CAA regulations regarding the distance the flight-line is from the crowd line have now been put into force. These regulations are a direct result of the Shoreham crash. The CAA has instructed that the new distances will be 30 metres for take-off and landing; 50 metres for models under 20 kg and 75 metres for jets and models over 20 kg. This is quite a distance away from the crowd. I would hope these restrictions will be relaxed, eventually. I regularly attend full size air shows at the Shuttleworth Collection and the CAA have allowed them to revert back to their pre

Shoreham distances. One can only hope common sense prevails and the LMA show lines will also revert back to where they were. Judging from all the models at East Kirkby, I think 2017 could be a bumper year. There were several new models and plenty of the regulars, I'm pleased to say. There was a bumper crop of Tony Nijhuis designed Wellington bombers, several of them new for 2017. One model I never thought I'd see again was Phil Robertshaw's Britten Norman Islander. This model previously belonged to Tony Hooper. It had a very heavy crash at Cosford some years ago and I thought it had been consigned to the great black bin bag in the sky. However, Phil has done a superb job rebuilding it, which was great to see. Steve Carr also has a new 3D aerobatic model and it does not come more surreal – a Fokker DR-1 Triplane! Built from a Bill Hempel kit,



John Greenfield's beautiful 1/2 scale DH Tiger Moth. John puts plenty of effort going into the engine start up!



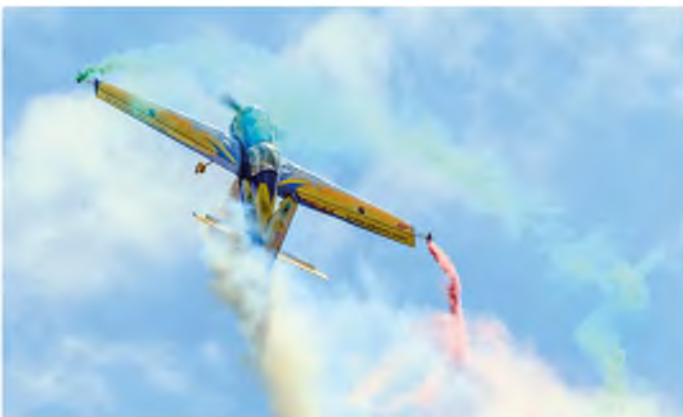
John flew a lovely display routine with his Tiger Moth



The Dawn Patrol. Always a popular display



Anthony Hills' superb third scale SE5a



A model we're more used to seeing Steve Carr fly, his large Yak 55. The model is an ARTF kit from the Bill Hempel stable



Phoenix from the ashes? Phil Robertshaw completely rebuilt this lovely Britten-Norman Islander after a very heavy crash at Gosford some years ago

the Triplane is 65% scale. That gives it a wingspan of 192 inches. Steve has made another of his own design 550 cc petrol engines for it.

As usual there was an excellent mixture of flying slots. These are all sorted out in advance by Rob Buckley. There is a lovely contrast between the types of model slots flown. One slot, for example, might be WW1 themed, followed by an aerobatic display, followed by fast jets. It all adds up to an interesting day. The pilots and models have to be ready at the specified time and these are kept to time by Ian Russell. He also maintains strict safety protocols on the flight line at all times.

Apart from Steve Carr's excellent and unusual Triplane display, two other model displays stood out for me – John Greenfield flying his lovely 1/2 scale Tiger Moth and

Mark Hinton with his CARF Sukhoi SU-27. These two pilots put on a superb display of scale flying and they use typical display manoeuvres that the real aircraft would use in an air display. Both models looked very realistic in flight. Adam Johnson should also be mentioned as he put on a superb flying display with his Aermacchi MB339. Adam is the next generation of the Johnson clan and is now flying models as well as his father, Andy.

Mike Booth also put on a good display with his new scratch built third scale Yak 3. The model looked very good in flight. Mike said he might do a full composite kit sometime in the future to compliment his Supermarine Works Spitfire range. One other model that caught my eye was Tony Hooper's Messerschmitt Bf 110. This is an electric power model built from a Chris Gold

plan. The Bf 110 features a Benedini sound system that replicates the twin Daimler Benz engines and I have to say it sounded very good in flight.

The LMA show at East Kirkby was another successful show with plentiful variety of models being displayed. Add to this the taxi runs from the Lancaster and all the interesting bits and pieces in the Lincolnshire Aviation Heritage Centre and you have an enjoyable day out.

One final note. While I was writing this article I learnt of the sad passing of Ken Bones. It was great to see him at East Kirkby, having a good time with all his mates. Ken was a lovely guy and a great aeromodeller. He will be sadly missed by all of us in the LMA. Blue skies to you, Ken. **RCMW**



Mark Hinton looks very pleased with the latest edition to his model air force, the Sukhoi SU-27



The CARF-Models Sukhoi SU-27 at full throttle



Tony Hooper about to start the large Moki radial engine in his CARF-Models Corsair, which also features the CARF folding wing system



Tony Hooper's Corsair looks very realistic in flight



Steve Rickett put on another fine display with his scratch built Douglas Boston III



Another CARF-Models SU-27, this time flown by Steve Johnson, looked superb. The model was painted by Phil Noel at Pinnacle Aviation and looked very realistic





Adam Johnson is one of the youngest display pilots but he put on a superb display with his Aermacchi MB339. A Wren 160 turbine powers this model



One of the smallest and probably the oldest model at East Kirkby, the Der Jaeger of Tony Woodhouse



The Skymaster Grumman Cougar of Mark Hinton stands out well in its orange experimental aircraft livery. A JetCat P120 turbine powers this 85" wingspan model



Mark Hinton's newest jet model is the Jet Legend F-16. The model is powered by a JetCat 200 SX turbine



A lovely looking model of the Cessna 195 from the YT International range. The model has a three cylinder Saito 60 cc petrol engine for power



Tony Hooper's CARF-Models Corsair unfolds its wings as the model taxis out to the runway



Adam Johnson calmly flew the large Wellington on a single engine and made a perfect landing



Steve Kasch's Nieuport 17 has an 80" wingspan, with a CRRC 26 cc petrol engine up front



Steve Rickett's beautiful de Havilland Dragonfly. The DH90 has a wingspan of 157 inches



Ian Redshaw's Me Bf 110 on the tail of Steve Rickett's Boston III



Andy Johnson's 18 ft wingspan Lancaster uses four Zenoah 38 cc petrol engines for power



Mike Booth's latest creation, the Yak 3, has a 2.9 metre wingspan and a 3D 150 cc in-line twin petrol engine. The model flies very well





Boeing B-17's of Dave Johnson (top) and Ken McCormack flying in formation during the 'bomber slot'



Ken McCormack's Phoenix Models Volcano. The Volcano is powered by a Wren 44 turbo prop engine



Ian Redshaw's large Messerschmitt Bf 110 is another old campaigner but still looks good in flight



Tony Hooper's Messerschmitt Bf 110 was built from the Chris Gold plan (Traplet Shop, MW3489). The model has two AXI 4130/20 electric motors and features dropping bombs and a Benedini sound system for the realistic sound of the Daimler Benz engines



Richard Scarbrough always put on a good display with his L39 Albatros



Lancaster 'Just Jane' out for the first taxi run of 2017 after being totally repainted. She looks superb!



Light Flight

John Stennard describes his latest piggy-back launch project and gives the low-down on his latest small model acquisitions

Even with extra strengthening the Whipet's wings still flex when piggy-backed, but not alarmingly

It's the August issue and we are deep into the outdoor show season. As usual with family holidays etc., 'give and take' is the name of the game meaning that some shows will be missed. In addition to the flying displays a good exploration of all the traders stands is essential. I use these opportunities to stock up on items with the next indoor season in mind – things like carbon fibre rod, Depron, etc. – plus any bargain basement indoor kits. Of course, I also regularly fall foul of temptation and end up carrying a big box to the car!

