
Radio Controlled
Soaring Digest
April 2022
Vol. 37, No. 4

The New RC Soaring Digest

April, 2022
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In The Air

Some thoughts as to where we go from here — at least technologically speaking.

Terence C. Gannon

"It may be tricky to fly big unpowered scale gliders on the slope, but sometimes the conditions are just perfect. A friend is launching my 1/4-scale Ka-7 from the Schweissel (Vosges mountains) into an 18 mph wind. The wind is blowing perfectly perpendicular to the slope, creating a nice wide and steady lift band. A perfect day to fly this beauty." — Raymond Esveldt

What eventually drove me away from attending Sunday mass, many years ago, was the arrival at our parish of a firebrand financial fixer masquerading as a kindly, aging Irish priest. What was obvious from his sermons was Father was less interested in saving our souls than he was in our savings accounts — a substantial portion of which we should, as good Catholics, pitch fork over to help make the parish something less of the financial basket

case than it was at the time. A dwindling congregation should have provided a clear, unequivocal signal to the priest that he was — as we like to say these days — 'off message'.

So with this background, it with some trepidation that I turn this month not to RC soaring, but to the seemingly arcane subject of online publishing and specifically our use of Medium for that purpose.

A warning: it's pretty techy, nuts-n-bolts, rattle-in-the-engine-room, *Inside Baseball* kind of stuff. If that isn't your cup of tea, then please scroll down to the bottom and have at the April issue. I'll understand completely and won't be the least bit offended. If I was sitting where you are, I might even do the same myself.

That said, and at the risk of potentially emptying the virtual pews…

Are Medium's Days Numbered?

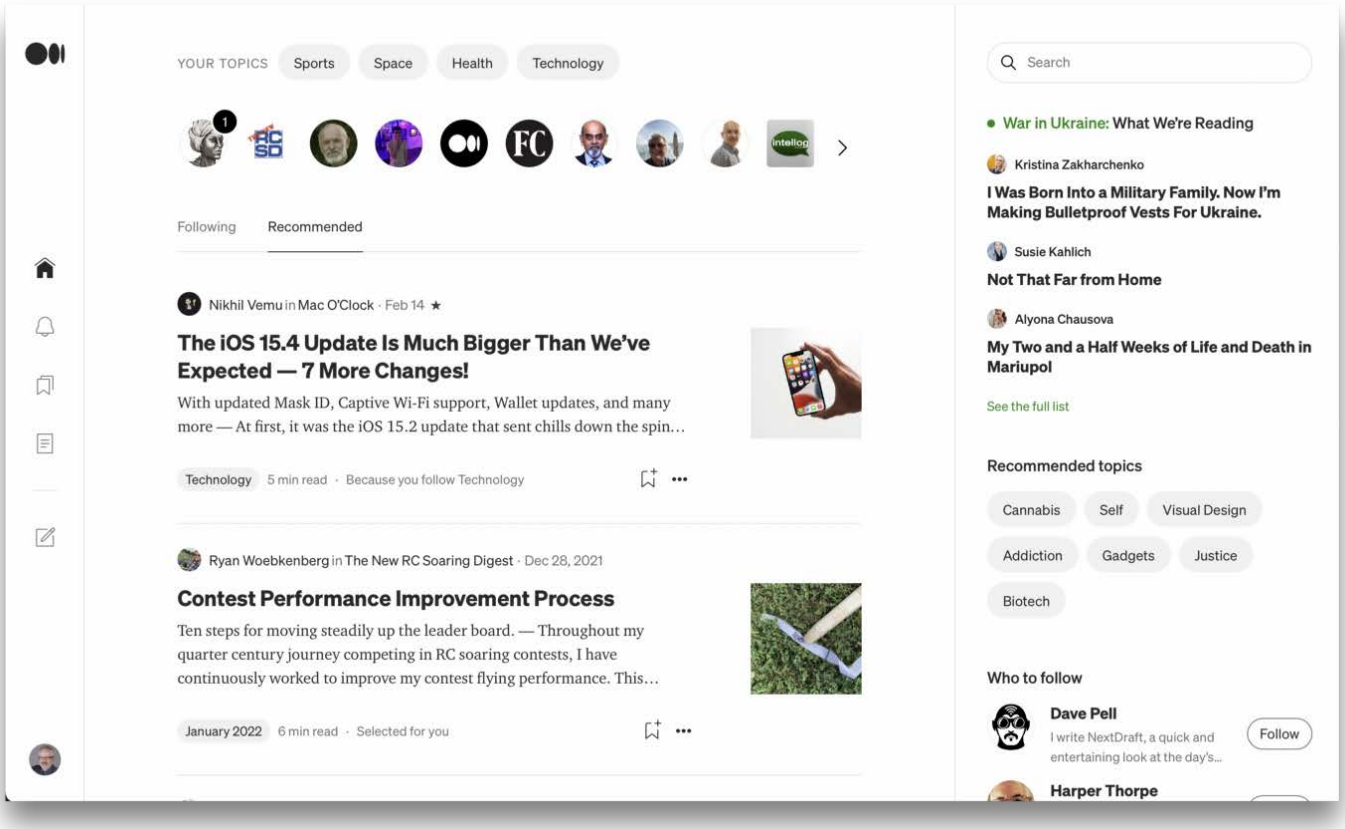
Personally, I have been writing on Medium for six years (nearly to the day) and what attracted me to the platform in the first place was its focus primarily on a 'pristine reading experience'. If you imagine a high quality, coffee table magazine — you know the ones that cost $20 in the local bookstore — the folks at Medium seemed to have used that as their Prime Directive for what readers would see when they were reading stories. Seemingly not far behind was making it an easy-to-use platform for writers. They made it a lead-pipe cinch to make a story look good. That came with limitations — Medium still doesn't format tables worth a damn, for example — but on a net basis, I was quite happy to work within those limitations for all the time and energy I saved *not* tweaking format. Go with the flow was the order of the day.

That's what informed making the choice to use Medium as the primary

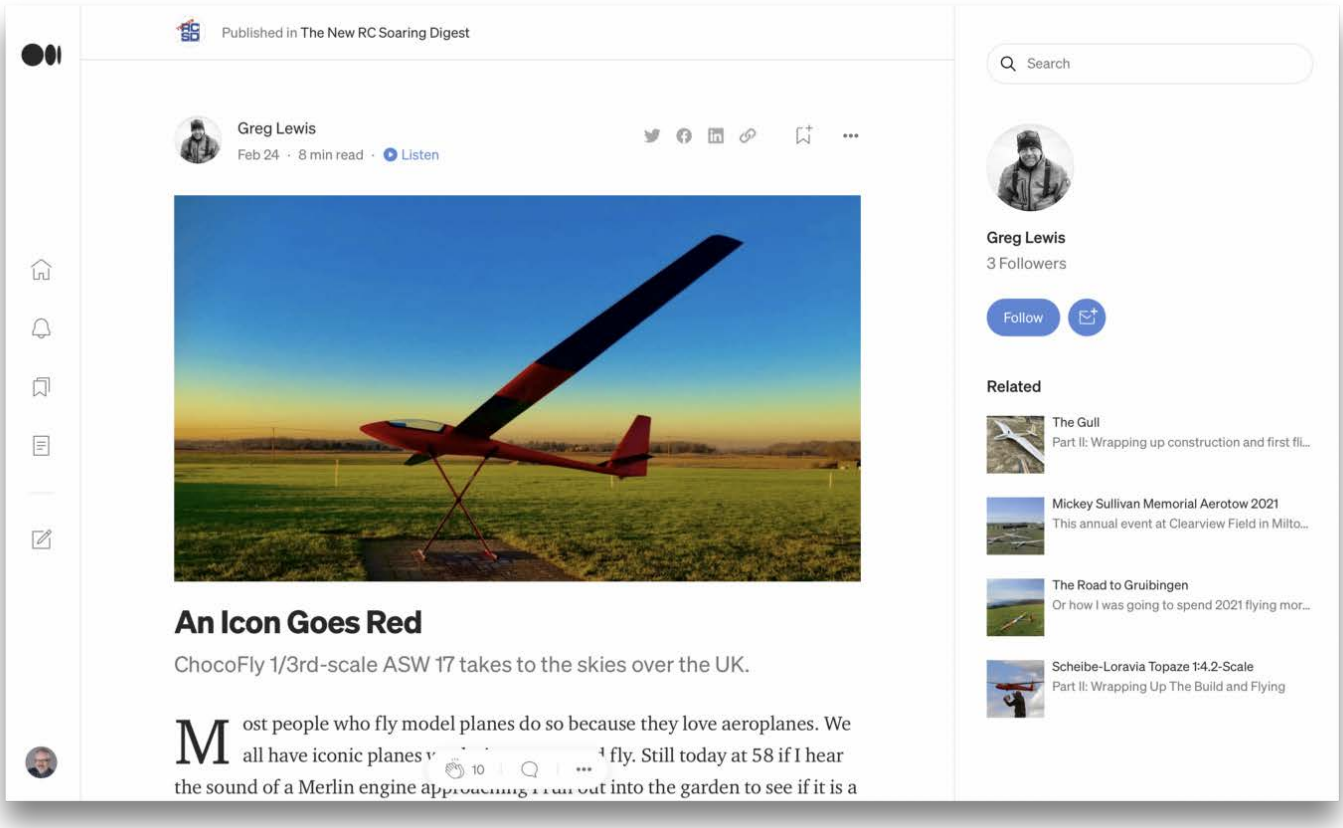
publishing platform for the New RC Soaring Digest when it was launched in January of 2021. For quite a long time it looked like sheer genius — even if I do say so myself. A substantial number of contributors were happy to jump on board, learn which levers to pull in Medium and started cranking out great articles formatted in a consistent, attractive way and with relatively little effort. A fair number of contributors where not able to make that leap, however, which candidly should have been my first clue that my self-assessment of my 'genius' might have been just a little overstated. Okay, a lot overstated.

Trouble at t' Mill

A few months ago, you may have noticed your home screen with Medium had changed — and not necessarily (or even likely) for the better. It was replaced with this thing:



It's ever present when reading stories whether you like it or not. I was so alarmed when it showed up I actually called it in as a technical problem. To which the folks at Medium Support said, ominously (and paraphrasing), that it was 'intended behaviour'. In other words, it was supposed to be this way. So when I attempt to read, for example, Greg Lewis's popular story on the ChocoFly ASW 17, it now looks like this:



The clutter is a little different — and *maybe* a little more useful — but it's still clutter. Making things worse is this new reader interface comes with the collateral damage of severely limiting the options for formatting images, which are such an integral and important part of the RCSD reading experience. There were previously four different choices for placing images in the copy. Now there is just one and the least imaginative one at that. Gone was our favourite — the 'full bleed' formatting of the key image above the title.

So, the pristine reading experience which was a really important reason why Medium was chosen in the first place, has become the proverbial baby thrown out with the bathwater. In the spirit of fairness, I have linked in the *Resources* section at the bottom of this article, Medium's explanation and rationale for their choices which I invite you to read at your leisure. If it makes sense to you (and without a hint of sarcasm) that's great. It just doesn't make any sense to me.

Furthermore, the trigger for dedicating these valuable *In The Air* column inches to this arcane subject was the hint of further changes to come — none of which sound like positive developments, from my perspective. I guess we'll all see.

Whew, We're Future-Proofed

Within a couple of months of launch — a small but very important decision was made with the intention of future-proofing RCSD to the almost imperceptibly small chance that Medium were to go away at some point. It's super techy, but here it is:

When sharing the URL for any article in RCSD (such as used in social media, for example) rather than sharing the Medium-specific URL, we share the URL that is RCSD-specific instead. Here's an example: for last month's *In The Air*, when it was published on Medium, it was automatically assigned the URL:

https://medium.com/rc-soaring-digest/in-the-air-6b7ebade4b34

There's no rhyme or reason to it — it's simply a string of characters that's guaranteed to never change. But when we share the news of this article being available to RCSD's readers, we actually share it with this URL:

https://new.rcsoaringdigest.com/2022/03/in-the-air

What we do, when you hit that latter URL is use something called a 'JavaScript redirect'. In other words, one line of code that runs and sends you over to the link on Medium and away you go happily reading the article you expected to see. It usually happens so quickly you may not have even noticed.

The implications are significant, though. In the event that Medium does go away for RCSD at some point — which now seems more of a possibility, even if it's not yet a probability — then the JavaScript redirect simply will go to the new publishing platform, whatever and wherever that might be.

This approach has some other distinct benefits: first, it's way easier to remember the 'friendly' RCSD URL as opposed to that string of weird characters. But also, it permits us to tweak things a little so that the URLs share really well on social media from which well over half of RCSD's readers come, as it turns out. By comparison, sharing Medium-specific URLs can be a tad, well, unpredictable. We also use this redirect file to gather some privacy-regulations-compliant metrics on where and how many readers we have.

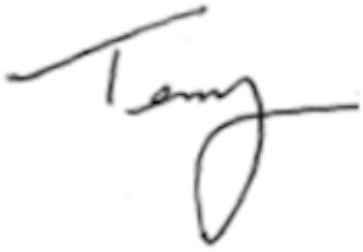
Rest assured, however, that we are busy working on options that will keep RCSD the great reading experience it has been, is, and always will be. That's *our* Prime Directive. This whole schmozzle may even be a blessing in disguise. By perhaps taking a new path, there may be even greater possibilities for RCSD in the future.

I'll provide more news along these lines as and when it's available.

OK, you have made it this far, for which I am eternally thankful. And no collection plate being passed around! But I think it's best to simply let you

get on with the stuff which really interests you, by clicking one of the links below. And as always, thank you so much for reading and thanks to our great contributors for making it all possible.

Until next month, fair winds and blue skies.



Resources

- ***A Better Medium.com*** — Medium's explanation of their new look user interface which is the subject of this article.

Cover photo*: The outstanding photo which graces the cover of RCSD this month is by Mark Baldacchino taken at everyone's bucket-list flying site, Torrey Pines. Pictured is Gary Fogel's Schweizer TG-3 a few weekends ago just after launch by Greg Schibler. Gary notes that this particular model was made in 1977 and so this flight celebrated its 45th year of soaring. Gary has also contributed a wonderful article to this month's issue of RCSD.*

Here's the ***first article*** *in the April, 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****.*

Letters to the Editor

We love it when one of RCSD's articles triggers a great memory.

The NEW RC Soaring Digest Staff

Many thanks to Valera Fomin for the additional stamps he was able to contribute to our montage. Do you have a glider stamp or some glider mail that's not pictured here? Let us know!

Replica Arrow Under Construction

I really enjoyed the article on the *Arrow* in the March issue of RCSD. I wasn't sure if you were aware, but the *Arrow* may fly again, in a smaller 60% scale size. The Avro Museum in Springbank, Calgary, Alberta is making a replica!

I became aware of this as the company that I fly for in Montana had a Learjet 24D that we were trying to sell. The FAA was mandating Stage II noise

aircraft be retrofitted with hush kits or grounded. Well after a few years of deals that fell through for one reason or another we were approached by the Avro Museum to purchase the motors. The owners were, like, it's all or nothing. So the deal was sealed and on a Wednesday the 26th of June, 2019 the plane was delivered with me sitting in the copilots seat. The motors are GE CJ-610 producing 2,950 pounds of thrust each. And boy are they loud!

The Lear had been sitting for quite some time so the locals hadn't heard it for awhile. My wife used to get calls from friends asking what military plane was out at the airport when we were doing flight training. Nope, just us out flying around in the world's original business jet. I recall a few days later a neighbor a few doors down who had been a backseater in the USAF in F4 *Phantoms* asked me if we flew the Lear the other morning? I said, yeah, and told him the story. He said he was standing on his back deck sipping coffee and could hear us for like 10 minutes after we left! 😉 For an old aviator it was music to his ears.

As we pulled into the FBO at Springbank there were a dozen or so folks milling around with cameras. They were very excited to have their airplane — well, motors — arrive. It was sorta sad to hear them joking what to do with the rest of the plane, like making BBQ grills out of the tips tanks. Hearing the old girl was going to be cut up was sad. Time moves on. I recall the financier joking that he hoped to live long enough to see the *Arrow* off the ground. I believe he said the goal was for three years to have a first flight. Seems that time is approaching.

Anyway, this was probably more about my walk down memory lane but here's the links to the last flight and to the Avro Museum's project (see *Resources* below).

Curtis Suter

Exec Air Montana, LLC

PS. I see that I had 915.6 hours as SIC in this specific Learjet

Curtis — thank you so much for submitting this marvellous story! You have quite the way with words, so we hope you might consider writing further articles for future issues of RCSD? Thanks again, and all the best. — Ed.

Resources

- ***In The Air*** — from the March 2022 issue of RCSD, which triggered the letter from Curtis.
- ***The Avro Museum*** — where the replica Avro Arrow is being built. A

recent visit to the project seems to indicate it may have either moved or gone dormant?

- ***The Last Flight of N955EA*** — the flight path of the Lear on its last journey, from FlightAware.

*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**.*

Orcrist | A 2.5m VTPR Glider

Part I: Picking the design, making plans and getting the build underway.

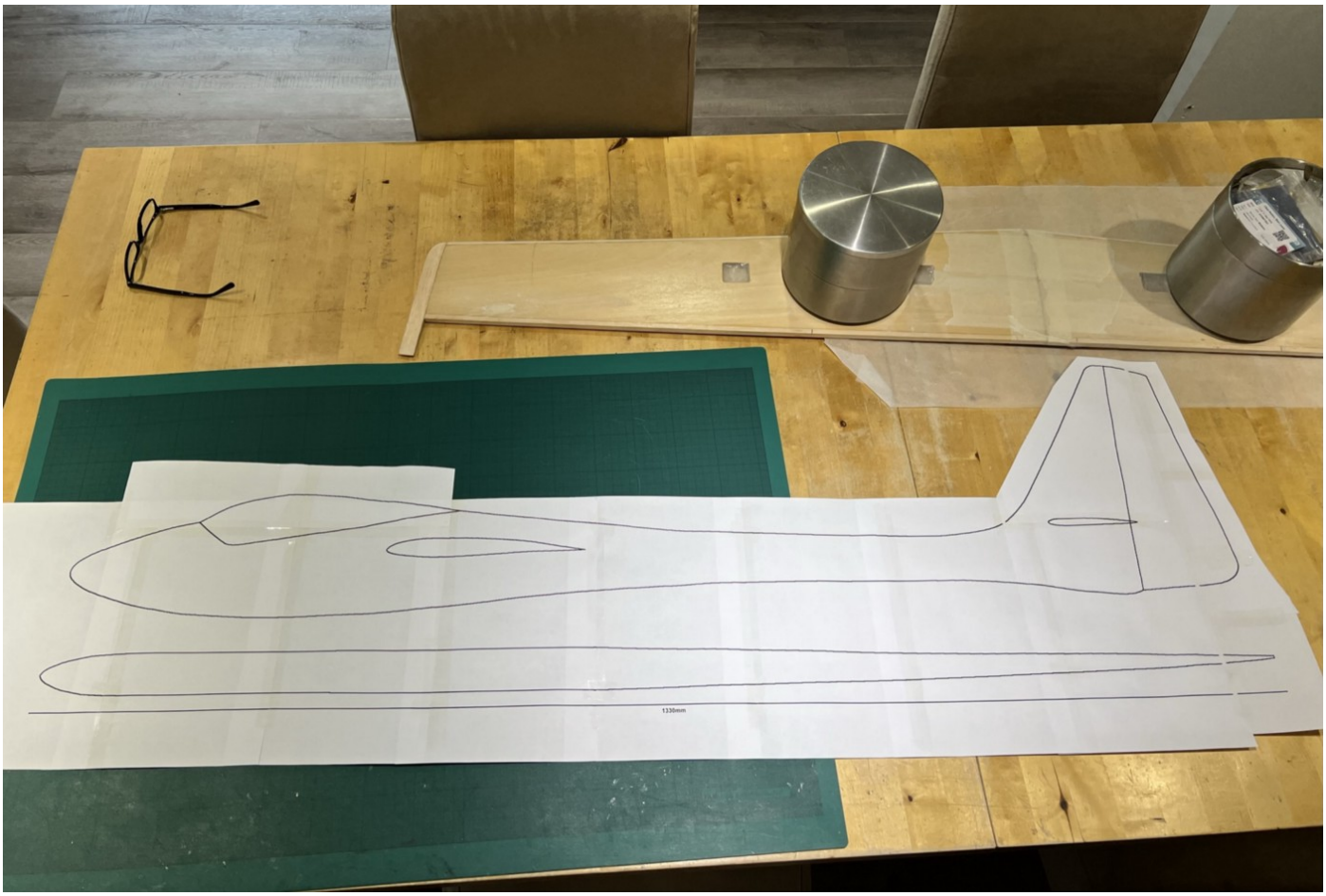
Marc Panton

If you have an interest in RC gliders (which I guess you do, if you're reading the New RC Soaring Digest!) and you've been on the internet, you have probably come across people doing aerobatics with RC gliders. If you venture further into that rabbit hole, you've likely stumbled across the phrase 'VTPR', you might even have Googled it and know it stands for *Voltige Très Près du Relief* or "aerobatics very close to the ground". As with many specialties like dynamic soaring and thermal duration, there's a whole range of purpose-built designs that have evolved to match the task at hand: full aerobatic flight, in close proximity to the slope.

> *For those with a VTPR curiosity and time to invest, SlopeAerobatics.com is a great starting point. See Resources below for this and all other links referenced in this article.*

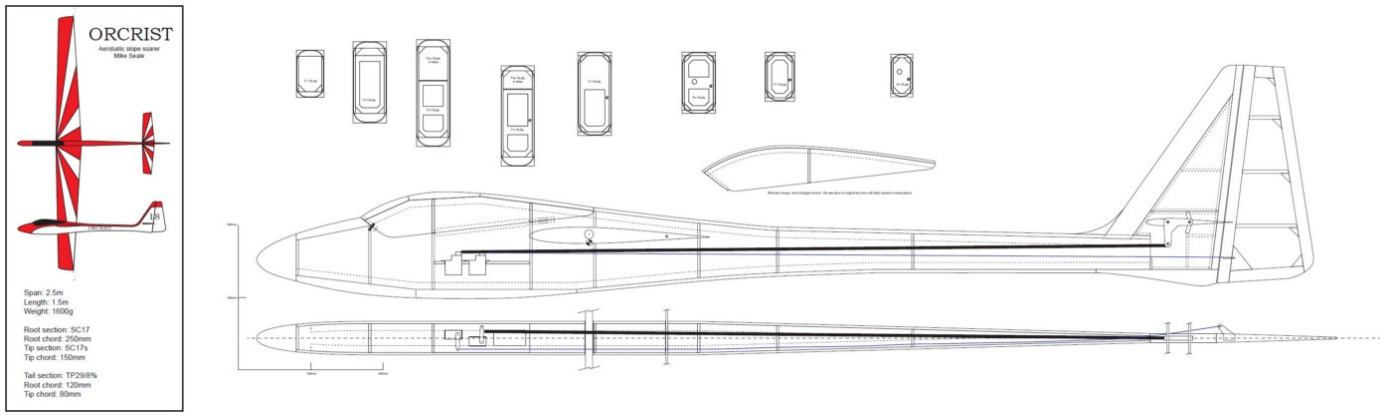
What Exactly to Build?

You've might have seen a few of these designs: *Le Fish*, *Voltij* and *Ahi*, all qualify. For my taste, the *Le Fish* and *Ahi* are a little small and the *Voltij* a little pricey for something designed to do aerobatics close to the ground. Another option is to self-build which leads me to the *Excalibur*, a 2.5m French design that pops-up on numerous videos but is fickle (based on my English language Googling) to find much info about, let alone plans. There are a few 1:1 sized silhouettes and some wing plans, but they leave much for the builder to interpret. Then which construction technique? Foam? Wood? Composite/moulded?



The only ‘plan’ I found for an Excalibur left out plenty of detail. (The Phase 6 wings are not relevant to this build.)

Enter a post I discovered on RCGroups by Mike Seale (again, see *Resources* for link) where he faced much the same dilemmas as I. Fortunately, he’s produced a plan for a built-up fuselage and even included a wing plan and foam cutter template.

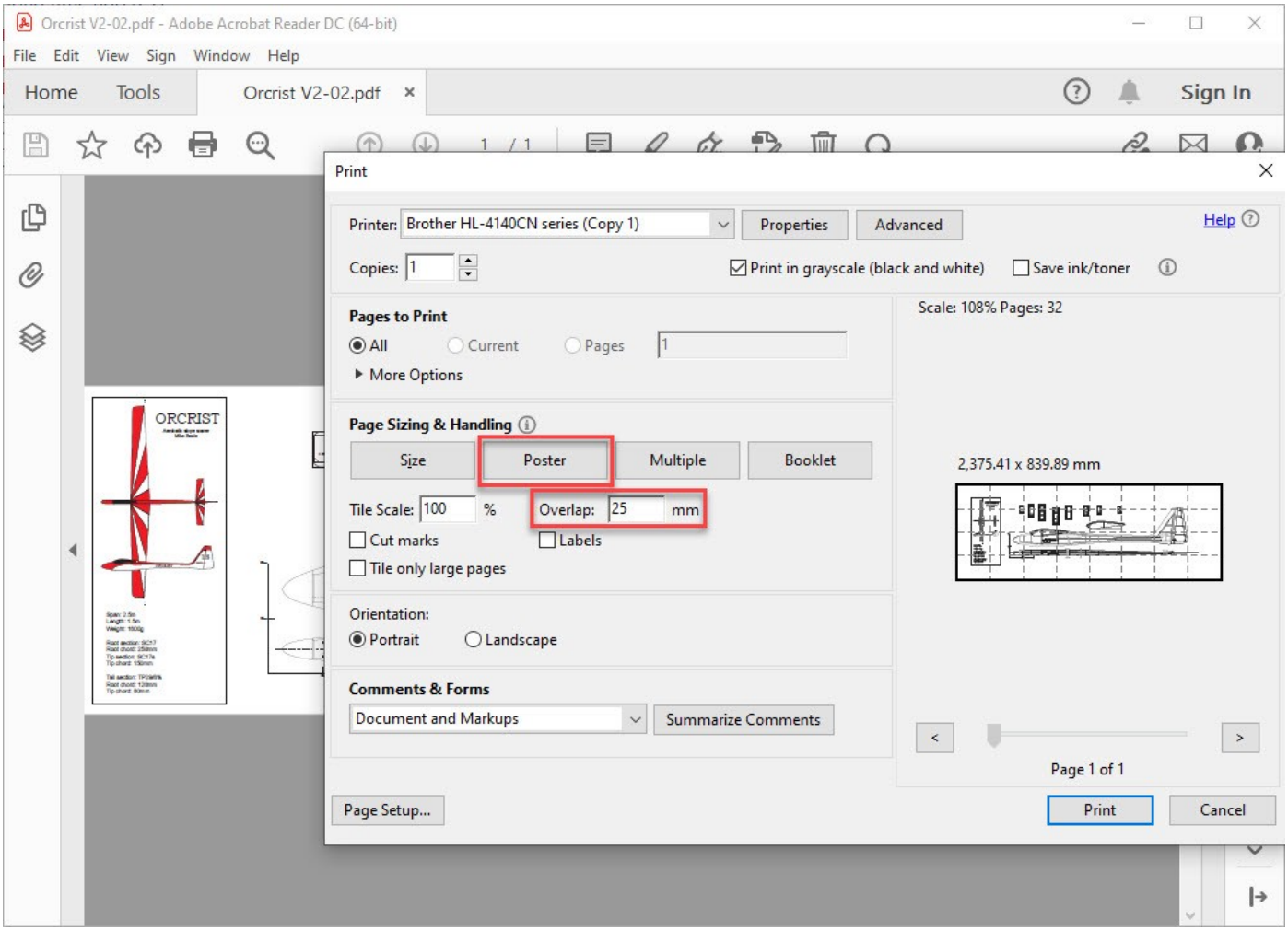


Mike’s (really quite good) home-brew plan for the Orcrist

The Best Laid Plans

Equipped with the plans (post #1 in the RC Groups thread), the next task is to print them 1:1 scale on a normal home printer. I don't have a plan printer, so I need to tile and print, then stitch back together with tape.

