

The NEW RC Soaring Digest

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In The Air

So you want to do for a living what you now do for a hobby?

[Terence C. Gannon](#)



Iñaki Elizondo Casado's *Weberschock* 'Radical' amidst a backdrop of balsa-hungry wind turbines at the world famous Bwlch in South Wales, UK, at the 2017 Welsh Open F3F. (image: Kevin Newton)

A number of years ago, I had the good fortune to see Chris Anderson, the former editor of *WIRED* magazine, speak at Mount Royal University here in Calgary, Alberta, Canada. Amongst his many accomplishments in addition to his time at the helm of *WIRED*, he founded *3D Robotics*, an early entrant into the commercial drone business, and he's the author of a number of bestselling books including most notably *The Long Tail* and *Makers: The New Industrial Revolution*. I have thought for quite some time that Anderson

is very capable of Gladwellian insight into popular culture, but doesn't seem to get the same kind of credit Gladwell himself does, which always surprises me.

Anderson spoke on many topics that night (his thoughts on LEGO have also stuck with me to this day — it's nice to encounter a fellow fanboy) but in particular I was intrigued by his comments about his '*tendency to industrialise his hobbies*'. I'm sure I am hopelessly mangling his words but I believe the essence was along these lines — so often we enjoy doing something so much we seek to turn that hobby into a profession. Anderson has done it at least a couple of times and the impression with which I was left was it was a decidedly mixed blessing for him. While I am now lapsing into pure speculation as to what was in Anderson's mind that night, my sense was along the lines of '*sure, do it, but be prepared to pay a price*'. Not the least of which is that even the most compelling subject can be made a drudge if we *have* to get up and do it every day.

I started thinking about this when I read the third part of Bob Dodgson's autobiography *The Implementation of a Dream* in this issue. In particular, that with a quarter of a century of producing some of the best glider kits around, Bob eventually wrote: "after we closed *Dodgson Designs* I did very little glider flying. I had lost my boundless passion for it — having turned my great hobby into my job for 25 years." Clearly that many years is a good run, by any standard, but his comment still made me a little sad. Actually, a *lot* sad. I would hate to think a stiff breeze blowing straight up a seaside cliff, or a booming thermal sucking up everything in its path would ever become — well — boring. Just another crappy day in paradise.

Make no mistake about it — I doubt many, if any, of us would take a pass on the opportunity to hit the slope for a couple of hours for a living as opposed to working on the killing floor at the local slaughterhouse. Or, much less

bombastically, even a stuffy office with all the nonsense which goes along with that. But, let's be realistic, there's a pretty good chance no one, any time soon, is going to pay you to carve up the ridge while polishing up a perfect eight point roll.

That said, it's never going to be a choice which is so black and white. There are a millions shades of grey between those binary extremes where at least some of what we enjoy about our collective interest can be used to put bread on the table and maybe a little money in the bank at the end of the day.

What strikes me, in particular, is the skill set that is so intrinsic to our hobby just happens to line up with some pretty important trends in broader society. For example, I don't know where you're likely to find a higher concentration of people who know more about making things fly with extreme efficiency. Most of the time, consuming no fuel at all — as exemplified by the fascinating work described in *Like Soaring on Mars* in this issue. But even those pursuits such as F5J (as ably described by Mike Vos in *South Africa F5J Team Qualifier*, also in this issue) which actually *do* involve the consumption of energy, it's amazingly little, and green energy at that. It's then converted into a *lot* of flight time. The doing-a-lot-with-a-little ratio is pretty outstanding.

I enjoyed the recent NOVA episode entitled the *Great Electric Airplane Race*. They did a good job at painting a fairly accurate assessment of where things really stand in this area. Progress has been impressive, for sure, but they certainly didn't claim that we'd be flying the transpacific routes on a batch of lipos and a couple of outrunners any time soon. In fact, they were fairly candid that was a long, *long* ways off — with much of the technology still needing to be invented or requiring unobtainium as the primary building material. But the important point is this: we are at least on right trajectory

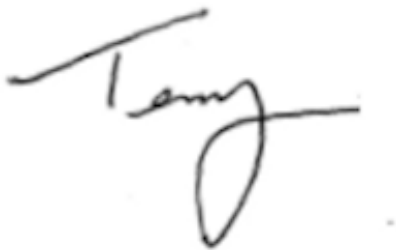
that will eventually, in the **distant** future, include flying lots of passengers great distances without blowing big holes in the only atmosphere we have.

Here's what I know for sure. If I was one of those talent-hungry companies featured in that recent NOVA episode, or some other greentech industry like wind energy, and I was looking for people who have relevant domain expertise, knowledge of advanced materials, an ability to set up efficient and effective R&D programs and possess a can-do attitude while working and playing well with others...

I would look no further than the readers of RC Soaring Digest.

We have now reached that critical mass where there are now too many great articles to enumerate and summarize them here. I simply encourage you to dive in with the link below. I hope you enjoy what we have been able to put together for you this month.

Fair winds and blue skies!

A handwritten signature in black ink, appearing to read 'Terence' or 'Terry', with a stylized, flowing script.

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The out-of-this-world (literally) cover photo is of Stratodynamics' F5J-based HiDRON™ high altitude research platform as it cruises around the New Mexico desert at over 80,000 feet. For the whole story, check out Like Soaring on Mars, the [first article](#) in this issue. Or go to the [table of contents](#) for all the other great articles. A PDF version of this article, or the entire issue, is available [upon request](#).

Like Soaring on Mars

Stratodynamics continues to prove out its RC glider-based high altitude research platform.

[The NEW RC Soaring Digest Staff](#)



The HiDRON™ moments before it was released from its launch vehicle at 25km (82,000ft) over the New Mexico desert. (image: Stratodynamics Inc.)

Readers of RC Soaring Digest have been known to go to some rather extraordinary lengths to find exactly the right spot to launch their latest ship. But it's safe to say the recent flight of Stratodynamics' HiDRON™ high altitude research platform likely has achieved a new 'high bar' for great places to start a great flight — how about 30km (98,000ft) above the New Mexico desert, as was the case on June 6th, 2021. Five hours after being released from its weather balloon launch vehicle, HiDRON™ landed safely at

Spaceport America, located at Truth or Consequences, New Mexico which was also where the flight originated. During the time aloft, HiDRON™ collected reams of sensor data which will now be used to further research clear air turbulence in Earth's atmosphere.



The HiDRON™ and its balloon launch vehicle as they depart Spaceport America on June 6, 2021. (image: Stratodynamics Inc.)

Of particular interest to RCSD readers is that part of the flight program included Auto Soaring (which we covered in last month's issue). One segment of the flight involved first identifying and then circling in a thermal rising from the desert floor, wherein HiDRON™ was able reclaim one kilometre (3,280ft) of altitude and extend the flight.

At 30km Earth's atmosphere — at 1.15 kPa (11.5 mbar) — is roughly the equivalent to at least parts of Mars. The extremely thin air at the drop altitude explains why after being released from its launch gondola, HiDRON™ quickly accelerated to 480km/h (300mph) during its pullout manoeuvre and achieved controlled flight at 28km (92,000ft).

If RCSD readers think they recognize the aircraft which is the basis for HiDRON™, that's because it features "a Simitri F5J main wing with a customized fuselage and empennage, designed to improve stability in low Reynolds number conditions", said Stratodynamics CEO Gary Pundsack.

Following the successful series of increasingly ambitious test launches commencing on June 1st and concluding with the June 6th flight, CEO Pundsack commented:

"This mission represents a major milestone for Stratodynamics in achieving controlled, autonomous flight at record-setting altitudes and with aircraft's aerodynamically efficient airframe capable of utilizing available natural energy. The HiDRON™ also performs as an extremely sensitive instrument that can detect turbulence and correlate data collected from payload sensors. This campaign will contribute to Stratodynamics' turbulence detection systems currently in development for multiple aviation-based applications."

Spaceport America Launch. (video: Stratodynamics Inc.)

While the 30km New Mexico launch is impressive, it does not represent the absolute maximum for the HiDRON™. In September of 2019, the platform achieved an altitude of 33.9km (111,434ft) after a launch originating near Timmins, Ontario.

The New Mexico flights represented a broad collaboration of agencies and institutions including Stratodynamics, UAVOS, the University of Kentucky, New Mexico State University, Spaceport America and was supported by the NASA Flight Opportunities Program.

We hope to provide additional, in-depth coverage of this fascinating project in the future. We would also like to think we could someday feature Gary Pundsack and his team in a future episode of the still-in-development RCSD podcast.

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Resources

- [*Technology Advancement Utilizing Suborbital Flight Opportunities*](#) (NASA research opportunities using Stratodynamics technology)
- [*Auto Soaring*](#) (RCSD article by Norimichi Kawakami)



The HiDRON™ crew after the successful flight on June 6th, 2021. Pictured, from left-to-right: Flight Technician Ryan Nolin and Principle Investigator Sean Bailey from the University of Kentucky; Stratodynamics CEO Gary Pundsack; Autopilot Designer and UAVOS CEO Aliaksei Stratsilatau. (image: Stratodynamics Inc.)

We would like to thank Nick Craine, Business Development Lead at Stratodynamics, who provided tireless assistance organising the images and video for this article. 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](#).

Wild Faroe Islands Soaring

Go north at England and turn left at Norway.

[James Hammond](#)



A landscape which would not be out of place in the next Peter Jackson movie. (image: Regin Eyfinnson Poulsen, Tórshavnar RC — felag)

Want to try some really spectacular sloping? OK, go north from the UK, then turn left at Norway. The next stop is the Faroe Islands — a breathtakingly beautiful and wild place. When thinking of the planet's most idyllic slope soaring sites, the list could be very long indeed, and it's unlikely that the Faroe Islands would be the first place that comes to mind. But, well every picture tells a story.



The slopes are — well — everywhere. (image: Tórshavnar RC — felag)

The Faroe Islands are a well-kept secret, an 18 island archipelago nestled in the north Atlantic to the west of Norway and to the north of the British Isles. It's a green-banked paradise, with most of the islands linked by roads and bridges, and here's the best bit: it's beset with fantastic slope soaring sites and inhabited by a fanatical, warm-hearted band of modelers.



How about that for a flying spot? (image: Tórshavnar RC — felag)

It is there, in this virtually unknown sloping paradise, that dwells *Tórshavnar RC — felag* (in the local language Faroese — yes, they even have one of those)! Or in English, *Tórshavn RC society*, a model club with 45 years of history.



**Tórshavnar
RC-felag**

The club was first founded in 1976 by Birgir Simonsen, Carlo Petersen, Magnus Gunnarson, Finnbjørn Johansen, Zacharis Hansen and Bjarne J. Petersen.

Here a very special tribute must surely be made to Birgir Simonsen — founding member of *Tórshavnar RC — felag* and still going strong as an active, well-loved and respected flyer, and also a kind mentor offering his good advice at over 88 years old.



Birgir at 88 years old with a special wing design. (image: Tórshavnar RC — felag)

Birgir is the pioneer, and definitely the father of RC flying in the Faroe Islands. He started building his first plane in WWII, a Spitfire using a rubber motor. As enthusiastic club member Jógvan Hansen comments: "I started early — I remember the day very well when I was a young boy around the year 1978, my father and I went for a little drive outside town. That day was the first time I ever saw an RC glider. It was Birgir Simonsen who was flying that glider and I thought that was very cool."



Father of RC gliding in the Faroes — Birgir Simonson. He bought his first RC radio in 1967—it was a four channel Futaba radio. (image: Tórshavnar RC — felag)

Back in the seventies, the embryo club was simply called *Tjørn* (Lake) as initially it was only meant for members with boats. But when the club was reorganized and re-founded in year 1980 its name was changed to *Tórshavnar RC — felag*. Now with 70 members, the club caters for all branches of R/C: boats, planes, helicopters and cars.



A Dynamic awaits its turn. (image: Tórshavnar RC — felag)

Jógvan goes on: "Now we fly mostly slope gliders near our clubhouse on the island named Streymoy. On the west side are the best spots with nice stable wind from the ocean, but we fly also on the east side of Streymoy. Sometimes when the wind is coming from a different direction, we go for a drive — typically up north searching for a good spot."

The beautiful thing: in the Faroes, the 'good spots' are almost limitless.



Flown by Regin Eyfinnson Poulson, a Typhoon takes to the air above Tórshavn. (image: Jógvan Hansen, Tórshavnar RC — felag)

Jógvan continues: "We are very lucky here in the Faroe Islands because we do not have any restrictions when we go flying. The only restrictions I can think of are if winds are too strong, too little, or when raining. We are flying all

year round with gliders, in winter too when islands are white with snow."



Birgir and Regin stop for a coffee break. But is it coffee that they are drinking? (image: Tórshavnar RC — felag)

Asked if the club has scheduled meetings, Jógvan replies: "For those of us flying, no not really, but members with cars and boats do have regular meetings. We just call around to see who will be going flying and where, when it looks good. Mostly we fly slope gliders. All-round gliders are most dominant and some aerobatic and F3F models are also flown."



A Sessanta 60 shrieks past in the skies above the Faroes. (image: Jógvan Hansen, Tórshavnar RC—felag)

I have flown all over the world, but I have never visited the Faroes — but with its breathtaking scenery and fabulous array of superb soaring sites, it's definitely on my bucket list!

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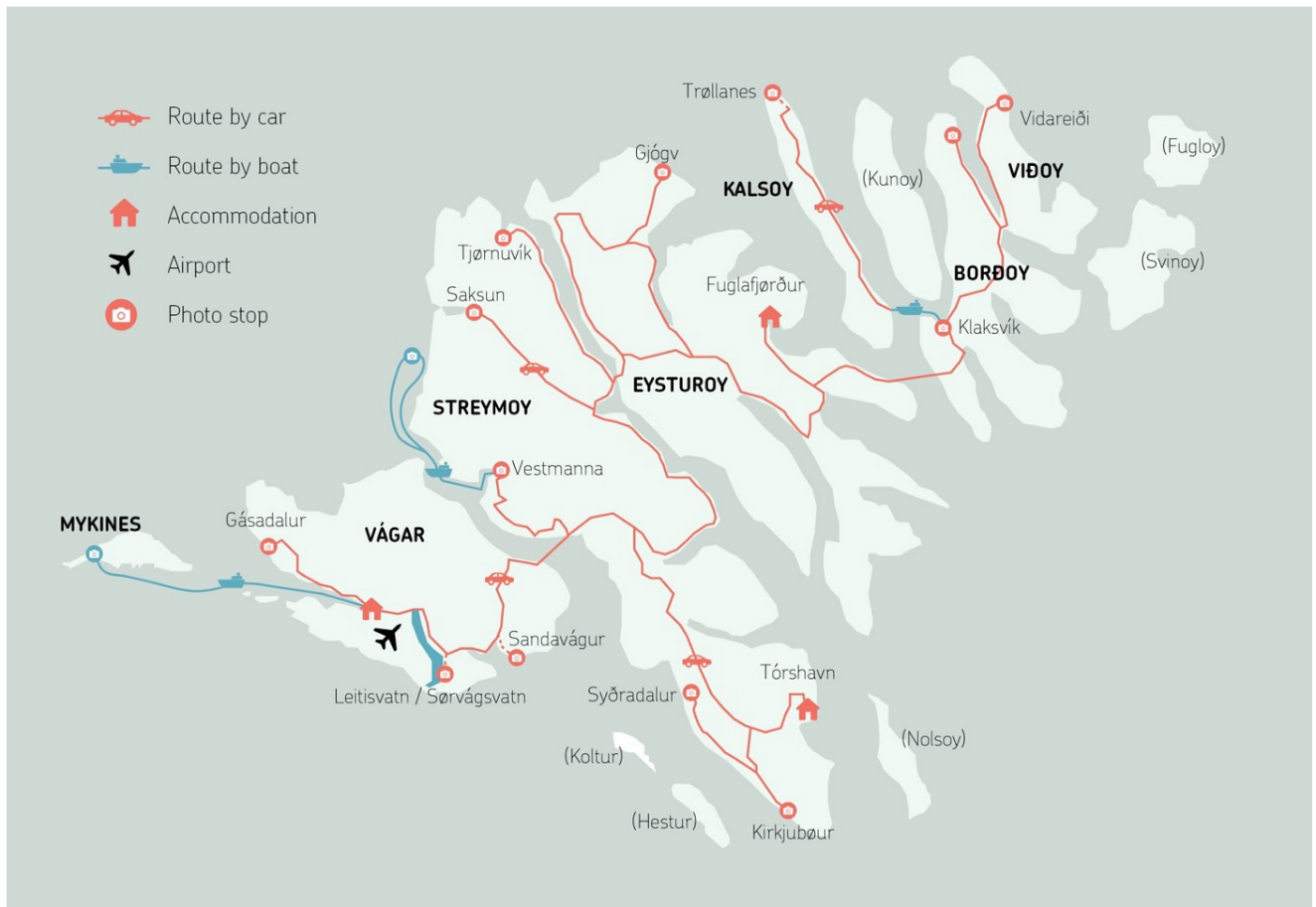


Parting shot of Birgin Simonsen — just about to loft a Stormbird — not a model for the faint of heart! (image: Tórshavnar RC — felag)

Faroe Islands Facts

- A well-kept secret, for radio glider flyers at least, the Faroe Islands archipelago is a group of 18 volcanic islands separated by fjords and sounds and situated in the middle of the Gulf Stream in the North Atlantic at 62°00'N and 06°47'W, halfway between Scotland and Iceland.
- Total land area: 1,399 km² (540 square miles) with the highest peak 880m (2,887ft); average height above sea level 300m (980ft).
- Because of the Gulf Stream flowing around the Islands, the climate varies very little, in fact averaging between 3.8 °C in the winter to 11.1 °C in the summer
- Population: approximately 52,650 of which over 22,000 people reside in the capital, Tórshavn.
- The Faroes is a self-governing region within Kingdom of Denmark, and even has its own Faroese language, though of course Danish is almost universally spoken.

- The main industry is blue water fishing, and this amounts to 80% of the GDP of the Faroe Islands.



The 18 volcanic islands which make up the Faroe Islands archipelago are well connected by both land and sea routes. (image: Sarah in the Green)

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South Africa F5J Team Qualifier

A full report on the first class competition in Gauteng, South Africa on May 30th, 2021.

[Mike Vos](#)



F5J flight line ready for launch. Brett Lewis closest to camera.

For those not familiar with the FAI alphabet soup of class names, F5J equates to "thermal duration gliders with electric motor and altimeter/motor run timer" and Mike provides an excellent further explanation in his article.
— Ed.

It's a cool, sunny morning at GEMS field, Gauteng, South Africa, and the first group of F5J pilots is standing ready to launch for the first flight of the day. The competition system counts down to the start horn and then you hear the power unleashed to get up and out of the hand to let the timers start the

clock. This early flight requires a high launch, but how high — every meter is penalty points against your score. Then 30 seconds later all the motors cut and it's quiet. Just pilot skill and experience searching for thermals and flying the plane as carefully as possible to maximise the opportunities.



Photo 2: Aldo Vos launching a Maxa 4m glider.

The run-up to the Team Qualifier competition starts early in the year with planning and communication of the dates to the community and registering the events with the South African Model Aircraft Association (SAMAA). The team qualifier events follow a more formal approach from scheduling dates to running the event. This is to ensure all pilots who would later be interested to be in the running for the South African team to represent the sport at the

next World Championship have had a chance to participate. About two weeks before the competition the online entries open.

Two days before the competition the entries close to allow time for the competition organisers to create the setup and do the random draws for pilots to rounds and groups. For this specific event, we had eight pilots entered who would then fly in eight rounds of two groups each in a random selection order. The scorecards are created for the pilots to record scores consisting of the flight time starting when the plane leaves the pilot's hand until it touches the ground, the launch height is recorded and the landing distance of the nose of the plane to a marker on the ground is also recorded.



Photo 3: Model Gliding Association (MGA) competition setup with timer to indicate working time left in a round.

On the day the pilots start arriving in the early morning to unpack and assemble the beautiful gliders. The Model Gliding Association (MGA) trailer is there from which the large timer display, audio equipment, gazebo, 'spots' and other items are unpacked and set up by many helping hands.



Photo 4: Aldo Vos chilling next to his F5J Maxa.

At this event two brand new *Plus X* F5J planes by Vladimir were taken out still to be set up and a 3rd *Plus X* also came in all the way from Natal. What beautiful planes. The field where we fly most of the Gauteng gliding competitions is at the East Rand Polo Fields surrounded by farmlands and open areas. A pilot's briefing starts the day, to get general rules highlighted before the start.

The competition then starts and effectively runs automatically on the audio announcements and large timer board. The rounds start with announcing the pilots from the group and then a preparation time followed by 10 minutes of working time when the planes are launched and pilots must try and use as much of this time as possible. F5J is a very strategic and difficult glider class. The pilot must try and launch his 4-meter glider as low as possible to minimise height penalties but ensure a safe height to try and make the 10 minutes of working time. In the minutes and seconds before the launch the pilots will scan the air, observe wind direction changes, look for birds or insects that could indicate the presence of a thermal in the area close to the ground to target for the launch.



Photo 5: Neil Murray assisted by wife, Eileen. Landing his Plus X F5J close to the spot.

Once the gliders are in the air, the pilots focus on the plane to observe any movement of the wings or tail that may indicate the presence of thermal activity. Then they start circling the plane in the area the thermal is believed to be in order to gain maximum height and energy from the rising air. In a competition, the pilot has a caller/timer that will stand next to him who needs to keep the time and score of the flight but also assist the pilot in helping to read the conditions and provide info to the pilot of conditions around the area. This helps the pilot to decide where the best places may be to maximise the flight. The helper will also tell the pilot how other gliders in the air perform and often a couple of gliders will use the same column of rising air. On our day of flying there was quite a bit of wind in the morning and that caused some of the first flights to be difficult and some pilots were caught and landed far out resulting in zero scores for a flight.

Coming in for landing the pilot tries to get the plane as close as possible to a landing spot. This is another tricky part with an F5J glider with quite an expensive motor and propeller setup that you rather not want to push hard

into the ground but need to stop where you want it. When gliders come in at the end of the working time the countdown and approaching planes raise the adrenaline and it is exciting to see who cuts it the closest without overflying the time and forfeiting landing points.



Photo 6: Brett Lewis with his F5J Shadow assisted by Wolfgang Steffny.

The pilots help each other and although competition is stiff the atmosphere is friendly and social. The key is to have fun and enjoy it. Helping another pilot with timing also allows sharing of tips and experience to improve. Competitions are therefore probably the best scenarios to learn very fast from experienced pilots on how to improve. The competitions also push you a bit to ensure your planes are in good condition and always improving your flying skills beyond the point of just cruising around the sky.



Photo 7: Craig Goodrum won the lucky draw of the day.

On this day the weather improved and around midday the pilots were starting to try lower and lower launches with varying degrees of success but always learning for the next time. Low launches are exciting. The pilot must work hard after the 30 seconds of motor run to get the weakest of thermals to lift the plane to heights to sustain the maximum working time. It is also great to watch this as the pilot can spend minutes a couple of meters above the ground and sometimes not make it and have to then at least try and get a decent landing.

After the days flying the pilots all handed in their scorecards and the calculations on the software then revealed the ranking of the pilots for the

day. Whatever the outcome, everyone enjoys it even when there are unfortunate mishaps of a plane hitting the ground with a 'thud'. That will be fixed and the plane will soar again and probably win the next round. The challenge of finding thermals and having to read these subtle signs of nature's hidden energy pockets makes glider flying exciting, challenging and fun.

At the end of the day we also had a lucky draw for all the pilots that participated and the lucky pilot was Craig Goodrum!

F5J TQ1 20210530 - Overall Results
[GEMS 30/05/2021]

www.GliderScore.com

Rank	Name	Ctry	RegnNo	Club	Score	Pcnt	Raw Score	Rnd1	Rnd2	Rnd3	Rnd4	Rnd5	Rnd6	Rnd7	Rnd8
1	GOODRUM, Craig				6872.1	100.00	7268.2	1000.0	*396.1	1000.0	993.6	878.5	1000.0	1000.0	1000.0
2	VOS, Aldo				6263.3	91.14	6263.3	*0.0	1000.0	1000.0	1000.0	1000.0	932.1	331.2	1000.0
3	GOODRUM, Michelle				6179.8	89.93	6179.8	860.0	1000.0	835.7	*0.0	1000.0	592.7	1000.0	891.4
4	MURRAY, Neil				5238.0	76.22	5238.0	577.3	642.3	924.2	*0.0	353.2	934.3	951.5	855.2
5	STEFFNY, Wolfgang				5226.9	76.06	5711.8	647.9	751.5	599.6	755.3	961.3	726.8	784.5	*484.9
6	VOS, Mike				4925.1	71.67	5227.3	1000.0	396.1	940.9	681.3	621.1	973.2	312.5	*302.2
7	VAN DER MOLEN, Jethr				3447.9	50.17	3447.9	0.0	0.0	0.0	*0.0	958.6	1000.0	878.2	611.1
8	LEWIS, Brett				3022.2	43.98	3022.2	0.0	0.0	0.0	1000.0	550.9	806.2	665.1	*0.0

Figure 8: F5J Team Qualifier 1 overall results for the day.

An F5J Scoring Primer

The competition rules and scoring of F5J must be well understood to help perform well during a competition. Every pilot's score is compared to the best score of the group and calculated as a factor of 1000 of that score.

For example: Pilot A flies the best score at 3 minutes and 12 seconds and has a landing with a 50 bonus points score, that is a 'raw' score of $3 \times 60 = 180 + 12$, flight score is 192, add 50 points for the landing equals 242 points. This excludes the launch height penalty still to be calculated. This becomes

1000 points for that group.

Pilot B flies 3 minutes, 6 seconds and has a landing with a 40 points score — 'raw' score of $3 \times 60 = 180 + 6 = 186$, add 40 equals 226.

This becomes $(226 / 242) \times 1000 = 929.75$ points for that flight group. Still excluding the launch height penalty.

Now let's add the launch height penalty calculations. Scoring starts when the aircraft leaves the pilot's hand with the motor running. The pilot may stop the motor at any point, but the higher he climbs the more the penalty points mount up. After 30 seconds the on-board system stops the motor automatically. The launch height is defined and measured by the onboard system (Altis) at the highest point during the 30 seconds of motor run and 10 seconds after the motor stopped.

The penalties are as follows: 0.5 penalty points per meter gained after release up to 200 meters and then 3 points per meter above that. As you get one point score per second flown for 10 minutes — 599 points (in practice 9:59 maximum) — if you fly to 300 meters (100 penalties plus 300 penalties) you can get a maximum of 199 points plus your landing points. Conversely if your launch height is only 30 meters because you could find a thermal and fly to a time of 9:59 minutes your score is — 599 minus 15, equals 584 points plus landing bonus points.

If we take the flight examples above and apply the following height penalties — for Pilot A, launch height of 94 meters and Pilot B launch to 50 meters scores change as follows: Pilot A — 3 min 12 sec = 192 minus 47 = 145 plus 50 landing points = 195; Pilot B — 3 min 6 sec = 186 minus 25 = 161 plus 40 landing points = 201.

Now Pilot B has the upper hand at 1000 points. Pilot A now has $(195 / 201) \times 1000 = 970.15$ points for that flight group.



Photo 9: MGA Phoenix Voltanix 2m for training new pilots.

Competitions do not require special gliders. Any glider that can launch with an electric motor, fitted with an Altis unit to limit run time and record launch height, can be used. Even a 'foamy' can be used and compete.

We want to get more pilots to fly in this exciting young class that only had its first world championship in 2019. The MGA bought three Voltanex *Phoenix* V2 gliders recently with the goal to attract new pilots, especially juniors, to train and try this sport under the guidance of experienced pilots. In this way, they can join in the fun with a very low barrier to entry.

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Resources

- [FAI Sporting Code for F5J Competitions](#)
- Location of [Greenfield Eastern Models Soarers](#) (GEMS) field.
- [South African Model Aircraft Association](#) (SAMAA)
- [Model Gliding Association of South Africa](#) (MGA)

Text by Mike Vos and Jan Sime. Images by Mike Vos. 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](#).

Petrels I Have Known and Loved

A photographic review of examples of the iconic Slingsby Type 13 Petrel that have appeared since the publication of the 1:3.5 scale plan, back in the last century.

[Chris Williams](#)



Two 1/5-scale Petrels in a simultaneous landing.

When Fred Slingsby produced the Type 13 Petrel in the late 1930's, three examples were built. Of those three, two remain to this day; one in the US, and one in the UK, both in flying condition. The most noticeable difference between the two is that the US version sports the original all-moving-tailplane, whilst the one in the UK has a modified, conventional tailplane.



A new 1/4-scale Petrel at the County Model Flying Club.

I seem to have established some sort of connection with this glider,

producing a plan at 1/3.5-scale back in the last century, that has produced many a variant since. Perhaps the one produced by veteran aeromodeller Dave Stokes stands out the most, as he chose to finish her in the original varnished wood finish, which necessitates the painstaking replication of all the original plywood panels; truly a poem in the art of woodwork!

My own current 1/3.5-scale example is the second from the original plan, although the wing design benefitted from some digital updating.

In recent times I have produced a 1/5-scale version which was featured as a free plan in RCM&E magazine, followed by a scaled-up 1/4-scale version, which is available from Sarik Hobbies as a plan or plan/laser kit.

Below, here is the aforementioned Dave Stokes with his all-varnished wood Slingsby Petrel along with some photos of this magnificent aircraft in action, and on the tarmac at Middle Wallop aerodrome. The attention to detail is extraordinary.









Below, top left, is my current 1/3.5-scale version of the Petrel. Top right is Darren Maple's Petrel at Middle Wallop. Below that, three 1/3.5-scale versions also at Middle Wallop aerodrome.





Against that beautiful blue sky backdrop, Steve Fraquet launches his much-

flown version at a White Sheet Club Scale Fly-In. On the right is the same aircraft in an atypical attitude which shows the versatility of the HQ wing section.





Here I am launching my 1/5-scale version at White Sheet Hill along with a shot of the it in the air on the same day.





The following video brings together all of my love and enthusiasm for this classic glider both on the bench and in the field.

I hope you enjoy watching the video and listening to the original soundtrack, which I also composed and performed.

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Aircraft Specifications

- 1/3.5-scale Petrel: Span: 4.9m, weight: 22lbs (10kgs), wing section: HQ35/17 at root, transitioning to 35/12 at the tip
- 1/4-scale Petrel: Span: 4.3m, weight: 14lbs (6.3kgs), wing section: HQ35/14 at root, transitioning to 35/12 at the tip
- 1/5-scale Petrel: Span: 3.4m, weight: 8.5lbs (3.9kgs)

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The Aeroic Sine Wave Spar

Let's get a wiggle on.

[James Hammond](#)



Aeroic Sine Wave Spar installed on a Corsa 118". (image: James Hammond)

This time I'm going to let you know a little about the Aeroic Sine Wave Spar — what it is, how it happened, what it does, and how it's made. I'm not going to bore you with loads of math because I have never used any for this application. Once the idea came, like the wheel almost, it seemed so damn logical. I still don't know how effective it is in the numerical domain. The proof, I hoped, would be in the testing and so it proved to be. — JH

Is This a New Idea? Emphatically: No.

The *Aeroic Sine Wave Spar* (ASWS) is far from a new idea and has been

used in several military and commercial aircraft by Boeing and Grumman among others — but I actually didn't find this out until I began to cook up my own idea. After I actually tried it, it seemed to be such a good solution to many problems that I was sure it must have been used before on full sized aircraft. So I went looking for it on Google and sure enough I found it. That said, now, if you look on Google, half the references are to my own work and the excellent explanations of good buddy and co-conspirator Konrad Dudek.