So, moving onwards and upwards, here's a quick look at how to extend your Whipet flying duration, plus some more models that are definitely in the 'small and light' category.

Whipping It Up

The E-flite Whipet has provided me with lots of fun but very few flights of any length. Although it discus launches well, due to the low mass of this model the height that can be gained is limited. Dave, a fellow Whipet flyer, had the idea of adding a carrier to an electric Wot 4 so that his Whipet can be launched at a much higher altitude. He designed the carrier specifically to fit the Whipet, using one servo with a long servo arm to provide the hold and release functions. The carrier was very successful but it was immediately clear that the Whipet needed a couple of modifications.

The speed and climb of the Wot 4 resulted in the wings of the Whipet flexing rather alarmingly and the size of the Whipet made for orientation problems when launched from a high altitude. Dave modified his Whipet by using CF rod under the wings, while I went

for 1 mm ply strengthening plates. Both modifications have worked well and although the wings still flex the additional rigidity at the root has avoided creasing or snapping of the wings.

The orientation issue is also improved by, in Dave's case, painting the underside of the wings black, and on mine with fluorescent colour spray.

Even with these modifications, the Whipet needs good visibility flying conditions. If you take it up high the model appears extremely small when released but its excellent flying qualities mean that it quickly moves into a stable flying attitude. I enjoyed some super

flights with the 'high launch' Whipet and thoroughly recommend the experience.

The weight of a Whipet, or several, is actually very low and the Wot 4 has a big surplus of power. In fact, a much smaller model could easily lift a Whipet aloft and a more compact and lightweight carrier/launch system could be devised. If using a model the size of an Wot 4 it would be easy to design a cradle that would take several stacked Whipets. Mind you, if all launched at once you would definitely need some underwing identification markings! If you have a regular flying partner, a lifter/glider combo is a good idea and gives twice the fun per flight.



My Whipet wing strengthening uses 1 mm ply and has worked fine



The glider mount on the Wot 4 Mk 2 is a simple and sturdy design



The mount holds the Whipet very securely and has a foolproof release mechanism



A multi-Whipet mount would be easy to design and a multi launch could become a competitive option



Sophisticated packaging for a suitably 'high tech' model

Macfree Smart RC Plane

I had seen and read the specifications of this intriguing little model on-line so I was very interested when given the opportunity to look at one. This was to consider the possible market for this model. The performance is an important factor but so is the sales potential and the retail price can be the decider. It is increasingly difficult to fit some model products into the toy or model categories. Size certainly cannot be used to sort this out, nor can the retail source. Perhaps 'toys' are likely to have a shorter active life and a limited potential for a varied performance, plus a reduced input from the operator?

The Smart RC Plane is presented in a very rigid and tough plastic case, with a foam lining that protects the plane and the 2.4 GHz Tx. Also in the case are spare parts, a four output USB charger and three 1S 200 mAh LiPos. The Smart RC model is available with



The Tx has numerous function buttons to operate the various flight patterns



The 1S LiPo is situated under a hatch near the nose. The model can be flown without the U/C

LIGHT FLIGHT

a coreless direct drive or a brushless motor; my version had the coreless motor.

Control is achieved through two micro 2 g rotary servos and elevons. An undercarriage set is included and this is plugged in as and when required. The Smart RC model is both small and lightweight; it has a wingspan of just 222 mm (8.74 in) and a flying weight of 32 g (1.2 oz).

What makes this small model interesting is that it is fully stabilised and it has a barometer and altimeter to control the auto pilot 'Smart Training Mode'. There are actually four flight modes: Smart Training, Self Levelling, Stabilized and Normal.



The pusher motor has an important 'do not touch' warning notice!

The model is factory set for 'Smart Training' and 'Self Levelling' modes only, but the other two modes can be accessed using a set up programme.

The small but easy to handle Tx is quite complex, as in addition to the two sticks it has two buttons on the top that are used for the Smart Training height mode and two switches on the front for switching below flight modes. The instructions are also quite complex in order to cover the different flight modes and are not the easiest to understand. However a good video is available online.

Eager to get the Smart RC model in the air, the first flight took place in a very unsuitable wind strength. The Tx talks to you and tells you, in a rather robotic female voice, the mode you are in, low flight battery, etc. A hatch in the nose area opens for the flight battery. It was far too windy to fly the model in autopilot mode so I flew it in the normal stabilised mode.

The take-off from our concrete road was very quick and as I opened up the throttle the elevons automatically moved to 'up'. There is no rudder but roll control is available on both sticks. The automatic stability control was extremely effective and it held the model level in very difficult wind conditions. There was plenty of pitch control so heading into wind was not a problem and with careful use of the controls the model can be hovered down with the stabiliser system working overtime. I was impressed with the flight

performance and eager to try out the Smart Training mode next time.

Back at the field, with slightly less wind, I was able to try this out and with the switches set in the correct positions, the 'S' button is held down and released after a five second audible countdown. After releasing the button the model took off perfectly and climbed to 20 metres. It then levelled out and proceeded to fly in circuits. If the top buttons are pressed the model either climbs five metres or descends five metres. The maximum height the model will fly under this control is 30 metres. The circuit direction can be changed, or set for a figure 8 flight pattern. The landing is also automatic and it proceeds after one of the buttons is pressed and held until 'ready to land' is heard.

The Smart RC plane is undoubtedly a very cleverly designed model both from the aircraft and electronics point of view. The flight performance is good, although the stabilisation system does influence its ability to perform aerobatic manoeuvres. For aerobatics the 'Normal' mode setting is required.

Some of the fun is lost if you have no hard take-off area available, although it can be hand launched in all flight modes and would fly well at a small flying site. Whether or not the Smart RC Plane is a sales success does not change the fact that the concept, technical achievement and excellent flight performance has to be admired.



Although small the bright colour scheme makes it easy to keep in view



The 'hands off' climb out is an interesting experience, and duplicated by the 'self landing' function

Double Delight

I showed the assembly and flying of the TV Black Flyer V 1 indoor model a few issues back and this Vapor-like model has proved to fly well. The kit from Banggood was a very good buy as it included the model parts, a Vapor type Rx module and a geared motor and prop. It now looks like it is only available as the Black Flyer V 1 .1, without the Rx module, for around £14. Although not difficult to assemble the Black Flyer did need quite a bit of attention to detail and careful hand skills.

The same manufacturer has now introduced a biplane version of the same model called the Black Flyer V 2 and I was keen to try it. The biplane kit version has the same size wing but, obviously, two of them, plus some clever CF fittings. This model has no Rx module but does include the motor unit and prop, and costs around £16.

Although the original Parkzone Rx module is still available from a number of sources it can cost around £45. The Rx module from a Mini Vapor is also very suitable and can



The Black Flyer Biplane offers an interesting construction experience and a nice Vapor-type alternative

sometimes be purchased for less than £30. It is easy to forget that in fact you are buying an Rx, two servos and an ESC for whatever amount you pay. The AR 6400 6 channel Rx module can be used but is slightly heavier. In many cases modellers will have these Rx modules recovered from the E-flite/Parkzone models in which they were fitted.

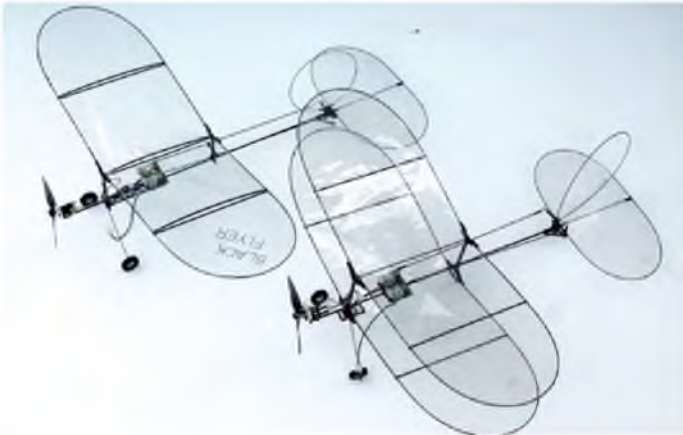
A Super Micro module of the Vapor type is also available from HK and I have found this to work well. A separate Rx of the Deltang type with an integral ESC (visit Micron to

view these) plus two 1.4 g linear servos would also give a suitably lightweight set of gear. The choice is yours but in the end it is best practice to fit the very lightest Rx module/system that you can.