There's a few ways to do this, but the two I have used with success both involve Adobe Acrobat DC Reader. The first way is 'simply' to use the `Poster` settings in the print dialogue. If you ensure there is some overlap between tiles, you can use these to ensure things are aligned when you stitch the tiles back together later.

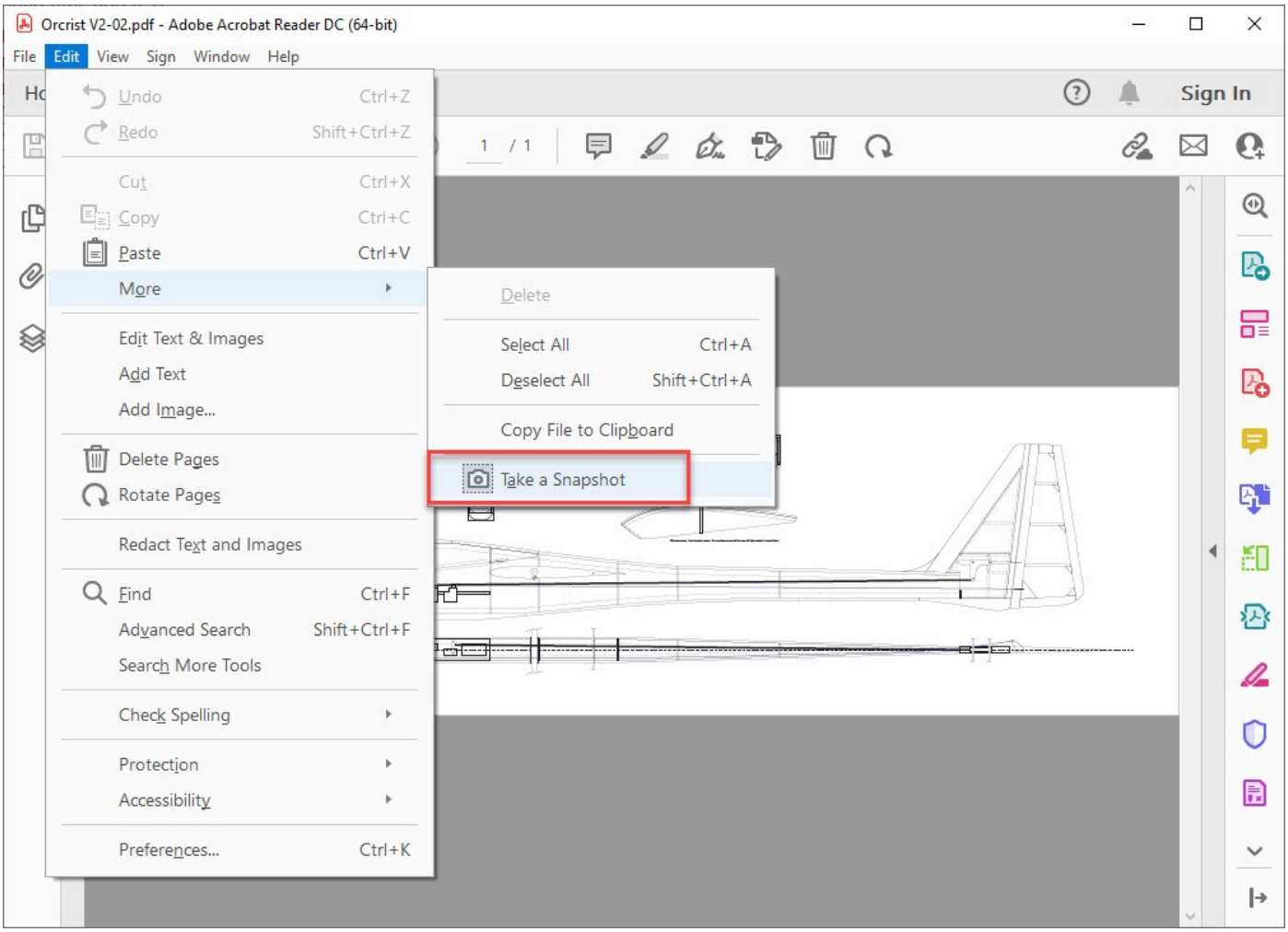


Poster print options in Adobe DC Reader

The draw back of this method is you get lots of empty space ‘printed’ as well as any supporting text, that is not just the plan.

The second way (and my preferred method) is to use the `Take a Snapshot` tool in DC Reader to select only the bits you need.

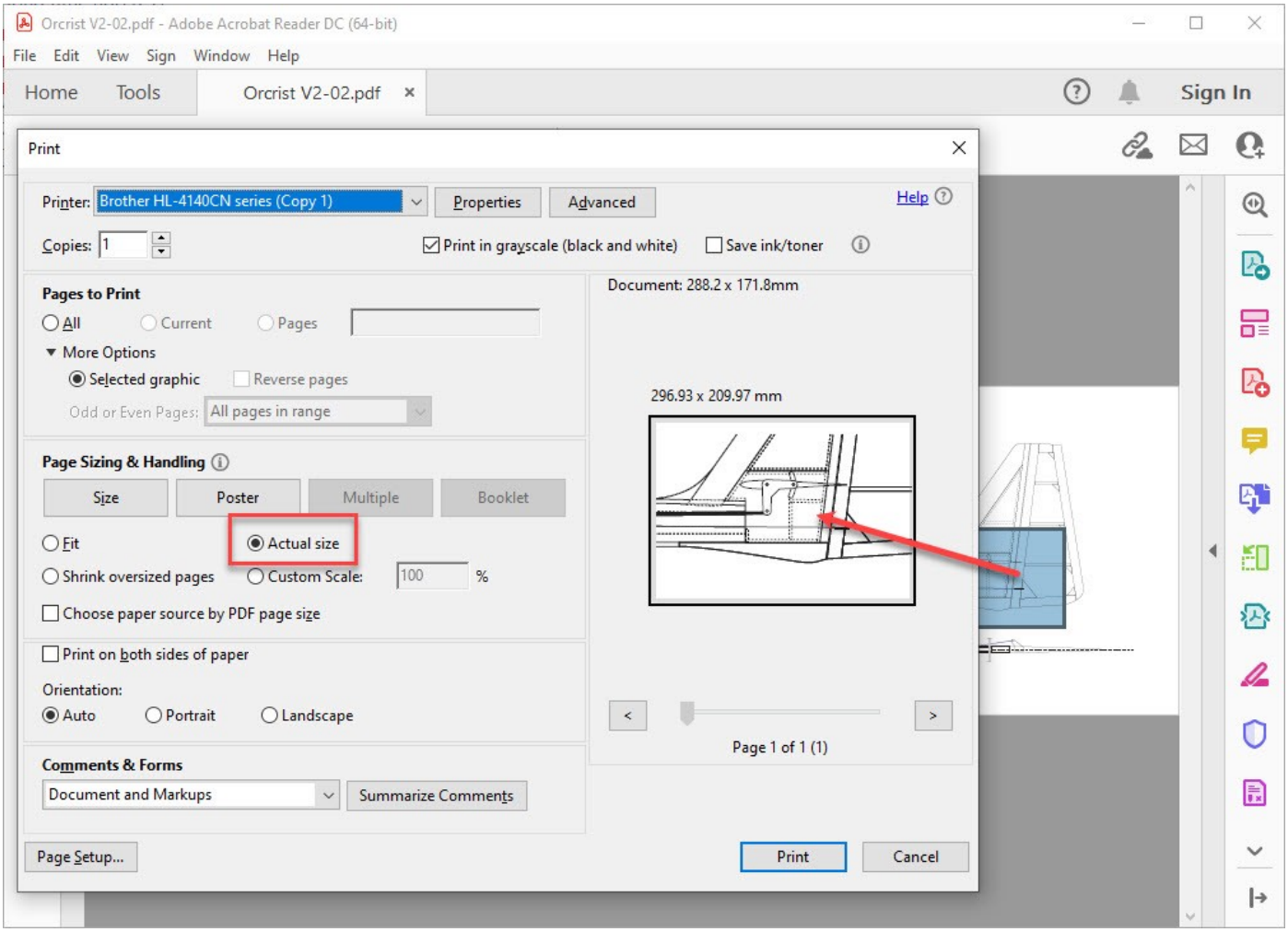
The tool is often buried a few menus down, but once you’ve located it, it should stay in the first level of the `Edit` menu.



The ‘hidden’ `Take a Snapshot` tool

Simply drag a box around the parts of the plan you need to print (aiming to nearly fill a single page of your printer’s paper size) and press `Ctrl–P`. In the printer window, check `Actual size` is selected and print. Repeat selecting /

printing the areas you need, aiming to overlap so you can align until you have a set of plans to tape together, without the stuff you don't need!



Select, Ctrl-P, print, repeat.

Back to The Build

With my freshly printed and taped plans, I cut the plan into a set of formers and the fuselage templates. The fuselage template was used to trace directly on to the side material, twice (two sides) and the former templates were glued to the ply (I used a thin ply which, with hindsight, should have been a little thicker!)


Titebond III
INCH


Titebond III ULTIMATE

Left: Plan cut to make templates, formers pasted to the ply and cut, fuselage halves ready to be traced. | **Right**: A few minutes with the bandsaw and there's two fuselage halves.

The build method is similar to a *Phase 6* (and other Chris Foss builds) and probably many other 'traditional' balsa builds: Triangle section is glued to one surface and acts as the jointing surface to receive the adjacent part.

Owing to an oversight on my part, 1/2″ triangle was substituted for the 3/8″ on the plan (doh!) which meant I needed to adapt the formers to match the larger materials.

Trial fitting the adapted formers. Note the vertical section on the formers, trimmed to shape.

Additionally, I added triangle sections vertically to the formers — ensuring a

good surface area for the adhesive. (Remember how I said the ply was a bit on the thin side?) the secondary benefit was that this helped ensure the formers were square during bonding too!

Lastly, the tops and bottoms of these vertical sections were trimmed to meet snuggly to the longitudinal sections on the side.

Happy with the trial fit of the formers, showing they fitted well and the adaptions had worked, the next step was to repeat adding the triangle sections to the the other fuselage half.

Trial fit, now to add triangle section to the other half.

By the time I had adjusted the formers for the thicker triangle section, there

wouldn't be much wood left at the corners of the cut-outs, as you see here, I left the lower sections whole; a few grams of extra won't make much difference.

Glue, Glue and More Glue

Let's have a quick chat about adhesives. To attach the paper templates/plan cut-outs to the base ply, I used an aerosol spray adhesive similar to Spraymount. For the triangle section and the many other wood-wood joints I alternated between impact adhesive (Evo-Stik Impact) and aliphatic wood glues (Titebond III and Gorilla wood glue). The selection basis tended to be how long I wanted to wait while clamping vs time available for building — use the aliphatic when I could leave things overnight and the impact when I had a few hours to do lots of build activities, taking advantage of the quicker grab time (almost instant) of the impact adhesive.

Gluing the formers, weighted to keep things flat and square

For gluing the triangle sections, where they need to conform to shape, I found the impact adhesive was preferable: pinning the sections to the outer ply was a non-starter given how thin it was, where-as the impact adhesive (if properly applied to both surfaces and flashed off) gave near instant adhesion with minimal slip.

Around this time, I began to realise that my choice of ply might be a little thin. Not wanting to re-do a bunch of work and waste materials, I tried a few remedies to strengthen the walls, which between formers and triangle sections, were a little flexible to the touch.

The first attempt was by gluing cross members, much like stringers across the expanse. It was OK, but a ‘PITA’ to do for each area, there would be three

in need of attention on each side.

‘Stringers’ — Fail! They were replaced with doublers.

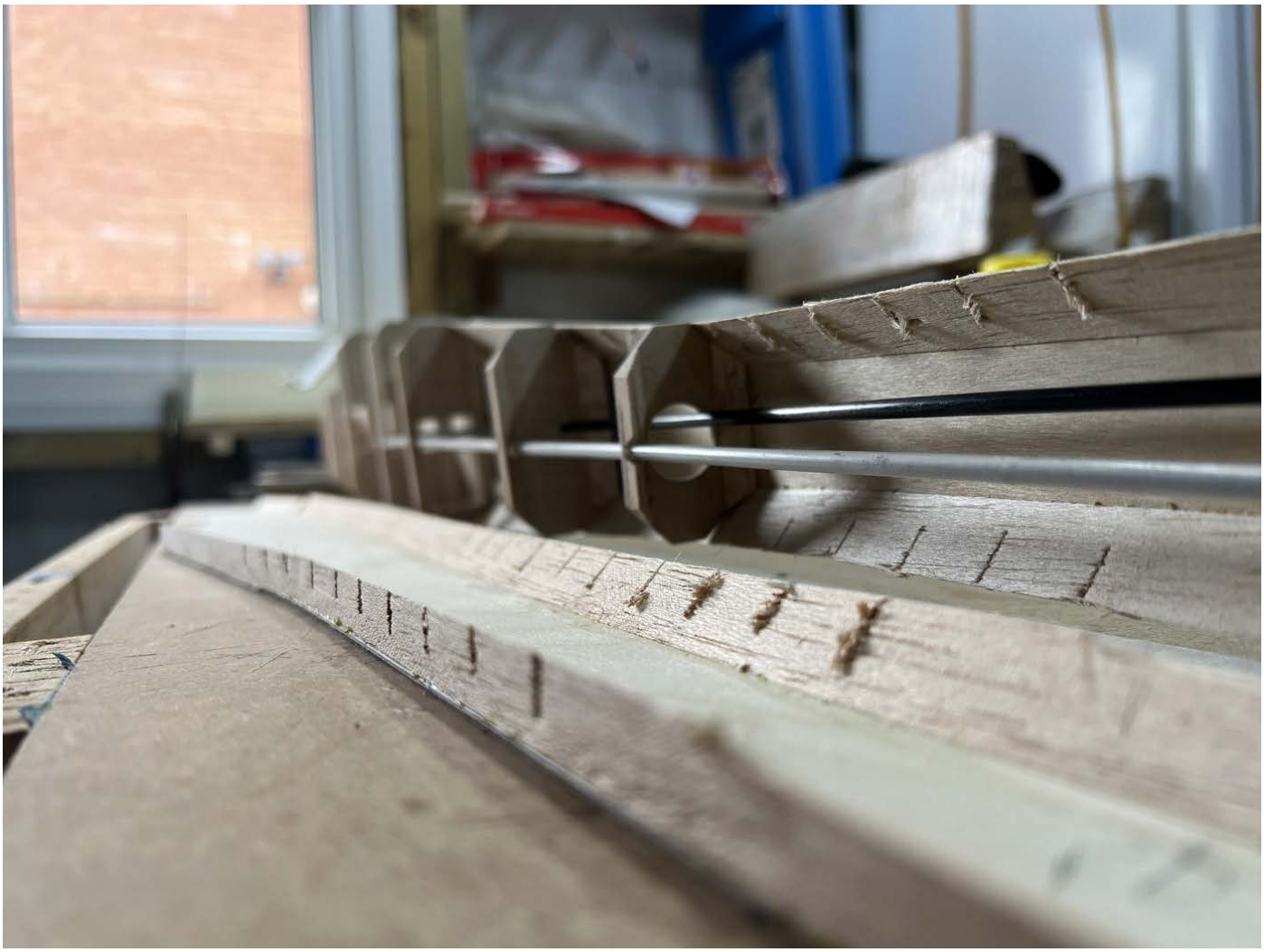
Subsequently this was removed it and I just doubled the whole skin on the internal panel, butted tight up to the fore and aft formers.

By this point, I had also glued the formers to one half, ensuring they were aligned, and the control runs for the ELE and RUD were fitted. (hot tip: the RCGroups thread!)

Give Me Some Relief

This is one way to help the triangle sections conform to the shapes of the

sides and later, the taper of the fuselage towards the tail is to relief cut into the sections: about every 25mm / 1″ I cut into the section, on the side facing the **inside** of the curve, but not all the way through, to allow it to compress.



Relief cuts, part way through.

Here, I'm thinking ahead to joining the two fuselage sides, showing the added relief cuts to the triangle sections to allow some flex. (It's a double edge sword: In the left-hand side, I chose the stiffest sections, now I need it to bend!)

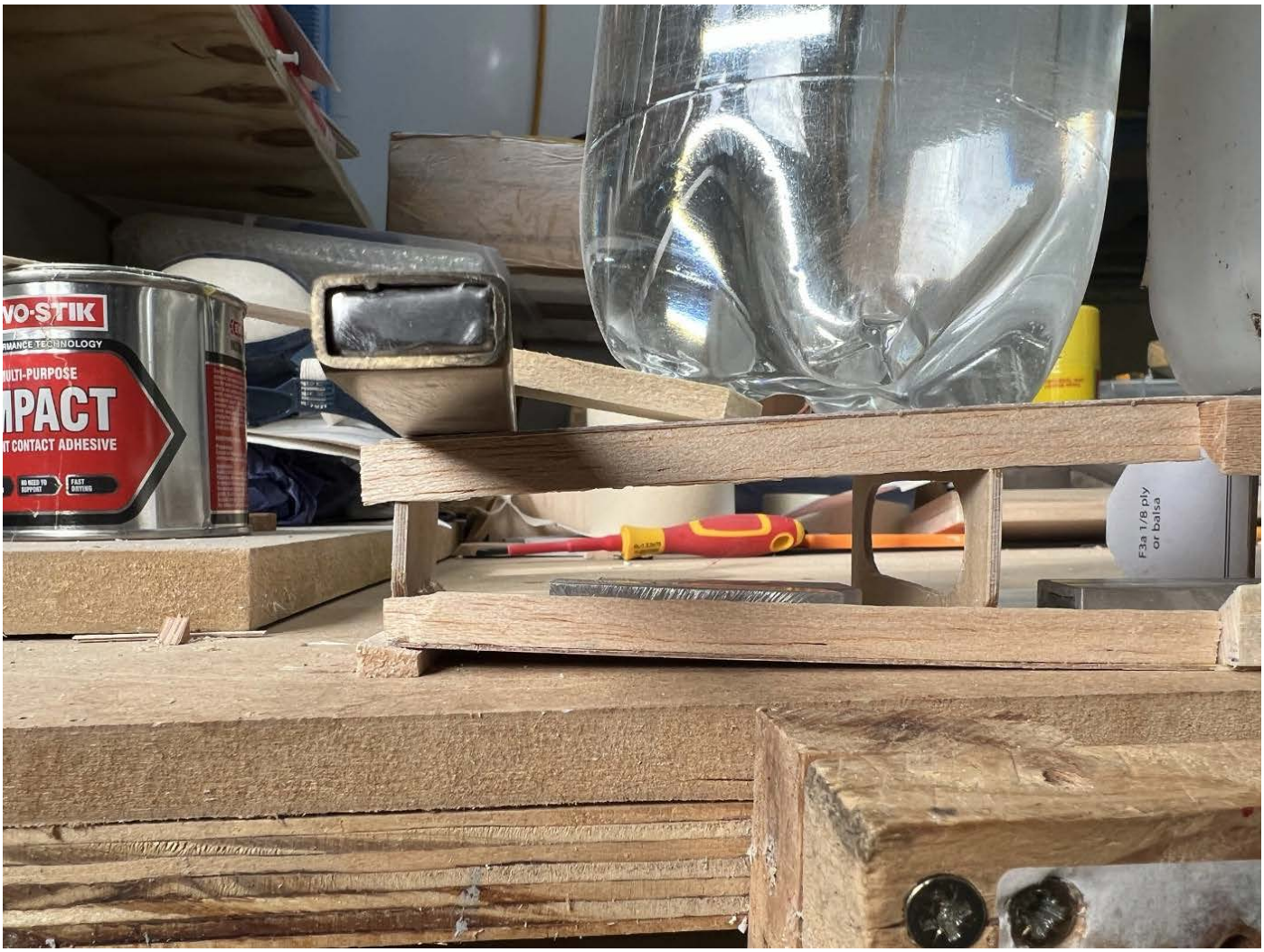
Gluing the two halves was a multi-step process. The triangle sections and formers help to keep the length aligned, but the taper of the nose and tail

need some thought to ensure an even taper.

First up: bond the mid-section, where the two halves are parallel. An indication of the strength the triangle sections / ply formers: the two jugs are five litres of fluid (~5kg / 12lbs) each and the bars are lead filled stainless box section (400g / 14oz) each.

Two sides, glued together and weighted while the glue cures.

Once cured and with some Heath Robinson (Google it) weights and shims, glue the nose: bending the nose sections together, evenly while the glue set. Remember the almost instant impact adhesive — it works very well in this situation!



Weights and shims to taper the nose.

It was a similar story at the tail end: glue the last of the triangle section, while forming the gentle taper (with weights and shims), **but** leaving the last former and remaining length from the last former back to the tail unglued. The reason being, we need to remove some triangle material to get the correct taper and to allow the tail to be fitted.

More weights and shims to get the tail taper right.

The result should be the basics of a fuselage, straight, true and light!

Ta da!

As mentioned, I have left the tail section of the two halves, from the rear former back **unglued** while I work the tail and the all-moving tail surfaces.

A sneak peak at Part II, coming up!

That's It For Now

I hope that my efforts here might inspire you to create your own VTPR glider — or any design for that matter. If you have any questions, please do not hesitate to leave them in the Responses section below, and I will do my best to answer them.

Until next time!

Resources

- ***SlopeAerobatics.com*** — "dedicated to the joy and satisfaction inherent to flying RC glider aerobatics on the slope. The website has an international focus and is meant to showcase the different styles of aerobatic R/C slope flying popular around the world…"
- ***Le Fish*** — "The Le Fish plan was intended as a first step towards my stated goal above, to create a lightweight EPP aerobatics glider that would allow me to take what I love about flying a Weasel and go even further…"
- ***Voltij on aeromod.fr*** — "Avec le Voltij, nous avons réussi à concilier des objectifs antagonistes : une aile parfaitement adaptée à l'acrobatie, mais aussi performante pour prendre de l'altitude…"
- ***Voltij on air-rc.com*** — "With the Voltij, we succeeded in reconciling conflicting objectives: a wing perfectly suited to acrobatics, but also efficient to gain altitude…"
- ***Ahi*** — "Inspired by years of 'in your face' flying with our Weasel and Alula gliders, the Ahi takes your slope expression to the next level of performance…"
- ***Orcrist 2.5m on RCGroups*** — The RCGroups thread that proved to be the source of so much valuable information.
- ***ExCali — the California Excalibur VTPR Glider Project on RCGroups*** — "We are undertaking our most ambitious project yet, a California reinterpretation of the world famous Excalibur VTPR glider…"
- ***What does VTPR stand for?*** — Now you know.

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Origin Story

A Fresh Start

Keith Morison

The Fresh set against a backdrop of the east slope of the majestic Canadian Rockies. (image: Ken Lam)

This article originally appeared in the September-October, 2021 edition of Model Aviation Canada*, the official publication of the* Model Aeronautics Association of Canada *(see* Resources*, below). It is reprinted here with their permission and our thanks. — Ed.*

This isn't really a kit review, or even a construction article. You might find some hints and tips later on in the article, but that isn't what this is about either.

This is a story about coming full circle.

The First Time Around

My first model airplane was a 2m span *Drifter II* glider that I built over a winter, and broke on my first attempt to do a test glide. I had proudly marched to the nearby school field, checked my control surfaces, threw the glider...thunk.

The fuse split open and the ground was littered with the pennies I had used for nose weight. No idea what went wrong. I repaired the damage and the following weekend my father drove me out to the local glider club field where some of the guys there pointed me in the right direction...upwind. It was a new concept for me, and made all the difference in the world.

But, this story isn't really about that experience either...but we will visit some more memories from then.

This Time Around

I hate to admit it, but I haven't been actively flying for a long time now. I've kept in touch with the hobby, and the members, through my work with this magazine, and the passion for model aviation is still strong. But...not having shop space, other life priorities, and other hobby priorities have gotten in the way.

Recently, thanks to a new heated garage with workshop space, the desire to pick up the hobby again — just for fun — made me start looking seriously at how to return. Among the priorities is that I wanted it to be easy, fun, and simple.

There is a somewhat new glider contest format known as F3RES. It's a play on the FAI F3 designation for Radio Controlled models, and RES, the abbreviation for rudder, elevator, and spoiler. The simplest controls available

for a glider…just about. If I recall correctly, i didn't build in the spoilers on by *Drifter II*, as they were show as an option.

The spec for the planes is fairly simple, Balsa, Ply, and limited composites. In the case of the model I chose, the *Fresh* F3RES, it used carbon tube wing spars and tail boom. The gliders are launched with a hi-start made from 15m of surgical tubing and 100m of fishing line, stretche out to about 4kg of pull.

Building Kits

Building is dead. Only foamies will be around in 10 years. Building is taking off again. There is always conflicting information out there. The truth of the matter is that it is easy to enjoy the hobby without needing to build a model from a kit, or from plans. But, it always has been. One of my first slope models I ended up having 'custom built' by a friend in the club…and I can't even remember why. I was young, and it involved some building skills that I didn't have…and that could have been it. But even after that, I tended to buy used models or, as time went on, buy composite sailplanes that were high performance ARFs, essentially, needing only radio installation.

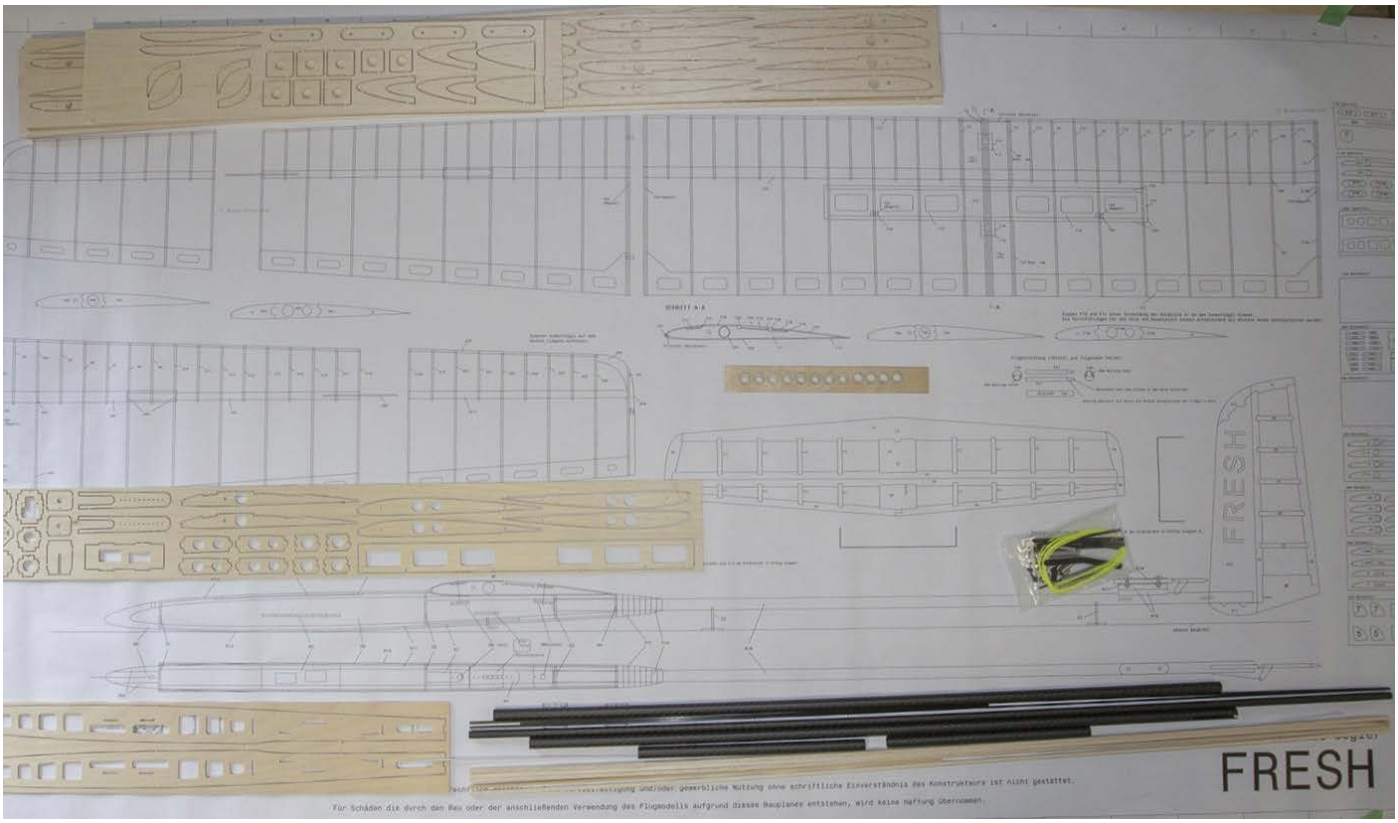
I was never a great builder, for me it was a means to an end. On the other hand, I've known countless people for whom the hobby is all about the building board and the workshop. I can think of one friend who built stunning scale models, but never flew them…instead trusting them to the thumbs of others.

