
Radio Controlled
Soaring Digest
July 2022
Vol. 37, No. 7

The New RC Soaring Digest

July, 2022
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Click on any row to go directly to that article.

In The Air

The busy flight-line at the SkyPark's World RC Soaring Festival near Lake Arrowhead, California on June 25–26, 2022. A full photo essay (see Resources, below) of this impressive event is in this issue. (credit: ©2022 SkyPark at Santa's Village, all rights reserved.)

Let's help those who have had the courage to turn their passion into their profession.

Recently, I received an interesting letter from a gentlemen by the name of Jim Ealy, who some of you may know by his nom-de-plume of AstroJeff. For those of you who don't know Jim — I didn't — he is the proprietor of the *Vintage Sailplaner* website (see *Resources*, below, for link). Jim describes himself as a "radio control soaring consultant". Heck, if I had known that was a job, I could have avoided a couple of decades doing jobs which are way less interesting than that.

In any event, amongst Jim's many accomplishments is the production of a wide range of beautiful vintage glider plans in a variety of scales. Amongst the types you'll find in Jim's collection are the *Woodstock*, *Horten III*, *Rhonbussard* and a *Tandem Tudor* amongst many others.

His output is breathtaking, to say the least. At this point if not Jim, then maybe Jim's work is ringing a bell — perhaps you have even built one of his designs. The drawings are beautiful. Certainly good enough to hang on the shop wall for purely aesthetic reasons. And the price? Seems like he's practically giving them way — *but not quite*.

However, the reason Jim got in touch with our offices was, candidly, a little less pleasant. Turns out that Jim's plans are out there for sale on websites **other than his own**. In a particularly brazen example I was able to research and confirm, Jim's title block on his plans has been unceremoniously covered up with somebody else's in what appears to be an attempt to pass off Jim's work as their own. I found that shocking, I must admit.

Then there is the story our own James Hammond who, when he's not writing great articles for this humble journal, runs *Aeroic Composites*. In a somewhat similar case, albeit at the other end of the technology spectrum, James has found that somebody is knocking off his designs and selling them at a steep discount. The unauthorised copies of James' aircraft are sub-standard to put it mildly. Not only is this entirely unethical, the speed and weight of these aircraft makes their failure potentially lethal to those unfortunate enough to be standing below it they unexpected disintegrate when knifing through a zillion G turn.

What brings these two anecdotes together in my mind is that likely neither would have occurred if there wasn't **a ready market for cheap stuff**.

There, I said it.

In other words, a market which doesn't think too much about the impact of the sale not made from the real creator of the product. If, in fact, that market is even aware the firm from which they're buying is not actually said creator. Or care, that much, because it's just *such* a good deal.

Like many bootlegs, it’s not their creation which forms a natural impediment to their proliferation. The opposite, in fact, as creating the knock-off is a piece of cake these days. Pretty darn good ones, in fact, at least superficially. However, if there is no one to sell them to — well, that’s a tougher nut to crack for the would be knocker-offer.

I’m not naïve: writing a few lines in the New RCSD is not going to put paid to the grey/black market for these kinds of products. But what I will say is that it only takes a small amount of effort on your part to ensure that when you put down your hard-earned money for your latest project, that then becomes the hard-earned money of the Jim or James with whom you are dealing. Simply take the time to ask — *do the due diligence!*— to ensure it’s a legitimate sale and the right people are being properly compensated.

If nothing else, think of it as lending a helping hand to those with the courage to give entrepreneurship a try. In such a small (actually it’s *microscopic*) and highly specialised market such as ours, these mavericks have chosen a pretty hard row to hoe. Let’s try making it just a little easier for them. After all, they are churning out some pretty great stuff for all of us.

Barring that, do it because — like my dear departed Dad often said to me — “it’s simply the right thing to do.”

And Without Further Ado

The reason that this month’s issue was actually a day or two late is that we have an absolutely bumper crop of articles this month — the New RCSD’s biggest so far! We think there is truly something for everybody. So I had best just get out of the way, let you click the link at the bottom and have at it.

Until next month, fair winds and blue skies.

Resources

- *The Vintage Sailplaner* — This is where Jim Ealy's exceptional designs can be obtained, completely on the up-and-up. Accept no substitutes!
- *Aeroic Composites* on Facebook — From their *About* page: "Aeroic is dedicated to designing, manufacture and supplying some of the best flying Model Sailplanes in the world…"
- *SkyPark's World RC Soaring Festival* — A photo essay from this spectacularly successful event held this past weekend at SkyPark near Lake Arrowhead, California.

Cover photo*: We have had a number of photographic contributors who have been 'repeat offenders', getting their photos featured on the RCSD cover more than once. Our friend Kevin Newton is now amongst that* ***very*** *exclusive club. In the unique photo which graces July, Kevin managed to get his drone to capture Peter Gunning hurling his* Freestyler 6 *into the wild blue. Kevin and Peter were on their annual, early season outing to La Muela, Spain, when this amazing photo was captured. You are welcome to download the July cover in a resolution suitable for computer monitor wallpaper (****2560x1440****).*

Disclaimer*: While all reasonable care is taken in the preparation of the contents of the New RC Soaring Digest, the publishers are not legally responsible for errors in its contents or for any loss arising from such errors, including loss resulting from the negligence of our staff. Reliance placed upon the contents of the New RC Soaring Digest is solely at the readers' own risk.*

Here's the ***first article*** *in the July, 2022 issue. Or go to the* ***table of contents*** *for all the other great articles. A PDF version of this edition of* In The Air*, or the entire issue, is available* ***upon request****.*

Unlisted

Stratodynamics Wins Prestigious Upper Airspace Traffic Management Award

The out-of-this-world, wing-side view from HiDRON™ at 27 kilometres up. (credit: Statodynamics)

Along with collaborator UAVOS Inc., this aerospace innovator takes home top honours.

STAMFORD, LINCOLNSHIRE, UK, June 22, 2022 —*Air Traffic Management* magazine just announced the winners of their recently concluded *ATM Awards*. Amongst winners in a variety of categories, Stratodynamics Inc. along with their collaborator UAVOS Inc. took first place honours in the *Upper Airspace* category, intended for "new aircraft, new traffic management requirements [and] new ways of working" in the upper atmosphere.

From the New RCSD article *Like Soaring on Mars* in the July, 2021 issue: "Stratodynamics' HiDRON™ high altitude research platform likely has achieved a new 'high bar' for great places to start a great flight — how about 30km (98,000ft) above the New Mexico desert, as was the case on June 6th, 2021. Five hours after being released from its weather balloon launch vehicle, HiDRON™ landed safely at Spaceport America, located at Truth or Consequences, New Mexico…"

Of particular note to New RCSD readers is that HiDRON™ is based on "a Simitri F5J main wing with a customized fuselage and empennage, designed to improve stability in low Reynolds number conditions", said Stratodynamics CEO Gary Pundsack.

When questioned about the nature of their winning entry, Stratodynamics Vice-president of Business Development and Marketing Nick Craine told the New RCSD: "We're so proud of out team's accomplishments over the last 12 months. In the case of this particular campaign, we were able to demonstrate fully controlled flight over 300 mph at 28 km (91,860 ft) which is about 7000 ft higher than a Blackbird SR-71. We're ever grateful to the crew at Spaceport America, our collaborators at UAVOS for their incredible autopilot as well as our balloon handlers from New Mexico State University whose assistance helped the University of Kentucky achieve its high altitude goals".

The New RC Soaring Digest will continue to track this pioneering project and will bring further developments to readers just as soon as they are available.

SkyPark’s World RC Soaring Festival

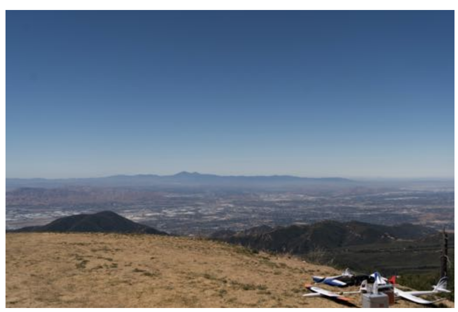
A photo essay from this spectacularly successful event held this past weekend at SkyPark near Lake Arrowhead, California.

This was the second event held at the brand new, purpose-built alpine soaring venue located 5000 feet above the valley floor at the renowned *SkyPark at Santa’s Village*. It’s less than three hours drive from LAX near beautiful Lake Arrowhead, California. We had 38 pilots and planes in attendance for the event and we were blessed by two days of unbelievable weather.

The *SkyPark* is an ‘alpine lift’ event, which means that staying aloft is based predominantly on thermals coming up from the valley floor below. And most everybody that flew ‘skyed out’ with the gigantic thermals.

Notably, Ed Stewart won the spot landing contest with a plane that really shouldn’t be doing spot landings because how fragile it is — yet he pulled it off like a champ.

Now, for those of you who know me, I'm a man of few (written) words, so I'll simply let these beautiful pictures — provided by the PR folks at *SkyPark at Santa's Village* — tell the rest of the story of this remarkable weekend. Click any picture for a larger, higher resolution version.



(video credit: Karlton Spindle | soundtrack credit: Cheel/YouTube)

And yes, there will be a *SkyPark World RC Soaring Festival* in 2023! Keep an eye on *New RC Soaring Digest Events* (see below) for the 'save that date' as soon as it's available.

Letters to the Editor

There's just one new stamp in our montage this month. Can you spot it?

Reader feedback done up old school.

Triggered Memories of California, 1989

A recent RCSD tweet reminded me about a trip I made to California in 1989! I flew at Torrey Pines with this plane. This photo was taken in the Santa Ynez mountains inland from Santa Barbara.

I still fly this glider. It is a thing I designed called Swalleau. 2- or 2.5M span, foam and epoxy glassed veneer wing. Balsa, glass and 1/64 ply laminated fuselage sides and an all moving tail. I epoxy/glass clothed the flying surfaces after the trip to America.

Funny thing is: last time I flew it someone with a moulded sport plane went, I remember thinking “crikey , that is fast!” as it zipped past his plane whilst I was having a bit of a hoon. It has a RG12 wing and I was lucky enough to spend some time with Rolf Girsberger and even before we spent time discussing airfoils I’d fitted underside trips and extracted good performance from the plane.

It was interesting flying TP back then. It was pretty light winds and most people were flying built up floaty things. I wonder what they made of this odd English bloke rocking up!?!?

And 29 years later it is still being flown. Plug in tip panels required as it was really light lift. Most people on Menez Hom were flying F5J things.

Went to one of the Brittany VTPR sites but it was so light I didn't fancy the risk. Although not VTPR Madstab enabled it is a very aerobatic glider. Next gen will be modernised.

Kind regards,
Iain Medley-Rose

Iain — there is nothing I like more than a treasured memory triggered by something we've put out there. What a great story of a long-lived airframe. Keep 'em coming, it's always great to hear from you, and thank you so much for sending it in. — Ed.

Send your letter via email to NewRCSoaringDigest@gmail.com with the subject 'Letter to the Editor'. We are not obliged to publish any letter we receive and we reserve the right to edit your letter as we see fit to make it suitable for publication. We do not publish letters where the real identity of the author cannot be clearly established.

Read the next article in this issue, return to the previous article in this issue or go to the table of contents. A PDF version of this article, or the entire issue, is available upon request.

Unlisted

The Slingsby King Kite

The quarter scale Slingsby King Kite, at rest (credit: Raymond Esveldt)

Part I: Recreating Fred Slingsby's Star-crossed Design in Quarter Scale

This is the first part of a six part series. See the Resources *section below for links to Vincent's other magnificent projects previously featured in the pages of the New RCSD.*

Winter was near and I got that building itch again. What to build this time?

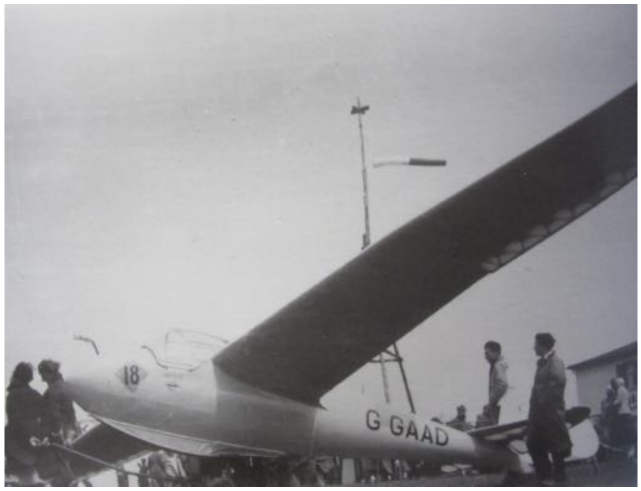
First, I like to refer to the Slingsby *Gull* that I built before and wrote about here in the New RCSD. It turned out to be a bit heavier than expected and maybe partly due to the choice of airfoil, the flying characteristics were a bit disappointing. For slopes this is not a problem, but I fly mostly on a flat field and then this is a pity. A lighter plane with a better airfoil would be nicer.

Whilst building the Slingsby *Gull,* a friend lent me the book *Slingsby Sailplanes* by Martin Simons, writing about the development of all of

Fred Slingsby’s gliders. There was a wonderful story about the Slingsby *King Kite T-9*.

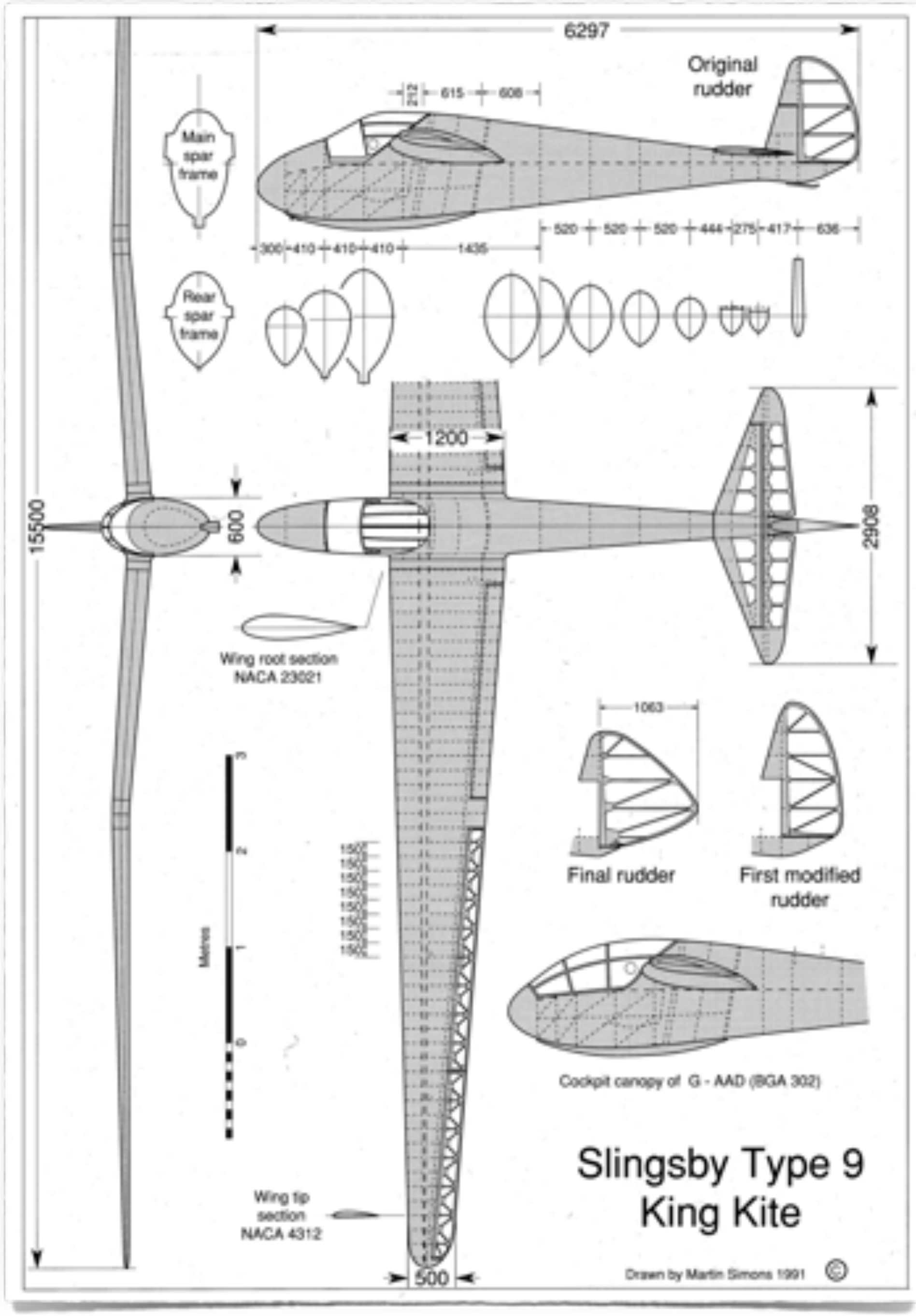
The Slingsby King Kite at the Wasserkuppe. (credit: ‘Slingsby Sailplanes’ by Martin Simons)

This was an innovative design from 1936/37 meant to participate in a major international competition at the Wasserkuppe in July 1937. It was expected at the time that gliding would become an Olympic sport. So this glider was equipped with flaps and built to fly fast. Because there was little time three (!) prototypes were built simultaneously. During the test flights, the aircraft unfortunately turned out to be extremely sensitive to spins. As an emergency measure, all kinds of enlarged vertical stabilizers were built. With such an enlarged vertical stabilizer it finally flew and did reasonably well. Afterwards it turned out that there was an error in the building of the wings. What went wrong never became completely clear, but what I understand is that the wing twisting was not well built (in all three!) and that the centre of gravity was quite far back. It is a wonderful story: *Slingsby — The Rise and Fall,* can be found on the Scale Scoaring UK website which is linked in *Resources* below.