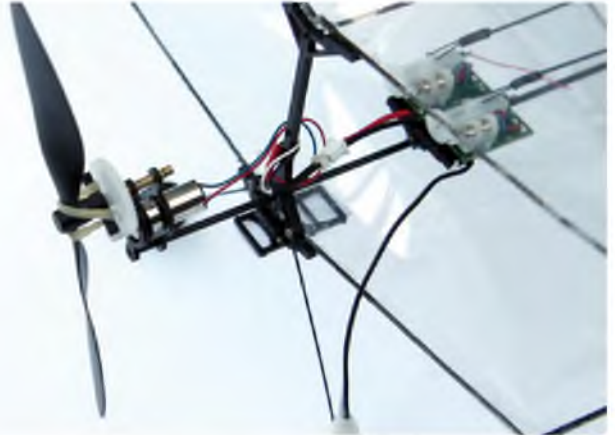
Many of the fittings used on the biplane are the same as used on the monoplane, with the exception of the wing mounting parts. Like the monoplane the model construction is not difficult and the photo instructions are quite clear, it is just that the parts are very small and need to be handled carefully. My

biplane had a 17 g flying weight, against 15 g for the monoplane, and flies beautifully.

If you have any Rx modules hanging around from time expired Embers, Vapors or many of the E-flite scale models like the Sukhoi, give them a new lease of life in either the monoplane or biplane Black Flyer. These models will provide you with an interesting building experience and a sweet little indoor, very small space, R/C model. Remember models of this size can fly in very small spaces and outdoors too in calm conditions.



Viewed next to the monoplane Black Flyer the parentage is obvious



To keep the weight as low as possible I used a Mini Vapor Rx/module



The small size of the Mini Vapor Rx/module is shown here. A lead for the motor connection has to be soldered to the board. Get out the magnifying glass!



The HK Rx/module is nicely small but also needs a motor lead to be soldered to the board. This unit may not work easily for you unless you have a 'channel assign' function on your Tx



The geared motor/prop units used on these models are very inexpensive and have applications on other models

Tail End

I am concluding with another Double Delight but a slightly different one as it is the new E-flite UMX A-10. This tiny EDF twin flies extremely well and the AX3S system works its magic, particularly in blustery conditions, and provides rock solid stability. It has a very lively performance, loops and rolls with ease and flies beautifully inverted. Do not look too hard or you will notice the less than pristine nose area! A cautionary tale for another issue.

Information and photos are always welcome to: jstennard41@gmail.com

I am available for talk/demos on flight/indoor R/C within the Bristol area and, as the BMFA Western Area Education Co-ordinator, I am also happy to talk to school pupils and youth groups. **RCMW**



Maybe the best yet? The Horizon Hobby UMX A-10 shown before an early pilot error reduced the length of the fuselage...

Left: Even after a very severe nose job the model still flies incredibly well, even in quite strong winds. Again, it's more fun when flying off a hard surface

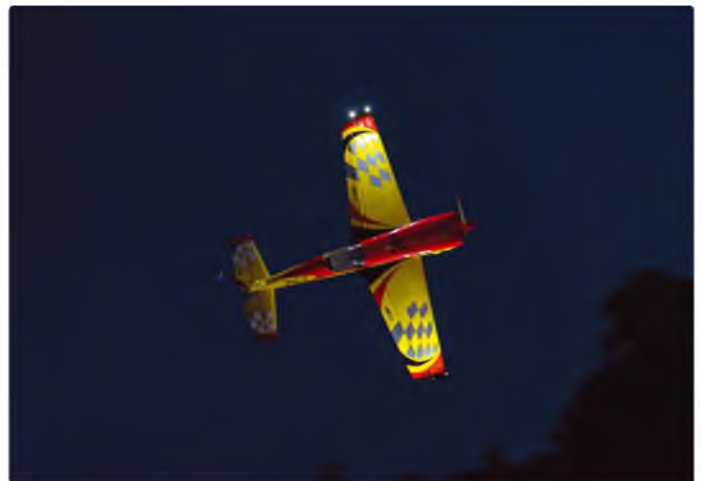


Weston Park Night Spectacular

Next month Malcolm Brunt will be reporting from the flight line at the main Weston Park model show. But we couldn't resist showing you some of the amazing coverage that Malcolm caught on camera during the Saturday night show, held on the evening of 17th June



Christoph Hemming flew helicopters with pyrotechnics and rotors that are programmed to display images and lights



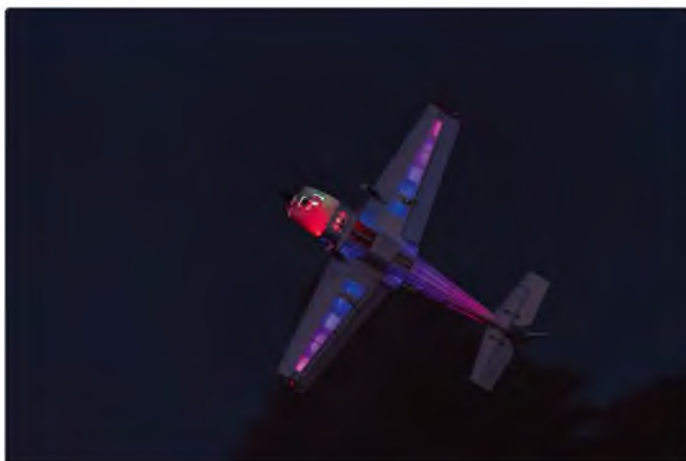
Liam Clayton flicks to knife edge with his 88-inch span electric Pilot Extra 330SC



Team Global RC pilot Ross Baseley flying an Edge 540 3DHS of 106-inch wingspan and powered by a DLE 111



Above & below left: Dean Coxon flew Simon Wood's Pilot Extra. Simon is the creator of the lighting effects at the show and he developed his own Pilot Extra lit from within the airframe rather than the more conventional external lighting. The model changes colour during the display giving a ghostly but serene effect



Rob Gardner flying the Nexus Sukhoi SU28 MM, which unfortunately crashed at the end of its display when the engine stopped. The model is expected to rise from the flames like the proverbial Phoenix



Above & below: The climax to a marvellous Saturday show at Weston Park was when Azza Stephens and Sonny Millgate created an aerobic feast by lighting up the sky and flying close to the fireworks with their Extras



Jasse 'The Ace' Dussia flew a 106-inch Edge. Part way through his show he lost the lights from the left wing but he carried on, despite only being able to see the fuselage, tail and just one wing!

Soarers' Slot



This month Mike Proctor reveals more F/F inspired construction techniques and tackles a tricky height switch problem before shipping his models to the continent for an F5J competition in Portugal

Steve Haley flew a Pike Dynamic in the calmer slots at the F5J Spring Cup event near Lisbon, Portugal. He poses here with winner's trophies. See 'Portugal 2017'

Last time we left the build description of Gary Peck's lightweight eSoarer, using the Low Drag Aerofoil from a free flight application, just as the wing construction came to an end.

The tailplane is made in exactly the same way as the wing; a look at the picture should refresh your memory. There are some obvious differences in design, as the tail needs only a very small 'D' box to produce the required amount of torsional rigidity over its short span. The section is fully symmetrical and the tail is attached to the fuselage boom using an AVA all-flying unit.

The fin and rudder use completely conventional balsa outlines and ribs, which are then given an external layer of carbon strip for torsional rigidity. The fin is just thick enough to house the two micro servos that drive the elevator and rudder. The fuselage and boom were purchased, so that completes the construction.