For me, though, I wanted to build my 'return ship' from a kit because I felt that was one of the things I wanted to reconnect with in the hobby. While I don't think it is a mandatory part of being a model airplane enthusiast, I do think building helps you understand the model you're flying and will also keep some 'crashed' models from being discarded.

Building Is Different Now

As I said, most of the planes I flew were bought, not built. In fact, I'm having trouble remembering the last model I built. It might have been the *Decathlon* I spun into the ground, or the *Ninja* sloper that I glued to my hands and had to have removed in the emergency department of the local hospital. Both of those were in the early/mid '90s, and after then I didn't really have a workshop.

But the real comparison, for the sake of this story, is looking back to that *Drifter II* kit. Of course I didn't know what I was looking at, of even doing, so it was great that the instructions were well written and detailed, with the beginner in mind. The kit had everything I needed for the airframe, except for covering, glues, and radio. The ribs were all 'die crush.' Some would say die cut, but they tended to be a bit hard on the wood.



The Fresh comes with all the wood and hardware, providing stunning CNC cut parts. (image: author)

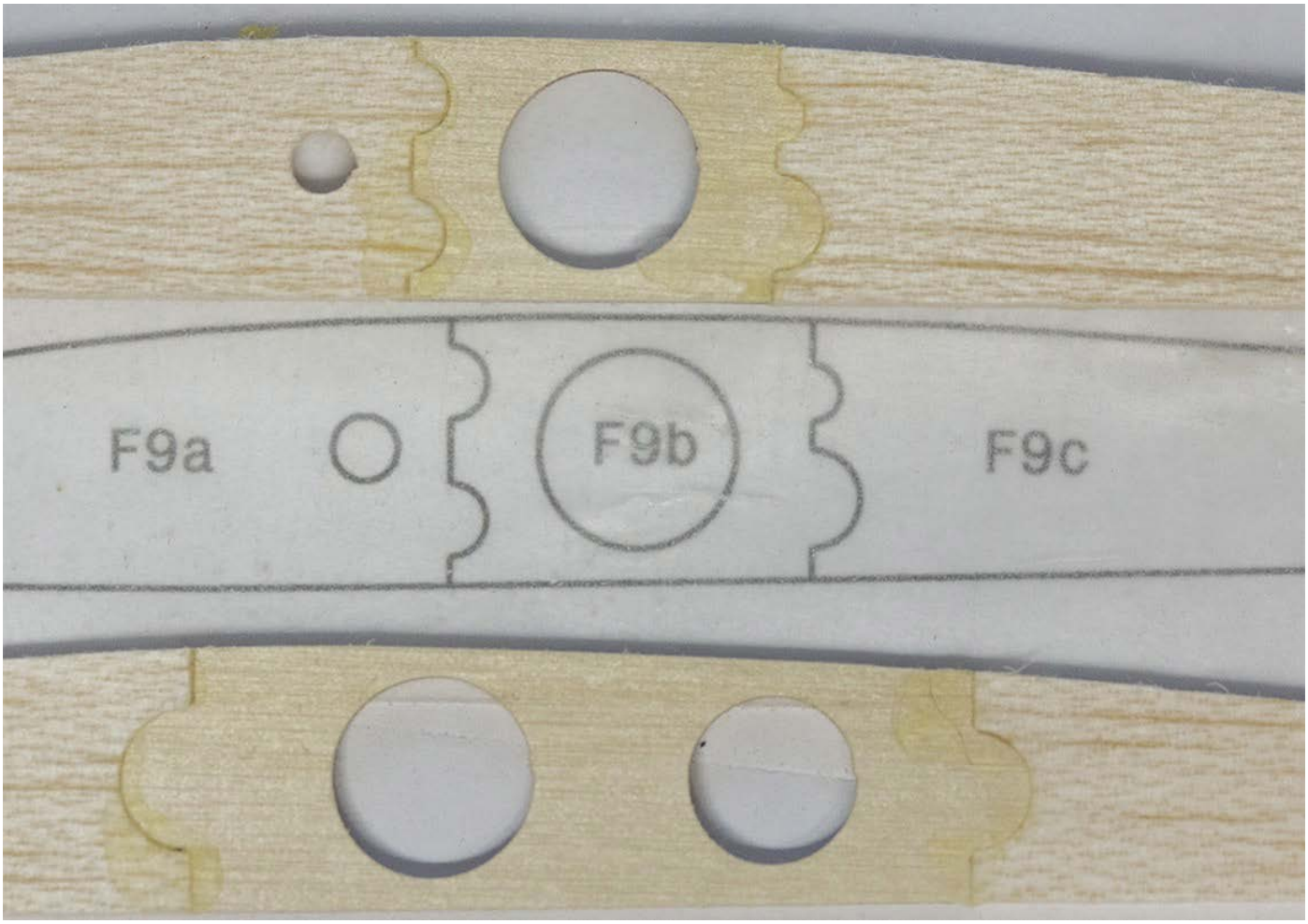
In comparison, the *Fresh* kit I ordered from hyperflight.co.uk featured no instructions, but great plans, CNC cut parts, and supplied and designed in jigging to make the model fit together easily, and straight. There is a translated manual online, but now that I'm through the build, I think it is somewhat lacking. In retrospect, I'd have built the model in a slightly different order, and would have done a couple of things differently.

Sticking Together

Another big difference was the glues available. My *Drifter II* was built with nothing but white glue and epoxy, as needed. A few years later, the first of the cyanoacrylates came on the market...*Hot Stuff*. Later came 'thick' CA , kickers, and 'foam safe' CA.

The *Fresh* called for mostly thick CA with some use of thin CA and kicker. A few key joints called out for 30 minute epoxy. This makes the build process absolutely fly.

Combined with a designed that keyed the main parts together with tabs and slots, and building is suddenly nearly foolproof. In contrast, the *Drifter II* parts were mostly hand cut from the sheet stock, or built on the plans from stick material.



The kit design used a different set of keying features to make sure the right parts, like these hybrid balsa and ply ribs, went together correctly. (image: author)

The extensive use of CAs meant that I only had to dry fit the CNC cut parts, pin them in place on the plans, and then hit them with the CA. Give them a few minutes to cure, and its on to the next phase.

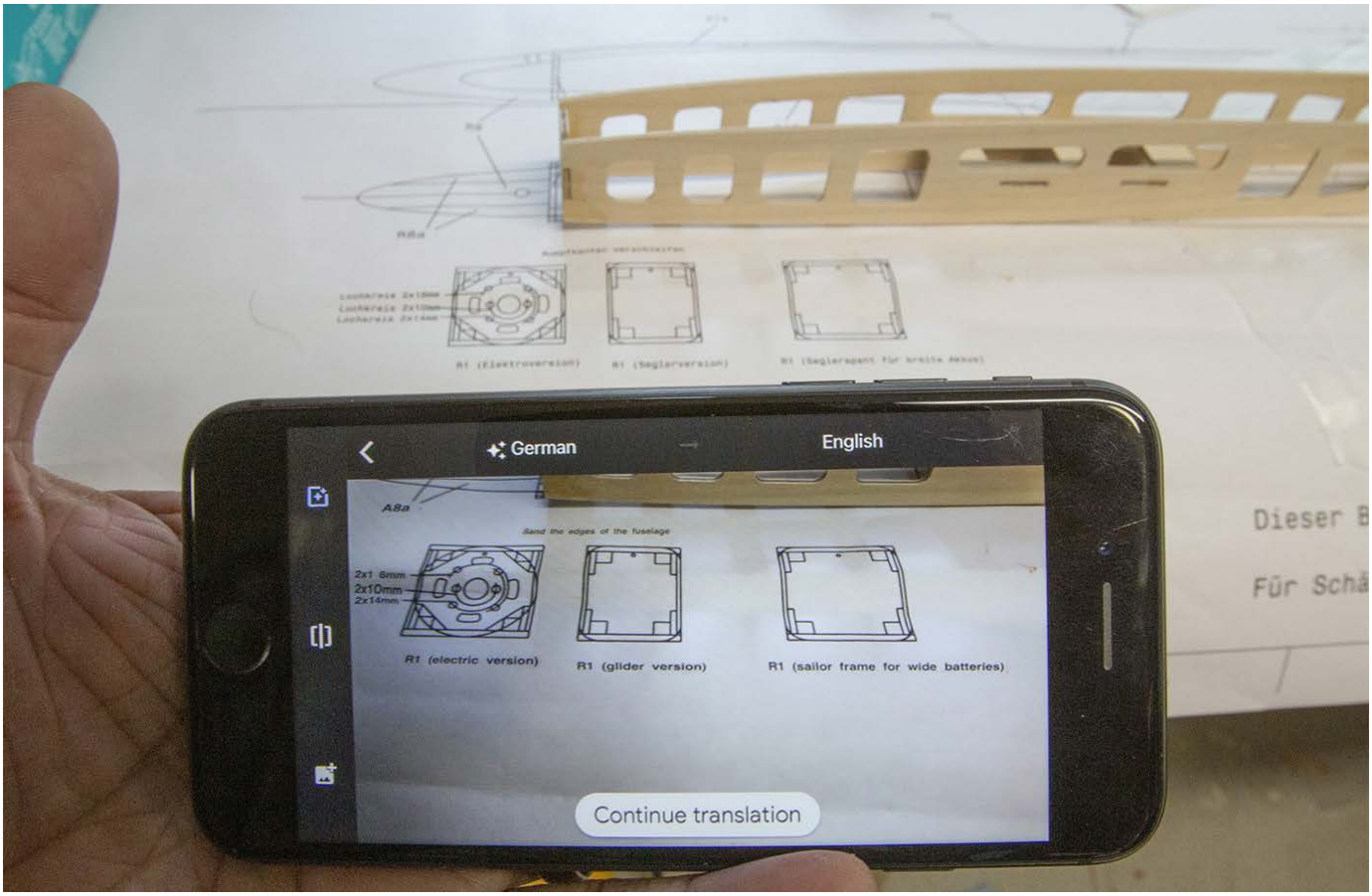
I took my time, building this over three weeks of evenings, but I can easily see going from opening the box to in-the-air in a week if you put your mind to it. A lot better than laying up parts and waiting overnight for the glue to set.

Technology to The Rescue

One of the biggest advantages of technology today was the fact that I could

search out a couple different YouTube videos of *Fresh* builds. As with anything on Youtube, the videos varied in helpfulness, but at least let me see some of the common challenges.

Another pleasant surprise was the ability to use the *Google Translate* app's live translate feature to translate the German plans into English when things weren't clear. Of course the translations weren't always clear either.



Google Translate's (see Resources, below) live translation came in handy from time-to-time with the German language plans. (image: author)

Time Away from The Screen

For me, at least, building time meant a clean break from screen time. Mostly. My shop is in a heated, but detached, garage. The bench is a multi-purpose bench, but built with working close to projects in mind. It's almost perfect for

this project.

I'd tend to go out to the garage in the evenings, and work on the build for an hour or so at a time. One thing my years have taught me is patience, so I'd review the plans, double check the materials, dry fit the parts, and pin carefully in place…when needed.

I'd finish a section, clean up the building board, and make way for the next part of the build…starting with a fresh and clean work surface. Suffice it to say…that's very different from the *Drifter II* build.

A Different Approach

Patience was a virtue in all aspects of the build. Slow and methodical approach to sanding, shaping and finishing the plane paid dividends with great results. Take a close look and you'll see where I rushed the project.

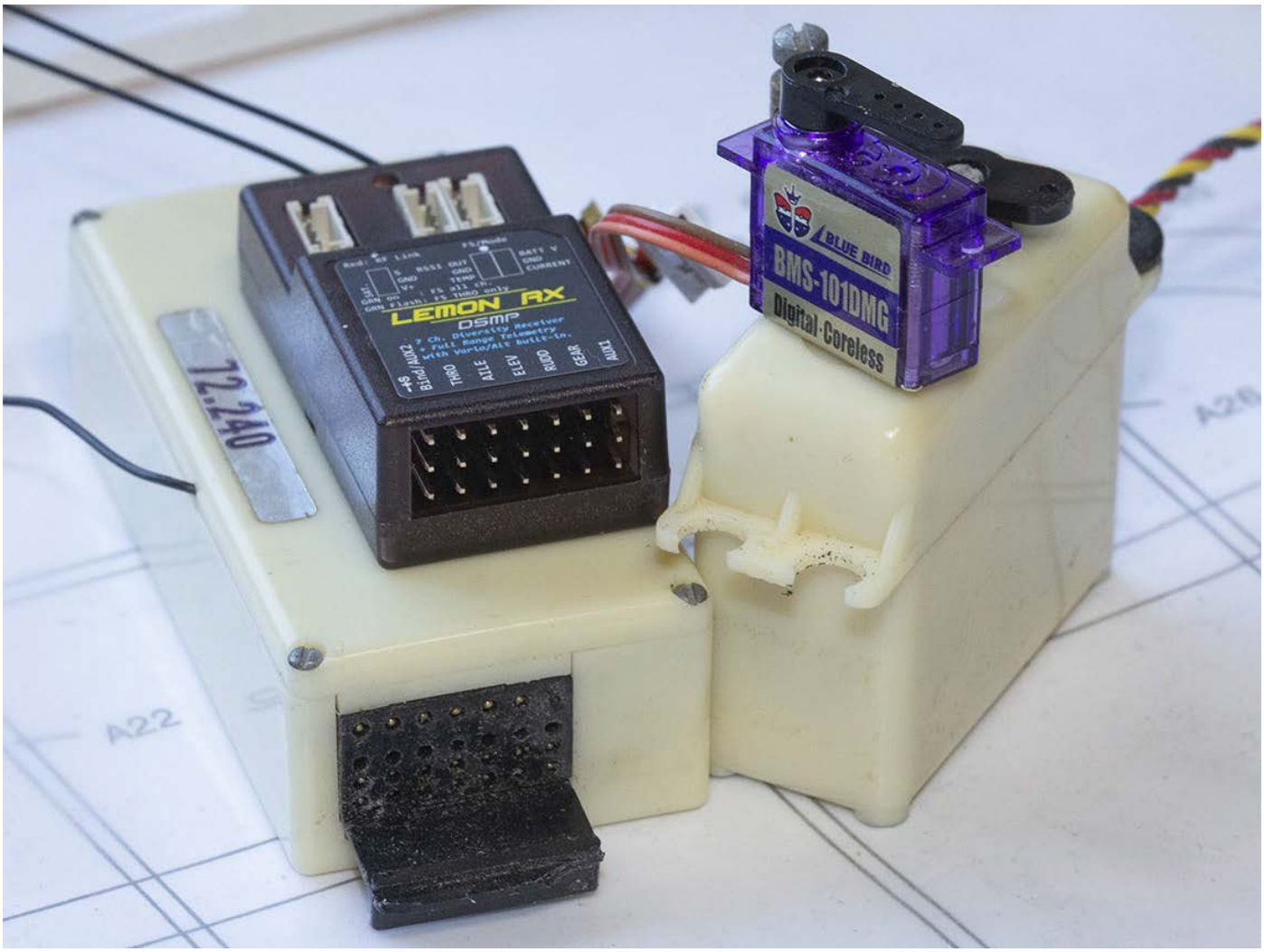
Putting unfinished pieces together and admiring them instead of starting on the next part slows down the build. Lots of that was done…and I don't regret it one bit! (image: author)

I'm definitely older, and possibly wiser, so between the patient approach and a more deliberate approach to things, this build went smooth and easy. Even

though I hadn't 'built' a model for 30 years, it was more than just not skipping a beat…I seemed to be instinctively a better builder. I have absolutely no doubt that the quality of the kit, and the thought behind the construction design helped make it easy.

Finishing

There were challenges along the way for sure. Some radio install issues and some other challenges along the way left me scratching my head and coming up with solutions. The model came in heavy. 17.75oz (503g) 2.45oz, or 16%, over weight. If I were doing it again, I know exactly how I'd shave that weight down…but it isn't enough extra weight to be a huge concern. The two big things would be to replace the solid sheet fin with a built-up one and to put balancing weight in the nose cone…which came with space already hollowed out. Of course that would also mean building the fuse last, which makes a lot more sense for a number of reasons.



What a difference from my original Tower Hobbies (Kraft) receiver and servo to what is available today! The old radio didn't even have servo reversing! (image: author)

The fuse is tight, making the radio and nose weight installation a challenge. The control surfaces use a counter spring and single pull cable to actuate them…so a spring is always trying to pull the controls right and up…and the servos pull on a cable to centre them and turn left and down. It was my first exposure to the system, and that caused some problems…but I did get them working. Carbon pushrods may be in the future.

Covering the model went better than expected. Transparent yellow, orange and red Monokote was used, which no-doubt contributed to the weight gain. I probably could have used a lighter covering film, but old habits die hard.

Flying

Balanced, and with as much throw as I could get out of the tail surfaces, it was time to head out to the field. With club mate Warren Man-Son-Hing, MAAC 14220, offering to give the plane a throw or two, its time had come. The first throw showed it would fly fine. A second throw confirmed a slight trim change, and then it was out with the hi-start, essentially a 115m long slingshot.

Once again Warren threw for the first launch, and the *Fresh* went up like it was on rails. Stable, predictable, and climbing well. The first flight was all about trimming. Expecting it to be up, down and ready for the next launch for more trimming...but that was interrupted when the wing tipped up...lift. I turned into the thermal and started circling, and the *Fresh* held its ground and even gained some height. After a couple more flights to fine tune the CG, expo, and throws...it was time to call it a day. A successful day.

The author tosses his Fresh glider into the air on the end of a hi-start. (image: Ken Lam)

So…What's This About Again?

In the few flights I had with the *Fresh* I know, without a doubt, that it flies better than the last small glider I owned, a high performance pre-built sailplane from Europe. Now, it could be that I just feel more affinity with the plan I build up from sheets of wood than I did with something that arrived just waiting for radio bits…but that reality doesn't matter. The airplane I built with my own hands flys well, has a unique colour scheme, and gave me hours of relaxation and pleasure even before I took it out to the field for its first flights.

A perfect day for a first flight, the Fresh flew straight off the building board and into the thermals! (image: Ken Lam)

There is a growing number of model airplane enthusiasts who aren't builders. Foamies and ARFs have opened the hobby to a range of people who otherwise may not have tried it. But, if you're one of those who've never built a model to fly...think about trying it. Many of today's kits are simpler to build than ever before, and I'm sure you'll find experienced builders around you more than willing to give you some tips and advice. There is a definite thrill of flying something that is uniquely yours.

Fresh Specifications

Wing Span	79in	**Wing Area**	552in²
Length	51.2in	**Flying Weight**	15.3oz
Wing Loading	4.0oz/ft²	**Aspect Ratio**	11.2
Wing Airfoil	AG36mod / G37mod	**Dihedral**	11.0°
Controls	Rudder, elevator, spoiler		
Sold by	hyperflight.co.uk		

Resources

- Model Aeronautics Association of Canada — Canada's national organization supporting the development of model aviation in Canada.
- Model Aviation Canada — the September-October, 2021 edition in which this article was first published.
- Google Translate — your linguistic gateway to the world!

Keith Morison started the hobby by learning the basics on gliders with the intent of moving up to power models. He regularly flew gliders for over 20 years, and has only owned two power models. He managed two World Championship glider teams and was contest director for a World Championship event held near Red Deer, Alberta, Canada. He is a former Sailplane Chairman and Zone Director for MAAC, and has been publishing

Model Aviation Canada *since the turn of the century.*

*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**.*

Albert E. Hastings | America's First National Glider Champion

Clarifying this pioneering pilot's importance to the history of soaring.

Gary B. Fogel

Franklin "Bud" Iszard, Al Hastings, Warren Eaton and Hawley Bowlus at the 1930 National Contest. (photo courtesy of National Soaring Museum)

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Introduction

The period of 1929–1931 was particularly important to the growth of soaring in the United States. Inspired by the success of Lindbergh's Atlantic crossing, yet mired in the depths of the Great Depression, young aviators struggled to find their way to the sky without the added expense of motors. Like-minded individuals formed local clubs with associated glider meets. Others seized the moment to convert these local experiences into a national movement, a movement that helped grow the sport prior to World War II. Many of these heroes of soaring are well known; Ralph Barnaby, Lewin Barringer, Hawley Bowlus, Roswell Franklin, Warren Eaton, etc. Appropriately, many of these individuals have been recognized by the Soaring Society of America with induction into the United States Soaring Hall of Fame. However, one pilot in particular, Al Hastings, remains an enigma. Inducted into the Hall of Fame in 1973 largely for his skill as the first (and second) National Glider Champion in 1930 and 1931 respectively, his life remains mysterious. Even his biography associated with the Hall of Fame makes note of this:

> *"Sadly, as is so often true, we know very little about this member of the Soaring Hall of Fame. We tend to think of our own ambitions and successes, certainly worthwhile. We love the sport; we want to do our best. However, our successes and accomplishments rest on the shoulders of those who came before us. Consider for a moment Al Hastings. Who was he? What did he accomplish? What do these early pioneers mean to us? Why should we care? We should care because the sport we love today exists due to the triumphs and accomplishments of those who came before us. Al Hastings is one such person." [1]*

It is hoped that this biography helps to clarify Hastings' importance to the history of soaring in the United States.

Early Beginnings

Albert Eurotas "Al" Hastings was born March 30, 1902 at Colorado Springs, Colorado, to Frederick Reed Hastings and Mary C. (Bacheler) Hastings. One of three sons, Albert was named after his paternal grandfather, Reverend Albert Eurotas Hastings of Detroit, who had died in 1880. Sadly, Al's father, Frederick died on February 3, 1914 when Al was only 11. For a time he continued to live with his mother, Mary, in Colorado Springs. Al later graduated from the Kemper Military School in Boonville, Missouri.[2] The Kemper Military School was established in 1844 and closed in 2002, and for a time in the late 1890s and early 1900s advertised itself as the "West Point of the West." Will Rogers was to become its most famous alumnus. After high school, Al enrolled at the University of Iowa at Iowa City, Iowa, to study art as a member of Beta Theta Pi. While in Iowa, Al took his first flight in a plane.[3] It was also in Iowa where he met Miss Mildred E. Wyland of Walnut, Iowa.[4] Al and Mildred soon married at her parents' home in Lincoln, Nebraska, in December 1922.[5–6] For a time they both attended the University of Nebraska in Lincoln. Al completed his second year of college but then, for unknown reasons, they moved to Washington State, the first of many moves for the couple. Upon arriving in Washington in 1925, Albert started flying airplanes near their home in Longview, Washington.[7] Al bought a powered aircraft, although the plane was demolished not long after by Harry L. Smith who had borrowed the plane. Entering a spin that became unrecoverable, Smith survived but the plane did not.[8]

Al and Mildred started a family with the arrival of their son, Frederick Reed Hastings (Al's father's namesake), on September 20, 1926. There isn't much known about Al's time in Washington between 1926 and 1928. It is assumed that he still worked around powered aircraft. By 1928 the family had moved once again to Oakland, California, where Al took the position of Field Manager for Golden State Aircraft Company at the Oakland Airport.[9] His

daughter, Shirley Barbara Hastings, was born May 2, 1928 at nearby Alameda. A month later, Al became a dealer for Alexander Eaglerock in northern California.[10] With his career in aviation finally on the rise, Hastings established the Sierra Aircraft Company at Marysville, California near Yuba City for $25,000 and served as its President.[11] Formation of the company was co-shared with Don M. Cornell (sales manager) and Jim Reid (pilot). It should be noted that there is no known relationship between Al Hastings and Charles Cook Hastings, the operator of a popular line of general stores during the Gold Rush. Charles Cook Hastings established Hastings Ranch in Pasadena in the 1920s, complete with its own airport (known as "Sierra Airdrome" or "Hastings Airport"), also complete with his own "Sierra Aircraft Company."[12] The oddity of two Hastings both in California operating aviation companies at the same time with the same company name is too unusual not to mention, but a connection has yet to be confirmed.

Al Hastings' Sierra Aircraft Company in northern California offered regional transport from Marysville to other cities in northern California. In order to help publicize the company, he flew from Marysville to Vallejo in an Alexander Eaglerock to attend the opening of the famous Carquinez Bridge.[13–14] Business was good and the office in Marysville was expanded in mid-July at Cheim Airport just to the northeast of town.[15–17] Sierra Aircraft Company also operated from a private field about two miles out of Chico, California.[18] The Chico Airport was dedicated on September 30, 1928 and the Sierra Aircraft Company staged the main celebration including a broad assortment of planes and an address by Army Lieutenant Joseph R. Hargrove. As the event's main organizer, Hastings also addressed the crowd of 6,000 people.[19] In March, 1928 Hastings visited Paradise, California, in an attempt to convince the Paradise Progressive Association of the benefits of having their own local airport (likely with service by Sierra Aircraft Company).[20]

In the spring of 1929, the Hastings family moved yet again, this time to San Diego, California. There Hastings enrolled as a student at Airtech, a popular flight school at Lindbergh Field. It was likely that he focused on an advanced aircraft training course offered at Airtech, including night flying towards his transport pilot's certificate. However, upon arrival to Airtech, Hastings was thrust not only into a training program but into the arrangement of a midsummer social for Airtech personnel at the Thursday Club near Sunset Cliffs on July 20, 1929.[21] Hastings also became team manager for Airtech's "indoor baseball" team and in early August, the Airtech team beat the rival Ryan Aircraft team 10–6 to decide the "Civilian Air Championship of San Diego." The family residence at 3785 Dana Place was within walking distance of Lindbergh Field.