Photo 2: A sine wave aircraft spar section. (image: James Hammond)

How Did the ASWS Happen?

Going back a bit I have to admit that the ASWS was born from laziness, or maybe boredom or a bit of both. In my time, actually from the mid-1970s when I first began in radio, I have made a great many model sailplane spars of different kinds, but I had never been totally happy with what I'd done for

quite a few reasons — in order of my dislike:

- Heavy
- Bulky
- Expensive
- Difficult to make
- Time consuming to manufacture
- Poor in torsion unless wildly reinforced with larger than life spar caps
- Dubiously effective

The situation was that I was always wracking my poor brains for some way to make lighter, slimmer, less costly, easier and faster-to-make spars with good torsion resistance, and overall more effective than the alternatives. Seems like a tall order, and for many years it was just a dream. Until one day I had an epiphany.

Bingo

I discovered the humble cardboard box, but this was not just any cardboard box, it was a super strong thick-walled version used to pack heavier marine engine parts, and maybe it was that feature that attracted my attention. I guess I may have been studying the box somewhat wistfully, remembering that my old friend Roland Sommer — another Taiwan 'refugee' and now sadly passed away — had in his younger days used corrugated cardboard as a core material for F3B model wings. A true modeller, and owner of *Wowings*, Roland was always a dab hand at repurposing everyday materials.

My eyes fell on the centre section of the box material — made of heavy folds of corrugated paper. Then suddenly it occurred to me, in fact like a flashbulb going off; I could see a potential new way to use those wave-like folds, this time by situating them vertically instead of horizontally, and that's how it all

[illegible]

Got to Try It...I Was Fired Up

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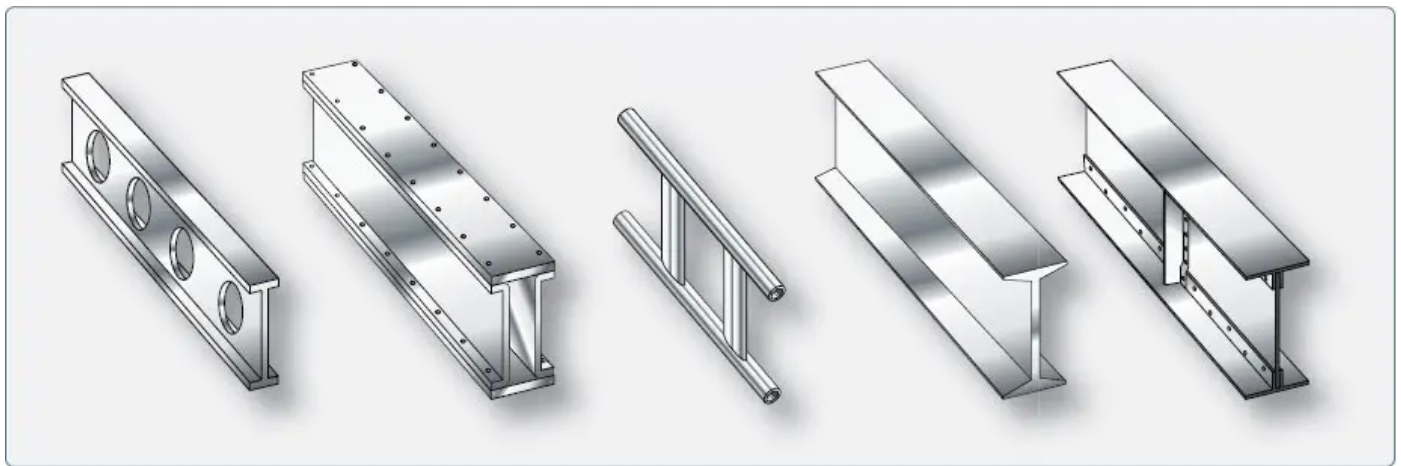
Photo 4: A whole sheet of early spars. Later the carbon was reduced and carefully oriented for optimum strength. (image: James Hammond)

I soon had the plastic sheet mounted and turned into a serviceable tool to lay up my first effort. Not wanting to go too crazy I just did a simple six ply lamination of carbon with the plies all in the same 180-degree orientation — in other words the worst case. After curing I cut the sheet and mounted the

resulting "spar" into an old (damaged) Redshift model wing mould with a normal glass/balsa/glass layup and a pair of double carbon spar caps. I hardly slept during the 48 hours it took to get it out of the mould and honestly it wasn't the best job with imperfect bonding at the top — but it was enough. By this time, I was completely convinced that it was going to work — logically it just had to; but the big question was — how well?

Now, with my thanks, here's a slightly edited explanation from Konrad Dudek which was originally posted on the Aloft Hobbies Slope Forum:

Let's set a base line using the I-beam and box beam models.



Drawing 5: Various spar configurations.

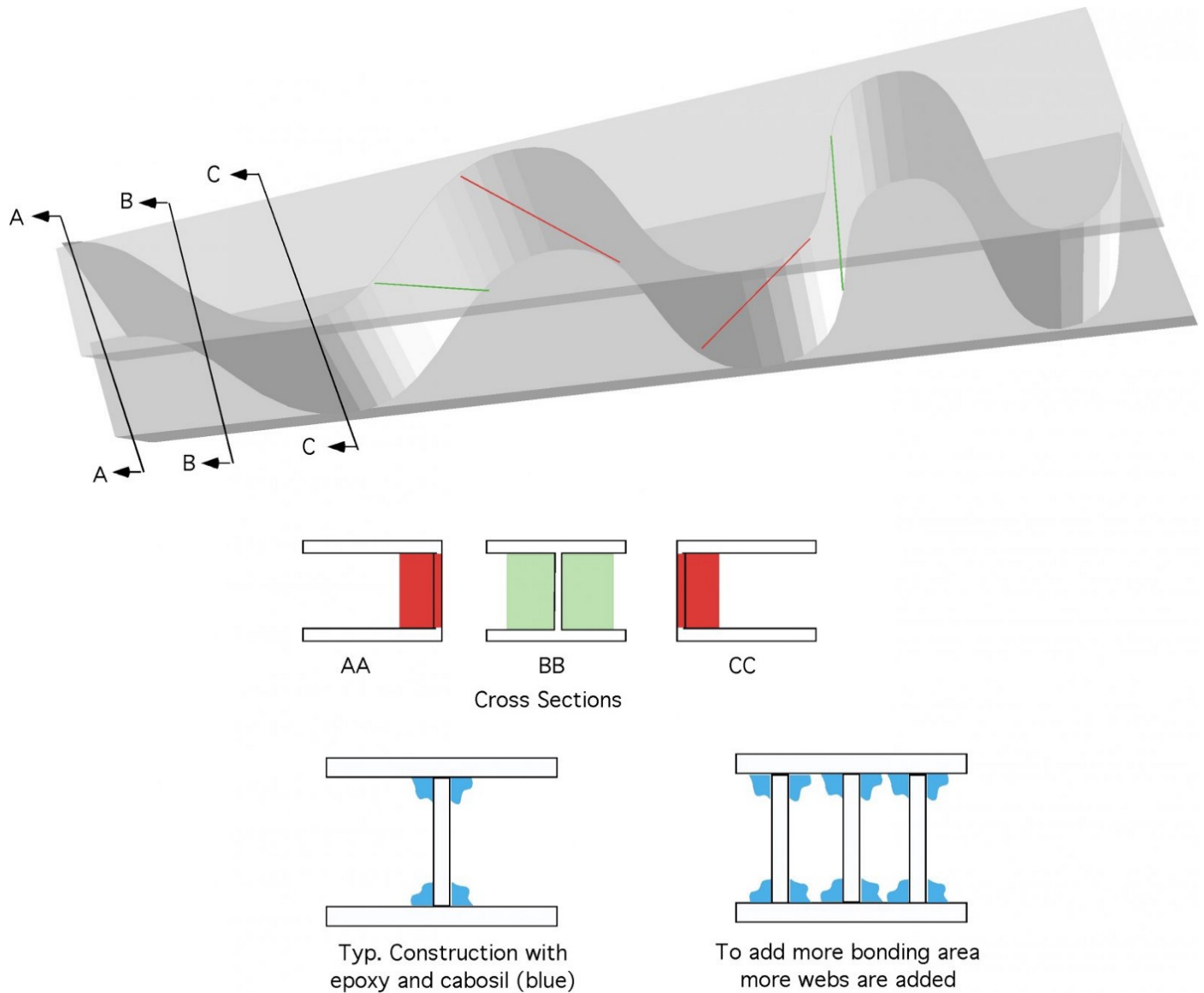
I-Beam

It offers a lot of strength for any given amount of material (cross section) against bending. The further apart one can place the spar caps the stiffer the beam is against bending, as I recall this goes up by the square root of the distance. But the I-beam performs badly against any torsional loads it is very easy to twist.

Box Spar

It performs much better against torsional loads. But if keeping to the

cross section (mass) the same size spar caps would need to be brought closer together to allow for the material of the box webs. This is a huge cost in bending moment if one recalls the advantage of keeping the spar caps apart. Therefore, most box spars will need to suffer a weight penalty in added material to keep the spar caps as far apart as possible.



Drawing 6: Cause and effect. (drawing: Konrad Dudek)

Sine Wave Beam

The serpentine web offers the best of both the I beam and box beam. With the vertical web going from one side of the spar caps to the other

side of the caps the sine wave beam is much stronger against torsional loads than the box spar. The resulting sine wave beam is almost as light as the classic I beam but there can be slight weight gain compared to the I beam as the effective length of the vertical web is longer; but this can be adjusted in practice by judicious use of the carbon fibre during manufacture. Alternating the UD carbon layer numbers and layer directions between 180 and 45 degrees provides optimum strength.

The advantages over 'conventional' spars are easy to see and measure by load and torsion testing of a sacrificial sample wing, as Doc H did in the beginning.

Other Advantages of the ASWS

Flexibility

Although its technically monolithic after manufacture; until the ASWS is bonded into the wing, it is relatively flexible laterally, and that means it is really easy to train it onto the thickest part of the wing throughout its length — thus making it the most effective that it can be. This ideal positioning is hard or impossible for straight spars to emulate without cranking.

Strength Distribution

The strength and weight distribution are very easily controlled and easy to vary by layering the UD carbon plies according to the position of the spar in the wing. i.e. More fabric at the roots and less at the tips.

Bracing Directions

By changing the angles of the UD fabric plies to give directional bracing between 45 and 180 degrees, the strength distribution and resistance to

bending and torsion can be infinitely varied and applied exactly as needed for the position.

Testing

When tested 'against' or maybe it's better put as compared to a well-made conventional box spar, the ASWS showed up as about 30% of the total weight and gave a 15 to 20% increase in tension/compression stiffness while improving the torsional stiffness by about 75%. Quite impressive.

How It Turned Out

Running through my list, I was startled at how well it had come out:



Photo 7: An early experimental ASWS on some G10 glass plate. This method was abandoned in favour of direct bonding to the spar caps. (image: James Hammond)

Weight

About half the weight of a "conventional box spar assembly that I had been using.

Bulk

The ASWS is really skinny and although it takes up more space laterally, it's also somewhat flexible and will conform easily to the maximum thickness point of an elliptical planform wing — which I always use.

Cost

Possibly slightly more expensive than a box spar in the beginning (It turned out that I had used a lot more carbon than was actually needed).

Difficulty in Manufacture

No, it's the simplest spar even and can be made in large sheets that are later cut to suit.

Manufacturing Time

There isn't a lot — it's fast to produce.

Torsion

Compared to what I had before — **wow**.

Overall Effectiveness

Massively improved.

Amazingly, it wasn't just a bit better than a box spar but for strength to weight ratio, the ASWS — yes, by that time I have to admit that I had claimed it — was in a whole new league of its own. Hence, the *Aeroic Sine Wave Spar* has been a feature in all of the Aeroic Composite Aviation Products model sailplanes since 2014.

I invite you to give it a try and see if you don't agree!

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A GPS Triangle Primer

A basic introduction to this increasingly popular competition.

[Stéphane RUELLE](#)



Some of the pilots and sailplanes present and, of course, the towplanes and towpilots — without them, there would be no aerotow!

I have flown sailplanes for the last 30 years, and have especially enjoyed flying scale models, as much on the slope as on flat land. Without a doubt staying up on a flat land area is more challenging than on a slope. Finding lift and being able to stay up in the air brings you a feeling of joy and happiness that is difficult to explain. In essence, that is what inspires me about it!

When the lift is good you enjoy jumping from one thermal to another exploring the flying site; when the lift is weak, flying is usually more

conservative, trying to not take too much risk to lose precious altitude. The approach is usually to stay in lift you have found and to do not dare go anywhere else as, for sure, sink will bring you down in no time. I have been happy with this for about 25 years, but five years ago things changed!

A small group of addicted cross-country guys in the west of the US (John E., Dean G. and Rick S.) started using GPS equipment to do some GPS Triangle racing, and were extremely enthusiastic about it. They brought that idea to the Midwest, lending their equipment during some of the JR Aerotow events for anyone who wanted to try. We were not ready to embrace it yet — go fast, losing altitude, turning laps — what was the point? For me it was "Racing? What for? I just enjoy flying and most of the time I am alone!"



Photo 2: Rick S., one of the promoters of GPS Triangle racing in USA.

Well, folks, I was wrong. In 2019 Peter G. went flying with these guys in Montague, California and was just so enthusiastic about it that we had to try it again! I would say that he found the right words to convince us, not on the

racing part, but in forcing ourselves to improve, alone, by not staying in the same area and exploring the entire field; to prove yourself that you can do better, with the best competition being against yourself.

So, what is GPS Triangle? It consists of a task that is defined by a triangle where the turn points are located 500m 90 degrees to the right (referred to as TP1) of where the pilots stand, 500m in front of the pilots (TP2) and 500m to the left (TP3). The starting gate is an imaginary line between TP2 and the pilots. Racers must cross the start gate lower than 500m altitude and less than 120km/h, then do as many laps as possible in 30 minutes. Energy management is key between being conservative and keeping altitude and being audacious ('push it' as Dany A. describes in his videos) to optimize the number of laps while still looking for thermals. During a competition, 'work time' (generally speaking 15 minutes) is defined as time in which you have to be towed up and cross the start gate.

There are other less formal formats: for example a 'Cup Challenge' where, during a meet, you can fly when you want, make as many attempts as you want, and keep your six best flights. This past year with COVID, some virtual cups have been organized: not at the same field but during the same weekend, just for fun, across the globe, so no pressure from shoulder-to-shoulder competition.

GPS triangle

Figure 3: Visualization of the task at my home field.

Some new classes appeared in the last year to expand the range of gliders used: *Scale* (1/3 scale max), *SLS* (no limit of size), *Sport* (max 5m 7kg, 30mn, 350m course) and *Light* (F5J type, 20mn, 200m course).



Photo 4: Me and my trusty H9 ASH31, the perfect ship to practice.

I purchased a unit and started to play with it. The main information provided is GPS location, but it also provides additional information about your model to make you more aware of what it is doing: speed, altitude, compensated vario and heading, for example. Using my trusted Hangar 9 6.4m ASH31 I used that unit every time that I went out. I have been able to practice by

myself as my model was able to ROG.

I would say that I like a lot the idea of having feedback, and being forced outside my comfort zone, climb as best I can but also dare to prospect the area when the lift is not there and see how to optimize my flying skills.

In 2020 we were planning, with a couple of East Coast guys, to go to the cross country/GPS mecca in the US : the Montague Sailplane Festival located in Montague, California very close to Mount Shasta, and about one hour south of the Oregon border. But as everybody knows, 2020 was a bust. I got a rain check for my airline ticket as the sole prize!



Photo 5: The Siskiyou Mountains at sunset.

We decided with Peter G. to commit to 2021 despite the uncertainties, in the hope that things would get back to some form of normality. We have been blessed as the closer we got more restriction were lifted leaving us with the possibility of participating in the 2021 edition.

Peter drove from Illinois with both of our models, and I joined by air arriving Saturday, just before the training day. Competition was starting on Monday and was ending on Friday after five days of hard flying.



Photo 6: Peter G. bringing his '22 at the start gate.

First let me describe the venue. For me, coming from the Midwest, driving through Oregon and Northern California gave me some memories of my native Alps, just a pure joy ride even before starting to fly. The city of Montague is located on a plateau at 2500ft that is sandwiched in between a pass on the north enroute to Oregon and another one to the south to go to the San Francisco basin, making the scenery and climate quite unique. The vision of Mount Shasta at 14,000ft can justify by itself the entire trip!



Photo 7: My 8.8m ASW22 BL from Baudis in the foreground. That's Mount Shasta in the background.

Dean G., the organizer, hosted us in two full size hangars at the Siskiyou County Airport, an old US Air Force NORAD base, which was very convenient to gather the models and the pilots. The flying site is just two miles from the hangar, no grass like in the Midwest but a level dirt runway that is quite wide and long so you cannot miss it (except if you land down wind — see my video). The country is beautiful, very low density population, and low density air traffic. A perfect recipe for a good flying site.



Photo 8: Here is the club house — a full size hangar with ASG-32 SLS on display!

It took me a couple of days to get a handle on the atmospheric conditions, which are very different from the place I usually fly. Lift was present, even early in the morning but spotty, inconsistent and weak. This is very unusual for this place as the week was way cooler than what they usually have for June. But after a couple of days I had a handle on it, especially after remembering to plug my compensation probe into my variometer!



Photo 9: The Pilot Stand.

Competition was fierce with lots of very good pilots enrolled, a perfect environment for learning from each other. The number of laps between heats varied between two for the poorest conditions and 16 for some monstrous lift coming through for half an hour! The highlight of the week was for me was deciding to start the task first, not always the best choice as there is no other sailplanes to mark thermals for you. However, conditions were good at the beginning of the heat and got weaker and weaker, giving me an advantage over other pilots during this heat.



Photo 10: Pilot and spotter reading trajectory, thermals, other planes. It's not unusual to request to yell out altitudes just to be sure that you are not flying at the same level in the same thermal!

I had to go back to Michigan early, on Friday, missing the last day of competition so I could watch my son's state water polo tournament. But I was left with some beautiful memories, some willingness to improve my task management, and the will to come back next year to another great event.



Photo 11: Pilots rehashing a great day's flying.

Finally, let me take you on a ride onboard my ASW22 for a lap session in Montague.

Baudis 8.8m ASW22BL @ 2021 US GPS Triangle Nationals

If you cross paths with people familiar with GPS Triangle competitions, ask them to give you their insight on it. I am pretty sure that they will be more than happy to share their experience, to have you try a task with your sailplane and possibly use their equipment. I have demonstrated GPS Triangle in the Cumberland, Maryland aerotow events and will be more than happy to demo it to you should we cross paths at some point in the future.

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Resources

- [Additional photos](#)
- [GPS Triangle equipment](#)

- [GPS Triangle rules](#)
- [USA GPS Triangle Facebook group](#)
- [ScaleSoaring.com forum](#)

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J'Adore PicaSim!

A superb — and free — flight simulator for slope soaring.

[Chip Kaye](#)



François Cahour's Quartz model in flight in PicaSim.

Flight simulators are, of course, no substitute for the natural-world pleasures of RC soaring. But they **can** be loads of fun to fly and can serve as an excellent, risk-free training tool. With PicaSim you will be able to put in stick time easily wherever/whenever to refine your existing piloting skills or develop new skills and the related muscle memory needed for true piloting fluency without thinking. As one personal example with many, **many** crash-free hours of practice I was finally able to crack the code on the previously disorienting inverted rudder control!

PicaSim introduced me to RC soaring in general and the marvels of slope in particular. Living in New England where much of the otherwise wonderful slope terrain is rendered unflyable by heavy tree cover, PicaSim has been my constant partner and most reliable flying locale (NOTE: Terence C. Gannon's delightful column *In The Air: Is great flying right on your doorstep?* from last month is an inspiration so I am **not** giving up!) I first learned of PicaSim through the wonderful video tutorial (Video 1) immediately below from Steve 'Surfimp' Lange flying his influential Le Fish design — seeing this I was instantly and completely hooked with slope soaring, aerobatics and PicaSim:

Video 1: Intro to R/C Slope Aerobatics with PicaSim.

First released in 2013, PicaSim began life earlier as the popular *Slope Soaring Simulator* (SSS), both developed by the generous and productive Danny 'Mr. Rowl' Chapman. Over time PicaSim has seen steady improvement with new features, planes and flying locales and is available on desktop for Windows (and MacOS by using Windows emulation software like *PlayOnMac*) or as a mobile app for both iOS and Android. I fly the desktop version which is entirely free to download and use but can be supported with a small donation on the *RowlHouse* website which I'd encourage for all who use it regularly. The two mobile apps are available through their respective app stores either as a free/limited version or for a nominal cost for the full/unlimited version (see *Resources*, below, for links to all of these sites).

For slope enthusiasts in general and particularly if you enjoy aerobatics, ultrabatics and VTPR, PicaSim truly stands apart from the competition. While major commercial simulators focus broadly on features and support for powered flight, they are generally limited for wind-powered flight. PicaSim though has gliders and slope soaring in its DNA. Many folks, myself included, feel that PicaSim's features, flight performance and glider and wind modeling for slope are second to none.

While a comprehensive tutorial on PicaSim's extensive features and configuration options is beyond the scope of this article (see related links below under *Resources*), here we will have a brief overview of the features that make PicaSim so special: *Gliders*, *Flying Sites* and *Customisation*. That said, while these technical details and features indeed make for a robust, customizable system, the true joy is in resulting excellence of PicaSim's slope soaring experience.

Setup and Configuration

Assuming you have downloaded and installed PicaSim and configured your radio transmitter as the controller (see related links below under *Resources*), at program startup you will be presented with the main screen. Here you will find access to PicaSim's useful Help system notes (? icon at bottom) and choice of PicaSim's two modes of operation: *Free-Fly* and *Challenge*.



Figure 2: Main startup screen.

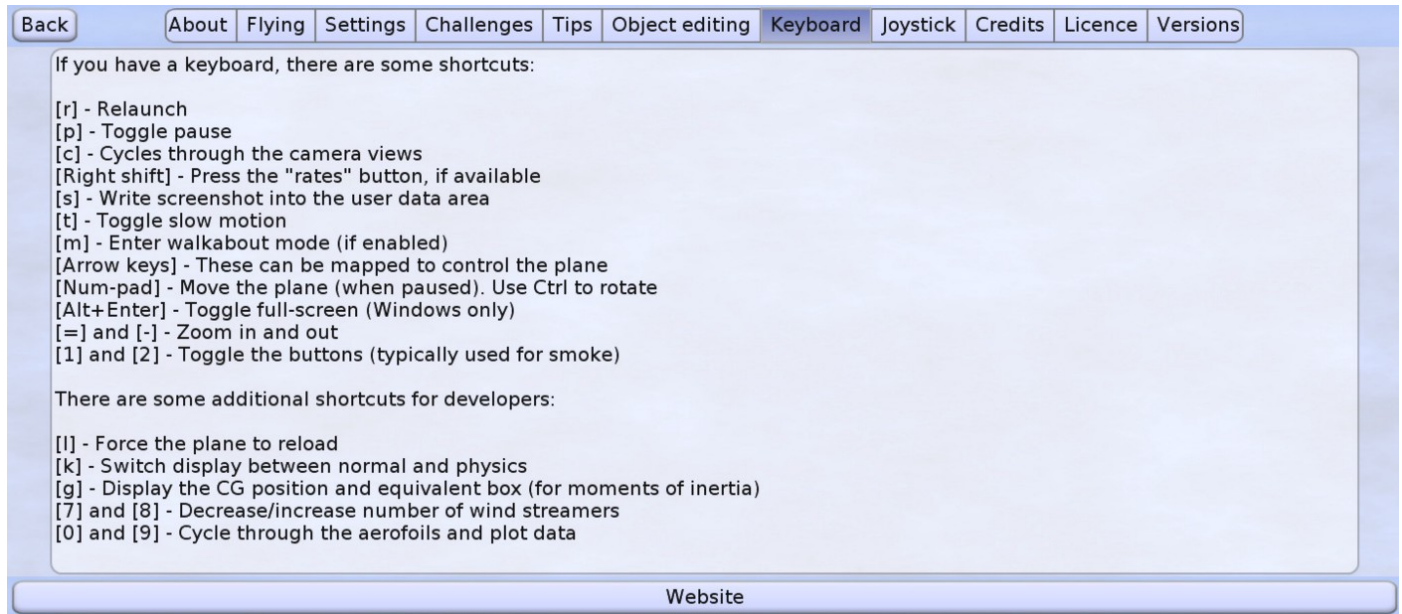


Figure 3: Help system displaying useful Keyboard short cuts

The challenge mode offers a variety of training and contest flying scenarios (thermal duration, F3F racing, gated courses, mountain racing, etc.) which can be great fun. Here though we will be focusing on the `Free-Fly` mode whereby you can choose your own combinations of glider, flying site and other configurations.

PicaSim's configuration system is where you can set all manner of options for your glider and flying scenario and is accessed using the `Gear` icon displayed on both the startup screen (Figure 2) or the main flying screen (Figure 4).



Figure 4: Main flying screen with access to PicaSim configuration and walkabout features.

The configuration page includes a set of tabs across the top giving you access to a variety of program feature groups including `Aeroplane` and `scenery` for tuning your glider and flying site which we will discuss in more detail later. Generally it will be these two tabs along with `options 1` and `options 2` you will use to set your own preferences. Each of the tabs can be viewed as an abbreviated 'Simple' set of options to get started or as an expanded set of all possible options by using the `Advanced` button at the bottom of the screen.

PicaSim also smartly provides the ability to save and load your own custom configurations through the `save...` and `Load...` buttons at the bottom of the configuration page (see *Customization*, below, for details).

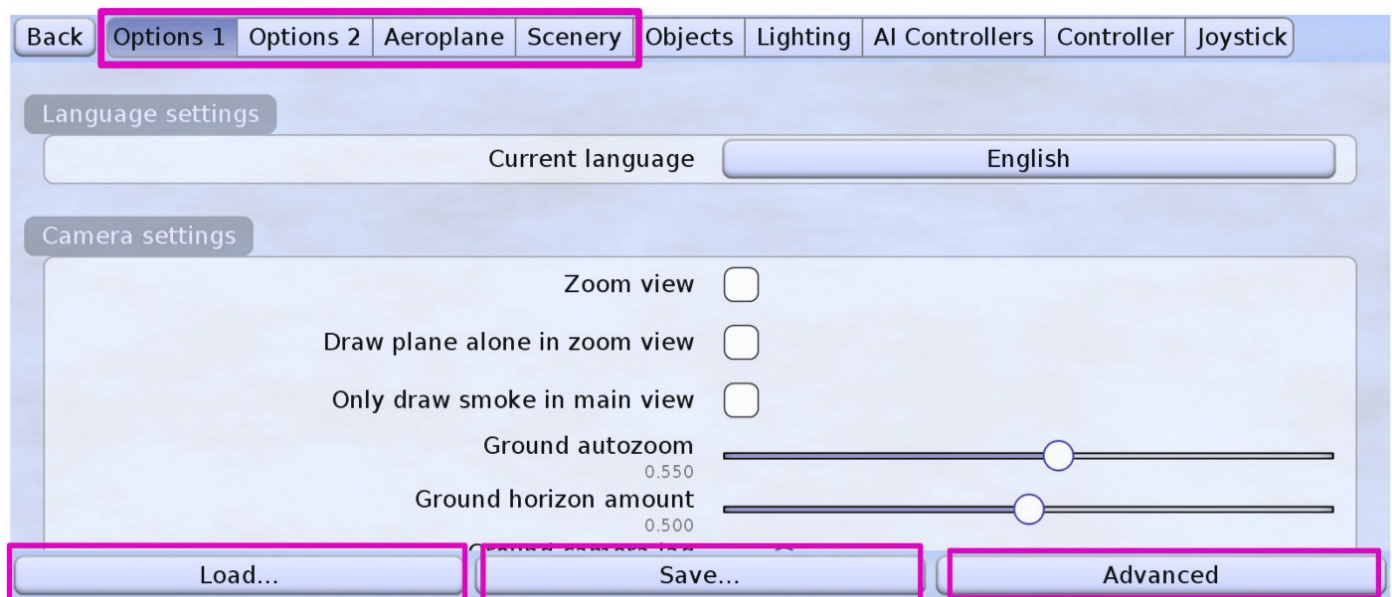


Figure 5: Configuration page.

Gliders (aka Aeroplane)

Out of the box PicaSim includes a large variety of glider types and models — slope, F3F, DLG, motor and scale gliders, for example — and among them are a number of well-known slope designs including *Le Fish* (Steve Lange),

Dreamflight Weasel (Michael Richter), *Quartz* (François Cahour), *Quark* (Island Models), *Phase 6* (Chris Foss) and others. In general these and all of PicaSim's models have been painstakingly tuned to best approximate their real world counterparts, but as we'll see they can be further tuned and customized to match your own preferences.

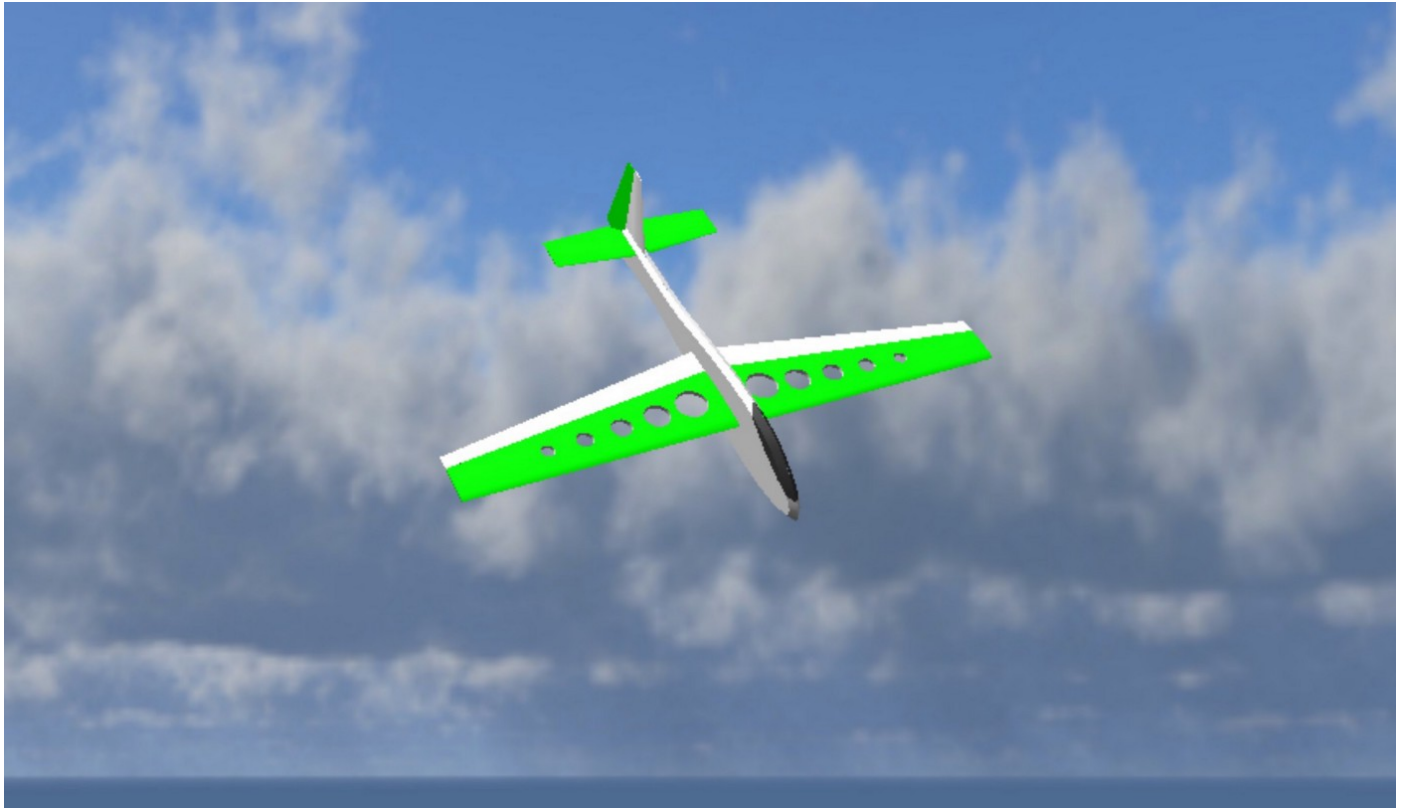


Figure 5A: Le Fish Ultralight (design: Steve Lange)



Figure 5B: Dream-Flight Ahi (design: Michael Richter)



Figure 5C: Quark (design: Island Models)



Figure 5D: Trapeze (design: Paige Anderson)

Beyond PicaSim's included models, new models can also be created and added to the system. The process for creating new models (see *RowlHouse Customisation* page in *Resources*, below) is quite involved, but anyone can take advantage of models created by others. Recently RCGroups member *Bishop_1* created an excellent version of the *Dream-Flight Ahi* which can be easily downloaded (see also *PicaSim Ahi* in *Resources*) and added to PicaSim for anyone interested as shown in the following video.