Additional photos of the Slingsby King Kite at the Wasserkuppe. (credit: 'Slingsby Sailplanes' by Martin Simons)

Because this glider was sheeted with plywood (which I like), was innovative and had good flying possibilities, I decided to build it in quarter scale. The wingspan would then be 3875mm and I hoped to keep the weight below 4.4kg, that is the original weight, 280kg divided by 64 (4 x 4 x 4) = 4.4kg.



(credit: 'Slingsby Sailplanes' by Martin Simons)

The Wing Connector

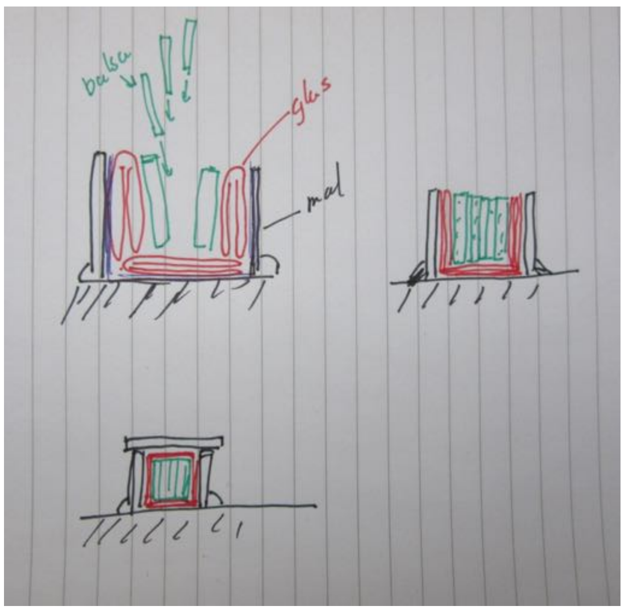
I grew up with pencil and drawing board and now I wanted to draw this glider digitally. I bought the drawing programs *devWing* and *DevFus* (see *Resources*)and it took me quite some time to learn to work with them. Gradually I managed to do useful things, often with some frustration, but in the end with a lot of satisfaction. Moreover I was unsure about a couple of things; the wing connector, the hinges of the control surfaces, the glueing technique and how to keep the weight as low as possible.

First the wing connector. After breaking the round carbon 8mm wing joiner (originally a steel pin was planned) of my *Nemere* 1/6, 330cm span along with some warnings on the Retroplane forum, I had my reservations about round carbon wing joiners.

> An aside: what I may have overlooked was that putting a wing joiner in rigid tubes in the fuselage and wing introduces stress points. A steel wing pin is unfortunately quite heavy. And then there's the V-shaped arrangement in the middle part of the gull wing, which makes it impossible to insert a long straight joiner, especially with a somewhat thinner profile.

Fortunately, on the Dutch modelling forum (and on the Retroplane forum) I came across an Excel spreadsheet with spar and wing joiner calculations: *Calcul d'un Longeron (Dédié Structure Bois)* which I have linked in *Resources*, below. That was convenient, because being brought up with kilogram, later newton and finally millipascal units, I was afraid to make a mistake of a factor ten or so. With this programme I could safely calculate the wing spar and also a wing joiner.

I realized that if I made a wing joiner of unidirectional (UD) glass/epoxy myself, I could make it with dihedral built in. This means, moreover, that the wing joiner could be held in place solely by the reinforced skin of the fuselage, a tube being impossible because of the built-in V. I bought 20x20mm square aluminum tube which should fit nicely between the 20x4mm upper and lower girder of the main spar. Now I had to make a 17x17mm square glass rod so it would fit into this square tube. I decided to try and make that first. From spruce battens and a boardcovered with packing tape to get a non-stick surface and glued together with hot glue, I made a simple mold.



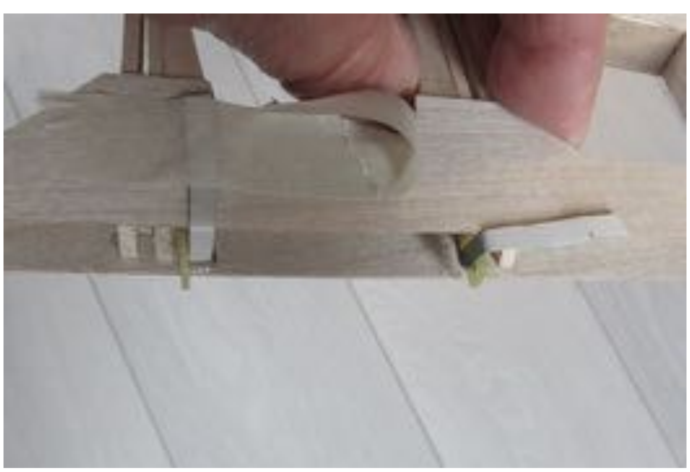
Left: Preparation for lamination, UD glass tape in the foreground, mould behind it. | Right: Sketch of the joiner construction.

Ready to release from the mould.

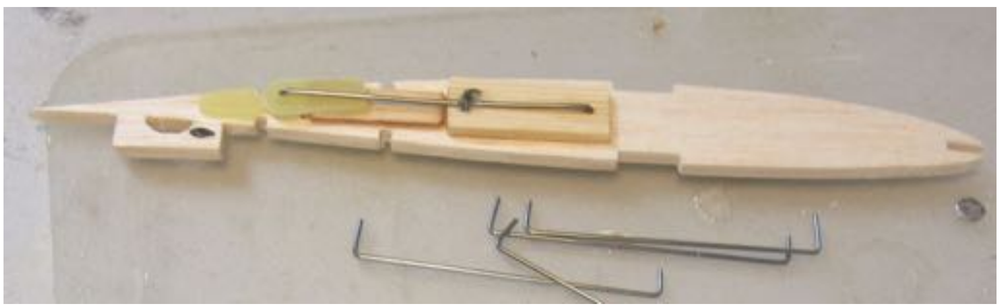
I took four pieces of UD 600g/m² glass tape, 7.5cm wide, impregnated that with epoxy, folded it lengthwise twice double (four layers thick, total) and placed it on the bottom of the mold. And after that the two upright sides in a similar way. In between those upright impregnated tapes, I first put 2mm balsa strips of 11mm, each against one side and then I put 1mm balsa strips between the other balsa strips to get the impregnated glass in place without touching it and surely make a mess of it. Thereafter, the last layer of glass on it, and closed it with a batten wrapped in tape to get a flat surface. After the resin had set I had a square glass/epoxy 'tube' with a balsa core. The wall thickness turned out to be more than 4mm, making the joiner much stronger than the wing spar. It should be able to resist 27G according to the *Calcul d'un Longeron* spreadsheet. The weight of this joiner is 168g, 60cm long. I was glad with this experiment and now could go on planning the glider.

Hinges

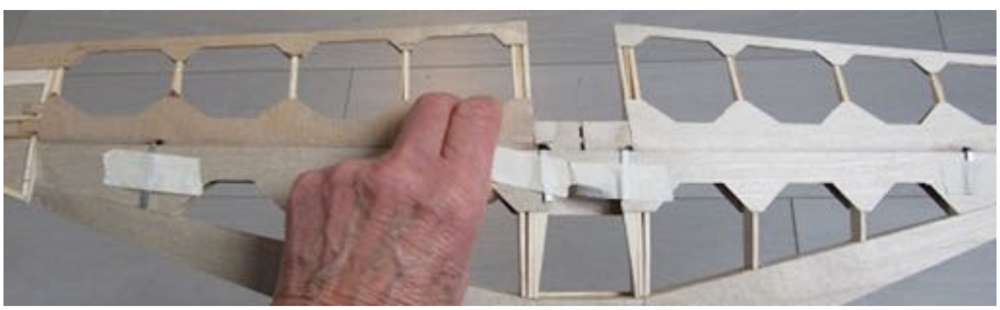
The next problem: all horizontal steering surfaces are 'locked in'. Because of the planform they cannot slide sideways on hinge pins and I wanted them to be removable. I solved that with hinge pins which were sprung. I made strips of 1mm epoxy plate and drilled 1mm holes in one end. To compensate for the thickness of the epoxy sheet, I glued a piece of spruce to the fixed part of a rib and then attached the epoxy strips. From 1mm steel wire I bent a long hinge pin, so it could spring. If lifted with a screwdriver, the hinge is released. If I take the screwdriver out again, the hinge pin will click into the hole.



Left: A ‘disconnected’ hinge. | Right: The unlocking tool, a strip, turned a quarter turn and ready to be removed. The elevator should then be in the extreme position.



Rib with glued-on hinge and springy hinge pin.



Stabiliser with all hinges unlocked.

Coming up in Part II of *The Slingsby King Kite* in next month’s issue, I move on to further construction details of the empennage. For now, thank you for reading and if you have any questions, please leave them in the *Responses* section below and I will do my best to answer them.

Orcrist | A 2.5m VTPR Glider

Maiden flight at Thurnham Castle, Kent.

Part III: It's a (vinyl) wrap and maiden flights.

Readers may want to familiarise themselves with the first and second parts of this series before continuing with this follow up article. Also, click any picture in any RCSD story for a higher resolution image. — Ed.

Just the Tip


Wing tips joined and shaped. Surfaces cut and capped.

At the end of the last episode, I had a set of wings that joined the fuselage and that was about it. They still needed work on the tips, servo pockets, control surfaces cutting and hinging before any thought of flying could be considered.

The wing panels were cut oversized from stock slabs of foam, so the first job was to trim the tips down to the required span, as per plan. Additionally, the plan shows a balsa tip giving a bit of tip protection and providing a bit of span beyond the end of the aileron tips.

The wing panels are a veneered foam construction and the trailing edge surfaces are cut from the same panel, then hinged with one of the usual ways — in my case, I've bottom hinged with tape.

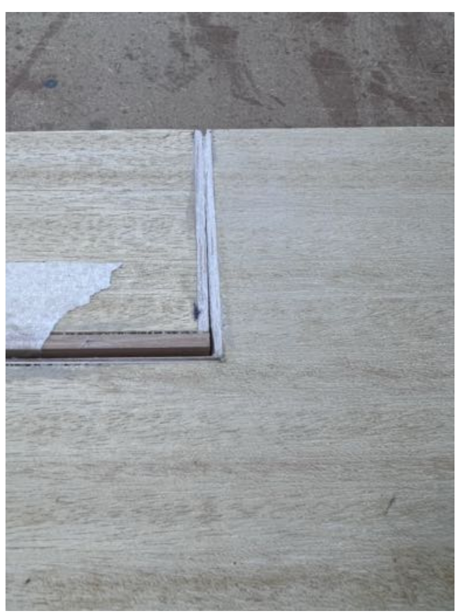
> I chose a bottom hinge for both aileron and flap (as opposed to a more traditional bottom flap hinge / top aileron hinge) to allow for mixing both together to form a single aileron in certain flight modes, whilst still allowing a significant flap travel.

The dimensions of the surfaces were carefully transferred to the panel and then cut with the bandsaw, ensuring symmetry between both wings and allowing for a gap for upward travel, rather than a vertical cut. Once separated, the two edges were planed back to allow for a hardwood facing to be added, giving a little more rigidity and allowing for the gap to be planed to exact dimensions. A similar process was applied to the inner and outer tips of each surface and the panels where they were cut chordwise, these were capped with balsa.

Lastly, a block of balsa was glued to each tip with Gorilla / PU glue and then rough trimmed to shape using the bandsaw.

Once cured, the tips, hardwood false spars and balsa caps were trimmed, planed and sanded to profile, resulting in a nice tidy wing plan, tight panel gaps and straight hinge lines, ready for covering.

Hardwood false spars, balsa caps and the balsa block tips in place, ready to trim.



Tips planed and sanded to shape, nice tight panel gaps.

Plan form looks right (n.b. a later photo with the servo wires in place)

Servos

The wing is a four servo ‘full house’ wing with servo operated flaps and ailerons embedded in the wing panel.

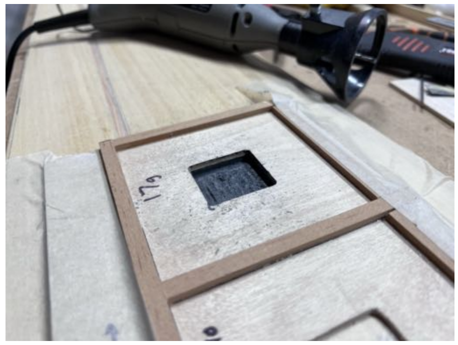
Servo fitted and cover cut to shape.

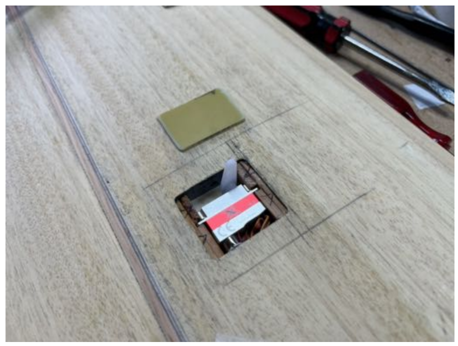
You may recall from earlier episodes, there is reinforcement for the servo pockets inside the wing skins, so it was important to cut pockets accurately, where the reinforcement was. The locations were transferred from plan, taking into account the location of the spar (don't want to cut that!), but also ensuring there was enough depth of the servos too. Originally, I had planned to use some Savox 12g servos I had on the shelf from an earlier project, but in the end I went with new KST HS08Bs (thanks HyperFlight, link in *Resources* below) as I plan to run on high voltage 2S LiPo for power.

Servo thoughts, Savox out, KST in. Pocket locations transferred to the panel.

Using the best tool ever (Dremel) and my pocket router jig (see *Resources*, below), routing out the pockets was a straightforward process with care being needed to make sure I didn't go too deep.

The pockets were lined with thin ply on the bottom to spread forces across a larger area, rather than direct to the foam and the fore and aft walls were lined with hardwood. More hardwood was used to create a notched frame for the servos to sit in, forming part of the mounting. The careful attention to depth meant these servo frames were perfectly aligned with the upper surface of the servo and rebated *just* enough to cap with a 1.6mm composite board. The board was screwed to the hardwood ensuring a snug, slop free servo mounting.





Route out, slot in, fix down.

Wiring Harness

Servo mounts fettled, the next challenge was to run the servo cables. In hindsight, I could have done this before I skinned the wings, or at least run the channels first. Anyway, a long length of music wire with a slightly roughened tip made its way through the foam slowly but surely by hand from the root to the 1st servo pocket. Easy! Well, yes but the second step from the first pocket to the second was less straightforward.

At the root, there's plenty of thickness to 'get it wrong' without causing a catastrophe (or minor annoyance). But as the span increases, the thickness decreases and the length of the cable run nears two-to-three times the initial length. This causes issues with drag on the music wire (it's hard to twist and push), makes alignment tricky — you have no way to **know** where the tip is, either chordwise or vertically.

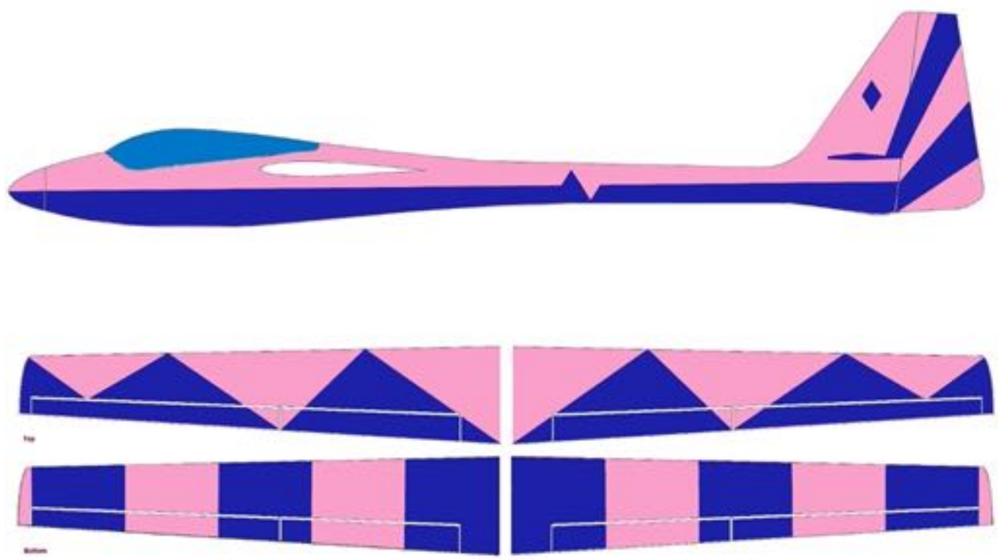
In the end, I used a drill to rotate the music wire (slowly) and ensured I started with a straight rod, lined up as best I could. Fortunately, I managed to reach the 2nd pocket without hitting the wing skins, twice!

A 40" music wire drill bit…

With the cable runs drilled, the next task was to open up the channels to a size big enough to run servo wire through. A carbon rod with sand paper taped to the tip managed this easily. It followed the pilot holes created by the music wire and with the drill used to rotate it. They opened up nicely.