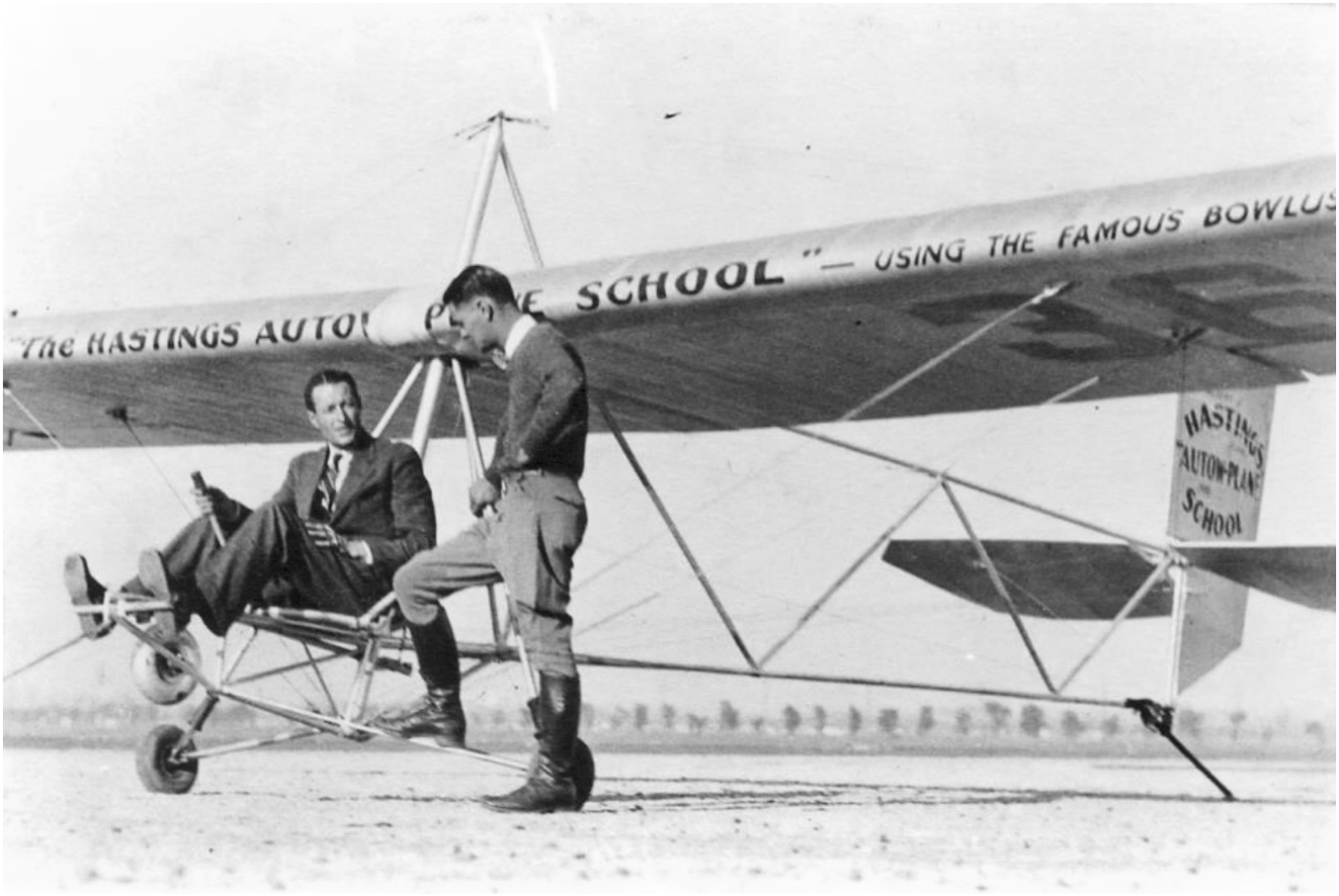
Primary glider instruction at Mines Field, Los Angeles with Hastings shown standing on the right.

Students at Airtech were exposed to many facets of aviation and taught by very experienced instructors. His small class of five students included

Douglas Corrigan, who earned his transport license in October 1929 and would later earn the title "Wrong Way" Corrigan, as a result of his "unintentional" flight from New York to Ireland in 1938.[22] One of the Airtech instructors was William Hawley Bowlus, who was also in the process of flight testing his #16 sailplane, the Bowlus SP-1 at Lindbergh Field. Bowlus's interest in gliding was infectious. In September, 1929, Bowlus easily took first place honors at the Pacific Coast Glider Meet, held in Pacific Beach, then a small town on the outskirts of San Diego. It is quite likely that Hastings was in attendance. Al quickly became hooked and started to take glider instruction at the Bowlus Glider School, also located at Lindbergh Field. Already adept at piloting, Hastings rather quickly received U.S. third class glider license #32 under Bowlus's instruction.

In early December 1929, a large contingent of glider aficionados from the Bowlus Sailplane Company and Airtech drove north to attend the very large Redondo Beach Glider Meet west of Los Angeles. While the winds required for ridge soaring were rather non-existent, the San Diego contingent still performed well with John C. "Jack" Barstow winning the grand prize, William Van Dusen taking first place for distance, and with J. Allison Moore and Wm. Hawley Bowlus also taking prizes. With three large Bowlus sailplanes entered in the meet, Hastings had a chance to fly in what was his first of many glider contests to come.[23] Just two weeks later, over December 14–15, 1929, six students from the Bowlus Glider School qualified for their first class glider licenses at Plumosa Park near Loma Portal, a suburb of San Diego. These students included William Van Dusen, J. Allison Moore, Earle R. Mitchell, Roy Pemberton, Jack Barstow, and Al Hastings. Al earned second class glider license #7 and first class glider license #6 in the United States. Having observed Hastings' managerial skills, Bowlus hired Al as sales manager for the Bowlus Sailplane Company.[24] In the midst of the Great Depression, Bowlus needed all the help he could get to sell sailplanes.[25]

In January 1930, Bowlus envisioned a set of Bowlus Glider School franchises providing gliding instruction at cities in California. Hastings gravitated to this idea. Soon thereafter, the Hastings family left San Diego for Los Angeles, with Al establishing a Bowlus Glider School at Mines Field (the current site of Los Angeles International Airport). Bowlus primary glider T-2 serial #2 (identification mark 365V) was sold to Hastings as a part of the plan, with some undisclosed proceeds of the franchise coming back to the Bowlus Sailplane Company. While Hastings established this first glider school in Los Angeles in February, 1930, Bowlus and Charles Lindbergh conducted gliding experiments at Lebec, California, to the north of Los Angeles.[26]



Al Hastings seated in the Bowlus primary glider at Los Angeles.

When Frank Hawks decided to make a transcontinental aerotow in the Franklin *Eaglet* glider, he tested the idea in late March 1930 with a flight

between San Diego (Lindbergh Field) and Los Angeles (Mines Field) on March 28, 1930. Hastings would have been at Mines Field at the time of this test, and it is likely he assisted in some manner, although there is no direct evidence.[27] Hastings' glider training program continued at Mines Field throughout April and into June 1930[28–29] complete with auto-tow demonstrations for the official dedication of Mines Field as Los Angeles Municipal Airport on June 8, 1930. His last flight that day included a perfect landing directly in front of the administration building. Riding on the growing popularity of gliding, his instruction program gained considerable traction. By July he was also training members of the Union Oil Glider Club at Vail Field southeast of downtown Los Angeles, although it isn't clear if this was as a part of the Bowlus Sailplane Company or on his own accord.[30]

The 1930 Nationals

The Bowlus Sailplane Company folded in mid-1930 due to the Great Depression. Bowlus moved to the east coast to continue his gliding instruction and sales. It remains unknown what became of the Bowlus T-2 primary glider that Hastings used for instruction, but Hastings also closed his Bowlus-related glider school at Mines Field. On September 7, 1930 the Hastings family left their home in Inglewood, California, driving to Monticello, Iowa, to visit Mildred's sister. Just prior to leaving, Al Hastings noted that he would be back, and planned to fly a glider from the top of Mt. Lowe, the namesake of American Civil War aeronaut, Professor T. S. C. Lowe.[31] The Hastings family arrived at Monticello on September 15, and Mildred and the children stayed there while Albert continued on to Elmira to attend the 1930 National Glider Contest, the first of its kind in the United States.[32] Hastings arrived at Elmira three days later as the first out-of-state pilot to report for the competition.[33] According to the press, Hastings had 376 glider flights to his name prior to his arrival at Elmira. Hastings had not trailered a glider

along with him from the west coast. Instead, he made arrangements with Wallace Backus of New York City to team up with him and make use of Backus's two Franklin PS-2 utility gliders for the contest. They would help crew for each other during the meet.

As was the case at Redondo Beach in 1929, the winds required for ridge soaring failed to materialize during the early portion of the contest. On September 24, the lack of a contest but plethora of expert instructors generated an idea in the mind of Donald Walker, then manager of the National Glider Association. He personally selected a Navy aircraft Inspector by the name of Lt. Roland Myer and Al Hastings to help instruct locals in the art of gliding in an effort to generate improved local interest. Al jumped at the chance and became a rather outspoken advocate for local sponsorship of a group of young boys interested in their own glider club at Elmira.[34]

Once the winds arrived, Hastings really proved his talent as a pilot. Taking off from Elmira's South Mountain on the next to last day of the event, he managed to soar 7 hours, 43 minutes and 11 seconds in his Franklin PS-2. He was forced to land only because of darkness as the U.S. Dept of Commerce required lights for night flying and such lights had not been installed on the Franklin.[35] The flight was judged by R. T. Walker, and was billed as a new national soaring endurance record. (Although Hawley Bowlus had flown for over 9 hours at Point Loma near San Diego and although Hastings' fellow glider school classmate Barstow had soared for over 15 hours at the same location in 1930, both were considered unofficial). During the meet, Hastings also had soaring flights of 3 hours, 16 minutes; 2 hours, 45 minutes, 15 seconds; 1 hour 47 minutes, 35 seconds; and 45 minutes and 15 seconds. While German soaring ace, Wolf Hirth, had amassed more total points than Hastings at the contest, Hirth could not claim the championship due to his German citizenship. Thus, Hastings was crowned America's first ever National Glider Champion and received the Evans Trophy personally

from Robert B. Evans, son of Edward S. Evans who had helped guide the burgeoning gliding movement in the United States. Hastings also received a check for $250 (roughly $4000 in today's dollars).[36–38] Hawley Bowlus had also made the journey to Elmira but was unable to outperform his former student, Hastings.

Al Hastings receiving the Evans Trophy as America's first national glider champion. Insets feature (left) Wallace Backus, altitude winner, and (right) Wallace Franklin, spot landing winner. (Elmira Star-Gazette, October 6, 1930)

Al Hastings was immediately the subject of considerable national notoriety. At age 28, he took some time off to survey soaring sites in Massachusetts.[39] Realizing that the same glider training program he had helped establish in

Los Angeles could also work in Elmira, he began instructing students at Elmira. With assistance from Wally Backus and using the same Franklin PS-2 used to win the Nationals, they established the glider club Hastings had championed during the meet.[40] The first meeting of what would become Elmira's first glider club was October 21, 1930, with Sherman P. Voorhees elected president.[41] This club became known as the Mathias C. Arnot Gliding and Soaring Club of Elmira, named after Arnot who had built Elmira's first glider. Hastings then established a glider school, a course of instruction, complete with glider licensing. To graduate, each student was required to have a minimum of 3.5 hours of primary instruction (auto towing), and 1.5 hours of secondary instruction (gliding from a hill). 16 students signed up for the instruction program at the club's first meeting for a price of $35 each (the equivalent of $540 in 2020 dollars) with primary instruction at Elmira's Caton Avenue Airport. Some of Hastings first students to receive their glider licenses included Franklin Iszard, Edward Barton, Robert Atwater, Daniel Lewis, Holmes Shoemaker, Norman Weiberg, and Bramwell Terrill.

Al Hastings instructing Franklin Iszard in a Franklin PS-2 glider, perhaps the same as the one used by Hastings to win the 1930 Nationals (Elmira Star-Gazette, October 27, 1930).

By the end of October 1930, Mildred and their two children left Iowa to join Al in Elmira and establish residence.[42–43] Hastings was invited to participate in a two-day benefit airshow at Caton Avenue Airport on November 9, 1930 to raise money for the unemployed. He was aerotowed to 2,000 feet at dusk, and made a nice flight for the spectators with a landing illuminated by the headlights of many cars.[44] 10 days later, he gave a lecture entitled "Building and Flying Model Gliders" to the local Elmira Air Cadet Corps.[45]

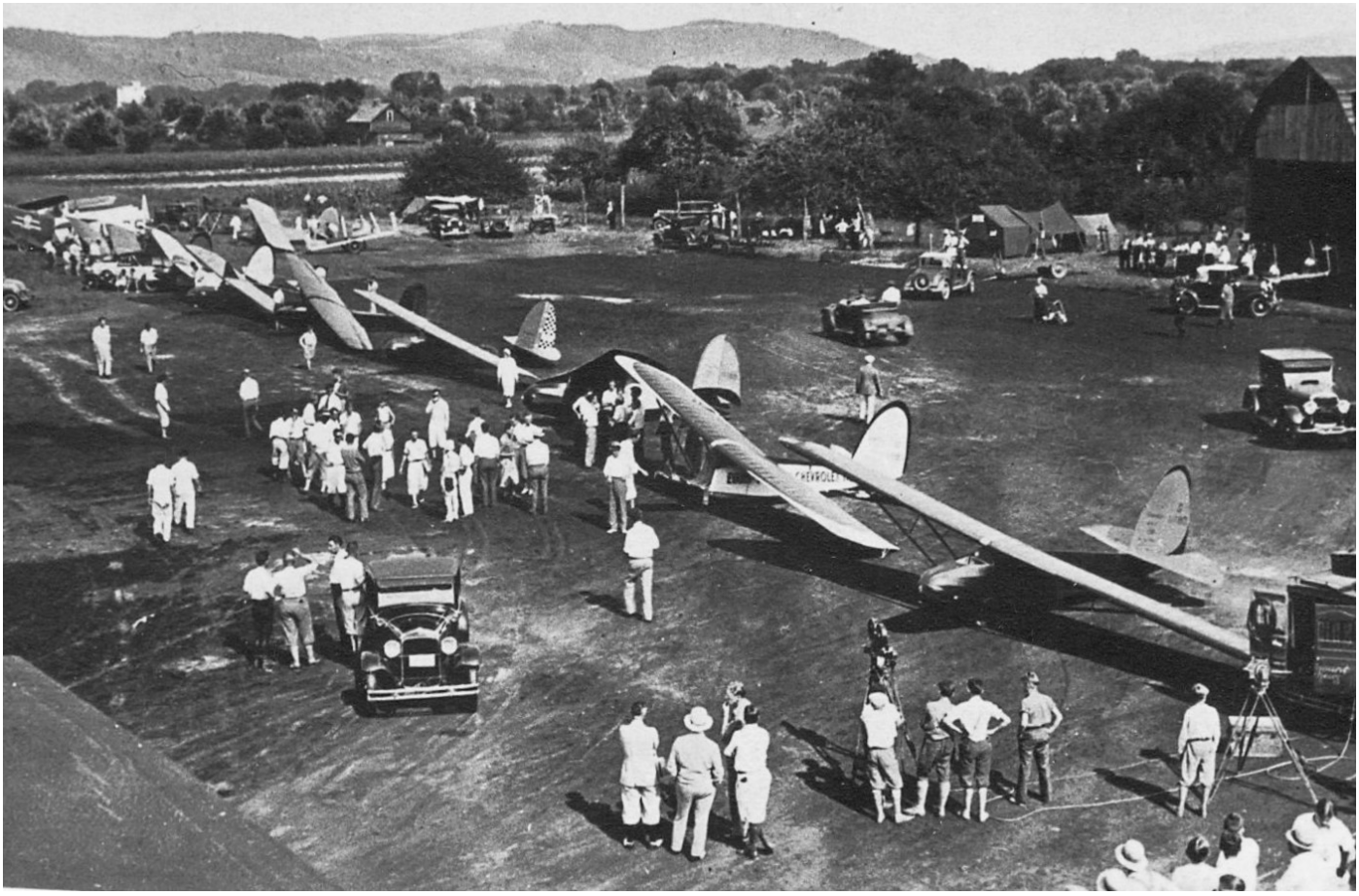
Over the winter of 1930–1931, Hastings likely focused on ground school instruction, as there isn't much recorded of any flights. His notoriety

remained intact, as by spring 1931, Hastings' national championship was mentioned once again in *Popular Science*.[46] On May 6, 1931, Al helped Warren Eaton make an auto-tow from Norwich Airport. Eaton creatively glided back to a nearby hill, found some lift, reached a comfortable altitude of 2,100 feet and soared for 1.5 hours before being forced back down due to rain. It was believed to be an unusual unofficial duration record for an auto-tow.[47]

By mid-1931, glider looping records started to become a "thing," with Lyman Voepel making several well-publicized loop records in a Heath Super biplane glider. Not to be outcompeted, on June 16, Hastings made five loops in a Franklin P-S-2 at Elmira. It was believed to be the first time a loop was made with a monoplane glider.[48] Late in June, Hastings was one of only a handful of pilots who received special permission from the Department of Commerce to use aerotowing as a form of launch.[49–50]

The 1931 Nationals

In preparation for the 1931 National Glider Contest, Hastings arranged for the purchase of a brand new Franklin PS-2 for a local glider club sponsored by Evans-Dunston Chevrolet. He drove to Buffalo to bring the glider back to the club in early July.[51] Hastings had been so busy with training, that it was said he had trained roughly 100 local glider pilots in the Elmira region between the 1930 and 1931 Nationals, with his students making more than 1000 flights and having logged more than 70 hours of airtime collectively.[52] His efforts were clearly making a difference and helped to solidify Elmira as a "soaring capital."



The scene at the Second National contest 1931 at the old Caton Ave. Airport of Elmira, New York.

The National Glider Contest was held once again in Elmira in August 1931. Hastings flew a Franklin PS-2, likely the one that he had so recently retrieved from Buffalo. Early in the meet he made a nice distance flight from the East Hill in Elmira to Erin, NY, a distance of 15 miles in 2 hours.[53] On August 12, he took off from Elmira Airport via aerotow at 10:07:30 a.m. and climbed on the lift at South Mountain. 7 hours and 30 minutes later he landed back at the airport at 5:37:30 p.m.[54] Interestingly, Hastings's flight was nearly matched perfectly by another pilot, Bud Stickler, who took off via shock cord from South Mountain at 10:03:00 a.m. and landed back at South Mountain at 5:33:05 p.m. for a total time of 7 hours, 28.5 minutes. It was a great day of soaring at the Nationals! Hastings finished the meet first in duration, second in altitude, and third in distance. The strong showing was good enough for Hastings to finish in first place overall and retain his title as National Glider

Champion.[55–56]

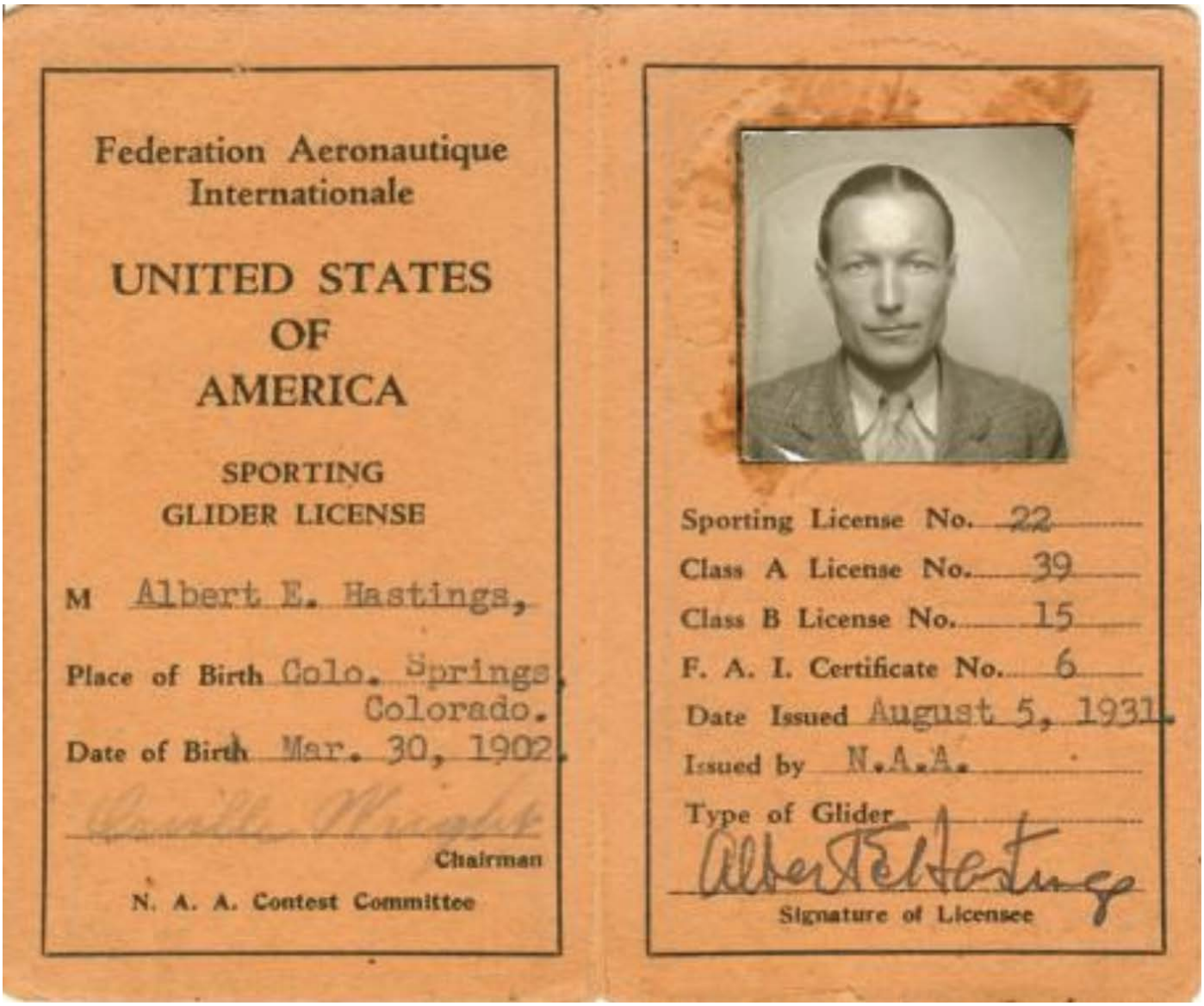
A Franklin PS-2 taking off by bungee cord from one of the hills near Elmira, NY.

Cross Country

After the Nationals, Hastings left Elmira briefly during the second week of September 1931 to spend a week training glider students in Pittsfield, Massachusetts. However, state officials closed the glider school shortly after it opened because it failed to meet some state requirements.[57] Hastings returned to Elmira and soon embarked with the family on a planned tour of the midwest and southwest to help promote gliding. The route also took the family through Nebraska to see family. With winter arriving and Hastings in need of income, he took the opportunity to find warmer climes.[58]

In October they visited Iowa City, Iowa. Hastings provided a gliding exposition at Cedar Rapids Airport on October 10–11.[59] He then hooked up with an aerial troupe making airshows throughout Nebraska. This "All Nebraska Air Tour" had its first demonstration on October 21 at Burwell, Nebraska with Hastings making demonstrations by both auto-tow and aerotow.[60] From there they continued on to Cozad, Nebraska, but the show scheduled for October 29 was canceled due to high winds.[61] Hastings

continued to be somewhat of a gliding celebrity as the October 1931 issue of *National Power Glider* magazine had a full article that focused on Hastings and his gliding school at Elmira.[62]



Al Hasting's glider license from 1931.

Albert Hastings made it back to Los Angeles. It is assumed that the family also came with him but it is possible that they also stayed with relatives in Iowa. 1932 was the year of the 10th Olympic Summer Games in Los Angeles and as such many activities were planned throughout the first half of the year in anticipation. A two-day glider meet was planned by the American

Gliding Association at the Hollywood Riviera Gliderport at Redondo Beach. Hastings entered in the contest, perhaps with his Franklin — it is unknown. On the first day of the contest, the winds were great and five sailplanes were soaring in competition. He finally had a soaring flight at Redondo! But as if right on cue, the wind died very suddenly, forcing all five planes that were in the air to land on the beach below nearly simultaneously. In an attempt to avoid traffic, some sailplanes made "watery" near-shore landings. Hastings was one of them, along with his friend Harland Ross.[63]

Hastings remained in the Los Angeles area through the winter and into spring of 1932. It isn't clear how he was employed at this time, but in June of 1932 he managed to make another "first" for gliders: the first aerotow behind an autogyro. Taking off from United Airport at Burbank, California, he climbed behind a Kellett autogyro flown by G. H. Miller. The stunt was arranged as a part of a short movie being produced by Hastings and a man named Vic Clark.[64–65] It remains unknown if the movie was ever released. Later that same month, a three-day "Pre-Olympic Glider Contest" sponsored by the Curtiss-Wright Flying Service was held at Glendale's Grand Central Air Terminal. 20 competitors entered in the meet, flying 10 gliders, including Hawley Bowlus, Don Stevens, Frank Hutchinson, Harland Ross, and Al Hastings. 10,000 spectators watched the activities over the three days as the entrants competed for duration, spot landing, altitude and the unique "landing over a hurdle" event. Most of the flights were made by auto-tow. However, on one day Hastings was aerotowed to 2,000 feet and completed three loops on his return for the crowd. His stunt was good enough for first place in the altitude category and he managed to capture first place overall with 22 points. Harland Ross placed a close second with 19.[66–73]

California to Texas via New Mexico

Hastings' whereabouts become a mystery after this time. For some reason

he chose not to defend his championship at the 1932 Nationals, possibly due to a lack of financial resources. However, he did remain connected to the soaring community. In 1933 he was selected by the National Aeronautic Association to serve on a new NAA Committee on Gliding with Warren Eaton as chair.[74–75] It is possible that Hastings simply took the time to be with his family, either in the Los Angeles area or in the midwest. By 1940, he had taken a job as a foreman of the Houston Packing Company, living with his family in Harris, Texas.

At the beginning of WWII, the federal government took quite some time to understand the true importance of gliders to the war effort. Eventually a glider training program was established. Hastings was requested to serve as a glider instructor and eagerly did so at the Lamesa Advanced Air Force Glider School in Lamesa, Texas, starting in 1942.[76–77] After the war, he and the family moved yet again to Albuquerque, New Mexico, where he helped to establish the Civil Air Patrol Glider Club at Skycourt Airport after a free glider demonstration on February 10, 1947. He took a job as an aircraft technician for the School of Mines. His daughter became a student at the University of New Mexico with the family living together at Martin's Trailer Court.[78]

Over his many years of glider instruction from Los Angeles to Elmira to Lamesa, several of his students eventually became commercial pilots after the war. They stayed in touch with Al for the remainder of his life, visiting him when possible. In 1952, the family moved to El Paso, and Al worked as a salesman for an art school. He had finally returned full circle to his original college interest in art.[79–80] His mother died on September 23, 1953. In 1960, the U.S. National Soaring Contest came to Odessa, Texas. Al Hastings couldn't resist the urge to visit and to see old friends. He soon helped to form the El Paso Soaring Association. Suffering from chronic bronchitis and emphysema, Albert Hastings passed away August 17, 1965 at El Paso at the age of 63. He was survived by his wife Mildred, son Frederick who was at the

time in the U.S. Air Force, daughter Shirley, and seven grandchildren.[81–82]

Postscript

In 1973, Albert Hastings was inducted into the U.S. Soaring Hall of Fame for his two national championships, dedication to the early promotion gliding, and service to glider training from his early involvement with the sport through World War II. In 1996, a bronze plaque was installed at Point Loma by San Diego sailplane enthusiasts and The Environmental Trust to honor the pilots who helped make San Diego another capital of soaring in the 1930s. Hastings was specifically included in the list of pilots on this plaque. Not long thereafter, the National Soaring Museum dedicated National Soaring Landmark №7 at Point Loma, California, to honor the flights of Hawley Bowlus and Jack Barstow at the site. Today the two plaques exist side by side near the entrance of Cabrillo National Monument.[83]

Acknowledgments

The author would like to thank Jack Wyman for his edits and Bertha Ryan for her dedication in making sure that each member of the Soaring Hall of Fame has a complete biography. The author and editor which to also thank Jean Doherty at the National Soaring Museum for her assistance and agreement to allow for reproduction of this article in RCSD.

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Glider Mail

History you can hold!

John Patterson

This article originally appeared in the June-August, 2021 edition of Gliding Australia Magazine*, the official publication of the* Gliding Federation of Australia Inc. *(See* Resources*, below) It is reprinted here with their assistance, permission and our thanks. Also, by press time we were unable to track down a picture of the author. If you know of one, or can help us find one, please let us know! — Ed.*

Aerophilately is the branch of philately that specialises in the study of airmail. Since the beginning of aviation, enthusiasts have created, collected and studied paper ephemera relating to all aspects of the transport of mail by flight.

This ephemera can take many forms including official government issued flight related postage stamps, unofficial privately produced non-postal stamps (often referred to as vignettes or cinderellas), envelopes or specially created cards carried on important flights or in aviation competitions and often signed by the pilot, aerogrammes and even baggage labels.

Within aerophilately there are numerous popular specialist areas of interest such as pigeon mail, rocket mail, balloon mail, parachute mail and air crash mail. The latter one — as the name implies — is mail that has been retrieved from a crashed aircraft.