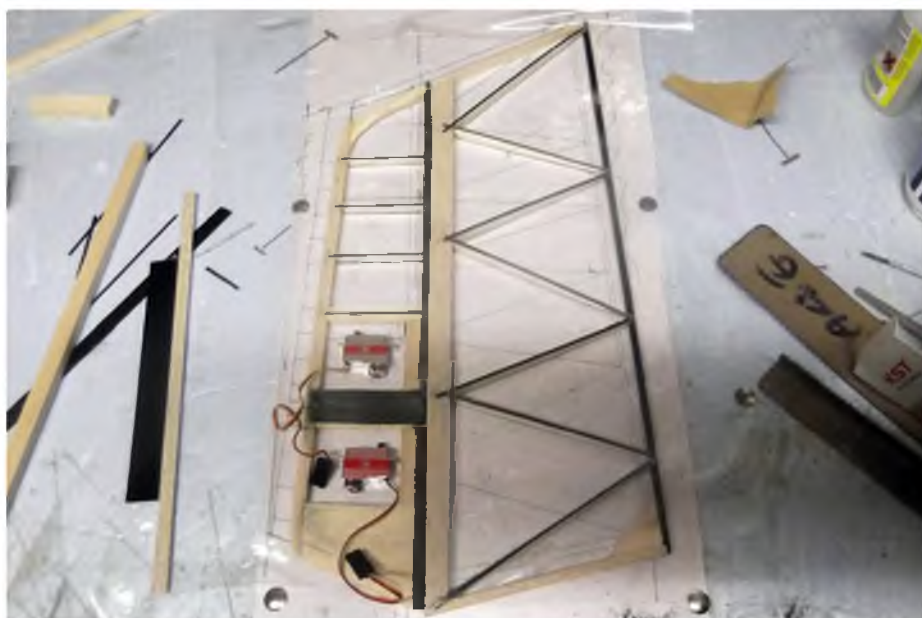
The covering is Icarex ripstop polyester, much used in kites, which is light, strong and airtight. It is stuck onto the airframe with contact adhesive, thinned slightly with cellulose thinners to improve spreadability. It heat shrinks and is available in a wide variety of weights and colours. The picture shown here is of a finished aeroplane and not in fact the one described in this article.

However, as Gary has continued the good work over the past few months you get to see the latest incarnation of his model, flown at the 1st Northern eSoaring competition. The similar construction is obvious, as is the depth of solid colour from the Icarex covering, but this version has a section with much less camber. In fact it uses a pair of existing chuck glider tips, with the rest being home built.

It is unlikely that Gary will stop building in the near future so we can look forward to seeing more of his excellent work fairly soon.



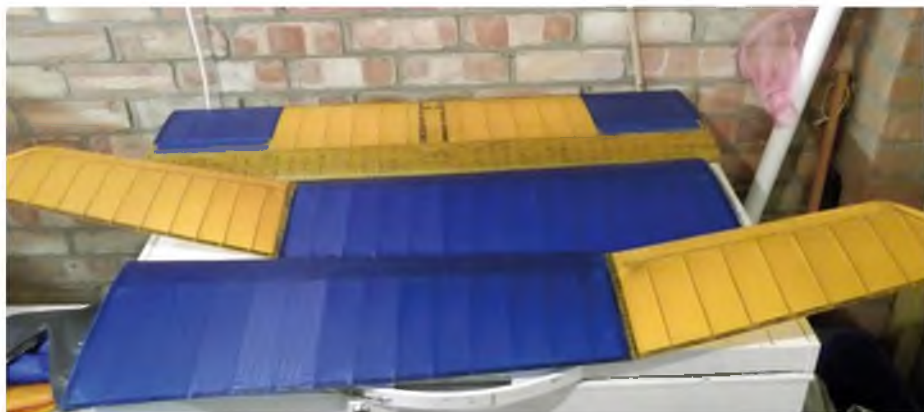
Tailplane construction on Gary Peck's eSoarer is much the same as the wing described last time but the D-box leading edge is much smaller



Fin and rudder construction is relatively simple, being a balsa 'outline' with carbon strip strengthening. Thickness suits micro servo installation for rudder and elevator control



The Low Drag Aerofoil used on Gary's model and a view of the wing joiner. Much more undercamber than a 'normal' electric soaring glider but it works in lightish air



A better view of the Icarex covering on the main wing components



The next generation is already upon us! Gary's latest eSoarer is slightly smaller in span than the one described and uses a different aerofoil, with less camber



Richard Brown assembling his Vinco 4 m lightweight eSoarer at the 1st Northern eSoaring League event. Model uses DLG type, solid Rohacell-cored flying surfaces, to achieve minimum weights of close to 1,100 g

AMRT Woes

Altitude/Motor Run Timers are more often known as 'loggers' or 'height switches'. Whichever, they occasionally cause problems and I have been lucky to usually be on the, "Can you help me with this?", end of them. This time I was at the sharp end of the trouble, which over time I have come to know is almost always self inflicted! However, after checking that all the settings were OK, meaning 'the same as my other models', I could not resolve the problems, which went thus...

I ordered another Altis V4+ for my Xplorer F5J and set it up exactly the same as the one in my Maxa. Meantime, I had done the test flights without an AMRT and all went well. I installed the V4+, set it to eSoaring with restart enabled and the trouble began. The motor would start sometimes and not others; this applied to first ground starts and air restarts. After some messing about I swapped the one out of the Maxa and it behaved the same, so something in the model was suspect. More messing and still with the same results. So, I tried an Altis Micro and all worked OK! Enough, so I consulted the guru!

"Where are the throttle end points?", says he.
 "Same as all the others: -100 and +100", say I.
 "Make sure the low end is under 980 ms", says he.

I find that I need to set for -125 at the low end on my MC 24 to achieve this and all is well! Why this should happen on only one (albeit all-carbon) model I have no idea, but I have adjusted the others anyway.

Right: AMRT's need correct settings both on the unit and the controlling transmitter if they are to function correctly in all situations – see text





General view of the flying area at Montemor Portugal. Only English people ask what the wild flowers are, apparently! Beautiful blue sky looks nice on postcards but watching models climbing out under power and subsequently gliding can be testing, depending on attitude and colour scheme



HQ for the UK Team. This is about a quarter of the available hangar space and it provided excellent weather protection and secure storage for people and models. If you happen to have the space under a full size glider wing standing up with care is essential! Organisers helpfully provided 12 V batteries for charging purposes



Portugal 2017

Once again an intrepid band of F5J flyers departed the UK in late May to take part in the in the F5J Spring Cup event near Lisbon. We originally planned for six competitors to attend but for the second year in succession, very close to departure, Brian Johnson discovered that he was unable to go for health reasons. Last year, with almost exactly the same timing, his wife Norma fell and caused a severe fracture to her leg, which needed complicated surgery and, naturally, a cancellation of their trip. Brian considers Portugal the most expensive country he has never visited! We wish him well, for next time.

We flew out from Manchester in two groups, taking two models each in the Correx model boxes, the construction of which was detailed last year. It never fails to amaze me how much 'stuff' can be put in luggage and still not be near the limit! As well as two models I included: radio gear, chargers, model spares, awning and poles (bamboo instead of aluminium), old camera, spare boots and a coat. This lot took some lifting but was still 4 kg under the 23 kg excess baggage option on Monarch! Most of the others have now fitted small removable wheels, from old luggage cases, to one end of their boxes. I didn't and therefore struggled the most!

Batteries were much discussed before flying but following the CAA information the two spares, with their terminals taped up, went into LiPo bags in the hand luggage. As our batteries have got smaller in capacity over time and the allowance is 100 Wh (Wh = Ah x V) my 2 x 1 Ah 4S packs were only around 34 Wh total. They caused no problem at baggage check-ins.