It’s a Wrap!

I had planned to cover the *Orcrist* using sign writing vinyl from the outset but now the decision on the design of the covering became more pressing. The glider is a bit ‘non traditional’, so a plane white glider wasn’t really on the cards. A few iterations were played with anchored to a basic two-tone livery. In the end I went for a pink and blue scheme, creating a bit of a talking point, but also offering high contrast for visibility.



A visual mock-up of the design

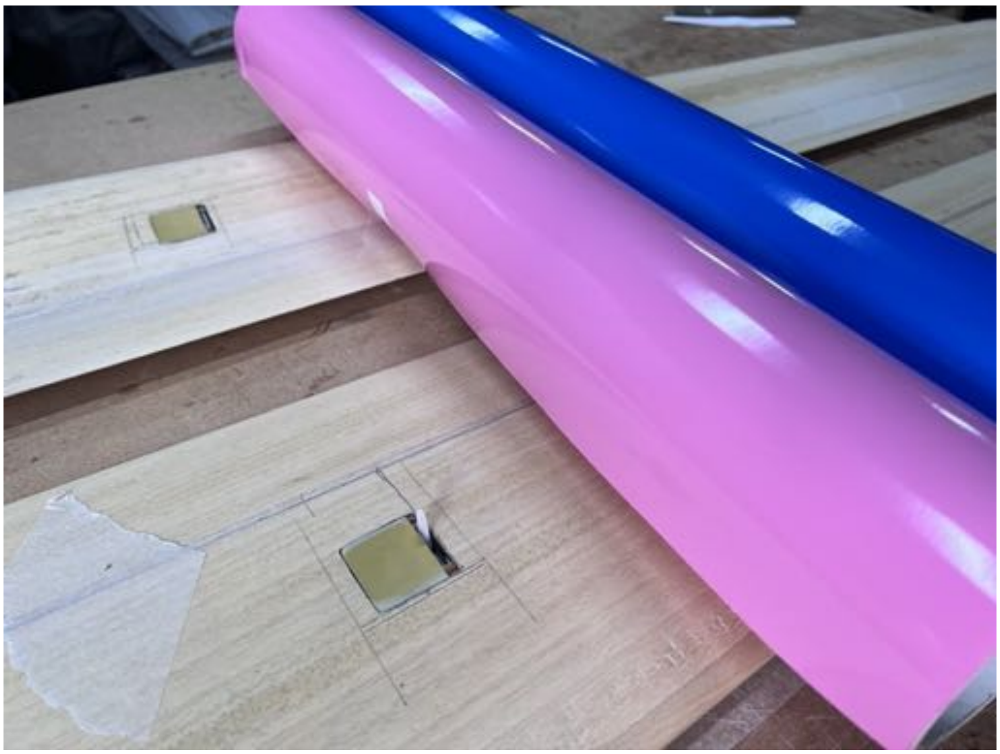
I’ve used vinyl for wing coverings previously and like the way it can “mask” some minor surface blemishes where traditional coverings might not. It also offers a huge range of colour options too. My vinyl came from a UK based wholesaler called Metamark (see *Resources*, below).

There are **many** YouTube videos on working with vinyl, especially for ‘wrapping’ cars. The basics are:

- Clean the surface your sticking too — no dust!
- Use a new, sharp blade!

- Work from the smallest / tightest curves to the largest areas (you can stretch / expand if needed, but not shrink)
- Use (gentle) heat to help form round curves / to bond the adhesive
- Work away from you / towards the edge (smoothing towards you will cause a ripple)

I use a paint stripping heat gun, but that's **very** harsh and care needs to be taken not to either cook the vinyl (it will tear and shrivel) or damage what's underneath. I suspect a hair drier might work too, although I've not tried that.



Ready to start covering the wings.

A section of vinyl was cut with a good excess around the edges to cover one surface. I used the pink as the base colour. Working from the tip, the vinyl backing was removed in small amounts as I worked my way up the wing.

The high contrast pattern under the wings

Once the full length was covered, the tips and leading/trailing edges were gently heated and stretched round, ensuring the stretch wasn't too big, so as to preserve the colour (but eliminating any ripples) and then trimmed.

For the underside, square sections were carefully cut and stuck in to place, creating a high contrast pattern.

Video presented in slow motion in order to reveal detail.

Fuselage Covering

Covering the fuselage was a slightly more tricky endeavour. I initially tried to use a single section of a colour on the bottom section, but my vinyl wrangling just wasn't quite up to it. Undeterred I removed it (gentle heat to weaken the adhesive). I tried again but this time aiming to cover a quarter not half the area. The result was much better, although there's a very fine join line. You'd struggle to see it! The horizontal edge where the colour changes was achieved by using the factory edge from the vinyl roll. The neat factory edge was lined up and then held in place with masking tape while the remaining areas were stuck down, forming a datum. The next colour was then lined up (again with the factory roll edge), butt-jointed to the previous.

The tail was covered in the same way, but separately to the fuselage; it was just too tricky to deal with such large sections of vinyl and all those contours!

A few design details and flourishes were added and the result is a nice straight joint with no overlap or 'wobble'.

Some flourishes

Covering completed

Hinge the Surfaces

With the wings and control surfaces covered, the surfaces were hinged using Blenderm tape, first the inside of the hinge, then the outer surface. If you do it the other way, you may/will find the tape restricts a little bit of travel.

> Another thing I do is to run the tape in sections per surface, *not* overlapping. That way, if on section fails in flight, the tear shouldn't (I hope) tear the full span of the hinge.

Tape hinge the control surfaces after covering.

With both surfaces hinged, the full span of both **should** travel together smoothly. Mine did!

Checking alignment on the full span.

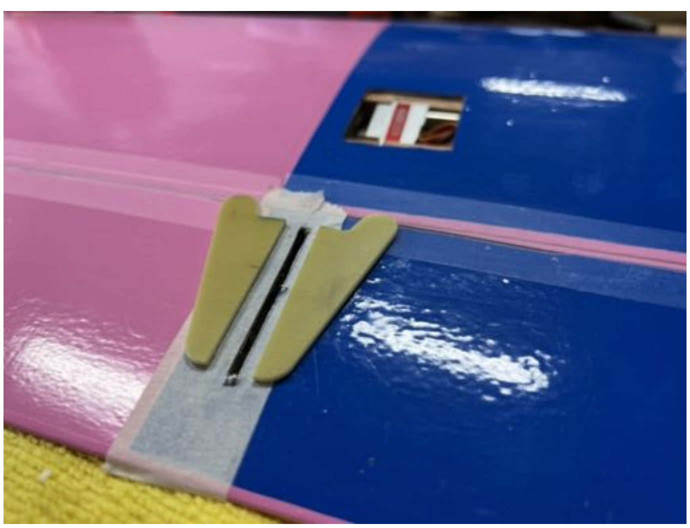
Control Horns

This is a scratch build, so it seems appropriate that the control horns are scratch-built too (like the rudder and all moving tail). Following similar principles, I used 1.6mm composite board to fashion four matching horns on the bandsaw and hand file:

Four matching control horns.

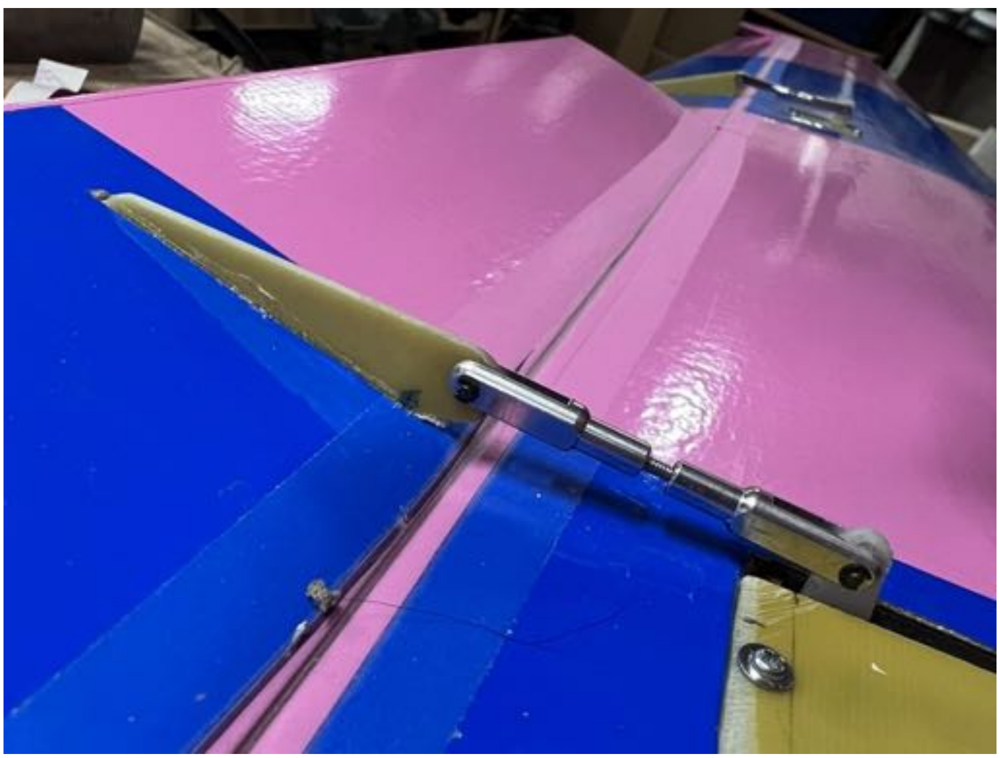
The control horns were rebated into the surfaces, aligned with the servo arms. Care was taken to insure there was sufficient clearance for full flap travel (near 90 degrees) whilst giving the servo the best leverage versus the hinge.

Once happy with the dry fit, they were glued into place with PU glue. Note the masking tape to protect from any foam creep.



Slot for the horn, full flap travel.

Finally, with the hinges and horns in place, the control arms were made to size using MP Jet (see *Resources*) machined clevises and M2 steel rod.



MP Jet clevises, homemade horns (and a dog hair.. doh!)

Time Flies (And So Does the Orcrist!)

Work and weather combined to stretch the build and maiden flights well into the British summer flying season. I was being quite picky about the wind conditions for its first flight, given the almost symmetrical wing and the slightly over eight build. I picked a day with a forecast wind of 12–18 mph and a hill with a nice big landing area on top, few trees and perhaps most importantly, options to land on the slope too — just in case.

The first flight was from Thurnham Castle in Kent on a gloriously sunny day with a nice southwest breeze. After a few minutes confirming I had control while it flew in my hand, a firm chuck resulted in the glider soaring away, climbing a little and only needing a couple of clicks of trim. The 'bale out' space ahead was not required and gradually a 'feel' for the basic flight controls was gained. I didn't push the envelope, but there was plenty of authority in pitch and role. A few minutes of floating around confirmed the wing was not particularly good at lift generation, but it was stable in turns and as an airframe, it could penetrate too. All promising signs for its intended purpose: aerobatics in proximity to the edge of the ridge. Alas, Thurnham is not the ideal slope for that type of flight — the ridge has a nice rounded crest, no sharp incline or lip to create a strong up draft, but ideal for a slope session with a 'normal' glider.

The next maiden was down by the seaside at Beachy Head. As a slope, it's a bit more pronounced in incline, but again, misses the boat slightly due to the bushes near the top. My *Alpina* soared away perfectly — the *Orcrist* struggled to make it beyond the bushes! Next slope!

Maidens 1 (Thurnham) and 2 (Beachy Head). Overhead Thurnham.

Lessons Learned And Thoughts

I've enjoyed the build — so no issues there. I've not built much before (just the normal kits where you fit servos or cover a few things) and certainly not from scratch. I've therefore learned a few things along the way:

- Build lighter. I have a tendency to overengineer things. The tail could be much lighter and I may strip off the tail skin and lighten the balsa underneath.
- Build lighter **still**! The wings are overengineered: the spar could be half the thickness. The epoxy soaked into the veneer, I will use a different glue next time and I'm not sure I needed to glass them either!
- Cut / route the servo wire channels before skinning the wings — it will save time and reduce risk!

Talking of wings, the resulting panels were a little thinner than the plan versions. talking with 'those who know' they have suggested a cooler cutting wire; the suspicion was I had the wire a bit hot and the resulting kerf was a bit more than expected. This, coupled with using veneer instead of balsa sheeting resulted in a pair of quite skinny (thin) wings. I will almost certainly make another set and aim for a bit more thickness. (and weight saving).

Thanks for reading this series, and if you have any questions please leave them in the *Responses* section below and I'll do my best to answer them.

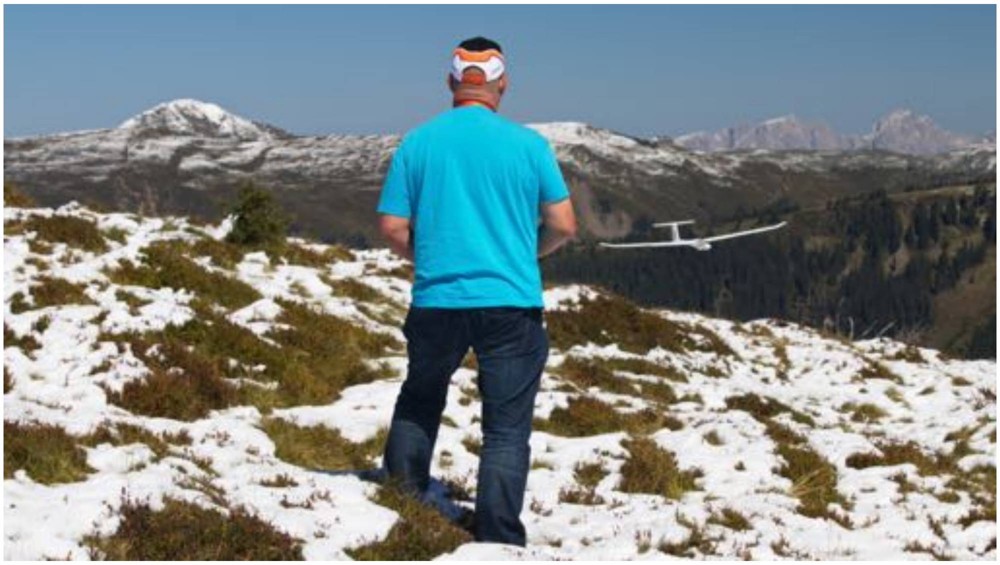
There are no words.

Resources

- *Orcrist | A 2.5m VTPR Glider* — Part I: Picking the design, making plans and getting the build underway.
- *Orcrist | A 2.5m VTPR Glider* — Part II: Building, cutting and skinning the tail and wings.
- *Metamark* — Sign materials & vinyl supplier
- *HyperFlight* — A well known supplier of RC gliding equipment. (ships internationally)
- *MP Jet* — Supplier of excellent, precision engineered RC components. (ships internationally)
- *What a Tool! Servo Templates for Dremel Rotary Tools* — My previous RCSD article where I explain the finer points of routing with Dremel tools.
- *Dark Grey Styrofoam* — The foam is listed as 'styrofoam' with a density of 33kg/m³ (~2 lbs/ft³). They do other colours, but not in the 'large size' sheets — however, it's all the same density.
- *Koto Wood Veneer* — This veneer is very similar to Obechi.
- *25g/m² Ultra Lightweight Close Weave Glass Cloth, 950mm Wide* — I've had both glass and epoxy from this supplier — friendly and quick service. Their epoxy hardener has a slight blue tint which is helpful when mixing which isn't noticeable once cured.
- *EL2 Epoxy Laminating Resin* — I'm using this laminating resin with the 'fast' hardener, pot life 15–20 minutes in my shed at 15C. Cured in ~10 hours (ie. overnight). The cloth samples are handy for odd jobs and repairs where you don't need a meter of material, such as the servo pocket reinforcements.
- *My LHS: Addlestone Model Centre* — A proper model shop with materials, kits, and parts. Don't forget to support *your* LHS (local hobby shop)!
- *Orcrist 2.5m on RCGroups* — The RCGroups thread that proved to be the source of so much valuable information.

All images, videos and drawings by the author. Read the ***next article*** *in this issue, return to the* ***previous article*** *in this issue or go to the* ***table of contents****. A PDF version of this article, or the entire issue, is available* ***upon request****.*

Flying in the Mountains



Keep up the speed!

Dynamic, challenging and fast, but what is it that makes mountain flying so special?

Slope and Thermals

Gliders have two ways of staying aloft. In my country the Netherlands we use almost exclusively thermals. Warm, light air rises and by flying in the rising air you model goes skyward. The other way uses air that is forced upward by sloping terrain, such as hills, mountains or dunes. By flying upwind of the sloping terrain your model can maintain or gain altitude. We Dutchies hardly have any mountains available, just some small slopes on the coastline, but I've been fascinated with mountain flying since the first try. Why is that?

In the Netherlands we just have some dunes for slope flying. No mountains are present.

One of the great things about mountain flying is that both of the above mechanisms are often both present at one location. Close to the mountain you can use the slope wind, further away you can use thermals. Thermal activity is often a lot stronger and more extreme than on flat land. On a south slope the angle of the sun to the ground is better than on a flat meadow. Thermals need time and altitude to develop. At altitude thermals are normally larger, stronger and more stable than close to the ground. Starting your flight on a mountain top you will meet thermals that have been developing for hundreds of meters. The sink between the thermals can also be a lot stronger, so good nerves and faith that rising air will be ahead are sometime necessary. Having a motor in the model can decrease the stress level to more comfortable levels in these conditions.

