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The New RC Soaring Digest

September, 2022
Vol. 37, No. 9

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In The Air

"If we'd had a Model Flying Club and were spitting distance from a one-in-a-million slope, we might well have done better in school in our short time there." This photo, by our friend Jurek Markiton, triggered the memories which were the inspiration for this article.

It's the most wonderful time of the year.

There's a classic TV ad for the Staples stationery store chain which ran back in 1996. I remember the theme music as the big, brassy Andy Williams arrangement of the Christmas classic *It's the Most Wonderful Time of the Year.* But it wasn't in the fall to support Black Friday or Christmas sales, but rather starting in mid-summer, to support that other annual spend-o-rama: 'back to school' in September. But in the case of this truly clever ad, it's not the kids who love the holiday, but rather the parents: said kids are *finally* going to be somebody else's problem for a bunch of hours a day much to the parents delight. But I can't possibly do it justice — check out the real thing using the link in *Resources* below. It's a classic: so much so that whenever I hear that song, I now think of Staples, not Christmas.

I was one of those kids in the ad. The best day of the year — by a country mile — was the last day of school. Which back in Vancouver, BC in the 1970s, was always in June — never in July. Conversely, the most horrible day of the year was Labour Day. Again, it was an article of faith that school never started until after that and mostly likely the *very next day*. Consequently, it made Labour Day not a 'holiday' as we supposed to think, but like having your execution scheduled for the next day and knowing the governor's call ain't going to come.

I *really* hated the first day of school.

Even today, with my school days a very, *very* distant memory, I have this vestigial unmoored anxiety on Labour Day, which began to subside only when my wife and I starting taking vacations beginning on that long weekend. Why that weekend, you ask? Because the kids were back in school, of course, and we didn't have any! Oregon beaches that were jammed mere hours before were now empty of everybody except us DINKs. It truly is the most wonderful time of the year.

What does any of this have to do with RC soaring, you ask? Not much admittedly — but it was an opportunity to provide some inkling of how checkered my school career actually was, starting very early in life. I had a love/hate relationship with school at best, but that's another story for another day.

Back in the *The Trailing Edge* in the June issue of the New RCSD (again, see *Resources*), the staff wrote:

> "If we'd had a Model Flying Club and were spitting distance from a one-in-a-million slope, we might well have done better in school in our short time there."

Which forms the plot twist of this short missive: almost from the day I was no longer *obligated* to go to school, I really couldn't get enough of learning something new. I go so far as to say it's almost like an addiction. Learning is absolutely the best part of my week. A day is darker without it, and a day with nothing but and I learn something really interesting—well, let's just say if I smoked it would be a perfect time for a cigarette.

Here's a further observation: lots of New RCSD readers must feel exactly the same way. Back in the February, 2021 issue — only the second one I had edited — there appeared an article entitled *The Aerodynamics of a DLG Unravelled* by Theo Volkers and Tjarko van Empel. While I was pretty new and inexperienced at the job back then, I must admit to having reservations about it. It was just so… complicated. While extremely well written, I had to really work at reading and understanding the points the authors were trying to teach me. I remember thinking "I'm not exactly sure who's going to read this, but what the heck, let's run with it."

What a huge misunderstanding on my part. *The Aerodynamics of a DLG Unravelled* is by far and way **the most popular article ever to run** in the New RC Soaring Digest.

The object lesson of course? That people **love to learn.** And seemingly, the harder they have to work at it, the more they seem to love it. No, I don't have facts and figures to back that up but anecdotally I've seen enough how-to articles out-trend the other articles in an issue to know that there is always a ready audience to learn something new.

Which leads me to my final points on the subject of informal, lifelong learning. We'll continue to focus — nay, dare I say **emphasise** — the learning component of the New RCSD. Also, if you enjoy a learning-centric article, don't forget to let the author know or ask questions if you have them. Start a conversation. On the other hand, if you have something you want to teach the world — write an article and get it in for a future issue!

After all, it's my job to try and give readers what they want and in this case — in fact, all cases — I really need your help doing that. Let's get smarter together.

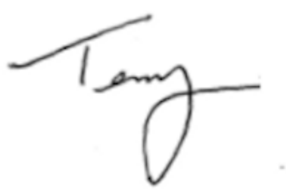
Dear Mr. Stubblebine

In the April, 2022 issue as part of my *In The Air* editorial, I wrote a section entitled *Are Medium's Days Numbered?* Prefacing that, I did my best to scare off readers with the comment "it's pretty techy, nuts-n-bolts, rattle-in-the-engine-room, *Inside Baseball* kind of stuff." I really hope that most decided to continue with the material that was *really* interesting (like the article which followed and virtually everything else in that issue) but for the few that persevered, there's something of a postscript. The TL;DR version is that Medium's new CEO, Tony Stubblebine asked me (and to be honest, undoubtedly thousands of their other users) what I thought of the service that he now leads as chief executive.

So I told him.

For those who are interested in what that is, check out *Dear Mr. Stubblebine* linked below. And with apologies to Mark Twain — and you the reader — I didn't have time to write a short letter, so I wrote a long one instead.

And with that, I bid you good reading, fair winds, blue skies and don't be late for school!



Resources

- *It's the Most Wonderful Time of the Year* — Turns out the soundtrack wasn't the "big, brassy Andy Williams arrangement" of *It's the Most Wonderful Time of the Year*, but it doesn't matter — comedically, the ad still works in spades.
- *The Trailing Edge* — The key photo for this article was provided by Jonathan Demery, who leads some great RC soaring programs at

St. David's College at Llandudno, Wales. In this article you'll find some additional commentary on these excellent extra-curricular programs.

- *The Aerodynamics of a DLG Unravelled* — The classic article on discus launched gliders by co-authors Theo Volkers and Tjarko van Empel.
- *In The Air* — The "techy, nuts-n-bolts, rattle-in-the-engine-room, *Inside Baseball* kind of stuff" that set the stage for…
- *Dear Mr. Stubblebine* — Terence C. Gannon's open letter to Tony Stubblebine, the new CEO of Medium, the platform on which the New RCSD is published.

Cover photo*: This month's gorgeous cover photo is by Laurent Ducros and was taken at Cap d'Erquy in February, 2021. It features a couple of the gliders of the aerobatic team based nearby on the northwest coast of France. The four meter span* Air 100 *gliders in Hamilton livery are all built by Eric Poulain who is also one of the team pilots. You are welcome to download the September cover in a resolution suitable for computer monitor wallpaper. (2560x1440).*

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

Silent Arrow® Production Ramps Up

An update on the story we have been covering since February, 2021.

LOS ANGELES, August 25, 2022 —Chip Yates, the founder and CEO of Silent Arrow, recently told the New RC Soaring Digest that another production run of 15 GD-2000 autonomous cargo gliders had been completed and shipped. Units from this most recently completed production run are being deployed to undisclosed locations and missions in the Middle East, the United Kingdom, Serbia and Germany directly from Silent Arrow's Calfornia-based manufacturing facilities.

When asked for his comment about the status of the program so far, Yates said:

"I'm really proud of this humble team. And in particular, I'm proud of the fact that Silent Arrow has been funded by friends, family and most importantly, customer revenues. While other, high profile startups burn venture capital funding, we build and fly!"

When questioned asked about what the future holds for the Silent Arrow program and the units being shipped, Yates said in a quote exclusive to New RCSD:

"One unit is going to a US manufacturing facility we are setting up for mass production here in the States, another few are going to the UK and Serbia to be used as training tools to set up mass production in Europe, some are going to the Middle East to fly missions, and some are being used to qualify new deployment aircraft — large military transport aircraft other than the C-130 by undergoing drop tests in the US and Europe.**"**

We'll continue to follow this story which represents one of a very limited number of successful commercial uses of autonomous glider technology.

Letters to the Editor

See if you can spot the stamp we've added. Hint: it's the subject of Simine Short's 'Stamps That Tell a Story' this month.

Around the world with stops in Portugal, India, the United States, the United Kingdom and Poland.

Another Source for Martin Simons Books

First of all congratulations on the magazine, it is fantastic. Just saw the article on Martin Simons and would like to inform you and the article's author that other books by Martin Simons are available new in English, directly from the German publisher EQIP — they are super friendly. You can have the three book set or each book individually. I have all three and they are amazing.

Best wishes from Portugal,
João Monteiro

Thanks so much for your kind words about the New RCSD, João. The link you sent looks great, thank you for the recommendation and we *have added it to the* Resources *section below. — Ed.*

Dispatch from Indore, India

In response to the question posed in last month's In The Air*, a long-time reader responds:*

Glad RCSD is still around, I joined over 10 years ago. How many participants? There were about 2500 subscribers then. Wonder how many now?

One of our fellow flyers leased a plot three miles off the highway, and built a proper model airport, mowed runway, night lights, air conditioned hangar etc. Had a wonderful time there for a couple of years, till it got shut down due to some unfortunate circumstances. Fortunately another fellow flyer owns a cricket ground just beyond restricted airspace red zone. Post COVID we hope to start flying there again.

Here's a short video of my Sunbird flying there about six years ago. In a thermal after about 22 seconds from launch! Age 70, flying soarers 55 years, global moderator of RC India.

Regards,
Krishna Kumar (KK) Iyer
Indore, Madhya Pradesh, India

KK — thanks so much for your letter and thank you for your kind words. You're absolutely right: we can use our own social media platforms to provide additional data points as to the size of the RC soaring community. The direct answer to your question: we currently have 2,399 addresses on our mailing list. Along the same lines, we have 2,920 followers on Facebook, 1,609 on Instagram, 870 on Medium and a couple of hundred more split between Twitter and LinkedIn. We have added the link to your video in Resources*, below. Finally, please consider writing an article for RCSD.We would love to feature more news of RC soaring in India!— Ed.*

‘Latest Insanity’ Not So Insane after All

I maidened the 2m ASW-15 this morning. It flies! To my amazement the little sloper zipped around the sky like it had been designed for a ducted fan. The turbine-like sound, though not loud, is kinda cool, too. A little right rudder was all the trim that was needed. I was pleasantly surprised at how flat the -15 glides with the motor off. Only about 10% throttle is needed to maintain level flight. At full chat, near vertical climb is available with the 4S/1800 battery pack. The heavy little thing glides very fast, which makes it a real challenge to land with no flaps. Anyway, it’s the closest I can get to slope soaring sans slope. Good fun! Worth all the effort.

I took photos during construction and will incorporate them into an article for RCSD. Will try to get some in-flight video, as well.

Waid Reynolds
Green Valley, Arizona

Waid — thank you so much for the follow up from last month’s letter and congratulations on the successful first flight of what should now be called the ASW-15J? We’re looking forward to the article, as I’m sure all RCSD readers are as well. — Ed.

It’s Called a Teaser, Folks

I’m going to be a bit pushed to put something together for the next issue, so how about a teaser pic for a feature on the *Rhonadler 35* next time around?

Chris Williams
Dorset, England

That totally works for us, Chris. Can't wait to see the full article. — Ed.

Likes the Novel Way Information Is Presented

A faithful reader in Poland sent in some wonderful photographs and (as we always do) sought permission to run them in the New RCSD:

Of course you can use my photographs. I must admit that I am curious how you want to use the content. Personally — I wouldn't be able to use it in a way that would interest another reader. But I like your articles and I always look forward to them. Like most of the photos posted on your website, I am delighted. Sometimes they are even 'works of art'!

The content of most articles is basically known to me — 50 years ago I obtained electronic education — but I always admire authors for the structured presentation of this information. That is, the way of passing it on and 'selling' it to young people — seems interesting to me and I wanted to see whether it will be more effective than traditional knowledge in physics lessons in primary school?

Jurek Markiton
Poland

It's clear from Jurek's photos that he is doing a lot more than his fair share of passing along his encyclopaedic knowledge of the hobby in both formal and informal ways. Click on any photo for a larger scale image.

Thanks, Jurek, for your kind words and your beautiful photos. Just so you know, we have also featured them in this months Lift over Drag *and* In The Air *articles where they provided great inspiration for the written text. It seems like you are doing a wonderful job of attracting many new, young participants to the hobby! — Ed.*

Resources

- *EQIP Werbung & Verlag GmbH* — Another, highly recommended source for Martin Simon's books.
- *RC Indore Sunbird Electric Glider* — KK Inyer's video of his *Sunbird* in action. What a beautiful, unobstructed flying field.
- *RC India* — The premier online resource serving the RC community in India. Lots of great material including (even if we do say ourselves) the index to the New RCSD, which we post every month in the *Chatter Zone*.

Send your letter via email to NewRCSoaringDigest@gmail.com with the subject 'Letters 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.

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Cool New Stuff

But wait a second…doesn't this look familiar? There's a reason why, see below. (credit: Composite RC Gliders)

Our monthly round-up of exciting, must-have merch.

Alpenbrise

A brand new 4m (157") Alpine/GPS soarer from Aeroic.

This story goes back at least 40 years to — well — 'back in the day' they say. In this case 'the day' was when one of the loves of James Hammond's life; the droolingly lovely Multiplex *Alpina* seduced him into the thrills of slope soaring.

He was lost from the moment he saw her. To misquote a pretty good Meryl Streep movie — from that point on he was 'in her thrall'. He waited a very long time for the next generation *Alpina* but in his opinion, alas, a worthy successor never emerged.

So, after more than four decades, James decided to do it himself. He took nothing whatsoever from the original design but did try to capture that beautiful, thoroughbred feeling in the air and on the ground that the original emanated. Whether he hit all the targets — those are some pretty big boots to fill — but you can tell you he did have a darn good try. Thus, the *Alpenbrise*.

By the way, if the slinky soarer looks familiar, that's because it was the subject of one of the articles from James *Designing for…* series right here in the New RC Soaring Digest. Get the inside scoop on all of what went into this new design. We have linked the article in *Resources*, below.

So, how to get your hands on your own *Alpenbrise* before your head explodes? In Germany and greater Europe, contact [Composite RC Gliders]() and in the US or Canada, contact [Aloft Hobbies]().

Click any image for detailed view. (credit: Composite RC Gliders)

Resources

- *Designing for an Alpine Soarer* — “The hills are alive…with sailplanes designed for for the rigours of mountain soaring” James Hammond describes the design influences and details of the *Alpenbrise*.

The Fine Print *All product descriptions in* Cool New Stuff *are prepared in collaboration with the product’s manufacturer and/or distributor which is/are entirely responsible for ensuring the accuracy of their product’s descriptive text and images contained herein.*

Would you like your product featured in Cool New Stuff? *Please contact us. 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.*

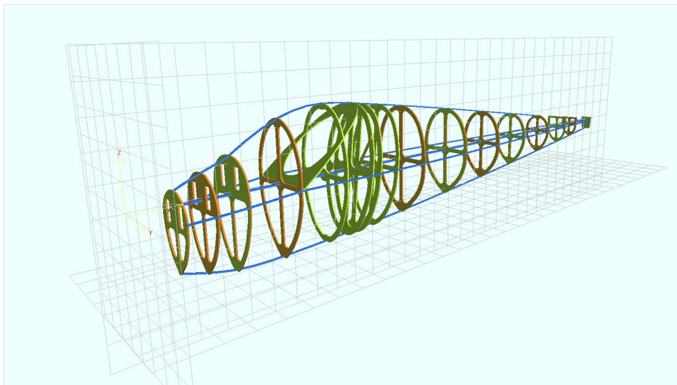
The Slingsby King Kite

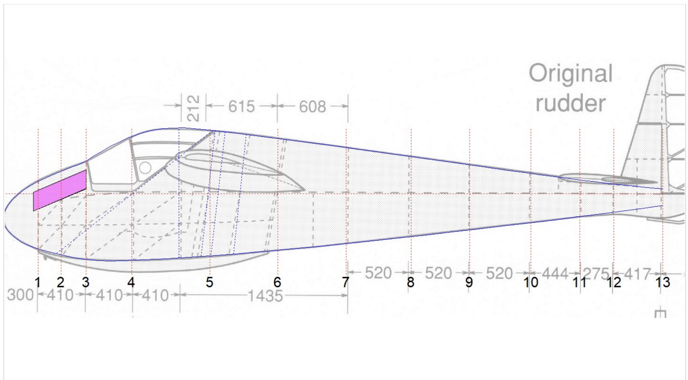
Frames set up on the temporary support battens, right-side up.

Part III: The Fuselage

This is the third part of a six part series. Readers may want to review previous parts of this series before proceeding with this article.

I drew the fuselage with *DevFus* (see *Resources*, below). After a lot of messing around on the screen with terms I'd never heard of, I got familiar with it! Unfortunately, sometimes drawings were suddenly (perhaps magically?) put in a different folder and I could no longer open them in the drawing program (stop laughing!) That's why I drew the hull about three times. Practice makes perfect they say. Gradually I found out what was possible. It's much easier to make a hull straight in a drawing than to sand frames down or glue extra material on!