Dreamflight Ahi for PicaSim

Figure 6: Tutorial on installation of the Dreamflight Ahi.

The default configuration for each glider is modified through the config page `Aeroplane` group tab. The group's many options are broken up into several sections and below we see the first `General settings` section which provides quick access to the primary flight and airframe tuning features. Here you have the ability to add and adjust ballast and modify the size, mass and drag of the airframe giving you a great deal of control to customize the flight characteristics to your own preferences or even to create what effectively is a different model—for example, ever flown a 3m *Le Fish*?

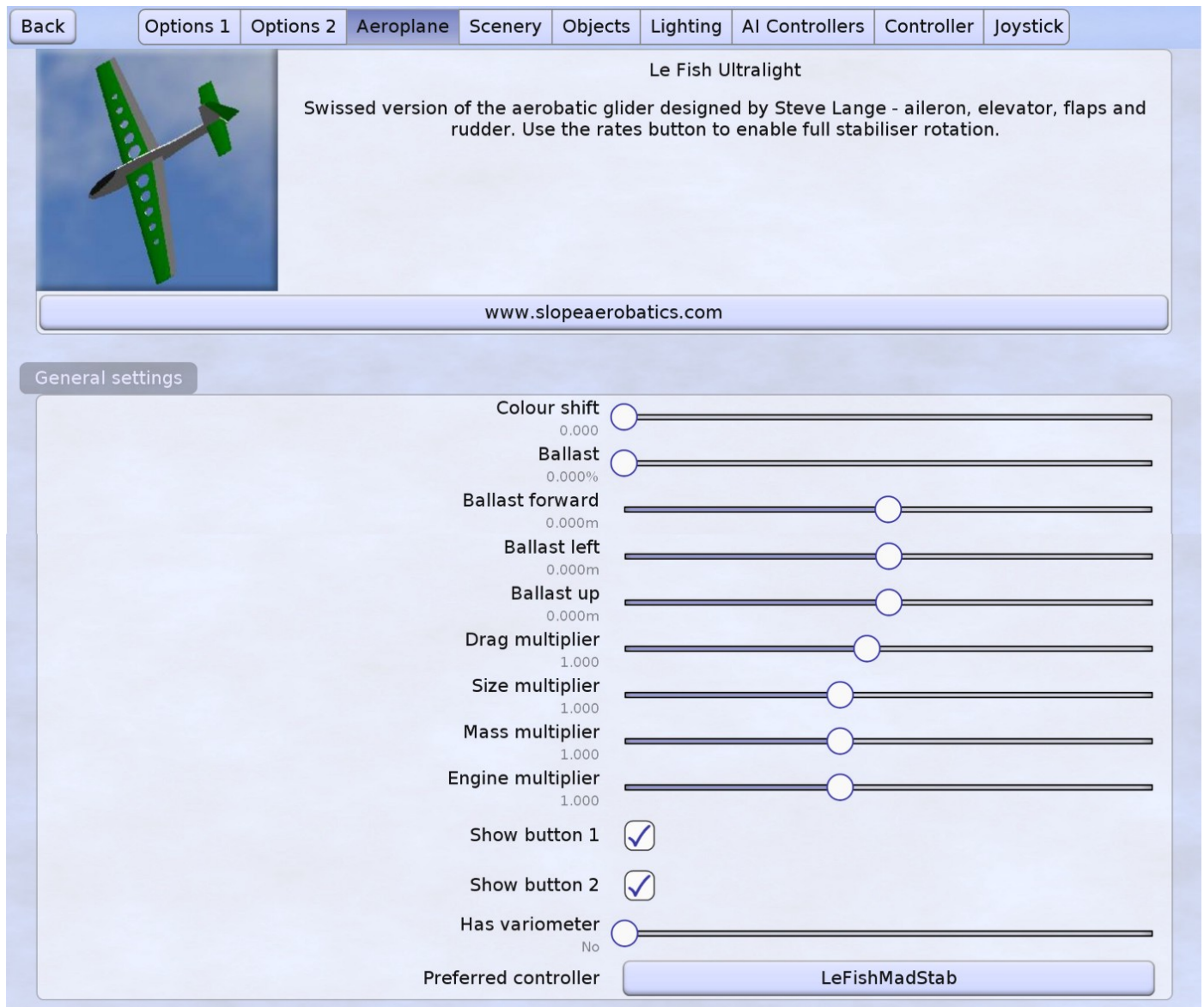


Figure 7: General glider configuration settings.

Flying Sites (aka scenery)

To my mind, PicaSim's many slope flying sites are perhaps it's greatest strength. Below you can see a number of the many sites which can be accessed through the `Load...` button (Figure 5) on the configuration page scenery tab. Using the tabs shown at the top right of the `Load scenery` screen you can view all of the flying sites or choose a subset including `slope` as shown below or `user` which will display your customized flying sites

created with the `save...` button (Figure 5).

The `cliff` site first on the list is a great place to start and seems to be especially popular as seen in many PicaSim YouTube videos where it is featured. But don't let that obscure the enormous variety of slope gliding experiences contained in the other options as described below (Figure 8).

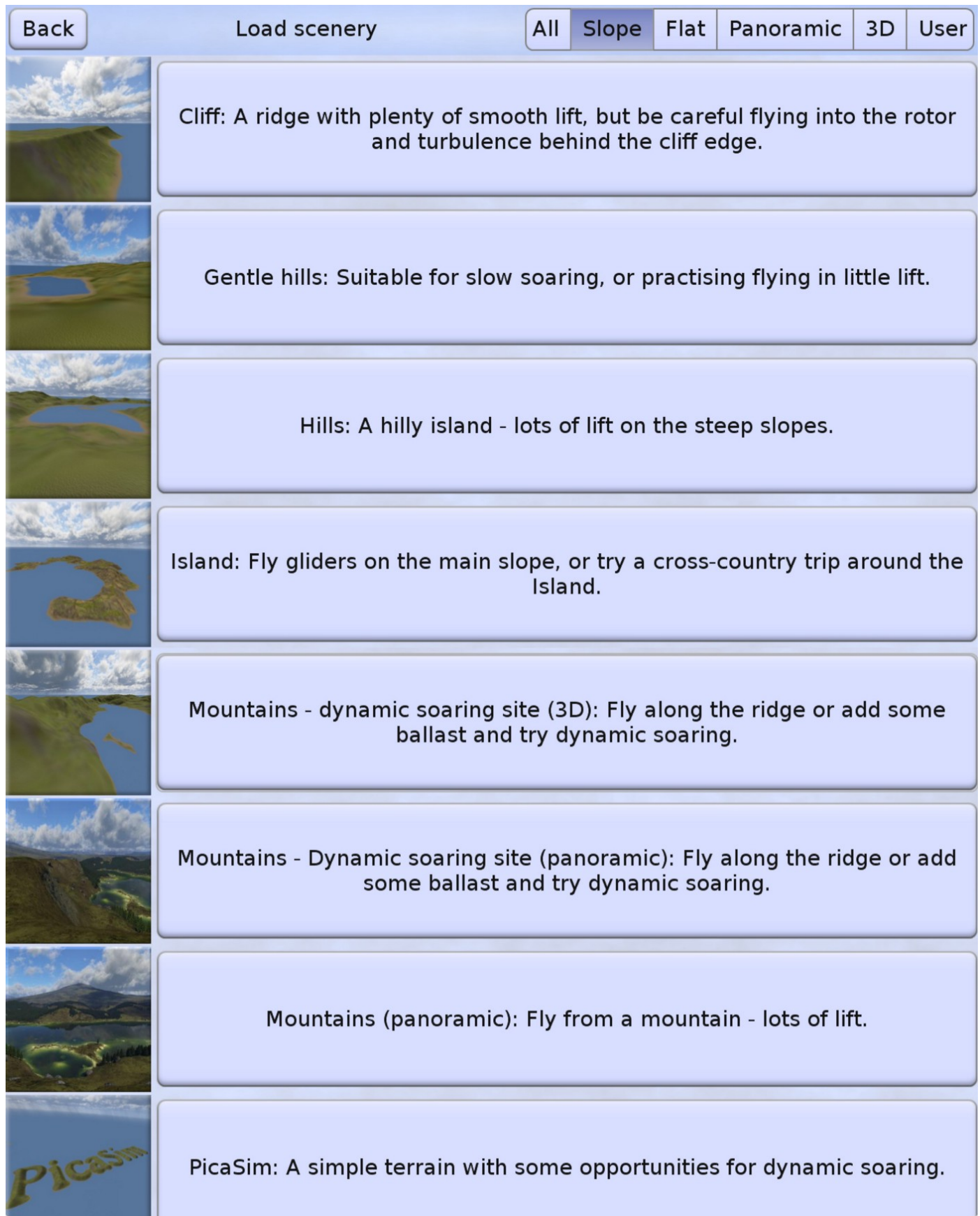


Figure 8: Selection of slope flying sites.

Of special interest for selecting flying sites is PicaSim's *Walkabout* feature. Clicking the walking-figure icon (Figure 4) puts you into a mode whereby you can use the right stick on your transmitter to move throughout the selected scene to find new slopes to fly. Once you find a new spot you can immediately begin flying as the program will automatically configure the wind direction to blow directly into the slope. And if you like the new slope position you can save it as part of your user configuration by using the `save...` button (Figure 5).

As with the `Aeroplane` tab discussed earlier, the configuration page `Scenery` tab is broken up into several sections. Below we see the first `Wind settings` section which provides quick access to the primary parameters for controlling wind and lift. In particular the `Wind speed`, `Wind bearing` (for off-axis wind direction), `Turbulence amount` and `Rotor tendency` parameters allow you to dial in anything from near perfect conditions — great for practicing new aerobatic manoeuvres without fighting the wind — to near impossible conditions — great for honing your skills and saving your fleet from disastrous flying in sub-optimal conditions in the real world.



Figure 9: Flying site wind configuration settings.

Customization

Once you have dialed in settings for any of the configuration screen tabs, you can save it as a `user` configuration to be loaded at any time. Below we have customized the standard `cliff` flying site by dialing down the values `Wind speed` and `Turbulence amount` (the values shown happen to be standard settings I use for flying the *Le Fish Ultralight* model). Once you are

happy with your own settings you can click the `save...` button at the bottom of the screen.

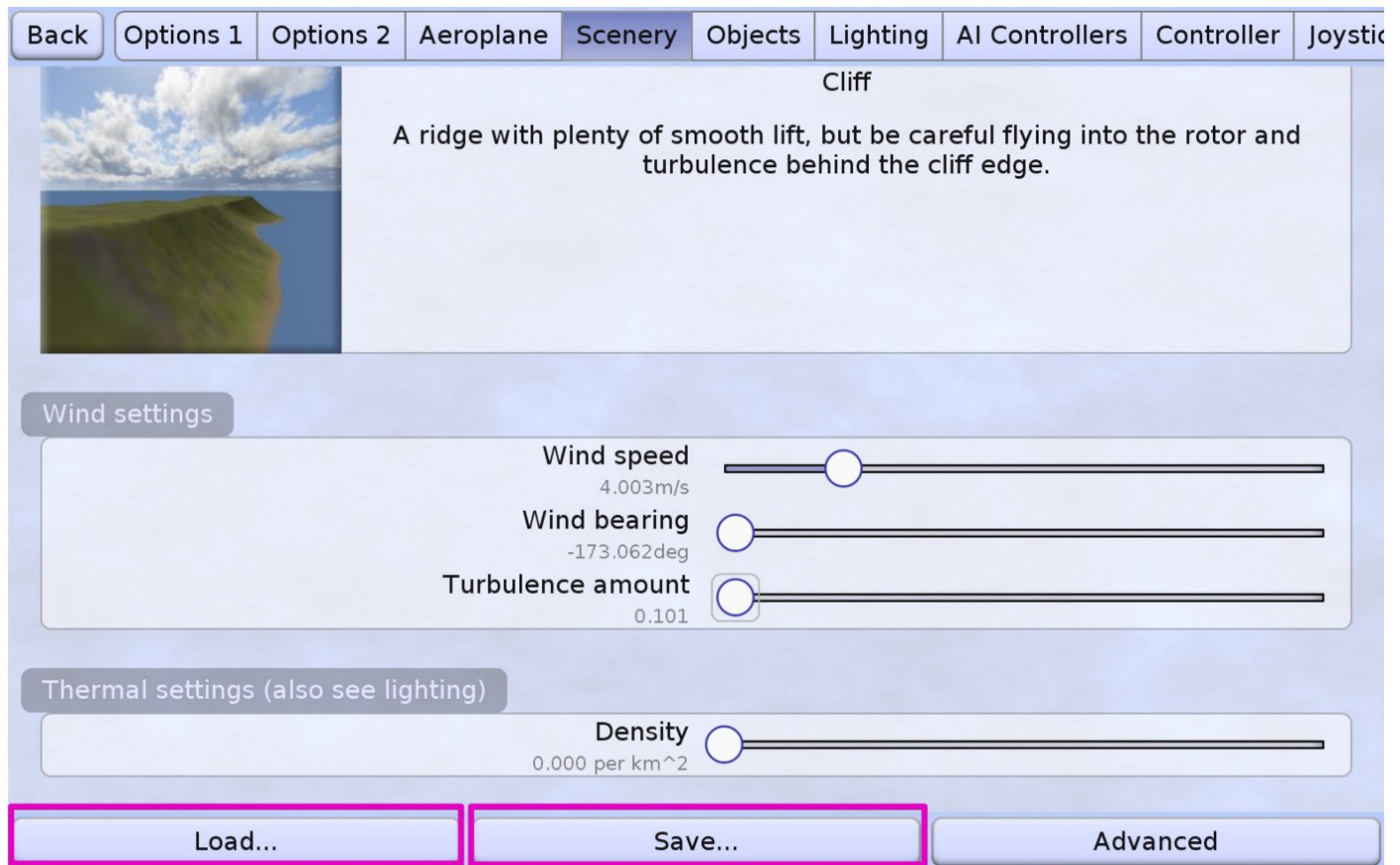


Figure 10: Customized “Cliff” configuration, ready to be saved.

Here we see the display after clicking `save...` above. In this example I am naming my custom `cliff` configuration as `my_cliff`.

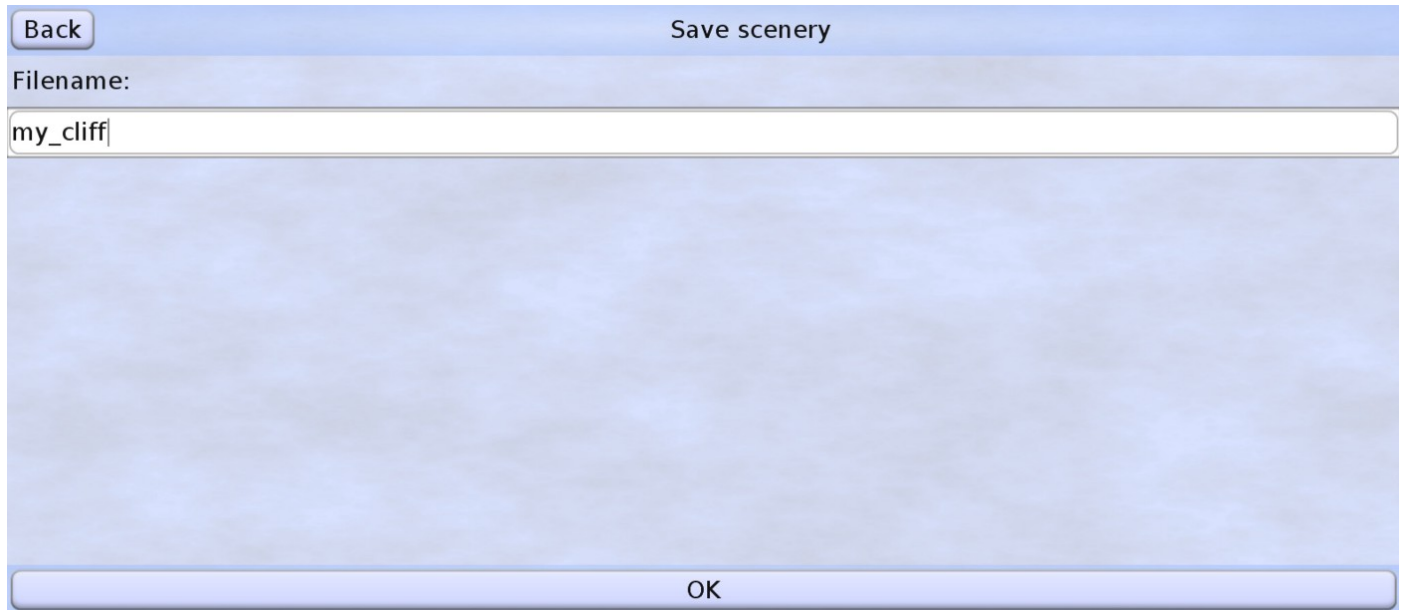


Figure 11: Saving 'my_cliff' configuration on the 'Save...' button screen.

And here we see the display after clicking the `Load...` button above. By selecting the `User` tab at the top right we are presented with only our custom configurations for easy access, in this case the `my_cliff` configuration saved above.



Figure 12: Loading custom 'my_cliff' configuration on the 'Load...' button screen

Note again this `save...` and `Load...` functionality applies to all of the

configuration page tab groups so you can save custom settings for all of PicaSim's configurable options.

Finally, going beyond the main wind settings in the example above, the following video demonstrates how you might use more advanced `scenery` parameters to develop a highly customized flying site. In this example I am configuring the standard `cliff` site to approximate a flying site based on a remarkable video of Eric Poulain flying his iconic Excalibur design on a low 2m slope directly on a beach in France (see *VTPR de Plage* in *Resources*, below).

PicaSim config for "VTPR de plage"

Video 13: Customizing a flying site to match it's real-world counterpart.

End Note

With this very brief overview of PicaSim my sincere hope is that it might spur your curiosity enough to give it a try — you may well be surprised at just how useful and fun it can be to fly virtually! And I would invite anyone to post to my RCGroups thread *Documenting PicaSim for Slope and VTPR* (see *Resources* below) with your questions and — hopefully — your PicaSim experiences ahead. Cheers.

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Resources

Below are a few resource links to help get you going with PicaSim and later perhaps to dive deeper into it's more advanced features and configuration.

- [The Official PicaSim website](#)
- [Downloading PicaSim](#)
- [Free PlayOnMac software for running PicaSim on Mac](#)
- [Glowing words about PicaSim from François Cahour](#)
- [RCGroups thread — Documenting PicaSim for Slope and VTPR](#)
- [RCGroups post — PicaSim Ahi model files and installation](#)
- [RCGroups threads search for 'PicaSim'](#)
- [Danny Chapman's official PicaSim YouTube channel](#) (videos)
- [PicaSim: Controller setup with R/C Transmitter](#) (video)
- [Intro to R/C Slope Aerobatics with PicaSim](#) (video)
- [PicaSim for aerobatics practice — Studying the Masters: BPLR's Mad Snap in PicaSim](#) (video)
- [François Cahour's Quartz in PicaSim](#) (video)
- [In The Air: Is great flying right on your doorstep?](#) by Terence C. Gannon
- [Slope Soaring Simulator](#) (SSS)

- [RowlHouse Customisation page](#)
- [Dream-Flight Ahi](#) (promo video)
- [VTPR de Plage](#) (video)

Full Configuration Options

The full set of Advanced options for each of the configuration page tabs are quite extensive. Below you can view all of the options available for the important Aeroplane and Scenery tabs.

The screenshot shows the 'Aeroplane' configuration tab for the 'Le Fish Ultralight' model. The interface includes a top navigation bar with tabs: Back, Options 1, Options 2, Aeroplane (selected), Scenery, Objects, Lighting, AI Controllers, Controller, and Joystick. On the left, there is a 3D model of the glider. The main area contains a description: 'Swissed version of the aerobatic glider designed by Steve Lange - aileron, elevator, flaps and rudder. Use the rates button to enable full stabiliser rotation.' Below this is the website 'www.slopeaerobatics.com'. The 'General settings' section includes sliders for Colour shift (0.000), Ballast (0.000%), Ballast forward (0.000m), Ballast left (0.000m), Ballast up (0.000m), Drag multiplier (1.000), Size multiplier (1.000), Mass multiplier (0.750), and Engine multiplier (1.000). There are checkboxes for 'Show button 1', 'Show button 2', and 'Has variometer' (set to 'No'). The 'Preferred controller' is set to 'LeFishMadStab'. A 'Launch' button is at the bottom left.

Back Options 1 Options 2 **Aeroplane** Scenery Objects Lighting AI Controllers Controller Joystick

Le Fish Ultralight
Swissed version of the aerobatic glider designed by Steve Lange - aileron, elevator, flaps and rudder. Use the rates button to enable full stabiliser rotation.

www.slopeaerobatics.com

General settings

Colour shift 0.000

Ballast 0.000%

Ballast forward 0.000m

Ballast left 0.000m

Ballast up 0.000m

Drag multiplier 1.000

Size multiplier 1.000

Mass multiplier 0.750

Engine multiplier 1.000

Show button 1 ☐

Show button 2 ☐

Has variometer ☐ No

Preferred controller **LeFishMadStab**

Launch

Launch method (flat sceneries)

Bungee

Launch speed
10.000m/s

Launch angle up
0.000deg

Launch up
1.300m

Launch forwards
1.500m

Launch left
-1.500m

Launch offset up
-0.100m

Relaunch when stationary ☐

Tow hooks

Belly hook offset forwards
0.000m

Belly hook offset up
-0.030m

Nose tow hook offset forwards
0.300m

Nose tow hook offset up
-0.030m

Bungee launch

Max bungee length
100.000m

Max bungee acceleration
25.000m/s²

Aerotow launch

Tug plane
Jackdaw

Tug size scale
1.000

Tug mass scale
1.000

Tug engine scale
1.300

Tug max climb slope
0.150

Tug target speed
13.000m/s

Aerotow rope length
10.000m

Aerotow rope strength
5.000

Aerotow rope mass scale
1.000

Aerotow rope drag scale
1.000

Aerotow max height
150.000m

Aerotow circuit size
100.000m

Crash detection

Delta velocity fwd/back
5.000m/s

Delta velocity sideways
5.000m/s

Delta velocity up/down

The image shows a settings menu for the J'Adore PicaSim! flight simulator. It is organized into several sections, each with a title bar on the left. The settings are primarily sliders, but some are checkboxes or dropdowns.

- Top Section:** Contains four sliders for velocity and one for resilience.
 - Delta roll velocity: 10.000m/s
 - Delta pitch velocity: 750.000deg/s
 - Delta yaw velocity: 750.000deg/s
 - Suspension resilience scale: 500.000deg/s, 1.000
- Chase camera:** Contains seven sliders for camera parameters.
 - Target offset fwd: 0.000m
 - Target offset up: 0.000m
 - Distance: 2.000m
 - Height: 0.400m
 - Vertical vel frac: 0.500
 - Flexibility: 0.900
- Cockpit camera:** Contains one slider.
 - Pitch: 0.000
- AI Controller:** Contains a dropdown, two checkboxes, and sixteen sliders.
 - Plane type: Glider
 - Allow AI control: ☒
 - Can tow: ☐
 - Waypoint tolerance: 10.000m
 - Min speed: 10.000m/s
 - Cruise speed: 15.000m/s
 - Max bank angle: 70.000deg
 - Bank angle per heading: 0.500
 - Speed per altitude: 1.000s⁻¹
 - Glide slope per excess speed: 0.050s/m
 - Pitch per roll angle: 0.010deg⁻¹
 - Heading change for no slope: 90.000deg
 - Max pitch control: 0.200
 - Max roll control: 1.000
 - Control per roll angle: 0.010deg⁻¹
 - Pitch control per glide slope: 1.000
 - Roll time scale: 0.100s
 - Pitch time scale: 0.050s

AI Navigation

Min altitude
15.000m
Slope Min upwind distance
10.000m
Slope Max upwind distance
20.000m
Slope Min left distance
-50.000m
Slope Max left distance
50.000m
Slope Min up distance
-10.000m
Slope Max up distance
10.000m
Slope Max waypoint time
60.000s
Flat Max waypoint time
100.000s
Flat Max waypoint time
60.000s

Smoke source 0

Enable ☒
Colour hue
0.000
Colour saturation
0.000
Colour brightness
1.000
Position fwd
0.200m
Position left
0.000m
Position up
-0.050m
Velocity fwd
-1.000m/s
Velocity left
0.000m/s
Velocity up
0.000m/s
Max num particles
10000
Channel for opacity
Smoke 1
Min opacity
0.000
Max opacity
0.400
Channel for rate
Hook
Min rate
60.000Hz
Max rate
60.000Hz
Initial size
0.100m
Final size
5.000m
Life span
4.000sec
Damping time
0.100sec

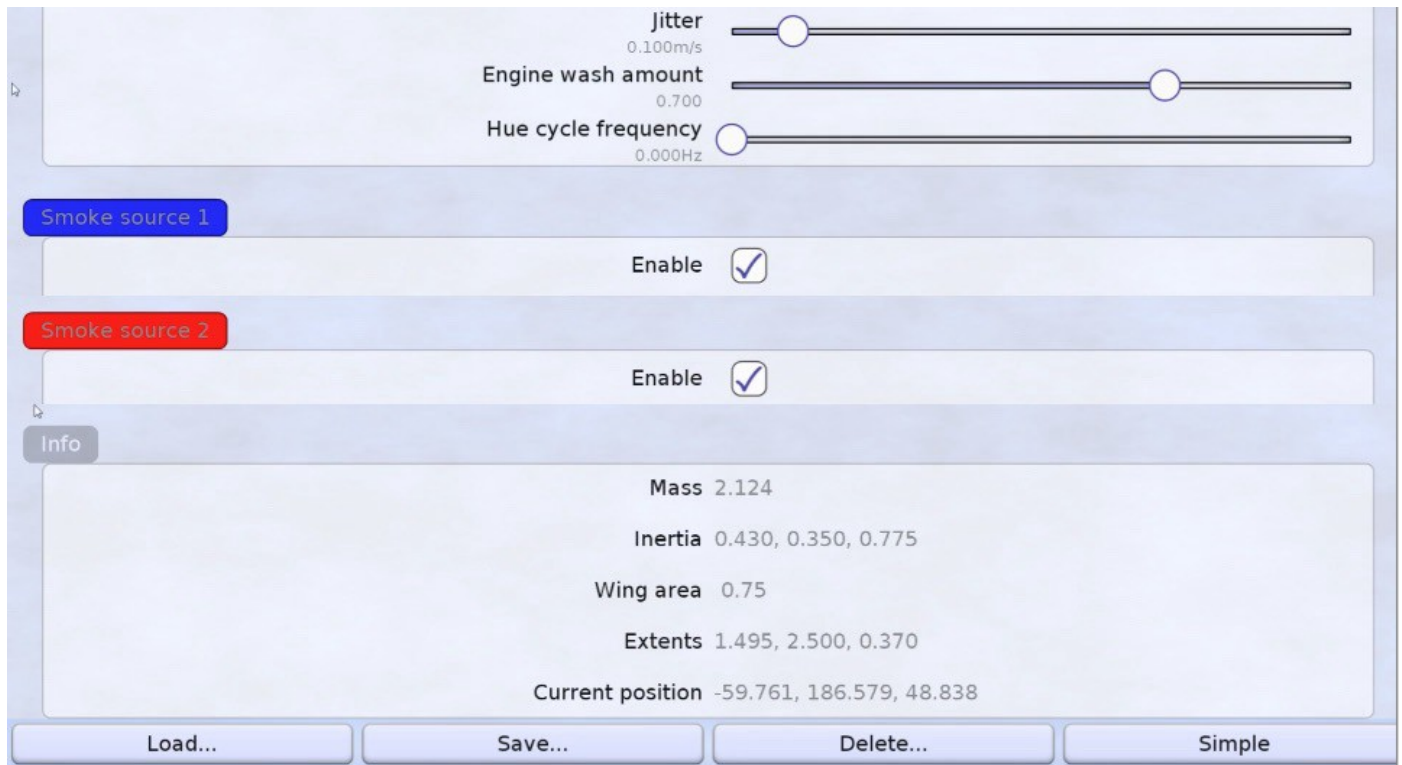


Figure 11: Full 'Aeroplane' glider configuration options.



Wind lift smoothing

3.500

Vertical wind decay height

100.000

Separation tendency

1.000

Rotor tendency

1.000

Boundary layer depth

50.000

Thermal settings (also see lighting)

Density

0.000 per km²

Range

1000.000

Life span

300.000s

Depth

50.000m

Core radius

40.000m

Downdraft extent

80.000m

Updraft speed

3.000m/s

Ascent rate

0.400m/s

Expansion over lifespan

2.000

Runway

Runway type

None

Length/radius

100.000m

Position X

0.000m

Position Y

0.000m

Height

0.000m

Angle

0.000deg

Width

10.000m

Surface settings

Roughness

0.010m

Friction

1.000

Ridge terrain settings

Height

100.000m

Max height fraction

0.600

Width

100.000m

Height offset

20.000m

Horizontal variation

10.000m



Figure 12: Full 'Scenery' flying site configuration options.

*All images and videos 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**.*

RC Soaring Diaries

Forget what your parents told you — it's great to throw a Tantrum.

[Michael Berends](#)



Me, ready to throw a Tantrum in the local school yard.

First off, welcome back to another installment of **RC Soaring Diaries!** I started as a YouTube Channel — and now as a series in RCSD — because I wanted to share my adventures, experiences and 40 years of knowledge with others. Not only to those already flying gliders, but to also motivate and enlighten pilots within other disciplines of the hobby and newcomers. My hopes are to help shatter the stereotypes associated with gliders. Their diversity is always overlooked and feel that someone needs to promote how amazing, and multi-functional these flying machines are.



Photo 2: The finished Tantrum RE prototype.