Weather

Not just the rising air, but also other weather factors can be more extreme in the mountains. The wind at a mountain top can be a lot stronger than in the valley. The uneven terrain can cause severe turbulence. Turbulence is to be expected downwind of obstacles, but can also be present in unexpected places as vortices can travel a long way. By studying your surroundings you can predict a great deal of the turbulence, but do expect surprises. Always keep enough airspeed in your model. During the landing the model is closest to the terrain so more prone to turbulence. It’s best to keep your approach speed above that normally used on flat land.

You may be anxious to get into the air, but don’t forget to stop and smell the flowers along the way.

In many places wind and thermal activity have predictable cycles. Thermals develop later in the day than on flat land, normally only after noon. Thermal activity can generate wind in the valley, this wind has fixed patterns and blows in a predictable direction, sometimes reversing in the late afternoon or evening. Patterns that are known to locals.

If the sun shines, you do catch more UV radiation at higher altitudes, so applying enough sun block and good contrasty sunglasses are a must.

On moist days clouds often hang in the valleys. This creates beautiful sights, but also risks. During the morning the cloud base rises and clouds below may well get to eye level. If wind is blowing up the slope moisture may condense and clouds may appear out of nowhere on your flying spot. If the visibility suddenly deteriorates a very quick landing may be necessary as visibility may drop quickly to mere metres.

Beautiful but tricky conditions. Clouds may rise along the slope and reduce visibility dramatically.

Models

What models do you want to take to the mountains? A general rule: models than can take a bit of beating. An ultralight floater may be nice in the early morning or late evening, but will it handle a landing on a stone covered slope?

EPP flying wings are perfect for trying out new slopes. They are manoeuvrable and can take a rough landing. And if something does go wrong the financial damage is overseeable. For bigger models four-flap wings are favourable. Butterfly control surface deployment is a great help in difficult landing conditions. If a model does not have flaps than spoilers are very nice to have. You often have to land on downsloping terrain or in rising air, without any means for increasing drag landings can be a big challenge.

Foamies are perfect for new or small slopes.

F3B/F3F models are probably the best all around gliders for mountain flying. The have an incredible speed range, can be landed on small fields and do take a beating. I have also flown with DLGs a lot. They fly well until 5BFT wind (that is, a moderate breeze), but are more vulnerable during transport. Big scale models are a true joy to watch in a great mountain scenery, but they do need a bigger landing area that is not always available.

I always have motorized models with me when I go slope flying. On unknown slopes, in unknown conditions or in the morning (before the thermals and the wind pick up) it’s very comfortable to have the certainty that you can always get your model back to eye level. You can fly out into the valley and search for lift without nerves. Sometimes your model can get considerably lower than the starting altitude. Flying a model under eye level does take some getting used to, it’s a very different perspective than flying overhead. With heavier models it’s nice to launch your model with the motor running, decreasing the chance of a stall. Two seconds of running the motor does decrease the risks during the launch a lot.

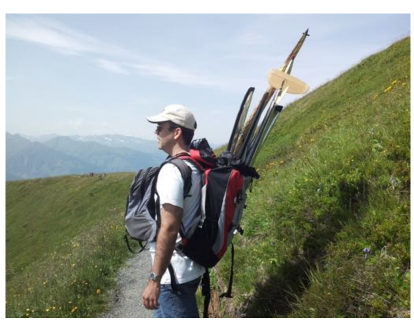
Left: F3B/F3F models can be flown in all conditions. They are the perfect mountain flyers. | Right: Big scale models require some space for landing and are generally more vulnerable.

Left: I usually start with a two second motor run. Call me a sissy, but I think it's safer. | Right: A DLG can be a lot fun in the mountains.

Transport

If you're lucky you can park your car right next to the flying spot, but often a hike is involved. A large trekking packpack or a snowboard bag can be used, but you can also buy specialized model airplane backpacks that fit gliders of various sizes. If a long hike is needed to get to a flying spot than gliders up to 2.5m are the best choice. The extra weight and discomfort then stay within limits. For shorter hikes larger planes can be taken. On some mountains you need to take the ski lift. It can be a challenge to load all your stuff into the lift car in time before the doors close! Try to carry as little loose stuff as possible.

A nice hike to a flying spot can be very enjoyable, see it as part of the total experience. I find that flying on a desolate spot after a hike with beautiful views makes me feel better than flying right next to my car without the sweat.



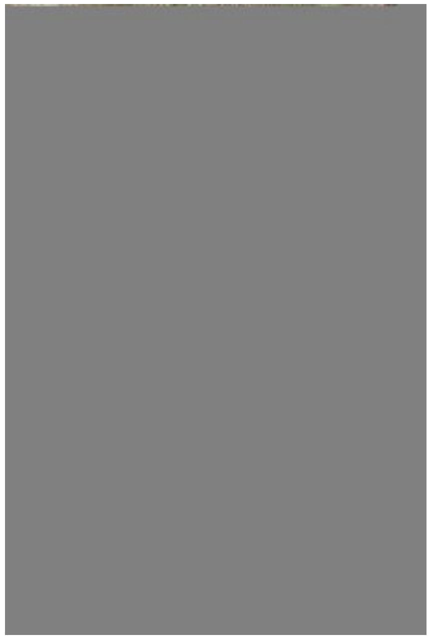
Left: Any good sized backpack may do the trick. | Centre: Dedicated model bags may provide better protection for your models. | Right: Getting your models in and out of the ski lift is the risky part here.

Landing

Landing on a mountain slope is a lot more complicated than landing on a Dutch meadow. The terrain is rarely flat, often littered with boulders and turbulence is the norm. The landing circuit is greatly influenced by many obstacles like trees, ski lifts (and their cables!) or the mountain face. It's key to think about the landing circuit before even starting a flight. Where is the wind coming from, where are the obstacles, what is the best piece of ground to land? You must know where and where not you can put your model on the ground before flying.

The slope of the terrain determines the way of flaring. When landing on downsloping terrain you want to come in slow, so you can 'push' your model to the ground at the last moment. When landing on upsloping terrain you need to have extra airspeed for a well-timed extra strong flare. In turbulence you will need some extra speed to have more pressure on the aerodynamic controls and to prevent stalling in a gust. If an approach is not working out well, retract your flaps or spoilers and continue flying. Keep trying until you get it right!

The downside of the difficult landing conditions is an increased risk of damage. There is always a chance that a fuselage will break or a wing will be dented. So make sure you take some repair tools on your mountain trip.



Left: In the mountains the risk of damage is undoubtedly greater than at home. | Right: A well deserved treat after a day of flying.

Beautiful Experience

Flying gliders in the mountains comes with many challenges. Everything is more extreme than flying on flat land. Flying spots are harder to reach, the slopes are big and steep, rising air is more violent, landings are challenging. But then the rewards! Your model is moving through the most beautiful panoramas and can cover serious distances. You can explore the performance envelope of your glider to the max. This makes mountain flying very rewarding. Every time I do enjoy how my models show their full potential in the mountains. Even if I have to take a damaged model back to the car at the end of the day I still have a huge grin on my face from the preceding flight.

Enjoy!

Marvellous Minimoa Redux

The Minimoa in the air at the County Model Flying Club (CMFC).

Part II: Variations on a Theme

Along with the Type 13 *Petrel*, the iconic *Minimoa* has always had a space in my heart and in my hangar. The proof of this lies in the fact that the latest version is the **tenth** in the line.

The Minimoa’s bare bones.

There aren't many full-size *Minimoas* left, and the majority are of the main production version, so the Swiss registered HB-282 is the only remaining earlier version of this glider. The main differences are a slightly lowered dihedral and a differently shaped rudder, along with which she has gained a modern canopy and Schempp-Hirth brakes rather than the original top-mounted spoilers.

Close up details.

So pleased was I with the previous ¼-scale version, due to its ability to fly in slightest lift and its OAP-friendly proportions, it seemed a no-brainer to build this my third version of that particular machine. Once again, the fuselage is Solartexed and painted with 2K paint, whilst the flying surfaces are covered with a mixture of HK matt clear and red film.

On the ground at County Model Flying Club (CMFC).

Due to the combination of the all moving rudder, the exaggerated gull dihedral and the large ailerons, trimming takes a good bit longer than usual, with just the right amount of co-ordinated aileron and rudder (CAR) and aileron differential needed to get pleasingly coordinated turns.

In the air at CMFC via Mobius 4K camera.

At the time of writing the trimming bugs have just about been ironed out and with a bit of luck and a following, sorry, I mean a wind blowing directly on a hill, we might be able to film the *Petrel* & *Minimoa* in action.

Left: Getting a tow from Smallpiece's faithful Greenley tug. | Centre: In the air at CMFC. | Right: The HB-282's quarter scale predecessor.

Plans for both the *Petrel* and *Minimoa* are available from me on PDF form and there are build logs for both on the Scale Soaring UK (SSUK) forum, and I have linked these in the *Resources* section following the *Variations on a Theme* video.

Thanks for reading and good luck with your own *Minimoa* project!

Resources

- *Minimoa Build Log* — From the SSUK website: "My personal history with the Minimoa goes back a long way. The b/w pic shows my 2nd version in the early 1980's, scaled up from the Bob Banks plan, which was my 1st…"
- *Minimoa Plans* — These can be downloaded from the SSUK website. This only requires being a 'Gold Member', which simply means going to the donations page and making a small donation for the upkeep of their website.

- *The Williams Anthology* — The collected works of Chris Williams as published in the New RC Soaring Digest.

All images, video and soundtrack by the author. Read the ***next article*** *in this issue, return to the* ***previous article*** *in this issue or go to the* ***table of contents****. A PDF version of this article, or the entire issue, is available* ***upon request****.*

Cellmeter 8

What's on offer for this economical battery meter and servo tester? Quite a bit, actually.

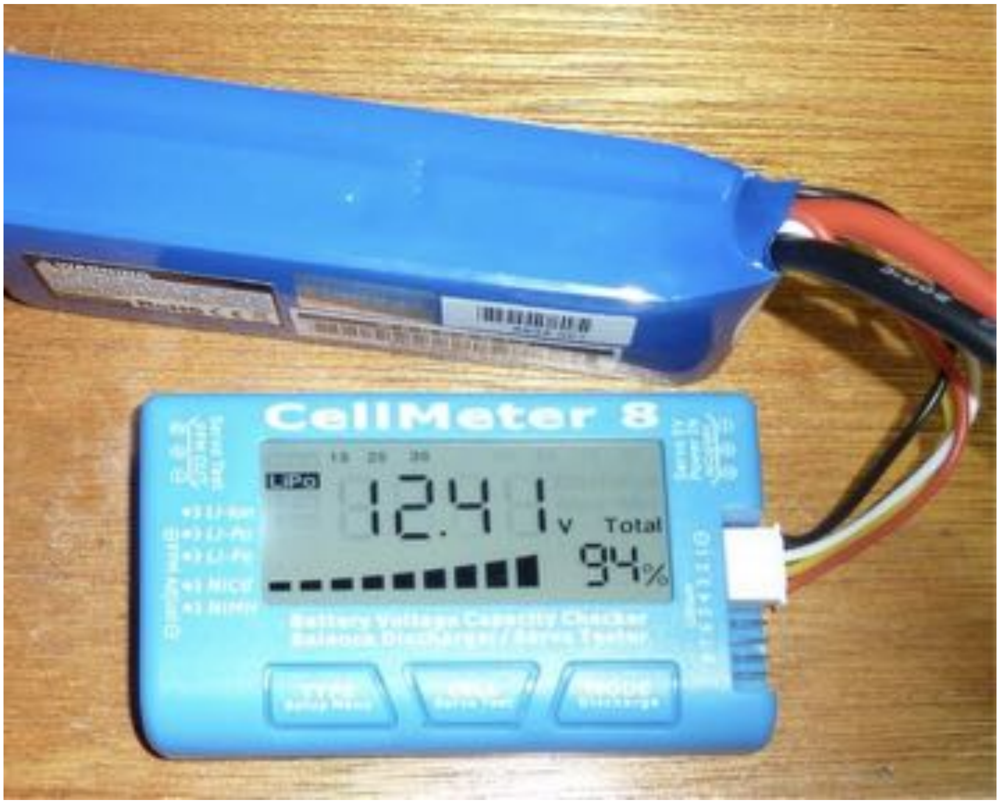
I have been using my present meter for some years and it is beginning to show different readings from my chargers. Time for a change. I bought a new one from eBay for £8.50. It is much the same size as the old one but it can take up to 8S LiPos. As a bonus you can test servos with it. This is very handy at the field if a servo starts to behave oddly or you want to set it to neutral at 1500μs (ie. 1500 microseconds).

The manual is the usual one with tiny type and poorly-translated English but it is quite a simple device and with this review you will have no trouble using it.

Look at the 'key photo' at the top of this article. The word in capitals on each button is what happens with a single short press. The smaller words are what happens with a long press.

LiPOs

I plugged in a 3S LiPo as shown immediately below. The default screen shows voltage and the overall percentage of charge.



`TYPE` This allows you to select cell type, defaulting to LiPo.

`CELL` Pressing this button repeatedly gives you the voltage of each cell. The number of the cell on display is shown at the top of the screen.

`MODE` Pressing this repeatedly gives you:

- Overall battery voltage
- Voltages of the cells
- Difference between maximum and minimum voltages of individual cells

NiMHs

I plugged in a NiMH 4.8V pack. I got the screen as shown below. NiMH pack voltage and the percentage charge. I am a little suspicious of the 99% shown. Even a day or so after charging the value will be below that. The voltage proved correct so perhaps the percentage is where the over-estimate is.

Using the Setup Menu

Hold down the `TYPE` button until it beeps.

Pressing the `TYPE` button then steps you through the options and back to the start screen.

You can then set the following using presses on the `CELL` and `MODE` buttons to step through values (long presses for quick change):

- Voltage down to which you want discharge cells — defaults to `3.700`
- Servo signal frequency. Defaults to `50Hz`
- High and low values for the servo `PPM` signal. Choose from `500–2500` or `1000–2000`. Be careful as some servos won't tolerate the extended range.
- Then you get `LEDt`. This means 'LED time' or how long the screen light stays on.

- Lastly you can switch the beep on and off.
- Then you are back to the start screen.

Testing Servos

Plug in the NiMH pack and servo as shown below.

- Hold down `CELL`
- Turn the wheel and watch the servo move
- The signal is displayed in `µs` (shown as `us`)
- The bar display shows the position of the servo

Accuracy Check

Using a high resistance multimeter:

	Multimeter	Cellmeter 8	Out by %
3S LiPo	12.39	12.42	0.25
4C NiMH	5.11	5.07	0.79

Good enough for me.

Discharger

You can also discharge batteries down to a chosen voltage per cell. I can't see you would want to do that at the field and all chargers have an option to do that at home. When I tried it the voltage drop was slow so this is not something I will be using.

Summary

A low cost and neat device that will be very useful at the field. This is my default tester now.

Soaring the Sky Podcast

E111: Behind The Lens Of A Glider Pilot | An Interview With Tobias Barth

Last month we kicked off an ongoing series where we select and present episodes from Chuck Fulton's highly-regarding soaring podcast. We have linked all of the services where you can find Soaring the Sky*, or simply click the green play button below to start listening to this month's selection . — Ed.*

On this episode we chat with world famous aviation photographer and glider pilot Tobias Barth! Many of you have seen his incredible images taken all over the World. Since 2019 the *Aviation Calendar, Soaring Edition* has exclusively used his pictures. His work has also been featured in magazines and other media. What does it take to get all those amazing shots while flying sometimes only a wingspan apart from the other aircraft? Tobi started flying gliders at the age of 13 and never looked back. He continues to enjoy soaring and many of those flights you will find him with camera in hand looking for that next great shot. You can find thousands of images on his website.

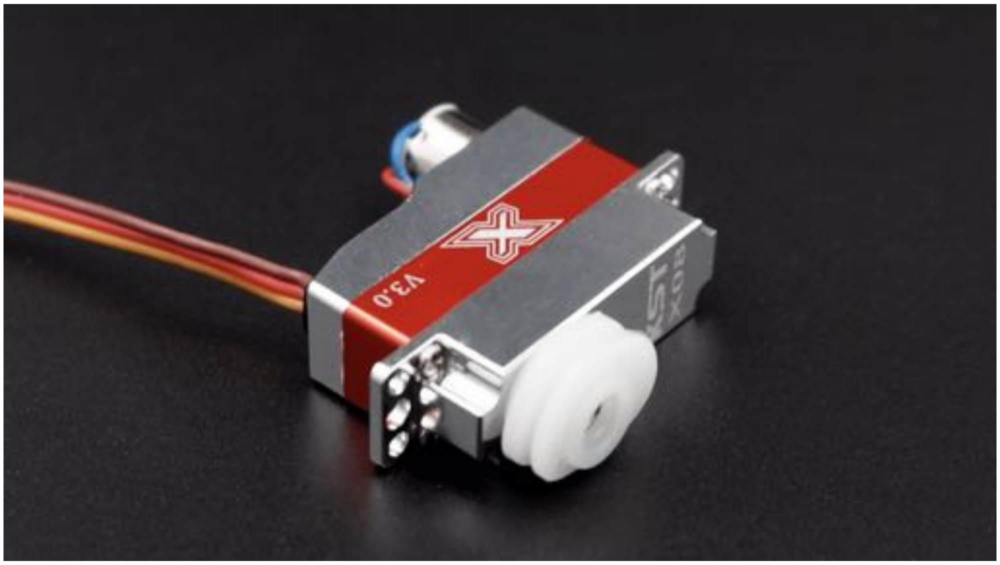
Also, Sergio The Soaring Master brings us at (01:05) another great segment and this one is titled *Flying Old Timers.* Everyone, if given the opportunity should take a flight in these amazing time machines. What can we learn from these vintage aircraft?