Our group of three arrived at Lisbon and met Manuel Almeida, who kindly collected our boxes and had arranged onward transport for them to the field, the next day. We collected a hire car and drove to Evora, about 125 km to the east, passing close to the flying site at Montemor, en route.

The flying site is a small gliding club, with a good hangar and a separate clubhouse, where food and drink was available all day. We were able to fly from 2-6 pm Friday (Portuguese time is the same as the UK) when the temperatures were in the high 20's. As last year, we were able to set up HQ in the hangar and leave the models assembled there for the duration of the meeting, which is a huge advantage.

It soon became obvious that there was lift about in the clear blue sky but finding it and seeing the models could be tricky. The wind was light and several of the other models being tested were obviously lightweight and seemed to be at the edge of their unballasted flight envelope.

Left above: Manuel Almeida helped the UK team with transport and has mastered the art of high visibility colour schemes for blue skies, demonstrated here on his Pike Perfection V tail

Left: Steve Haley used his Pike Perfection in the breezier slots. Several examples of Xplorer, F5J and standard, were flown in Portugal. The lime green fin really does stand out well



There is always an AVA in this world and this one shows just how well the multi-coloured scheme works in good back-light. Super stable flight characteristics were demonstrated by one flyer who dropped his transmitter during the flight; he picked it up, sorted the switches, put the neck strap back on and continued flying!

The hangar has a row of a dozen or so glider trailers leading directly away from it and a long row of low cork oak trees forming another arm parallel to its doors. It was a good area to explore for lift and see it any patterns were developing; they didn't seem to be! At 6 pm we tidied the hangar and departed.

Saturday was the first day of the competition and nine rounds were scheduled. They would be followed on Sunday by another round and then three Fly Offs.

The first slot showed the way things would be for the whole day when two people launched to 100 m and barely did 2 minutes; all the rest went close to 180 m and only one beat 5:20. It was very easy to get into a 'hole' that was all downhill and not get out until the ground came up and bit you! Fortunately, none of us were in slot one and with the exception of Simon Haley, who got a zero chasing lift too far downwind and landing 'out', we all survived R1.

R2 went well for most of us. Steve Haley maxed from a 95 m launch but most were around 150+ m and often there was a big mix of scores.

Nobody made any big errors in round R3. I landed just short of the tape for a zero landing score. Bob Dickenson was starting to show a mastery of the conditions, which continued all day.

R4 was tricky because all of us, except Bob, were in Slot 3, requiring a recruiting campaign amongst English speaking contestants to get a helper each. It worked out reasonably well, with nobody dropping badly.

I had the worst flight in R5 but the others were doing OK. R6 was lurking round the

corner though and Bob didn't win his Slot for the first time! Steve flew in the dreadful Slot 2, which was won with 4:06. Steve flew into the biggest piece of sink ever and did 2:48 from 144 m! Everywhere he went conditions just got worse!

Slot 3 was little better, being won with 4:43, but Martyn Wharrie salvaged a reasonable score. Bob returned to his winning ways in Slot 1, R7 but Steve and Martyn both got caught in the sink again, along with most of the others. Simon and I did OK in Slot 2. The sink and turbulence seemed to relent from the start of R8, with Slots 2 and 3 being won with wall-to-wall maximums, but Martyn had a tricky time in Slot 1.

Only R9 to fly before retiring to the restaurant for the much anticipated event dinner! With conditions continuing to improve only two scores in the whole round were under 9:30. We were ready for dinner!!

The following morning we assembled for the final round and fly-offs, in conditions that had changed yet again; it was now quite breezy at higher levels and turbulent with it! With such up and down scoring, Fly Off places were still up for grabs. Bob was the only one to be certain of a top seven place, even without flying; the rest of us needed to be careful to get a place.

A quick test flight had shown that ballast or a heavier model was best. I changed from my Xplorer F5J to my Pike Perfection and launched high (202 m) but into chronic turbulence, which cost considerable height. In a low scoring slot Simon fared better, earning a Fly Off place. All the others got in, with the exception of Martyn who had had a poor 'middle section' in the qualifying rounds.

Fly Off

So with four Brits in the three round Fly Off the helper search started again. Steve's wife, Fiona, helped him, Martyn helped me, whilst Bob and Simon got local help.

In Round 1 the air continued to be very tricky to read but was quite different from Saturday and Bob lost his mojo! Steve and I had 8 minute plus scores but I had switched back to the Xplorer and it spun round, landing on the sand, just too quickly for me not to be able to get my leg out of the way, so I lost landing points. Bob and Simon had middling scores.

Round 2 produced my worst score of the all-sink variety, but Steve was second and Bob and Simon did well.

Round 3 was different again. Having launched into yet another hole, I managed to push sideways and then forward, making the best of some good air, which most others did not. Steve had good air directly overhead but, yet again, when it collapsed everything came down. Steve and I were top within a second of each other and Simon had a good time, but Bob chased after a downwind bird and had a nice afternoon walk to get his model back, fortunately undamaged!

The final results were quickly forthcoming by the organisers, who had done a splendid job keeping us updated throughout the competition and they deserve everybody's thanks.

Steve finished first, with Jorge Medina second and myself third. Simon was fourth and Bob was seventh after his walk! Martyn finished 13th, which just about summed up his comp...

Roll on next year!

Our thanks to Fiona Haley and Joao Mestre for the additional pictures. **RCMW**



British team in Portugal, hanging on tight to their models as the wind is at its height just after the qualifying rounds - 3 Perfections, 1 Optimus and 1 Electra. The strip of tarmac is the glider club's runway - narrow, isn't it?



Prize giving in Portugal, with the clubhouse, shaded area and outdoor tables behind. Simon Haley was fourth overall and top junior - a great performance

Check our website for a full list of events www.rcmodelworld.com

Diary Dates

INDOOR

12th Sept, 10th Oct, 14th Nov, 12th Dec '17

Waltham Chase Aeromodellers Indoor R/C FPV Meeting at Wickham Community Centre, Mill Lane, Wickham, Hants PO17 5AL, from 7 pm to 9.30 pm. Admission: adult flyers £4, spectators and junior flyers £1. Proof of insurance required. Model size/weight limitations apply. All models to be 25 mV 5.8 GHz or WiFi equipped. Video frequency control system will be employed. See www.wcaero.co.uk for more details. Contact: Alan Wallington, 'Vfrenbeck', Bull Lane, Waltham Chase, Hants, tel. 01489 895157

7th Oct, 4th Nov, 2nd Dec '17

Indoor Flying at Furze Field, Furze Field Sports Centre, Mutton Lane, Potters Bar, Herts EN6 3BW. Times will be from 6 pm until 8 pm, flyers £9 and spectators £2. Rubber, free flight and small electric models only, wingspan will be limited to 20 inches. Enquiries to Mike Quille, 020 8500 3549, Email: mp.quille@live.co.uk

14th Oct, 11th Nov, 9th Dec '17

North London MFC Indoor meeting, at Furze Field Sports Centre, Potters Bar, Hertfordshire EN6 3BW. From 6 pm until 9 pm. All up weight limited for fixed wing 225 g, 36 inch span, helicopter 400 g. BMFA insurance required. Contact Peter Elliott, Email: ianelliott56@btinternet.com

GENERAL

23rd July '17

F3A, 4th BMFA GBR Team Selection Event. Mansfield. FAI 'P' and 'F' schedules. Also GBR/CAA League competition, all schedules. See gbrcaa.org then forum 'Competition News' for details and 'Competition Entry Form' for fees and payment. Team Selection competitors have priority entry if competition is over subscribed. Visitors welcome but please contact Contest Director, Brian Hoare on 07962 358470 for details

30th July '17

GBR/CAA F3A League competition. Warboys. All schedules. See gbrcaa.org then forum 'Competition News' for details and 'Competition Entry Form' for fees and payment. Visitors welcome but please contact Contest Director, Clive Whitwood on 01487 832195 for details