I'm invited out to a lot of flying fields that are primarily used for powered RC flying and do glider demonstration flights that always seem to grab everyone's attention. Always showing up with a quiver of ships which

normally consists of the largest, smallest, fastest and slowest plane at the field. Its always a lot of fun to setup a glider and always have people make comments such as, "I used to have a glider like that but got bored with it". Then launch an E-Glider, speck out in 10 seconds, point it's nose straight down as it starts to whistle fiercely gaining speed then blasting across the runway at 200+km/h (125+ mph)! Followed by using all of that energy to climb back out to a substantial altitude, settling in for some nice cruising and thermal hunting. Listening to all the comments behind me from the onlookers is always entertaining!

On the flipside of that, I can then discuss launch glider (DLG) a small one meter glider and lazily fly for over 10 minutes never exceeding 90 meters (300 feet), which exceeds the duration that most of the standard powered craft at the field are capable of. All with one toss and no engine. Which brings us to the topic of this article.

Ever since I was a young teenager in the early 80s I was always fascinated with smaller models and back then, the thought of throwing an RC glider in the air and thermalling it out was unfathomable and just a dream. We had very heavy radio gear and only standard size servos available to us, mixed with heavy batteries. Not a great recipe for success!

As technology advanced the electronics got smaller and smaller allowing us to make this dream a reality. Along the same timeline, composite building techniques evolved and the airframes got lighter and more efficient which gives us what we see as today's high performance DLGs.

There is however a negative side to the evolution in my eyes.

We used to build all of our hand launch gliders ourselves. Even when composites came into the picture, using vacuum bagging techniques and readily available materials, the average hobbyist could still enjoy and

participate in this side of the hobby in an affordable way. Even kits were moderately priced. Today, this has changed dramatically with hi-tech molded composite frames, small servos with amazing precision and a plethora of computer radio mixes for various flight modes. All this is great and I use all of the above, but is it really needed for the average weekend flyer and is it in a price range that's within the budget of average hobbyists? Not to mention the complexity of the models and their flight modes for the entry level glider pilot.

It's kind of like an average person using an Indy car to drive to the corner store and back for a loaf of bread. Unfortunately the chance for the "normal guy" to get a 'real' taste of what DLGs are about, has now really been put at a level that is out of reach for a lot of RC enthusiasts.

This is not only seen in DLGs but in RC soaring in general. Competitive classes getting so expensive to participate in that it's really only for the elite and the turnouts over the years have dwindled. Here in my area of Canada we used to have an abundance of contests every year with great attendance and now there is none at all. It's nice to see classes such as F3-RES (that is, rudder/elevator/spoilers) come into play that put contest flying back in the realm of the everyday hobbyist. Hopefully it will gain some traction and get some more people interested in contest flying.

This Is Where the Journey of the Tantrum Begins

I really liked what F3-RES was doing as a competitive class. So I wanted to challenge myself to design a one meter DLG that was built out of conventional, and affordable, materials but had the performance that was lacking on all the other economical options that I was aware of out there. My experience with most of these designs found that they all suffered from the same performance hindering attributes. The majority of these in weight and

airfoil deficiencies. Most of the ARFs (that is, almost-ready-to-fly) and foamies were heavy and the built-up options available in kits or plans used airfoils and planforms that weren't ideal, affecting both launch and glide path, especially when a breeze came up. This also made them launch like potato chips!

I knew that I needed to come up with a design that was light, could launch well and track across sky when the nose was pushed down a bit. The simplicity of two-channel rudder and elevator control was a must, allowing the pilot to concentrate on launching and flying instead of fumbling for switches trying to get in and out of different flight modes. Simplicity is key, especially for the newbies who have their hands full just trying to keep control of their glider. This also goes for experienced power pilots crossing over into gliders as the majority of them have problems with pushing in down elevator when the nose rises which creates stalls and porpoising. It's something very foreign to them and a struggle I see all the time!

My thoughts were to go with an open balsa framework wing covered in film, a balsa pod with carbon boom and sheet balsa tail feathers. This follows the current F3-RES ships that are popping up all over and seems to be a recipe that works well for building light, strong and efficient planes. The added benefit is that it can be easily repaired with standard things readily available at a hobby shop.

Once I had a basic design in mind I then started focusing on an airfoil. Most designs use a Mark Drela *AG03* as it can be easily shaped and built because of its flat bottom. It does work well but there is always a trade off losing performance for ease of building. After doing some research I came across another airfoil called the *PolyHot* which was designed by Gerald Taylor specifically for small polyhedral gliders. It has a slight undercamber as it approaches the trailing edge and is very similar to ones used on higher

performance ships.

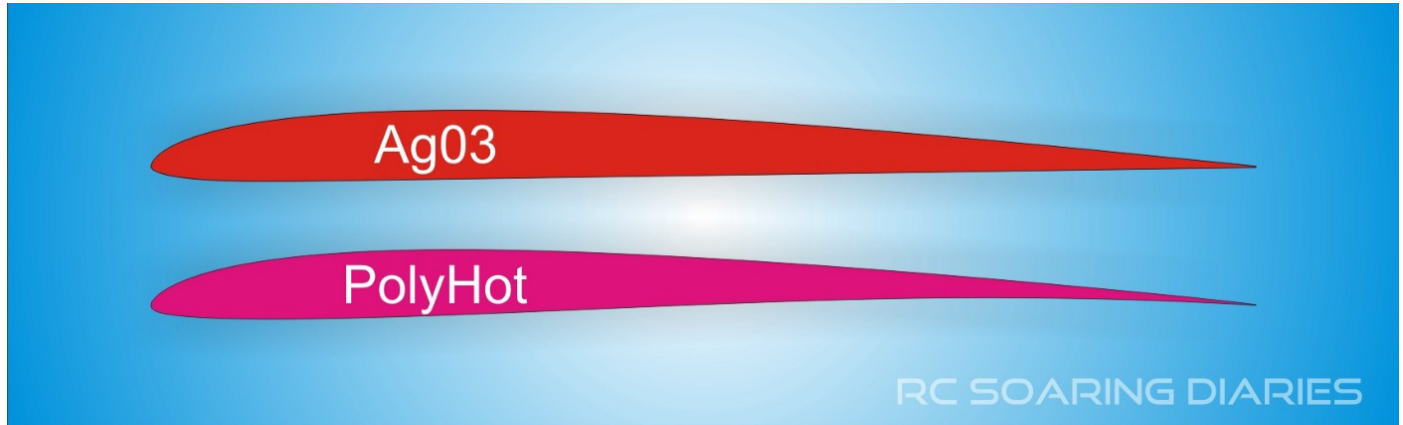
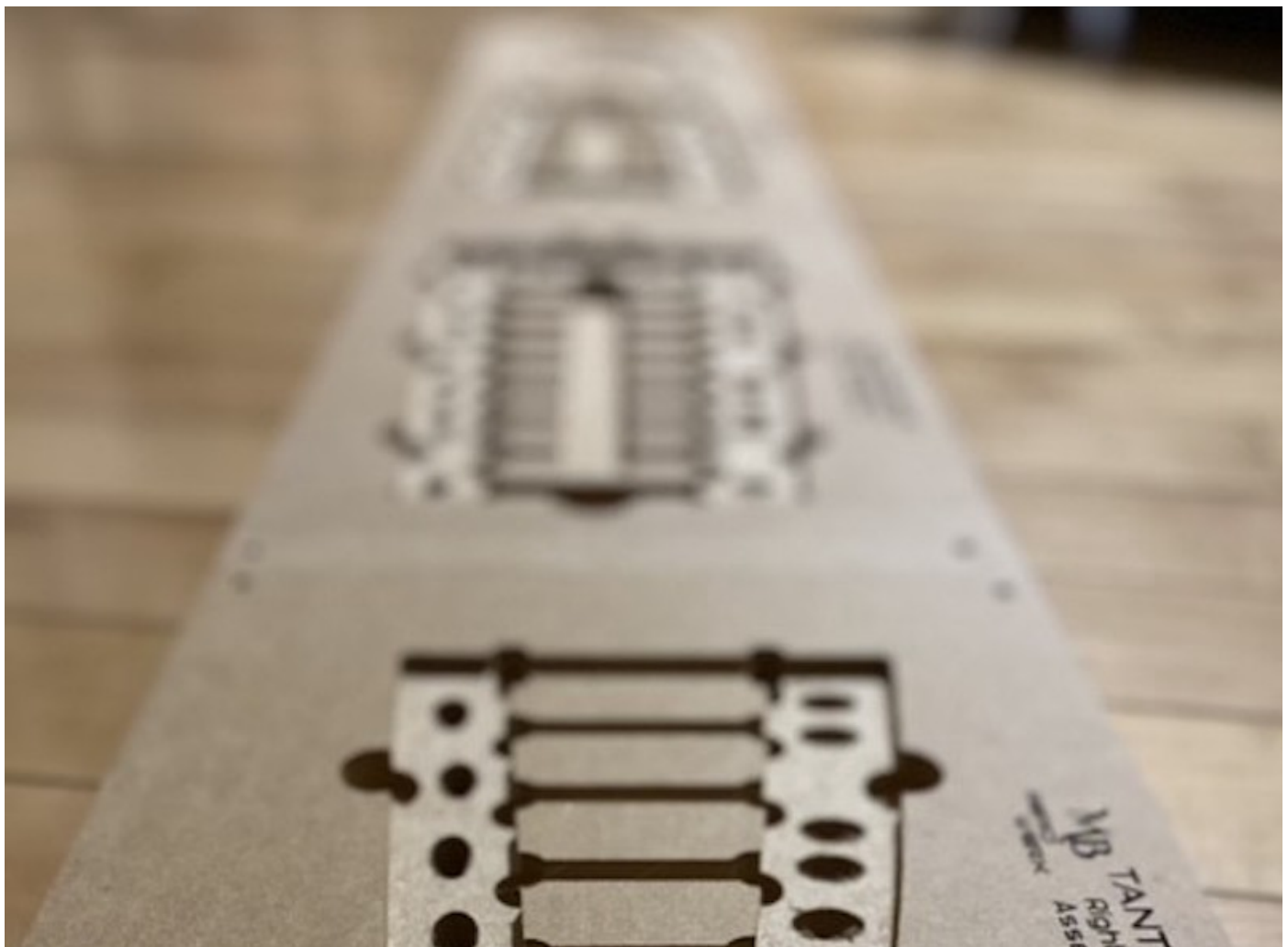
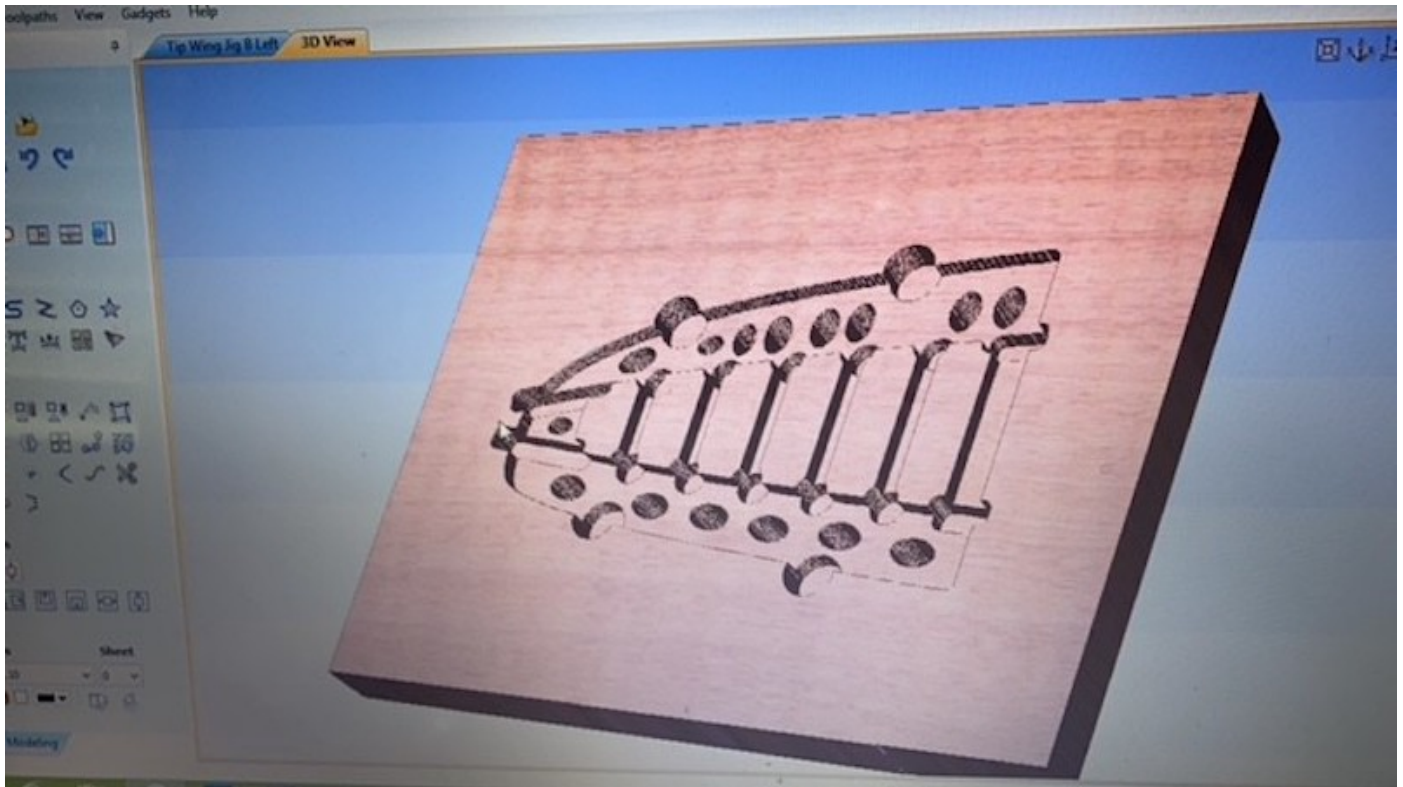


Figure 3: The differences in airfoil shape.

This brought up the question of “how am I going to build this wing?” I originally wanted to build the wing flat and shape it with a sanding block and templates just like I did back in my hand launch glider (HLG) free-flight days but the airfoil was pretty complex and wanted to make it as accurate as possible. So I opted to use the technology I have on hand and CNC shape the entire wing. I came up with a way to make building jigs that I could assemble all the parts in and then lay it down on the vacuum table of the CNC to hold the parts for shaping.



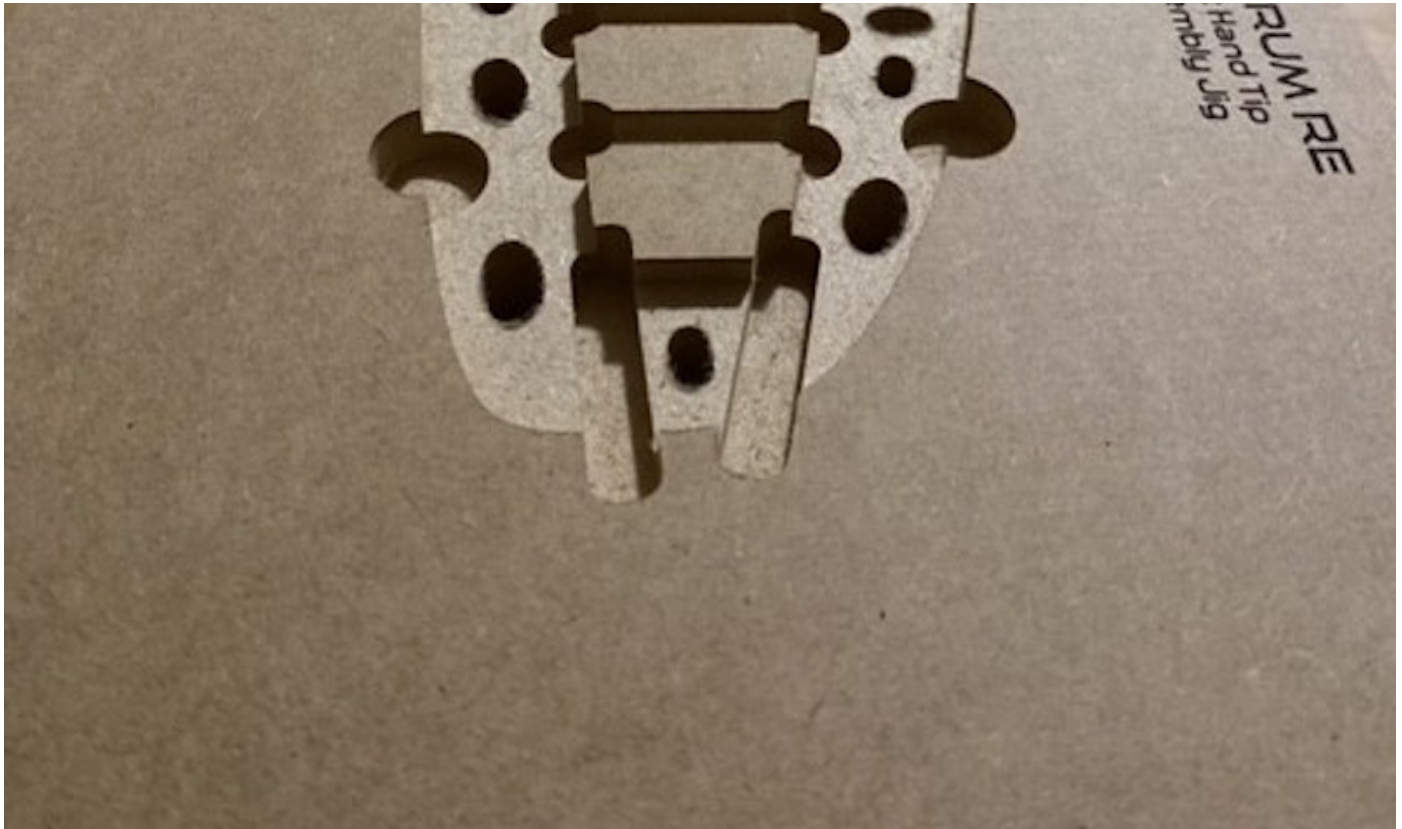


Photo 4 (left): Computer rendering of an assembly jig. **Photo 5** (right): Completed assembly jigs.

The jigs were cut and worked extremely well not only as a holding fixture but as a way to assemble the parts quickly and accurately. It was very simple, and only took minutes, to place all the pre-cut balsa pieces in their appropriate slots and hit them with some glue.



Photo 6: Balsa pieces put into their respective slots and glued.

The next step was to place them on the CNC router table and machine the top surfaces. I was delighted as to how well this worked and it took about 20 minutes for each panel. you can see a time lapse of the process in this video.

Cnc contouring the Tantrum RE wing

Video 7: CNC contouring the Tantrum RE wing.

After the top surfaces were done I created some more MDF jigs to hold the wing panels inverted to machine the lower surfaces. This was easily achieved by inverting the top surface impression in the jig so the panel was cradled in the fixture properly while it was held down by the vacuum. The results of all of this effort was outstanding and I was more than pleased with the results! I had a number of balsa wing panels all precisely made with a sophisticated and complex airfoil ready to be joined and covered.

Joining the panels was done in a very conventional way. Sanding the right dihedral angles into the wing panels, then gluing them together followed by light fiberglass tape around the joints. Voila, the wings were completed and ready for covering.

I designed the tail feathers while all the panels were being cut which is the beauty of CNC. You can do other things while the machine does the work.



Photo 8: Laser cut tail feathers with some cool looking lightening holes.

Nothing out of the ordinary here just some sheet balsa cut to shape on an inexpensive \$200 table top hobby laser. It took a number of passes to cut all the way through but it did the job and also engraved the *Tantrum RE* (that is, rudder, elevator) logo into them. I liked the design but was under some scrutiny when I posted a picture of them on social media concerning the

configuration of the lightening holes in reference to the grain. I had to ensure everyone that the lack of strength wouldn't affect a glider of this size and the forces that it would see. I actually thought they looked pretty cool.

The fuselage pod was a very easy thing to design as I recently built an F3-RES glider and used the fuselage on it as inspiration for this design. Balsa sides with 1/64" plywood strategically placed doublers along with laminated balsa formers and a small balsa block for the nose. Once again this was designed and done when the wing panels were being shaped. Which means that the majority of the plane was done by the time all the wing panels were completed.





Photo 9 (left): Some hangar flying to see how things were starting to look. Even my cat Ollie was looking on with interest. **Photo 10** (right): Covering on and we can really see how this is going to look.

Covering the tail and wings came next. After some research the choice of covering material was *Ultracote Lite* as the weight was acceptable and knew that it would work well for this project. I actually built a couple of prototypes at the same time and covered them both in different colors.

To finish off the fuselage I decided to use white *Ultracote* as I had some sitting around in the shop but this wasn't done till after the test flights. I moved onto some of the finishing details. The stabilizer pylon was 3D printed and fit on the tail boom perfectly also giving the nylon screw a good place to thread into, securing the tail. I wanted to create a contoured throwing blade so that it felt better on your fingers than a straight one. This was created by making a 3d printed mold, waxing it up, then sandwiching a number of layers of resin soaked carbon cloth scraps in between both halves. This was then clamped together and left to cure overnight. The next day the two mold halves were split apart and out popped a contoured carbon section that I could slice into throwing blades. Its pretty amazing what you can create with a little bit of creative thinking and some scraps for mere pennies.

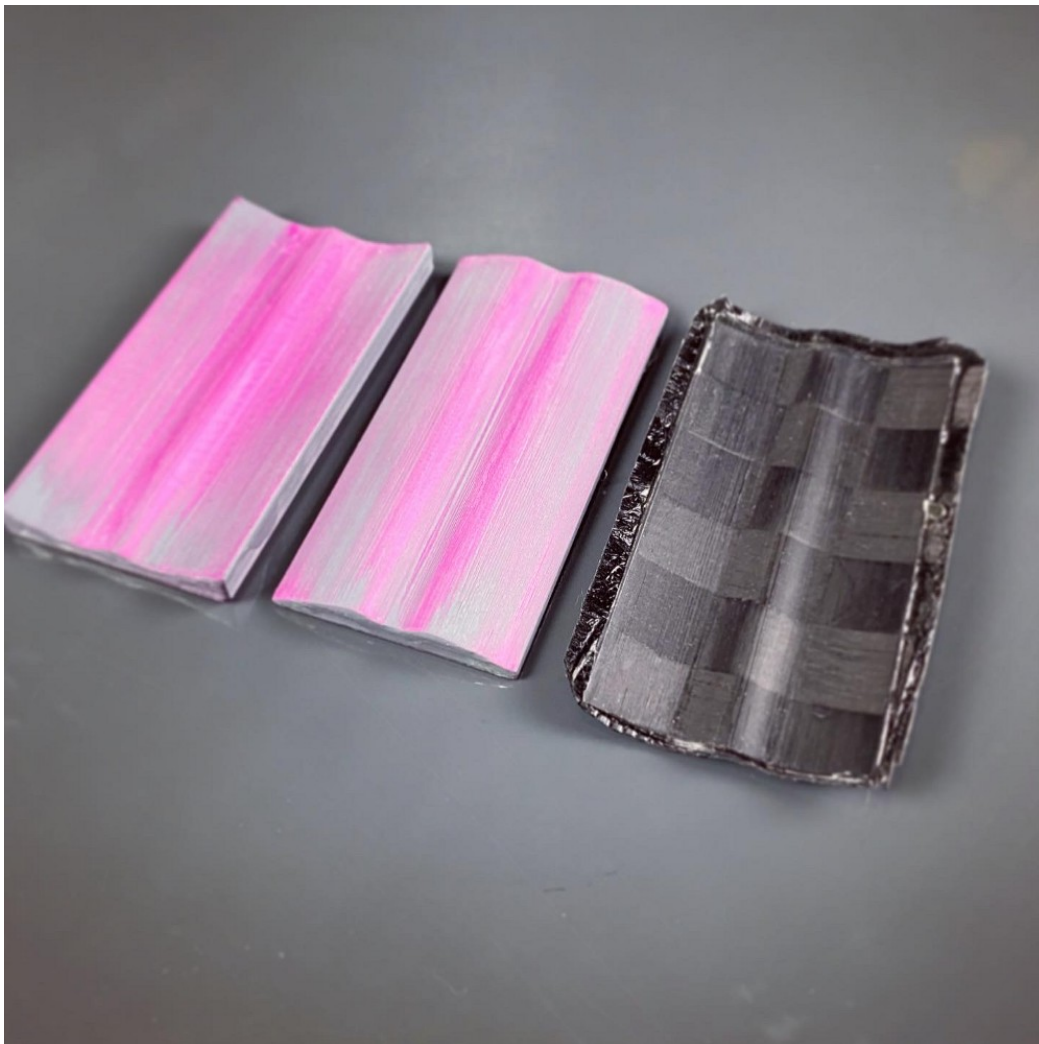


Photo 11: 3D printed molds used for making contoured throwing blades along with the finished carbon fiber piece.

All that was left was to finalize the radio installation. This was easily done with a pull string system and a torsion spring in both the stabilizer and fin. The spring was made out of fine music wire that was taken from an 'E' Guitar string as hobby shops don't carry music wire fine enough for this purpose. This was a tip given to me long ago and wanted to pass it along. The string used was 20lb. braided fishing line. For those unfamiliar with this control system, the servo only pulls on the control surface one way and the torsion spring makes it go the opposite way.

Very little weight was needed to get this little bird balanced on the center of gravity (CG) point that I computed. Which put the all up flying weight at 120grams ready to fly which is were my estimated target was. I was extremely happy with this result!

After all the research, work and struggles through the project it was finally time to fly this little machine. Was it going to launch well? Was it going to fly well? Was it going to be strong enough? Did I figure out all my volumes and areas correctly? So many questions run through your head with the anticipation of the first flight. I've been at this for almost 40 years and have built and designed a lot of planes but every first flight brings on some nerves and trepidation.

The *Tantrum RE* was finished during a heatwave in my hot and sticky shop. It was all ready to go but couldn't stand being outside in the heat! There was also a lot of wind associated with the heatwave too, so I waited a few days for better conditions. Then at last one evening the wind died down and it didn't feel like a sauna outside, so I ran to the local school field to see what my little creation would do!

Once I arrived I did the standard testing of my controls and a range check. All that was left was to give it a slight hand toss. I aimed for a spot ahead of me and gave the *Tantrum* a little push to pleasantly see it gently glide away from me nice and straight on a nice shallow glide path without even having to touch the controls. Next launch was a javelin style launch with some more force and was able to turn around come all the way back and land at my feet. So far so good! Now the real moment of truth.

I grabbed the throwing blade, did a half spin and sent her skyward. I was amazed at the height I launched to, it was double what I was anticipating! The next launch was done with more force and was really amazed at the launches. This is exactly what I wanted to see! All the planning and work was all coming together. Not only was it launching well but I really wasn't needing any rudder correction on launch which was a bonus as I thought that I would surely need to come up with a launch mix adding some right rudder. Another noticeable characteristic was how much ground I could cover. Circling down to one end of the field and still able to make it back through the wind and the gusts. I'm also happy to say that I was able to grab a ride on a few evening thermals getting some really decent flights!

You can see some video of that evening in the following episode of *RC Soaring Diaries*:

The TANTRUM RE takes flight

Video 12: The first test flights of the Tantrum RE.

Since the first flights I've had a number of other sessions with the *Tantrum* and can say that it thermals really well. On a few days, including today, I was able to launch once and fly 'til I got bored. Chasing thermals downwind, then racing back up upwind to snag another one. It's so worry free because of the simplicity of the two channels. Just relax and enjoy the experience.

The rewards of all the hard work have been great! Although the majority of this plane was made with some high tech equipment and not really within the realm of something that anyone can build, the prototypes have shown me that great flying DLGs can be built inexpensively using very common materials. My goal is to further develop this glider and concept into something that's achievable by anyone with basic tools and modelling skills.

Whether by making kits available with pre-shaped wing panels or devising a way to build the wing using standard building techniques with plan or kit.

It will never be a composite plane or have the same performance but I think it bridges a gap and opens the door for people to try DLG and be successful at it without having to break the bank.

I think that everyone should be given the opportunity to **THROW A TANTRUM!**

Thanks for giving me your time and reading this article. Wishing you some happy flying and we will see you next time!

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The Skyscraper Method for Fuselages

Want to breathe new life into those orphaned wings and tail?

[Peter Scott](#)

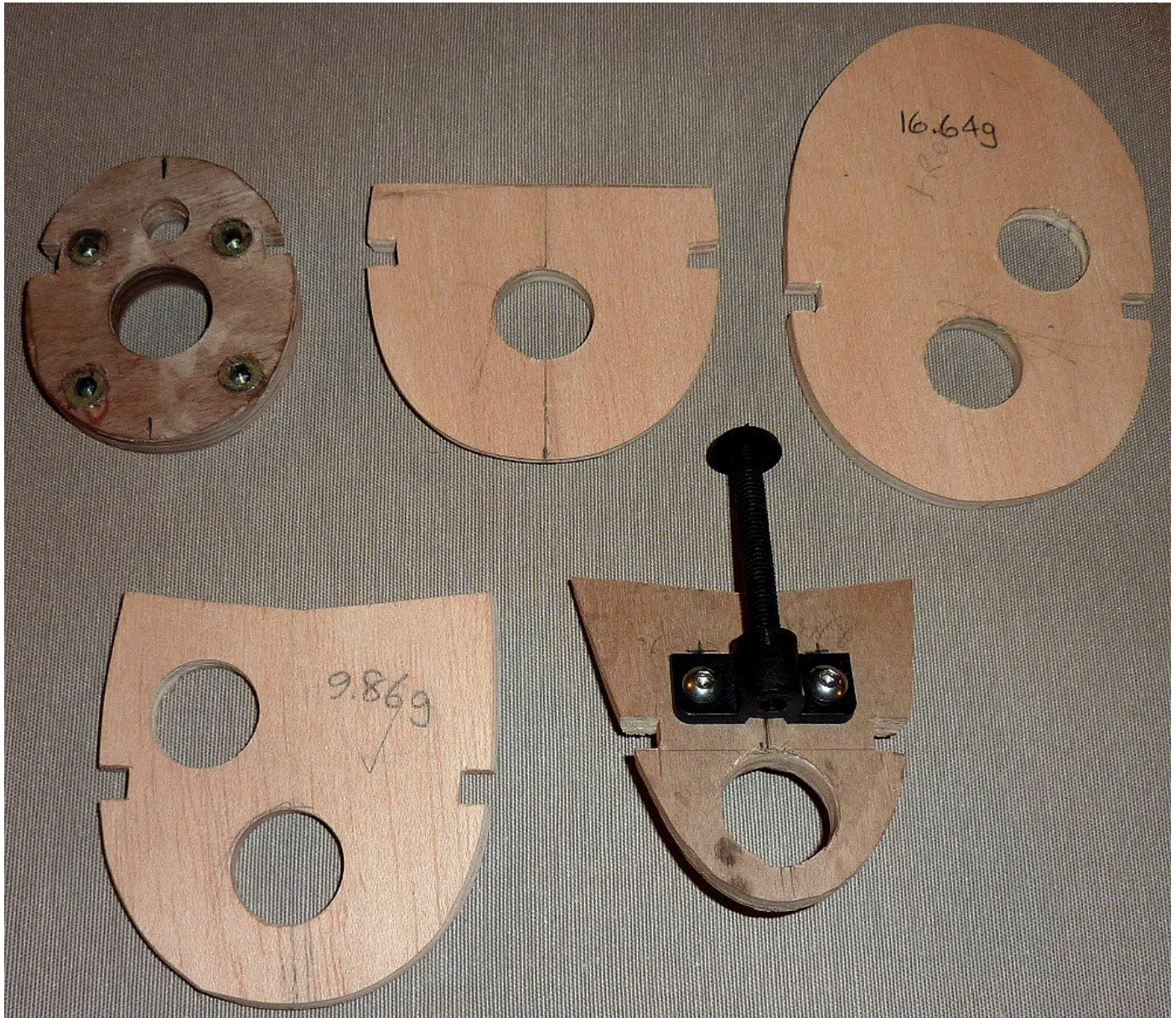


The wings and tail are from a 40 year-old 3m Graupner Cirrus, and the new fuselage is the subject of this article.