Resources

- ***Soaring the Sky*** — From the website: "*Soaring the Sky* is an aviation podcast all about the adventures of flying sailplanes. Join host Chuck Fulton as he talks with other aviators around the globe. You never know who the next guest will be on *Soaring the Sky*." You can also find the show on Instagram, Facebook and Twitter.
- ***Tobias Barth: Pilot with a Passion for Air-to-Air Photography*** — From the website: "I started flying at the age of 13. Since then, this kind of almost silent aviation has not let me go. At first, the focus was only on pure gliding. Soon an aerobatic license and a rating for motorized variants were added…"
- ***Fotokalender Segelfliegen 2022*** — Tobias' glider photo calendar. From the website: "Otto Lilienthal himself coined the term gliding. What would the aviation pioneer say about today's gliders? Their outstanding ability to fly, the magic of light and amazing perspectives inspire Tobias Barth to create fascinating pictures…" (translation: Google Translate)
- ***@tobi.barth.photographer*** — Tobias Barth's official Instagram page.

Subscribe to the *Soaring the Sky* podcast on these preferred distribution services:

Electricity for Model Flyers



An older version of the KST X08 servo with pull-string servo pulley installed. See Resources, below for more information. (credit: ArmSoar)

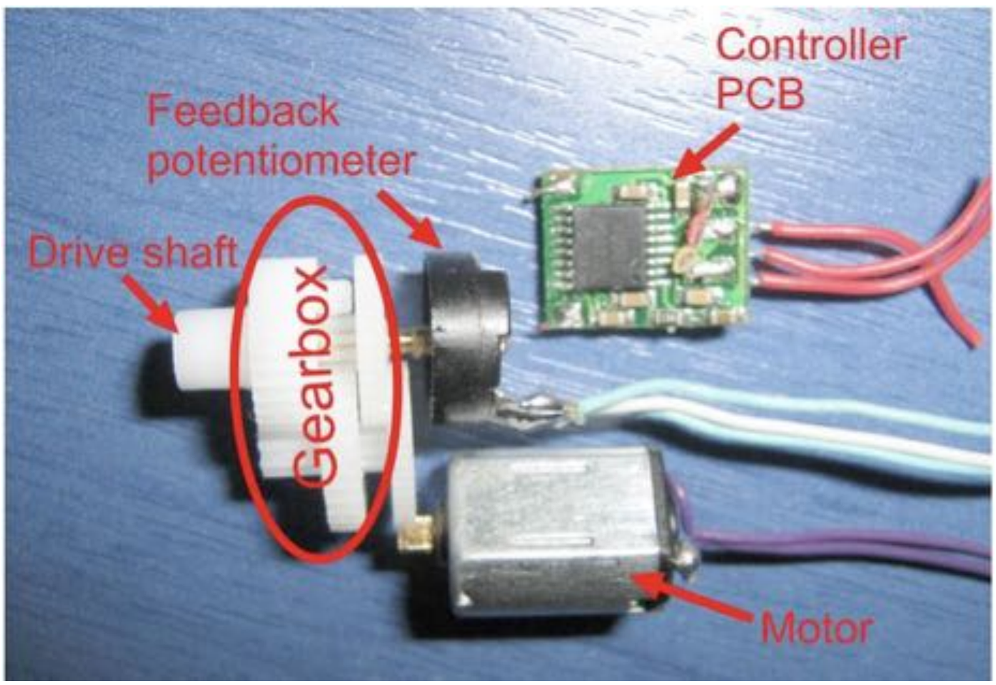
Part VIII: Analogue, Digital and Coreless Servos

All rotary model aircraft servos work the same way. Unless coreless, the only difference between analogue and digital ones is one small piece of electronics.

Servos use pulse width modulation (PWM) and feedback.The receiver (Rx) splits each second into fifty ‘windows’ of 20 thousandths of a second (that is milliseconds, abbreviated as ms) each. Inside each window the Rx sends a pulse of voltage, between 3.3 and 5V, down the signal wire (yellow or white) to each servo, evenly spaced out. These pulses are fairly rectangular in shape and vary in length (width) between 1.0 and 2.0ms. The length is determined by the position of the transmitter stick, rotary or switch position for that channel. So full up elevator might be 1.0ms and full down 2.0. Neutral will be 1.5, with small changes to it being set by trim or offset. A two-position switch will change the width from one extreme to another. A three position switch will add a 1.5ms mid-point. That explains the words **pulse** and **width**. **Modulation** means a change that carries information in this case a move from 0 to 5V or vice versa.

Most servos don't use all of their possible movement so you can send signals outside the normal range and get more movement. However this is risky as you don't know how much more is safe for a particular servo. FrSky Taranis users have to be careful as the amount of movement can be set in at least three ways and they add. A good head for arithmetic is needed and good ears to hear the buzzing from an overrun.

Inside the servo case there are four things — a motor, some gears, some electronics and a variable resistor called a feedback potentiometer (pot) as shown immediately below.



I don't need to explain what the motor does. The gears do two things. They slow down the motor rotation and they increase its turning force (torque). Torque is measured as a force times a distance. For servos the unit is usually kg cm. A 10kg cm servo can make a force of 10kg at the end of a 1cm arm, 2kg at the end of a 5cm one and so on. The pot is turned by the final drive from the gears. Because it is a variable resistor, as it turns it produces a varying voltage, so the position of the servo output shaft is turned into a voltage that can be read by the electronics.

The servo electronics PCB measures a pulse and turns it into a desired position for the servo. Remember the pulses come once every 20ms. It reads the voltage from the pot, known as feedback. If the pot voltage shows that the servo is already in that position it does not send a voltage to the motor. If the servo is out of position it sends a voltage to move it one way or the other until it is in the right position. This means that the servo can only move once every 20ms. Rapid small movements of the stick can be confused. The effect can be that the response might feel sluggish or weak.

What's Different about Digital?

The electronics is where digital servos are different. The PWM pulses from the Rx are the same. However digital electronics 'remembers' the pulse size and produces voltage pulses at a greater rate than fifty per second, in fact 300 or more, so they are effectively continuous. This means that the motor starts sooner and produces more torque. It also means that the servo responds instantly to any external force on the control surface that moves it from the correct position. If you push the servo it feels 'solid' rather than mushy. I am not clear why such servos are called 'digital'. They are not, but I suppose it sounds modern and there is no better alternative. High-speed or high-pulse-rate could be misleading.

Analogue servos switch off when they get no signal so can be moved by external forces. Some digital servos hold their last position and firmly lock it. The only downside to digital is that the servos use more power so you must use a bigger capacity battery to drive them.

One last word to explain is 'deadband'. Its true meaning is the amount of signal change needed before a servo reacts. In a car it is how far you need to move the wheel before the steering takes effect. However sometimes it is used loosely in RC servo descriptions to mean sluggishness.

When I started using digital servos I noticed that some buzzed slightly. Being used to analogue servos this worried me, as buzzing often indicates a fault, meaning that I wouldn't fly. I was assured that slight buzzing is normal with some digital servos.

Coreless Digital Servos

If you watch a highly aerobatic model the speed of the control surface movement is impressive. It can be less than 0.1 second to 60° deflection. To achieve this, coreless servos have very light moving parts. There is no moving iron core, hence the name, just a light wire cage of windings shown copper-red as shown immediately below.

(credit: Avsararas/Wikimedia)

A conventional servo motor has an iron core armature wrapped in wire that spins inside the magnet. In a coreless servo, the armature is a cylindrical thin wire mesh that spins round outside a magnet. There is no iron core. Ordinary servo motors have three or five magnets. When the coil is between two of these the force drops. There are no gaps in a coreless motor magnet, so they are smoother, more constant, and stronger.

Current Consumption

A word of warning. Digital servos use more current than analogue ones, because they are working all the time. If they also produce a lot of torque, and are high speed coreless types, they might need more current than your receiver can provide, especially if there are two on a Y-lead. For digital servos above say 10kg cm torque, try to find out what current it uses and what your receiver can provide. To be safe (and I broke a receiver finding this out) use a power distribution board for this kind of high power setup.

Good and Bad Points of Digital Servos

Good

- Fast reaction to control and deflection
- Smaller deadband
- Probably lock in position rather than switch off

Bad

- Use much more energy so must use larger, or twin, batteries or replace them regularly as you do flight batteries
- Likely to need a power distribution board

For further information and some excellent pictures by Jan Malášek see *Servo Control Interface in Detail* in Resources, below.

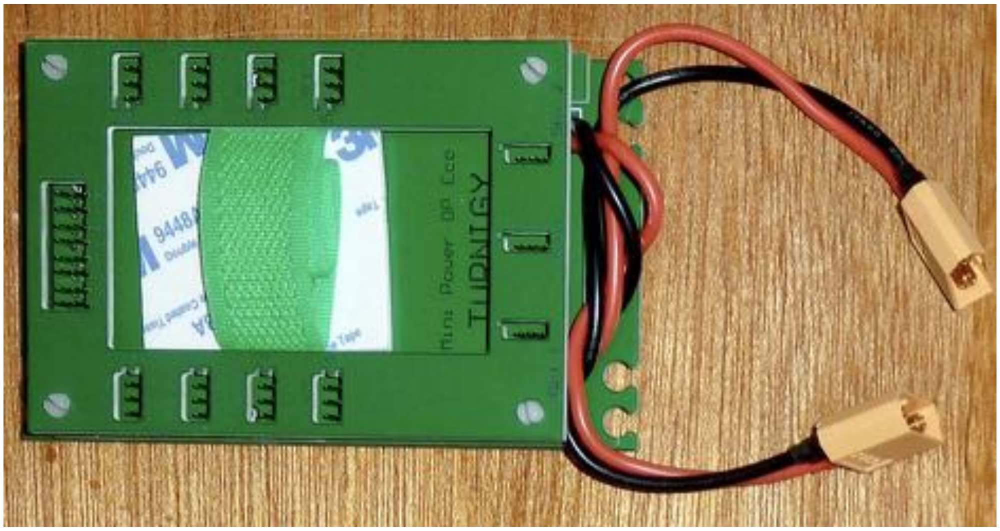
Servo Arms

Haven't we all struggled to find a servo arm to fit on a servo we are re-using, having thrown away the box and failed to label the bag into which we put the spare arms? They differ in size and the number of splines or grooves. Some have a square hole. I now stick to Futaba-style 25-spline servos for more powerful servos. I like the alloy arms that have a slot that allows them to be locked on with a side screw. You can see the pictures immediately below. Other makes that use 25 spline arms include TowerPro, Hitec, Turnigy, Aerostar, Corona, Bluebird, Savox and Traxxas. You need to check before buying a particular servo.

I do find the choice of an odd number of splines rather illogical. It means that, in its neutral position, you can only fit the servo arm at right-angles to the servo body on one side of the servo. On the other side it will always be slightly out as you have to move it round to find a groove. The splines are 360/25 degrees apart. So you have to move half this, or about 7°, one way or the other as shown immediately below.

Servo Power Distribution Boxes

As mentioned above, digital servos use more power. A high torque one, say starting at about 15kg cm, can use 2.5A and of course the more powerful and high-speed coreless ones use even more. A receiver might be overloaded and will either break or give weird signals. The solution is to use a power distribution box, like this one from HobbyKing for £25 ($32), weighing 80g. It is also sold as a badged product by UK dealers such as 4Max for a slightly higher price.



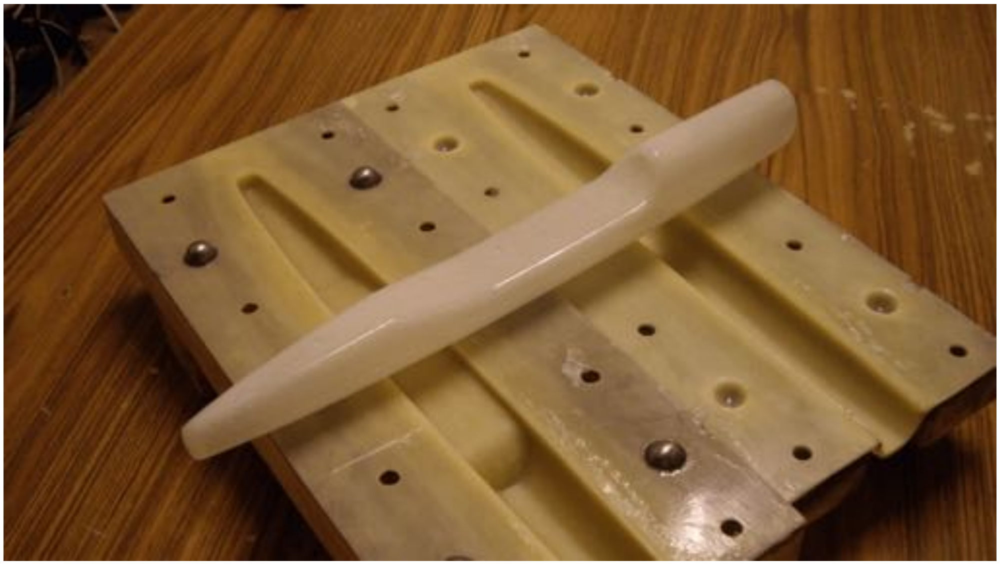
The receiver is strapped (or velcro'd) into the middle. The servo signal outputs from the receiver plug into the pins in a row at the top as shown in the picture immediately above. The servos plug into the sockets down each side. The box just passes on the PWM signals but supplies the servo power itself. Two servos can be plugged into each channel. One or two receiver batteries are connected either through the XT60 connectors for 2S lipos or, if 4.8V or 6V NiMHs, plugged straight into the board.

The box shown above can manage eight channels. At a much higher price you can buy boxes that handle many more or you could use two boxes. The supplied switch need not be used as the box defaults to on, but if used it plugs into the middle socket. If you want an LED display for battery charge you can plug one into an unused servo output.

The only downside that I can see, apart from the weight and cost, is that these boxes cannot be used where you want a single wire into a wing holding a FrSky S.BUS converter or other S.BUS servos. However you could feed an S.BUS signal into one or more input sockets and plug the wire to the S.BUS devices into one or more sockets so removing one of the potential overload dangers when using S.BUS with powerful servos. Make sure you use thick enough wires to carry the current. Or of course you could power the servos using wires separate from the signal ones.

Next month, I tackle telemetry. For now, thanks for reading, and if you have any questions, please leave them in *Responses*, below, and I'll do my best to answer them.

Shinobi | A Home-Grown Moulded Fuselage



A finished Shinobi inner nosecone part resting on the mould.

Part VIII: In This Final Part of This Series We Make the Inner Nosecone Plug from the Outer Nosecone Plug

Readers who have not already done so may want to read the ***previous parts*** *of this series before continuing with the article below. — JH*

Objective

We want to make an inner nosecone for the new glider fuselage set, but obviously the hardest thing is to make sure the new part will allow your previously produced outer nosecone to fit snugly, and also to make sure there is enough 'meat' on the end so that it can be securely bonded to the fuselage pod. This can be a tricky job if starting from scratch, but fortunately there is no need to do that. Already shaped, the outer nosecone part of the original plug can form a perfect base for its inner part. But before we start on that:

Preparation

To make sure that the inner nosecone plug will be the correct shapes and sizes, and will fit nicely, we need trial examples of both parts to fit it to, during the carving and sanding stages. This will also give a great opportunity to try out the new moulds and get some experience.

> **Advice:** I always make the first mouldings transparent so that the inner details and possible flaws or problems are easy to detect. Transparency in this case will also help with the inner nosecone fitting.

The Big Chop

Carefully mark the outer nosecone joining line on your plug, then check it, then take a sharp saw and cut it off! Yes — chop it off. Use a fine-toothed saw and try to be as careful as possible so that the saw kerf does not damage the nose cone or the fuselage pod parts. If you don't have a really fine toothed saw it's a good idea to run a strip of tape around the saw line first. Now you can wrap up your fuselage pod plug and put it away for another day — job well done!

Add the Fuselage Register

We need to add a piece on to the back of the plug that on the final moulded part will provide a register that enables the inner nosecone to be securely bonded into the rear pod. To do this, simply cut an extra piece of the same wood that you used for the main parts and glue it on to the back of the new plug on the cut line. I tend to use as much length as I can without getting ridiculous, as the more of the inner nosecone that is bonded into the fuselage then the stronger and more rigid the entire assembly becomes. Essentially this can form a kind of ring spar right on the part of the fuselage that can be prone to breakage, that is, just in front of the wing. Once the glue has set, the extra piece can be carved to the same profile as the rest of the plug.

Cut the Radio Tray

Carefully mark the radio tray area that you want to see on the final inner nosecone plug and then cut it out. As usual, take your time and carefully mark and check the lines before cutting off the unwanted wood. Try to anchor the wood temporarily to the work bench with clamps, and check while you are cutting to make sure your saw keeps to the correct line.

Here the added part glued on to the rear of the new plug can be seen. Also, the radio tray area has been removed.