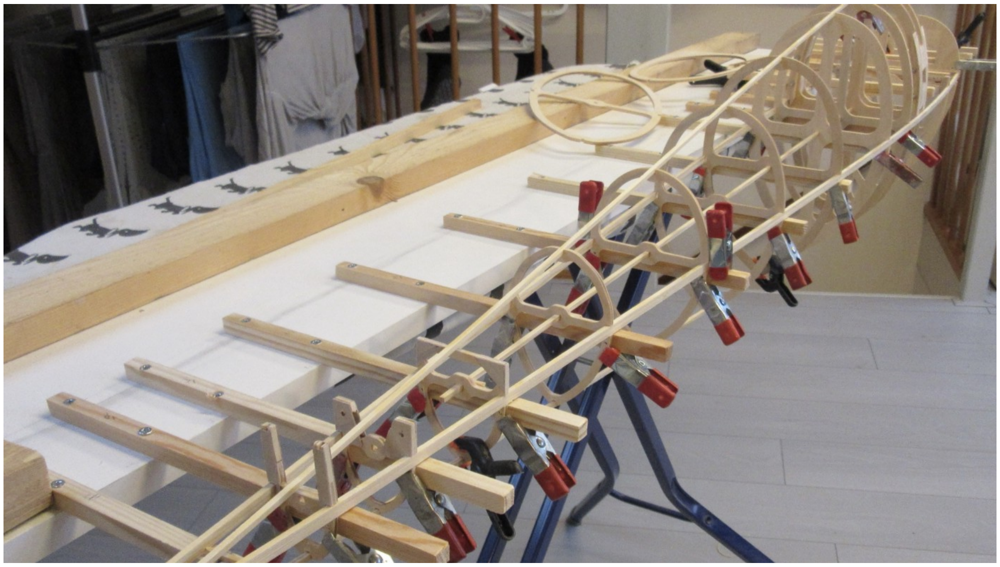




Left: Fuselage in 3D. | Right: Fuselage side view.

I thought it would be handy to use a temporary central spar to align the frames. My friend Adri Brand kindly offered to mill the frames from 3mm plywood and again he did an excellent job. As with the *Gull*, I made a building jig from a board onto which I screwed 10 x 10mm battens at frame spacing. I deliberately made a 'jump' in this as I wanted to cover part of the fuselage on the construction jig. Because I wanted to use thin stringers this was necessary to keep it straight. It takes some effort to save weight!

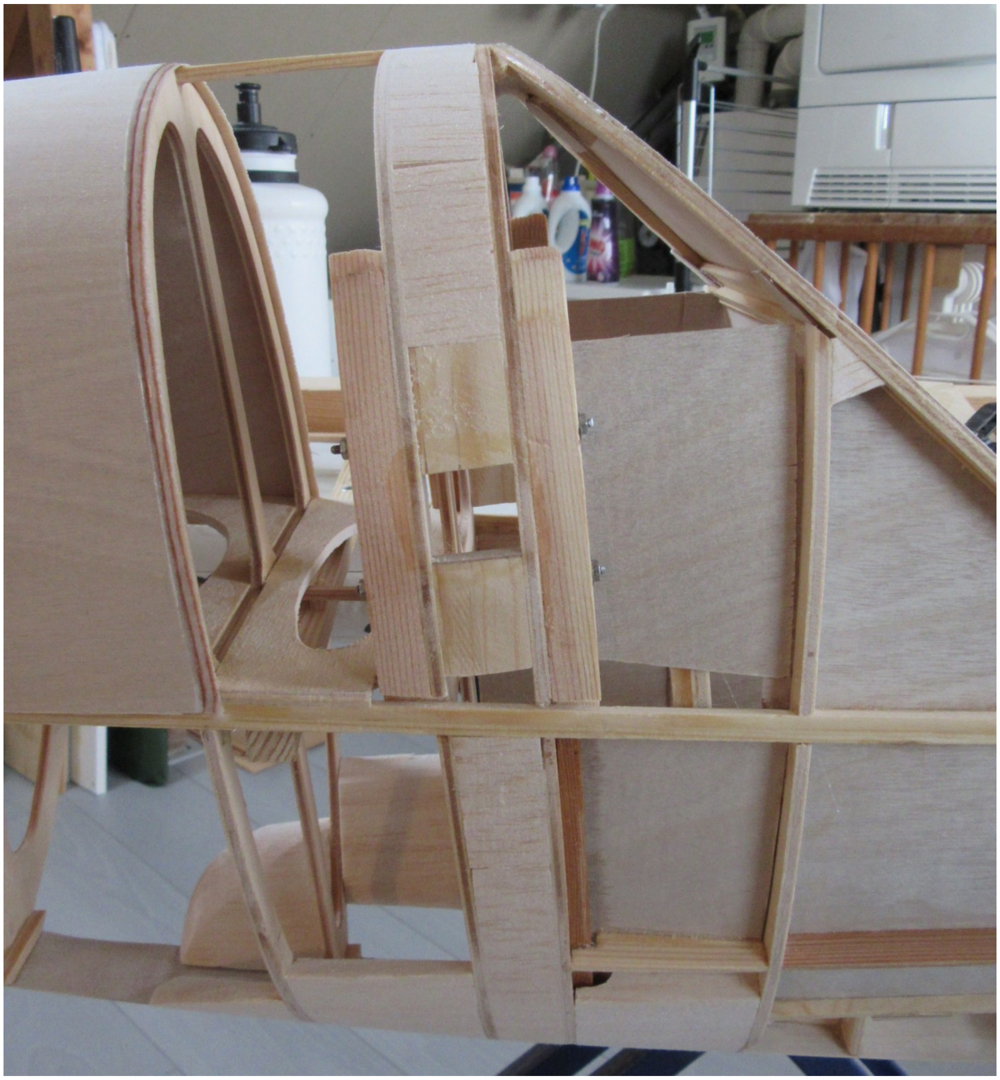
Aligning those stringers took time and I wanted to get on with it, but mistakes in the stringer arrangement are hard to correct later. So patience was essential. The temporary central girder rested on the construction jig, so I didn't have to screw down the frames, clamps were sufficient.



Frames set up, they rest on the central temporary support battens. See also key photo above for a similar view, but with the fuselage right-side up.

To reduce the ballast, I wanted to keep the tail surfaces and tail boom as light as possible and place all servos and receiver batteries as far forward as possible. For the fuselage stringers I looked at the real plane; those stringers are really minimal, so I decided to use 3x3mm and 4x2mm spruce stringers. Together with the 0.6mm plywood skin this should be strong enough. After having sorted this out I could start to build.

I first glued in the two stringers, left and right, turned the building board over and then the lower stringer, which flared out to the wide keel, where the skid would come later on. It was great that the frames were aligned so there was very little sanding needed! The design had taken some effort, but this went very well! When that was done, all kinds of details had to be made.

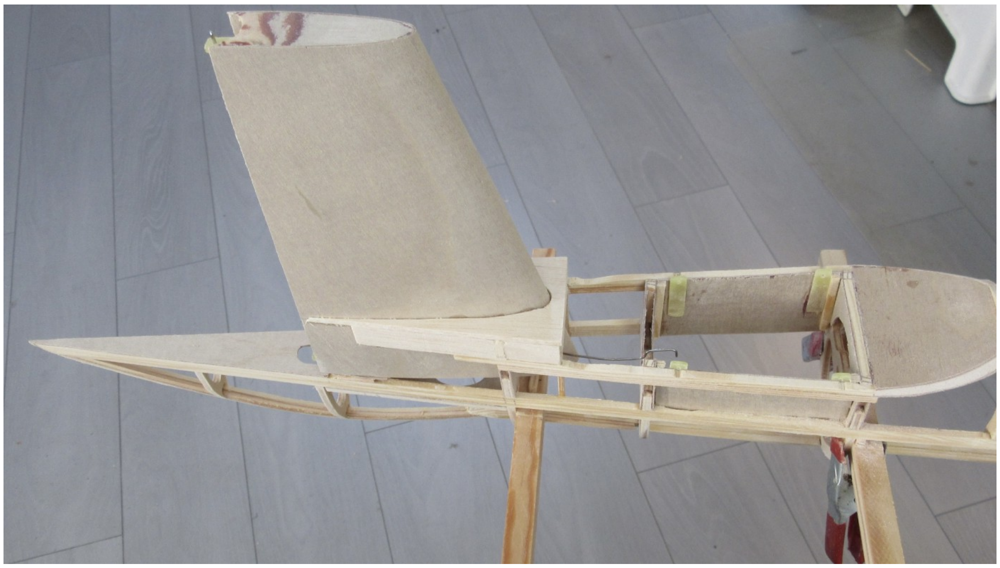


Reinforcement at the wing joiner.

First the wing joiner reinforcement. On the two main frames I glued some massive spruce, forming a square hole so the curved wing pin could be slid through. Reinforced with M2 threaded rods to transfer the forces to the fuselage.

For the tailskid I laminated the lower girder and made an extra frame, I had to deduce from the photos how that had been constructed. It was fun to find out, but it took some time.

No details of the fuselage-horizontal stabiliser connection could be found on any of the photos of the full-size aircraft. I suspected that the way of assembling had been similar to that of the *Gull* I had built before. That was fixed with four horizontal pins that were inserted from both sides. In the model I solved this with two continuous 1mm steel wire pins. That determined the shape of the fuselage at the leading edge of the horizontal stabiliser. First I made a filler piece according to the drawing. I had to remake it three times before I felt it to be right. Knowing this I laminated from balsa and 0.4mm plywood curved plate, sanded at the outside to align the other frames. In front of the fin, there appeared to be also some kind of spacer, visible on the photo.


Stabiliser and fin attachment — quite a task!

The placement of the servos came next. I wanted them well in the front for the centre of gravity, also low in the fuselage to make the cockpit interior to scale. I could place the three servos, namely the rudder servo which works with two pull-pull cables, the tow release servo and the elevator servo, under the ‘knees’ of the pilot.

After this research, it was time for the front of the fuselage. First I cut off the top part of the fourth frame (canopy) and glued the angled rear cockpit frame in. Then I covered the inside of the frames with 0.6mm plywood. I now had still good access and the front of the fuselage was dimensionally stable.

My intention was to cover the top of the fuselage up to the cockpit with plywood, with the fuselage still in the construction rig, to keep it in shape. After that it could be removed from the rig and finished.

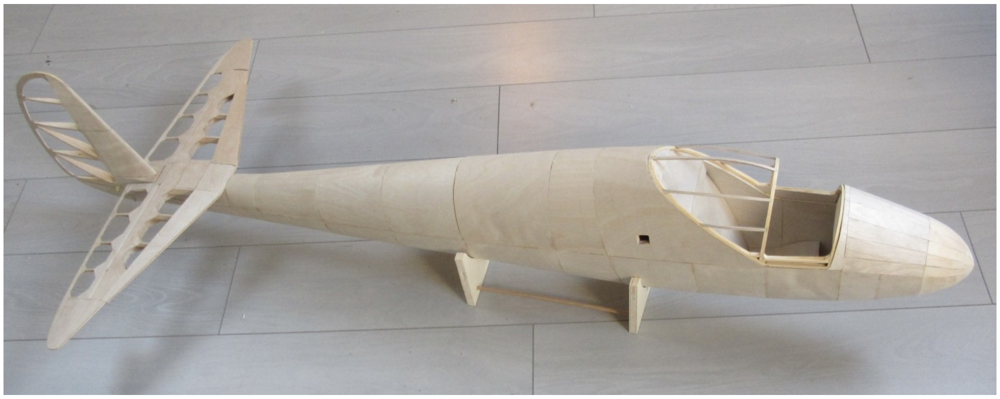
Before I continued with the cockpit, I had some doubts about the size of the stringers in the fuselage. They were about the same size as in the real one, but my landings are often a bit rougher than in real life. On the other hand, a light tail boom gives much less ballast.

I decided to put a single glass roving with epoxy on the inside of the left and right stringer, the stiffness of glass is closer to that of wood than that of carbon. I hoped that would work out well. I drilled 2mm holes in the frames right next to the stringers and with a double folded 0.2mm steel wire I pulled the dry glass roving through the holes and impregnated it with epoxy. After curing, the stringers felt much stiffer and not much weight was added.

Back to the cockpit. I first fitted the pilot (borrowed from my *Gull*) and after the necessary fitting he sat neatly in his seat. Now I could made a backrest, seat and floor with plywood/balsa sandwich. All fastened with screws in plywood supports, so I could reach the servos later.

The pilot fits well. On the inside I made a lot of plywood reinforcements.

Then the canopy. In those days ‘bubbles’ could not be made, so the original canopy was made of curved panels of Perspex resulting in lots of character! First I laminated the three frames and glued the whole together using the fuselage as a mould, of course with plastic foil in between. To keep it dismountable I made two pins at the front and in the back, between layers of 0.6mm plywood, a couple of strong magnets, both in the canopy and in the fuselage. From 0.6mm plywood I laminated the longitudinal beams. That was a fiddly job, but now the canopy frame was ready to be glassed.



Fuselage and stabiliser almost ready with the wing fairing still to be made.

In the next instalment coming up next month, I will kick off with details of gluing the ply sheeting. I passed on cyano for this, because I wanted to try another long-known technique: the heat of a covering film iron and dried white glue. But for that, you will have to join me next time. In the interim, if you have any questions, please leave them in the *Responses* section below and I'll do my best to answer them.

Until next month!

Contest Performance Improvement Process

High scoring landing at Dayton, Ohio July 2021 Mixed Launch contest.

Part III: Determine the best investment to make towards your contest improvement goal.

This is the third part of this series. Readers who have not done so already may want to go back and read [Part I] and [Part II] before continuing with this article. — Ed.

The first two parts in this series covered the first four steps of a ten step process. These steps were:

1. Determine Your Contest Goals
2. Evaluate How You Compare to Your Goals
3. Evaluate the Scores of the Group You Aspire to Join
4. Analyze How Much Your Scores Need to Improve and Evaluate the Causes of Your Score Delta

This article will discuss the next step: to evaluate the relative value of items from the last step and use this to determine the best investment to make towards your improvement goals.

A competitor may have the temptation to try to work to improve in every scored area of competition. However, that might not be the most realistic path of improvement or the best investment from a time, financial, or opportunity cost perspective. For example, take the F5J raw scoring formula:

> *Flight seconds (max of 599) — (meters of start height between 0m and 200m * .5) — (meters start height over 200m * 3) + landing bonus (max of 50)*

In the F5J example, if you are frequently launching to 220m that would be a launch deduction of 160 points compared to a start height of the slightly lower 200m which would be 100 points. That start height difference would result in more than completely nullifying a perfect landing and would nullify a full minute of flight time. This means for F5J launching above 200m, although sometimes in some extreme conditions may be warranted, in general is very detrimental to contest score. As an example of this we can review my *2021 Southwest Classic F5J* contest raw scores:

As you can see from the above example the relative value of me working to improve my landing scores is fairly low at this point. Obviously any improvement is going to be good but even if I could have managed to score perfect landings in every round I would have only improved my raw average by about four percent. In comparison, if I could find a way to lower my launch height's that were above 200m to 199m yet keep the flight time the same I would have improved my raw average by about 14%.

I flew another F5J contest August 13, 2022:

A few things have changed between the *2021 Southwest Classic F5J* and this contest but the biggest change was I upgraded from flying a 3m version of the *Millennium* design to a relatively current F5J design. One thing that hasn't changed is that I still manage to fumble switches as I did in Round 5 where I accidentally cut the motor at 34m when I planned to launch about 100m higher. Another thing that has been consistent is I'm still launching a little higher than I probably should. Taking out that one flight where I fumbled the motor switch my average launch height was about 152m. This is close to 20m higher than the average winning score for the flight group I was in. That works out to about 10 points difference of raw score which works out to about 15 points or so of normalized score. That doesn't seem like a lot but at the top of competitive contests that difference can be what separates first place and 2nd place. I stated in the first article of this series one of my goals for contesting is to win a contest with at least 20 pilots.

For another data point, I will compare my raw scores from the August 2022 Dayton contest with the *2021 Southwest Classic F5J*'s top 25%. That contest was a larger two day contest but the weather conditions were somewhat similar. It was a bit flat in the morning, but later in the day the thermals started to develop. The big difference here was the 2nd day of the 2021 contest got really gnarly from a wind perspective but otherwise the air conditions were somewhat similar. The 8th place (lowest placing in the top 25%) from the 2021 contest:

The average flight time here was 9:18, average landing 49, and average launch height 136m. The landing score there is just two points above my landing score but taking out that round where I fumbled the launch switch this average start height is about 15m lower than the average tow which I was launching at the August 2022 contest.

Given my current abilities it may be tempting to me to work on continuing to improve my landings. For F5J It would certainly be satisfying to average a little closer to the 9:59 and fly contests where all of my landings are 50 points. But given where my current landing skills are spending a lot of time to try to improve my average landing score further is probably not as valuable as spending that time working on launching a bit lower and still making the flight time. I had been launching to a relatively conservative 150m. I'm working on a practice regimen where I work to try to lower that launch average first to about 130m then to about 100m or so. I'm working on trying to do a better job of evaluating thermals during the 30s motor run time and practicing to make sure that I get better at not fumbling switches.

Until next time, good luck with achieving your own contest improvement goals!

Resources

- *My Southwest Classic F5J 2021 Experience* — My report here in RCSD from this great contest held annually near Phoenix, Arizona.
- *2021 Southwest Classic F5J* — The Academy of Model Aeronautics event listing for last year's event. A great place to learn more about the event.
- *Have to Travel and Brought a Sailplane?* — It's nothing to do with contests, but you may also find this article by the same author.

*All images and data 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**.*

Rediscovering Martin Simons

"Slingsby prepares for a bungee launch in his first sailplane, the British Falcon. The steel ring attached to the rubber rope is on the open hook at the nose. Ground crew hold the tail until the rope is stretched sufficiently to launch the sailplane. (Slingsby collection)" (caption: Martin Simons)

Part II: Curated selections from Simon's classic work 'Slingsby Sailplanes: A Comprehensive History of All Designs'.