I decided to build a new motorised fuselage for 40 year-old 3m Graupner Cirrus glider wings and tailplanes. It is a credit to the quality of the original kit that all were sound and true after years of storage. I fitted ailerons and airbrakes and covered with Hobby King film.

I decided to use a 20mm round carbon fibre tube for the tailboom. I bought one that was made with epoxy resin rather than polyester so it would glue

well with epoxy. It turned out to be exactly the correct length for the complete fuselage and was only 92g.



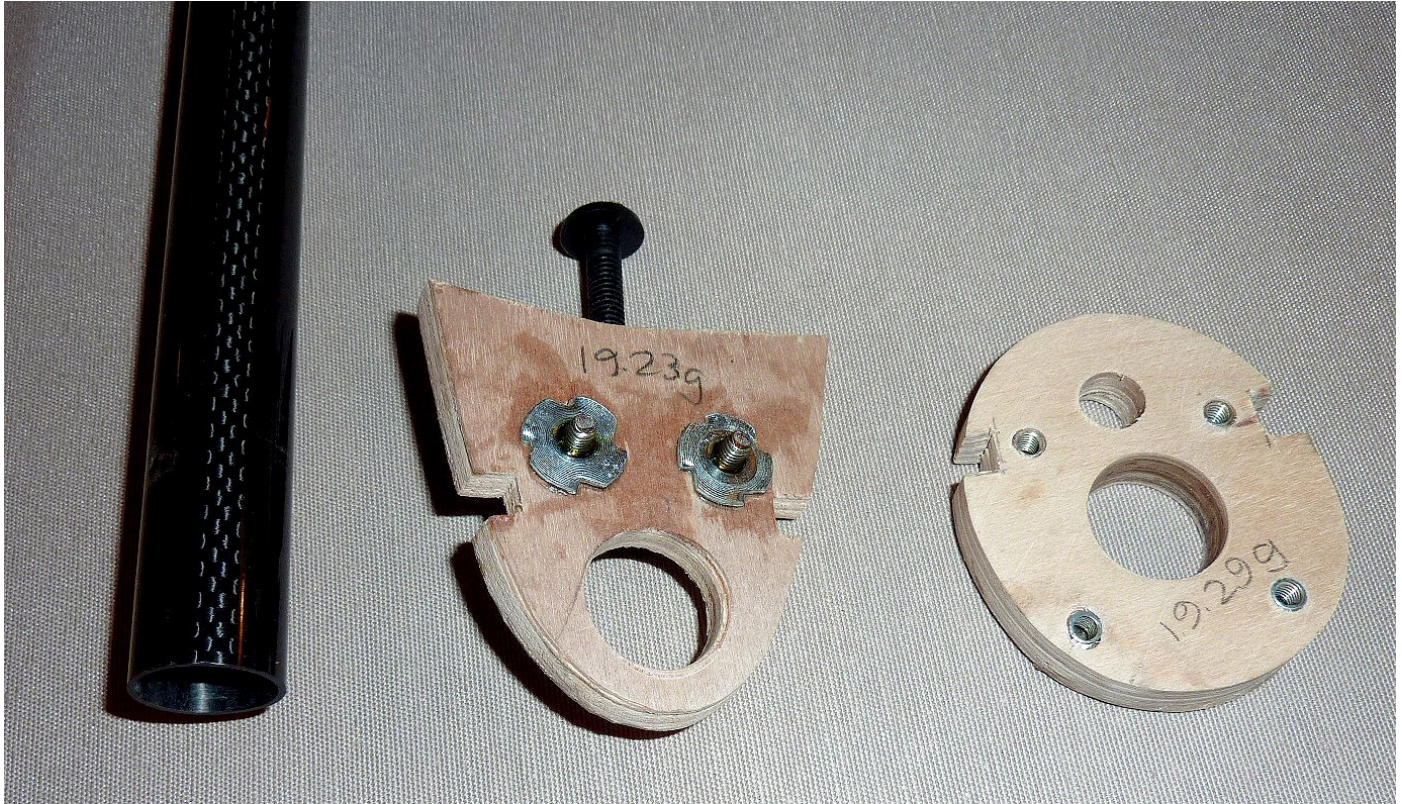
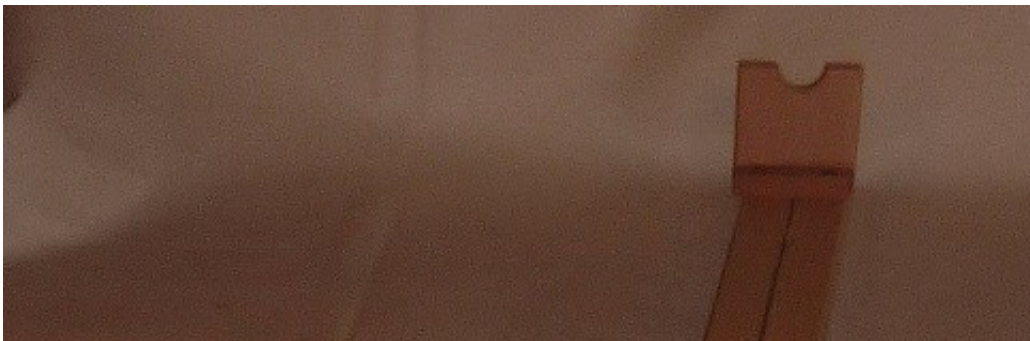


Photo 2 (left): Formers. **Photo 3** (right): Formers and carbon fibre tube.

This set me thinking about not cutting it but taking it right through forward to the motor bulkhead. I decided to use 6mm liteply formers. I love liteply! The only exception was the motor bulkhead, which I laminated from four layers of 3mm birch ply. The five formers weighed a pleasing 48g in total including t-nuts, threaded inserts and wing mounting bracket. The fuselage has a semi-scale curved pod at the front planked with 3mm balsa and then glassed using 24 or 48 g/m² cloth and Eze-Kote polyester resin. I couldn't use carbon fibre cloth as it would screen the receiver. Any minor damage to the shell can easily be repaired.



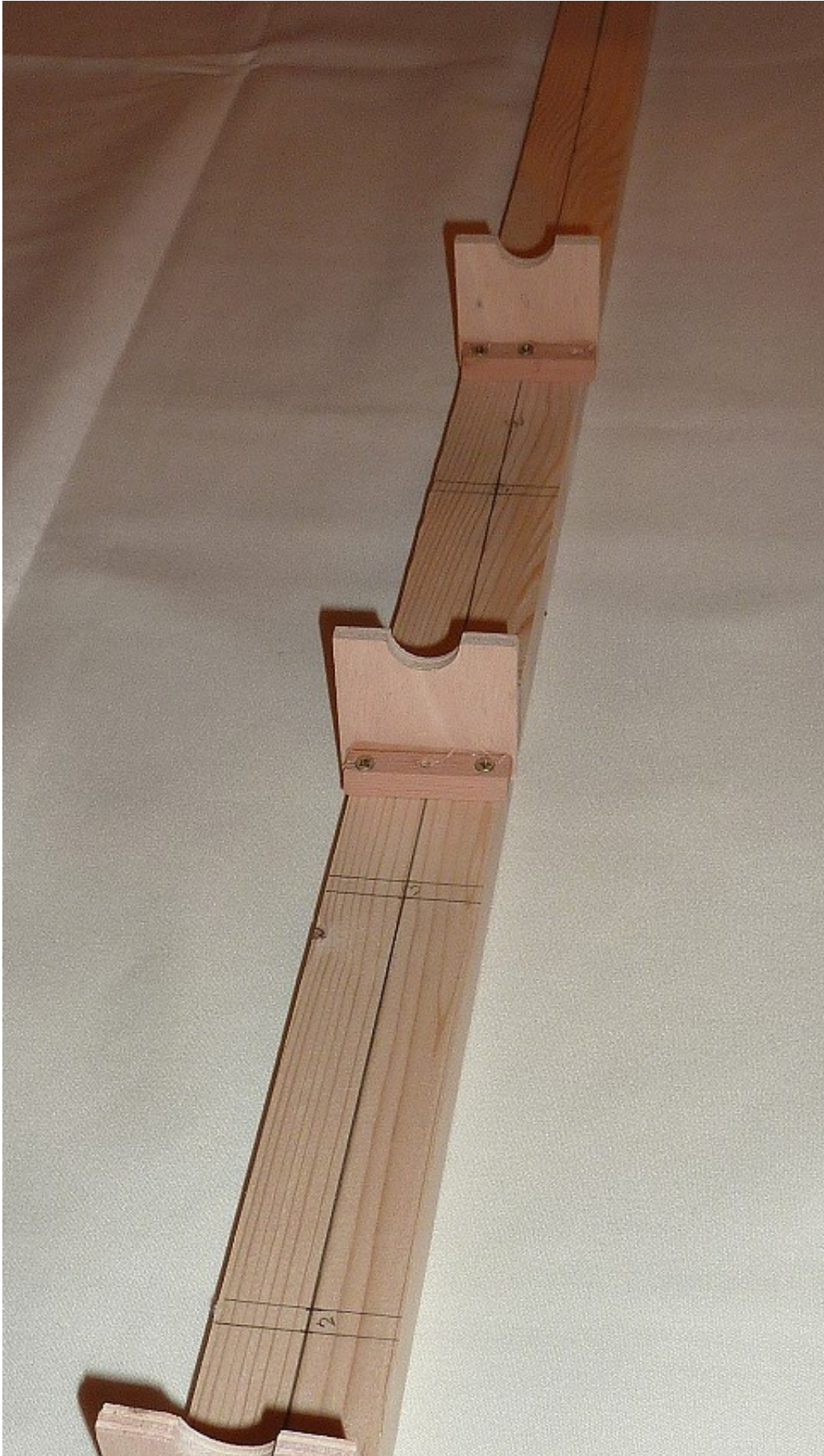




Photo 4: The jig.

I drew the formers on 1.5mm card and cut them out to check that the curves would look good. I then traced them onto the 6mm liteply and cut them using a Makita jigsaw with a fine blade, followed by sanding to exact shape with a belt sander lying on its side. I cut the 20mm holes using a diamond holesaw in a bench drill press. I tested the shapes again for flow on a 20mm wood dowel. I didn't want to scratch the polished surface of the carbon fibre by moving the formers around. I built a jig with cross markings to ensure lateral true and marks at top-dead-centre on each former to get them vertical.

One difficult decision was where to cut a hole in the tube for the servo leads which would go from the receiver to micro servos in the tail for the elevator and rudder. It will be a stress-raiser of course but I reasoned that a 5mm smooth rounded slot cut in the side with a diamond holesaw in a bench drill press should only cause horizontal weakening that the longerons and the ply plate for the radio gear would correct. If I had any residual doubts I could sleeve it with epoxied 1mm ply. I didn't need to. I smoothed the inside edges of the slot with a dribble of epoxy in case the carbon fibres wore the insulation away and shorted the wires.

At the rear I drilled holes top and bottom, with another holesaw, for a 6mm

carbon fibre tube leading edge for the fin. I left the tube unglued until all the formers were in place so the bottom could drop onto the datum line on the jig to check that the formers were aligned with the fin.

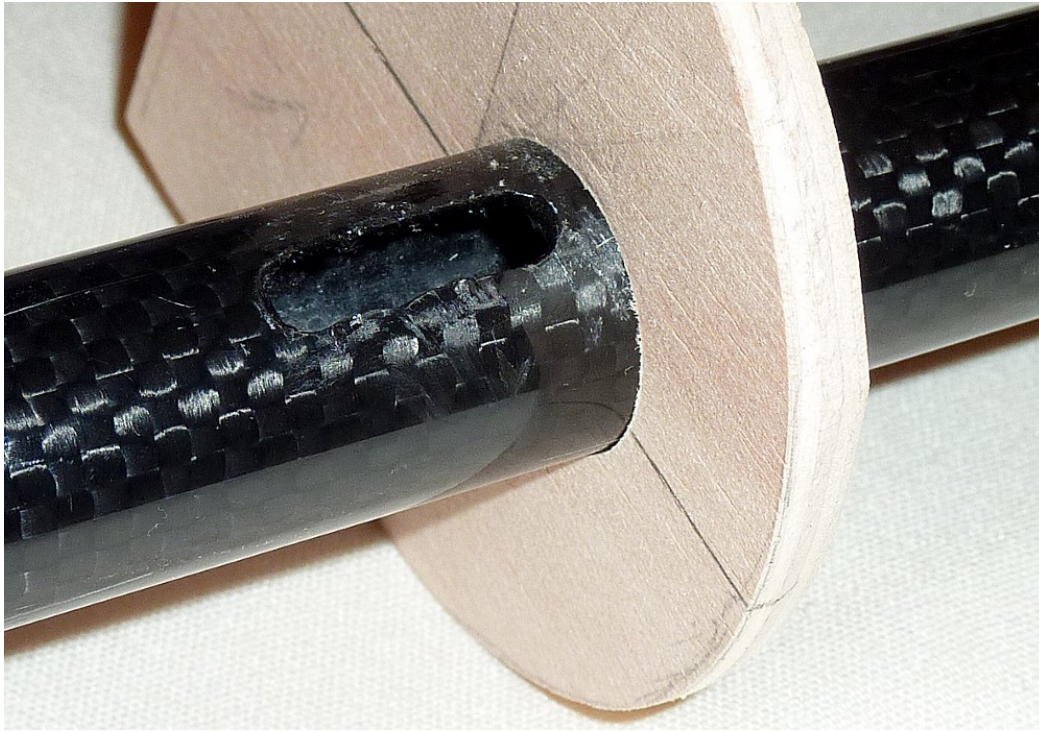


Photo 5: Servo wire slot.

Installing the servo extension wires proved easy. I dropped them in from the tail end until I could see them through the slot then hooked them out with a wire paper clip.

At the rear I drilled holes top and bottom, with another holesaw, for a 6mm carbon fibre tube leading edge for the fin. I left the tube unglued until all the formers were in place so the bottom could drop onto the datum line on the jig to check that the formers were aligned with the fin.

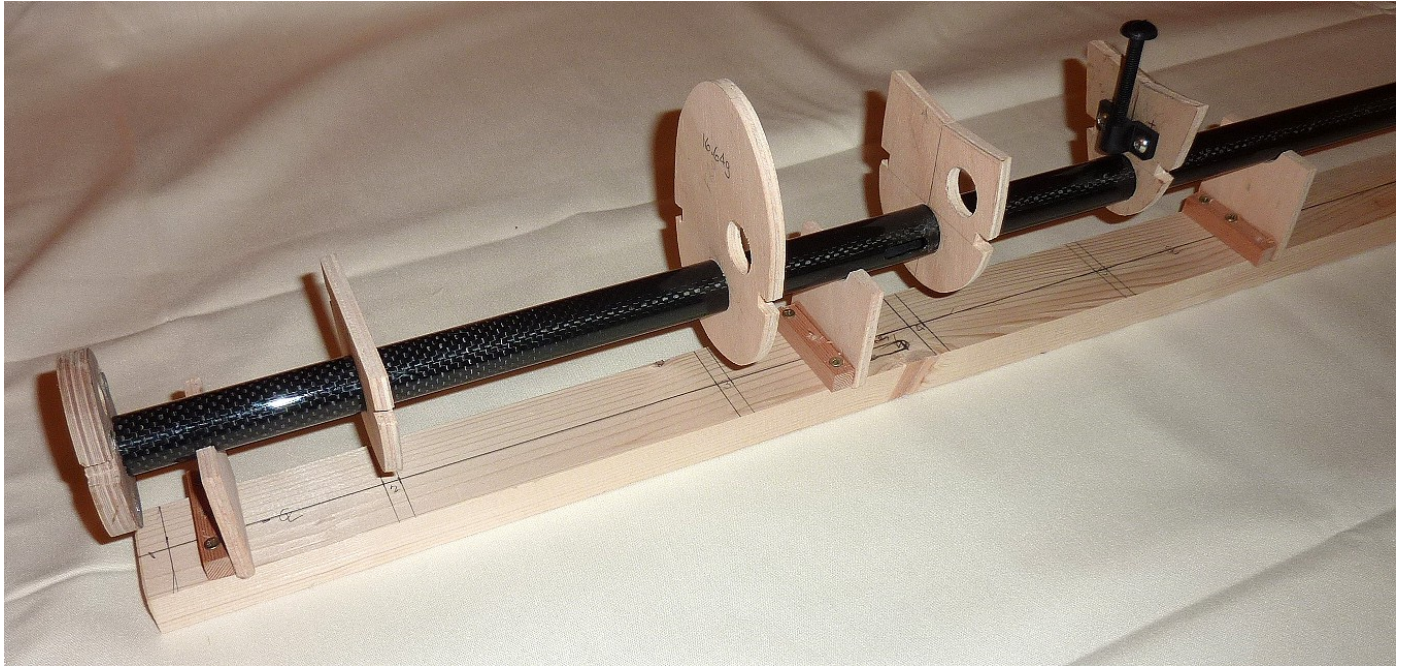


Photo 6: Unglued formers on the jig.

I glued the motor former first using a square, as this would determine the motor thrust lines and so had to be exact. After 24 hours, when the two-part epoxy had fully cured, I glued the others. To measure exactly the two parts of the larger quantities of epoxy needed for this I used a disposable cup on a balance. One big advantage of the tube is that angles of attack are easy to measure and set up and the fuselage is certain to be straight in plan view.

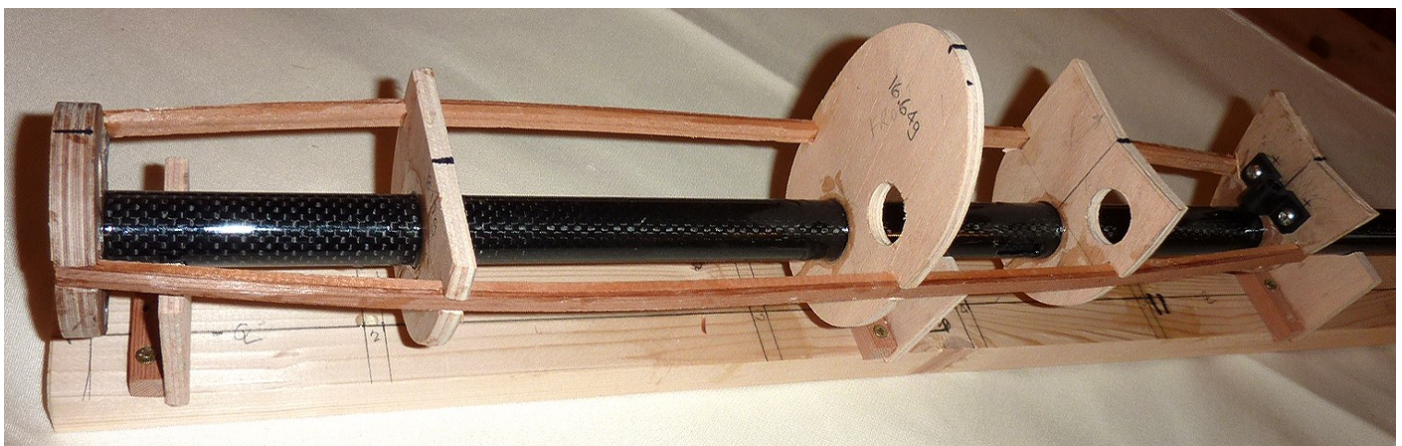


Photo 7: Longerons located and glued in place.

To protect the planking when landing, and to stiffen the structure, I shaped

and glued in a keel made of 6mm liteply. It stands 3mm proud of the formers so the planking will be flush.

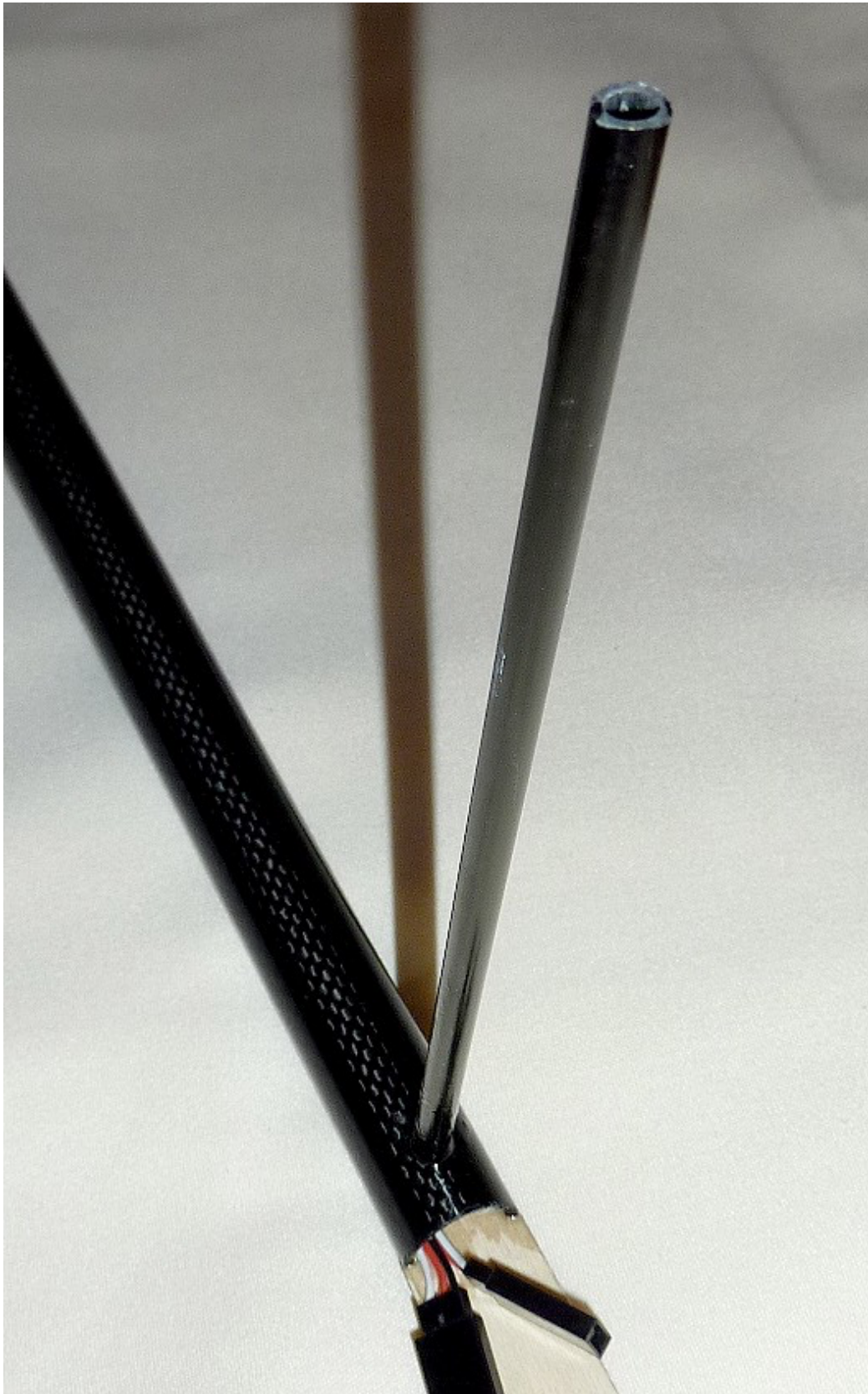




Photo 8: Fin assembly detail.

The fin leading edge is a 6mm round carbon fibre tube with 0.5 mm walls. The 3mm liteply insert helps to lock it in place and forms a fin rib. Because this reduced the space inside the main tube I had to install the servo leads before gluing. I wrapped the wires with plumber's PTFE tape to prevent them being glued. It worked a treat.

The rear of the fin is a 6mm square thin-walled carbon fibre tube. I will use round pivot hinges for the rudder glued into holes drilled in the tube.

For a while I puzzled over how to get the fin perfectly aligned. Then I realised that two spruce spars clamped onto the fin uprights and the wing fixing bolt would do the trick. I was pleased and surprised to find that the spruce was straight enough afterwards to be usable.



Photo 9: Two spruce spars clamped onto the fin uprights.

The main tube takes up a fair bit of room in the pod. However the only electronics under the wing are a tiny FrSky X8R receiver and battery voltage and vario telemetry devices, so there is plenty of room. I put in a sloping plate under the canopy so the battery would be ejected in the event of a sudden stop. In minor bumps it is often the battery that causes damage, which in this case would only be to the canopy. Unfortunately the size of the tube ruled out a retractable wheel. I used an aluminium strip strake instead. I had hoped to use titanium but couldn't find any 6x2mm strip.

All that is now left is the planking of the forward part of the fuselage and

installing the mount for the all-flying tailplanes.

The further constructions details of the fuselage will be described in the second part of this article, coming up in the next issue of RCSD.

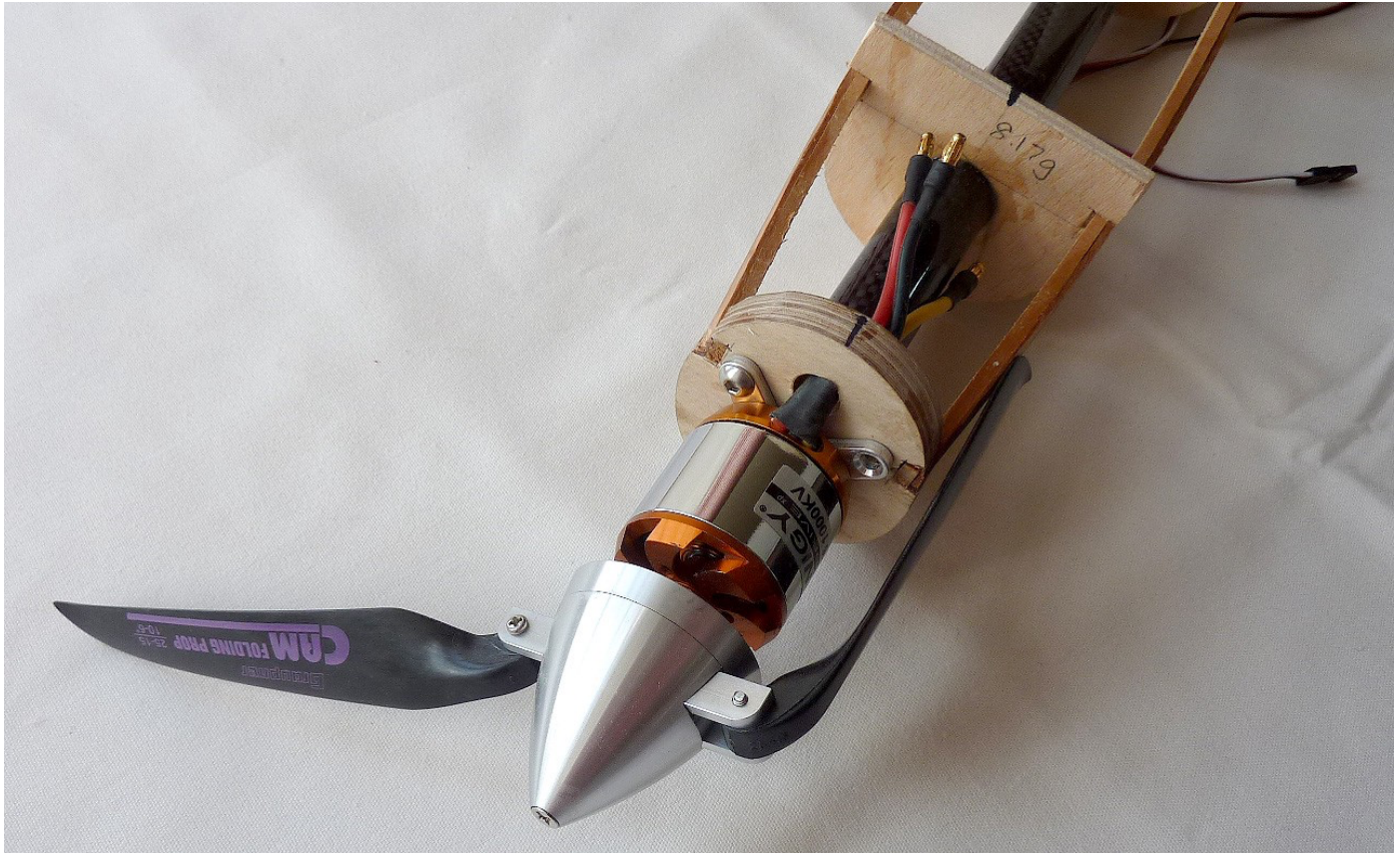


Photo 10: The motor mounted on the motor bulkhead.

I am pleased with my first major use of carbon fibre. It is light and stiff and does not change shape over time. One disadvantage is that all gluing must be done using epoxy, though possibly thick CA is an alternative. Not being water based, epoxy doesn't get lighter as it dries so you have to be as sparing as possible.

A cylindrical tube works well for a curved fuselage. I must try a square one for a square fuselage. It would make lining up the formers and forming a balsa shell very easy.

Why do I call it the skyscraper method? Such buildings now have a strong central core from which floors and walls are cantilevered. Then the glass is put on the outside. Apart from being rotated by 90 degrees my fuselage design is the same, as it has a very strong core with a light shell covered in glass (fibre).

So far as weights are concerned, here's how things turned out: carbon fibre tube, 92g; formers, 48g; all up with formers, longeron and keel, 202g.

Lessons

1. Cover the exposed part of the tail boom with a removable film of some kind before starting to glue things. Despite the greatest of care I have put some glue smudges on the polished surface.
2. Provided you are willing to do planking, this is an excellent method for building accurate circular cross-section fuselages.

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*This is the first part of a two part series. Watch for the next part in the upcoming issue of RCSD where the author covers the build up of the pod and other finishing details. All images by the author. Read the [next article](#) in this issue, return to the [previous article](#) in this issue or go to the [table of contents](#). A PDF version of this article, or the entire issue, is available **upon request**.*

The Implementation of a Dream

"In 1982, I drove our little Odyssey motor home on a Toyota chassis back to the AMA Nationals (Nats) at Lincoln, Nebraska..."

[Bob Dodgson](#)



"Here's a group picture from Bob's 2019 induction into the AMA Hall of Fame in Wenatchee, Washington. A number of Dodgson fans and friends are in this picture. Left to right: Tom Nielson, Bob Dodgson, Tom Brightbill, Ron Lenci, Jim Pugh (rear), Shawn Lenci (front), Sandie Pugh, Dave Banks, Jim Thomas, Dave Johnson, and Ken Eaton."

(image: Jim Thomas)

This is the third and final part of a three part series. To get the whole story, you'll want to read [the first](#) and [second part](#) (if you haven't already) and then this article. Once again, we're featuring author and reader photos of Dodgson Designs aircraft and we thank all of them for the opportunity to present them here. — Ed.

Well, the 100-inch Todi proved to be the first successful multi-channel competition glider kit in the United States. All of the other successful competition gliders had only rudder and elevator control while some of them did have spoilers also.