Carving the Inner Nose Cone Profiles to the Correct Depth

The next part of the process is to begin to carve the new plug from the old plug. There is a trick here that my dad taught me when I was knee-high to a grasshopper that I have found really helpful in controlling the depth of wood to be removed from compound curved shapes.

Take a piece of broken metal hacksaw blade with not too low tooth count — say around 20TPI — and using fast set epoxy, glue two wood 12mm x 6mm (½” x 1/4”) strips each side. Now here’s the trick, you need to glue the strips on so that the teeth of the blade protrude about 1~1.2mm (0.40” ~0.60”) because in this way the blade cannot cut too deeply and will provide a very useful and accurate reference for carving and final sanding.

Two pieces of backing wood are glued on to a piece of fine-toothed hacksaw blade to provide a depth reference saw. Note the blue hacksaw blade protrudes 1~1.2mm past the wood backing pieces. This sets the depth for your initial wood removal and ensures that the depth is even all over.

Okay, now having made your all-singing, all-dancing depth setting saw, begin to make cuts all over the original plug to set the depth for your next job — carving and sanding the final version.

> **Advice:** A neat trick here is to spray the plug all over (lightly) with that old rattle can that you have been meaning to throw away for ages. The paint will settle into the grooves you have made and provide a nice reference ‘grid’ for carving.

Carving off the Excess Wood

Now you should have something resembling the body of a baby crocodile; long; slim and with a lot of sawn scales. Take a razor plane or your favorite carving implement whatever it may be and you are comfortable with, set it at a really fine shaving setting and begin to carve the new curves, by shaving away the ‘scales’. Don’t go too far. Remember there has to be ‘meat’ left for sanding and finishing the new plug.

Sanding the New Plug

As usual, we need to be very careful with the sanding so as not to remove too much material and also to consider how we want to make the actual part later. Sharp corners and angles are the enemy of the glass laminator, and can also be stress raisers and so should be avoided as much as possible. Inevitably there will have to be some corners, wing stub ends, fairing ends and such like, and these can be dealt with by special layup procedures but its best to keep them to a minimum. As the radio tray area does not need to be sharp then we can easily sand in some nice radii to make the eventual part easier to produce.

Here the now extended inner nosecone plug is seen with the parts it will have to mate with. Note that the new plug now has radii at the sides of the radio tray, and has been filled, sanded and epoxy finished ready for moulding.

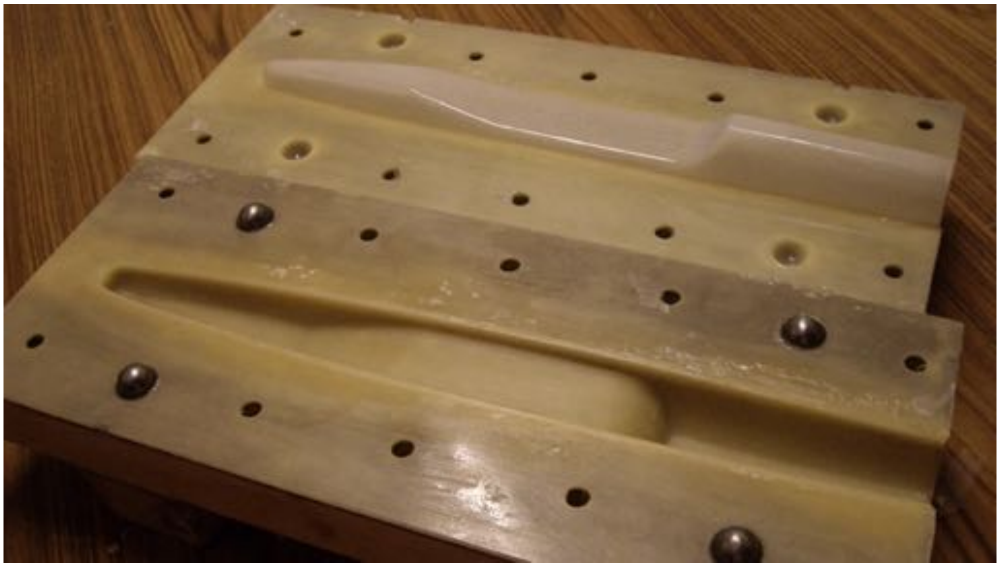
Use a trial moulding of the rear fuselage pod and the outer nosecone to check the fit, first at the rear where the inner nosecone part will be bonded into the rear fuselage pod. Hopefully the place where you cut the nosecone part off the rear pod will still be visible, and make a good refence for how the new plug fits inside. When that looks about right, start fitting the nosecone moulding over the new plug to check how it fits in the fuselage. It's a good idea from time to time to fit the inner nosecone plug into the rear pod moulding, and then also try the fit of the outer nosecone with it in place. This will illuminate any problems in the final fit of both parts.

The inner nosecone plug is trail fitted in each of the mating mouldings.

Finishing

Fill any depressions that might have appeared and then fine sand to about 240~360 grit. Finish as usual with epoxy.

Making the Mould for the Inner Nosecone



Here is the Shinobi inner nosecone mould with a part as yet not removed — as can be seen it's moulded horizontally.

Departing slightly from 'normal' moulding practice, the inner nosecone can sometimes be moulded with a horizontal seam and there can be advantages to this:

Remembering that the seam if joined green and overlapped will cure at least double the thickness of the common walls of the moulding. Sometimes it can be a good strength arrangement to have a seam that is not made in the same direction as the rest of the model parts. Obviously, the nose part is the most likely portion of the finished airframe that will constantly have to take a pounding from landings, so having a seam orientated at 90 degrees the other parts of the model can be a good way to distribute those stresses. Also, on occasion if the shape of the inner nosecone is more complex due to special requirements, it could be easier to mould it horizontally; and for both reasons actually I chose to mould the Shinobi inner nosecone in this manner (see key photo above the title).

Left: The parts together — wow they fit! | Right: We have been through the moulding and mould making procedure several times by now, so there is no need to do it again for the inner nosecone. Just follow all the steps for the previous parts and you will be in business.

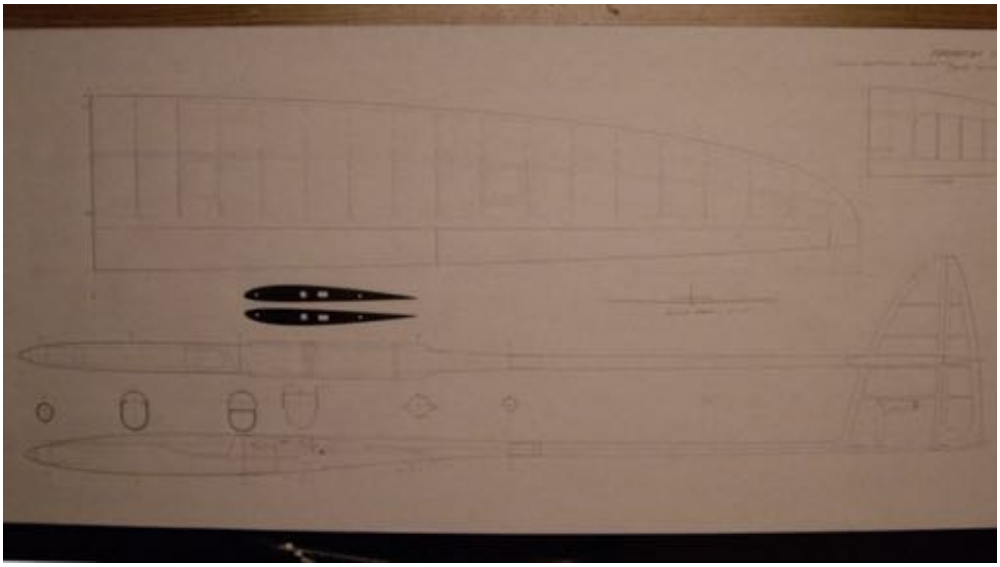
From an idea — this is an excerpt from Part I — just to remind you how far we have come.

The Sketch

I'm not going to go through the processes that I normally use to design the plane here, because if you are going to make your own model then you will pretty much know what you want to make. But you'll need a drawing to work from, and ideally it should have both top and side views. I usually make a 1:1 third-angle pencil sketch on paper — yes, I know, Old Skool, but then I'm an old phart so what do you expect? For those of you whizzkids that are familiar with CAD, then of course you can use that medium to make your drawing, but make sure it can be printed out 1:1.

> **Advice:** Before you start, take time to plan your work step by step. Things like a slip-on nose cone or a removable cap type canopy will

> have a big effect on what you do and when you do it in the process, but if well thought out can be easy to accomplish.



The original Hamachi (now Shinobi) drawing. From an idea to the air.

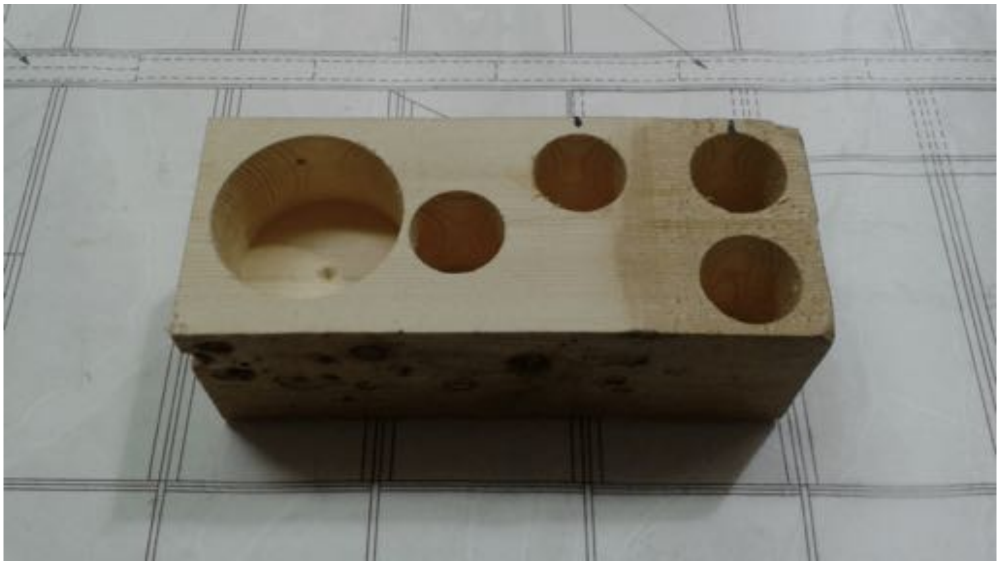
Parting Shot

I do hope you have enjoyed reading this series as much as I have enjoyed putting my experience into words and pictures.

If you have any questions please don't hesitate to post them to the *Responses* section below and I will do my best to answer them. Putting them here also means others will benefit from both your question and my answer.

Thanks for reading and good luck with your project!

Simple Glue Holder



I ended up with a cup holder, a place for sticks and places to keep glues pointed down for ready use.

Get out of a sticky situation.

It seems that it takes a long time for the glue to get to the end of the bottle once it gets below half full especially when it's cold. I've dealt with this for years and used to just stand and wait. I figured I'd share what I finally came up with that works great and saves a lot of time waiting for glue.

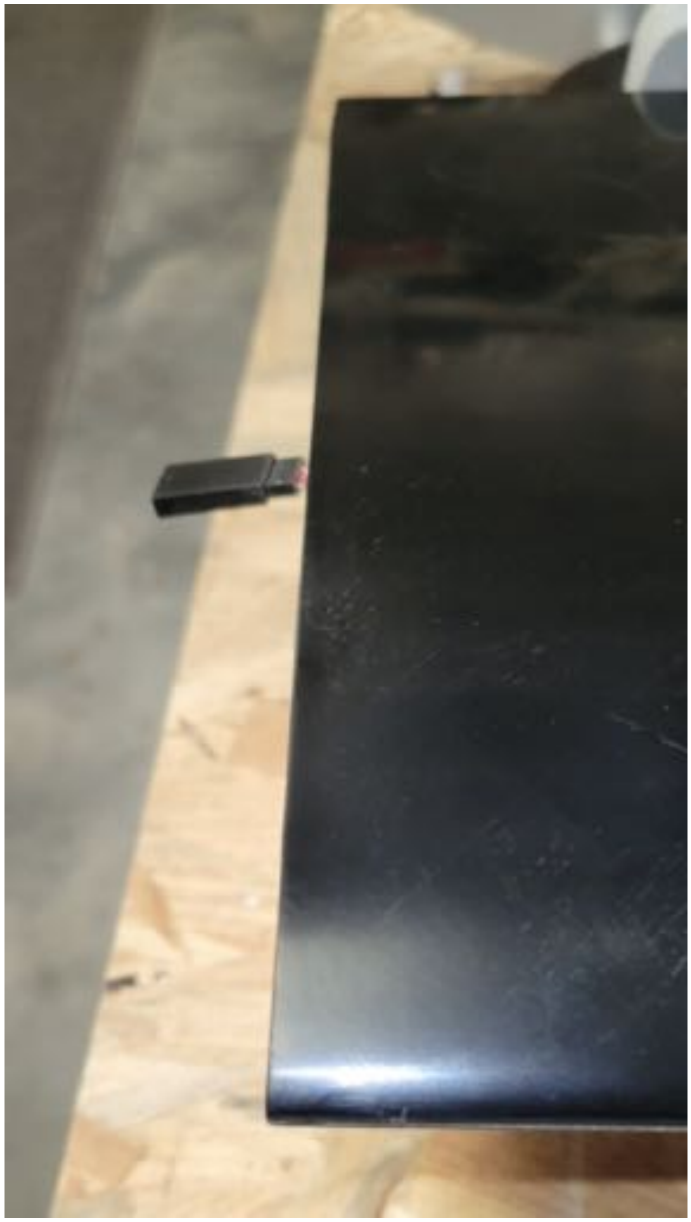
I just took a scrape block of wood and drilled some holes in it. This was a really well used scrap. The end result was as pictured above in the key photo. Really very handy if you are a builder. I have a couple of different ones around the shop made from scrap, as shown below.

Do your own design and make building easier (or just a bit faster).

Note: Make sure your glue tops are on tight. I don't store glue this way. I just use it when I'm working on something.

Always Wear Sunscreen

Given the brevity of my main tip for this month, I have a bonus tip which is timely given it's high summer up here in the Northern Hemisphere. No, not just to wear sunscreen (but that is a good idea, of course) but also if you want to get the tape residue off of your wings and canopy/nose and you don't have any solvent with you. Sunscreen works great. Most sunscreens have solvents in them — acetone being a common one. Just rub some on with a paper towel or rag and you end up with a nice clean surface (and UV protected?)


Before and after using sunscreen.

Enjoy the summer!

Stamps That Tell a Story

Good things come who wait. And who are persistent.

On March 5, 1982, the United States Postal Service (USPS) issued a handsome airmail postal card simply entitled *Soaring* and designed by Robert E. Cunningham. It was for international usage and was unveiled at the 1982 Soaring Society of America's (SSA) Convention in Houston. It honoured the sport of soaring and to coincide with the SSA's 50th anniversary. This project took a long time to happen. Here is some background information:

In 1962, then SSA Region-7 Director Dale S. May started the ball rolling. He proposed a soaring stamp to the USPS to commemorate the 35th anniversary of the SSA which was to be in 1967. He figured five years was plenty of lead time.

No stamp.

Next Bernald S. Smith urged USPS to issue a soaring stamp to mark the first World Gliding Championships to be held in the USA. Bernald was President of the SSA in 1969 and the contest was scheduled for 1970 in Marfa, Texas. He pointed out that almost every other country had observed their hosting of the event with a stamp.

Still no stamp.

In frustration, Dale May created his own 'design', using the American Bald Eagle stamp, issued on May 6, 1970 as part of the Natural History series. He added a small piece of white tape with the words "World Soaring Contest" and posted many cards during the Championships at Marfa.

Region-4 Director Floyd Sweet refused to take **NO!** for an answer and began writing letters annually to all the SSA Directors. In 1978, the then Director of the National Soaring Museum passed Floyd's letter to members of the Elmira Stamp Club (ESC). 1980 marked the 50th anniversary of the First National Soaring Contest in the USA (held in Elmira, NY) and 1982 would mark the 50th anniversary of the founding of the SSA. The club's decision was to shoot for 1980 with 1982 as a fall-back position. Frank Hurtt, Ithaca, NY, presented his design showing a Schweizer 1–26 sailplane over Chemung County.

No stamp for 1980.

The time must have finally been right for a soaring stamp. A *Soaring Stamp Proposal Committee* was formed representing the SSA, the NSM and the ESC. With everyone who was someone involved in this project, success came.

Early in 1981, the USPS decided that a postal card (with a larger area for an image!) would be more appropriate than just a stamp. It would be used primarily for mailing to Europe where the sport originated. By September the Citizens' Stamp Advisory Committee approved the idea of an airmail postal card to be designed by Cunningham, who was from Fort Worth, Texas.

It was to relay the feeling of the sport and show non-specific sailplanes. Final approval came from the Postmaster General in

January 1982 for the airmail postal card to be issued at the SSA convention to honour soaring as “an art, a science and a sport…which has become popular around the world.”

The United States of America was the first country to honour the sport with postal stationary. With the stamped imaged being as large as it is, one can see that the designer obviously created a new type of aircraft. The sailplane in the front seems to show the nose section of a *PIK-20* and the tail section of an *Open Cirrus*; the second sailplane shows what looks like the front half of a *K-6E* and again with an *Open Cirrus* tail section. The third sailplane can not be identified. A towering cumulus makes a perfect backdrop.