Not unexpectedly, there is also a sub branch of aerophilately known as glider mail. To qualify as glider mail, the item in question needs to have been transported in a glider at some point in its journey to its ultimate recipient, and should include some physical indicator to confirm that.

In addition to the ephemera listed above such as official and unofficial stamps, pilots' signatures and specially created envelopes and cards, other characteristics commonly found on glider mail include custom made rubber stamps known as a cachet promoting the flight or an associated event, printed glider-related imagery, a written indication of the type of glider used and/or the name of the pilot, and occasionally even a standard 'Par Avion' type of air mail label.

Some glider mail will be transported through normal mail channels after having been carried on a flight and will thus also include the non aviation related postal stamps and cancels. Occasionally, a piece of glider mail will have all of these characteristics.

A glider mail cover can be like a little package of clues that, if properly interpreted, can provide quite specific insight into the origin and purpose of the artefact. To a gliding enthusiast, they can provide a direct link to

important moments in gliding history and trigger whole new avenues of glider research.

To demonstrate these various forms of iconography, here are some interesting examples of glider mail originating from outside Australia that are available on a popular auction site at the time of writing:

An extremely early example of German glider mail dating from November 1924, this card was carried by glider from the town of Buchelburg to the town of Lehningen, a distance of about 50km as the crow flies. This trip is indicated by a hand-applied rubber stamp. The card was then transported a few kilometres to the town of Neuhausen where it entered the postal system and was delivered to its ultimate destination, most likely the town of Gorlitz, some hundreds of kilometres further away near the Polish border.

The card obviously had some money raising purpose for the publisher, the Aviation Club of Pforzheim, because the text indicates that any profits will be used to further aviation activities. The card is also a promotion for the featured aeroplane, a *Roter Teufel* (Red Devil) brand machine of the model type *Hols der Teufel*, which translates as 'Devil Take It' or just 'Go To Hell'. Wikipedia has this to say on the *Hols der Teufel*:

> *The first glider to be named the Hols der Teufel was the influential Djävaler Anamma, designed by Alexander Lippisch in 1923. Its key structural feature was an A-frame which carried wire braced wings and linked to a flat girder rear fuselage. It later evolved through the Schneider Grunau 9 into the very popular Zögling, which avoided the controversial 'skullsplitter' forward member of the A-frame with a vertical strut behind the pilot.*

This plane was the first series production undertaken by famed sailplane designer and manufacturer Alexander Schleicher after he started his own

business. Interestingly, he also has a connection with the next item.

Another very early glider mail item, this illustrated letter card was prepared for the 6th German gliding competition in August 1925 and was flown about 5km on 31 August from the well known gliding centre of Wasserkuppe to the nearby town of Gersfeld. Information available on the web indicates that "*the mail was transported by the well known Rhone veteran Gottlobb Espenlaub who dropped the mailbag in front of the post office at Gersfeld*". From Gersfeld it was transported through the German mail system to its final destination in the nearby town of Fulda.

The front of the card features a fascinating photo of people watching early gliders in action, with a hand written attribution to a gliding meet at Gersfeld. The reverse features a printed cachet with an eagle on the left that promotes the competition as well as the name of the event sponsor, the Rhon Rossitten company. This company provides the link to Alexander Schleicher mentioned above — he worked on sailplane construction for the Rhon Rossitten company at Wasserkuppe before going out on his own and building the *Hols der Teufel*.

On the right side of the reverse is a postal cancel mark created by the German Reichspost as a one-off for this flight. Apparently this cancel was designed by a member of the Vereinigung ehemaliger Feldfliegertruppen (Association of Former Field Pilots), which would account for the fairly militaristic nature of the cross and eagle imagery. This connection points to the important role that ex-members of the German air force played in the development of aviation, and particularly gliding, in their country in the years following World War I.

The reverse also features a very early German Mit Luftpost (By Airmail) sticker and a small red hand stamp identifying the item as having been flown

by glider between Wasserkuppe and Gersfeld.

The pilot Gottlob Espenlaub was himself a noted early sailplane designer who is co-credited, along with Gerhard Fieseler, as the first person to demonstrate the effectiveness of the aerotow — their demonstrations lead to the eventual broad adoption of the launch technique. Espenlaub went on to spend much of the rest of his career designing rocket-propelled gliders — which sounds like a tautology to me.

These two covers dating from 3 August 1934 are artefacts carried on the *Lustig Sky Train* — a remarkable experiment to test the potential effectiveness of the glider as a regular mail and goods delivery service. A powered plane took off from New York towing three Franklin PS-2 Gliders. This sky train flew to Philadelphia, Baltimore and Washington DC, releasing one glider over each city carrying mail intended for that city. Figure 5 shows a cover flown to Philadelphia, while Figure 6, a cover flown all the way to Washington, has been signed by all four pilots on the sky train and thus is considerably scarcer.


PRZESYŁKA
1 ZŁ
SZYBOWCOWA
1958
PRZESYŁKA"
SP - 1538
III LOT POCZTY SZYBOWCOWEJ
WYSTAWA FILATELISTYCZNA
LESZNO 1958
PZF
FILSPORT
000517
Exprès
P. Celestyn Kozłowski
Poznań
Przemysłowa
53/25
35084


IX SZYBOWCOWE MISTRZOSTWA POLSKI LESZNO-1963 2-16.VI.
PRZESYŁKA
2 ZŁ
SZYBOWCOWA
LOT POCZTY SZYBOWCOWEJ
IX SZYBOWCOWE MISTRZOSTWA POLSKI
LESZNO WLKP. 16.VI.1963
250
POLSKA
7784
PAŃSTWOWE PRZEDSIĘBIORSTWO
FILATELISTYCZNE „RUCH"
Warszawa 1
ul. Barbary 4
EKSPRES POCZTĄ SZYBOWCOWĄ
IX SZYBOWCOWE MISTRZOSTWA POLSKI
LESZNO WLKP. 2–16. VI. 1963
PZF Poznań

Figures 7 and 8

These two fabulous Polish covers dating from 1958 and 1963 each feature a dazzling array of iconography, including printed envelopes, special vignette stamps, numerous stamps referencing glider mail, the model and call number of the aircraft used, a specially designed cachet, Express Post designations and postal cancels indicating subsequent transmission through the postal system. As if that wasn't enough, Figure 7 also carries two official Polish postage stamps with a design featuring a glider. Figure 7 was created in conjunction with a philatelic exhibition held in the town of Leszno, and Figure 8 is associated with the 9th Polish Gliding Championships, also held in Leszno. I liked Figure 7 so much when I saw it that I bought it!

Figure 9

This rare example of an official Government sponsored glider mail release is

a 1972 cover produced for carriage by glider as part of the 60th anniversary celebrations of the British Royal Flying Corps. As well as the red ink cachet, the flight details and the pilot's signature, the cover features a British Forces Postal Service cancel designed specifically for postal material associated with the 60th anniversary celebrations. The cover also shows a large printed image of two RAF Airspeed Horsa gliders from No 298 Squadron under tow in 1944.

Figure 10

This 2007 cover was produced in commemoration of the 50th anniversary of the Auerbach airfield in Germany. The cover was transported by normal post from Qatar using a Qatar 100th Anniversary of Aviation postage stamp which features an image of a very early pioneering glider design. The cover also features a printed photo of a modern glider. Upon arrival at Ellefield in Germany the cover was transported to the Auerbach airfield where it was carried by glider before receiving the green cachet stamp.

Australian Glider Mail

Aerophilately is a popular pastime in Australia so it is no surprise that a number of glider mail articles have been produced here.

Figure 11

This marvellous and very scarce cover was created to commemorate the first sailplane flight in Australia that took place during the Empire Air Day at Kingsford Smith Airport on 29 May 1937. 125 covers were flown by Pilot M Warner. The covers were individually numbered and each was signed by the Pilot.

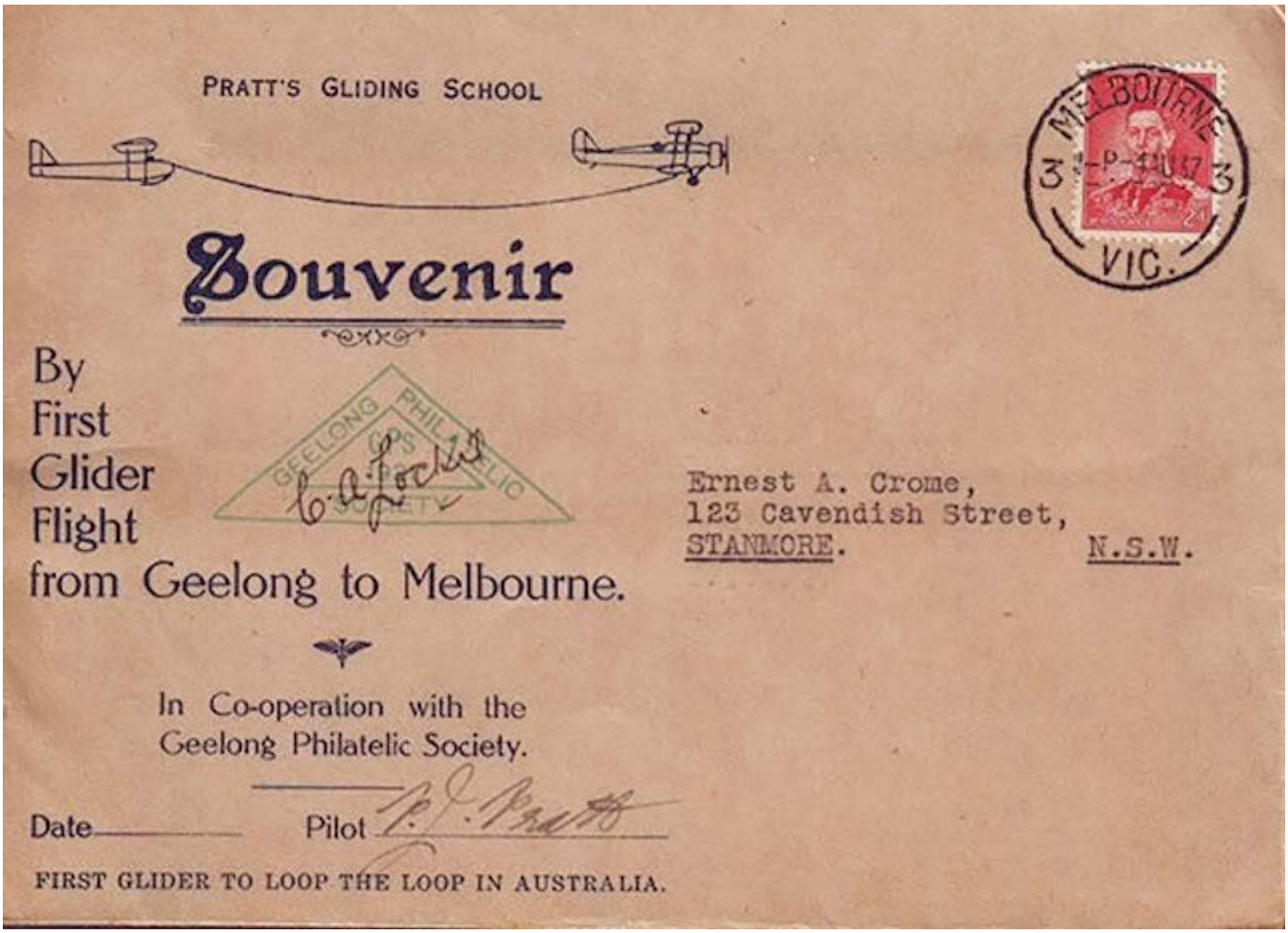

Figure 12

Also created in 1937, this cover was one of 600 carried by pilot PJ Pratt on the inaugural glider flight from Geelong to Melbourne. The image on the cover would suggest that the glider was under tow most of the way. The cover proudly proclaims that the glider used was the first to loop the loop in Australia. The cover was created in co-operation with the Geelong Philatelic Society and is signed by both a representative of the society and the pilot.

The recipient of both this envelope and that displayed in Figure 11, Ernest Crome, is regarded as one of the three towering figures in Australia aerophilately. The other two are Nelson Eustis and Tom Frommer.

Figure 13

A number of glider mail articles were created for the 14th Gliding World Championships held in Waikerie, South Australia during January 1974. On 21 January 1974, the Polish team organised the transport of 442 covers by Polish Team member Franciszec Kepka on a 455km competition flight that followed the course Waikerie — Spalding — Robertstown — Laxton — Waikerie. Kepka placed third that day. On arrival at Waikerie, the covers were officially cancelled at a special mobile post office that had been set up at the airfield, thus allowing them to enter the postal system for transmission to their ultimate destinations.

These individually numbered covers feature a specially produced envelope design, the flight details, a hand stamp of the pilot's name in lieu of an autograph, a specially designed Australia Post cancel and one of four different coloured privately produced vignette stamps created for

attachment to the glider mail.

Figure 14

These are the four different coloured vignette stamps produced by the Polish team for attachment to their glider mail carried at the 1974 World Championships. Sadly, glider mail vignettes are rarely produced in Australia.

Figure 15

In addition to the items shown in Figures 13 and 14, the 1974 Gliding World Championships at Waikerie also saw the creation of another series of covers carried during the competition. 36 pilots from 18 different countries each carried around seven covers. Each of these featured a specially printed envelope that also carries the flight details, the pilot's signature and the same official postal cancel issued by a special mobile post office that had been set up at the airfield. In common with Figure 13, once cancelled, these covers were then transmitted through normal Australia Post channels.

I hope you have enjoyed this brief introduction to glider mail. It is an area that allows enthusiasts to own tangible relics of notable events in world gliding relatively inexpensively and can also trigger some quite fascinating avenues of research, especially with the magic of the internet at one's fingertips.

If you would like to find out more about the subject, you could look out for the book *Glider Mail — an Aerophilatelic Handbook* written by Simine Short and Dan Barber published in 1987. I should add that although I haven't seen this book, I suspect it would be worthwhile pursuing. For information on every aspect of Australia's aerophilately, including glider mail, your best resource is the 8th edition of *The Australian Air Mail Catalogue*, a relatively recent edition by Nelson Eustis and Tom Frommer. This book is a magnificent production which would be of interest to most aviators, not just those interested in aerophilately.

I would be interested in seeing any other examples of Australian glider mail that you may own. Please add a comment in the *Responses* section below if you have any examples you would like to share.

Resources

- Gliding Australia — is the governing body for the sport of gliding in Australia.
- Gliding Australia Magazine — the June-August, 2021 edition in which this article was first published.
- Jacobs Hols der Teufel — the Wikipedia page referenced above.
- Glider Mail — an Aerophilatelic Handbook (AbeBooks) — just one example of a source for this book
- 8th edition of The Australian Air Mail Catalogue (National Library of

Australia) — information on accessing this catalogue.

John Patterson is a Sydney-based records officer and amateur antiquarian. He has been interested in gliding ever since 1975 when Rob Hall became his stepfather.

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Repairing a Transmitter Aerial

Gain a sense of accomplishment and save some money while you're at it.

Peter Scott

(credit: Lucasbosch/Wikimedia under CC BY-SA 3.0)

These notes are about repairing a FrSky Taranis X9D, but the general principles should apply to many makes and models of transmitter. I have no connection financially or otherwise with the makes and suppliers listed.

If, when you switch on, you get the message `WARNING Tx antenna problem` then you probably have a faulty aerial (antenna). Even if the model appears to respond do not fly until it is fixed. Your range will be lower and you won't know by how much. On the X9D a good way to check is on page seven of

radio setup. You see a number at the bottom labelled RAS (Relative Antenna Status). This is a measure of how efficiently the aerial is working and should be zero or close to it. Much higher than one and the aerial is probably defective. You can also use it to check whether the repair has worked or whether part of the electronics has also failed.

The standard folding X9D transmitter aerial is fairly fragile. Unless you have the version of the board with the plug in IPEX connector, replacement requires some delicate soldering. Don't attempt it unless you have a steady hand and a good quality iron with a very fine tip, ideally one with temperature control. Otherwise sweet talk the club electronics expert. He or she will usually respond to flattery.

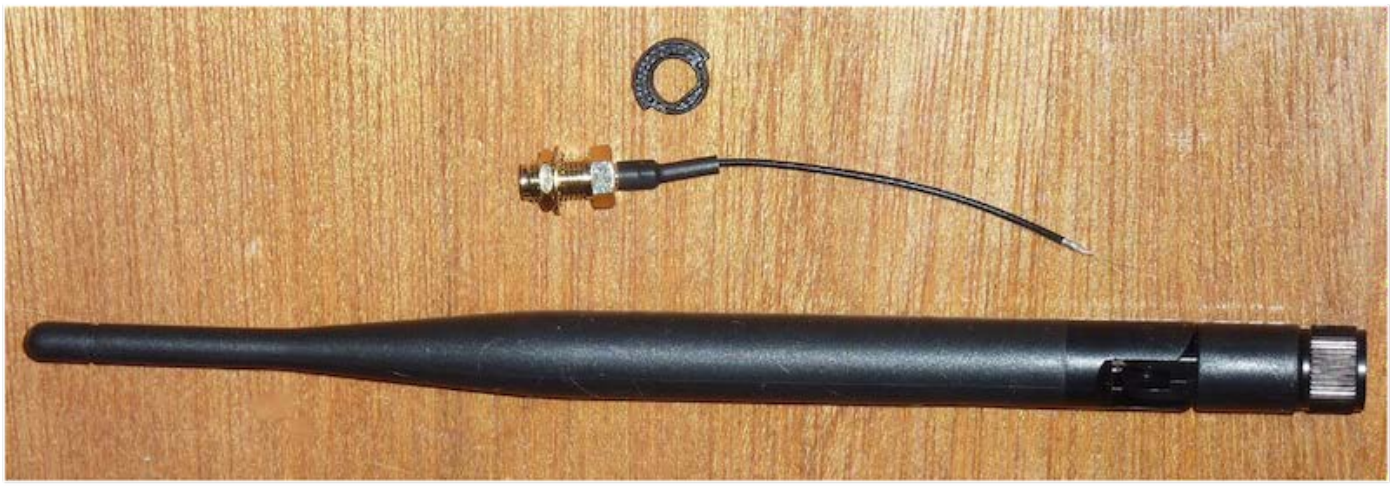
If you are replacing the aerial with another standard one you can skip the next bit and move straight to *Soldering in the New Feed Wire*, below

I decided to replace the standard aerial with a removable one that screws on. For this I had to install a different fitting called an RP-SMA connector. SMA is an abbreviation for SubMiniature version A and RP is Reverse Polarity meaning a pin rather than a socket. I bought a kit from Banggood for about £7. If I had only wanted the aerial I would have gone to the excellent UK company T9Hobbysport.

> *See Resources, below, for links to these suppliers and information relevant to this article.*

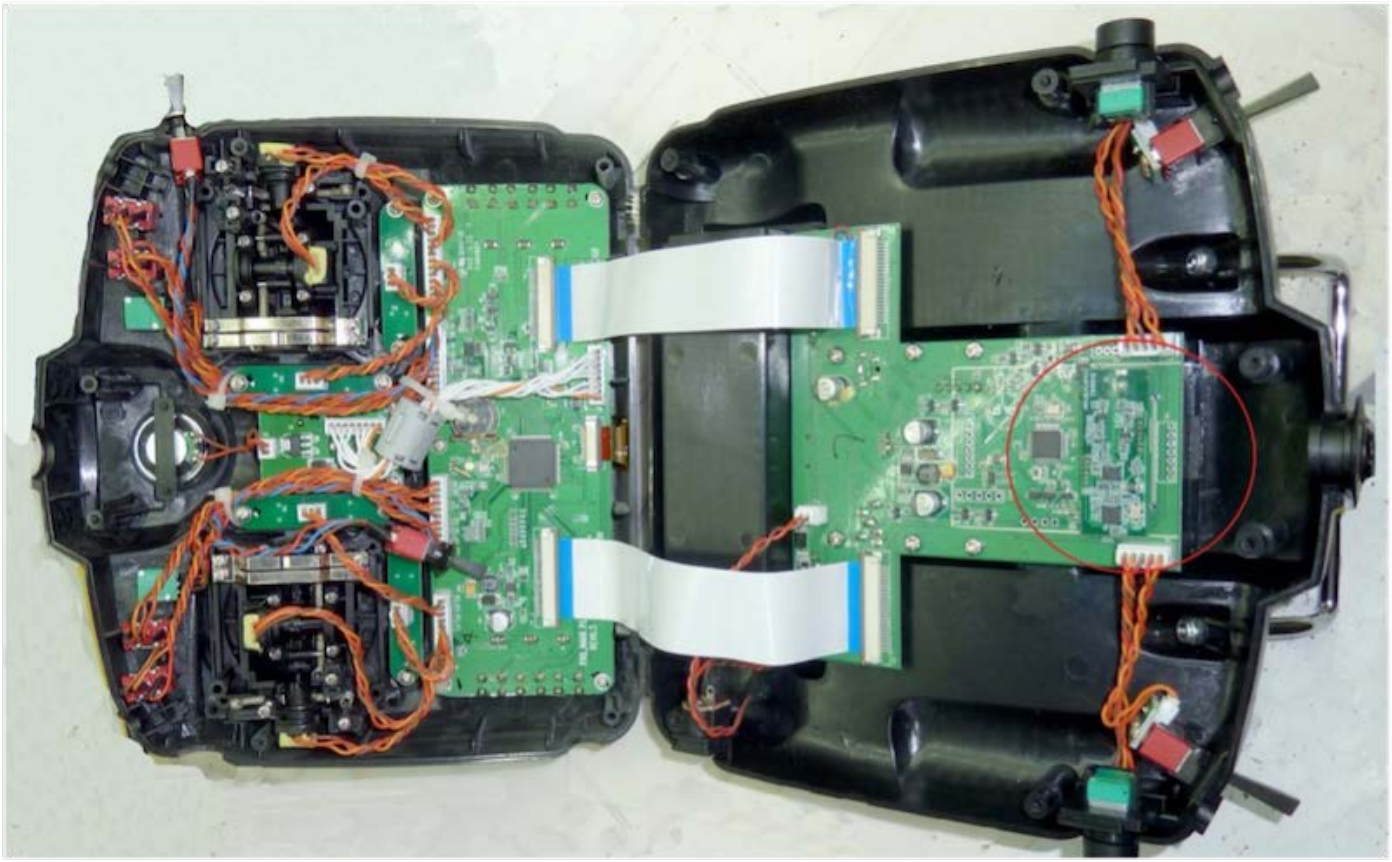
The aerial is detachable, though the connectors only have a life expectancy of five hundred times screwing on and off. You can also use the RAS to check if the RP-SMA needs to be replaced after it has been used a lot. There is a small loss of signal compared with a direct soldered aerial connection as even high quality gold plated connectors will drop a signal by 1 dB or so. However I bought a 5 dB aerial rather than the standard 2 dB so this should

compensate. The extra 3 dB in theory doubles the radiated power. The aerial is longer so I will have to remove it for storing in the box. The higher gain aerial is more directional so don't point it at the model when flying.



The RP-SMA fitting and 5 dB aerial kit.

After removing the six crosspoint screws the case falls open. Oh, where did that screw bounce off to? The part we are going to deal with is in the red circle. Take a photo so you refit switches the right way round.



I had to trim the plastic bush in the top of the Tx to allow the threaded part of the RP-SMA fitting to stick out far enough. With a fine hacksaw and a craft knife I removed one layer of the top and was left with this.

I then glued the plastic washer that came with the new aerial into the bush using epoxy. Notice there is a flat that locks the connector so it can't rotate. You might need to open out the central hole in the rear of bush so the hexagonal part of the RP-SMA connector fits in. I used a 10 mm drill bit, hand held and not in a chuck and then made grooves for the points on the hexagonal body with a burr in a Dremel.

Left: washer. | **Right**: Washer glued in place in bush.

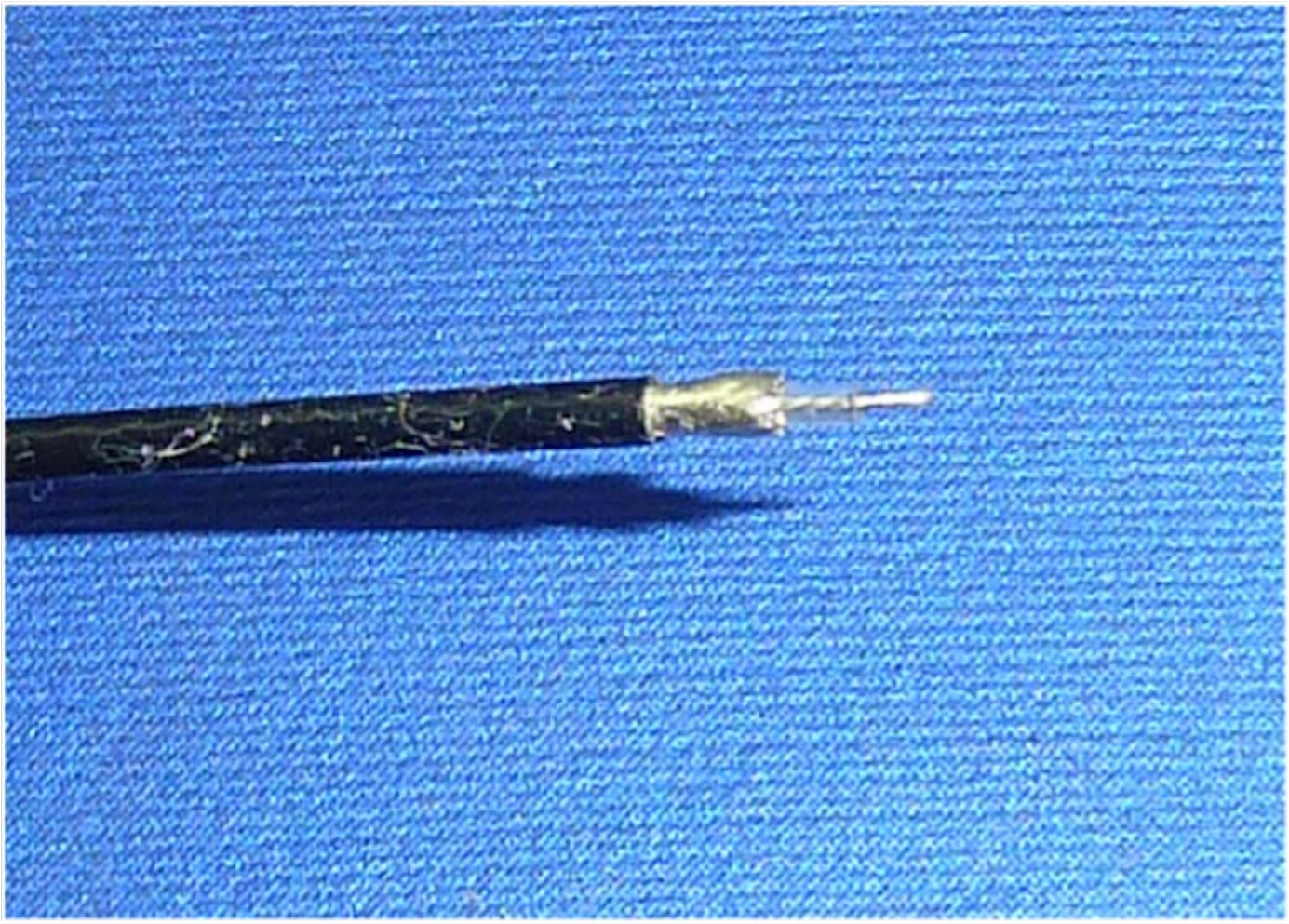
These pictures show the bush fitted into the Tx before soldering the feed wire. Fixing the bush first reduces the strain on the newly soldered joints later. I also used to masking tape to secure it further, only removed after screwing the case back together.

Soldering in the New Feed Wire

If you have jumped straight here take a look back at the picture of the Tx opened up and the red circle. Unscrew the six screws and open the case. Take a photo of the opened up Tx especially the solder connections, which is most important if your Taranis is a slightly different model from that in the pictures. It also helps with getting the switches back in the right way round.