The Todi used the first two-control mixer, the Dodgson Coupler, in the model glider industry to mix flaps and ailerons — producing flapperons. Moreover, the coupler incorporated an elevator trim bar to feed in precise amounts of down elevator as the flaps deployed to compensate for the trim change caused by the flap deployment. The Todi did not need spoilers to win contests all across the U.S. and Europe. In fact, half of our Todi and Maestro sales were overseas where our kits were heralded as the wave of the future and won many major and national contests in England, Germany, Norway, Finland, etc.



"Dave Banks holding his 1989 Nationals winning Pixy. Dave won 2-meter by far and he also had the highest score of any sailplane class that year." (image: Bob Dodgson)

The Maestro series of gliders was introduced in 1974. The Maestros used the same control system as the Todi but added spoilers as well. They were larger

and most of the Maestro models had a wingspan in the 134-inch range. However, the Maestro Caliente had a wingspan of 99.5" and could compete in the 100 inch class as well as in open class. The Maestro Megan could be built with either a 128" or a 140" wingspan.

All through the 1970s and 1980s most other competition kits still had polyhedral wings and used rudder, elevator and spoiler control systems only. Not so with Dodgson Designs kits! Toward the end of the 1970s, some of the competition flyers of our Maestro kits even started putting separate flaps and ailerons on them rather than using flapperons. In 1979, Dodgson Designs recognized this as a serious option for our kits even talking about it in our catalog.

Then, in 1980, we came out with the Camano to replace the Todi. It was the first successful thermal competition glider kit to come stock with separate flaps and ailerons. The early Camanos also had spoilers. I was still not completely confident in just using flaps for precision landing control.



"This is Steve Bowman's Windsong Sorry to say we lost Steve a few years back — RIP."
(image: Craig Christensen)

However, it was not long until Camano flyers like Dave Johnson discovered

that 90 degrees of flap throw provided the best landing control around. Soon the spoilers came off the Camano and we went to foam core wings.

In 1982, I drove our little Odessy motor home on a Toyota chassis back to the AMA Nationals (Nats) at Lincoln, Nebraska. I was accompanied by several of the top flyers in the Northwest Soaring Society at that time including Tom Brightbill (multiple Nats winner), Tom Neilson (Nats winner), Dave Johnson (multiple season champion, etc.) and Tom Culmsee (Nats contest director). Most of us were campaigning Camanos and Maestros in open class and K-Minnows in two-meter class that year. The K-Minnow was a T-tailed version of the Camano with two-meter wings. It used the same revolutionary control system. We had recently pioneered the use of foam core balsa sheeted wings on the Camano and K-Minnow. These were the first successful competition glider kits to use solid core wing construction.



"Dave Banks spot landing his 'song. Steve Cameron timing." (image: Waid Reynolds)

On the long drive home, the Windsong concept was born in a kind of think-tank atmosphere. We all liked the size of the Maestro MK III with its 134-inch wingspan, but we wanted the more precise control system of the Camano

along with a higher performance wing, using the unheralded Eppler 214 airfoil. We also wanted a wing that would be easier to construct than the sheeted spar and rib construction of the Maestro, Todi and the first Camanos. The basic design concepts were pretty well solidified on that long journey home from Lincoln. However, I still had lots of decisions to make and details to figure out.

PRICE LIST
Effective March 1, 1983

SARATOGA WINDSONG

Windsong Kit, Complete . . .	\$199.95	Canopy, Fiberglass	\$ 7.00
Fuselage & Canopy (Fiberglass Only)	45.00	L-2 Flap Linkage	6.50
Fuselage Kit, Complete (Fiberglass, Hdw & Wood Parts)	70.00	M-2 Trimable Aileron Mixer . .	4.95
Wing Kit	109.00	Wing Rod, 5/16"Dia.x10"	1.50
Stab Kit	20.00	Set Detailed Plans (3 sheets)	10.50
Rudder Kit	10.00	Set Building Instructions . . .	2.50
		Foam Wing Cores Only	\$ 75.00
		Vacuum Aileron Pushrod Fairings Pair	3.00

CAMANO 100 & 100F3B

Camano 100 w/E193, Complete	\$159.95	Foam Stab Kit	\$ 15.00
Camano 100 w/E205, Complete	159.95	Foam Stab Core Only	7.50
*Camano 100 w/E214, Complete	159.95	Rudder Kit	8.00
Camano 100F3B w/E193, "	164.95	Vacuum Formed Canopy	3.50
Camano 100F3B w/E205, "	164.95	Canopy Base, Balsa & Plywd	3.50
*Camano 100F3B w/E214, "	164.95	L-2 Flap Linkage	6.50
Fuselage (Fiberglass Only w/Canopy)	35.00	Wing Rod, 10"Lx1/4" Dia. . . .	1.50
Fuselage (Wood/Deck/Fin Pieces)	15.00	*Wing Rod, 10"Lx5/16" Dia. . .	1.50
Fuselage Kit, Complete . . .	50.00	Set Detailed Plans & Bldg. Inst.	10.50
Foam Wing Kit	89.00		
Foam Wing Cores Only	55.00		

K-MINNOW

K-Minnow w/E193, Complete . .	\$149.95	Foam Stab Kit	\$ 15.00
K-Minnow w/E205, "	149.95	Foam Stab Core Only	7.50
*K-Minnow w/E214, "	149.95	Rudder Kit	8.00
Fuselage (Fiberglass w/Canopy)	35.00	Wing Rod, 1/4"Dia.x6-1/2" . .	1.50
Fuselage (Wood/Deck/Fin Pieces)	15.00	(See CAMANO 100 prices for other parts.)	
Fuselage Kit, Complete . . .	50.00		
Foam Wing Kit	89.00		

*This configuration sent as
standard unless otherwise
specified.

ACCESSORIES

Transfer Tape, 3/4" x 36 yd. (for applying sheeting: 2 rolls required for Camano 100 and K-Minnow 3 rolls required for Windsong)	\$ 5.00/ Roll
Frost PCI-2, 12-volt Charger	39.95

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we pay the shipping cost by United Parcel Service or Surface Parcel Post within
the U.S. Shipping is via U.P.S. where possible. There will be a \$9.00 charge
on any returned checks.

-12-

"Man, those were the days." (image: Kristopher Harig)

At home, I carved the plug for the first fiberglass Windsong "taco-shell" fuselage. This innovative idea, first used with the Camano, made it possible to have a graceful fiberglass fuselage that used spruce and plywood

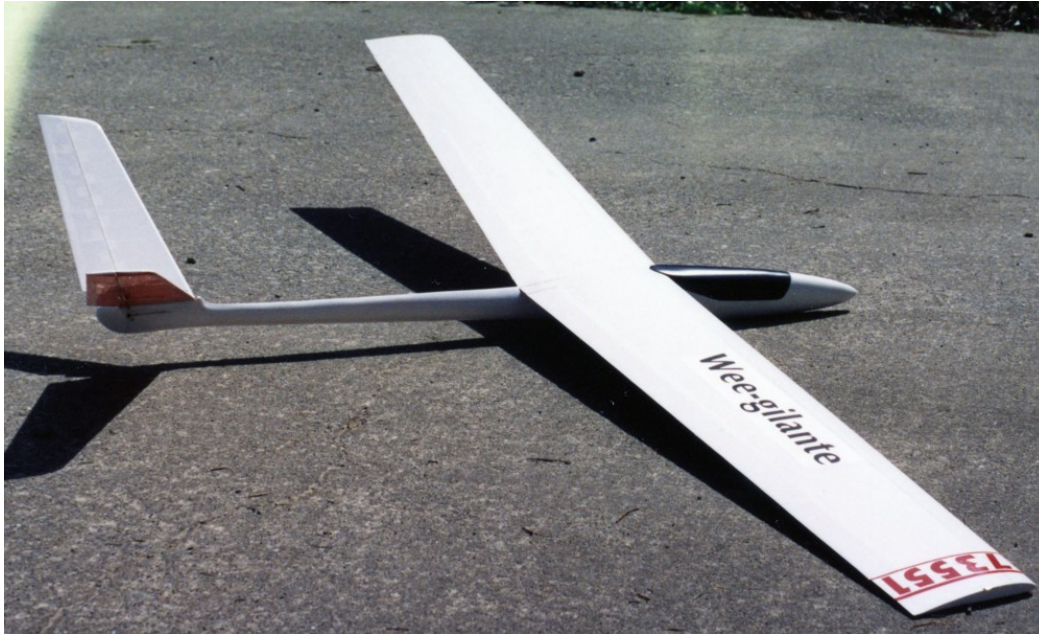
reinforcing inside and balsa and plywood for the top deck. It was easier to produce, stronger and more heat-stable than an all-fiberglass fuselage of the day. It was decided to go with foam core, balsa sheeted wings to simplify construction. As first used on the Camano, I figured out an efficient spar system and used lightweight foam to come out with wings that were stronger and yet as lightweight as equal sized built-up thermal glider wings.

While I was building the first Windsong prototype, I heard of a new full-sized German glider that could reflex the ailerons to function as spoilers. This idea got me to thinking. I have always loved simple and elegant solutions to complex problems. So, I decided to not put spoilers on the new Windsong and rather use separate flap control and ailerons that could reflex. I wanted to be able to reflex the entire trailing edge (TE) for high-speed flight anyway, so I would already have all the necessary functions in place. I worked out all the mechanical mixing systems and had the prototype Windsong flying in a few weeks after the trip to Lincoln. Its performance was breathtaking. I had seen nothing like it! At the time there were no computer radios, but the mechanical systems worked great and having all four servos in the fuselage kept the weight forward and gave me a Windsong that flew at about 54 ounces. The aileron spoiler effect used in conjunction with positive flaps was a real crowd stopper. No one had ever seen anything like it.



"Modified Camano and a Pixy against the fence with an Anthem in the foreground." (image: Tim Egersheim)

There it was in 1982, the control system, complete with 'crow' that many years later would become the industry standard and still is to this day. In fact, when computer radios started coming on the market in the late 1980s, they used the Windsong control system as the glider model that they were trying to emulate electronically. Even today the competition DLG gliders use the same basic control system that was introduced on the groundbreaking Todi in 1972.



"And the 2-Meter Wee-gilante." (image: Bob Dodgson)

Also, with the Windsong, we learned that 90-degrees of flaps was about the best precision landing control and so seldom used the aileron-spoiler function except to help dethermalize. In what became known as 'crow', with ailerons up and full positive flap, the Windsong could be pointed straight down dethermalizing at a safe speed of about 40 mph! No other thermal competition glider could dethermalize so fast and yet so safely and so spectacularly!

One of the most exciting sights that was unheard of at the time was watching Dave Banks regularly thermal out with his Windsong from a hand-launch! This is captured on our Dodgson Designs video tape that uses footage shot between 1983 and 1986. 134-inch multi-channel gliders should not be able to do this!



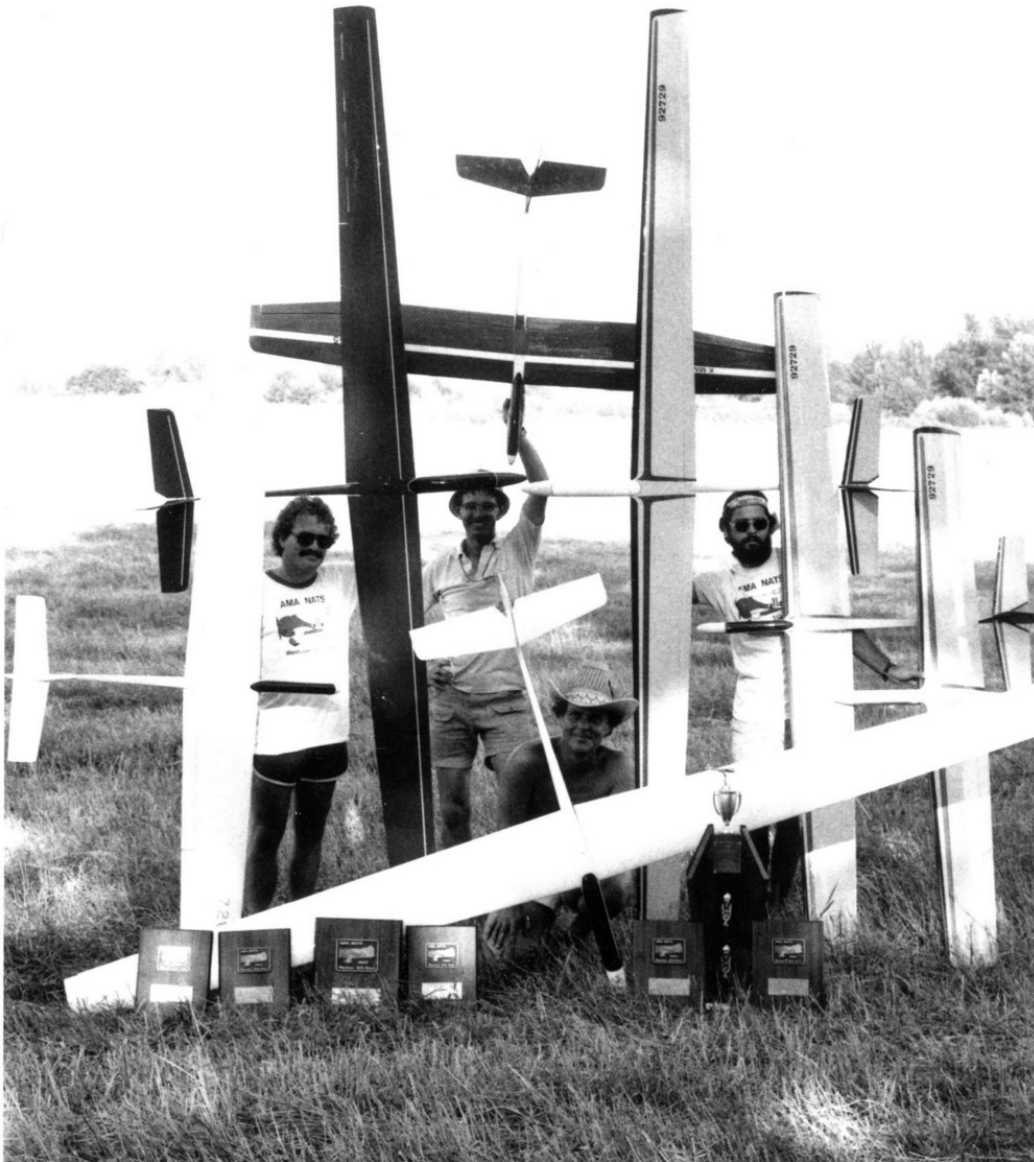
"Walt Volhard's Dodgson Saber at 60 Acres Park, Redmond, Washington 1991."

(image: Waid Reynolds)

Well, the Windsong, and its smaller brothers the Camano and two-meter Pixy, went on to win the Nationals many times flown by people like Tom Brightbill and Tom Neilson. Even I placed second at the Nationals with both the Windsong in 1983 and again with the Pixy at a later time.

The Windsong design evolved into the Lovesong that was a beefed-up version of the Windsong. We improved the mechanical control system too, using the Automatic Flap/Aileron Reflex Trim (AFART) devised by Windsong flyer Gary Brokaw.

Another interesting first for Dodgson Designs in the early 1980s was the introduction of the Pivot. The Pivot was the first successful thermal glider to utilize pivoting wings (wingerons) for aileron type control. This control system had been used some on the slope, but no one had come up with a successful thermal glider kit utilizing this simple control system. The Pivot was the first hand-launch sized thermal glider to use foam-core wings too! It won hand-launch as well as two-meter thermal contests and continued to be one of our most popular designs until we ended our kitting business in 1997. The Pivot could be taken apart easily too so that it could be carried around in its tiny shipping box to be a constant travel companion ready to do great flying at any slope or thermal opportunity.



"The Dodgson Designs planes that won a host of trophies at the 1983 Nationals Left to Right: Tom Neilson — K-minnow & Windsong, Dave Johnson — modified Sprite (I think), Bob Dodgson — Windsong and Tom Brightbill — Windsong, Camano and K-minnow." (image: Bob Dodgson)

In 1990, we introduced the Saber which had two firsts for a U.S. kit. It was the first thermal competition glider kit to use the SD7037 airfoil. This airfoil showed great promise from the wind-tunnel tests but had been passed over by designers and pundits — until the Saber. The Saber was also the first U.S. kit to use obechi sheeting for the wing skins. It was not long until the SD7037 airfoil became one of the most popular airfoils following the Saber's

successes and obechi sheeting became an industry standard.

Soon after the success of the new Saber, we updated the Windsong/Lovesong using the Saber wing technology and airfoil and called it the Anthem. However, many folks still preferred the Eppler 214 airfoil that the mighty Windsong made famous, so we finally offered an obechi sheeted Windsong Classic and lastly the Windsong Silver in honor of Dodgson Design's 25 years in the glider design and kitting business.



"Ray Cooper holding a Windsong — Dave Banks on right at 60 Acres Park early 90s." (image: Waid Reynolds)

In the early 1990s, we replaced the venerable Camano and Pixy with the 98-inch V-gilante and the two-meter Wee-gilante. These kits featured Saber wing technology along with V-Tails. They used a new Mono-Seam fiberglass fuselage that I developed. This fuselage had the production advantages of the taco-shell fuselage but offered the kit builder the construction ease of a fully formed and joined fiberglass fuselage. These beautiful glider kits offered all the controls that the Windsong had pioneered. They were popular in their size classes until we ended our kitting business.



"Me and my Windsong in 2016." (image: Bob Dodgson)

In 1994 I experienced a serious health problem called Churg Straus Syndrome. After recovering and with some minor lasting physical limitations I was able to continue the kitting and design business –but with more caution as all of the fiberglassing and foam cutting chemicals and the balsa dust

exposure might have been a factor in my getting sick.

Then, by 1997, it was evident that serious thermal competition glider pilots were going to expensive pre-built gliders using all space-age materials and they were being manufactured offshore. It was no longer profitable to continue designing and manufacturing high performance competition builder kits. So, I had an opportunity to go to work for Boeing in 1997 and I closed the doors to Dodgson Designs.

Jim Thomas, flying a Windsong (a 20-year-old design) that he had just finished building, placed third at the huge 2002 Visalia, California contest. He was in first place until the final flight where he lost 10 landing points by 3/4-inch and had to settle for third — showing that the mighty Windsong can still kick state-of-the-art butt!

When I was 70 years old I retired from Boeing after working there for 10 years plus two years of working at Star Aviation during a Boeing layoff. To my surprise, after we closed Dodgson Designs I did very little glider flying. I had lost my boundless passion for it — having turned my great hobby into my job for 25 years. I have since been enjoying other old hobbies like music. I was never musically talented but when I was kid my Dad gave me some singing lessons to try to help with my stuttering since I don't stutter when I sing. Well that did not help my stuttering but it did improve my singing and pitch from awful to not too terrible. So, I have been enjoying singing along with my old guitar.

I recently saw a unique new opportunity since my Dad had an 8mm movie camera in the mid 1930s and onward and took a lot of good family movies. I have used some of those movies along with movies that Sandy and I took and even videos that we took after 1982 to put with songs of me singing with the guitar on my YouTube channel (see *Resources*, below). The channel also

has the shortened Dodgson Designs glider video that I made from old footage for my Hall of Fame Induction.

Needless to say the 2019 Model Aviation Hall Of Fame induction has been the highlight of my fun retirement years and I am still enjoying each day with my wonderful lady and titillating marital partner of 58 years this December. Moreover, I still thrill at the passion and the unique opportunity that so many wonderful glider flyers afforded me by building and flying my kits during our 25 years of the Dodgson Designs business. Thank you all for making my passion and dreams live for me and for my family. You will always keep my spirits soaring!

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Resources

- [The Last Troubadour](#) (Bob Dodgson's YouTube channel)

For those who have enjoyed entering the 'turn back time machine' with Bob, RCSD has obtained his permission to rerun articles from Second Wind, the much-loved Dodgson Designs in-house publication. We look forward to bringing those to you in the future.

Finally, RCSD would like to thank both Bob and the AMA History Project for permitting the use of the AMAHP document as a source for this series of articles in RCSD. In particular, we would like to thank Jackie Shalberg, Archivist and Historian for the National Model Aviation Museum, for the assistance in making these arrangements. — Ed.

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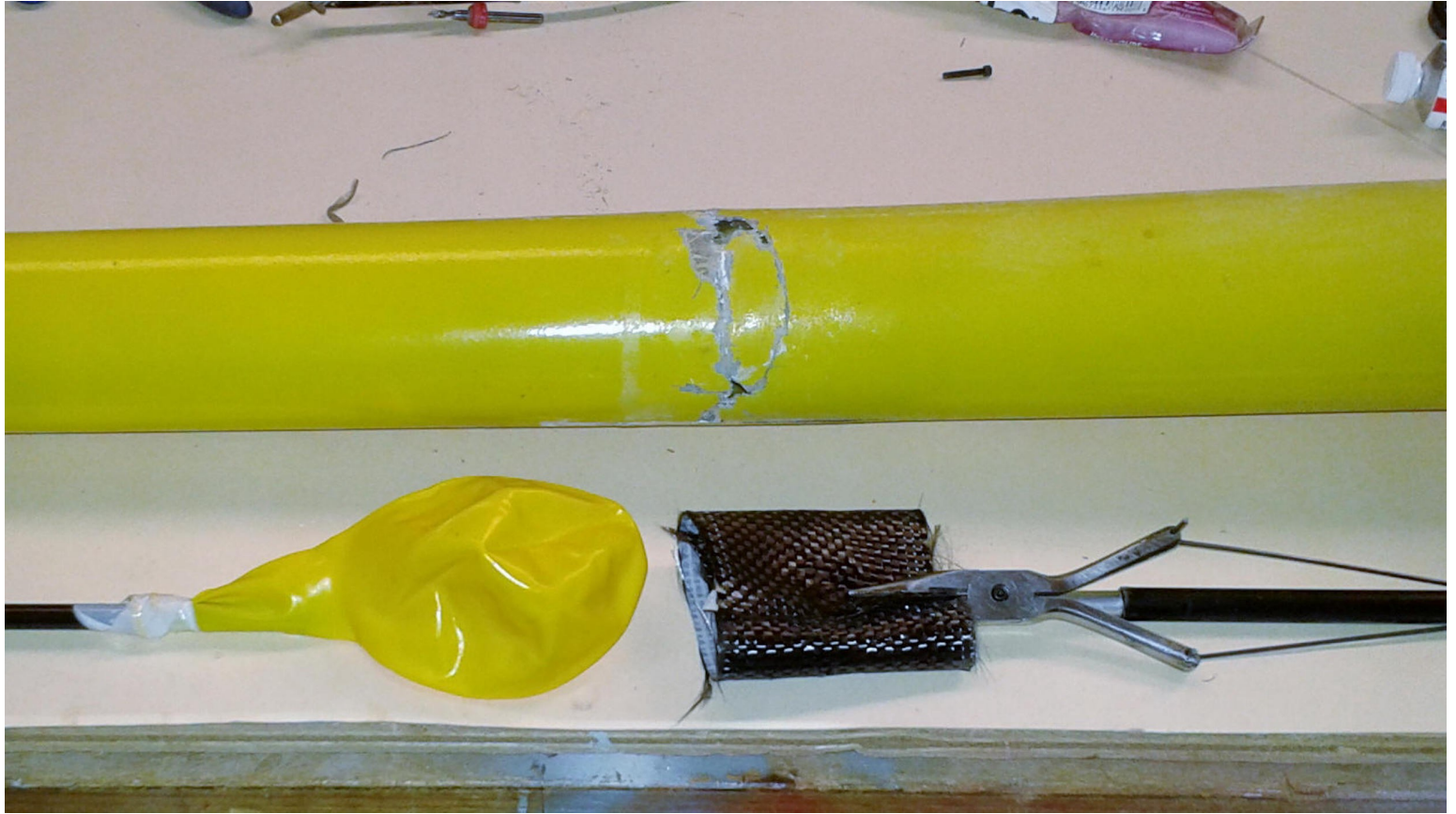


Photo 1: The Extra Long Reach Pliers in action, fixing a wayward Aquila XL fuselage.

Extra Long Reach Pliers

The perfect tool for repairing that long, skinny fuselage.



Tom Broeski

Follow

Jul 7 · 3 min read

I have a couple of long reach tools, but none long enough for what I was working on. I've had a need for something that could open and close and get way down in a fuse. Soooo... I needed to make something...



Photo 2: There are a number of types of long reach tools available. Here are a couple of mine — they get a lot of use.



Photos 3 and 4: The first thing I did was look around at what I had extra of. I had an old set from Harbor Freight that cost \$5, so I picked out one that was not too long and not too short.



Photo 5: I grabbed a 3ft fiberglass tube (carbon will work fine also) from my stock. This one looked good.



Photo 6: I marked where they should be cut off.



Photo 7: I was thinking of keeping the springs, but later found them unnecessary.



Photo 8: After cutting and grinding, I drilled a couple of holes for the pushrods.

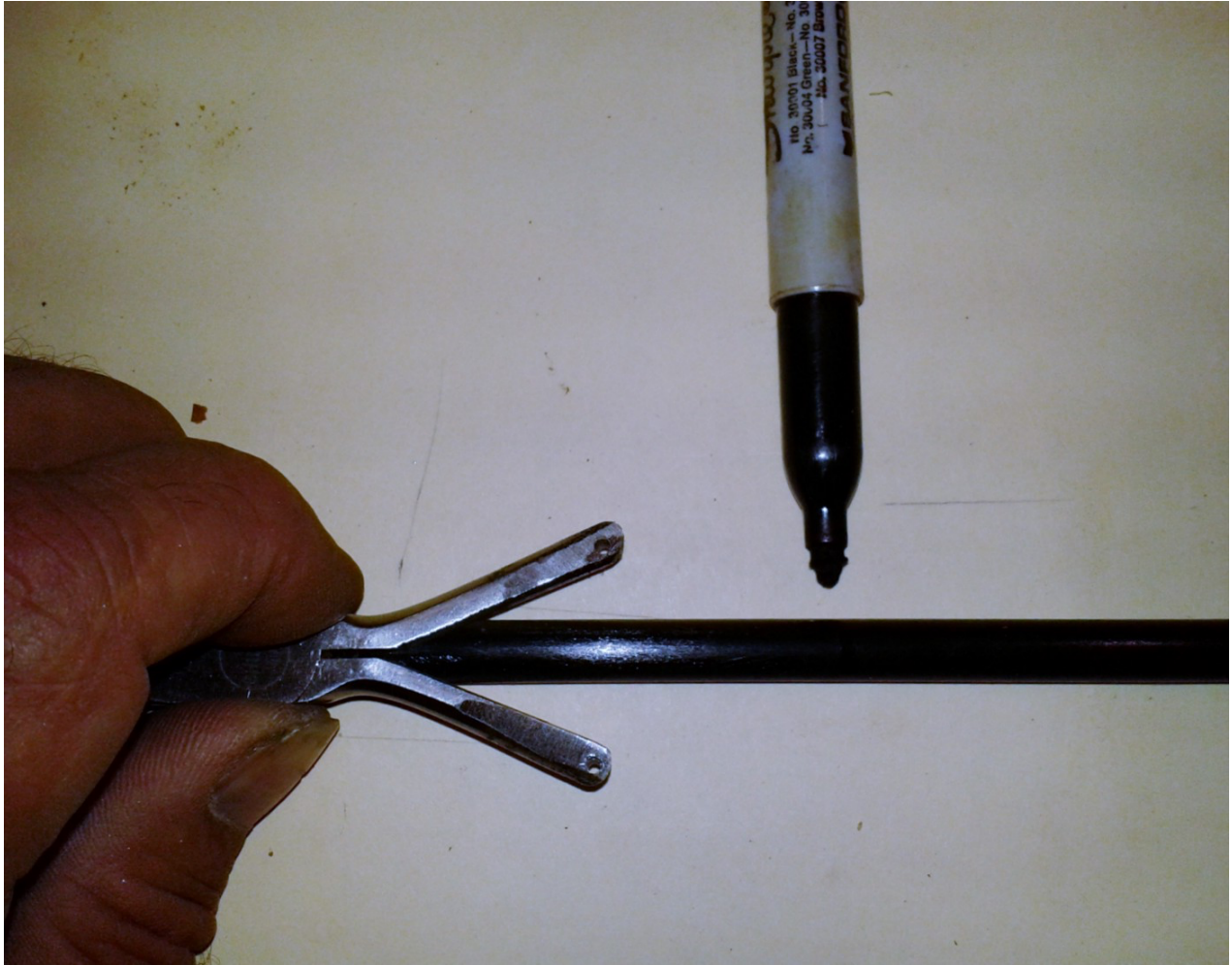


Photo 9: I marked a place that look reasonable for the pushrods to exit.



Photos 10 and 11: I cut a slot in each side of the tube about 3/4 in long.



Photo 12: I drilled through the center of the pliers, took a piece of aluminum rod, turned down one end to fit the tube, drilled and tapped it for a tiny socket head cap screw. You could just as easily fill the rod with epoxy or a dowel and put the pliers right on the rod. Just account for that when making the slots.

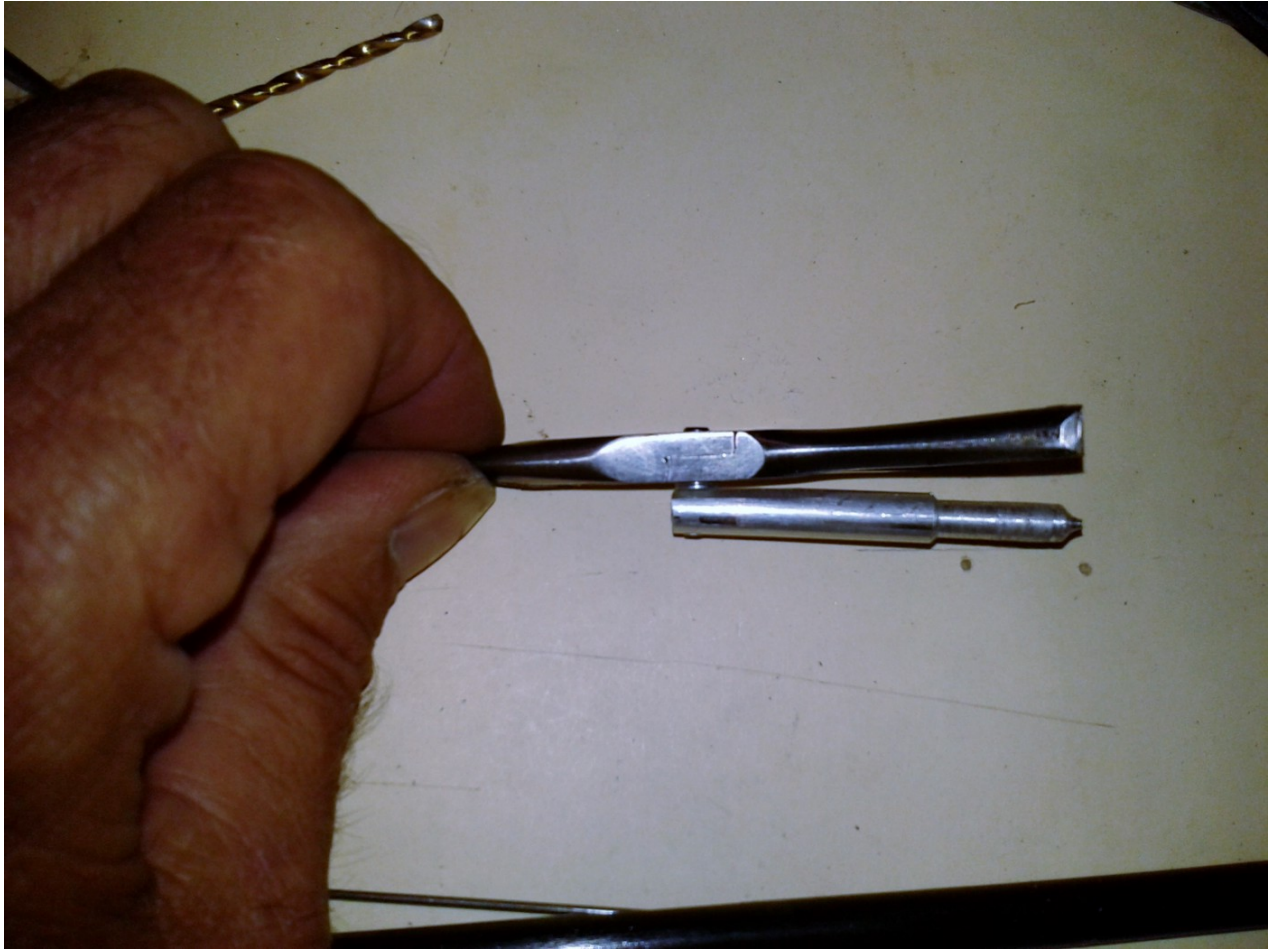


Photo 13: I added the washers as spacers and screwed it together.