Last month in Part I (see Resources *below for link), we kicked off with a short primer on this series and some initial selected passages from Martin Simons'* Slingsby Sailplanes *reprinted with kind permission of the family. We continue with a closer look at Slingsby's* Falcon (Falke)*, and some of Simon's thoughts on gliding technique. Pictures and text below are from the same book*, with *curator Peter Scott's comments identified by italicised characters within [] (square brackets) embedded in the text. — Ed.*

The Slingsby Type 1 Falcon (Falke)

Having achieved his A and B gliding certificates, Fred Slingsby was anxious to make progress. For early soaring attempts beginners needed a mild-mannered sailplane that would not respond too sharply to clumsy handling, yet had a sufficiently low rate of sink to allow sustained flight in slope lift. Günther Groenhoff, a young German pilot already establishing a high reputation, visited the Scarborough Gliding Club in the winter of 1930, and following Groenhoffs recommendation, Slingsby decided to build for himself, from plans obtainable through the Rhon-Rossitten Gesellschaft (RRG, the controlling body for gliding in Germany), a Falke. He was warned that it was not very easy to build, but he was confident that he could manage it.

The Falke had been designed by Alexander Lippisch in 1929, and it owed almost everything to the experimental tailless sailplanes which Lippisch had been developing since 1925. Flying models with wingspans of about 4m had been flown before the first full-scale Storch was tried in 1927 with limited success. It was followed by improved versions. The Storch 4 which Groenhoff tested in 1929 was entirely satisfactory. Stability was obtained with a back-swept wing having negatively twisted outer panels, or 'washout'. Tip winglets and rudders gave adequate control in yaw. The main improvement distinguishing the Storch 4 was the installation of lobate ailerons, or elevens, with their hinge line at 90° to the line of flight, rather than conforming to the wing sweep. The wing section at the root and for the inner panels was a modified version of the Gottingen 535, but the profile was progressively changed to a strongly reflexed shape at mid-elevon, and thence to a thin symmetrical tip. Lippisch's experiments with tailless aircraft culminated in the Me 163 rocket powered fighter of the Second World War.

Lippisch, who was head of the technical section of the RRG, decided that if a sailplane with no tail could be made stable with a sweptback wing, then a glider with sweepback and an ordinary tail unit as well would be even more stable, and hence exactly what the beginner required. Moreover, with such a layout the pilot would be well protected, sitting under and somewhat behind the centre of the parasol wing. An adequate soaring performance could be ensured by keeping the wing loading down, which could be done by using a large wing area with strut and wire bracing, giving a strong yet light structure. Little attention need be paid to reducing drag. Sailplanes were launched directly into the slope upcurrent by rubber bungee, and there was no need to have a good glide ratio for cross country flights. The Falke was not expected to go anywhere except gently back and forth in front of a hill. It was considered an advantage for an intermediate sailplane that it should not gain much airspeed in a dive. In the inevitable accidents it would not strike the ground so hard.

When Groenhoff met Slingsby the Falke was in production in Germany. There was already one in England; it had been imported for publicity purposes by the J. Lyons tea company.

Gliders at this time were always built of wood. The timber normally used in Germany was pine. Spruce was more expensive and offered only slight advantages. Aircraft-quality birch plywood was readily available. Cold-water casein glues were approved for aircraft construction and, provided the joints were kept dry, were perfectly satisfactory but damp joints could be quickly destroyed by fungus. *[This caused the decay of most of the Second World War de Havilland Mosquitoes]* Accordingly, numerous drainage and ventilation holes were incorporated at all points in the structure where moisture might otherwise accumulate. Mild steel fittings and brackets were bolted to the timbers after painting with zinc chromate. Steel control cables were guided round pulleys and through fibre fairleads where required.

The Falke fuselage, of hexagonal cross-section, was a wooden framework of six curved longerons with cross-frames and diagonal braces, with plywood skinning in front and fabric covering aft of the cockpit. As usual where wooden members butted together substantial plywood ‘biscuits’ or solid corner blocks were used to cany the loads through the joint. The undercarriage comprised a rubber-sprung main skid of ash, and a tailskid. An open hook was fitted under the nose for bungee launching. The strut-braced tail unit was simple, but the wing was very complicated. The two spars, swept at 12.5°, were built-up box sections. The upper and lower pine flanges had large ‘bird-mouthed’ blocks filling in wherever fittings had to go, particularly at the root ends and the strut end points. Both sides of the spars were faced with plywood. The wings had a slight ‘gull’ kink, enough to complicate construction without having any measurable effect on stability or handling.

“Sixty years on, the modern replica of Slingsby’s Falcon, built from the original drawings, is seen here at Dunstable in 1991. (P. Warren)” (caption: Martin Simons)

To make each wing rib, an outline of 5mm square strip wood was laid in a jig, being steamed where necessary to conform without strain to the aerofoil section outline. Uprights and diagonals were fitted inside this form, and 1mm plywood biscuits and webs were then glued over all the joints, after which a duplicate 5mm square strip outline was laid into the jig with matching uprights and diagonals, and glued. This split-rib structure, which persisted for many years in German sailplane construction, prevented sideways distortions of the ribs when they were under the tension of doped fabric covering. The wing chord was constant over the inner panels, which allowed some saving in work, but for the tapered and reflexed outer wing panels every rib differed from the next.

In the Falke and other training gliders, the plywood covering the front of the wing was little more than an unstressed fairing. Each rib was made in one piece from leading edge to trailing edge and slid into place over the completed spars before gluing. Because the plywood was glued only to the ribs, not to the spar flanges, it added little st rength to the wing as a whole. For torsional rigidity a two-spar structure with internal diagonal cross-struts was used. Every third rib was a compression member requiring its own jigging. The wing spars met on the aircraft centreline with simple pin joints, the rear pin also connecting with the pylon behind the cockpit. The front spars had separate connections to the braced vertical cabane struts on either side. The V struts restrained the wings from folding up or down under load, and provided additional bracing against torsion. A detachable plywood fairing covered the gap in the wings at the centre. The aileron control cables ran externally up the side of the fuselage, entering the wing just behind the forward cabane strut. The elevator cables also were external for part of their length. There was a steel bracing cable from the nose to the struts near their outer ends.

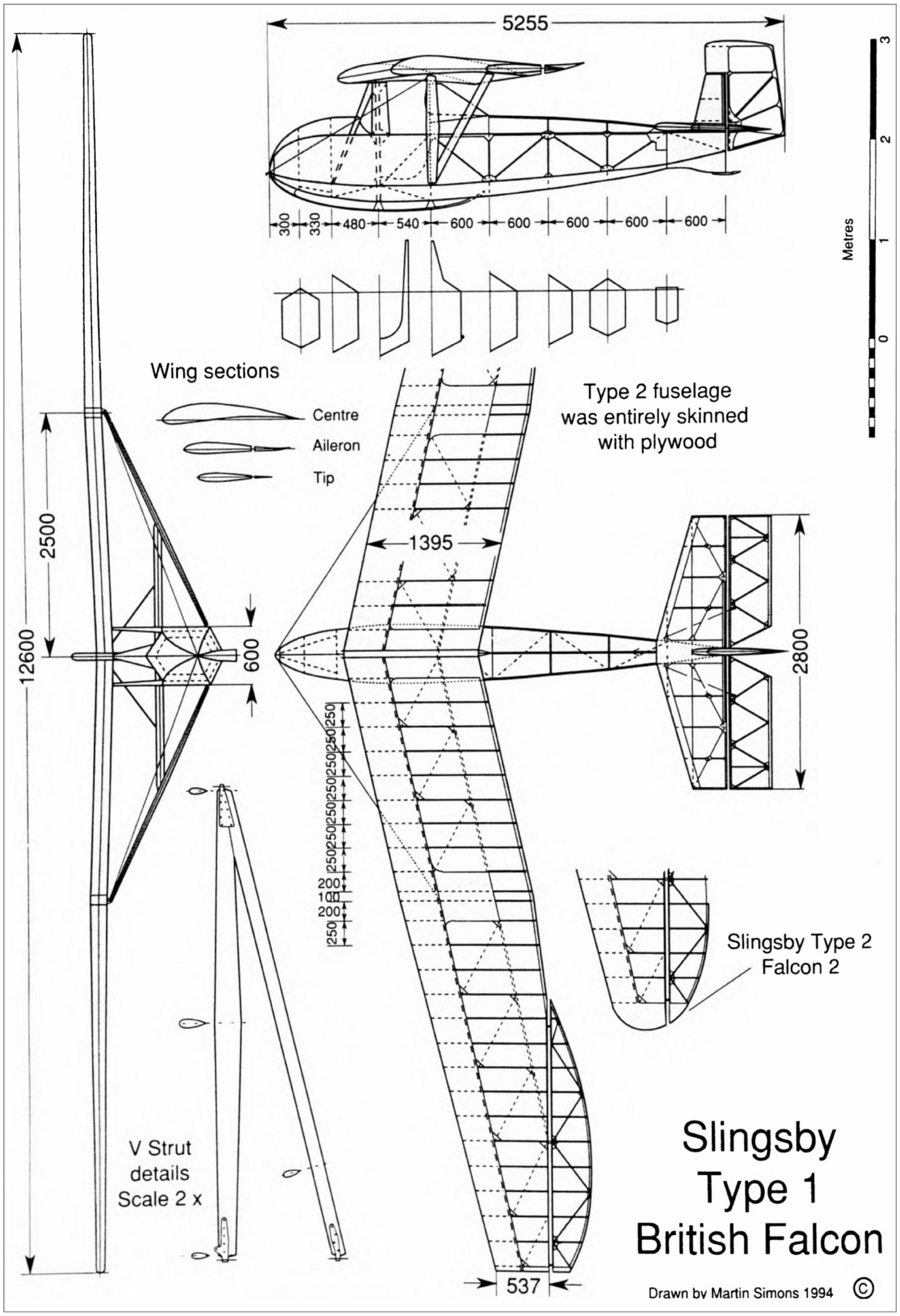
Slingsby completed his Falke in the spring of 1931. He stated that roughly 800 man-hours were required. Probably furniture production in his factory was much reduced for the preceding months. On completion the sailplane, in clear-doped finish and glossy varnish, was christened British Falcon. Slingsby made his first brief flight at Levisham Moors after a bungee launch powered by schoolchildren. Another pilot crashed the Falcon badly on its second flight. After repairs, Slingsby toured the country in search of good soaring sites, gaining his C soaring badge in September at Ingleby Greenhow and competing very successfully in the 1932 National Championships at Ireleth, near Askam-in-Furness, Lancashire. There were seven competing aircraft. The Falcon logged nearly 7hr total flying time during the five day meeting. Mungo Buxton borrowed it to break the British distance record with a 20km slope-soaring flight to Lake Coniston. To put this into perspective, in the German championships that year there were 60 sailplanes. Cross-country flights of 150km (93 miles) were made, but Groenhoff, Slingsby's adviser of 1930, was killed in one of two fatal accidents.

It was remarked that the Falcon flew itself, but handled easily when it was required to manoeuvre and was capable of soaring well. It was a great builder of confidence for nervous pilots. Rigging was rather a struggle, and it suffered from lack of upward view when turning. This became important as the soaring ridges grew more crowded, but for its purpose it had few rivals. Slingsby announced later in the year that he would build a Falcon for anyone for £95.

The second Falcon, which Slingsby later counted as his Type 2, was built to the order of Espin Hardwick, a stockbroker who played an important role in the development of British gliding. Falcon 2 was flying by October 1933, Hardwick obtaining his C soaring badge at a Sutton Bank meeting in that month. The *Type* 2 had rounded wingtips which improved its performance slightly, and its fuselage was entirely skinned with plywood. Hardwick suffered from a spinal deformity, so most ordinary sailplane cockpits must have been extremely uncomfortable for him. His Falcon had extensive padding and movable elbow rests, and it also possessed instruments, which very few other sailplanes in Britain did in 1933.

Slingsby soon decided that there was a future in glider manufacture, and he began to advertise under the heading, 'Slingsby Sailplanes, Scarborough'. The decision to abandon furniture manufacture altogether came in 1934 with a temporary shift to the disused Scarborough Corporation tram sheds, where there was more space for glider assembly. Eight more Falcons were built during the next few years after the move to Kirbymoorside, making a total of ten including the Falcon 2. One, of which nothing more is known, went to Canada. Three, including Slingsby's original, were written off at various gliding sites before the outbreak of the Second World War. The rest probably survived to be impressed for use by the Air Training Corps (ATC). One of these, piloted by a cadet, met its end in collision with a sheep at Camphill in Derbyshire about 1944. Others doubtless perished at other ATC schools. One was rebuilt with a flying-boat hull for the ATC to fly from Lake Windermere in 1943, and survives at the Windermere Steamboat Museum. Espin Hardwick's Falcon *2* was ceremonially burned at the Long Mynd following his death in 1955. (In Germany, one Falke survives. It was rescued from a Swiss Alpine mountain railway shed by Klaus Heyn and restored to museum standard by him.)

Mike Russell provided the initial inspiration for the construction during 1984–85 of an entirely new fully airworthy Falcon 1 by Ken Fripp's Southdown Aero Services at Lasham, using the original drawings rescued from Slingsby's loft. There were substantial contributions of work and financial support from John Sproule. The first flight was made in August 1986, with Derek Piggott at the controls. This Falcon, the only extant airworthy example, appears occasionally at vintage glider meetings in its clear-doped and varnished finish like the original Slingsby Type 1.



The Development of Soaring Technique

In 1930, knowledge of soaring in Britain was almost nil. Gaining height in the upcurrent on the windward side of a hill proved fairly easy. Anyone with a B certificate and a certain confidence could do this. After being bungee launched from the crest the glider was flown steadily along the hill to the end, performing a gentle turn there to come back and fly to the other end of the beat to turn again. Every turn was made away from the slope. As long as the wind blew sufficiently up the gradient a moderately efficient glider, flown well, could soar, possibly rising several hundred feet above the launching point. An extended soaring flight of 5min earned the C certificate. It was quickly learned that to turn or drift behind the hill was to be forced down to a premature landing.

The next important development came more slowly, hampered for the first few years in Britain by the total lack of any instruments in the gliders. To exploit thermal upcurrents to make cross-country flights over level ground seemed almost miraculous at first, and veiy few understood how it was done. The slope soaring pilot could judge his rises and falls fairly well by observing the level of the hill, but as soon as a sailplane was more than a few hundred feet up, the lack of a visual reference made it impossible to tell if height was being gained or lost. Turbulence felt in the air might indicate either lift or sink. Airspeed was measured by the force of the airflow on the face and by the humming of the flying wires. Altimeters were not used. The main requirement was a sensitive rate of climb indicator, or variometer. German pilots began using these in 1928.

In 1931 Kronfeld again came to Britain, gliding across the English Channel from a high aero-tow. Ha made a cross-country flight in thermals over London from Hanworth, south of Richmond, to Chatham, on the Thames estuary. On the following day he returned, passing directly over Croydon on the way to land back at Hanwoith. This was one of the first successful goal distance flights. He was observed to circle repeatedly in the narrow cores of the thermals to gain thousands of feet before gliding off in the direction he chose to go. Despite such demonstrations, and subsequent lectures and publications, it was not until 8 January 1933 that a British pilot, Eric Collins, dared to perform a complete 360° turn in a sailplane. In August of that year the first thermal soaring cross-country flights were attempted in Britain, Collins setting a British distance record of just under 50 km. By this time, flights of over 270 km had been made in Germany.

When good variometers, sensitive altimeters and airspeed indicators became available, British pilots soon learned to use them. The technique was to circle and climb in each thermal and then glide on to find the next one, climb in it to the top and move on again. By 1936 sailplanes were sometimes also fitted with gyro instruments to enable them to fly blind, taking advantage of the strong lift inside cumulus and cumulo-nimbus clouds. Airbrakes, or at least lift spoilers, became essential to allow safe landings in small spaces. The Silver C certificate, requiring a cross country of 50 km, a 1,000 m gain of height and a duration of 5 hr, was instituted internationally in 1931. Collins was the first Briton to achieve this, in 1934. By the end of 1939, 56 British pilots had so qualified.

Before the outbreak of the Second World War, flights over 200 km and one over 300 km had been achieved in England, the last, together with a height climb in cloud to over 14,000 ft, earning the International Gold C badge for Philip Wills. The English Channel was crossed in soaring flight from Dunstable by Geoffrey Stephenson in April 1939, flying a Slingsby sailplane, the Kirby Gull. The Second World War then intervened, bringing a general ban on soaring until 1946.

Penetration

In the post-war period, with mathematical studies pointing the way, the importance of speed was recognised. The length of a good soaring day is limited to a few hours. Some heating of the ground is needed to set off thermals, and this usually meant waiting until about 10 a.m. or later before starting a cross-country flight. The land cools in the evening, so to achieve a worthwhile distance the pilot needed to make a high average speed while the conditions lasted. The sailplane designer was now required to produce an aircraft with a low rate of sink when circling, but which on leaving the lift zone would glide at a high airspeed without losing too much height. Only the best part of each thermal should be used to improve the average rate of climb, then in the glides the airspeed must be increased, even at the expense of lost height. This improved the average cross-country speed, always supposing that another strong thermal could be found. If there was sinking air it was proved by calculation and experience that it was essential to fly through it fast, the height lost by putting the glider's nose down to gain airspeed being much less than that wasted by lingering too long in the bad air. The requirements are to a large extent incompatible. To achieve the lowest possible rate of sink at slow airspeed, a low wing loading and a very-high-aspect-ratio wing are necessary. To fly very fast with minimal loss of height in the glide requires a high wing loading, together with wing profile drag and the parasitic drag of tail and fuselage reduced to an absolute minimum.