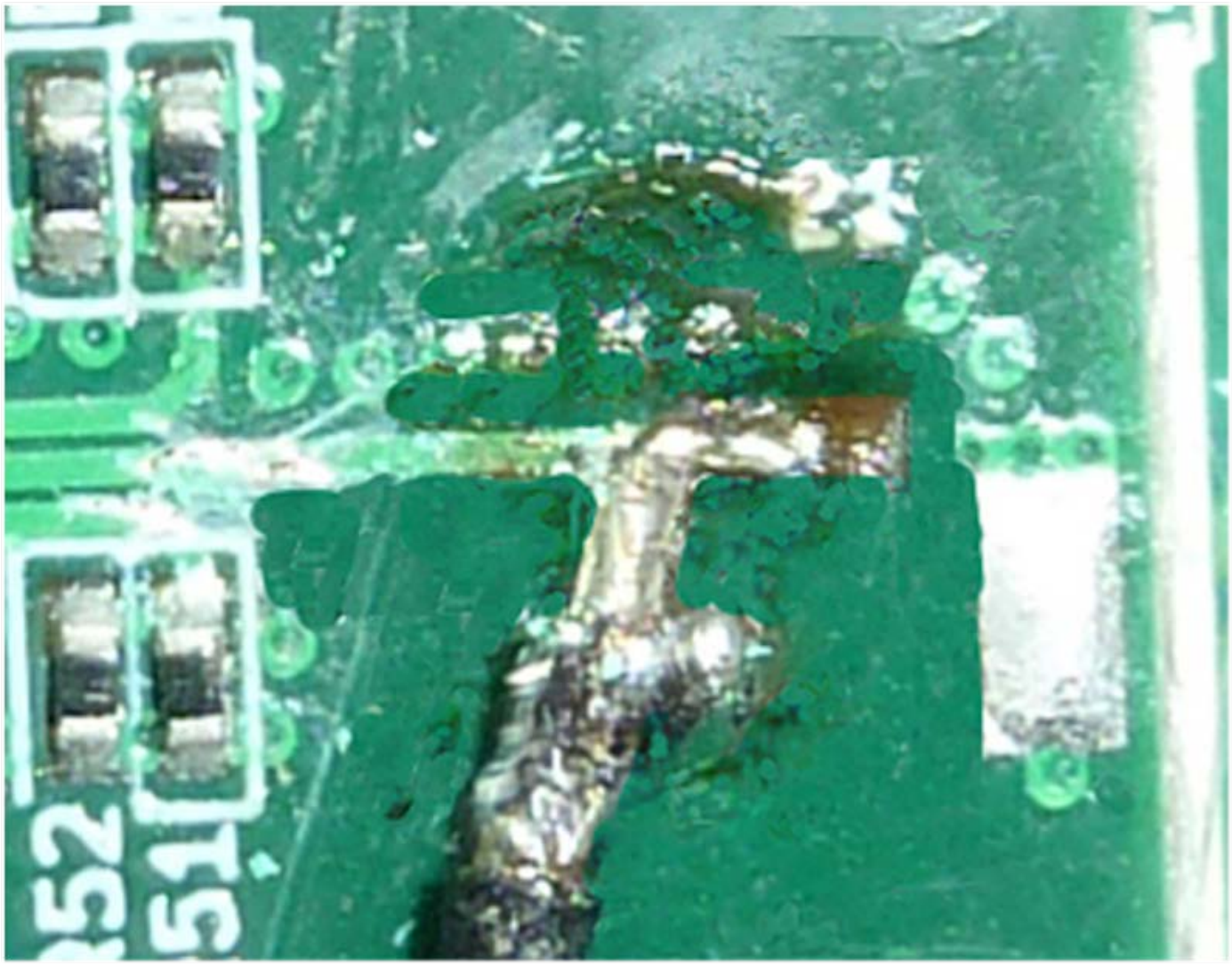
Below is a picture of the new feed wire from the RP-SMA connector as supplied — no need to trim it. There will be a similar one if you are replacing an aerial without using the RP-SMA. You can see the bare end of the wire on the right, then the plastic insulation, then the outer braid and finally the outer black sheath. The bare end must be soldered onto the left hand pad and the braid to the lower one. You don't need lots of solder but make sure it is shiny and rounded when hardened. A grey or cloudy surface means a poor, 'dry' joint, which must be done again.

The braid is the tricky bit. Heat the braid in advance and put a blob of solder on it. You then just have to touch this with the iron onto the blob on the board.



Using the soldering iron, remove the old feed wire from the board. If there is a lot of solder clean up the solder pads using a solder suction tool or braid, taking care not to overheat the board. Leave a blob on the lower pad. The two pads will look something like this. The lower blobby one is what the braid solders to. The small dark pad up and to the left is where the core wire goes. In my case that pad had pulled off so I had to scrape the green varnish off the track leading to the pad with a scalpel and solder to that.

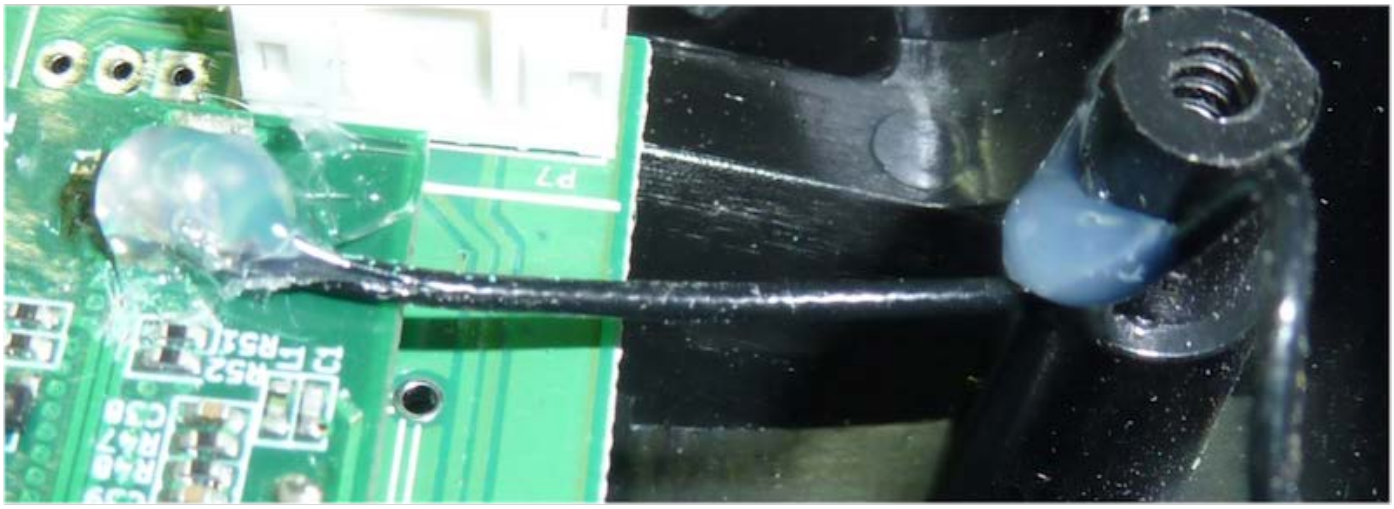
Here is my first attempt — the most tricky soldering I have done for years.



First I scraped the track again with the scalpel and a bit further along bared some more track to allow a continuity check with a meter. I bent the bare

wire end round to match the track. Then I soldered the braid and finally soldered the bare wire. I couldn't find my macro lens so the picture is a bit blurred and I have tidied it up a bit with Photoshop for clarity. The continuity and short circuit checks gave good results.

Finally, I locked the wire onto the board by putting on a blob of hot melt glue using a glue gun. The glue does not affect the electrical properties. Do not forget this step. It is crucial to ensure that the wire is firmly fixed in place so I also glued it to a pillar as you see in the photo.



Oscar Liang (see *Resources*, below) suggests using hot glue to fix the feed wire down onto the case of the transmitter, which is only possible is the feed wire is fairly long. Mine wasn't. He also suggests locking the RP-SMA connector into the plastic bush as well. I didn't need to do that as there was a tab and a notch to lock it.

You will know if the repair has been successful when you switch on. If it isn't, you will get the error message again.

Dummy Load in Place of an Aerial

The Tx that needed repair was one that I use as the slave on a training buddy

connection. It was disconcerting for the trainee to have to keep clearing an error message so it had to be mended. I don't need the aerial on it for buddying, especially the new longer 5 dB one. A feed wire can safely be disconnected from an aerial provided there is a load connected to it to soak up the power and stop it being reflected back to the transmitter. So I decided to fit a dummy load, in this case called something like a '50 ohm RP-SMA dummy termination load'. The power produced by the Tx is low at less than 100 mW so any dummy should do. And of course I can now more conveniently use it for a flight simulator.

The replacement aerial and RP-SMA connector are unusual in that the aerial is female, having a metal socket, and the RP-SMA is male having a metal pin. Usually it is the other way round. Remember RP means reverse polarity. When ordering a dummy load make sure you get one to match the RP-SMA connector. In my case this was a female one as shown in the picture.

Here it is fitted.

Or Change to IPEX

There is another way to do this repair. You can buy IPEX connectors that you solder to the board. They are also called Hirose U.FL and Amphenol AMMC. I haven't tried one. They are tiny and difficult to work with. You would then need to fit a different RP-SMA connector having a feed wire fitted with a mating IPEX connector. I think some Taranis Txs were supplied with the aerials connected to the board with one of these at one time. Some receivers use them for their aerial wires.

Left: Connector to be soldered on the board or connected in some way. | Right: Connector on the feed wire.

And Finally a Dummy Resistor

I realised after doing all that work that if I was only ever going to use the Tx as a buddy slave it didn't need an aerial or a dummy load. I could have got away with just soldering a 50 ohm resistor across the two pads. Oh well, another working Tx might be useful one day, maybe when I drop my present main transmitter.

Resources

- ***Banggood*** — From their website: "Founded in 2006 in Guangzhou, Banggood is a global leading direct-to-consumer online retailer, providing well-selected products…"
- ***T9 HobbySport*** — From their website: "T9 HobbySport is the UK's #1 FrSky distributors and widely regarded as leading performance radio-controlled aircraft specialists, offering the best…"
- ***OscarLiang.com*** — From his website: "I have been writing about FPV drone since 2013 and published over 1300 articles. You can find build logs, tutorials, DIY hacks and latest product reviews…"

*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**.*

Shinobi | A Home-Grown Moulded Fuselage

Part V: We Glass and Reinforce the First Half of the Nose Cone Mould

James Hammond

The ultimate objective of this exercise.

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

Before the Kickoff

Here are a few things you will want to have organised prior to proceeding:

Gather Newspaper You can never have enough newspaper when doing glasswork, and you need to cover your working surfaces with at least two layers of it. Alternative bench protectors to the newspaper is rubbish disposal bags cut open to form large plastic membranes. Anything can be used, but I prefer newspaper because it's generally free, easy to ball up and dispose of, and it's absorbent.

Prepare the Tools You'll need an accurate set of scales — preferably the digital electronic type — but unless you want to be awarded the marital pink slip — steer clear of SWMBO's kitchen scales. For the epoxy mixing and application, ready some cheap 1in (25mm) and 2in (50mm) disposable brushes, some mixing spatulas — popsicle sticks or thin clean pieces of wood will do, and some paper picnic cups for the epoxy. For this small-sized mould, we will not be needing a roller as careful brush stippling should remove most of the bubbles. And last but not least, a good sharp pair of scissors. Kitchen scissors? No, don't do it — your spouse will find out!

Prepare the Glass Cut enough 3oz glass fabric strips 2in (50 to 75mm) to 3in wide along the weave to cover your mould in both directions four times at 45º and place them ready. Then do the same with the thicker 6oz glass, again cutting enough strips to cover the mould four times at 45º. Lastly, cut a single piece of 6oz that is larger than the mould, cutting across the weave 45º to act as a finishing layer.

General Try to keep your work surfaces, and your weighing scale protected and protect yourself by wearing an apron and disposable surgical gloves at all times — and have more pairs handy. Preferably wear a mask too and conduct your work in a well-lit and well-ventilated space, with everything you will need readily to hand including a few dry rags to mop up any accidental drips or spills. You will have already decanted your epoxy resin and hardener into (separate!) handy-sized containers.

Glassing the Mould (At Last!)

Apply a generous coat of epoxy all over the gel-coated surfaces and then begin to apply the 3oz glass strips, placing them side by side while thoroughly stippling through the glass with the brush to make sure the resin is fully impregnated. Cut off the residual glass strip at the edges and use it for the next line. Spend time to make sure that all the bubbles are completely eliminated before applying the next layer of strips at 90º to the first layer. Again, make sure to completely impregnate the fabric and eliminate any voids or bubbles. Continue this procedure until all of the 3oz glass has been used up and the mould now has at least four layers.

The first strips of 3oz glass have been applied at 45º to the mould structure and the second layer will now be

applied at 90° to the first layer — thus forming a crisscross layup so as to make very sure that the cloth complies with the plug shape and no air bubbles are trapped. Note the neatly trimmed glass overlap at the mould edges. Also, note the larger finishing ply of 6oz glass cut at a 45° angle to the weave, 'standing by' that will be the finishing layer.

> ***Advice:*** *Try to keep the glass overlap at the mould edges neat. It will help later when the mould needs to be separated from the parting board.*
>
> ***Advice:*** *There are three important things to remember when stippling glass onto a mould: 1) Stipple out the bubbles, 2) Check that you have stippled out the bubbles, 3) Make sure that you have stippled out the bubbles.*

After the First Layer Is Done

Clear Up, Prep Up Use little time to clear up any mess, dispose of the old paper cups, brush(es) and the sticky bench covering, and then apply some fresh newspaper or plastic membrane. Next prepare some more paper cups and a new brush ready for the next, heavier layers. Now it's time to take a well-earned rest until the first 3oz layers of glass have hardened to the soft but not tacky 'green' state. This will be anything from a half-hour to a few hours depending on the room temperature and the type of epoxy and hardener.

First Layer Green? Give it a dig with a fingernail. OK? Now repeat the entire process using the heavier 6oz glass fabric, ending with the last single 45° ply finishing layer. Ideally, this should all have been done in the space of a single day, so now you know why it needs to be so carefully planned and prepared.

The second series of 6oz glass fabric has now been applied to the mould and allowed to cure until green.

Reinforcing the First Glassed Mould Half

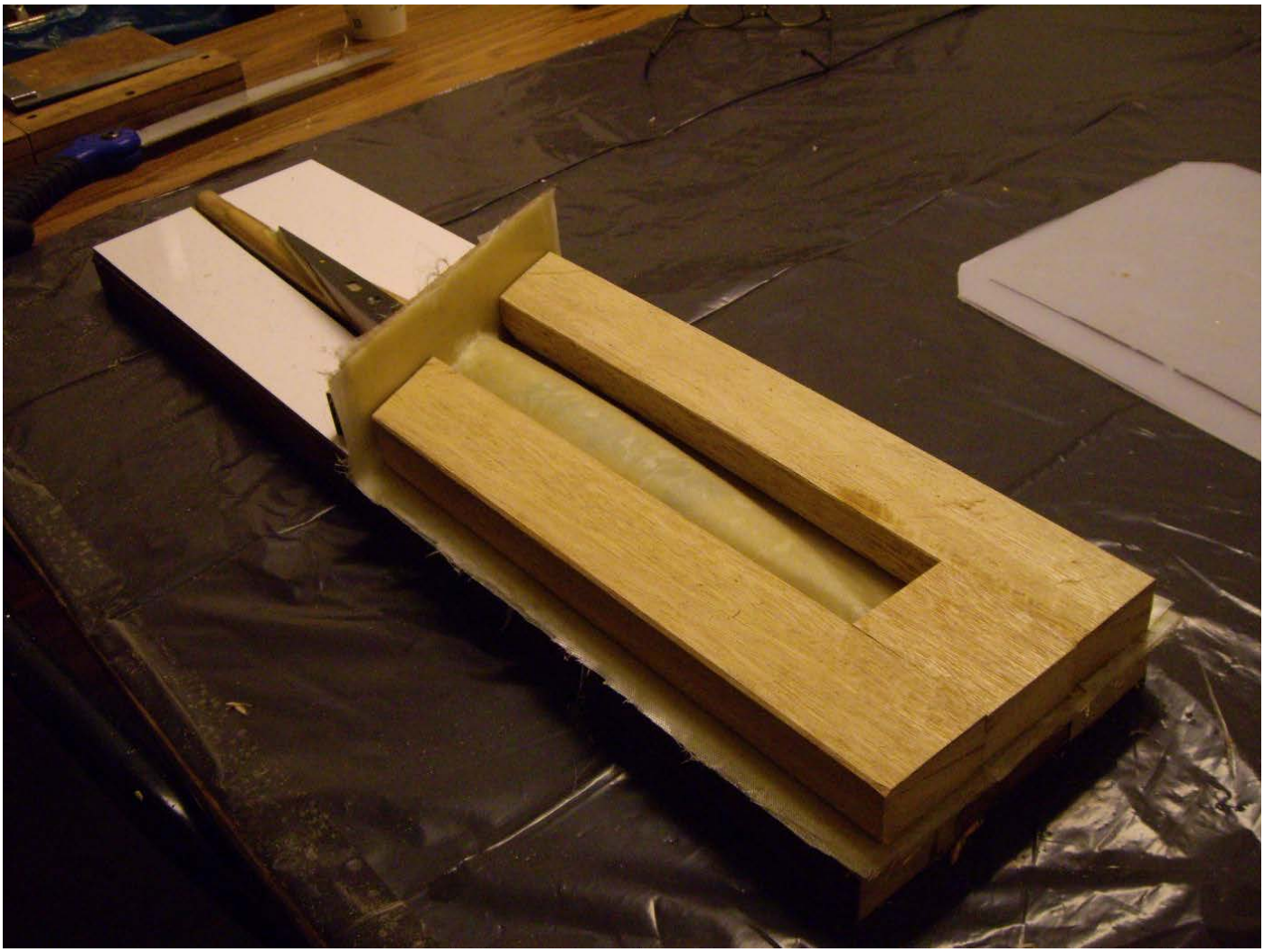
Light composite structures can be flexible but are easily stiffened by the addition of more, or different types of fibre, and because of this make ideal structures for light and strong aviation applications. The ratios of strength and flexibility versus weight can be very well controlled.

Of course, we can add more layers and even use different types of fibre to make our structures, moulds or parts stiffer, but if the structure is a mould that will be exposed to heat/cool cycles then it needs to be externally reinforced to some degree. A mould must be an accurate copy of the plug

and must stay accurate throughout its life, without distortion, or the parts we produce will be warped. Even on our small home project, it's a good idea to reinforce the mating parts of the mould to make sure that they stay true. There are many ways to do this.

Large commercial moulds such as those used for boats, or maybe racing car parts will have a tubular section steel frame moulded into the mould during manufacture. But we don't need to go to such lengths, so a couple of pieces of good stiff hardwood or good plywood will suffice. Cut the wood you need length — I use solid Meranti hardwood at about an inch-and-a-quarter (35mm) thickness as it's easy to get here, but good plywood will also work well — as long as it's thick enough.

> ***Advice:*** *Never, never — even in your wildest dreams think of using MDF as a reinforcing material.*

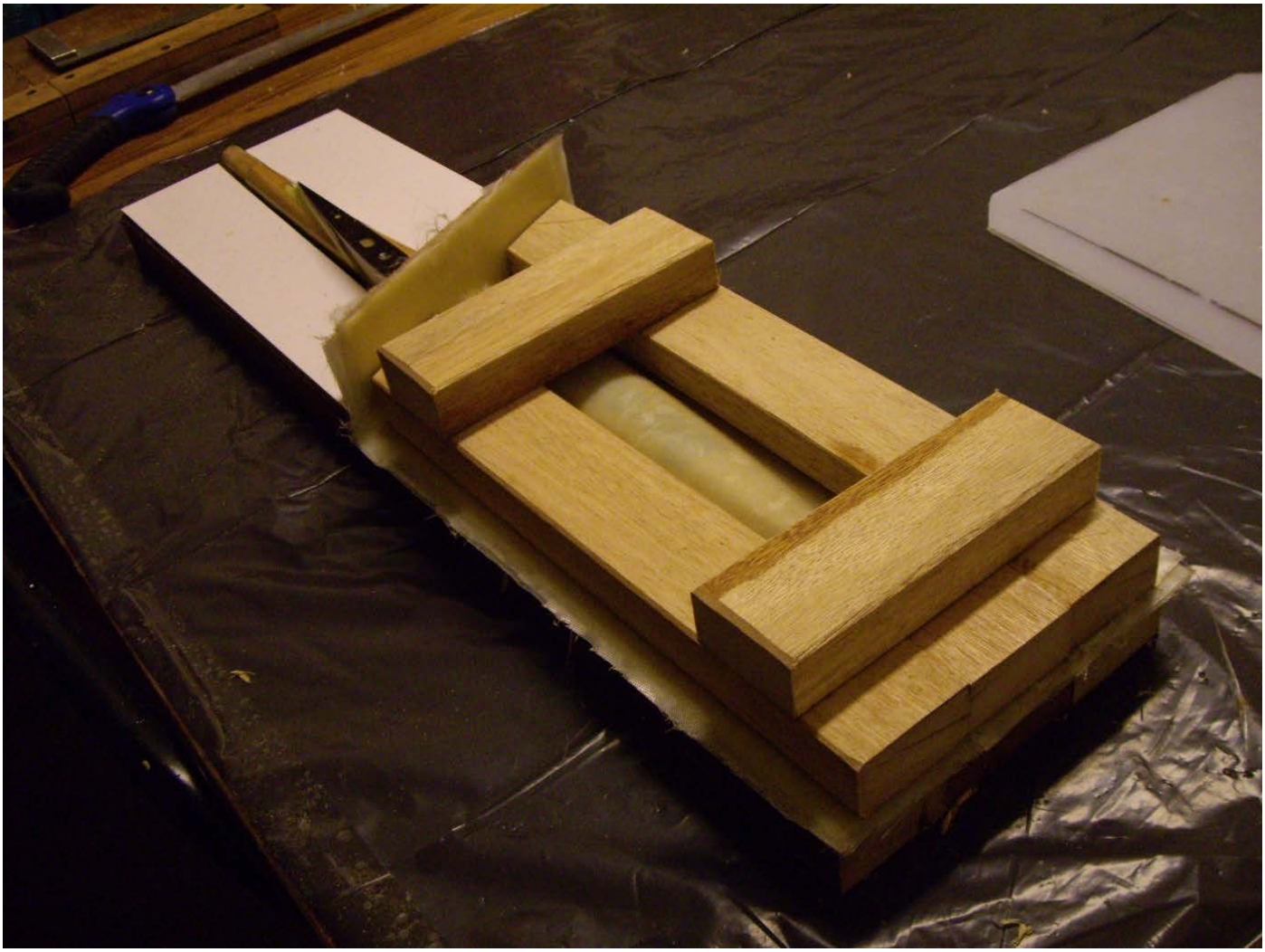


Wood reinforcement is ready to glue to the mating surfaces of the mould — but note: It will be glued to the mating surfaces only and NOT to the exterior mould curves.

> ***Advice:*** *Epoxy shrinks. If you get the epoxy goop that you will use to glue the wood on the actual moulded shape and not just the mating faces then you may see dips or depressions form in the eventual mould as the epoxy goop shrinks and pulls the mould structure. Therefore, it's important to glue the wood reinforcement to the mating surfaces* ***only*** *and* ***not*** *the exterior mould surfaces.*

Once the wood is cut and shaped to fit so that it will not influence the exterior curved surfaces of the mould, the parts can be glued with epoxy/colloidal silica goop. It's a good idea to add a couple of wood cross

pieces while you are at it to provide more strength and rigidity, and also to place the mould a bit higher off the bench for eventual use.



In this picture, cross braces have been added to beef up the structure.

Proof of the Pudding

Now is the time to see if we have done a good job — especially with the mould seam. Remember my advice to keep the overlapped glass edges neat? Now you'll see why as we need to separate the first half of the mould from the parting board. Take your seam knife — the same round-nosed one you used to trim the modelling clay around the plug, and insert it between the parting board and your layup — pry gently and not too far in. When the

moulding begins to separate, ease the seam knife by wiggling it around the edges bit by bit until the mould separates from the parting board. Now using the same seam knife, gently remove the modelling clay from the mould seams and step back to take a look at your work.

The seam should be nice and tight to the parting board and the plug, no dips, no lumps, no bubbles. If it's good, then you may now have my personal permission to reward yourself with one heavy tumbler of single malt apple juice — at least that's what I tell SWMBO it is. If it's not good you may turn off the lights, go into the living room with a really long face and proceed to sit and sulk and cuss that Hammond bugger who got it all wrong.

It's parted, it's nice and clean — good job! Time for a wee dram.

Now the surfaces — both the parting board and the exposed plug — will need to be cleaned with mild 75% alcohol to remove all traces of the modelling clay, and then re-waxed with mould release several times. As always — when you think it's clean — do it one more time, and the same goes for the mould release. There's no such thing as being too clean or having mating surfaces that are too easy to release.

All righty then...time to think about the second half of the nose cone mould, but before we get into that we also have to think about the mould location. How can we make sure that the left and right halves of the nose cone mould will always locate exactly? Well, there are several ways to do it, and many people have different preferences so as usual, I'm just going to show you my way, and I'll tell you why I use that method.

Next time in Part VI, we make a balls-up!

*All images 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**.*

How to Create Spectacular Multishot Photos

A photo series shown in one picture — how do you do that?

Raymond Esveldt

An example of one of my multishot photos.

The process naturally starts at making the photos. It is very important that the lighting of all the photos is exactly the same, so set the camera to manual lighting with fixed shutter speed and aperture. But also set the white balance to a manual value and set the autofocus to manual. When using automatic modes all photos may have small differences in lighting, white balance or focus, what makes post-processing a lot harder. The best weather for making these photos is sunny or overcast cloudy — in other

words, an even sky texture. Moving cumulus clouds may make post-processing harder because the clouds move and change shape during the photo series, or lighting conditions may change because of the cloud shades.

Some additional examples of my multishot photos.

The camera should be on a tripod so all photos are taken in the exact same direction. For the pictures with this introduction (the red-and-yellow glider) I used the time-lapse mode of the camera. The camera took a photo every second. After starting the camera I made my flight in front of the camera.

You don’t even need help from anyone to take the pictures! For the picture of the winch start I used the burst-mode of the camera with three photos/second. If possible use a remote control for the camera, if you have to press the shutter button manually you probably move your camera around a tiny bit affecting the result.

Post-processing has been done with Adobe Photoshop, but any editing program that can work with layers and masks should be able to do the trick. With the function `File > Scripts > Load Files Into Stack` I import all photos to be used into one composition file. Every photo gets its own layer. Choose which photo you want to use for the background, that should be your base layer. The rest of the photos should be stacked on top of the base layer in time order.

All layers except the base layer get a mask that will show only the model in that layer. The quickmask function is a very handy tool to make quick selections of the airplane in a layer. Use a brush with soft edges to ‘paint’ a selection around the model, then invert the selection and convert the selection to a mask. Because of the soft edges on the brush you will hardly see any selection edges in the end result. You need to do this for every layer. Once you get the trick it can be done really quickly.

It may take you a few attempts to get a good photo series on camera, but it’s fun to have a goal while flying and it can actually even improve your flying skills. Your efforts will be rewarded with a stunning composite picture that will surely impress your fellow flyers.

By using layers with masks you can cut the model out of every photo and put it over the base layer (the base layer is hidden in this screenshot).