Photo 14: Glued it in the tube. Then I inserted some music wire into the slots in the tube and bent the ends at 90 degrees.



Photo 15: Put the rods into the holes in the handle and...

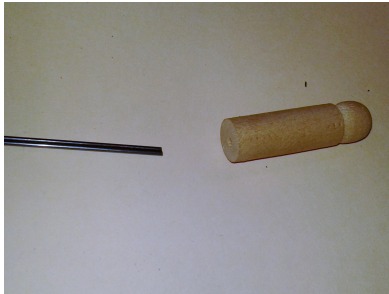


Photo 16 and 17: ...went way down to the other end and made a simple handle out of a dowel and...

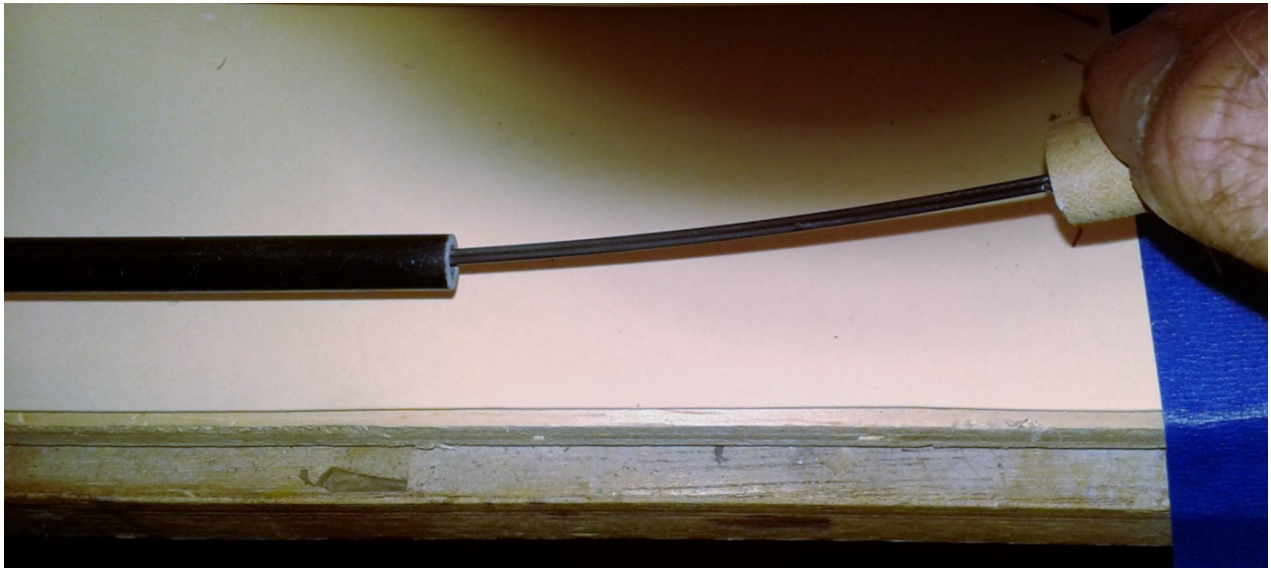


Photo 18: ...glued it on.



Photo 19: Left plenty of rod out the end so it could flex if necessary.

And there it is. It worked amazingly well. 45 minutes work — that I wish I had spent years ago when I was building (and repairing) a lot of planes. Here's how I used it to repair an Aquila XL fuse.

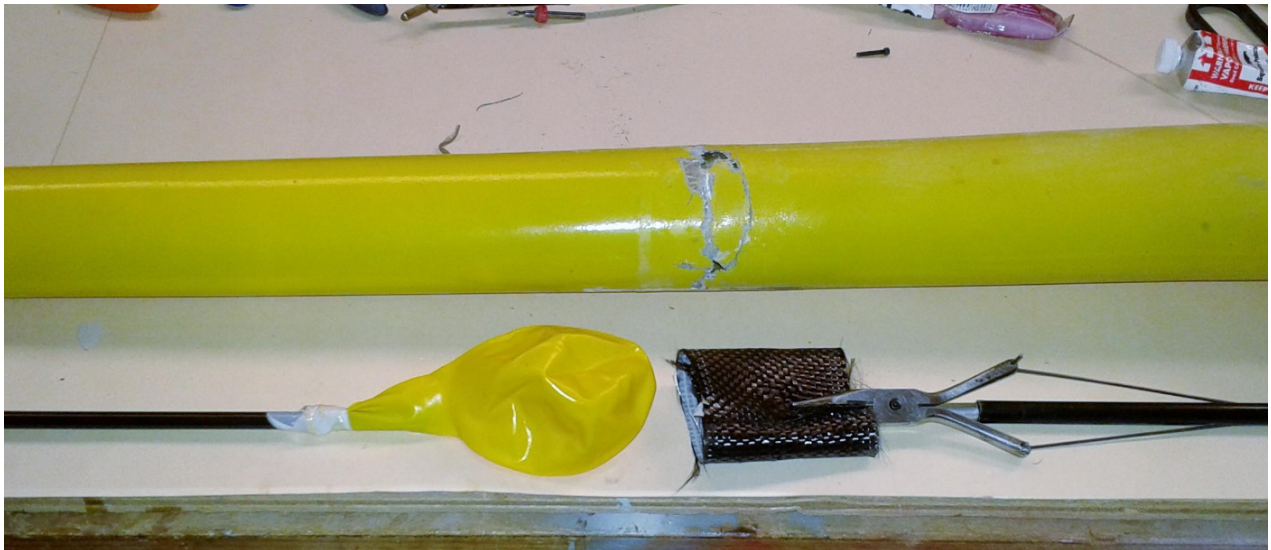


Photo 20: Long reach pliers and a tube with a balloon.



Photo 21: Marked where the pliers and cloth should end up.

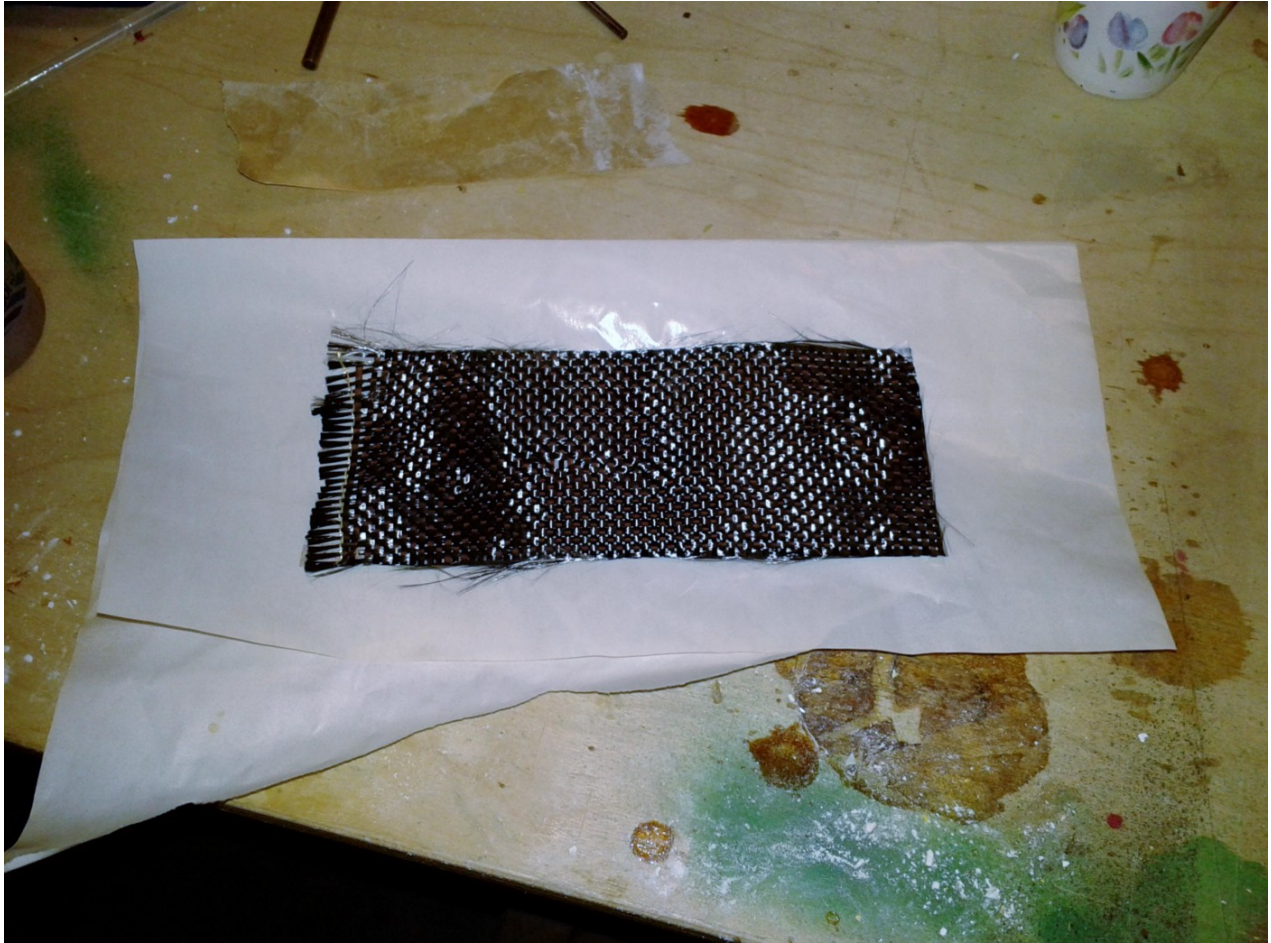


Photo 22: Cut and wet out a piece of carbon cloth.

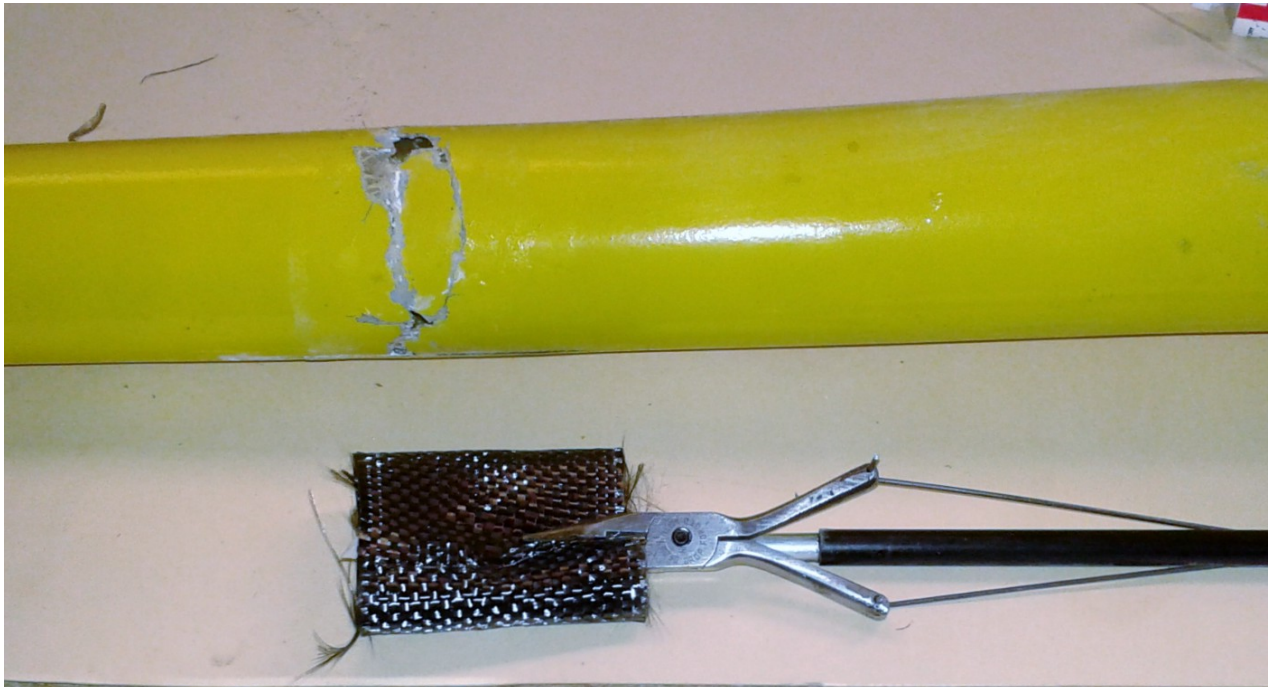


Photo 23: Rolled it and grabbed it with the Extra Long Reach Pliers.



Photo 24: Stuck it down in the fuse and released it.



Photo 25: Put a little extra epoxy in the big holes. I had dripped in some extra epoxy before running the cloth in also.



Photo 26: Ran the balloon in to the right spot and blew it up gently. Then blew hard to pop it and pulled it out. I did it again with a surgical glove since I ran out of balloons. I left it in until the epoxy got tacky and then blew until it popped and pulled it out.



Photo 27: The nose on this Aquila was fuse totally demolished, but I managed to put Humpty Dumpty back together again. After some sanding and filling, the fuse came out great.

'Til next month!

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In-Flight Setting of a Multi-Point Trim Curve for Crow Brakes

A Lua app for JETI transmitters inspired by Mike Shellim's recent RCSD article.

[Harry Curzon](#)



The JETI DS-24. (image: JETI model s.r.o.)

In the April 2021 issue of the NEW RC Soaring Digest, I was delighted to see the article *I've Got the Power: OpenTX* by Mike Shellim (see *Resources*, below) in which he describes his crow aware trim Lua application. At the time, Dave McQueeney and I were finishing the development of a Lua app for JETI transmitters which was inspired by Mike's work. We published it on May 22nd, 2021 along with a YouTube training video. The app will do the setting for you of a multi-point curve of elevator trim compensation for crow

brake/flaps/spoilers, whilst in flight, without you needing to take your eyes off the model or your fingers off the sticks. This saves you from the many iterations of fly, land, adjust, fly, land, adjust, to set a trim compensation.

The app takes Mike Shellim's wonderful idea and develops it further, so that instead of taking your fingers off the sticks to press the trim button, it uses the movement of the elevator stick itself to adjust the relevant point on a trim compensation curve. JETI users will be familiar with this concept, from the *Auto-Trim* feature. The result is that all you need to do is slowly open the crow brake/flaps/spoilers, just keep flying the model to the attitude that you want, and keep going until you have the brakes fully open. As you do this the app chooses the correct point along the trim compensation curve, and the elevator stick moves that point to the required up or down trim. Within one or two flypasts you can get a perfect trim over the entire movement of the brake. You can do it on a maiden flight so that your first landing does not suffer from wild pitching up and down as you operate the brakes or flaps.

Photo 2 shows a graph of a seven point curve created by the app on the transmitter home screen, demonstrating the non-linear nature of the elevator trim compensation required with crow brakes.



Photo 2: A seven point curve created by the app.

Photo 3 shows the choices available in the app settings menu.

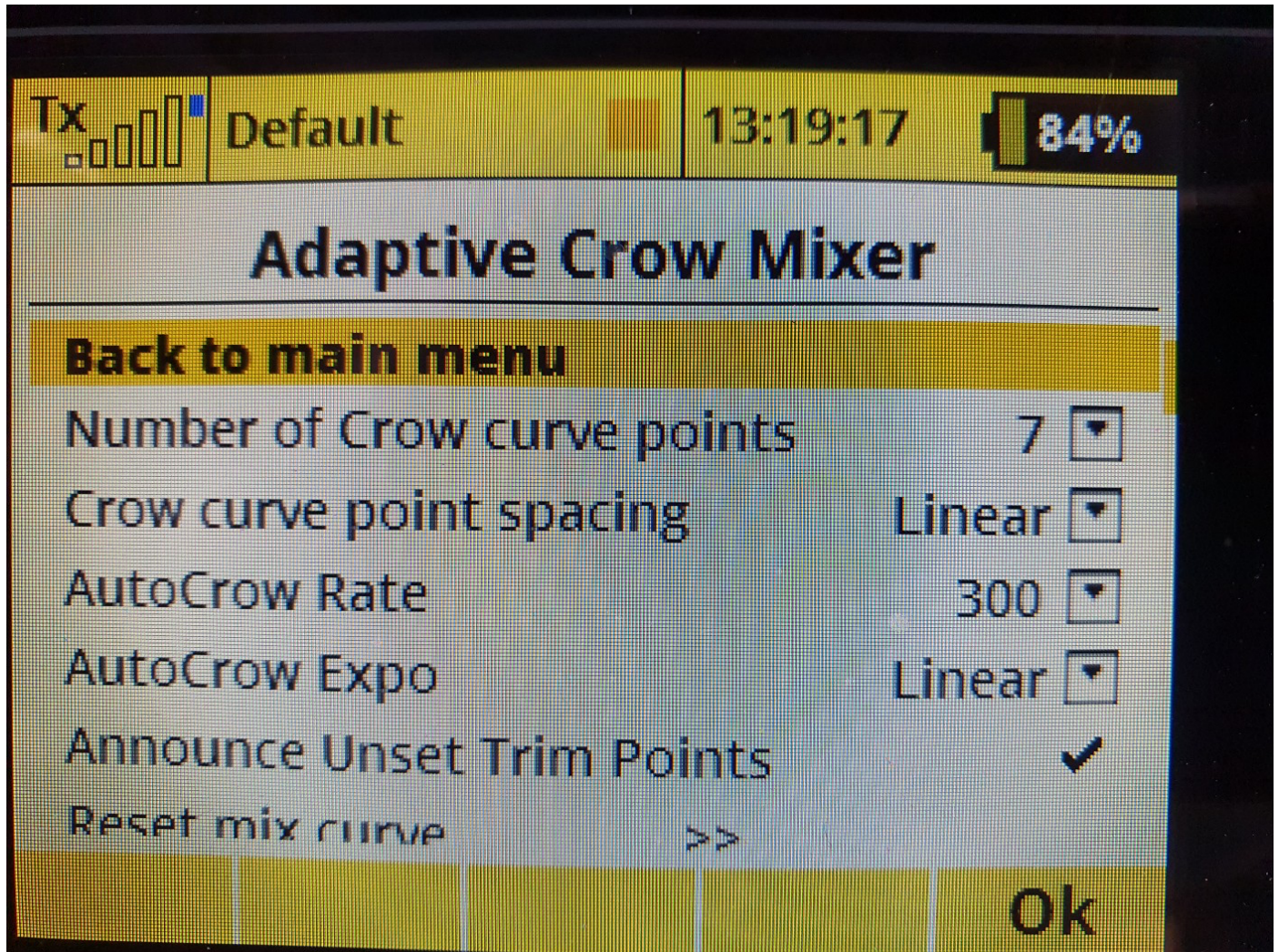


Photo 3: Adaptive Crow Mixer settings menu.

The app, which works on all the JETI transmitters, is available from JETI Studio but you will need to watch the training video to see how to enable that feature in Studio.

Jeti - auto-trim a multi point curve for crow brake (butterfly) elevator co...

Video 4: *JETI — Auto-Trim a Multi Point Curve for Crow Brake.*

Note that the video above is in English, but if you switch on subtitles and then use options you can select it to auto-translate the subtitles into most languages.

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Resources

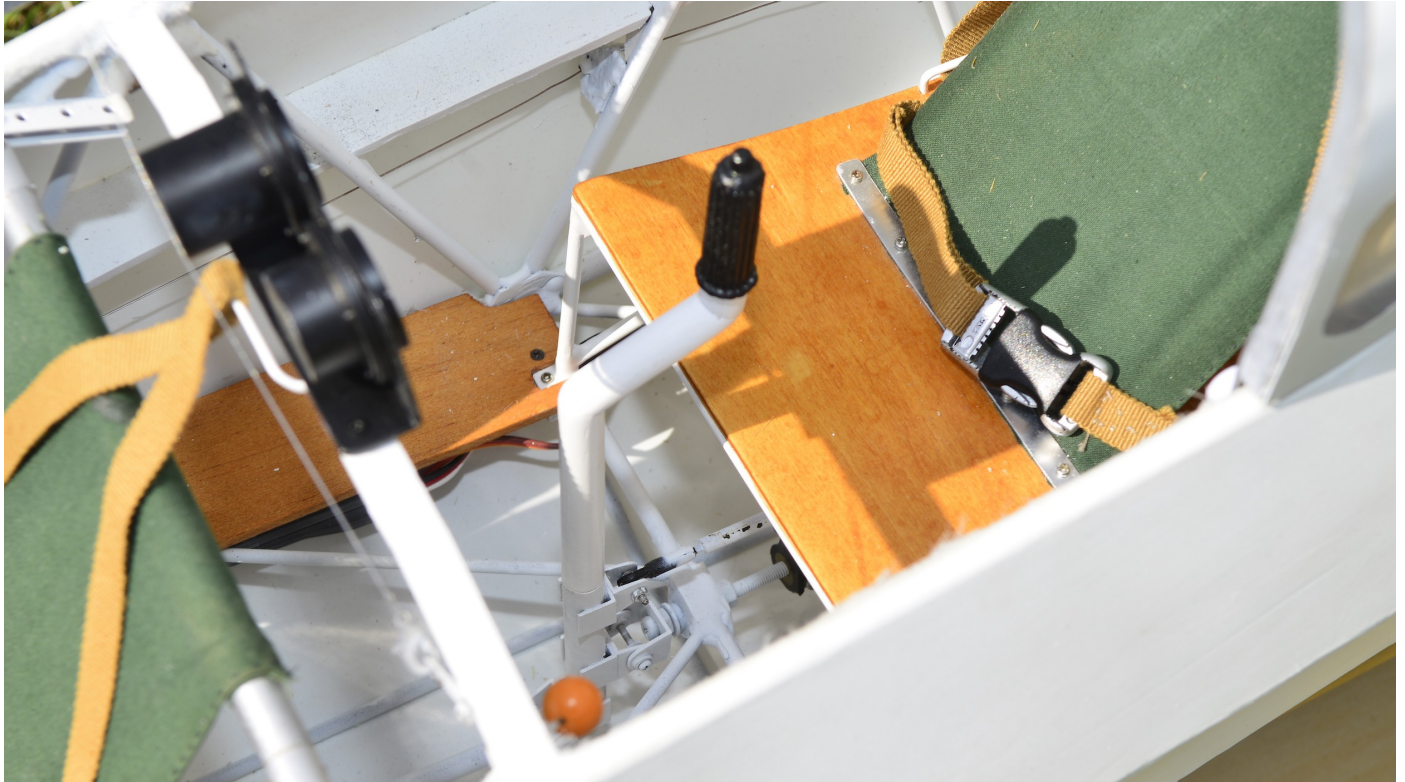
- [I've Got the Power: OpenTX](#) (article by Mike Shellim)
- [JETI for Gliders](#) (video series)
- [Lua Programming Language](#) (Wikipedia article)

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](#).

1/3 スケール三田式 3 型改 1 製作記

マルチパートシリーズの第4部。

[Norimichi Kawakami](#)



If you prefer you can read the [English translation](#) of this article, which was provided by the author. この記事に進む前に、このシリーズの [第3部](#) を読むことをお勧めします。

製作その11 翼端

実機の翼端

実機は主車輪が一輪式なので低速では必ず左右どちらかの翼端が地面に接します。そのため翼端には小さな補助車輪が付いています。画像58がその写真

です。

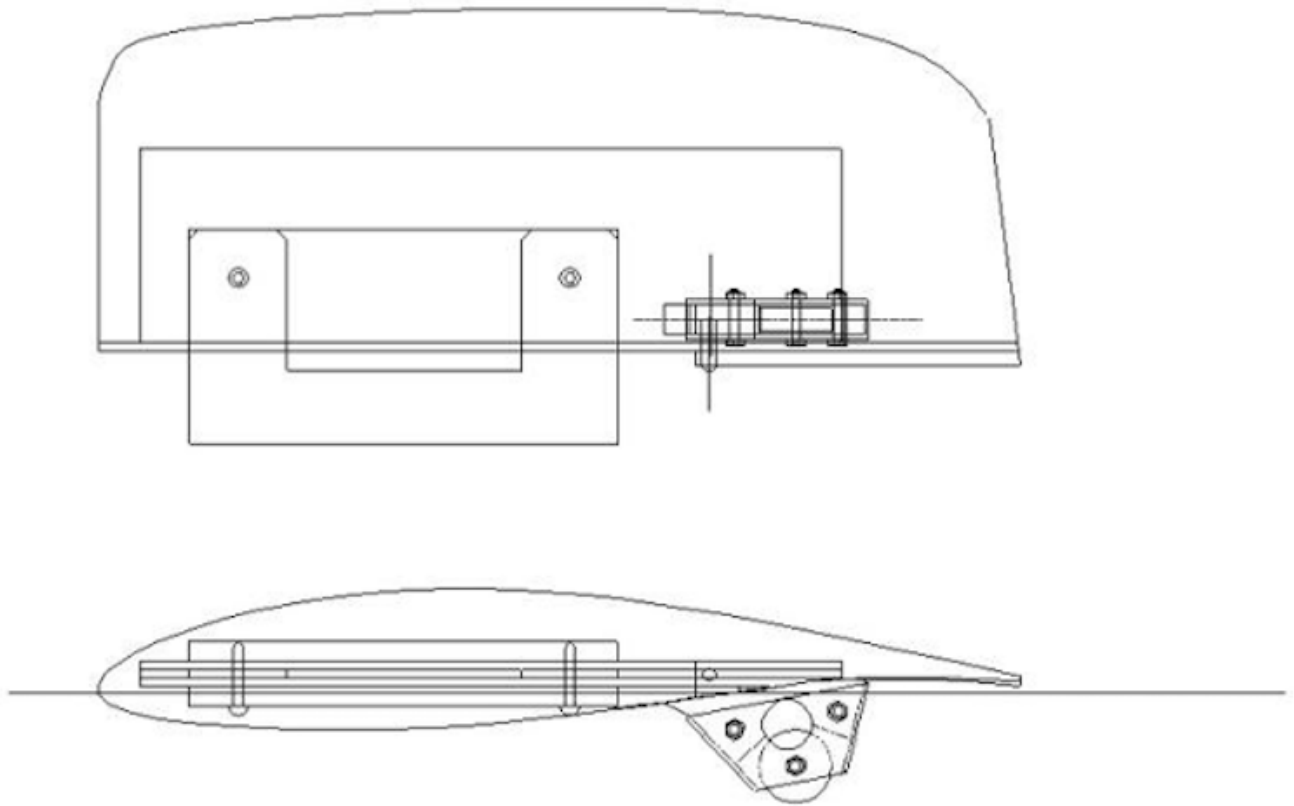


画像58 実機の翼端

この車輪の付いた翼端の1/3模型を製作しました。

図面

まず図面を製作します。実機の翼端は取外しができませんが、1/3模型ではエルロンを外側から嵌める方式にしたので、翼端は取外し可能に設計します。図面20が作成したものです。外翼に取り付けた2mm厚のアルミ金具を翼端に挿し込んでねじ締めする構造です。補助車輪は直径15mmの小さなものになります。その取付機構も実機と同じような構造に設計しました。



図面20 翼端の図面

部品製作

図面を基に製作した部品が画像59です。

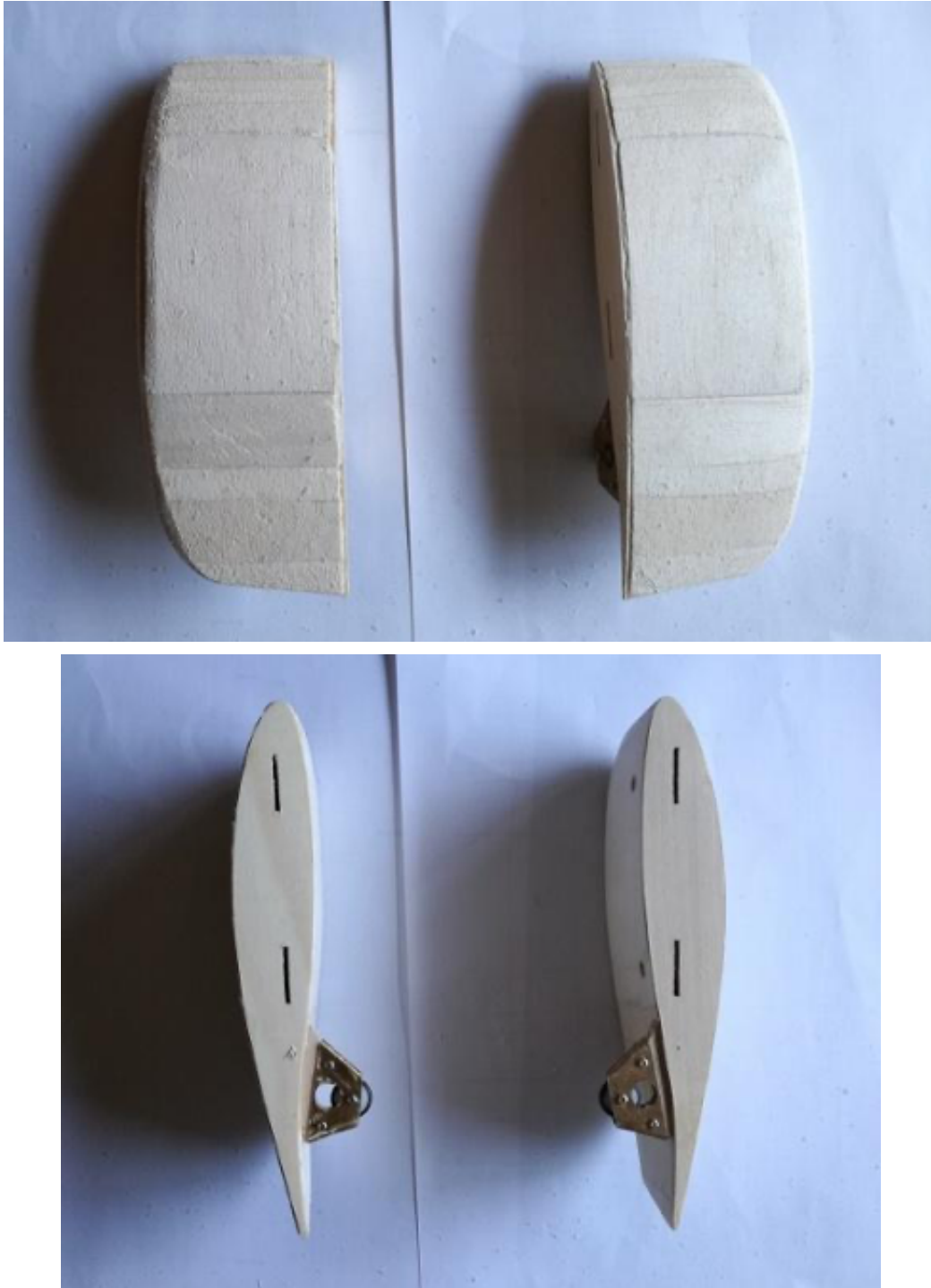


画像59 翼端用部品（片側分）

アルミ金具が挿し込まれる部分は1.6mmのシナベニア2枚で2mm厚のバルサを挟む構造です。ネジ留めする部分には4mm厚のシナベニアを貼って受けとします。それらを中心に翼の厚さ分だけバルサを重ね貼りします。翼端でも結構な翼厚があるのでかなりの枚数のバルサを切出しました。もっと厚いバルサを使用すれば枚数は少なくて済みますが、屑バルサを使用したので片翼で10枚以上の重ね貼りとなります。上記写真の部品は片翼分です。補助車輪を取り付ける部分は5.5mm厚シナベニアを核にして、0.5mm厚真鍮2枚で挟んで車輪を取り付けます。