Glider Patents

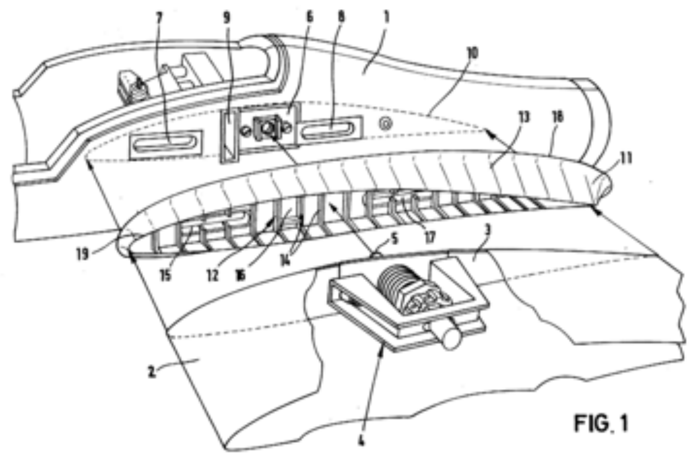


FIG. 1

US 4148450: Model Aircraft Construction

This is the first in our series of glider-related selections from the files of the US Patent and Trademark *office (see* Resources*, below). They are presented purely for the interest and entertainment of our readers. They are not edited in any way, other than to intersperse the drawings throughout the text. Disclaimer: inclusion of a given patent in this series does not constitute an expression of any opinion about the patent itself. — Ed.*

United States Patent [19] [11] **4,148,450**
Neuhierl [45] **Apr. 10, 1979**

[54] MODEL AIRCRAFT CONSTRUCTION

[76] Inventor: **Hermann Neuhierl**, Waldstrasse 36, 8510 Fürth, Bayern, Fed. Rep. of Germany

[21] Appl. No.: **830,316**

[22] Filed: **Sep. 2, 1977**

Related U.S. Application Data

[63] Continuation of Ser. No. 682,794, May 3, 1976, abandoned.

[30] **Foreign Application Priority Data**

May 6, 1975 [DE] Fed. Rep. of Germany 2520167
Mar. 18, 1976 [DE] Fed. Rep. of Germany 2611555

[51] **Int. Cl.**[2] **B64C 3/00; A63H 27/02**
[52] **U.S. Cl.** .... **244/124**; 46/76 R; 244/45 R; 244/117 R; 244/120
[58] **Field of Search** .... 244/130, 124, 120, 35 R, 244/45 R, 119, 133, 117 R, 123; 46/76 R, 76 A, 78, 79, 80

[56] **References Cited**

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Primary Examiner—Trygve M. Blix
Assistant Examiner—Charles E. Frankfort
Attorney, Agent, or Firm—Haseltine, Lake & Waters

Abstract

A model aircraft of the glider or motor-driven type can be provided with one or more different types of wing according to requirements by interposition between the respective pairs of wings and the fuselage of intermediate members adapted on the one hand to the fuselage of the aeroplane and on the other hand to the associated wings and ensuring an aerodynamically smooth transition from the fuselage to the wing. The fuselage can have a pair of lateral surfaces adapted in accordance with the cross-section of one specific wing construction so that intermediate members are only required if it is desired to employ wings differing from those having such a cross-section.

Background/Summary

FIELD OF THE INVENTION

This invention relates to model aeroplanes of the glider or motor-driven type which comprise, scaled down from the dimensions of a full size aeroplane, a fuselage and a pair of wings fitted laterally one on each side of the fuselage by releasable fixing means. This invention also relates to assemblages of parts such that different pairs of wings can be satisfactorily fitted to a single model aeroplane fuselage.

BACKGROUND OF THE INVENTION

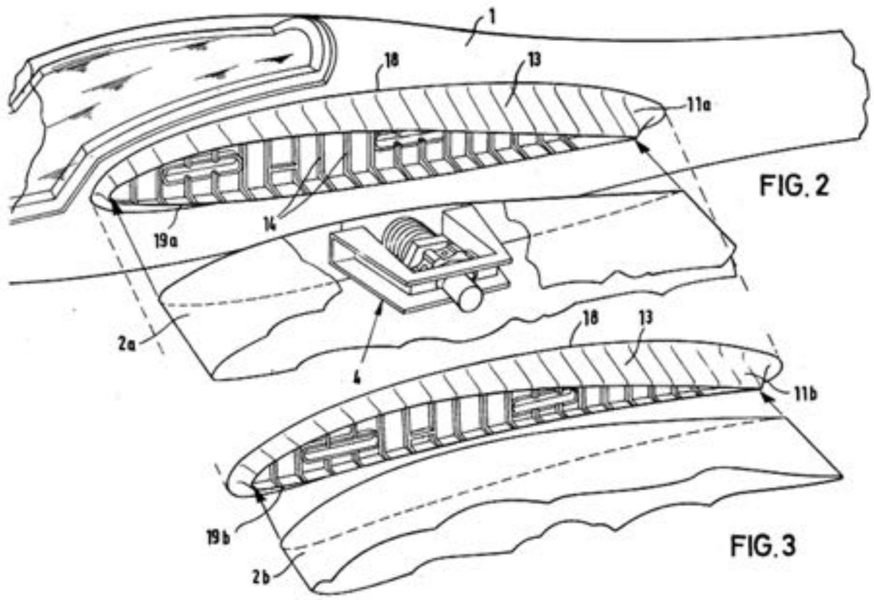
With model aircraft, the wings are fitted on the fuselage, either on the upper side thereof (high-wing monoplanes), on the under side thereof (low-wing monoplanes) or at an intermediate position on the fuselage (mid-wing monoplanes); model gliders generally possess this last type of wing arrangement. With mid-wing monoplanes, it is necessary to reduce the so-called interference resistance at the transition between the wings and the fuselage in an aerodynamically favourable manner. If the transition between the wings and the fuselage is achieved by shaping of the fuselage in the region in which the wings are to be affixed thereto by forming laterally on the fuselage a connecting surface or fairing corresponding to the cross-sectional profile of the wing, this means that, when the wings used are to be detachable, this being required with model aircraft for the purpose of easier transport, only a single quite specific cross-sectional profile of wing can be used.

With model aircraft, however, it is becoming increasingly desirable to be able to use interchangeable wings of different cross-sectional form and thus flying properties with a single fuselage. Weather conditions, in particular wind conditions, always vary to a considerable degree, and this means that the controller of the model aircraft, having to consider whether to achieve soaring flights, thermic flights or towing flights, might wish to be able to choose the wings most suited to achievement of a particular type of flight. However, this provision of wing variability has not hitherto been possible more particularly with mid-wing monoplanes because of the aforesaid need to provide a transition fairing on the fuselage designed for a single wing profile.

OBJECTS OF THE INVENTION

It is an object of this invention to provide a means whereby pairs of wings of different cross-section may be employed with a single model aeroplane fuselage.

It is a further object of this invention to provide a model aeroplane whose wings are releasably fitted directly to the fuselage, but which can be replaced readily by wings of alternative cross-section.



SUMMARY OF THE INVENTION

According to one aspect of this invention, there is provided a model aeroplane of the glider or motor-driven type which comprises, scaled down from the dimensions of a full size aeroplane,

a fuselage,

a pair of wings fitted laterally, one on each side of the fuselage by releasable fixing means, and

an intermediate member intermediate the end of each wing which is adjacent the fuselage and the fuselage, which intermediate member has outer surfaces having contours which provide an aerodynamically smooth transition from the fuselage to the wings, the intermediate member being defined on the side thereof adjacent the wing by an end surface which corresponds in size and shape to the cross-sectional form of the wing and being defined on the side thereof adjacent the fuselage by an end surface which corresponds in its contours to the contours of the fuselage.

According to a second aspect of the invention, there is provided an assemblage of parts for use in the construction of model aeroplanes of the glider or motor-driven type, which comprises, scaled down from the dimensions of the respective parts of a full-size aeroplane:

a fuselage,

a plurality of pairs of wings having different aerodynamic characteristics for fitting laterally one of each pair of wings on each side of the fuselage,

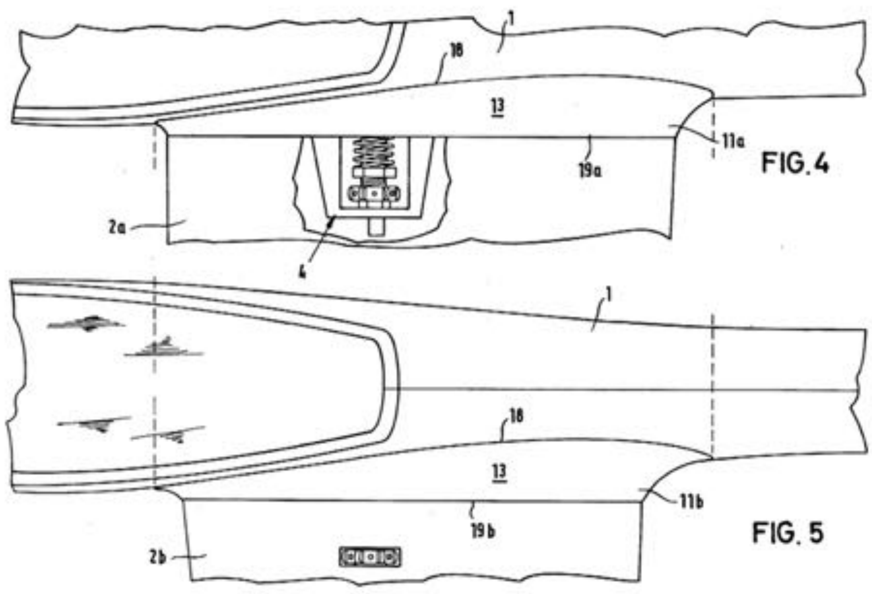
releasable fixing means for fixing the pairs of wings to the fuselage, and

associated with each pair of wings, a pair of intermediate members for fitting intermediate the associated wings and the fuselage and having outer surfaces whose contours are such that an aerodynamically smooth transition is provided from the fuselage to the associated wings, the intermediate members being defined on the side thereof adjacent the wings, in use, by end surfaces which correspond in size and shape to the cross-section of the associated wings and being defined on the side thereof adjacent the fuselage, in use, by an end surface which corresponds in its contours to the contours of the fuselage and is the same for each pair of intermediate members.

By the provision of the intermediate members which provide the required aerodynamically smooth condition between the fuselage and the associated wings, it is possible for wings of different cross-sectional profile to be fitted on a fuselage. Provision will generally be made in the intermediate members for the through-passage of means for fixing the wings to the fuselage so that the intermediate members are simultaneously clamped between the wings and the fuselage. For a particular aircraft fuselage, it is only necessary for a suitable intermediate member to be made available for each wing cross-section; the end of the intermediate member which is adjacent the fuselage will always be the same, although the opposite end will be shaped in accordance with the cross-section of the associated wing.

The intermediate member may comprise a skin over a stiffening strut structure in which the struts are so disposed with respect to each other that the fixing means are able to pass through the intermediate members from the fuselage to the wings. The skin is then preferably formed of an elastomeric material whereby the intermediate member is pressed with a slight pretension against the fuselage. Alternatively, the intermediate member may be formed as a self-supporting body of an elastomeric material. The body may either be hollow to allow through-passage of fixing means as aforesaid or may be basically solid, but provided with through-passages for such fixing means. A self-supporting intermediate member is also preferably formed of an elastomeric material for the aforesaid purpose.

If the fuselage is provided with paired lateral surface corresponding to the cross-sectional form of one particular wing, it is possible to dispense with the use of intermediate members for that one type of wing which can then be fitted directly to the fuselage. If alternative wing forms are to be used, then the requisite intermediate member will be required. In this case, the intermediate members will possess one end surface corresponding in size and shape to that of the lateral surfaces of the fuselage and one end surface corresponding in like manner to one specific form of wing cross-section differing from that of the wing which can be fitted directly to the fuselage.



BRIEF DESCRIPTION OF THE DRAWINGS

BRIEF DESCRIPTION OF THE DRAWINGS

For a better understanding of the invention and to show how the same can be carried into effect, reference will now be made, by way of example only, to the accompanying drawings, wherein:

FIG. 1 is a part sectional exploded view of a part of a fuselage and of a wing to be fitted thereon using an intermediate member;

FIGS. 2 and 3 are views of the type shown in FIG. 1 of wings which are to be attached to the fuselage and which have other cross-sectional profiles and correspondingly adapted intermediate members;

FIGS. 4 and 5 are partial plan views of wings of different cross-section fitted laterally on a model plane fuselage;

FIGS. 6 to 8 are side elevations of different intermediate members for the connection of wings of different cross-section to a model plane fuselage;

FIG. 9 shows diagrammatically in elevation, the connecting zone between a wing and a fuselage of a model plane, with the wing fitted directly on to the fuselage but replaceable in accordance with the present invention;

FIG. 10 is a view similar to that of FIG. 9 showing the use of an intermediate member between the wing and the fuselage enabling the wing shown in FIG. 9 to be replaced by a wing of alternative cross-section; and

FIG. 11 is an exploded perspective view of the intermediate member between a fuselage and a wing, the latter being shown partly in section.

DETAILED DESCRIPTION OF THE PREFERRED EMBODIMENT

Referring to FIGS. 1 to 3, a wing is to be fixed on the fuselage 1 of a model aircraft, a corresponding wing 2 being made available for fixing in like manner on the opposite side of the fuselage 1, but not being shown. The fixing is achieved by means of a fixing device 4 which is disposed in the end 3 of the wing and which is made visible by breaking away part of the wing skin. The fixing device is not fully described herein, since it does not form part of the invention. A screw 5 of the fixing device 4 is screwed or engaged in a suitable holding device 6 in the fuselage 1. Other recesses 7,8,9 are provided in the fuselage, into which holding pins (not shown) can be inserted. These pins project into openings (not shown) in the end of the wing.

Arranged inside the joint or gap which is formed when the end 3 of the wing is fixed by means of the fixing device 4 on that surface which is indicated by a chain-dotted line 10 on the fuselage 1, or is facing said surface, is an intermediate member 11. This intermediate member 11 comprises a middle part 12 which lies within the joint or gap and which is housed within a skin 13. The middle part 12 consists of a plurality of struts 14 which hold the skin 13 in the required aerodynamically favourable shape. Openings 15,16,17 are formed in the strut arrangement for through-passage of the fixing device 4 or its associated screw 5 and holding pins as aforesaid which are not shown and which project into the opeing 7 to 9 of the fuselage. The skin 13 of the intermediate member 11 is of an aerodynamically favourable shape so as to avoid the setting up of interference resistance between the fuselage 1 and wing 2 when the plane is in flight and is defined by an edge 18 adapted to the contours of the fuselage and an edge 19 adapted to the cross-sectional form of the wing 2.

Referring next to FIGS. 2 to 5 and to FIGS. 6 to 8, it can be seen that the diffferent forms of intermediate member bearing the reference numerals 11,11a and 11b, as the case may be, and intended for use with the same model aircraft fuselage possess an edge 18 which is to abut the fuselage and always possesses the same contours, whereas the edge 19 on the wing side is always adapted to the cross-sectional form of the wing 2 which is to be fitted. In FIGS. 2 to 5 and 6 to 8, therefore, the reference numeral 18 is always employed for the edge which abuts the fuselage, whereas the edge 19 is indicated as 19, 19a or 19b, depending on its constructional form.

The intermediate members 11,11a,11b are preferably injection moulded from high-quality synthetic plastics material which is preferably elastomeric. If the controller of the model aircraft wishes to replace the pair of wings in use by another pair, for example bacause of a chainge in weather conditions or to improve the flight efficiency or to produce a longer flying time, in the case of a glider form of model aircraft, in particular, it is only necessary for him to release the fixing device 4 and replace the wings by another pair of wings of the required other cross-sectional profile utilising always the corresponding intermediate member so that the most desirable connection to the fuselage 1 from the aerodynamic point of view is immediately guaranteed whatever the new wing format selected.

Referring next to FIG. 9, a fuselage 21 can be seen to be connected to a wing 22 by means of internally arranged fixing devices which are not shown. The joint is indicated at 23. With the size of the wing cross-section shown, no intermediate member need be provided between the wing 22 and the fuselage 21, since the connecting surface on the side of the fuselage (indicated at 24 in FIG. 11) corresponds to the cross-section of the wing 22.

In contrast, FIG. 10 shows a similar view to that shown in FIG. 9, but in which an intermediate member needs to be emplaced between the wing and the side 24 of the fuselage to ensure that the required aerodymamically smooth transition between fuselage and wing is achieved. In this case, an intermediate member 26 is utilised between the fuselage 21 and a wing 25 of smaller cross-section than the wing 22 of FIG. 9, thereby providing an aerodynamically smooth transitional surface. It can be seen from FIG. 11 that the intermediate member 26 comprises recesses 27 and circular openings 28 for the passage of fixing means (not shown) between the wing 25 and the fuselage 21 and which can be of the type shown in FIG. 1. Corresponding openings or recesses 29 are indicated on the connecting surface 24 on the side of the fuselage.

FIG. 11 also shows that the intermediate member 26 possesses a surface 30 of aerodynamically favourable form lying between the face 31 of the intermediate member on the wing side and the surface not visible on the fuselage side, which surface corresponds in its cross-section to the connecting surface 24 on the fuselage.