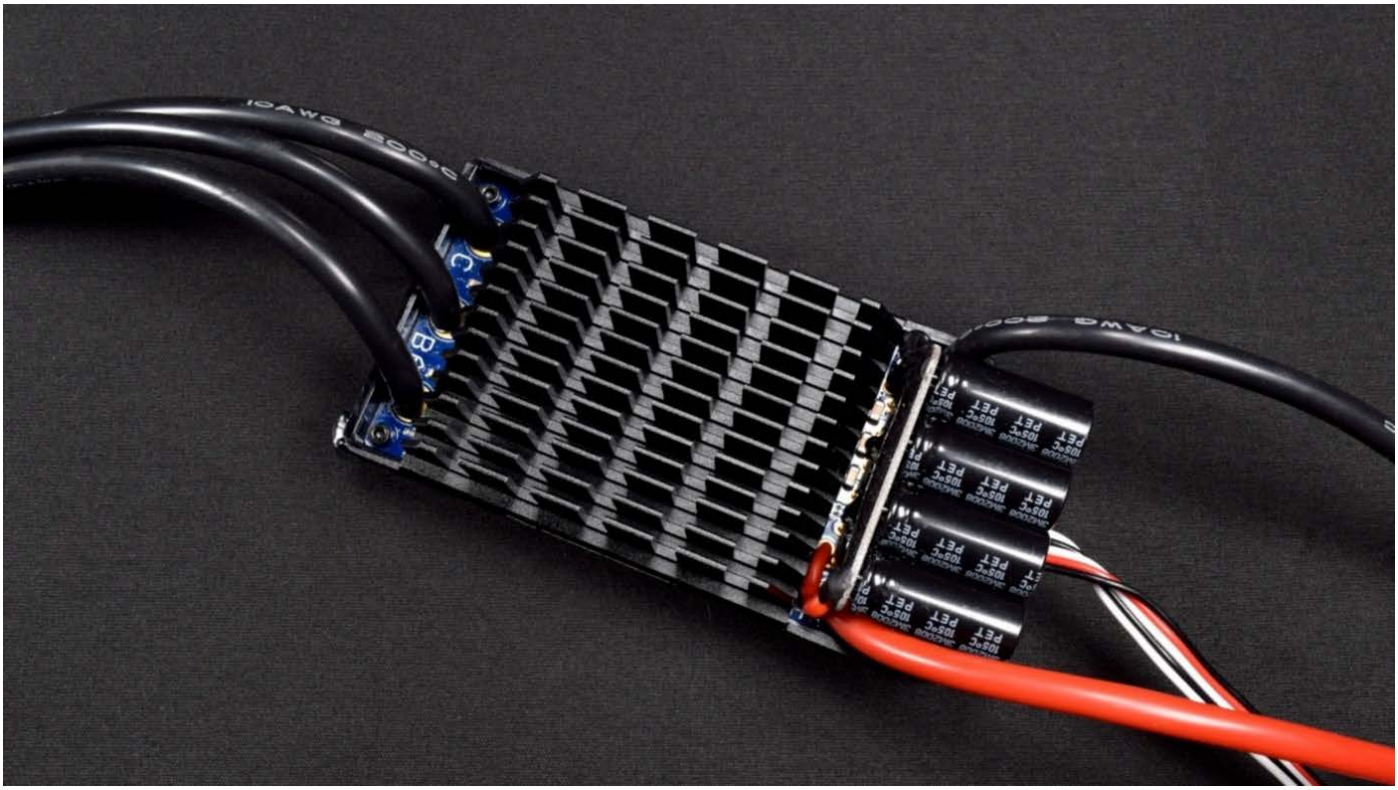
If you have any questions, please feel free to leave them in the *Responses* section below and I'll do my best to answer them. Also, if you give it a try, I would love to see the results of your efforts.

*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**.*

Electricity for Model Flyers

Part V: A Technical Explanation of Electronic Speed Controllers (ESC)

Peter Scott



(credit: Aloft Hobbies)

This is an attempt to explain how electronic speed controllers (ESC) work using the Feynmann Method which is to write it down in language simple enough for an eight-year old. He asserted that if you can't do that then you don't yet understand it yourself.

All electric motors rely on one magnet pulling or pushing on another so the motor shaft goes round. The motors we use in model aircraft have two types of magnet. One is a permanent magnet which can move round. The other is a coil of wire that is fixed. When you make an electric current go through a

coil of wire it makes it into a magnet. Our motors have fixed coils that can be switched on to make them into magnets and then off again so they stop.

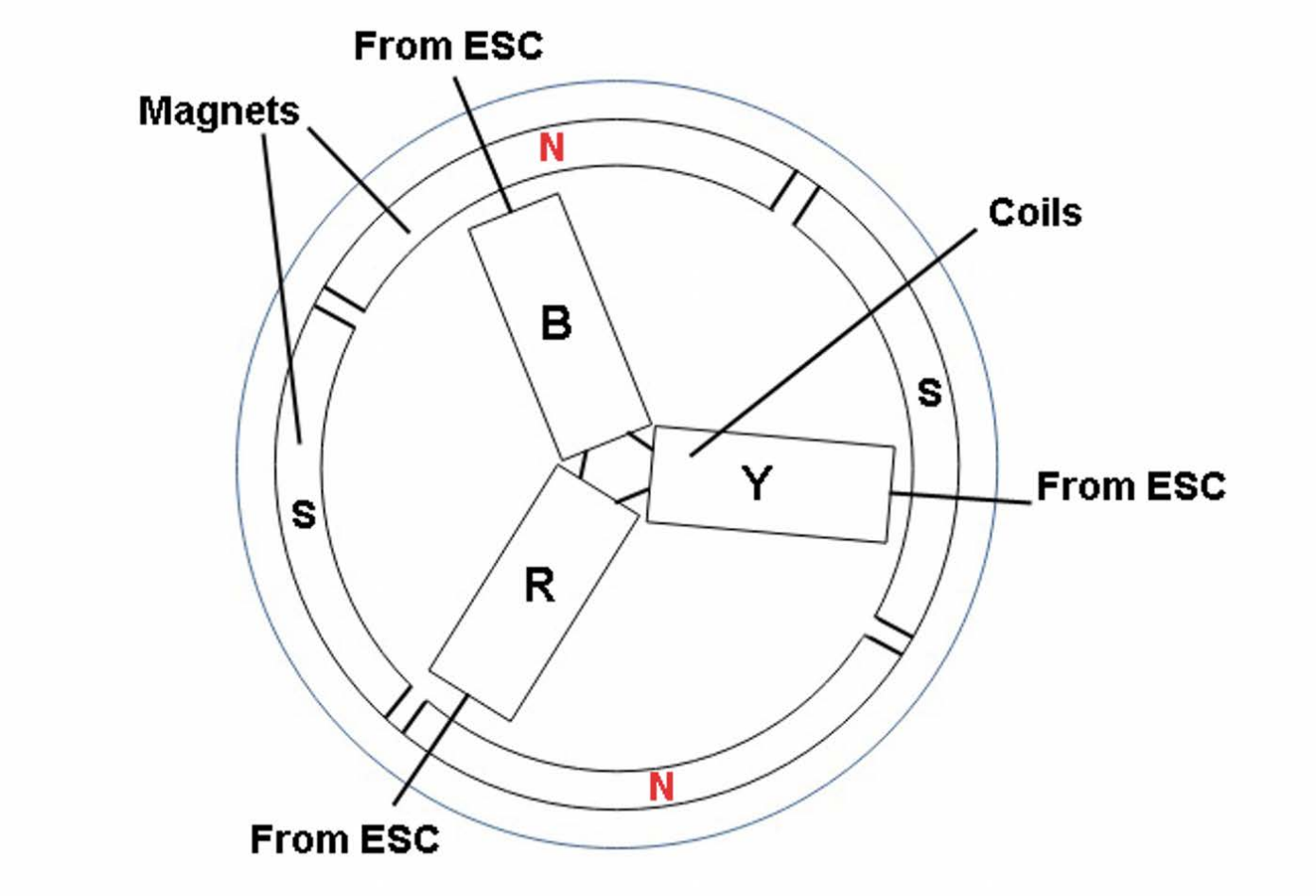


Figure 1 (credit: author)

The coils are fixed so are called the stator (static). In Figure 1 they are labelled R (red), B (black) and Y (yellow). These are the colours of the wires on the motor and possibly the ESC.

Look at the circular bit labelled NSNS. This the outer case of the motor onto which permanent magnets are fixed. The N and S are the poles that face inwards. They are made using a rare earth metal, usually neodymium (Nd). The case rotates and drives the propellor so it is called the ‘rotor’ (turning). If the red R coil is switched on so it becomes a south pole it will pull the magnet labelled N (north) round to line up with it.

If at the same time the black coil B is made a north pole it will push the nearby N magnet.

The rotor has started to turn. If B stays north it will pull the south magnet. If Y is made south it will pull the north magnet.

Why not use all three coils? The ESC needs to know the position of the rotor. The turning rotor creates (induces) a voltage in the now unpowered R coil and the ESC can read it to work out the position and speed.

The ESC sends constantly changing currents through a pair of coils. It moves on from one pair to the next. The effect is that the magnetic field effectively rotates and drags and pushes the permanent magnets with it. No electric current has to be fed to the rotor through brushes. This makes our motors simpler and more reliable and is why they are called ‘brushless’. Remember all those sparks you used to get from brushed motors? Our motors use tens of amps or even over a hundred. You can imagine the sparks you would get. This could not easily be done with light brushes.

How Is All This Switching Done?

We have to use a device called an electronic speed controller (ESC). These have electronic switches called field-effect transistors (FET) that can switch on and off in very short times and a circuit board that makes them switch.

Have a look at the following circuit diagram Figure 2, even if you are not used to reading them. On the left are the sets of U, V and W coils. These are the standard letters used for the coils I labelled red, black and yellow. On the right are the switches in the power circuit. They are labelled Tr1 to Tr6 as they are transistors.

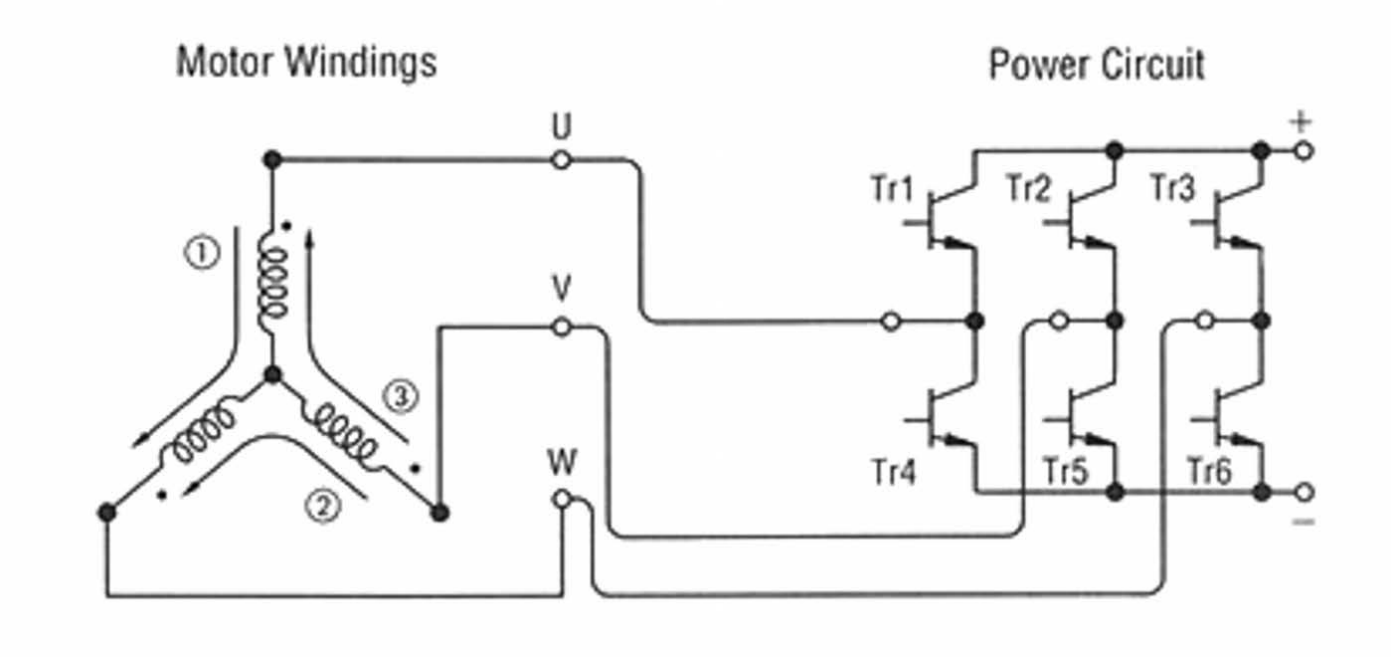


Figure 2 (credit: Oriental Motor)

Figure 3 shows one of the transistors. As you see there is some variation in the symbols used. In Figure 3 I have drawn the most common one.

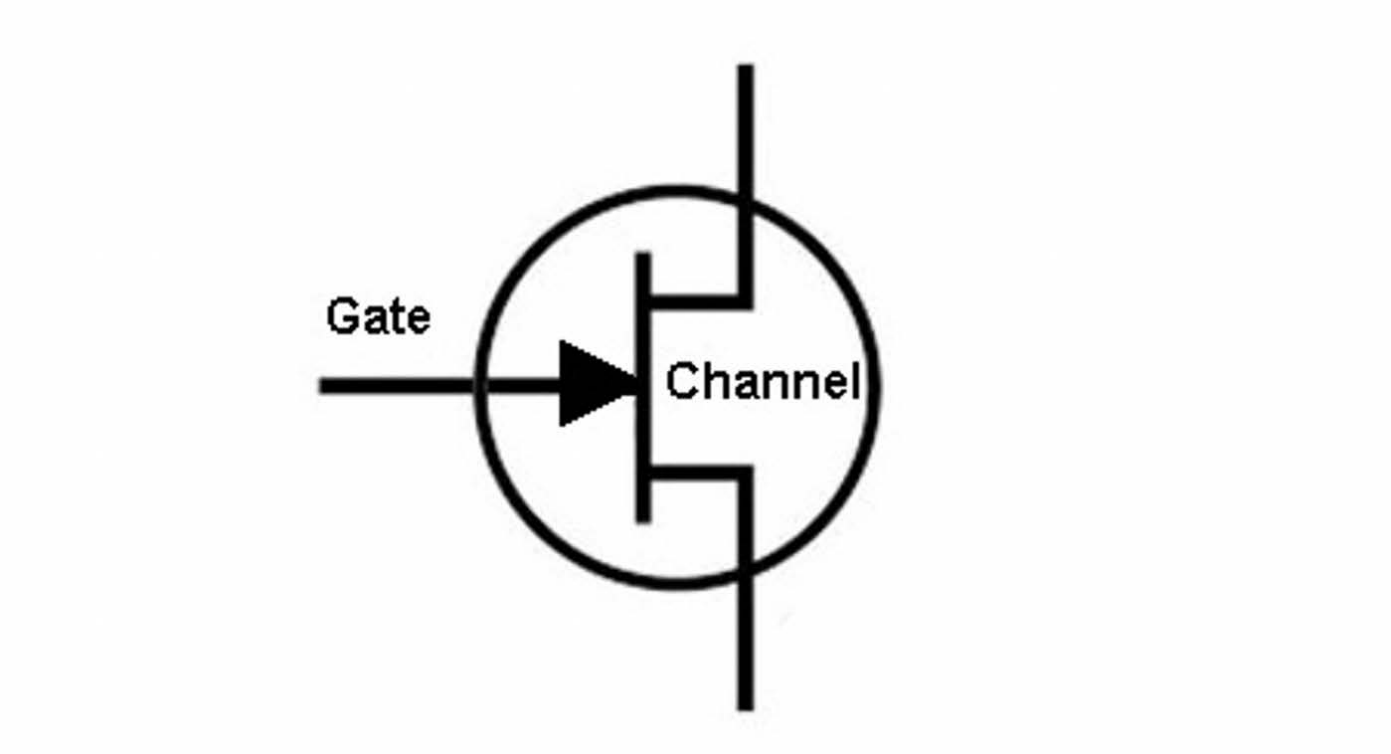


Figure 3 (credit: author)

Electric current can travel through the transistor channel from top to bottom but only when the correct voltage is connected to the small spike sticking out to the left, which is called a ‘gate’. The electric field the voltage creates allows the current to flow or not. That is why it is called a field-effect transistor (FET). It acts like the switch you use on your house lights and indeed FETs are used in light dimmers. They switch the bulbs on and off rapidly with different amounts of on and off, so changing the brightness.

Why are there six FETs, not three? There are only three coils to switch on. Look at the connection to coil U. If TR1 switches on, the coil is connected to the plus +. If TR4 is on, U connects to the minus -. So depending on which is switched the coil can be made north or south.

Step / Transistor	①	②	③	④	⑤	⑥	⑦	⑧	⑨	⑩	⑪	⑫	⑬
Tr1	ON					ON	ON					ON	ON
Tr2		ON	ON					ON	ON				
Tr3				ON	ON					ON	ON		
Tr4			ON	ON					ON	ON			
Tr5					ON	ON					ON	ON	
Tr6	ON	ON					ON	ON					ON
Phase U	N	—	S	S	—	N	N	—	S	S	—	N	N
Phase V	—	N	N	—	S	S	—	N	N	—	S	S	—
Phase W	S	S	—	N	N	—	S	S	—	N	N	—	S

Table 1 (credit: Oriental Motor)

If you have followed this so far you now know how the motors work. As the coils magnetise in turn they produce a magnetic field that turns round continuously pulling the rotor with it. Almost all electric motors used in cars and industrial machines work like this. They are also called ‘synchronous’ motors.

Factors to Consider Choosing an ESC

The compactness, rotational speed and power of brushless motors is impressive. When I started electric flying it took me a while to realise that they were small versions of the three-phase motors I had come across in industry. I was puzzled where the driving waves came from, so that sparked my interest in electronic speed controllers. You now know that they produce the three phases at large currents, but they can be programmed for braking the motor, reversing the motor, throttle response speed and other things. You can even change the sounds they make.

My favourite simple ESCs are Turnigy *Plush*. They are quite cheap, compact and very robust and they can be programmed using a cheap card rather than struggling with beeps from a transmitter.

My favourite ESCs of all are the FrSky *Neuron* range, so-called no doubt because they are 'brainy'. They are available in 40A, 60A and 80A versions with a +50% burst capacity. I use the word brainy because they provide a range of telemetry data for FrSky radio equipment, including RPM, temperature, current and lipo voltage, from which you can also derive milliampere hours (mAh) used and power. They produce up to 7A for the receiver and servos and as a final bonus they are small. The only downside is that they are expensive, starting at around £45 ($60).

But What's the Right ESC For Me?

There are several factors you should take into consideration when making a decision about ESCs:

- **Current Capacity** It is best to choose one that can produce a current at least 20% more than the maximum for the motor.
- **Number of Cells** Most ESCs can handle lipos of between two and six

cells. For larger numbers of cells, for example when you use two lipos in series, you need to find a suitable ESC, which is likely to be expensive.

- **Battery Equivalent Circuit (BEC)** That is, whether the ESC can produce the voltage for the receiver and servos. Make sure it can pass enough current for the receiver and servos. If not, fit a separate receiver battery or find out about power boxes.
- **Failsafe Cutoff** Whether it will switch off power to the motor if the lipo voltage drops low. This ensures that it can still supply power to the receiver and servos so you can safely land deadstick.
- **Programming Card** Whether or not there is a programming card available. As noted above, one is for the *Plush* but not for the for *Neurons*)

And last, but not least:

- **Size and Weight** (of course)

The more I learn about ESCs the more clever I think they are, or at least the people who design them. I like to know how things work. By that I don't mean what they do, but what are the underlying principles. These will be a combination of science, engineering and computer code.

Let us suppose that the throttle lever is at maximum. The ESC starts to energise the coils and the motor turns. What determines the speed at which it turns? For a given voltage and motor there is a speed determined by the propellor. If the propellor match is good the motor will turn at roughly its kV rating multiplied by the voltage. For a 3S battery of 12.6 volts and a motor of 1000kV this will be 12,600 RPM. In practice it will be lower as the battery voltage will be lower than its maximum value.

So How Do They Work?

We have now covered the physical arrangement. This does not explain how the ESC sends the correct pulse of current to the correct coil at the correct moment. This diagram shows the control loop. Note that there are boxes for detection of position and speed. The speed setting is the signal from the throttle.

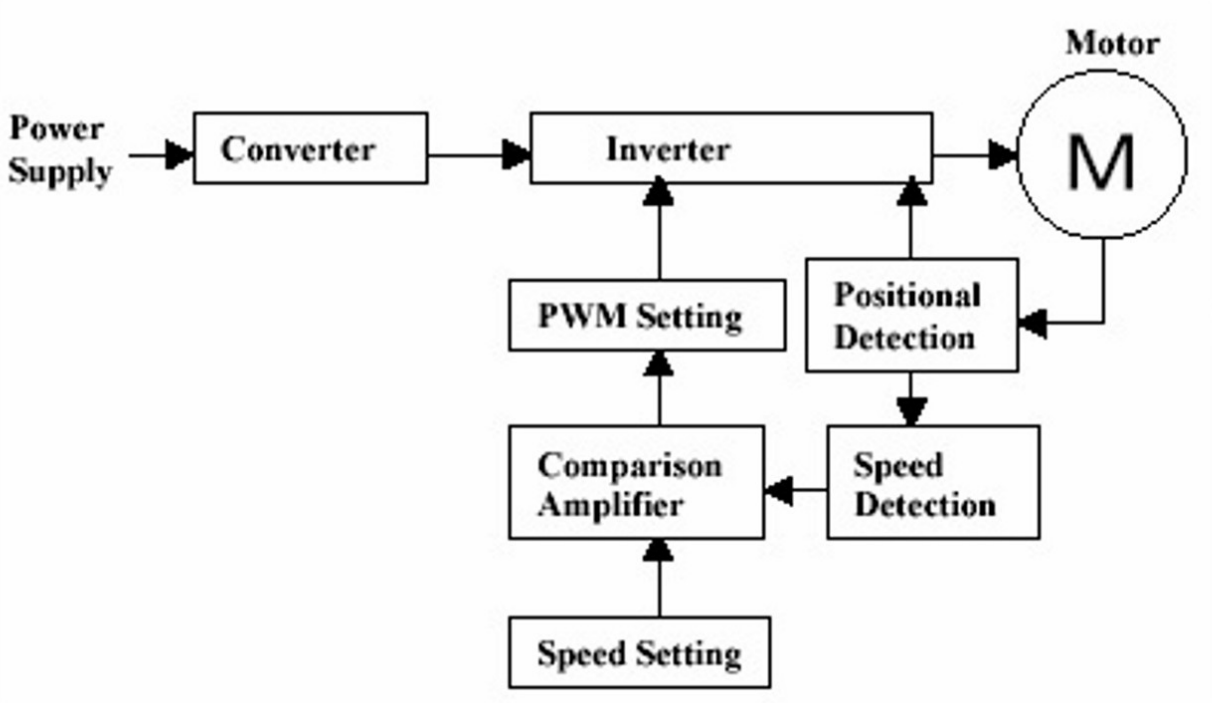


Figure 4 (credit: Oriental Motor)

The inverter produces and switches the power to the coils on and off as decided by the pulse width modulation (PWM) setting. This varies the power as you will see later.

Detecting Position and Speed

As we saw earlier the ESC powers two coils at a time. That leaves the third coil and wire unused. To see how it is used we need to understand a scientific principle called induction. Coils are made of windings of wires. If a wire moves through a magnetic field, or a stationary wire is in a varying field,

a voltage is created in the wire. The rate at which the magnetic flux 'lines' are cut by the wire decides the voltage. As a rotor magnet passes the third coil it creates a voltage in it by induction. The ESC circuitry notes this voltage by reading the third wire and uses it to calculate the rotor position and hence how fast it is turning. It uses this data to vary the speed at which the coils are switched.

Throttle Positions Less than Maximum

To send reduced power, the FETs that drive the coils are switched on and off during each power pulse (that is as noted above, pulse width modulation or PWM) or the 'duty cycle'. At full throttle both of the coils are on all or most of the time. They are most efficient at full throttle as each switching operation causes a small energy loss.

Calibrating an ESC Before Use

Many ESCs do not need this. If yours does, however, this is how to do it when connecting up for the first time or when changing transmitters.

1. Ideally remove the propellor or at least tie the model down.
2. Switch your transmitter on and set the throttle stick to maximum position.
3. Power up your receiver
4. Connect the battery pack to the ESC.
5. In a short while the ESC will beep.
6. Then pull the throttle stick to the zero power position.
7. The ESC will beep again, which indicates that your ESC has got the signal range of the throttle from your transmitter.
8. The throttle is now calibrated and your ESC is ready for operation.

What Programs Do They Run?

Hard as I looked I could not find any information on how the ESC reads and processes the data. This is not surprising. Companies making ESCs will be jealous of the commercial value of the program code.

So I thought it might be an idea to work out how I would set about writing the program code for an ESC and it might help you understand how they work. I might not get it right of course and I hope someone will correct me if I don't. Or maybe my method is correct but there are other ways of doing it.

We start with the data. Of the three wires to the motor, two will be carrying current depending on throttle setting. What will we 'see' on the third wire? As it is pushed at speed past a magnet, a pulse of voltage will be induced in the coil to which it is connected. The height of the pulse will tell us the speed and the centre of the pulse tells us the position.

How Does That Work?

Now the science bit. The strength of a magnetic field is called flux density and is represented by the Greek letter Φ (phi). When you played with iron filings and magnets they were tighter packed where Φ was greatest, near to the magnet. When a wire moves through magnetic flux a voltage is created (that is, induced) in it. This works with a fixed magnet and a moving wire, a moving magnet and a fixed wire or where wire and magnet are both moving. Just for completeness, though not relevant here, a fixed wire in a magnetic field that is changing, such as a field made by a coil of wire with a varying current, will also have a voltage induced in it. That is how transformers work.

So induced voltage = rate of change of the magnetic flux linked with the wire.

Physicists write that dΦ/dt pronounced ‘dee-fy by dee-tee’.

So the induced voltage tells us the speed of the coils of wire and hence rotor.

However we can also find the speed from the time between this pulse and the one from when the next set of coils is switched on. We could use either, or perhaps both. The midpoint of the pulse will show when the magnet and coil are exactly lined up so will show us the position of the magnet.

All computers (and an ESC is one) have a ‘timebase’, which is effectively a ticking clock that keeps everything in step.

A First Try at the Program Code

Here is my pseudo code that can be converted into any computer language. Note that it produces speed data in the two different ways. This code is for a situation where brake is on as it would be for folding props.

```
Repeat the following
    If throttle is more than zero
    Then do the following lines of code (start loop)
        Move to the next set of coils
        Identify the third wire by checking which has no signal going to it
        Read its voltage
        Read the clock time as a voltage appears above a threshold
        Sample the voltage repeatedly and rapidly and record values
        Read the clock time when it drops to the threshold value again
        Calculate the mid-point time
        Select the maximum value for the voltage
        Convert the maximum voltage into a speed value
        Convert the mid-point time into an angular position value
        Calculate a suitable delay
        Calculate the lengths of the drive current signals for wires 1 and 2 from throttle setting
        After the delay send the drive signals to the FETs for the relevant coils
        Calculate the speed from the current and last angular positions and the times
        Compare the mid-point time with the mid-point time of the drive signals
            If it is lagging or leading change the delay timing for the drive signals
    End loop
    Else (i.e. throttle zero) short out all coils to put brake on
    Read the throttle setting again ready for next loop
End of repeat (i.e. jump back to the start)
```

In a Neuron ESC there will be additional code for sending rpm and time, plus current and lipo voltage from other internal sensors, as telemetry data to the receiver.

In a twelve coil motor the above code would be repeated twelve times for each revolution. If the motor was turning at 10,000 RPM that would mean 120,000 loops each second. Is that even possible? To see why it is, you need to understand two things — machine code and clock speed.

First — Machine Code

Computer programmers (coders) usually write the programs in a language that is a bit like English. For example

```
printline(“Hello”);
```

That makes it easier to write and understand the program. Then a program,

called a compiler, reads each line and checks that it makes sense, a process called ‘parsing’. If it does it turns it into a machine code instructions. These are compact and efficient being just a string of binary digits (1 or 0). It stores them all in a file. You can spot these files on a computer as they usually have the file extension .exe, standing for ‘executable code’. They are what a computer — the ESC in this case — runs as a program (application).