Low-drag, so-called laminar flow wing profiles developed in the USA were found to be very useful, but required new approaches to glider construction and new materials. The aircraft became heavier with greater and greater spans. To remain safe at high speeds they had to be much stronger and stiffer than before. High-strength metal alloys began to find their way into the structures. To place a check on escalating costs, a simple 15 m span Standard Class specification was developed internationally, and proved successful, but the unrestricted 'open class' sailplanes continued to grow in complication and cost.

As aircraft and the pilots improved, gliding competitions changed from simple distance and goal flying to racing round prescribed courses. The need for *penetration,* the ability to glide fast at a shallow angle, became more and more urgent. Given a good glide angle at high airspeed, the racing pilot can sample a large mass of air in a short time, passing through the weaker thermals without circling in them. Only those that yield high rates of climb are selected. The need for low rates of sink in circling remains, still demanding high aspect ratios.

Further researches in aerodynamics produced better wing profiles, but these required even more accurate, wave-free wing surfaces. Careful attention to the form of fuselages and tails yielded worthwhile savings in drag. Traditional materials such as spruce, pine and plywood, even metal, were no longer good enough. Glassfibre, carbon and aramid fibre-reinforced moulded plastics were widely adopted.

With the new profiles and materials, even higher wing loadings were demanded. Some German sailplanes were fitted with water tanks as early as 1934, but carrying ballast did not become general until the 1970s. Given that the pilot will circle only in the strongest thermals, some loss of climbing ability owing to the extra weight is more than compensated for by the improved glide at high speeds. The water can be jettisoned if the thermals weaken. Some modern singleseat 'open class' sailplanes with spans of about 25 m (82 ft) may carry 200 to 250 kg (440–550 lb) of ballast on take-off.

The most recent development has been the widespread introduction of self-launching. A retractable motor with a propeller is built into the sailplane, dispensing with the need for launching apparatus or aerotowing, and with the business of retrieving sailplanes by road after out-landings. The weight of the propulsion unit becomes unimportant in a sailplane, which will normally be loaded with water ballast anyway. The long-term influence of this development on the traditional gliding club remains to be seen. There is nothing now to prevent a soaring pilot from keeping the sailplane at an ordinary aerodrome, taking off unaided and flying to the open country, where the engine will be shut off for several hours but started up again to fly home in the evening to join the regular landing pattern and taxi in.

The best glide ratio of a sailplane the measure of how far it can glide in still air from a given height is a useful indication of all-round aerodynamic efficiency. Slingsby's British Falcon in 1931 probably achieved about 16:1 and weighed about 230 kg (506 lb) in flight. By 1982 the best open class sailplanes had glide ratios close to 60:1 and weighed 750 kg (l,653 lb) fully ballasted. Corresponding figures for good 15 m sailplanes like the Vega were 42:1 and 508 kg (l,120 lb). Slingsby's Falcon was used for a 20 km (12.4 mile) flight soon after it was completed. In 1982 the world record distance flight for a sailplane stood at 1,460 km (907 miles) but, more importantly, the

1,250 km (750 mile) triangular flight speed record stood at 133.2 kph (82.76 mph). Slingsby sailplanes were produced during the half-century while these advances were taking place, and it was never easy to keep up.

[Next month I have Martin's take on the Slingsby Vega. Thanks very much for reading and please let me know if there is a particular section which of of interst and I'll try and find it and present it in a future article. — PS]

Resources

- ***Rediscovering Martin Simons: Part I*** — The first part of this series.
- ***Martin Simons Books*** — Martin's home website as well as the source for his fiction books *The Glass Ship*, *Cities at Sea* and *Jenny Rat*.
- ***Slingsby Sailplanes: A Comprehensive History of All Designs*** — Amazon's listing for the hardcover edition of Martin's book — at an eye-watering price!

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SOGGI’s Classic Line Launching Event

The Classic Line Launching Event group photo from July 16th, 2022.

The Southern Ontario Gliding Group Inc. celebrates time-tested designs in a fun fly format.

During the winter months, our executive was approached by Blake Moran, an avid RC enthusiast from Eastern Ontario. Blake mentioned that his club consists primarily of pilots who fly gas-powered land planes. He prefers to fly sailplanes, especially the ones we now consider classics. He came up with the idea of having a day in July where we would hold a special *Classic Line Launching Event*. Eventually, Saturday July 16th, 2022 was selected as the event date.

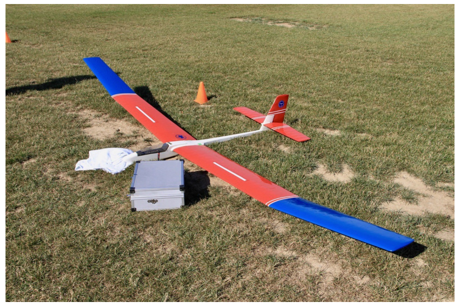
Left: Some classics waiting to be launched. | Centre: Member Tim Glover prepares his Gentle Lady for launch. | Right: Senior Member, Dick Colley assembling his new to him, 14’ wingspan, Pro Runner.

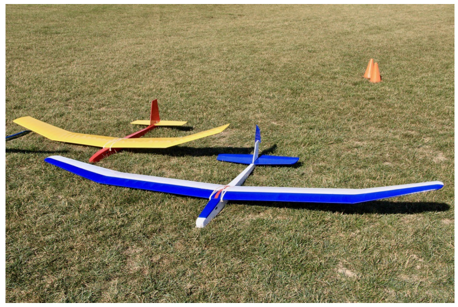
On Your Mark

Our executive felt Blake’s idea was great and accordingly planned to hold the event at our Hwy 6 sod farm flying field. I was in charge of the providing the barbecue and refreshments.

In early April, I emailed the season’s contest and flying event schedule out to all the members. Included in the notice, was the holding of the *Classic Line Launching Event*.

As a reminder, President Andy Meysner sent out an email to the members a week a head of the scheduled event. Andy noted that Tim Glover, one of the newer members of our club, had prepaid the cost for free cheeseburgers for the first 10 members to attend the event. Tim felt this might help boost attendance. We were impressed!





Left: President, Andy Meysner's scratch built Graupner Flamingo Contest. | Centre: 14' fully assembled Pro Runner. | Right: A Gentle Lady & an Oly !! Ready for action.

Get Set

I have accumulated a lot of line launch classics over the years since I joined the club. Unfortunately, most of them haven't seen the light of day for a long time! The week before the event, I went on a rampage, installing new receivers, setting the dual rates and exponential throws, flight modes, timers, checked the CG and other pre-flight tasks on **eight** old line launching classics!

Early in the morning of the event day, along with the help from fellow club member and friend, Terry Dawson, we took a van and a car fully loaded with items to the field.

The weather prognosticators had predicted low winds, sun and a high of only 25C! Instead, we experienced fairly strong, gusty winds veering from East to South West, and a high temperature close to 30C!

The free food offer must have helped because we ended up with 12 members and one guest in attendance. There were 22 different classic sailplanes laid out on the field.

Three heavy duty hi-starts and one F3RES hi-start were set up on the diagonal across the southern field to accommodate the strong south west winds. The north field was used primarily for hand launching and testing.

Left: Member Ann Tekatch and her modern composite 2M Sprite. | Centre: Long time member, Bob Koiter kneeling in prayer to the Thermal Gods before Launching. | Right: Member Bob Koiter ready to let his Mistral rip off the line.

Go!

As there was no specific contest tasks planned, the day's event was strictly a fun fly affair, which a lot of the members seem to prefer.

Around 11am I fired up the barbie and proceeded to cook up the hamburgers and jumbo hot dogs. Another member, Ann Tekatch donated enough money to pay for everyone's drink of choice! Well done, Ann!

Finally, when we were just about finished, another member, Jim 'Jim Bits' Laslett attended the event and brought a large box of Tim Bits which were eagerly consumed!

Not all the sailplanes brought to the field were flown, but they were all admired by those in attendance! There was great camaraderie and discussions amongst those who made the effort. The two shade tents set up on the field made conditions tolerable as the heat really built up during the day.

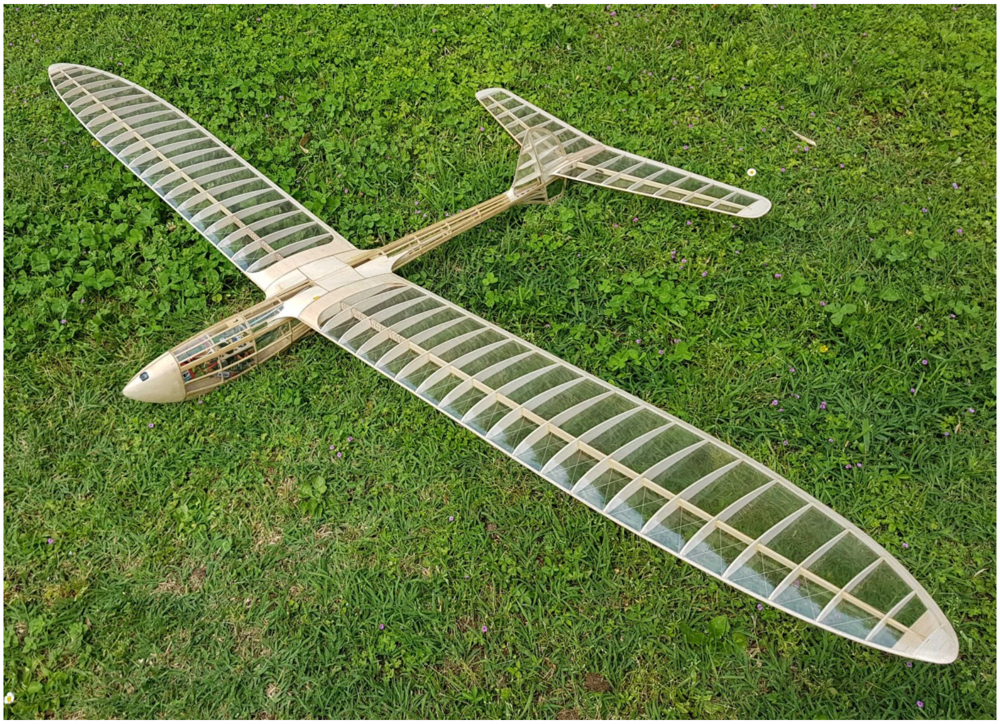
Gliders in Attendance

Bird of Time (3)	2M Gentle Lady (2)
99" Sagitta RES	Wanderer 99"
100" Antaries, full house wing	Spirit 100"
99" Hobie Hawk	3M Cirrus
2M Samba RES (not a classic…yet!) (2)	99" Windfree
100" Graupner, Flamingo Contest	134" Oly III RES
14' wingspan, Pro Runner (an older one of a kind design)	2M Sophisticated Lady
100" Mistral RES	2M MadRES (not a classic)
108" wingspan, Oly II	2M Sprite (not considered a classic yet)

This was such an enjoyable day, we will most likely make it an annual event. Perhaps other sailplane clubs from across Canada will jump on the bandwagon next year and hold a *Classic Line Launching Event* of their own!

All images by the author. Click on any one for a larger version. 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*.

La Dolce Vita



The Aeropiccola 'Albatross'.

I dream of living in a place where olives and lemons grow.

That, and my frequent soliloquising that "if I could do my life over again, I would come back Italian" means all things Italiano instantly catch my eye and strike my fancy. However, many of them are apparently made of unobtanium, and thus remain tantalisingly out of reach. But I stand by my statement that if I win the Mega Millions lottery — it's $50M this weekend!— before the sun sets over the Dolomites I am going to buy a Riva *Aquarama*, a couple of Vespas and a Ferrari *California*. These accoutrements and a summer place on Lake Como to keep them all.

Riva (credit: Riva Yachts) | Vespa (credit: Ante Hamersmit/Unsplash) | Ferrari (credit: Jebulon/Wikimedia)

“Darling, Amal and George want to know if we want to pop ‘round for a quick Prosecco before dinner…what shall I say? Are we — you know — ‘busy’?” And with that, the never-going-to-happen-daydream bubble bursts. Instead, I’ll just have to tuck into this bowl of *spaghetti alla puttanesca* — extra olives and a squeeze of lemon, please. Which, if you have ever tasted when prepared well, is *almost* as good as all of the above.

Then a few weeks back, my friend Paolo Rossi sent along a photo of a classic Italian *veleggiatore* design from 1949 — the *Albatross* from Aeropiccola of Torino. And there it was. My winter project had pretty much picked itself. No, it wasn’t a Riva, a Vespa or a Ferrari but to my eye the *Albatross*, which appeared as if in a dream sequence from a Fellini movie, perfectly captured the spirit of mid-century *La Dolce Vita* with its elegant, streamlined, arching and diaphanous form. To say I was smitten is like saying Pavarotti sure could carry a tune. I simply had to have an *Albatross* and the price of balsa notwithstanding, it was almost guaranteed to cost a whole lot less than the Riva, the Vespas or the Ferrari.

Turns out that Paolo's club, the *Gruppo Aeromodellistico Falchi Bergamo Associazione Sportiva Dilettantistica* had a club build of *Albatrosses* which produced many fine examples right here in the 21st century.

GRUPPO AEROMODELLISTICO BERGAMO

FALCHI

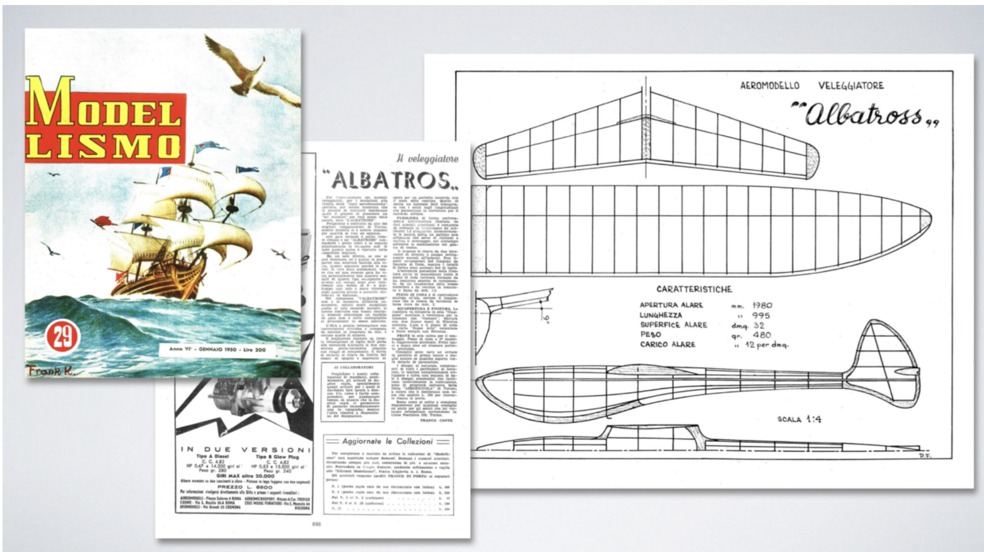
since 1965

1965

Gruppo Falchi members who participated in the club build of the Aeropiccola Albatross. Paolo Rossi is pictured top left. (credit: Paolo Rossi)

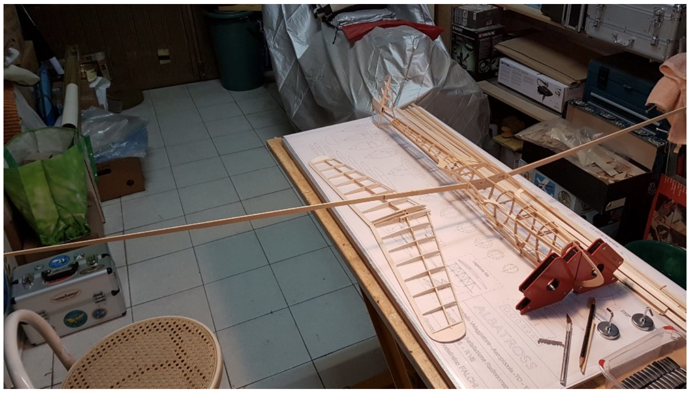
The Gruppo Falchi's build was aided greatly by a run of short kits which were produced with the aid of a DXF file prepared by club member Mr. Roberto Viti. From that, the various parts can be laser cut.

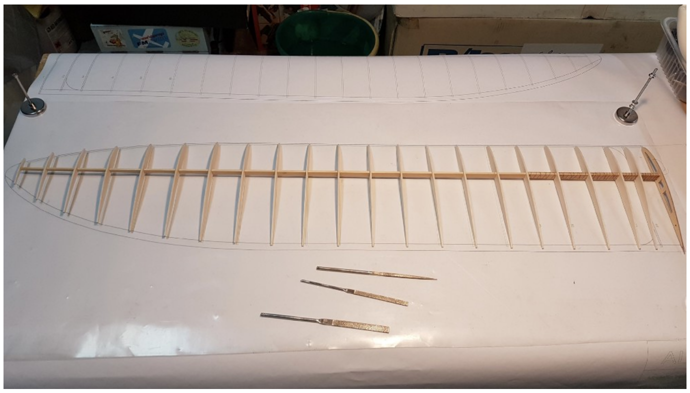
Also, for those who are really into authenticity and period memorabilia like I am, the club website (see *Resources*, below) also has some great backround material on the *Albatross* including the original article from the January 1950 issue of *Modellismo* magazine (just 29 centesimi!)