5th & 6th Aug '17

GBR/CAA Championships. BMFA National Flying Centre. All schedules. See gbrcaa.org then forum 'Competition News' for details and 'Competition Entry Form' for fees and payment. Visitors welcome but please contact GBR/CAA Competition Secretary Adrian Harrison on 07976 244004 for details

5th & 6th Aug '17

The Robert Mahoney Memorial Electric Fly-In, at Middle Wallop, from 9 am to 4.30 pm. Entry via Museum Gate. Electric only, no Free Flight, BMFA A certificate or equivalent. Over 7 kg requires 'B' or better. For more information contact Dave Chinery, Email: daviddchinery@aol.com, Tel: 07702 455777, or J. Bassett, Email: jbassett@efuk.net

6th Aug '17

Skelmersdale MAC Annual Fly-In. Low key Scale event and all are welcome. Proof of insurance required. Location is just off J4 of M58, South Exit (WN8 9TH). For more details contact: Andrew Bowman on 01942 716522, or Email: Andrew.bowman23@gmail.com

12th & 13th Aug '17

Redruth & District Model Flying Club 26th Annual Summer Show, from 10 am to 5 pm both days, along with our club pilots there will be again a number of local club pilots and guests. We can cater for campers wishing to make a week or weekend holidaying visit, and there will be barbecue catering on site. Modellers wishing to fly at the show please contact for model flying forms etc. Contacts, Steve Polkinghorne 01209 313263, Email: stevewings55@tiscali.co.uk, or Ian Greenfield on mobile 07706 929494

18th to 20th Aug '17

Festival of Flight at Ragley Hall, run by the Wrekin MFC. New dates confirmed, further details to follow but show will include many famous international flyers from the UK and Europe, as well as the amazing Richard Goodwin with his full size Pitts Special, which will guarantee to give the event that special Wrekin MFC touch, plus the Glider FX team will be there all weekend, running concurrent with the air display but on different parts of the park. There will be the Helifest model helicopter competition and display, Quad First Person View Racing, a large Boating Regatta on the eight acre lake and Model Car Racing. Saturday evening will featuring laser lights fireworks and light show! A large trade participation is anticipated as well as a swap meet. Admission prices: Adults £14.00, children £7.00, family £30.00, camping £65.00 pre paid, £70.00 on gate. For more details contact: Steve Bishop, Tel: 01952 587298, mobile 07758 895068. Trade enquiries call Peter on 01952 684169. www.festivalofflight.uk/

19th & 20th Aug '17

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

20th Aug '17

Kilnhurst Model Flying Club Funday. Planks, Helis and Quads are welcome to fly over our stunning scenery in an A.O.N.B, Stafford, Staffs. BMFA 'A' certificate and proof of insurance required to fly. Some restrictions apply, see www.kilnhurstmfc.co.uk for further details

26th to 28th Aug '17

F3A at the BMFA British National Championships. RAF Barkston Heath. Entries through BMFA

2nd & 3rd Sep '17

F3A Triple Crown. Invitational team competition: England, Ireland, Scotland. Venue: Heswall, Deeside. Visitors welcome but please contact Competition Director Brian Hoare on 07962 358470 for details

A FREE service, advertise your club's event, show, fly-in, bring and fly, swapmeet, sale or whatever. Simply send in the details to: 'Diary Dates', RC Model World, Traplet Publications Ltd., Traplet House, Willow End Park, Blackmore Park Road, Malvern, WR13 6NN, UK. Or Email to RCMW@traplet.co.uk Traplet Publications Ltd. are unable to take responsibility for event cancellations. Check before you go.

3rd Sep '17

Wolves Scale Glider Fly-In, at Long Mynd, Church Stretton. Starts at 9.30 am, £3.00 entry fee, proof of insurance is required. Further details from Mark H. Richards, 6, Saxon Road, Penkridge, Stafford ST19 5EP. Tel: 01785 712445, Mobile: 07921 210629. Email: markrichards@yahoo.co.uk

9th Sep '17

GBR/CAA F3A League competition. Beaulieu. 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 Ian Mould on 07774 473745 for details

10th Sep '17

Basingstoke Model Aero Club Electric Fly-In, at the flying field at Harrow Way, RG25 3AR. Gates open 9 am, pilots' briefing 9.45 am, flying starts 10 am. Pilots must have at least a BMFA 'A' cert and show evidence of insurance. Entry is FREE and there will be a trophy for best model. The Club has a large (130 m x 50 m) well-maintained grass flying strip. Food and drink available and toilet provided. Further location and contact details on bmacuk.co.uk

16th Sep '17

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 Ashley Hoyland on 0114 2873432 for details

22nd to 24th Sep '17

Lleyn Model Aero Club Bring and Fly, at Penyberrth, Pwllheli LL53 7HG. Come and join us at our annual event, this year being our 30th anniversary, so come and experience flying in the beautiful Lleyn Peninsula, in North West Wales. Our fantastic flying site and brilliant slope sites are always very popular with flyers and spectators alike, we have on-site refreshments, camping and caravanning, including static caravan hire at site adjacent to us. There is also a cafe and bar on-site serving food and drink day and night, and where we get together on Saturday night. For more info contact, Email: secretary@lleynmac.org.uk or Frank Pilling on 07867 361905

30th Sep '17

SE BMFA Autumn Scale Fly-In. The SE BMFA in conjunction with Epsom Radio Flying Club will be holding a Scale fixed wing fly-in in the area of Horley, Surrey. Open from 10 am, pilot's briefing at 10.45, flying from 11 am to 6 pm. Large models and Turbines up to 20 kg welcome. The field has a grass strip 92 m x 12 m and has a good flat surface. Tail restraints or secure restraint required. Pilots must be BMFA members and if not holding at least an 'A' test will need to fly under supervision. Turbines and models over 7 kg require the pilot to hold a 'B' test. There will be ample car parking, BBQ, marquees and a toilet available. All are welcome come and join us on what should be an excellent day. Send an email to, secretary@sebmfa.org.uk, to register your models and receive directions to the flying field. Please include your BMFA number and advise if any of your models are over 7 kg

30th Sep '17

Huddersfield & District Model Aero Club 6th Annual Swap Meet, at Shepley Methodist Church Hall, Penistone Road, Shepley, Nr. Huddersfield, West Yorkshire HD8 8DB, from 9 am to 12 pm. The Church Hall is situated on the A629, approximately 1/2 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, etc. For more details contact: 01226 766636, Mobile (30th Sept ONLY) 07790 647827

1st Oct '17

GBR/CAA F3A League competition. Sculthorpe. 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 Jenkins on 07725 314950 before travelling

7th Oct '17

GBR/CAA F3A League competition. Baldock. 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 Steve Edwards on 07920 006217 for details

7th & 8th Oct '17

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

8th Oct '17

SAM 35 Vintage R/C and Control Line Fly-In at Middle Wallop Army Airfield, Hampshire. All are welcome but please note that there will no free flight and that only 2.4 GHz is permitted. No BMFA Certs are needed, but current membership of the BMFA is mandatory, so please have your Membership Cards with you. There may be 'Tomboy' duration competitions, if there is enough support. Control-line activities will include the 'Bee Bug Bash' and other events, plus sport flying. Note that free flight is not permitted. The Gate will open at 9.30 am, Army Museum entry charge £6 per person, plus £5 per person for SAM 35 (excepting wives, partners and children). Enquiries to David Lovegrove, Tel. 01491 200558, Email: david.lovegrove11@btinternet.com or visit www.sam35.org/events for details.