In the case of the ESC, and similar things like receivers, phones and washing machines, the machine code is stored permanently in a chip inside, called firmware, so does not have to be loaded like a normal application. It is usually erasable so the programs can be changed by updates. Firmware binary code does not have a file name. It starts automatically as soon as the device is switched on.

Some programmers write directly in machine code. I have occasionally. A good programmer might write machine code better than a compiler can, but it is a lengthy and brain-boiling process. Early computers could not even start themselves up. The startup code had to be put in line by line by setting a row of toggle switches to one or zero and then pressing a button. This was called ‘toggling it in’ and allowed the computer to start, in effect by pulling itself up by its own bootstraps. Hence the term that we still use for starting up, to ‘boot’ the computer.

Clock

The clock in a computer processor ticks at a speed that we find difficult to imagine. Even the simple Arduino runs at 8 or 16MHz and it’s possible that those in ESCs run faster than that. There are roughly 30 million seconds in a year. At 16MHz a processor divides a second as a second divides six months. On average a machine code instruction takes two machine clock cycles (ticks). That’s plenty of room for lots of lines of code that each take a

few microseconds to run. Incidentally the speeds at which modern computers work are measured in gigahertz (GHz or a thousand million ticks per second). For example a 3GHz computer processor divides a second as a second divides 100 years and most computers have several processors.

Is That It?

Er, no. ESCs can do all kinds of clever things such as braking the motor on zero throttle by shorting the ESC wires, reversing the motor for getting out of reeds when flying on lakes (or playing in the air when flying a Durafly Tundra), changing the pulse timings for different type of motor, deciding what noises the ESC makes, calibrating for maximum and minimum throttle values, changing how rapidly the motor speed changes as the throttle changes, and so on. This would need another article. You have suffered enough for now.

Resources

- ***Inside the Electronic Speed Control*** — From *Model Aviation* magazine: “Mysterious events are often attributed to mystical causes, and brushless power systems are about as mysterious as things get in RC. Some systems work and others don’t…”
- ***Speed Control Methods of Various Types of Speed Control Motors*** — From Oriental Motor: “A large number of motors are being used for general purposes in our surroundings from house-hold equipment to machine tools in industrial facilities. The electric motor is now a necessary and indispensable source of power…”
- ***Turnigy Plush*** — From HobbyKing: “They have a broad range of programming features coupled with smooth throttle response making

them the go-to ESC for those in the know. "

- ***FrSky Neuron*** — From Aloft Hobbies: "smaller and lighter the new Neuron S is compared to the original Neuron (Neuron 59 grams / Neuron S 60A 39grams). Thats all well and good but we are here for the telemetry so let's dive in…"

*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**.*

Is Soaring Up to Its Glass in Hi-Tech?

What to ex-Spectra in the future?

Bob Dodgson

"Megan Dodgson with the First Windsong ever built that I flew to second place at the 1983 Nationals." (image/caption: Bob Dodgson)

This story originally appeared in the 93–1 edition of Second Wind, *Dodgson Designs in-house newsletter. — Ed.*

I have been in RC soaring about 25 years and I have never seen such a flurry of new kit manufacturers as I am seeing now. In the past a modeler had only a handful of kits from which to choose if he wanted a serious open class competition glider — and only one choice if he wanted a serious open class competition glider with full multichannel control. Now there are probably 15 choices!

In the years around 1965 to 1970, there was a great creative surge in the newly discovered sport of soaring in the US, culminating in the magnificent and huge hi-tech Jerry Nelson *Ka 6* out of 'Hummingbird Haven' California and Earl Pace's *Labelle* from Seattle. The *Ka 6* utilized a scale fiberglass fuselage and composite hollow-core molded fiberglass and foam wings with ailerons just like on the most exotic of today's gliders. It was sold as a complete glider, pre-painted and ready for radio gear. It was also sold as a package deal with an EK•logitrol radio installed. There were several of these beauties flying locally — most notably the ones in the hands of Doc Brooks. When the wild Doctor was flying his huge *Ka 6* on the slope, I landed — both to watch his daring antics and because the very large glass bird in Doc's hands took up the whole slope and would effortlessly slice through the gliders of the uninitiated like a hot knife through butter. Many of these *Ka 6*s were sold around the country.

The *Labelle* was a 'short kit' and was sold only to a few lucky friends of Earl Pace who never really put his kit into serious production. The *Labelle* sported an immaculately molded, white gelcoated fiberglass fuselage. It had glass and blue-foam vacuum bagged wings. This was my first introduction to the vacuum bagging process. The *Labelle* flew well. The only criticism that I had with it was that it had too much flex in the wing rod by today's standards. A larger diameter wing rod would have easily taken care of the unscalelike flexing.

Alas, Earl Pace was also a full-sized soaring pilot and soon completely gave up model development and Jerry Nelson sold his *Ka 6* kitting operation and moved on to another career, leaving the *Ka 6* and *Labelle* as searing memories of a light that shown too brightly and too soon for a country that would not be ready for them for another 20 years. What is worse, Europe is given the credit for the development and first applications of this technology several years later — while the poor US is always described as playing

'catch-up!'

While impressed with these amazing all glass birds, I as a kit designer, surmised that it would never be feasible to kit such exotic craft due to the labor intensive nature of the medium. It was also evident to me that these glass ships were not well suited to thermal competition flying and spot landings. As it was, my multichannel gliders were already more expensive than my polyhedral competition. Even now, knowing the price of materials and the time involved, I do not see how manufacturers can be making any money while selling their all glass kits for surprisingly low prices.

As a footnote to this 'golden age' of glider development, it was during this same 1970s era that I saw my first rotating or pivoting wing glider fly. It was on the slope at Fort Lawton. The innovator was Sandy McAusland, a mechanical engineer who later gave up RC for full-sized soaring. Sandy did not stick with the concept to refine it but he was one of the first to try it.

Unfortunately, after this great creative era, which also spawned the *Todi*, the first serious multichannel thermal competition glider kit, most parts of the country fell into a polyhedral slumber lasting for about fifteen years. The most innovative that the crowd with polyhedral paralyses got was putting 'blimp-like' 20% thick airfoils on their polyhedral dinosaurs. As one fan of old Broadway musicals put it *Put the Blame on [B]ame*. (I think I was referring to Mike Bame of glider fame at the time) The 1981 F3B World Championship contest is an illustration of the extent of the polyhedral paralysis in mainstream soaring.

Except for the flyers from the two main pockets of multichannel dominance, Carl Blake — a NWSS flyer, and Dwight Holley from the North East US the third U.S. team member — a California flyer had just started flying an aileron ship. No wonder the U.S. was seen as lagging behind the rest of the world in

glider development!

This was a year after we had introduced our *Camano* with full flaps and aileron control and only a year before the advent of the *Windsong* and the birth of full-blown crow capability Crow was the ability to use both ailerons in the up position of about 40 degrees like spoilers while using full positive down flaps at 90 degrees for speed and landing control. With crow, the *Windsong* could lose altitude safely and dramatically by pointing the nose straight down without building up too much speed. This was over ten years after Jerry Nelson and Earl Pace introduced the world to hi-tech composite soaring!

Finally in the last half of the 1980s the US soaring mainstream started looking at Europe and discovered that much had happened while they were in their polyhedral coma. Suddenly, some of those who had been snoring the loudest, grabbed the torch of technology and went leaping into the present with a vengeance. Since this time, technology has become the passion of the press touting all the new materials like Spectra and other innovations. People who only a month ago were totally freaking out at having to apply fiberglass cloth to the turtle deck of a *Lovesong* were now amazingly and seemingly effortlessly whipping out vacuum bagged quadruple tapered flying surfaces! It is a miracle!

I am reminded of a flyer who has built several of my kits — all the while complaining about how difficult it is to build the taco shell fuselage and apply the glass cloth to the nose and turtledeck. He then proceeds proudly to tell how he "improved on the design" by covering the wings, stabs and rudder with glass cloth and epoxy before MonoKoting them. Needless to say, his additions required much more effort than did the simple fuselage construction, the thought of which immobilized him with fear and panic. It is hard to take this kind of irrational ‘tacophobia’ and the resultingly heavy 100

oz *Lovesong* too seriously. However, since perception tends to drive reality and you can't effectively fight it, and since we have a reputation to uphold for innovative breakthroughs in soaring, we have developed our new MonoSeam fuselage technology that we have just introduced with the new *Sprite*!

Now on to what is happening today. There never has been so many high-end kits from which to choose! It is a great time to be a modeler. However, the often heard lament is "oh, so many kits — oh, so little time". For the first time, the modeler has a wide choice among nearly ready-to-fly open class gliders. For the first time a flyer can buy a glider off-the-shelf and with a minimum of building skill and time have a competitive contest glider. As I see if this is both good and bad (see *The Harley-Davidson Lesson* linked in the *Resources* section below). It is good because it puts high performance soaring into the hands of anyone with the bucks so it opens up high performance soaring to people who otherwise would not be able to partake in it. It is bad because it lets interlopers and neophytes into the high performance realm of soaring — forever piercing the veil of knowledge, craftsmanship and dedication that once separated the soaring gods from the rest of personkind. The instant plastic glider was inevitable. Its coming was foretold by the Nelson *Ka 6* and the *Labelle* more than twenty years ago. I guess the real question is, what took it so long!

What does all this mean for the future of soaring? Believe me as a kit manufacturer, no one has thought harder about this question than have I. First of all, I see many new entrants continuing to join the kitting business. Since the very limited high-end market cannot sustain many companies, I see even more manufacturers leaving the business or diversifying into other products. Remember that for many years, Airtronics and Dodgson Designs had the bulk of that market pretty much to themselves. I don't know about Airtronics but Dodgson Designs never got rich. Imagine the same niche

market split up 15 ways instead of just two or three.

Another trend that I expect to see develop is a split between the instant off-the-shelf plastic model market which will appeal primarily to the non-builder flash-in-the-pan 'instant-gratification boomers' and the market that is geared to the traditional craftsman/builder/flyer. In order to survive, the builder market will have to continue to offer a performance, maintenance and a serious price advantage over the plastic herd. This is an ongoing challenge since the plastic 'cookie cutter' birds are becoming ever more competitive and capable as the technology matures. As you might guess it is the craftsman/builder/flyer market that continues to interest me. The plastic gratification end of the market is far too crowded already — and besides I am allergic to epoxy. With my new MonoSeam fuselage technology, I can offer a mixture of convenience, price and performance other's can't match. Watch for a *Camano* replacement, standard class glider utilizing the *Sprite* technology — soon!

Resources

- ***The Harley-Davidson Lesson*** by Bob Dodgson as featured in the November, 2021 edition of the New RC Soaring Digest.
- ***Spectra by Honeywell*** — it's still around! From the website: "*Pound for pound, Spectra fiber is 15 times stronger than steel, lends its lightweight strength to industrial workplaces. Spectra is light enough to float in water while remaining hydrophobic.*"

Read the collected works of Bob Dodgson in the New RCSD: see **The Dodgson Anthology**. *Also, are you a fan of the retro* ***Dodgson Designs logo****? 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****.*

Club in Focus

Southwest Soaring Society

Ken Becker

This was not even half of the beautiful planes that were pitted on the field.

This is our second in an ongoing series of articles which is intended to raise interest in, and awareness of local grassroots RC soaring clubs. Would you like to be featured here and our **Clubs** *page? Let us know! — Ed.*

The 2022 *F5J Southwest Classic* — held at the beautiful soaring park known as *Silent Wings Ranch* located in Maricopa, Arizona and home of Southwest Soaring Society (SWSS) — was one to be attended, livestreamed, or read about.

Held in temperatures that to most in the United States were only a distant

anticipation as cold fronts ripped through most of the country, on this weekend we were blessed with beautiful skies, and acres of grass purposely planted for RC soaring only. It was a tad bit windy on Saturday as a front was blowing by, but it was not intolerable and far below our limits. Sunday was a nice day with low breezes and thermal activity. At times huge thermals stormed past and allowed an elevator to those who could find it and/or be brave enough to put their plane into a swirling cloud of desert sand and whatever else the quickly moving spirals sucked up.

Also this being an *F5J USA Tour Series* event, people came from all over the United States to attend for points and as this also will be the site of the 2022 *F5J USA Team Selects* many also used this as a precursor for that event.

Sixty-two pilots competed in the event making it the largest F5J tour event ever held in the United States and it was a very difficult event as many of the nation's top F5J pilots were in attendance.

Left: Co-Contest Director and Founder of the F5J USA Tour Series Chris Bajorek along with timer Randy West. | **Right**: Like a swarm of locusts at launch.

The backdrop of the beautiful Arizona desert mountains was a great canvas to watch incredible pilots battle and attempt to squeeze every inch of altitude out of their very light flying pieces of fine art. Even the winner had to deal with difficulties as he lost a model due to a midair. There were a few other midairs but all-in-all for the mass amount of planes (for which there were 13 lanes) it was an incredibly safe and well run event with no stoppages as it ran seemlessly thanks to Contest Directors Chris Bajorek and Tim Johnson and the pilots who were ready as the timer went off.

This event shows the strength of the growing popularity and the stronghold

F5J has taken in the competitive sailplane world as more and more people are finding interest not only in the incredibly sculpted carbon fiber models of F5J but also in the extreme competition.

Left: Thumbs up from competitor Tuan Le. | **Right**: Charlie Morris and his prototype Phoenix which performed well given this contest was its maiden.

This event for me at least was those things above and also a reunion, a band of like-minded folks that shared an incredible weekend of friendship and flying. As I continue to experience these wonderful events I can liken it to attending a Grateful Dead concert (for those old enough to know who they were!) If you haven't had that experience, let me explain. Going to the event itself is a meeting point, a reason to attend an event hours or maybe days or even an airline flight away. Usually on Friday nights there is a barbeque. Within the visitors community, if you need anything and ask, anyone who has it will make it available to you. It is a place to grow friendships and to grow your advanced knowledge of aerodynamics, theory, and meteorological

events. The big difference, of course, is no Grateful Dead concert I ever attended featured incredibly light, nimble gliders that float on the lightest of lift. I always look forward to the next gathering of glider guiders.

Speaking of which, the next major event that will be held at the *Ranch* will be October 28–30, 2022 which is the *F5J USA Team Selects*.

Also, if you missed it, the amazing crew of SWSS did an incredible job facilitating a very well done and also first livestream that was held through the club YouTube page (see *Resources*) and attracted those who were unable to attend.

Left: The Top 5 trophies turned out beautifully. | **Right**: John Armstrong and Gavin Trussell.

SWSS has put vast effort creating a beautiful and safe field and they invite you to come and or join. We will see you at the next event!

More about the Club

The home of SWSS is set amongst the hills and desert near Maricopa, Arizona and is newly formed, with memberships starting on March 1, 2021. The idea originated with Justin Rizor who has a deep love for this hobby. So much so that he purchased a plot of land that reminded him of something he had seen in Spain and named it similarly: *The Silent Wings Ranch* or simply *The Ranch*. This purpose-built, RC soaring-only facility has sprawling open areas to fly, acres and acres of grass, its own weather station and many more state-of-the-art additions. *The Ranch* has its own water source and pump to

keep the lawn green all year long. There are also two shade structures and many more improvements coming in the near future.

SWSS membership is already up to 54 pilots. These are incredibly talented individuals that make SWSS a force at every contest in which they compete. The club currently is focused on F5J, E-F3K/F3K (a format they are at the forefront of, combining both classes as they compete together) F3RES and Aerotow but all gliders are welcome. We do have an occasion to use the winch as well at times. We encourage you to follow us on our website, Facebook page (see *Resources* below) and/or join us and receive notifications of everything going on. We also travel to other clubs and post those events as well.

Acknowledgments

Thank you to the contest sponsors Soaring USA and Soaring Lab for contributing to this incredible event and all of its volunteers.

Resources

- ***Southwest Soaring Society*** (website)
- ***Southwest Soaring Society*** (YouTube)
- ***Southwest Soaring Society*** (Facebook)
- ***F5J Tour*** — From the website: **"**Welcome to the F5J contest clearinghouse for USA events. We hope this site helps F5J contesters connect with more events."
- ***Soaring USA*** — From the website: "Our goal is to offer you the largest collection of top quality models from around the world. We offer these at the best possible prices, and hope that you will find our site easy to

use..."

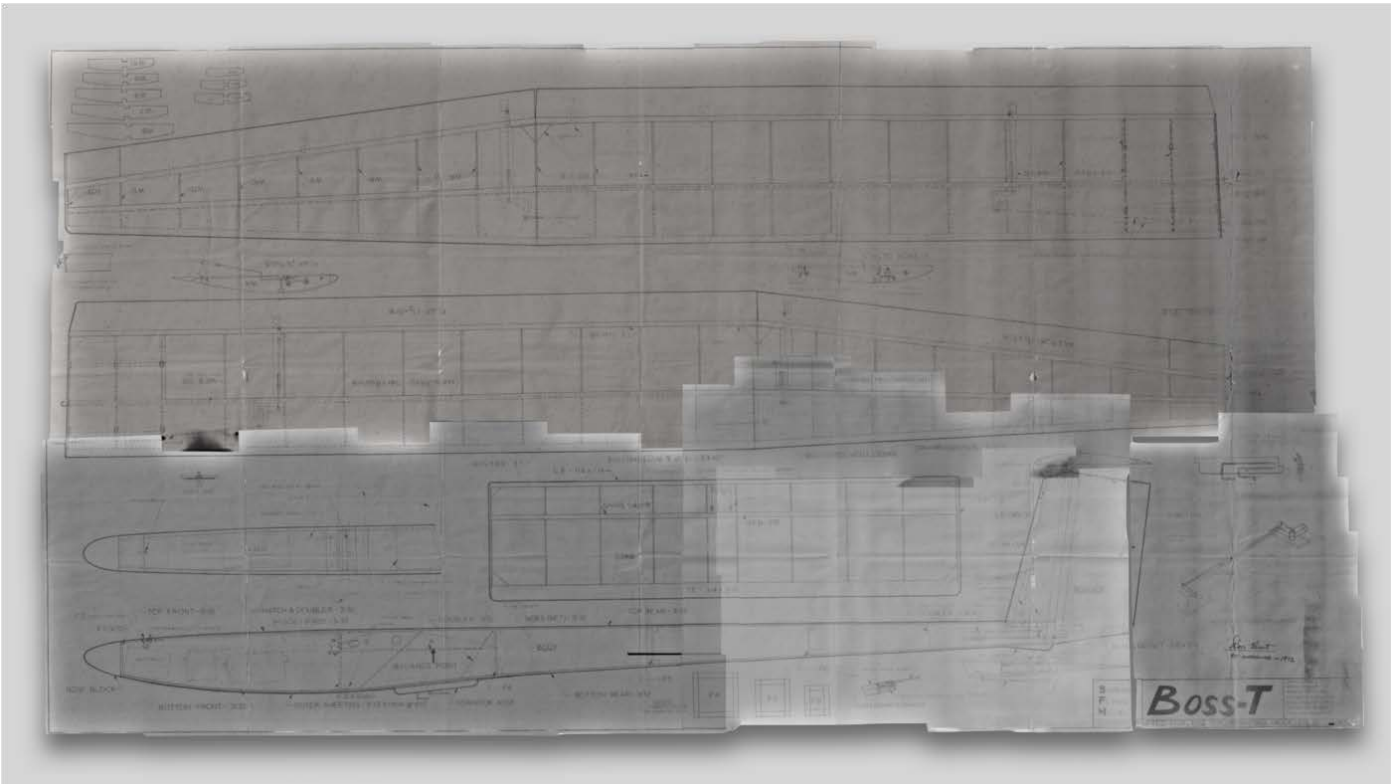
- ***My Southwest Classic F5J 2021 Experience*** — An independent write-up of the *F5J Southwest Classic* by Ryan Woebkenberg which appeared in the March, 2021 issue of the New RC Soaring Digest.

All images provided by the Southwest Soaring Society membership. 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****.*

Don Burt's Groundbreaking Boss-T

Revisiting a design to which many modern RC gliders can trace their roots.

Terence C. Gannon



I want to offer deepest thanks to my friend Steve Kerry, without whom this project would have not existed. He was the one who picked up on a casual mention of the Boss-T *in one of my previous articles, and through his tireless efforts was able to reconstruct an original set of the Superior Flying Models' plans, as shown above. So who's will be the first in the air, Steve? — TCG*

So what was your first RC glider? For me and my brother Patrick, it was the Superior Flying Models *Boss-T*. Perhaps it was the 'Simply Spectacular!' on the one page, photocopied brochure or that ten foot wingspan or all of those

hard chines, but Pat and I were smitten from the very moment we first laid eyes on it. We simply had to have it.

And have it we did, and we put it together over the next few months, taking time out from the project only for school and to mow another of the neighbours' lawns to help pay for it all. Or at least some of it, with the balance being provided by *very* understanding parents.

We did manage to finally get it into the air and it flew beautifully. It was a handful, though, what with flaps, ailerons, rudder and elevator, the movement of which was co-ordinated by an obscenely complex mixing mechanism and pushrods running everywhere.

It's not that the *Boss-T* didn't have its setbacks. More than a couple of times we broke various parts of the structure. The most spectacular of these crashes was precipitated by a wicked stall after it popped off the hi-start prematurely. It wiped out the nose right back to the leading edge. But never mind, I thought, I'll construct a replacement out of fibreglass. And on it flew.

It was only much later in life I began to learn the importance of Don Burt's design. Arguably, many of the sophisticated glider designs today can trace their lineage back to the seminal aircraft of this period. In one of the many articles which Bob Dodgson has reprised in the New RC Soaring Digest, he made mention of the *Boss-T* as being roughly contemporaneous to his designs. Bob had been designing straight wing multichannel gliders since 1969 and his classic *Todi* predates the *Boss-T.* So there is a pretty good chance Don incorporated at least some of Bob's ideas into the *Boss-T*. Bob, picks up the story:

> *Don Burt, a Scot, and full-size plane pilot, was a model free-flight competitor in Scotland where he obtained an aerodynamic engineering degree. Boeing paid to fly him over to the US to work for them. When I*

> *met him in about 1969 or 1970 he was flying his own polyhedral designs and he had scratch-built a beautiful scale KA 6 which flew very well on the slope. We were both just doing slope flying at the time. In about 1970 I had come up with my first flaperon multichannel glider. Don continued to develop polyhedral gliders and we did battle on the slope to see whose designs could stay up in the lightest lift and still fly well in high winds on the slope.*
>
> *Sandy and I socialized with Don outside flying and went to his house numerous times as well as got to know his mother from Scotland who would come and visit him. She was a dear little lady who always referred to our young daughter as "a wee bonny lass" and liked that we had named her "Heather" which Mrs. Burt said was a good Scottish name. Don was always doing something thoughtful for us like making some of his mother's Scottish desserts for us as gifts at Christmas.*
>
> *Don designed the T2 and the Boss-T and later the Bunny which was named after his wife of later years. Don was actually the inspiration for my kitting my designs. I was in a state of disbelief when Don told me he was going to kit some of his designs and began to do so and started selling a few kits. Seeing Don making it happen I figured if Don could do it, so could I and I began to kit the Todi in 1972. Thus began my 25-year career of kitting model sailplanes.*

I want to humbly thank Bob for taking the time to write-up his thoughts for this article.

So where do we go from here? I'm not entirely sure, but perhaps if the editorial duties of RCSD eventually allow the time, I'll begin to trace out the parts and get building.

If I do, you'll be the first to know.

Resources

- ***Reconstructed Boss-T Plans (V1)*** — mostly through the efforts of Steve Kerry (with just a little extra tweaking by me), these are the first version of reconstructed *Boss-T* plans. Whether they are useful to you or not is up to you, and we offer no guarantee in that regard. However, Steve and I thought we would make them available in their current state to anyone interested. If and when we refine them over time, we will post new versions. If you do the same, perhaps your refined version can also be made available for download.

Although it is not certain, there is a fairly good chance this is Don Burt's original Boss-T pictured here at the Seattle RAMS show in the late 1970s. This picture accentuates the sweep back which was another innovation in

this particular design.

*All photos by the author unless otherwise noted. 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**.*

The Trailing Edge

We’re trying to build a bigger tent.

The NEW RC Soaring Digest Staff

Sapphire at sundown. (credit: Raymond Esveldt)

It’s always a shock how quickly we arrive at this point — another issue of RCSD has come and gone. We really hope you enjoyed what you found this time ‘round.

Our Feature Photo

As regular readers likely know, we use *The Trailing Edge* to feature just one photo we think captures that ‘end of a great day’ feeling that many of us have no doubt experienced. The pure delight of searching for this image is that just when we think we’ve seen the best picture which captures this

particular moment — and that there can't possibly be any others — another one comes along which kinda takes our breath away. So it was with this month's contribution from Raymond Esveldt. Here are his comments:

> *The Sapphire from RC Europe is a bit of a strange bird. It's a modern laser-cut kit driven by a ducted fan (hidden in the lower fuselage), but the models appearance just breathes 'retro'. The colors match perfectly with the low sun on this wonderful afternoon.*

Raymond also contributed a great photo for *In The Air* this month, as well a helpful article entitled *How to Create Spectacular Multishot Photos* (see *Resources* below, for the link). He is indeed prolific and we thank Raymond for his many efforts — and we hope to see his work back on these pages in the future!

RC Soaring Adjacent

Two of the articles you might have found in this issue are what we call 'RC soaring adjacent': Gary Fogel's historical deep dive with *Albert E. Hastings | America's First National Glider Champion* and John Patterson's *Glider Mail*. We hope you enjoyed them as much as we did. But for those who might still be looking for the precise connection with RCSD's core focus of RC soaring, we can actually save you some time and further frustration: *there isn't any*. Well, apart from the very obvious one: which is gliding, of course.

We have done this before, with some success. There are those who thought Peter Garrison's *The Compass and the Clock* was a real stretch from gliding. But the connection is there if you know where to look. In fact, it's explained in Terence Gannon's *PSS Candidate | Melmoth* in the same issue. We're happy to report the vast majority of feedback we received was that these two articles were a happy diversion and a welcome detour. This is *leisure*

reading, after all. We think a great story — even if it tip-toes away from the main subject matter — is still very worthy of inclusion in RCSD.

The beauty of it? If you disagree with our philosophy then — *tap!* — onto the next story. RCSD's digital-first philosophy means we're never going to run out of space. Stories like the ones exemplified above will never displace stories that may well be more closely with your interests. It's not a zero sum game. It's win-win.

However, rest assured that it's a carefully thought out and very deliberate strategy. We're trying to build a bigger tent. We think by diversifying our story mix just a little — in as many ways as we can, including the way described above, is the best approach to attract more people to this thing we love to do. So we'll continue to look for these 'adjacent' stories in the future.

New in the RCSD Shop

Just out, the September 2021 edition of the RCSD Cover Photo T-Shirt in both English and Japanese. It comes in in six beautiful colours.

Ah, the best laid plans. When we embarked on this venture—the RCSD Shop, that is — we had such grand plans for how we were going to release the current month's *RCSD Cover Photo T-Shirt* in, y'know, the *current month*. However, as Mike Tyson was to have said: "everyone has a plan until they get punched". So let's just say the dizzying array of tasks required to bring each issue of RCSD to you every month has made us a little punch drunk. So now we're playing catch up: here's the ***September 2021*** edition. We manufacture and ship worldwide. Get yours today and help RCSD remain a commercial-free, pristine reading experience forever.

Make Sure You Don't Miss the New Issue

If you don't want to miss the May issue of the *New RC Soaring Digest* make sure you subscribe to our **Groups.io mailing list** or connect with us on **Facebook**, **Instagram**, **Twitter** or **LinkedIn**. And 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!

Resources

- ***How to Create Spectacular Multishot Photos*** by Raymond Esveldt, April 2022.
- ***Albert Hastings | America's First National Glider Champion*** by Gary Fogel, April 2022.
- ***Glider Mail*** by John Patterson, April 2022.

- ***The Compass and the Clock*** by Peter Garrison, November 2021.
- ***PSS Candidate | Melmoth*** by Terence C. Gannon, November 2021.

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