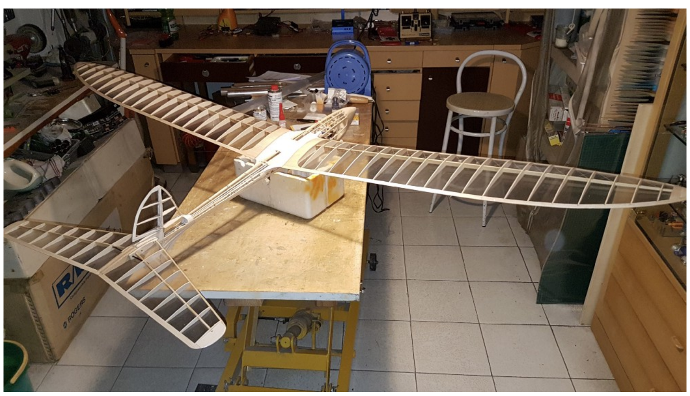


The original article on the Albatross from 1950.

Also on their website are copious construction notes — in Italian, of course, but with the aid of Google Translate I figure I will have no problem and nothing of significance will be lost in translation. Paolo also kindly sent along some additional photos of what I'm sure is a deceptively simple looking project.

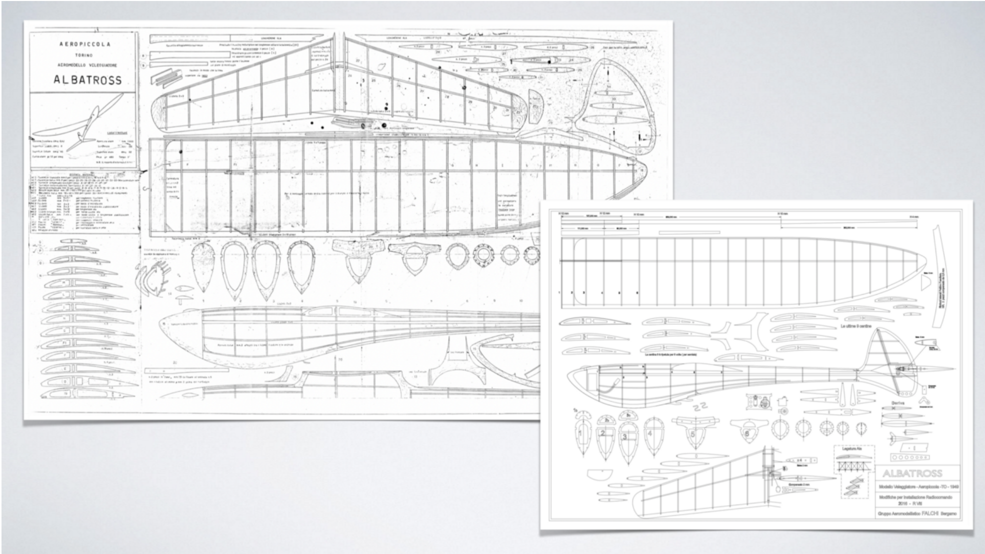






The Albatross in various stages of construction. (credit: Paolo Rossi)

Signor Rossi also mentioned that the DXF file which would be the feedstock for a laser cutting process is still available and he would try and send it along when I was ready for it. Alas, the short kits are no longer available, though.



The original Albatross plans from Aeropiccola on the left, and the beautiful new drawings by Roberto Viti from which a DXF can be generated for laser cutting of the parts.

So that’s it — my winter building plans are set. It’s almost (but not quite) as if I were wishing the 30C summer temperatures would wane in favour of chilly autumn evenings, so I can get started.

Viva Italia!

Electricity for Model Flyers

Pilot Dominique Nivelle puts on a ‘Light Painting’ show with his Easy-Glyder at Bartrès, near Lourdes in France in the summer of 2011. (image: ©2011 Régis Geledan)

Part X: Light Emitting Diodes and Resistors

Whether you are building a scale model and want navigation lights or you plan a night-time flying session, light emitting diodes (LEDs) are the way to go. They are cheap and can be had in a wide range of colours and brightnesses. They are robust and are very efficient so use little electricity.

Connecting LEDs Safely

LEDs won’t hurt you if you over-power them but they will fail. This short article will explain how to find the correct value for the resistor you need to get the best brightness and longest life from an LED.

We Need to Start with an Explanation of Resistors

Resistors are used to divide up voltages, to set or limit currents, and for many other circuity things. Their values are measured in ohm (Ω). The range of values is large, from a minute fraction of an ohm to many millions. They are made of many different materials, including metal wires and films of carbon or metals. For use with LEDs any type will do, so go for the cheapest and smallest, which will probably be carbon or metal film. They each cost a penny or two.

You can’t buy cheap resistors of an exact value. They are made in bulk with widely varying values. They are then measured and sorted into groups with centre values called preferred values, the least accurate and cheapest being in a system called E12. E12 gives centre values of 1.0, 1.2, 1.5, 1.8, 2.2, 2.7, 3.3, 3.9, 4.7, 5.6, 6.8 and 8.2. There are series with many more values, such as E24, but E12 illustrates how it works. To cover all possible values the centre values are then multiplied by 10, 100, 1000, 0.01 to give the actual value.

In the E12 series the -/+ 10% range of values of resistors in one group just touches the -/+ 10% range of an adjacent value so covering all possible values. I always found the use of a decimal point in the preferred values rather strange. For a resistor in the 2.2 range the multiplier actually multiplies 22 as you will see later.

Each resistor has three or four coloured bands printed on it, occasionally more. High power and accurate ones are usually marked with numbers for value and power. The first two bands show its preferred value and a third band gives the multiplier. The fourth band shows how accurate the resistor will be compared with the central preferred value, that is its -/+ % tolerance. The cheapest resistors are -/+ 10 % though most now are 5% or better. The colour codes are:

Band	1	2	3	4
Colour	Digit	Digit	Multiplier	Tol -/+ %
Black	0	0	1	
Brown	1	1	10	1
Red	2	2	100	2
Orange	3	3	1,000	
Yellow	4	4	10,000	
Green	5	5	100,000	0.5
Blue	6	6	1,000,000	0.25

Band	1	2	3	4
Colour	Digit	Digit	Multiplier	Tol -/+ %
Violet	7	7	10^7	0.1
Grey	8	8	10^8	
White	9	9	10^9	
Gold			0.1	5
Silver			0.01	10
None				20

How do you know which end to start reading? For example R V Y could be 4.7kΩ or 270kΩ . You will often find that read the wrong way the colour bands won't decode to a preferred value. Or you could simply read the label on the packet. Best of all just get out your multimeter to be sure. You haven't got a multimeter? 'Bout time you did! You can get a decent meter for less than £10 but make sure it is digital.

If you want an exact resistance value when using cheap resistors you need to measure, with your multimeter, the actual resistances of a lot of them of a given preferred value and select the one nearest to what you want. That won't be necessary with LEDs as the variation from the preferred E12 value shouldn't cause a problem. If you ever must have a very exact value you can combine resistors in series and parallel to achieve it.

Suppose We Want a 1200 Ω Resistor

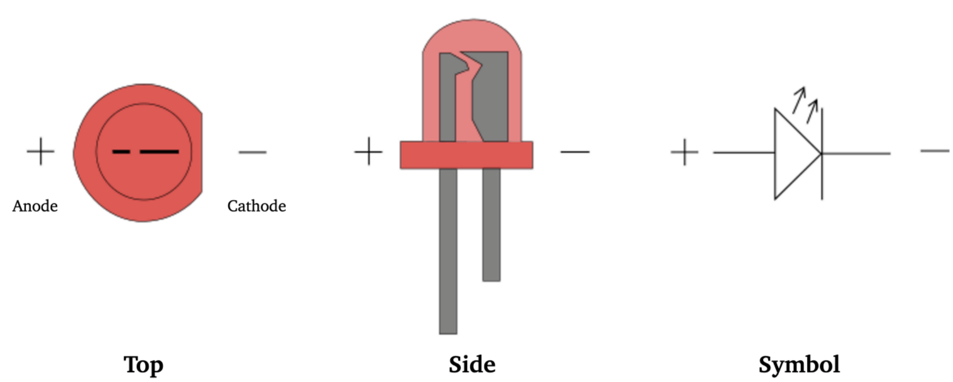
From the table the first two colour bands would be Brown (1) then Red (2) giving 12. Of course it needs to be 100 times that value so we need to use the multiplier 100. The colour for that is Red. Thus we choose the best value from resistors with Brown Red Red bands. Ignore any other rings. Read the wrong way this gives 220Ω but there will probably be a Silver or Gold tolerance band after the second red.

Power Rating

Resistors drop voltages so use energy. This means they get warm or even hot. They are designed to withstand a certain power. The currents used for LEDs are usually small so electrical powers are very small. This means that you can safely use 0.25 or 0.5W resistors.

To find what value resistor you need you must find the data for the LED, which you can get from the maker's data sheet or the web listing. First you need the maximum current that the LED will take, normally given in mA (milliamps). More than this and it might fail. Less than this and it won't be as bright. Current is always a trade-off between brightness and lifespan. It is **always** best to run electronic components at less than their maximum rating. Aim for about 80%. Don't worry though. LEDs just stop working. They don't blow up. Because they are cheap you can experiment to get the brightness you want. It won't matter if you destroy a few. Just make sure you throw away the blown ones immediately. You can't tell by looking. If you have bought a bag of anonymous LEDs without data you will just have to start with 5V and about 500Ω and just experiment.

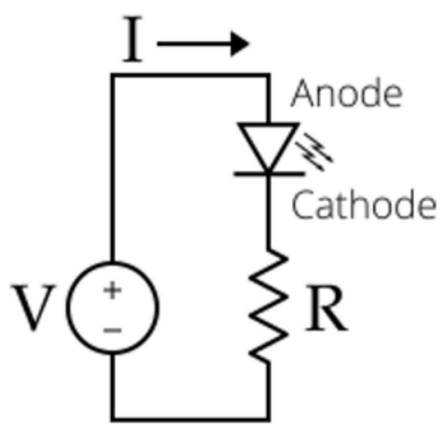
Obviously the higher the voltage the higher the current will be and the brighter the LED will be. Now we must choose a resistor to keep the current in safe limits.



Picture 1: What a bare LED looks like and a common circuit symbol.

LEDs are normally 3mm or 5mm in diameter. They fit into plastic clips or they can simply be glued in place. You can buy other shapes and get LEDs with different angles of beam. Clearly for a landing light a white beam of 20º or so would be best. Wing tip navigation lights should have a wider beam.

Figure 1 shows how the LED will be connected. The LED uses electrical energy and turns it into visible light, or ultraviolet or infrared energy. Using electrical energy means a drop in voltage inside the LED, called forward voltage. If you just connected an LED to a battery or power supply it would very likely have too much current flow through it and it would fail. Therefore we need to add a resistor to limit that current. Whatever voltage is left after the LED has taken its share must appear across the resistor. We use the desired current and the voltage to find the value of the resistor R.



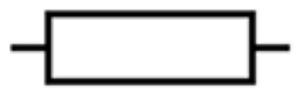


Figure 1: The jagged line on the left is the US symbol for a resistor. The easier to draw International Electrotechnical Commission (IEC) symbol a simple box shown on the right.

You Need the Following Data

- The voltage of the power supply. This will be the lipo voltage or the 5V provided by the receiver battery, BEC or ESC.
- The voltage drop across the LED when a current is flowing through it. This called forward voltage and will be probably be between 1.2 and 5V. You subtract this from the power supply voltage. A blue LED will have a higher forward voltage than a red one.
- Continuous forward current. This is the safe current. It could be 20mA to 1A but is normally the low tens of mA.
- Peak forward current. This is the current above which the LED will fail.

Now to Find the Resistor That Will Give the Correct Current

- 1) Subtract the LED forward voltage from the power supply voltage. Assuming a 5V supply and an LED forward voltage of 3V this gives 2V
- 2) Decide on a safe current. As the maximum is 20 mA let's choose 15 mA (15/1000A)
- 3) Use Ohm's Law to find the resistor R
- `R = V / I = 2 x 1000 / 15 = 133Ω`
- The nearest E12 value is 120

The formula therefore is:

`R = (Vs – Vf) x 1000 / I`

where `Vs` power supply voltage, `Vf` LED forward voltage, `I` safe forward current in milliamp, `R` resistor value.

Preparation for a Model

A good way to prepare LEDs for aircraft is to solder the resistor to one leg and then solder on insulated wires to the other leg and the resistor. Finally insulate the legs and resistor with heat shrink tubing. You can solder the resistor to either leg. It's important to label the assembly with the planned voltage in case you forget and to mark which wire goes to the positive.

Brightness

It is important to choose an LED with enough brightness. When flying in a mass launch single-model climb and glide competition I added a bright LED so I knew which model I was flying. It wasn't bright enough when just a few tens of metres up.

What do the brightness numbers in the data mean? There are two possible numbers — candelas and lumens. If neither is given then power in watts is a good guide. If that isn't there either, multiply forward current in amps by forward voltage to find watts. LEDs waste very little of the energy.

Luminous Intensity

This is the perceived brightness and allows for the sensitivity of the human eye to different colours. The SI unit is the candela (cd). The name derives from the original common units one of which was candlepower, the brightness of a specified candle defined by materials, burn rate and size. Typical LED values are 10 millicandela (mcd) to 20cd. It is also the title of a song by the Cuban band the *Buena Vista Social Club* about a man glowing with a desire so strong that he needs the fire brigade to put him out.

Luminous Flux

This is the total luminous energy sent out by the lamp. It is measured in lumen (lm). Typical values for an LED will be from 0.2 to 150lm. Common values for household lamps having many LEDs would be 250 upwards.

Steradian (sr)

Yes, it sounds like drain cleaner but the steradian is the SI unit of a three dimensional solid angle. Instead of two lines forming a flat angle imagine a solid round cone. Picture this being projected out to the surface of a sphere as shown in Figure 2. The area of the base is the square of the radius r so is r^2. The surface area of a sphere is $4\pi r^2$ so there are 4π steradians in a sphere. That's why you often see 4π appear in formulae concerned with radiation.

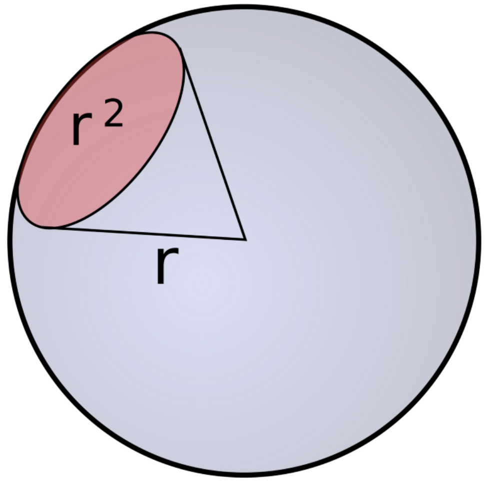


Figure 2: The cone is one steradian. (credit: Wikimedia under CC BY-SA 3.0)

Why Do Steradians Matter?

It shows us that as we move away from the source of radiation like light, or indeed our radio transmitters, the energy per unit area goes down with the square of the distance from the source. We also know this as the inverse square law first realised by Isaac Newton for gravitational force. And for light it relates the candela to the lumen. It is why a narrow beam from a given lamp will appear brighter. The number of candelas a given flux produces depends on what solid angle the flux is spread over.

`Luminous intensity (cd) = Luminous flux (lm) / steradians (sr)`

Until next time!

Soaring the Sky Podcast

(credit: Zach Yamauchi)

E107: Nixus Fly-By-Wire Project and Long Cross Country Flights with Zach Yamauchi

This is our fourth instalment of this ongoing series where we select and present episodes from Chuck Fulton's highly-regarded soaring podcast. See Resources*, below, for you can find* Soaring the Sky*, or simply click the green play button below to start listening. — Ed.*

Our guest today is Zach Yamauchi, a twenty-three-year-old glider pilot and aerospace engineer currently working for a company focused on unmanned aircraft. Zach learned how to fly gliders while attending Cal Poly. He also had the oppertunity to work on the *Nixus Project*, the first general aviation project using a 28m glider wing employing fly-by-wire technology. Zach will share with us more on this project as well as other soaring adventures he has had. Also in this episode:

- Listener logbook (01:11): Christopher Stevenson returns with a new listener logbook as he chats with some west coast pilots about some recent winter flights they had.