FIG. 6

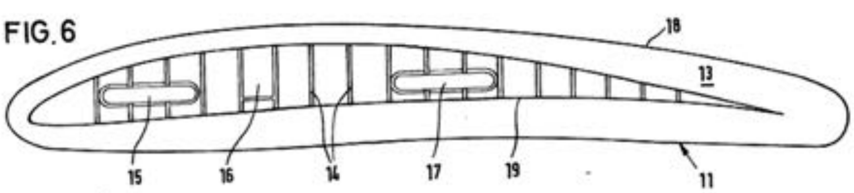


FIG. 7

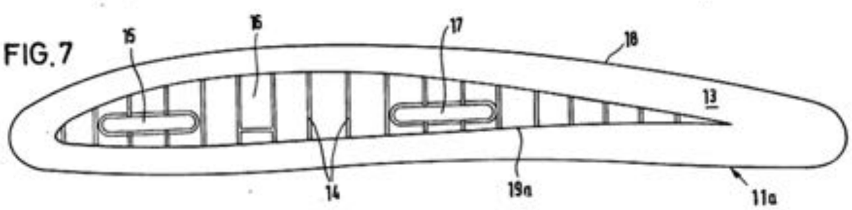
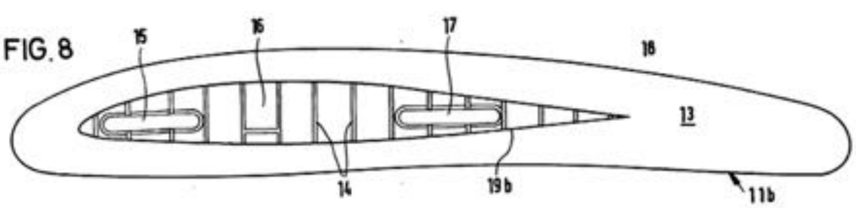


FIG. 8



Claims

1. A model aeroplane of the glider or motor-driven type which comprises, scaled down from the dimensions of a full size aeroplane,

a fuselage,

releasable fixing means, a pair of wings fitted laterally one on each side of the fuselage by said releasable fixing means, and

an intermediate member intermediate the end of each wing which is adjacent the fuselage and the fuselage, said intermediate member having outer surfaces with contours providing an aerodynamically smooth transition from the fuselage to the wings, said intermediate member being defined on the side thereof adjacent the wing by an end surface corresponding in size and shape to the cross-sectional form of the wing and being defined on the side thereof adjacent the fuselage by an end surface corresponding in its contours to the contours of the fuselage, said intermediate members comprising: a stiffening strut structure, a skin over said stiffening strut structure, said stiffening strut structure having struts disposed with respect to each other so that said fixing means are passable through said intermediate members from the fuselage to the wings, said wings and intermediate members being interchangeably attachable to said fuselage by said fixing means passing through said intermediate member, said wings having a shape dependent on predetermined environmental characteristics, said intermediate members having all the same shape and size on the side of the fuselage and having different cross-sections on the other side adapted to different wing sections.

2. A model aeroplane according to claim 1, wherein said skin is formed of an elastomeric material, said intermediate members being pressed with substantially slight pretension against the fuselage by said fixing means.

3. A model aeroplane according to claim 1, wherein the fuselage has paired lateral surfaces having the shape of a wing cross-section, said intermediate members being formed as self-supporting bodies having an end surface corresponding to said lateral surfaces and adjacent said lateral surfaces and an end surface adjacent said wings and shaped in accordance with the cross-section of said wings, the cross-section of the said wings fitted laterally on the fuselage differing from the wing cross-section characteristic of said paired lateral surfaces.

4. A model aeroplane according to claim 3, wherein the intermediate members are formed as hollow bodies.

5. a model aeroplane according to claim 3, wherein the intermediate members are formed as hollow bodies of elastomeric material, said intermediate members are pressed with substantially slight pretension against the fuselage by said fixing means.

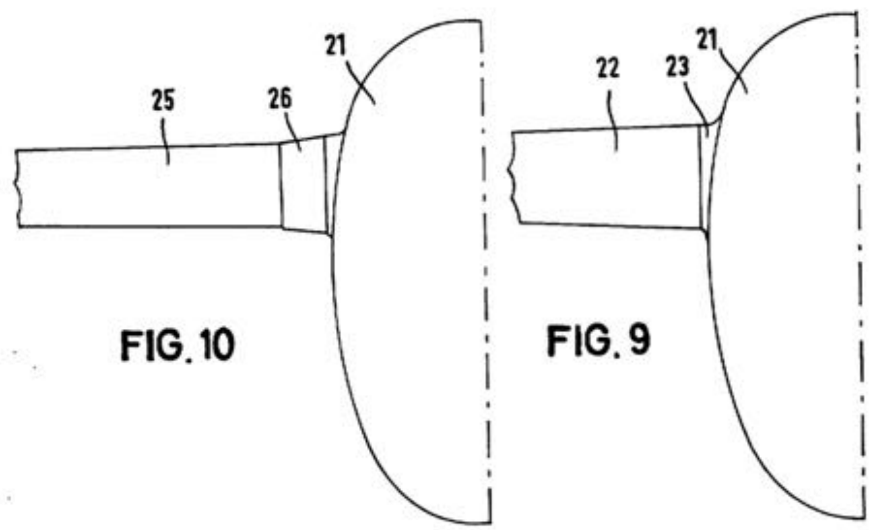
6. An assemblage of parts for use in the construction of model aeroplanes of the glider or motor-driven type, comprising, scaled down from the dimensions of the respective parts of a full size aeroplane:

a fuselage,

a plurality of pairs of wings having different aerodynamic characteristics for fitting laterally one of a selected pair of wings on each side of said fuselage,

releasable fixing means for fitting one pair of wings to said fuselage, and

associated with each pair of wings, a pair of intermediate members for fitting intermediate the associated wings and the fuselage and having outer surfaces with contours providing aerodynamically smooth transition from the fuselage to the associated wings, the intermediate members being defined on the side thereof adjacent the wings, in use, by end surfaces corresponding in size and shape to the cross-section of the associated wings and being defined on the side thereof adjacent the fuselage, in use, by an end surface corresponding in its contours to the contours of the fuselage and is the same for each pair of intermediate members, said intermediate members comprising a stiffening strut structure, a skin over said stiffening strut structure, said stiffening strut structure having struts being disposed with respect to each other so that said fixing means are passable through the intermediate members from the fuselage to the wings.



7. An assemblage according to claim 6, wherein said skin is formed of an elastomeric material, said intermediate members being pressed, in use, with substantially slight pretension against the fuselage by said fixing means.

8. An assemblage as claimed in claim 6, wherein the fuselage has paired lateral surfaces with the shape of a wing cross-section, one pair of said wings having said wing cross-section and the intermediate members being associated with the remaining pairs of wings and having an end surface corresponding to said lateral surfaces and an end surface shaped in accordance with the cross-section of said wings.

9. An assemblage as claimed in claim 8, wherein the intermediate members are formed as hollow bodies.

10. An assemblage according to claim 8, wherein the intermediate members are formed as hollow bodies of elastomeric material, said intermediate members being pressed, in use, with substantially slight pretension against the fuselage by said fixing means.

11. A model aeroplane of the glider or motor-driven type which comprises, scaled down from the dimensions of a full size aeroplane,

a fuselage,

releasable fixing means, a pair of wings fitted laterally one on each side of the fuselage by said releasable fixing means, and

an intermediate member intermediate the end of each wing which is adjacent the fuselage and the fuselage, said intermediate member having outer surfaces with contours providing an aerodynamically smooth transition from the fuselage to the wings, said intermediate member being defined on the side thereof adjacent the wing by an end surface corresponding in size and shape to the cross-sectional form of the wing and being defined on the side thereof adjacent the fuselage by an end surface corresponding in its contours to the contours of the fuselage, said intermediate members being formed as solid bodies and having recesses therethrough so that said fixing means are passable through said intermediate members from the fuselage to the wings, said wings and intermediate members being interchangeably attachable to said fuselage by said fixing means passing through said intermediate member, said wings, having a shape dependent on predetermined environmental characteristics, said intermediate members having all the same shape and size on the side of the fuselage and having different cross-sections on the other side adapted to different wing sections.

12. A model aeroplane according to claim 11, wherein the intermediate members are formed as solid bodies of elastomeric material, said intermediate members being pressed with substantially slight pretension against the fuselage by said fixing means.

13. An assemblage of parts for use in the construction of model aeroplanes of the glider or motor-driven type, comprising, scaled down from the dimensions of the respective parts of a full size aeroplane:

a fuselage,

a plurality of pairs of wings having different aerodynamic characteristics for fitting laterally one of a selected pair of wings on each side of said fuselage,

releasable fixing means for fitting one pair of wings to said fuselage, and

associated with each pair of wings, a pair of intermediate members for fitting intermediate the associated wings and the fuselage and having outer surfaces with contours providing aerodynamically smooth transition from the fuselage to the associated wings, the intermediate members being defined on the side thereof adjacent the wings, the use, by end surfaces corresponding in size and shape to the cross-section of the associated wings and being defined on the side thereof adjacent the fuselage, in use, by an end surface corresponding in its contours to the contours of the fuselage and is the same for each pair of intermediate members, said intermediate members being formed as solid bodies and having recesses therethrough so that said fixing means are passable through the intermediate members from the fuselage on the wings.

14. An assemblage as claimed in claim 13, wherein the intermediate members are formed as solid bodies of elastomeric material, said intermediate members being pressed, in use, with substantially slight pretension against the fuselage by said fixing means.

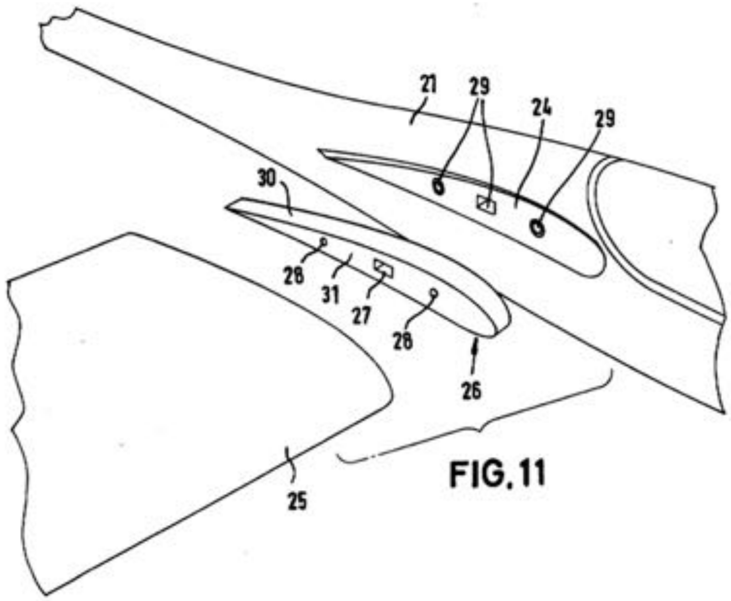


FIG. 11

Resources

- *[US Patent and Trademark Office]* (USPTO) — The USPTO provides an oustanding search engine which enables digging through (seemingly) every patent in their office. Proceed with caution — you could easily spend **days** of your time digging through their utterly fascinating files.
- *US Patent 4,148,450* — A PDF of the original patent as downloaded from the USPTO website, on which this article is based.

Read the next article in this issue, return to the previous article in this issue or go to the table of contents. A PDF version of this article, or the entire issue, is available upon request.

Unlisted

Form Follows Function

My two V-tailed design: the V-gilante, upper left, and the Wee-gilante, bottom right. (credit: Bob Dodgson)

Or does it?

This short article first appeared in №93–2 of Dodgson Designs' Second Wind *newsletter. — Ed.*

I was pretty pleased with myself in 1993 upon the development of the new MonoSeam *Sprite* fuselage. It is strong, lightweight, beautifully pre-molded and it lends itself to practical manufacturing techniques. This fuselage system, however, does not lend itself to including a pre-formed fin on the fuselage. Therefore, the *Sprite* builder must construct and install the vertical fin onto the fuselage. This is not a hard job and it provides for a very lightweight fin assembly — so it works out great.

From the beginning, however, I realized that the finless MonoSeam fuselage would be an ideal fuselage to use for a V-tail glider — since a vertical fin is not used at all. It was natural then, that when building the first prototype for the *V-gilante*, that I try a V-tail on it. This I did.

The tail is held on with two bolts and is therefore easily removed for transport.

My fears that the handling of the *V-gilante* would be adversely affected by the use of the V-tail were allayed at the first test flights. It handled exactly like a larger version of the *Sprite* with no strange V-tail induced characteristics.

Overjoyed that I had stumbled on the ideal configuration to best optimize my MonoSeam fuselage technique, I was pontificating to my visiting nephew, Tom Dodgson, on how beautifully integrated the design concepts were on the new plane. Being familiar with one of my oft-spouted truisms *Form Follows Function* Tom, computer engineer at Boeing, wryly commented “well Robert, as with most of your design breakthroughs, this looks to me like another case of *Form Follows F — k Up*.”

This humorous quip caught me off guard but I realized that it was right on target. Most of my best design innovations have been found while trying to do a workaround to a problem, a mistake or bug that popped up to block my path to design perfection. I had to admit that while I had always paid lip service to the phrase *Form Follows Function*, my own personal design style is more closely akin to the words of my insightful nephew, Tom.

Resources

- *The Dodgson Anthology* — The complete works of Bob Dodgson as featured in the New RC Soaring Digest.

Are you a fan of the retro Dodgson Designs logo? Is so, you might want one of these for your flying field attire. Otherwise, now read the *next article in this issue, return to the previous article in this issue or go to the table of contents.* *A PDF version of this article, or the entire issue, is available upon request.*

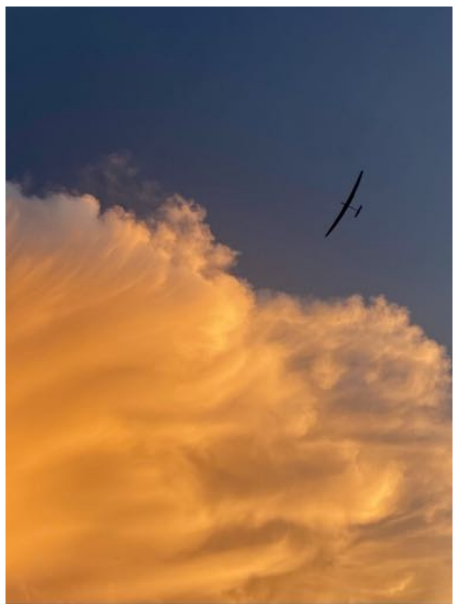
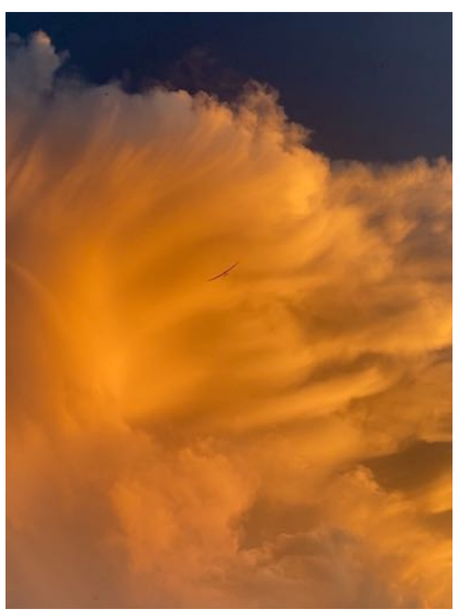
Unlisted

The Trailing Edge

Painting on a big, beautiful canvas.

Regular readers of this endnote in each issue will likely *not* miss our pithy commentary on some earthly matter or another. They're tough to write, so we're happy for the little 'holiday'. We'd like to think it's the boss giving a hoot, but actually, he can't take that credit. No kudos for him. Not even one.

Rather, it's just that sometimes a picture (or a series of pictures, as it turns out) more-or-less takes our breath away. They speak for themself. To wit, these extraordinary images taken by Verena Schwab at Oberpullendorf, Burgenland, Austria on June 4, 2022. So we're simply going to let the slinky thermal ship paint the clouds-at-sunset canvas and we'll try not to clutter things up with more verbiage.

Anything so beautiful is often a result of a team effort. In this case, Verena took the picture of pilot Hermann Haas's ship at altitude in the sunset. She passed along the pictures to Peter Kolp to post on Facebook. In turn, Bill Kuhlman spotted the pictures and alerted us to them, at which point we sought permission to run them here, which were fortunately granted. Our deepest thanks to all of these folks for pulling all the necessary levers to make this happen by deadline.

What's New in The RCSD Shop

The brand new Retro Logo Bucket Hat.

This stylish, 80s-90s nostalgia bucket hat features a beautifully stitched logo reminiscent of the original RCSD logo created by Jim Gray in 1984 and updated by Bunny and Bill Kuhlman in 2021. They come in these three great colours. It is a combination of timeless practicality and vintage style. Perfect for slope, field or cockpit. **Get yours today**.

Note that this product is made especially for you as soon as you place an order, which is why it takes us a bit longer to deliver it to you. Making products on demand instead of in bulk helps reduce overproduction, so thank you for making thoughtful purchasing decisions.

Make Sure You Don't Miss the New Issue

You really don't want to miss the August issue of RCSD when it's out — we have some exciting things in the works. Make sure you connect with us on Facebook, Instagram, Twitter or LinkedIn or subscribe to our Groups.io mailing list. Please share RCSD with your friends — we would love to have them as readers, too.

That's it for this month…now get out there and fly!