14th Oct '17

Tone Valley Autumn Model & Hobbies Show, at West Monkton Village Hall, Monkton Heathfield, Nr Taunton TA2 8NE. 10 am to 4 pm. Refreshments available. All types of models and hobbies displayed, trade stands and a table top sale. £2 entrance fee, under 14's free with a paying adult. Enquires & entry forms please contact (club sec) on Eddy Grant 01823 283077

5th Nov '17

Retford Model Flying Club Winter Swapmeet, at Babworth Road Sports & Social Club, Babworth Road, Retford, Notts DN22 7NJ. Table set up from 9.30 am (Small table £4, booked in advance. £5 on the day. Large table £6, booked in advance. £7 on the day), doors open 10 am – 12 pm, Admission £3. Hot sandwiches, tea, coffee, available from 10 am. For further information and bookings contact, Chris on 07966 764803, Gerald on 07941 867130, or Email: secretary.rmfc@sky.com Website: www.rmfc.org.uk

14th Nov '17

Southend Radio Flying Club Table Top Sale. The Ecko Club, Thornford Gardens, Southend on Sea SS2 6PU. Start time 8 pm to 10 pm. Tables set up from 7.30 pm, Entry £2, Tables £4 (includes entry), please book tables in advance. Refreshments available from the bar. Further information from, Les Baynham, Events Organiser, Southend Radio Flying Club, Email: fyles@hotmail.co.uk or contact Les or Den on 07729 421939 or 01702 295988

18th to 28th Nov '17

F3A World Championship. Argentina. See www.f3argentina.com.ar/. If you need more details please contact Ashley Hoyland on 0114 2873432

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The Sport Channel

Gray discusses another batch of retro model topics before finding a thoroughly modern glider on sale – in a supermarket!



Colin Hutchinson captured this dramatic shot of a free flight B-70 'Valkyrie' in action at Old Warden. Does anyone know whose model this is? A favourite early effort of your author's too, though it didn't get as far as this! (See text)

“It is good to be out on the road...”
(John Masefield)

This Month's Wise Words

To complete our opening stanza: “...And going, one knows not where...”

Our long-time contributor and now editor of SAM 35's magazine 'SAM Speaks', Colin Hutchinson, sent us a striking photo with such strong nostalgic associations that I just had to include it here.

Colin writes: “I thought you might like this shot of the Bob Linn Valkyrie at Old Warden back in May. It made everyone look up at the sight and sound of it flying. Made everyone it flew over duck, even though it was high over our heads!”

I can quite believe it, Colin – what memories that image evoked. When I was at school back in 1970, I'd already been struggling with this aeromodelling addiction for a couple of years or so and trying to make sense of it.

I'd hacked my way through kits and scratchbuilts and had begun my plan and magazine collecting habit, unaware of where it might lead forty-plus years into the future! I'd even acquired my first engine, the DC Bantam .049 glow, which had successfully flown my KK Champ C/L trainer.

My modelling literature though was constantly offering more exotic temptations. One publication receiving more attention than all my school books was the revered 'Aeromodeller Plans Handbook'. So many modellers of my own, and the previous generation, attribute their immersion in the hobby and their own creativity to those tiny pages, packed with thumbnail pictures of

designs which we could aspire to, if only our pocket money would run to it.

One sleek, streamlined sci-fi shape got my attention. And it was even suitable for my little .049! This was the Valkyrie, designed by Bob Linn, published in 1961 and based on the B-70, a huge delta canard nuclear bomber of that era. The construction was right up my street too – all sheet throughout. It was only 23" wingspan, but about 4 ft long! It would grant instant bragging rights with my school model club and would mean 'moving up a gear'.

Several weeks pocket money later, the plan arrived! First impression, it was gigantic; I'd never seen so much paper devoted to one model aeroplane. Second impression, it needed an awful lot of balsa sheet.

I haven't thought about that model for ages, but I realise that it must have involved several 'firsts', such as tracing and transferring large components onto the wood. I'm not sure how I managed to cut out the long, 3/32" wide reflexed aerofoil slot in the 1/4" sheet fuselage core; it would have needed accuracy I didn't possess at that time.

And how did I assemble all those sheet segments for the wing? I only had balsa cement then. How did I get it to stay liquid for long enough to make those long butt-joints without drying out? Beats me.

Somehow it all went together. I cut out, bent and bolted on the aluminium undercarriage legs, which were my first pieces of aeromodelling metalwork. At this stage I noticed the C of G on the plan. With the DC Bantam temporarily attached, I fed some

lead into the ballast box cut-out and soon had it spot-on.

I then wondered if my unfinished creation might actually glide. Lacking any traditional long grass nearby, I resorted to the next best thing – the middle of the road outside my home. Traffic was so light down our way that kids still played in the street.

I gave the Valkyrie a firm heave and, to my surprise, it sailed away and settled gently on its wheels about twenty yards away. So captivated was I that I tried glide after glide onto the tarmac, marvelling at my handiwork.

So knowing it could fly, the next stage was to get it primed and painted, right? Well, no. After more furtive test gliding sessions down the road, I think my hapless Valkyrie met its end when something fell on it in my workshop. It would probably have been repairable, but my attention span wasn't up to it.

Fast forward to 1973 and I'd begun to get a grip on the mysteries of building and flying. Thanks to a famous showbiz benefactor (remind me to tell you that story sometime...) I'd bought a Cox Pee Wee .020 glow motor and began my fascination with small models.

One of my first Pee Wee projects was a scale down of the Valkyrie (all done with old-school pencil, paper and basic maths) which not only got finished but spent some time AWOL after a flyaway!

So, thanks to Colin for the photo and for stirring some fun memories. If anyone would like information about the original 1961 Valkyrie plan, drop me an email at the address at the end of this column.

Getting The Bug

As we suspected, the question posed by Sid King recently regarding the contender for the first published commercial plan for a radio controlled model aircraft has seen SC readers embarking on their own paths of research on what is proving to be a topic raising ever more questions.

Sid wondered if the Walt Good 1949/50 'Rudder Bug', which he'd just completed, qualified as that design? Some of the responses we've received so far goes some way to establishing a timeline.

Regular contributor Denis Sharp provides the following: "Re: early models designed for R/C. About three years ago, I downloaded an Excel spreadsheet from a website of the Aero Modeller index which listed the contents of every issue from when it started in November 1935. I've gone through the index to see what reference it made to R/C models. 1939, May: Wireless Control Selector Mechanism for Radio Control.

1946, August: A Suggestion for Radio Control, Audio Frequency Modulation Radio Control.

1949, August: Radio Control Contest, Nationals.

1950, January: Rudder Bug, Plan and article on Aileron Control. Also regular series started called Radio Control Notes.

1950, May: Queen Bee Radio Model Plan.

1954, July: Report on R/C Duration Flight.

1954, November: Channel Crossed by RC Model."

Soon after, our long-time friend Andrew Burston from Australia mailed: "My first reaction was that the honour of being first should go to the Good Bros. with their Guff. However, this was initially published in Air Trails June 1940 as a free flight model. Further research turned up the Chester Lanzo model published in the December 1937 Air Trails as, I think, the first published R/C plan. At least it's proof of my

comprehensive indexing of model mags back to 1929!"

Looking at the copy of the Chet Lanzo article from 1937, his pioneering stick model is presented as a dimensioned working drawing in the style of the time. Using that old-school pencil and paper technique (funny how that's turned up twice this time), modellers of the day (mostly youngsters, too) would routinely draw their own full size plans. So, would the Lanzo qualify? Your thoughts, as always, are very welcome.

Incidentally, we had the pleasure of seeing Sid's Rudderbug at the vintage meeting in Shilton, Glos, where it performed magnificently. It justified its reputation for stability and reliable handling in some bumpy wind conditions. Seeing that unmistakable shape in the air at close quarters was a great pleasure.

If you would like more information about the Rudderbug plan, once again, drop me an email.