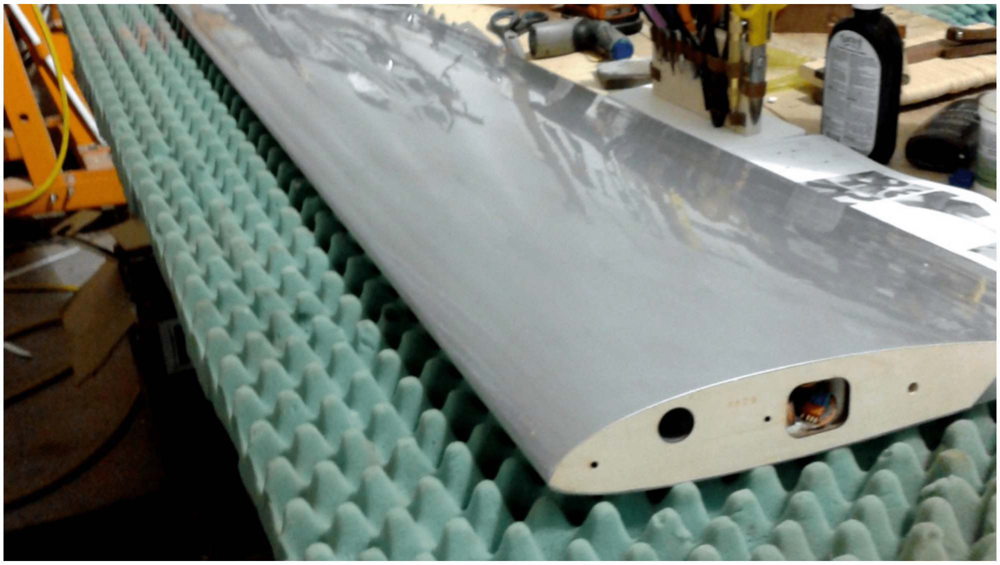
- Sergio the Soaring Master is back (01:13:50) with us with a brand new segment called, *Should I Stay or Should I Go*. All this and more now on E107 of Soaring the Sky!

Resources

- ***Nixus Project*** — The official Facebook page for the project which is the subject of this podcast.
- ***Soaring the Sky*** — From the website: "an aviation podcast all about the adventures of flying sailplanes. Join host Chuck Fulton as he talks with other aviators around the globe. You can find the show on Instagram, Facebook and Twitter.

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

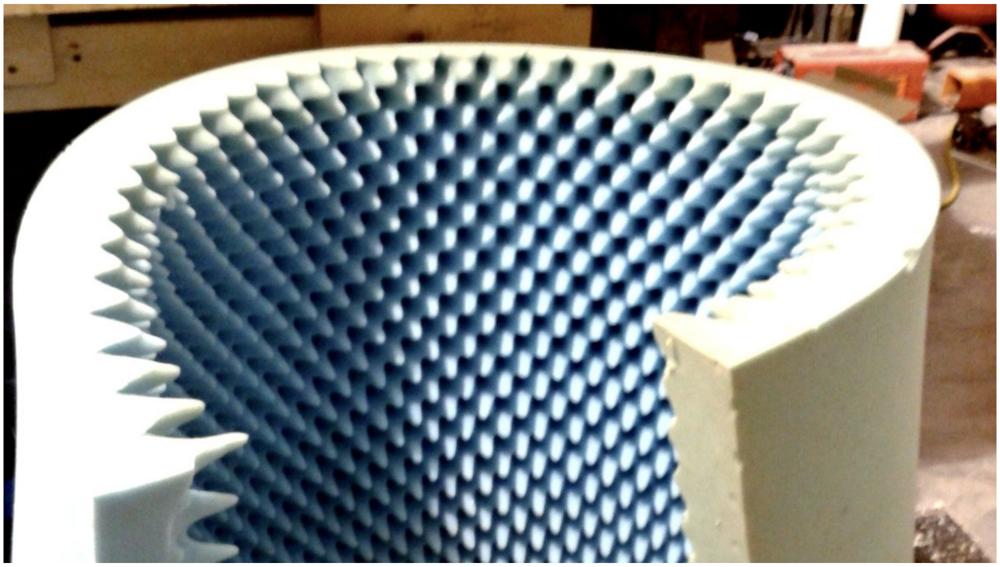
A Soft Spot for My Sailplanes



Waffles aren't just for breakfast any more.

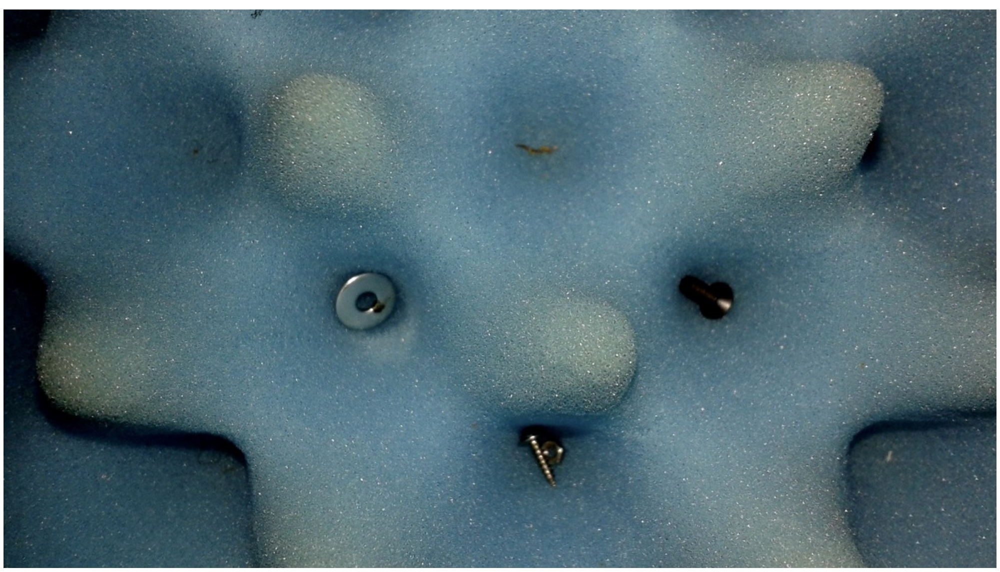
About 15 years ago, I ran across some hospital mattresses at a local surplus depot. I couldn't have designed a better item for preventing bench rash. Over the years I've kept an eye out and occasionally pick some up.

The ones I've found come in 33" to 36" x 72" and 2" to 4" thick. The dang things are convoluted — and that's what they're called — Convoluted Foam Bed Pads.



This is a 4" thick one, but I use the 2" thick ones the most. No more bench/hangar rash. I cut one in half to use on a regular basis, and use the larger one when I am working on something with lots of parts I want to spread out.

Also, I never have to worry about a small part or screw ending up on the shop floor or getting lost.



They just fall right into the dimples. That includes those teeny tiny itsy bitsy control arm screws from micro servos.

I paid $10 each for the ones I got, but they are worth it even if you have to get one from a hospital supply. Search around. Price ranges from $18 to $80.

Hope this helps and thank you for your reading!

Stamps That Tell a Story

Celebrating Swedish aviation then and now, and in particular a record setting ‘Weihe’.

Sweden Post issued a set of six stamps with the theme *Aviation Then and Now*. Swedish aviation history is shown on these stamps, honouring the 100th anniversary of the Royal Swedish Aero Club which was founded in 1900.

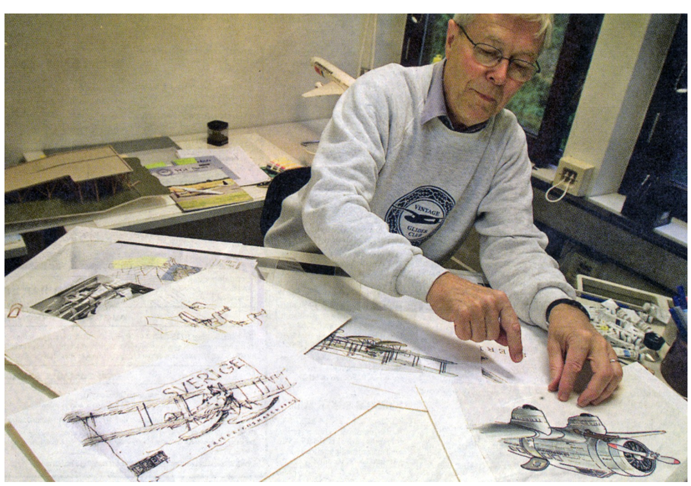
Sweden Post reported that this organisation is “the second oldest flying club (or aviation society) in the world,” with the Aéro-Club de France being the oldest (founded in 1898). Not knowing how they defined “flying club” or “aviation society,” it may be of interest to include here that the Royal Aeronautical Society of Great Britain was formed in 1866 with the Royal Aero Club of the United Kingdom founded in 1901.

One of these stamps shows a bright cream and red Swedish built *Weihe*, with the emblem of the Kungliche Svenska Aeroklubben KSAK. In the background is a yellow image of a SAAB 91 *Safir* and a white image of a Malmö Aviation Industry MFI-9, later known as a Bölkow

Junior. The main design, the *Weihe* sailplane SE-SCN, is probably the most famous of all *Weihe* sailplanes ever built, and it has many interesting stories to tell. Built by AB Flygindustri, AFI at Halmstad in 1943, it was sold to and registered by the Aero Club.

Flown by Per Axel ‘Pelle’ Persson, a Lieutenant and instructor with the Swedish Air Force, this ship took first place in the 1948 Internationals in Switzerland. His flight along the Alps, from Samedan to Geneva, a distance of about 290km, truly impressed Swiss pilots; no one had even considered to attempt such a flight before.

At the Internationals in Örebro, Sweden, in 1950, SE-SCN was flown by Billy Nilsson, again to first place. In 1956, a new Swedish feminine record was achieved by Gun-Britt Flodén. A relative newcomer to the sport of soaring, she flew this *Weihe* to the southern most tip of Sweden, a distance of 315.6km. It is noteworthy that this record still stands, forty-six years later!



Left: The record setting SE-SCN Weihe with records inscribed on its nose. | Right: Thorsten Fridlizius with some of the designs for this set of stamps — note his Vintage Glider Club sweatshirt.

The rest of the story about this famous SE-SCN is not quite as glamorous. It was sold in 1962 to a pilot in the United States and registered as N8602E. It changed hands a few times and is currently owned by an individual in Texas, who bought it in 1972 with the intent to refurbish and then fly it. However the project was much larger than envisioned, as the wooden ship was built with kaurit glue and, by this time, highly deteriorating. A restorer from the Augusta, Georgia area was interested in working on it and took over the project. Contact broke off and the current whereabouts of the sailplane are unknown.

The stamps were the work of Thorsten Fridlizius, a stamp designer for Sweden Post and Vice President of the Swedish Vintage Glider Society. Thorsten, who is also an advertising consultant specialising in aviation, kindly helped in writing this article. The photo above shows him with some of the designs for this set of stamps. He is wearing his Vintage Glider Club sweatshirt.

Fridlizius used a photo taken by him in the mid-1950s, published as the cover for *Schweizer Aero-Revue* (see key photo, above title), as the basis for the design. It was his intention to honour the Swedish Aero Club, the pilots who set new records with this particular *Weihe* and Hans Jacobs who designed this clean, simple and beautiful sailplane in 1938.

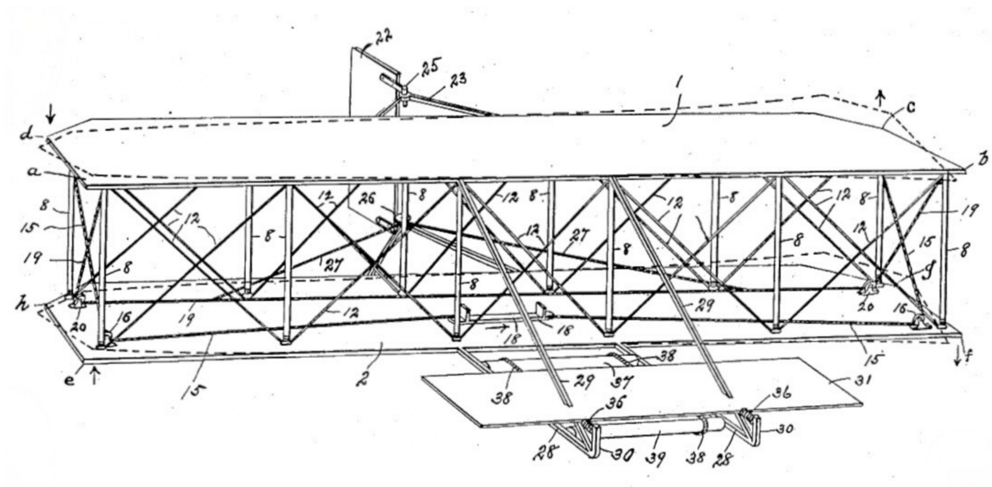
Resources

- *Stories by Great Glider Pilots All over the World* by Erik Berg. — Published by Airborne Publishing, Denmark in 1993.
- *Stamps That Tell a Story: The Series* — Catch up on your missing instalments of this excellent and informational series presented previously in the New RCSD.

This article first appeared in the May, 2002 issue of Gliding *magazine. Simine Short is an aviation researcher and historian. She has written more than 150 articles on the history of motorless flight and is published in several countries around the world as well as the United States. She is also the editor of the Bungee Cord, the quarterly publication of the Vintage Sailplane Association.*

*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.*

Glider Patents



US 821,393: Flying Machine

This is the third in our series of glider-related selections from the files of the US Patent and Trademark *office (see* Resources*, below). They are presented purely for the interest and entertainment of our readers. They are not edited in any way, other than to intersperse the drawings throughout the text. Disclaimers: a) Inclusion of a given patent in this series does not constitute an expression of any opinion about the patent itself. b) This document has no legal standing whatsoever; for that, please refer to the original document on the USPTO website. — Ed.*

UNITED STATES PATENT OFFICE.

ORVILLE WRIGHT AND WILBUR WRIGHT, OF DAYTON, OHIO.

FLYING-MACHINE.

No. 821,393. Specification of Letters Patent. Patented May 22, 1906.

Application filed March 23, 1903. Serial No. 149,220.

To all whom it may concern:

Be it known that we, ORVILLE WRIGHT and WILBUR WRIGHT, citizens of the United States, residing in the city of Dayton, county of Montgomery, and State of Ohio, have invented certain new and useful Improvements in Flying-Machines, of which the following is a specification.

Our invention relates to that class of flying-machines in which the weight is sustained by the reactions resulting when one or more aeroplanes are moved through the air edge-wise at a small angle of incidence, either by the application of mechanical power or by the utilization of the force of gravity.

The objects of our invention are to provide means for maintaining or restoring the equilibrium or lateral balance of the apparatus, to provide means for guiding the machine both vertically and horizontally, and to provide a structure combining lightness, strength, convenience of construction, and certain other advantages which will hereinafter appear.

To these ends our invention consists in certain novel features, which we will now proceed to describe and will then particularly point out in the claims.

In the accompanying drawings, Figure 1 is a perspective view of an apparatus embodying our invention in one form. Fig. 2 is a plan view of the same, partly in horizontal section and partly broken away. Fig. 3 is a side elevation, and Figs. 4 and 5 are detail views, of one form of flexible joint for connecting the upright standards with the aeroplanes.

In flying-machines of the character to which this invention relates the apparatus is supported in the air by reason of the contact between the air and the under surface of one or more aeroplanes, the contact-surface being presented at a small angle of incidence to the air. The relative movements of the air and aeroplane may be derived from the motion of the air in the form of wind blowing in the direction opposite to that in which the apparatus is traveling or by a combined downward and forward movement of the machine, as in starting from an elevated position or by combination of these two things, and in either case the operation is that of a soaring-machine, while power applied to the machine to propel it positively forward will cause the air to support the machine in a similar manner. In either case owing to the varying conditions to be met there are numerous disturbing forces which tend to shift the machine from the position which it should occupy to obtain the desired results. It is the chief object of our invention to provide means for remedying this difficulty, and we will now proceed to describe the construction by means of which these results are accomplished.

In the accompanying drawings we have shown an apparatus embodying our invention in one form. In this illustrative embodiment the machine is shown as comprising two parallel superposed aeroplanes 1 and 2, and this construction we prefer, although our invention may be embodied in a structure having a single aeroplane. Each aeroplane is of considerably greater width from side to side than from front to rear. The four corners of the upper aeroplane are indicated by the reference-letters *a, b, c* and *d*, while the corresponding corners of the lower aeroplane 2 are indicated by the reference-letters *e*, *f*, *g,* and *h*. The marginal lines *a b* and *e f* indicate the front edges of the aeroplanes, the lateral margins of the upper aeroplane are indicated, respectively, by the lines *a d* and *b c,* the lateral margins of the lower aeroplane are indicated, respectively, by the lines *e h* and *f g,* while the rear margins of the upper and lower aeroplanes are indicated, respectively, by the lines *c d* and *g h.*

Before proceeding to a description of the fundamental theory of operation of the structure we will first describe the preferred mode of constructing the aeroplanes and those portions of the structure which serve to connect the two aeroplanes.

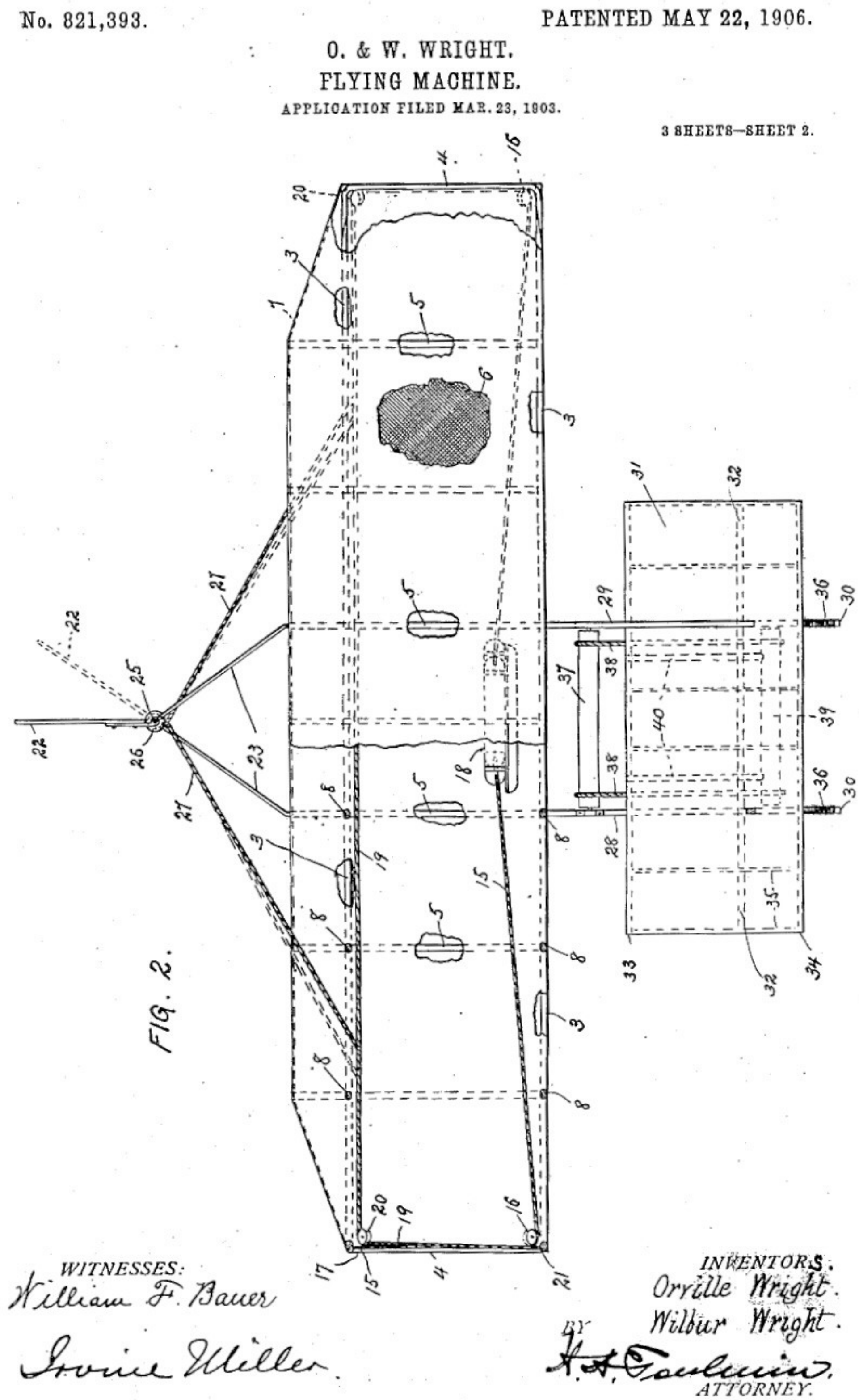
Each aeroplane is formed by stretching cloth or other suitable fabric over a frame composed of two parallel transverse spars 3, extending from side to side of the machine, their ends being connected by bows 4, extending from front to rear of the machine. The front and rear spars 3 of each aeroplane are connected by a series of parallel ribs 5, which preferably extend somewhat beyond the rear spar, as shown. These spars, bows, and ribs are preferably constructed of wood having the necessary strength, combined with lightness and flexibility. Upon this framework the cloth which forms the supporting-surface of the aeroplane is secured, the frame being inclosed in the cloth. The cloth for each aeroplane to its attachment to its frame is cut on the bias and made up into a single piece approximately the size and shape of the aeroplane, having the threads of the fabric arranged diagonally to the transverse spars and longitudinal ribs, as indicated at 6 in Fig. 2. Thus the diagonal threads of the cloth form truss systems with the spars and ribs, the threads constituting the diagonal members. A hem is formed at the rear edge of the cloth to receive a wire 7, which is connected to the ends of the rear spar and supported by the rearwardly-extending ends of the longitudinal ribs 5, thus forming a rearwardly-extending flap or portion of the aeroplane. This construction of the aeroplanes gives a surface which has very great strength to withstand lateral and longitudinal strains, at the same time being capable of being bent or twisted in the manner hereinafter described.

When two aeroplanes are employed, as in the construction illustrated, they are connected together by upright standards 8. These standards are substantially rigid, being preferably constructed of wood and of equal length, equally spaced along the front and rear edges of the aeroplane, to which they are connected at their top and bottom ends by hinged joints or universal joints of any suitable description. We have shown one form of connection which may be used for this purpose in Figs. 4 and 5 of the drawings. In this construction each end of the standard 8 has secured to it and eye 9, which engages with a hook 10, secured to a bracket-plate 11, which latter plate is in turn fastened to the spar 3. Diagonal braces or stay wires 12 extend from each end of each standard to the opposite ends of the adjacent standards, and as a convenient mode of attaching these parts I have shown a hook 13 made integral with the hook 10 to receive the end of one of the stay-wires, the other stay-wire being mounted on the hook

10. The hook 13 is shown as bent down to retain the stay-wire in connection to it, while the hook 10 is shown as provided with a pin 14 to hold the stay-wire 12 and eye 9 in position thereon. It will be seen that this construction forms a truss system which gives the whole machine great transverse rigidity and strength, while at the same time the jointed connections of the parts permit the aeroplanes to be bent or twisted in the manner which will now proceed to describe.

15 indicates a rope or other flexible connection extending lengthwise of the front of the machine above the lower aeroplane, passing under pulleys or other suitable guides 16 at the front corners *e* and *f* of the lower aeroplane, and extending thence upward and rearward to the upper rear corners *c* and *d* of the upper aeroplane, where they are attached, as indicated at 17. To the central portion of this rope there is connected a laterally — movable cradle 18, which forms a means for moving the rope lengthwise in one direction or the other, the cradle being movable toward either side of the machine. We have devised this cradle as a convenient means for operating the rope 15, and the machine is intended to be generally used with the operator lying face downward on the lower aeroplane, with his head to the front, so that the operator's body rests on the cradle, and the cradle can be moved laterally by the movements of the operator's body. It will be understood, however, that the rope 15 may be manipulated in any suitable manner.

19 indicates a second rope extending transversely of the machine along the rear edge of the body portion of the lower aeroplane, passing under suitable pulleys or guides 20 at the rear corners *g* and *h* of the lower aeroplane, and extending thence diagonally upward to the front corners *a* and *b* of the upper aeroplane, where its ends are secured in any suitable manner, as indicated at 21.



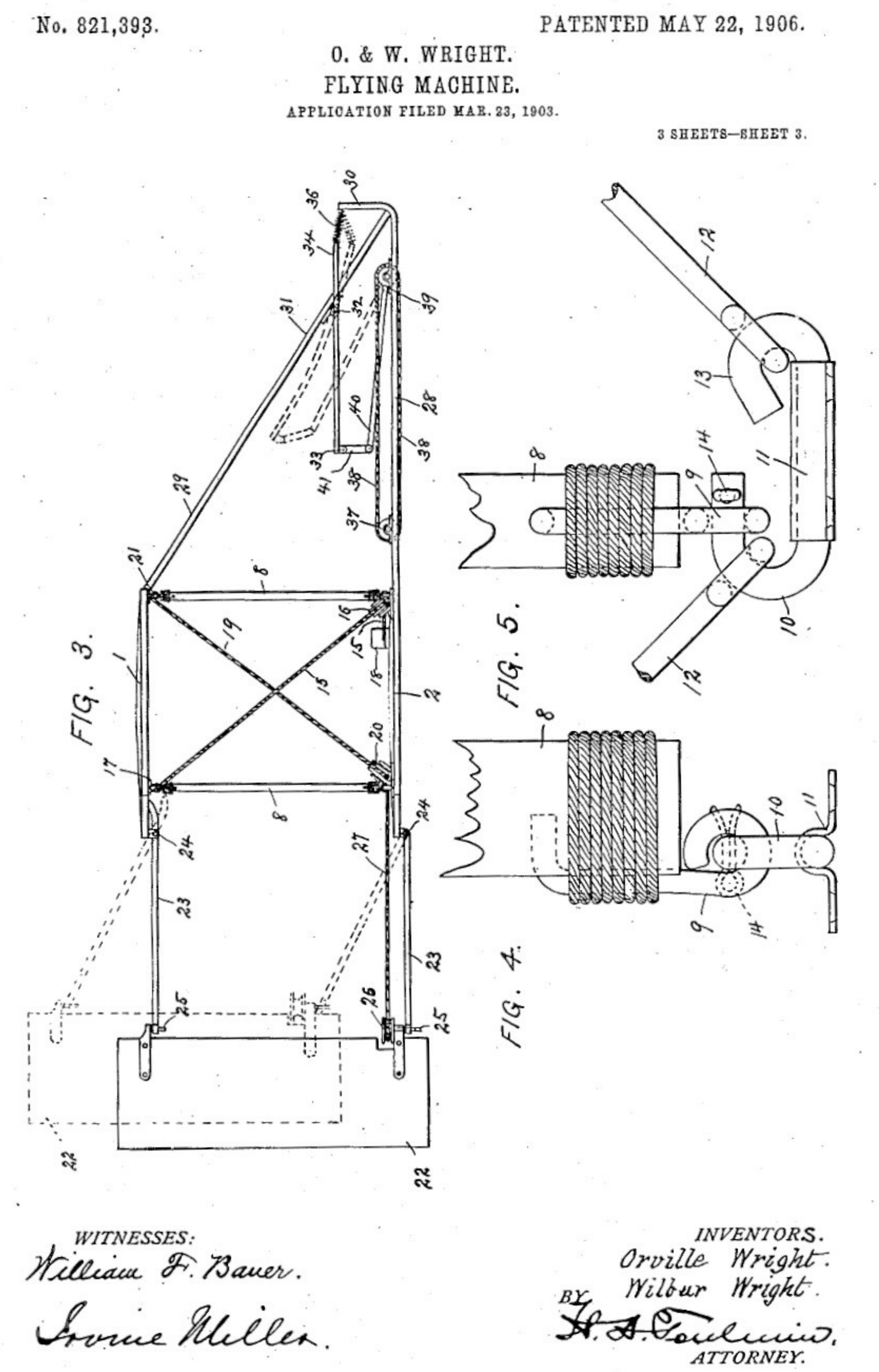
Considering the structure so far as we have now described it and assuming that the cradle 18 be moved to the right in Figs. 1 and 2, as indicated by the arrows applied to the cradle in Fig. 1 and by the dotted lines in Fig. 2, it will be seen that that portion of the rope 15 passing under the guide-pulley at the corner *e* and secured to the corner *d* will be under tension, while slack is paid out throughout the other side or half of the rope 15. The part of the rope 15 under tension exercises a downward pull upon the rear upper corner *d* of the structure and an upward pull upon the front lower corner *e,* as indicated by the arrows. This causes the corner *d* to move downward and the corner *e* to move upward. As the corner *e* moves upward it carries the corner *a* upward with it, since the intermediate standard 8 is substantially rigid and maintains an equal distance between the corners *a* and *e* at all times. Similarly, the standard 8, connecting the corners *d* and *h,* causes the corner *h* to move downward in unison with the corner *d.* Since the corner *a* thus moves upward and the corner *h* moves downward, that portion of the rope 19 connected to the corner *a* will be pulled upward through the pulley 20 at the corner *h,* and the pull thus exerted on the rope 19 will pull the corner *b* on the other side of the machine downward and at the same time pull the corner *g* at said other side of the machine upward. This results in a downward movement of the corner *b* and and upward movement of the corner *c.* Thus it results from a lateral movement of the cradle 18 to the right in Fig. 1 that the lateral margins *a d* and *e h* at one side of the machine are moved from their normal positions, in which they lie in the normal planes of their respective aeroplanes, into angular relations with said normal planes, each lateral margin on this side of the machine being raised above said normal plane at its forward end and depressed below said normal plane at its rear end, said lateral margins being thus inclined upward and forward. At the same time a reverse inclination is imparted to the lateral margins *b c* and *f g* at the other side of the machine, their inclination being downward and forward. These positions are indicated in dotted lines in Fig. 1 of the drawings. A movement of the cradle 18 in the opposite direction from its normal position will reverse the angular inclination of the lateral margins of the aeroplanes in an obvious manner. By reason of this construction it will be seen that with the particular mode of construction now under consideration it is possible to move the forward corner of the lateral edges of the aeroplane on one side of the machine either above or below the normal planes of the aeroplanes, a reverse movement of the forward corners of the lateral margins on the other side of the machine occurring simultaneously. During this operation each aeroplane is twisted or distorted around a line extending centrally across the same from the middle of one lateral margin to the middle of the other lateral margin, the twist due to the moving of the lateral margins to different angles extending across each aeroplane from side to side, so that each aeroplane-surface is given a helicoidal warp or twist. We prefer this construction and mode of operation for the reason that it gives a gradually-increasing angle to the body of each aeroplane from the central longitudinal line thereof outward to the margin, thus giving a continuous surface on each side of the machine, which has a gradually increasing or decreasing angle of incidence from the center of the machine to either side. We wish it to be understood, however, that our invention is not limited to this particular construction, since any construction whereby the angular relations of the lateral margins of the aeroplanes may be varied in opposite directions with respect to the normal planes of said aeroplanes comes within the scope of our invention. Furthermore, it should be understood that while the lateral margins of the aeroplanes move to different angular positions with respect to or above and below the normal planes of said aeroplanes it does not necessarily follow that these movements bring the opposite lateral edges to different angles respectively above and below a horizontal plane, since the normal planes of the bodies of the aeroplanes are inclined to the horizontal when the machine is in flight, said inclination being downward from front to rear, and while the forward corners on one side of the machine may be depressed below the normal planes of the bodies of the aeroplanes said depression is not necessarily sufficient to carry them below the horizontal planes passing through the rear corners on that side. Moreover, although we prefer to so construct the apparatus that the movements of the lateral margins on the opposite sides of the machine are equal in extent and opposite in direction, yet our invention is not limited to a construction producing this result, since it may be desirable under certain circumstances to move the lateral margins on one side of the machine in the manner just described without moving the lateral margins on the other side of the machine to an equal extent in the opposite direction. Turning now to the purpose of this provision for moving the lateral margins of the aeroplanes in the manner described, it should be premised that owing to various conditions of wind-pressure and other causes the body of the machine is apt to become unbalanced laterally, one side tending to sink and the other side tending to rise, the machine turning around its central longitudinal axis. The provision which we have just described enables the operator to meet this difficulty and preserve the lateral balance of the machine. Assuming that for some cause that side of the machine which lies to the left of the observer in Figs. 1 and 2 has shown a tendency to drop downward, a movement of the cradle 18 to the right of said figures, as hereinbefore assumed, will move the lateral margins of the aeroplanes in the manner already described, so that the margins *a d* and *e h* will be inclined downward and rearward and the lateral margins *b c* and *f g* will be inclined upward and rearward with respect to the normal planes of the bodies of the aeroplanes. With the parts of the machine in this position it will be seen that the lateral margins *a d* and *e h* present a larger angle of incidence to the resisting air, while the lateral margins on the otherside of the machine present a smaller angle of incidence. Owing to this fact, the side of the machine presenting the larger angle of incidence will tend to lift or move upward, and this upward movement will restore the lateral balance of the machine. When the other side of the machine tends to drop, a movement of the cradle 18 in the reverse direction will restore the machine to its normal lateral equilibrium. Of course the same effect will be produced in the same way in the case of a machine employing only a single aeroplane.

In connection with the body of the machine as thus operated we employ a vertical rudder or tail 22, so supported as to turn around a vertical axis. This rudder is supported at the rear ends of supports or arms 23, pivot at their forward ends to the rear margins of the upper and lower aeroplanes, respectively. These supports are preferably V-shaped, as shown, so that their forward ends are comparatively widely separated, their pivots being indicated at 24. Said supports are free to swing upward at their free rear ends, as indicated in dotted lines in Fig. 3, their downward movement being limited in any suitable manner. The vertical pivots of the rudder 22 are indicated at 25, and one of these pivots has mounted thereon a sheave or pulley 26, around which passes a tiller rope 27, the ends of which are extended out laterally and secured to the rope 19 on opposite sides of the central point of said rope. By reason of the construction the lateral shifting of the cradle 18 serves to turn the rudder to one side or the other of the line of flight. It will be observed in this connection that the construction is such that the rudder will always be so turned as to present its resisting-surface on that side of the machine on which the lateral margins of the aeroplanes present the least angle of resistance. The reason of this construction is that when the lateral margins of the aeroplanes are so turned in the manner hereinbefore described as to present different angles of incidence to the atmosphere that side presenting the largest angle of incidence, although being lifted or moved upward in the manner already described, at the same time meets with an increased resistance to its forward motion, and is therefore retarded in its forward motion, while at the same time the other side of the machine, presenting a smaller angle of incidence, meets with less resistance to its forward motion and tends to move forward more rapidly than the retarded side. This gives the machine a tendency to turn around its vertical axis, and this tendency if not properly met will not only change the direction of the front of the machine, but will ultimately permit one side thereof to drop into a position vertically below the other side with the aeroplanes in vertical position, thus causing the machine to fall. The movement of the rudder hereinbefore described prevents this action, since it exerts a retarding influence on that side of the machine which tends to move forward too rapidly and keeps the machine with its front properly presented to the direction of flight and with its body properly balanced around its central longitudinal axis. The pivoting of the supports 23 so as to permit them to swing upward prevents injury to the rudder and its supports in case the machine alights at such an angle as to cause the rudder to strike the ground first, the parts yielding upward as indicated in dotted lines in Fig. 3, and thus preventing injury or breakage. We wish it to be understood, however, that we do not limit ourselves to the particular description of rudder set forth, the essential being that the rudder shall be vertical and shall be so moved as to present its resisting-surface on that side of the machine which offers the least resistance to the atmosphere so as to counteract the tendency of the machine to turn around a vertical axis when the two sides thereof offer different resistances to the air.