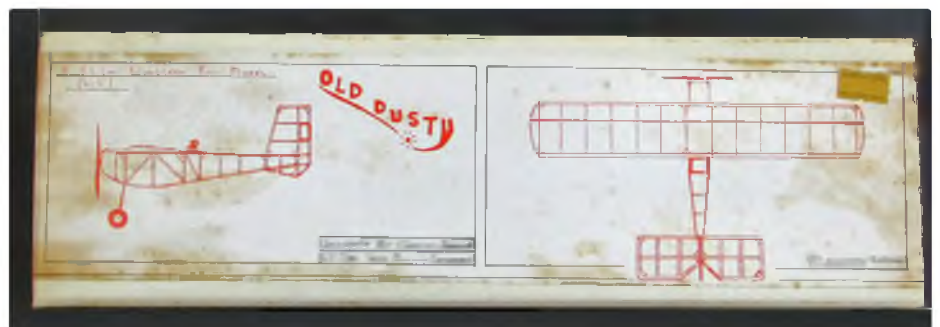


Sid King with his completed 'Rudder Bug', seen flying at Shilton, Glos, by the author. The Bug's renowned stability and dependable performance were very evident in quite breezy conditions. Was this the first published R/C model plan? It's certainly stimulated some discussion!

Rogers' Rarities

We're always grateful for material from Simon Rogers in Warwickshire and he's given this column some extremely entertaining items already this season. It's often difficult to keep track of his building and collecting activities, but I think he's hit pure modelling gold, at least for SC types.

Last year, Simon found a kit for a Performance Kits 'Owl' tow-line glider, which, as you may remember, was a design I'd tried to track down for decades. That resulted in Derek Foxwell of OSMAF producing a couple of laser-cut replica kits. Simon built his in days and it proved to be a convincing little flyer.



Readers may be forgiven for not remembering this one – we hadn't heard of it either! 'Old Dusty' was a British kit for a CO2 sport model, another of Simon's rarities. Kitting, materials and graphics were very basic. Is this the only surviving example?

This year another of Peter Fisher's quirky gliders became available. The 'Neutron', a 33" wingspan built-up model with a semi T-tail and a two piece knock-off wing, had all the idiosyncratic hallmarks of a PK kit.

Simon was on the case before I'd barely registered it and had a fine example built in no time. I witnessed the test flights on Salisbury Plain on one of the hottest days of the year and watched it narrowly avoid getting whisked away on the Wiltshire thermals. Simon also flew his Owl and we

wondered when was the last time that two PK gliders were actually together on the same field.

Simon also brought along the most obscure British kit I've ever seen. A small free flight sportster designed for the Telco CO2 motor, the 'Old Dusty' seems to date from the 1970s to mid 80s and is very much a 'cottage industry' product. No trade name is given for the manufacturer and it seems to owe a lot to the style of Andrew Moorhouse's kits of that time, particularly his 'Puffin', though crudely

done. The plans were lettered freehand and contain the kind of spelling that social media would later revel in. Even the 'printwood' balsa components appear drawn on with a felt pen.

Does anyone remember 'Old Dusty'? Did anyone build one? Was it ever reviewed? We've yet more downloads to give away, so if you fancy the Neutron or Old Dusty, or both, I'll send them to your inbox by return.



Another of Peter Fisher's distinctive Performance Kits designs brought back to life by Simon Rogers. The 33" span 'Neutron' towline glider has quirky Fisher styling throughout and features a two piece knock-off wing. It proved to be a very capable flyer, seen in flight over Salisbury Plain

Supermarket Soarer

Finally, I must thank Rob Simmonds for making us aware of another RTF model product that's shifting units beyond model outlets. Rob reports that a nice EPP foamie called the Playtive 'XL Glider' is available from some branches of the Lidl supermarket chain for £8.99 in the UK.

At 86 cm/34" span, it's large for a 'toy' type model and is quite attractively styled. As sold, it's for F/F (I've threatened to put a towhook on Rob's model next time we meet and see if it thermals. Get that address label stuck on, Rob!), but it's already proving a very popular subject for R/C conversion. A quick look on YouTube shows examples being slope soared and aerotowed.

Still with the supermarket theme, one of the leading discount chains is building a store in our little town, due to open in October. I couldn't help but reflect that on the exact spot where the building's steel frame has suddenly shot up, just a couple of years ago, I was flying a 3D electric aerobatic model. As the wise old locals say: "I can remember when it were all fields round here!"

Contributions, please to The Sport Channel c/o the Traplet Publications address. All -mail correspondence to: gray_rcmag@hotmail.com **RCMW**



Unexpected item in the bagging area! The Playtive 'XL Glider' is available from some Lidl supermarkets. 34" wingspan, moulded in EPP, the model is sold for F/F but it's already proving popular for R/C conversion (Photo by Nick and Robert Simmonds - now that's what I call a spot-landing!)

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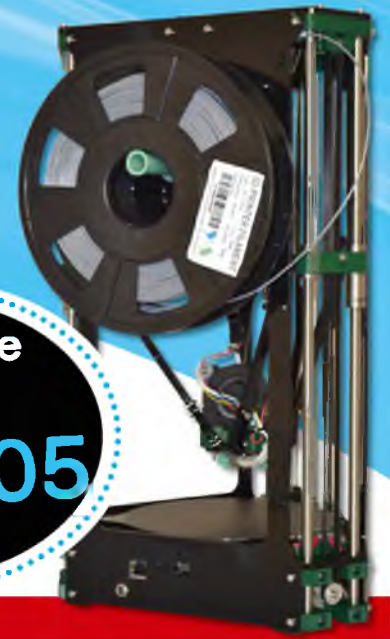
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**DON'T MISS
OUR SEPTEMBER
2017 ISSUE!**



Combat Fokker



Print Your Own Wheels!

First featured in Greg Thompson's 'Dogfighting Down Under' feature in the December 2016 issue of RC Model World, here's your chance to build your very own Combat Fokker! Greg's well thought out design is specially designed to absorb lots of punishment during combat flights, so it's a good choice if you are looking for a sturdy but scale looking aeroplane. This, our latest Fokker D.VII plan is to 1:8 scale, giving it a 43 inch wingspan. Oz combat rules dictate the use of a .25 cu.in. two-stroke glow engine but Greg's own (non-combat!) model is fitted with a Saito FA-45 four stroke. He also provides details of an electric conversion to suit the many modellers who prefer this type of power-plant.

Many modellers are discovering the delights of owning their own 3D printer. Anthony Bennett has recently joined their ranks and he came up with a novel idea when thinking up projects for his new piece of tech – 3D printed spoked wheels! Sounds crazy, but it works, at least for the lightweight foam models that Anthony enjoys building. Join him as he reveals the processes involved.

SEPTEMBER 2017 ISSUE ON SALE THURSDAY 17TH AUGUST 2017



Summer Showtime!

It's that time of year again and the first of the summer model airshows have been and gone. In a 'Flight Lines' compilation special we take a look at some of the models and flying action seen at the Long Marston, Weston Park and Wings & Wheels shows.

PLUS...

More features, columns and reviews from across the complete spectrum of the R/C model-flying hobby

*All contents are subject to change without notice

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Motor, ESC and 4 x Micro Servos
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BY
CHRIS FOSS



Motor, ESC & Servos Included

Wooden Airframe

Part No: A-CF010
SSP: £109.99

The saying 'Good things come in small packages' perfectly describes the Mini Wot4 ARTF. The Wot4 design is well established as one of the worlds favourite RC aircraft and in this 670mm wingspan parkflyer size it lives up to the reputation of the Chris Foss name.

The electronics package includes an outrunner brushless motor, 10A brushless ESC and four micro servos. To complete the model you need only add a suitable 650-800mAh 2S battery and micro receiver. The main structure is pre-built from lightweight balsa/ply and covered in iron on film. The kit includes a moulded cowling and a comprehensive hardware pack that contains lightweight wheels, aluminium undercarriage, pushrods and horns, together with full colour step-by-step instructions guiding you through the assembly.

Specification:

Wingspan: 670mm (26.4")
Length: 570mm (22.4")
Weight: 710g (25 oz.)
Radio System: 4-5 Channel (Required)
Servos: 4 x Micro (Included)
Electric Motor: 1510 Brushless (Included)
ESC: 10A Brushless (Included)
LiPo: 2S1P 7.4V 650-800mAh (Required)



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