From the central portion of the front of the machine struts 28 extend horizontally forward from the lower aeroplane, and struts 29 extend downward and forward from the central portion of the upper aeroplane, their front ends being united to the struts 28, the forward extremities of which are turned up, as indicated at 30. These struts 28 and 29 form truss-skids projecting in front of the whole frame of the machine and serving to prevent the machine from rolling over forward when it alights. The struts 29 serve to brace the upper portion of the main frame and resist its tendency to move forward after the lower aeroplane has been stopped by its contact with the earth, thereby relieving the rope 19 from undue strain, for it will be understood that when the machine comes into contact with the earth further forward movement of the lower portion thereof being suddenly arrested the inertia of the upper portion would tend to cause it to continue to move forward if not prevented by the struts 29, and this forward movement of the upper portion would bring a very violent strain upon the rope 19, since it is fastened to the upper portion at both of its ends, while its lower portion is connected by the guides 20 to the lower portion. The struts 28 and 29 also serve to support the front or horizontal rudder, the construction of which we will now proceed to describe.

The front rudder 31 is a horizontal rudder having a flexible body, the same consisting of three stiff cross-pieces or sticks 32, 33, and 34, and the flexible ribs 35, connecting said cross-pieces and extending from front to rear. the frame thus provided is covered by a suitable fabric stretched over the same to form the body of the rudder. The rudder is supported from the struts 29 by means of the intermediate cross-piece 32, which is located near the center of pressure slightly in front of a line equidistant between the front and the rear edges of the rudder, the cross-piece 32 forming the pivotal axis of the rudder, so as to constitute a balanced rudder. To the front edge of the rudder there are connected springs 36, which springs are connected to the upturned ends 30 of the struts 28, the construction being such that said springs tend to resist any movement either upward or downward of the front edge of the horizontal rudder. The rear edge of the rudder lies immediately in front of the operator and may be operated by him in any suitable manner. We have shown a mechanism for this purpose comprising a roller or shaft 37, which may be grasped by the operator so as to turn the same in either direction. Bands 38 extend from the roller 37 forward to and around a similar roller or shaft 39, both rollers or shafts being supported in suitable bearings on the struts 28. The forward roller or shaft has rearwardly-extending arms 40, which are connected by links 41 with the rear edge of the rudder 31. The normal position of the rudder 31 is neutral or substantially parallel with the aeroplanes 1 and 2; but its rear edge may be moved upward or downward, so as to be above or below the normal plane of said rudder through the mechanism provided for that purpose. It will be seen that the springs 36 will resist any tendency of the forward edge of the rudder to move in either direction, so that when force is applied to the rear edge of said rudder the longitudinal ribs 35 bend, and the rudder thus presents a concave surface to the action of the wind either above or below its normal plane, said surface presenting a small angle of incidence at its forward portion and said angle of incidence rapidly increasing toward the rear. This greatly increases the efficiency of the rudder as compared with a plane surface of equal area. By regulating the pressure on the upper and lower sides of the rudder through changes of angle and curvature in the manner described a turning movement of the main structure around its transverse axis may be effected, and the course of the machine may thus be directed upward or downward at the will of the operator and the longitudinal balance thereof maintained.

Contrary to the usual custom, we place the horizontal rudder in front of the aeroplanes at a negative angle and employ no horizontal tail at all. By this arrangement we obtain a forward surface which is almost entirely free from pressure under ordinary conditions of flight, but which even if not moved at all from its original position becomes an efficient lifting-surface whenever the speed of the machine is accidentally reduced very much below the normal, and thus largely counteracts that backward travel of the centre of pressure on the aeroplanes which has frequently been productive of serious injuries by causing the machine to turn downward and forward and strike the ground head-on. We are aware that a forward horizontal rudder of different construction has been used in combination with a supporting-surface and a rear horizontal rudder; but this combination was not intended to effect and does not effect the object which we obtain by the arrangement hereinbefore described.



We have used the term “aeroplane” in this specification and the appended claims to indicate the supporting-surface or supporting-surfaces by means of which the machine is sustained in the air, and by this term we wish to be understood as including any suitable supporting-surface which normally is substantially flat, although of course when constructed of cloth or other flexible fabric, as we prefer to construct them, these surfaces may receive more or less curvature from the resistance of the air, as indicated in Fig. 3.

We do not wish to be understood as limiting ourselves strictly to the precise details of construction hereinbefore described and shown in the accompanying drawings, as it is obvious that these details may be modified without departing from the principles of our invention. For instance, while we prefer the construction illustrated in which each aeroplane is given a twist along its entire length in order to set its opposite lateral margins at different angles we have already pointed out that our invention is not limited to this form of construction, since it is only necessary to move the lateral marginal portions, and where these portions alone are moved only those upright standards which support the movable portion require flexible connections at their ends.

Having thus fully described our invention, what we claim as new, and desire to secure by Letters Patent, is —

1. In a flying-machine, a normally flat aeroplane having lateral marginal portions capable of movement to different positions above or blow [sic] the normal plane of the body of the aeroplane, such movement being about an axis transverse to the line of flight, whereby said lateral marginal portions may be moved to different angles relatively to the normal plane of the body of the aeroplane, so as to present to the atmosphere different angles of incidence, and means for so moving said lateral marginal portions, substantially as described.
2. In a flying-machine, the combination with two normally parallel aeroplanes, superposed the one above the other, of upright standards connecting said planes at their margins, the connections between the standards and aeroplanes at the lateral portions of the aeroplanes being by means of flexible joints, each of said aeroplanes having lateral marginal portions capable of movement to different positions above or below the normal plane of the body of the aeroplane, such movement being about an axis

transverse to the line of flight, whereby said lateral marginal portions may be moved to different angles relatively to the normal plane of the body of the aeroplane, so as to present to the atmosphere different angles of incidence, the standards maintaining a fixed distance between the portions of the aeroplanes which they connect, and means for imparting such movement to the lateral marginal portions of the aeroplanes, substantially as described.

3. In a flying-machine, a normally flat aeroplane having lateral marginal portions capable of movement to different positions above or below the normal plane of the body of the aeroplane, such movement being about an axis transverse to the line of flight, whereby said lateral marginal portions may be moved to different angles relatively to the normal plane of the body of the aeroplane, and also to different angles relatively to each other, so as to present to the atmosphere different angles of incidence, and means for simultaneously imparting such movement to said lateral marginal portions, substantially as described.
4. In a flying-machine, the combination, with parallel superposed aeroplanes, each having lateral marginal portions capable of movement to different positions above or below the normal plane of the body of the aeroplane, such movement being about an axis transverse to the line of flight, whereby said lateral marginal portions may be moved to different angles relatively to the normal plane of the body of the aeroplane, and to different angles relatively to each other, so as to present to the atmosphere different angles of incidence, of uprights connecting said aeroplanes at their edges, the uprights connecting the lateral portions of the aeroplanes being connected with said aeroplanes by flexible joints, and means for simultaneously imparting such movement to said lateral marginal portions, the standards maintaining a fixed distance between the parts which they connect, whereby the lateral portions on the same side of the machine are moved to the same angle, substantially as described.

5. In a flying-machine, an aeroplane having substantially the form of a normally flat rectangle elongated transversely to the line of flight, in combination with means for imparting to the lateral margins of said aeroplane a movement about an axis lying-in the body of the aeroplane perpendicular to said lateral margins, and thereby moving said lateral margins into different angular relations to the normal plane of the body of the aeroplane, substantially as described.
6. In a flying-machine, the combination, with two superposed and normally parallel aeroplanes, each having substantially the form of a normally flat rectangle elongated transversely to the line of flight, of upright standards connecting the edges of said aeroplanes to maintain their equidistance, those standards at the lateral portions of said aeroplanes being connected therewith by flexible joints, and means for simultaneously imparting to both lateral margins or both aeroplanes a movement about axes which are perpendicular to said margins and in the planes of the bodies of the respective aeroplanes, and thereby moving the lateral margins on the opposite sides of the machine into different angular relations to the normal planes of the respective aeroplanes, the margins on the same side of the machine moving to the same angle, and the margins on one side of the machine moving to an angle different from the angle to which the margins on the other side of the machine move, substantially as described.
7. In a flying-machine, the combination, with an aeroplane, and means for simultaneously moving the lateral portions thereof into different angular relations to the normal plane of the body of the aeroplane and to each other, so as to present to the atmosphere different angles of incidence, of a vertical rudder, and means whereby said rudder is caused to present to the wind that side thereof nearest the side of the aeroplane having the smaller angle of incidence and offering the least resistance to the atmosphere, substantially as described.
8. In a flying-machine, the combination, with two superposed and normally parallel aeroplanes, upright standards connecting the

edges of said aeroplanes to maintain their equidistance, those standards at the lateral portions of said aeroplanes being connected therewith by flexible joints, and means for simultaneously moving both lateral portions of both aeroplanes into different angular relations to the normal planes of the bodies of the respective aeroplanes, the lateral portions on one side of the machine being moved to an angle different from that to which the lateral portions on the other side of the machine are moved, so as to present different angles of incidence at the two sides of the machine, of a vertical rudder, and means whereby said rudder is caused to present to the wind that side thereof nearest the side of the aeroplanes having the smaller angle of incidence and offering the least resistance to the atmosphere, substantially as described.

9. In a flying-machine, and aeroplane normally flat and elongated transversely to the line of flight, in combination with means for imparting to said aeroplane a helicoidal warp around an axis transverse to the line of flight and extending centrally along the body of the aeroplane in the direction of the elongation of the aeroplane, substantially as described.
10. In a flying-machine, two aeroplanes, each normally flat and elongated transversely to the line of flight, and upright standards connecting the edges of said aeroplanes to maintain their equidistance, the connections between said standards and aeroplanes being by means of flexible joints, in combination with means for simultaneously imparting to each of said aeroplanes a helicoidal warp around an axis transverse to the line of flight and extending centrally along the body of the aeroplane in the direction of the elongation of the aeroplane, substantially as described.
11. In a flying-machine, two aeroplanes, each normally flat and elongated transversely to the line of flight, and upright standards connecting the edges of said aeroplanes to maintain their equidistance, the connections between such standards and aeroplanes being by means of flexible joints, in combination with means for simultaneously imparting to each of said aeroplanes a helicoidal warp around an axis transverse to the line of flight and

extending centrally along the body of the aeroplane in the direction of the elongation of the aeroplane, a vertical rudder, and means whereby said rudder is caused to present to the wind that side thereof nearest the side of the aeroplanes having the smaller angle of incidence and offering the least resistance to the atmosphere, substantially as described.

12. In a flying-machine, the combination, with an aeroplane, of a normally flat and substantially horizontal flexible rudder, and means for curing said rudder rearwardly and upwardly or rearwardly and downwardly with respect to its normal plane, substantially as described.
13. In a flying-machine, the combination, with an aeroplane, of a normally flat and substantially horizontal flexible rudder pivotally mounted on an axis transverse to the line of flight near its center, springs resisting vertical movement of the front edge of said rudder and means for moving the rear edge of said rudder above or below the normal plane thereof, substantially as described.
14. A flying-machine comprising superposed connected aeroplanes, means for moving the opposite lateral portions of said aeroplanes to different angles to the normal planes thereof, a vertical rudder, means for moving said vertical rudder toward that side of the machine presenting the smaller angle of incidence and the least resistance to the atmosphere, and a horizontal rudder provided with means for presenting its upper or under surface to the resistance of the atmosphere substantially as described.
15. A flying-machine comprising superposed connected aeroplanes, means for moving the opposite lateral portions of said aeroplanes to different angles to the normal planes thereof, a vertical rudder, means for moving said vertical rudder toward that side of the machine presenting the smaller angle of incidence and the least resistance to the atmosphere, and a horizontal rudder provided with means for presenting its upper or under surface to the resistance of the atmosphere, said vertical rudder being located at the rear of the machine and said horizontal rudder at the front of the machine, substantially as described.

16. In a flying-machine, the combination, with two superposed and connected aeroplanes, of an arm extending rearward from each aeroplane, said arms being parallel and free to swing upward at their rear ends, and a vertical rudder pivotally mounted in the rear ends of said arms, substantially as described.
17. A flying-machine comprising two superposed aeroplanes, normally flat but flexible, upright standards connecting the margins of said aeroplanes, said standards being connect to said aeroplanes by universal joints, diagonal stay-wires connecting the opposite ends of the adjacent standards, a rope extending along the front edge of the lower aeroplane, passing through guides at the front corners thereof, and having its ends secured to the rear corners of the upper aeroplane, and a rope extending along the rear edge of the lower aeroplane, passing through guides at the rear corners thereof, and having its ends secured to the front corners of the upper aeroplane, substantially as described.
18. A flying-machine comprising two superposed aeroplanes, normally flat but flexible, upright standards connecting the margins of said aeroplanes, said standards being connected to said aeroplanes by universal joints, diagonal stay-wires connecting the opposite ends of the adjacent standards, a rope extending along the front edge of the lower aeroplane, passing through guides at the front corners thereof, and having its ends secured to the rear corners of the upper aeroplane, and a rope extending along the rear edge of the lower aeroplane, passing through guides at the rear corners thereof, and having its ends secured to the front corners of the upper aeroplane, in combination with a vertical rudder, and a tiller-rope connecting said rudder with the rope extending along the rear edge of the lower aeroplane, substantially as described.

ORVILLE WRIGHT.
WILBUR WRIGHT.

Witnesses:
Chas. E. Taylor,
E. Earle Forrer.

Resources

- *US Patent and Trademark Office* (USPTO) — The USPTO provides an oustanding search engine which enables digging through (seemingly) every patent in their office. Proceed with caution — you could easily spend **days** of your time digging through their utterly fascinating files.
- *US Patent 821,393* — A PDF of the original patent as downloaded from the USPTO website, on which this article is based.

Transcript from the original text by RCSD Editorial Assistant Michelle Klement. 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

A perfect catch for the last flight of the day captured by Stefan Eder of Aer-o-Tec in Germany. Their link is in the Resources section below.

Summer's end.

We're always a little surprised when we're asked about the little details of our office setup and working conditions. Mostly these come through Twitter which makes us wonder if it's SkyBot — or worse yet Elon Musk — simply gathering information for some nefarious purpose.

That notwithstanding, the subject of what music we have on in the office came up. The short answer is, for the most part, none. We encourage the use of headphones. Music is so subjective that it's pretty high risk to assault somebody with Speed Metal when you know their taste moves to the Adult Contemporary end of the spectrum. And nobody here seem to wants to admit that they already know all the lyrics to *Red (Taylor's Version).*

However, we do have one playlist we play out loud to which most of us can agree most of the time: *The New RC Soaring Digest Writing*

Trance is its rather ominous sounding name. It runs the range from what the kids call House through to what the same kids call Trance or Electronica. Mostly what we like is that it's non-music music. Something that fills the aural void without being distracting. It's like white noise without it actually being *noise*, which seems to let us focus on the job at hand. After all, we all know if the ten minute version of the Swiftinator's *All Too Well* comes up in the rotation, nothing is getting done for a while.

But every once in a while we let Tim Cook do the DJing — in other words, just set Apple Music to random play (within reason). Which is why it caught us all a little by surprise when the late, great John Prine's *Summer's End* began to play. Not our usual fare at all.

Prine's simple melody and even simpler, honest lyrics are absolutely perfect for a day that while it's still hot, it's a different kind of hot — softer and more gentle: the warmth of a summer just about run its course. There was a sense that everybody slowed down or stopped for a moment to savour the last of a lovely long, languid season inevitably fading away.

For a while the Coronamatics fell silent and the background chatter died away.

With the last, sweet bars of Prine's elegy for the best times sliding into fading memories, there were a few faraway looks and dare we say some moist eyes around the office, with no one clearly ready for summer to end quite yet.

What's New in The RCSD Shop

Presenting the The New RCSD Logo Events Flag. Fly it near the launch zone and it will tell you which direction the wind is blowing — no extra charge!

We were working away with our friends down in Minas Gerais, Brasil on a listing for their exciting *Retroplana 2022* event coming up in September (see *Resources*, below) and when the folks in the *RCSD Shop* got wind, they piped up with "hey, we have a flag for that." And thus was born the ***New RCSD Logo Events Flag***.

With its clever topographic map motif, it's a great way to jazz up the flight line at *your* next event. Also, if you fly it near the launch zone, it will tell you which direction the wind is blowing — no extra charge! This beautiful and functional flag is 87.6cm (34.5in) wide and 142.2cm (56.0in) long; it won't crease or shrink thanks to the 100% polyester, knitted fabric with a weight of 4.42 oz/yd² (150 g/m²) and has two metal grommets for running it up the flagpole to see who salutes.

Also, did you know that all of our products are made especially for you as soon as you place an order — making products as required instead of in bulk helps reduce overproduction, so thank you for making thoughtful purchasing decisions!

Make Sure You Don't Miss the New Issue

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

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