荒削り完の翼端

バルサを貼り合わせそれをヤスッテ翼端形状に粗削りにして補助車輪を仮取付しました（画像60）。



画像60 粗削り状態の翼端

最終形状より1mm弱厚い状態でヤスリかけを終えています。外翼のプランク貼りが完了した段階で外翼に取り付けて、全体形状がスムーズに繋がるように最終ヤスリかけをする積りだからです。

車輪は本当はもっとゴム部分が厚いものが欲しかったのですが、直径15mmで

適当なものが見つからないので、このようなものになってしまいましたが、略、実機に似た形状の翼端ができました。

翼端の完成

後日外翼の本地完の時点で翼端を整形しました。その後凹みにパテを塗って最終整形をしてからサンディングシーラーを塗って、乾燥後細目紙やすりを掛けて表面を綺麗にしました。この作業を2回繰り返してから、1000番のサーフェイサーを吹きかけて、その後赤色アクリル塗料で塗装して翼端が完成しました（画像61）。因みに重量は外翼への取付ネジを含めて各々58gでした。



画像61 完成した翼端

方針変更

機体の分割方法については基本方針その1で車での運搬を考慮して決定していましたが、これまでに完成したものを使って実際に搭載チェックした結果、主翼の分割方法を変更することにしました。

車への搭載チェック

主翼の骨格と胴体後部が出来上がったので、実際に車へ積んで確認しました。まず外翼です。画像62のように、ギリギリですが助手席を倒さなくても搭載できることを確認しました。



画像62 車への外翼搭載性チェック

次に胴体です。胴体は水平、垂直尾翼共取外し可能な作りにしましたが、それらを取り外してみると後胴は意外に細いことが判りました。これならば運転席と助手席の間に飛び出しても余り邪魔になりそうもありません。それで実際に積んでみました。



画像63 車への胴体搭載性チェック

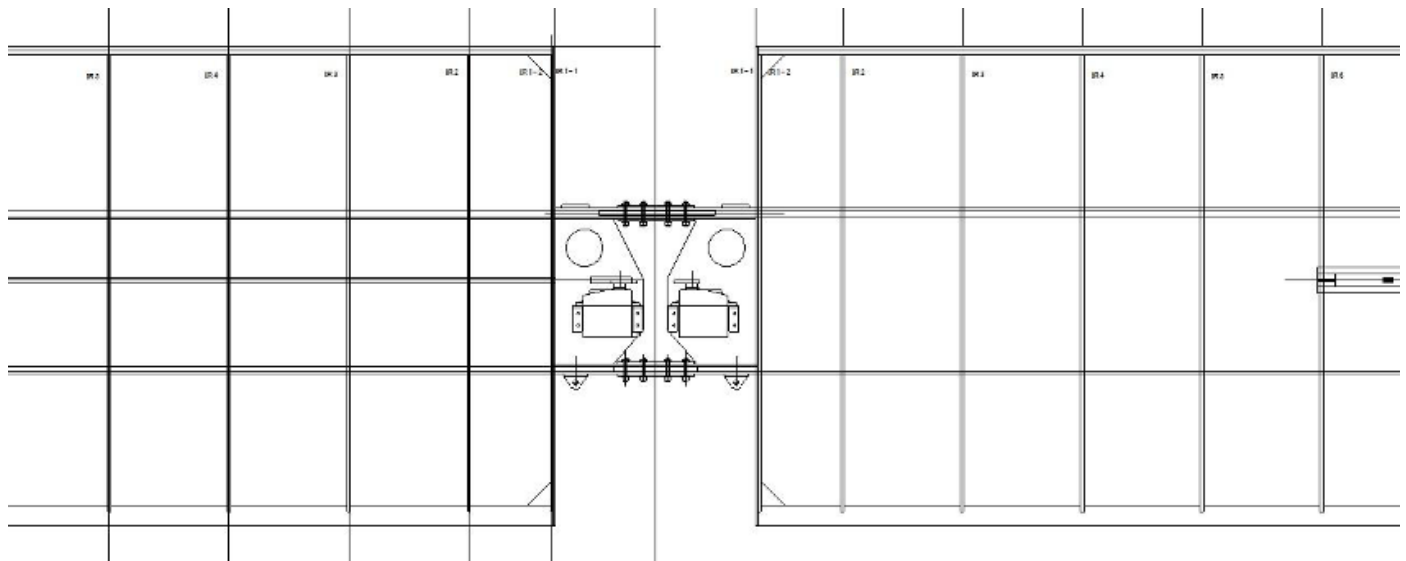
後胴は胴体全長の丁度半分の長さですので、車の荷物室には相応の長さを残して積んだ状態です。ペットボトルやラジオ等の操作には邪魔ですが、運転には支障無いことを確認しました。

主翼分割方法の変更

一番厄介なものが長さ2mの中央翼です。これを2分割すれば車の荷物室に楽に詰め、助手席を潰さないで済みます。幸い中央翼は製作の都合上2分割で製作し未だ結合していませんので、これを2分割することに変更しました。つまり、これまでの基本方針では主翼は実機と同じに中央翼と左右の外翼の3分割でしたが、中央翼を2分割して全体で4分割にすることに変更した訳です。

分割・結合部分の構造図

運搬には分割し飛行には結合するための、分割・結合構造を作図しました。



図面21 中央翼の分割/結合方式図

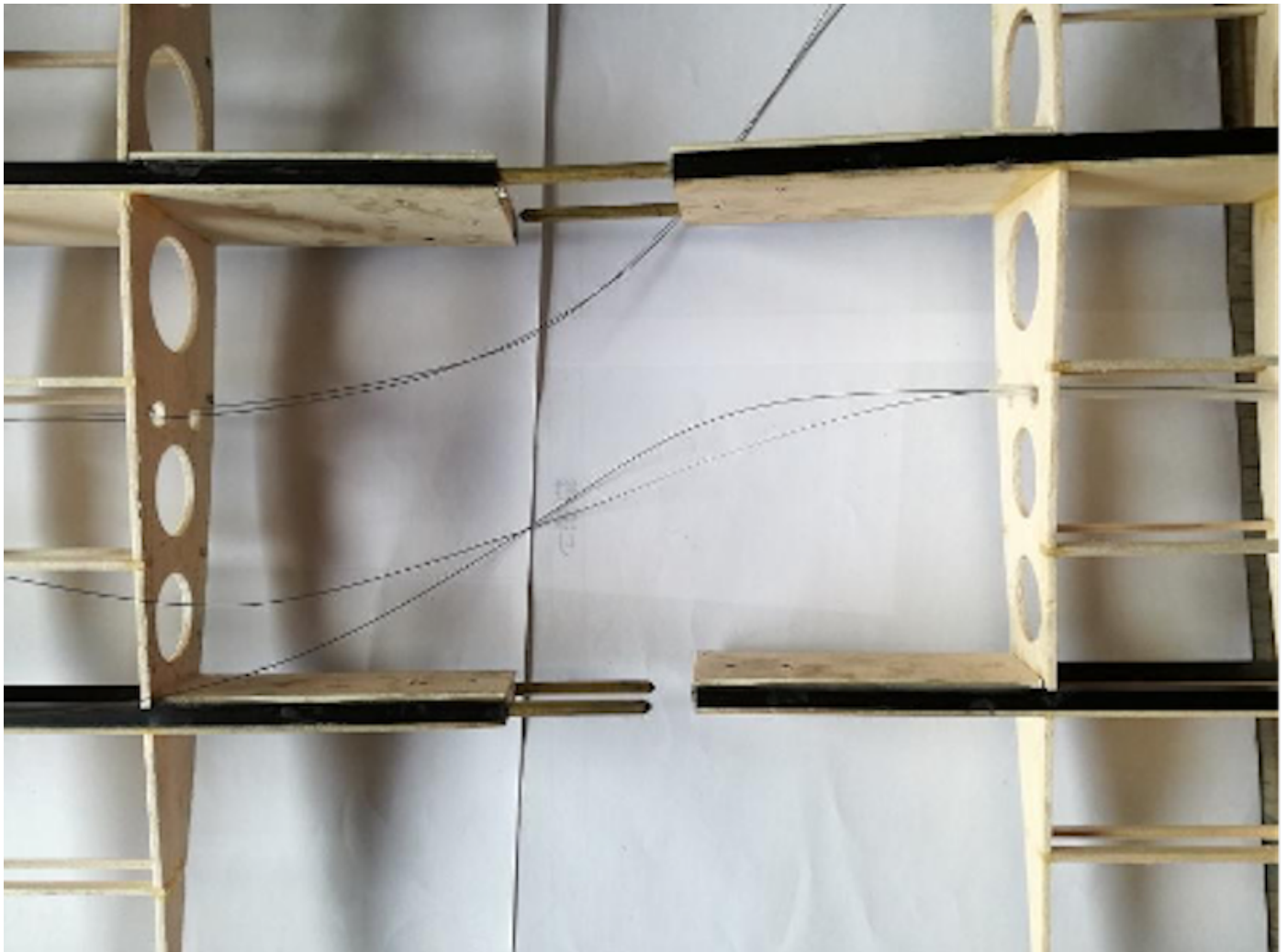
前桁、後桁共にそのフランジには内径4mmの丸アナが貫通していますので、そこに4mmのピンを挿入して結合の位置決めとします。元々、上下フランジの後面には翼幅方向に伸びる1.6 t のシナベニア製ウエブが貼ってありますが、前面にも同じシナベニアを貼り、更に両ウエブの間の隙間をその厚さ分のシナベニアを挿入して中実構造にします。これらはエポキシ樹脂で貼り合わせます。この中実構造の桁を2mm厚のアルミ板2枚で挟んで、3mm ボルトで結合する構造です。

変更に伴って目標重量にも影響が生じます。スポイラーサーボはこれまで中

央の一個で左右のスプイラーを操作することにしていましたが、今度は左右別個に2個のサーボを積む必要があり、その分重量も増えます。また、結合構造の重量も見込まなければなりません。両者合わせて約120gの重量増加になります。つまり、1,600gであった中央翼の目標重量は1,720gに増加してノーマル飛行状態の目標全備重量も7,600gから7,720gに増加します。

結合構造の製作

早速中央翼の結合構造を製作しました。画像64が位置決め用のピンです。4mmの真鍮パイプの中に3mmのカーボンロッドを通しました。



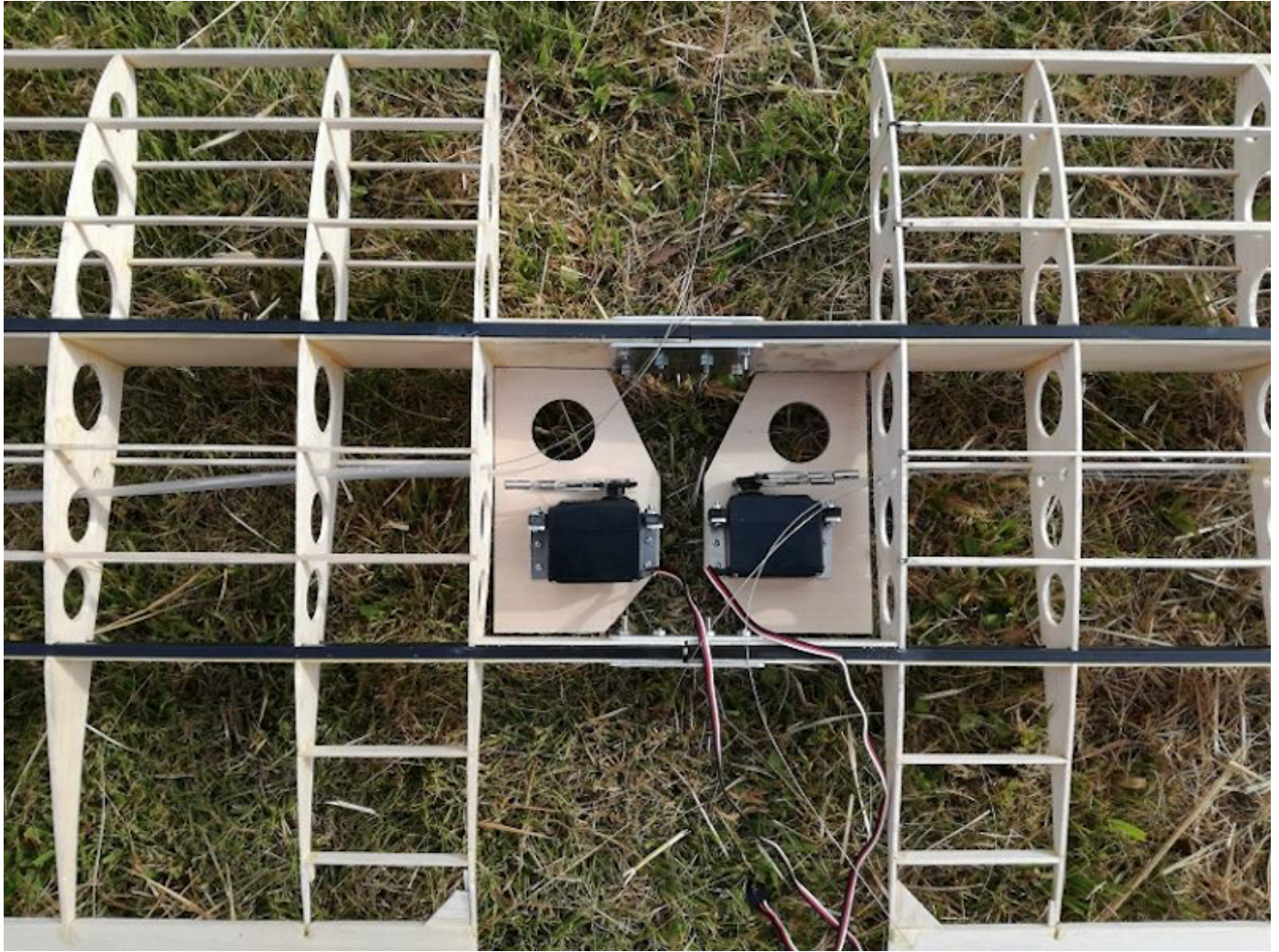
画像64 中央翼結合用位置決めピン

画像65は試しに左右を繋いだ状況です。



画像65 左右の結合テスト

かなりしっかり結合できることが判ったのでスポイラーサーボベッドも製作しました（画像66）。



画像66 スポイラーサーボ

重量チェック

ここで中央翼の重量を実測して、完成重量を予測します。重量測定結果は以下の通りでした。

左中央翼	400 g
右中央翼	398 g
接続金具	53 g
カンザシ	158 g
スポイラーサーボ	129 g
合計	1,138 g

残作業予想重量

プランク	400 g
内端リブ補強板	20 g
外端リブ補強板	10 g
カバリング	190 g
取付金具	50 g
エルロンサーボ延長コード	40 g
塗装&マーキング	30 g
合計	740 g

従って中央翼の完成予想重量は1,878gとなり、目標値1,720gを158g (9.2%) 超過してしまいそうです。

実は前回骨組み完了時点で重量測定して、ほぼ目標重量に納まると見込んでいましたが、その後、カンザシ周りの補強にグラスクロスをたっぷりのエポキシ樹脂で貼り込みました。更に外翼との接続ピンや外翼スUPPORT対策を施して重量が大分増加したのです。残作業予想重量もエルロンサーボ延長コード等の重量をカウント忘れしていた上に、スポイラーサーボの重量も50gと過少見積もりをしていました。サーボ本体の重量は一個40gですが、

サーボベッドとスポイラー索長さ調整金具の重量も馬鹿にならないものと判明しました。結果、目標の9.2%オーバーと少々みっともない重量になってしまいました。

第5次重量重心計算

このデータを元に第5次重量重心のチェックを行ったのが下の図表です。
(第4次は割愛しました)

5次重量重心	2018/9/7		実績率	26.06 %			
	予想重量	STA	モーメント	実績重量	残作業予想重量	目標重量	Δ(予-目)
左外翼	700	860	602,000	0		700	0
右外翼	700	860	602,000	0		700	0
中央翼	1,878	890	1,671,420	1,138	740	1,720	158
前胴	1,600	630	1,008,000	0		1,600	0
後胴	540	1,550	837,000	350	190	560	-20
垂直尾翼	212	2,450	519,400	162	50	240	-28
水平尾翼	378	2,270	858,060	268	110	400	-22
モーター	361	100	36,100	0		361	0
プロペラ&ハブ	50	-10	-500	0		50	0
受信機用電池	155	200	31,000	0		155	0
LiPo	600	340	204,000	0		600	0
その他搭載物	186	600	111,600	0		634	-448
合計	7,360	880	6,480,080	1,918		7,720	-360
目標重心位置		846					
追加Weight	370	160	59,130			0	370
ノーマル飛行状態	7,730	846	6,539,210			7,720	10

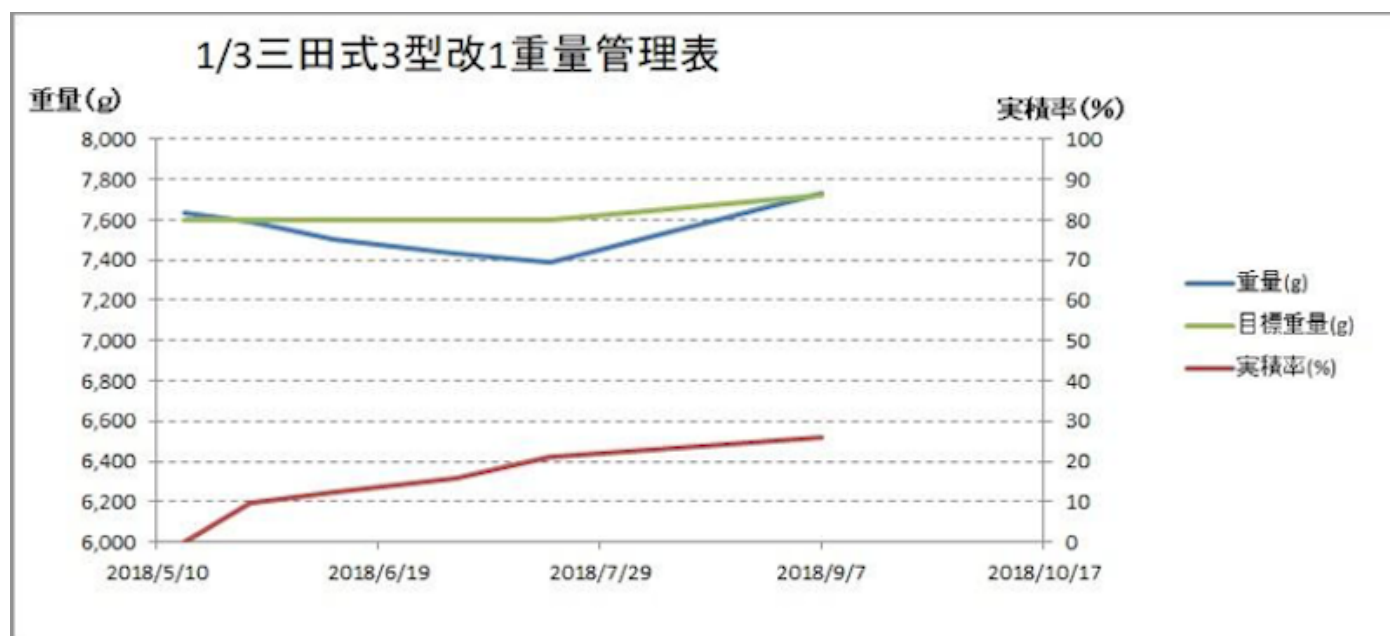


表5 第5次重量重心計算

今のところ、ノーマル飛行状態の全備重量は目標値の7,720gを10gオーバーで押さえられそうです。

外翼骨格の重量測定 大幅重量超過が発覚！

外翼構成品であるリブ組立、エルロン、翼端、サーボ組立、カウンターウエイトが出来上がったのでそれらの重量を測定しました。その結果目標重量を大幅に超過していることが発覚しました。

重量測定と完成重量予測

各構成品の測定重量は次の通りです。

左骨組み本体	343 g
右骨組み本体	344 g
左エルロン	49 g
右エルロン	43 g
左翼端	58 g
右翼端	57 g
左サーボ&延長コード	84 g
右サーボ&延長コード	85 g
左カウンターウエイト	34 g
右カウンターウエイト	35 g

合計して現状で、左外翼が569g、右外翼が563gとなりました。この状態から残作業での重量増を見込んで完成重量を予測すると表6になります。

外翼重量見通し			
		左翼	右翼
現状	骨組み本体	343	344
	エルロン	49	43
	翼端	58	57
	サーボ組立&延長コード	84	85
	カウンターウェイト	35	34
	小計	569	563
残作業	下面プランク	124	124
	上面プランク	135	135
	前縁	10	10
	内側リブ補強板	5	5
	外側リブ補強板	1	1
	サーボカバー	6	6
	カバリング	120	120
	カウンターウェイト鉛	20	20
	塗装等	30	30
	小計	451	451
完成重量見通し		1,020	1,014

表6 外翼完成重量予測

外翼は片翼で1,000gをオーバーする見通しです。目標重量は片翼700gでしたから両翼で630g（45%）も超過してしまいそうです。尾翼製作の経験から、プランク重量は多少過多に見積もっている可能性があります。片翼1Kgは覚悟する必要があるようです。

失敗7 外翼重量の目標値大幅オーバー

重量超過の原因と反省

当初この現実に驚いてガックリしましたが冷静になってその原因を探ってみて理由が判りました。目標重量設定時に暗黙に想定した外翼の作り方と、実際の作り方に大きな差があるということです。

どう言うことかということ、目標重量はサーマル工房製の1/5模型の重量データを元にその重量にスケール比の2乗を乗じて設定しました。当初は3乗を乗じて設定する積りでしたが、プランク材やオラカバ製カバーリング等の主要部材の厚さは殆ど同じと言うことで2乗にした訳です。

これは、1/3模型は1/5模型と同様の作り方にすることを暗黙に想定したことになります。しかし今回の1/3模型ではより実機感を出すことと強度確保の為に1/5模型とはかなり異なっています。例えば、

1. 一本桁の1/5に対し、1/3では2本桁に変更
2. 桁ウェブをバルサからシナベニアに変更
3. 2mm板厚リブの1/5に対して、1/3では2.5mm（一部3mm）板厚のリブを採用
4. 1/5のエルロンは単純エルロン形式だが1/3ではフリーズ式に。
5. ヒンジもシート式から着脱可能なピン式に
6. 1/5には無い翼端補助車輪やエルロンカウンターウエイトの装着

これらは全て重量増加の要因です。つまりこれらの重量増加要因を考慮せずに設定した目標重量に無理があった訳です。

第6次重量重心計算

このデータを元に早速第6次重量重心を計算しました（表7）。ノーマル飛行状態の重量は8,377gと予想され、想定した最大全備重量の8,700gに近づきました。目標重量に無理があることはこれから作る前胴にも当てはまると思われます。1/5模型では降着装置は単に短いカーボンロッドで主車輪を胴体

に取り付けているに過ぎませんが、1/3模型では既に実機と同じようにゴム製の緩衝装置も持たせた凝った作りのものを製作してあります。今回の1/3では操縦系統や座席等も組み込む計画ですので、それらの無い1/5模型から推定した前胴の目標重量は過少であることが確実です。

どうやら想定した最大全備重量がノーマル飛行状態の重量となりそうです。強度検討や動力装置の選定は最大全備重量で検討してあるので飛行は可能ですが滑空性能にどの程度の影響が出るのかが気になります。この点については後で性能計算をして確認します。

因みに、サーマル工房が販売しているKa-8とMinimoaの1/5スケールと、1/3スケールの重量を同社のHP上のデータで見ると、次のような値です。

Ka-8	1/5 = 1,950g	1/3 = 6,500g	比率 = 1:3.33
Minimoa	1/5 = 2,950g	1/3 = 11,500g	比率 = 1:3.90

製作によって幅のある重量は中央値を採りました。この比率で1/5三田式から1/3の重量を予想すると、1/5の重量が2,765gですから、3.33倍では9,210g、3.90倍では10,800gとなります。サーマル工房のこれら1/3スケール模型も、コクピット内部の操縦系統等は作り込まれていない上に降着装置も単純なものです。これらを考えると最大全備重量の8,700gで完成することも厳しいことが予想されます。目標重量設定時にこのような幅広い検討をすべきであったと反省しきりです。

教訓4 目標重量設定時にはベースとなる機体との作り方の相違、装備品の相違に十分注意せよ。

6次重量重心	2018/9/15	実積率		38.15 %			
	予想重量	STA	モーメント	実績重量	残作業予想重量	目標重量	Δ(予-目)
左外翼	1,020	860	877,200	569	451	700	320
右外翼	1,014	860	872,040	563	451	700	314
中央翼	1,878	890	1,671,420	1,138	740	1,720	158
前胴	1,600	630	1,008,000	0		1,600	0
後胴	540	1,550	837,000	350	190	560	-20
垂直尾翼	212	2,450	519,400	162	50	240	-28
水平尾翼	378	2,270	858,060	268	110	400	-22
モーター	361	100	36,100	0		361	0
プロペラ&ハブ	50	-10	-500	0		50	0
受信機用電池	155	200	31,000	0		155	0
LiPo	600	340	204,000	0		600	0
その他搭載物	186	600	111,600	0		634	-448
合計	7,994	879	7,025,320	3,050		7,720	274
目標重心位置		846					
追加Weight	383	160	61,200			0	383
ノーマル飛行状態	8,377	846	7,086,520			7,720	657



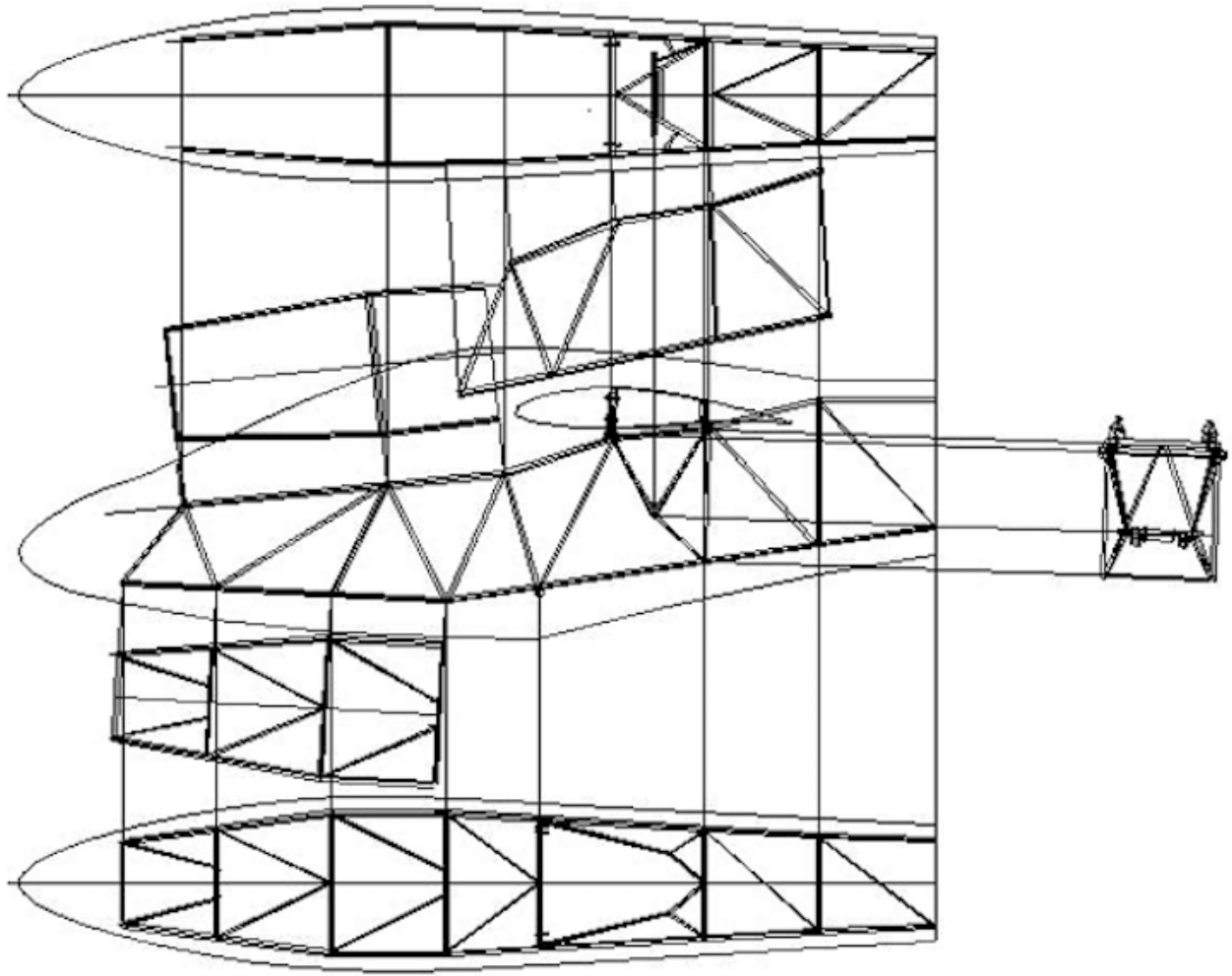
表7 第6次重量重心計算

製作その12 前胴主要骨格

続いて前胴の主要骨格の製作に入りました。

図面

図面22が前胴の主要骨格図です。この部分を主にカーボンチューブで製作します。



図面22 前胴主要骨格図

図面を良く眺めていると平面部分が存在することに気が付きます。主翼取付け部の左右パネル、コクピット床面およびキャノピーとの境界（キャノピーシル）の4つです。まずこれらのパネル構造を平らな板の上で製作します。

パネル構造の製作

後部胴体構造を製作した時と同じように、これらパネルの原寸大図面を焼きだして平板に置き、その上から接着剤の染み込み防止用に薄いポリフィルムを被せてから縦通材の位置決めに細いヒノキを図面に沿って打ち付けます。このヒノキで縦通材を固定します。下部縦通材は直線ですのでΦ7mmのパイプ一本で済みますが、上部縦通材は階段状に折れ曲がりますので3本の部材

を繋ぎます。接続部分はΦ4mmのアルミパイプを長さ60mmに切断したものを、縦通材の内部にエポキシ樹脂と共に埋め込んで固めます。

次いで上下縦通材を繋ぐΦ5mmの部材を図面寸法にカットして、所定の位置に嵌め込んでから瞬間接着剤で固定します。部材の接続部はパイプの丸みに合わせてダイヤモンドやすりで丁寧にRを付けます。

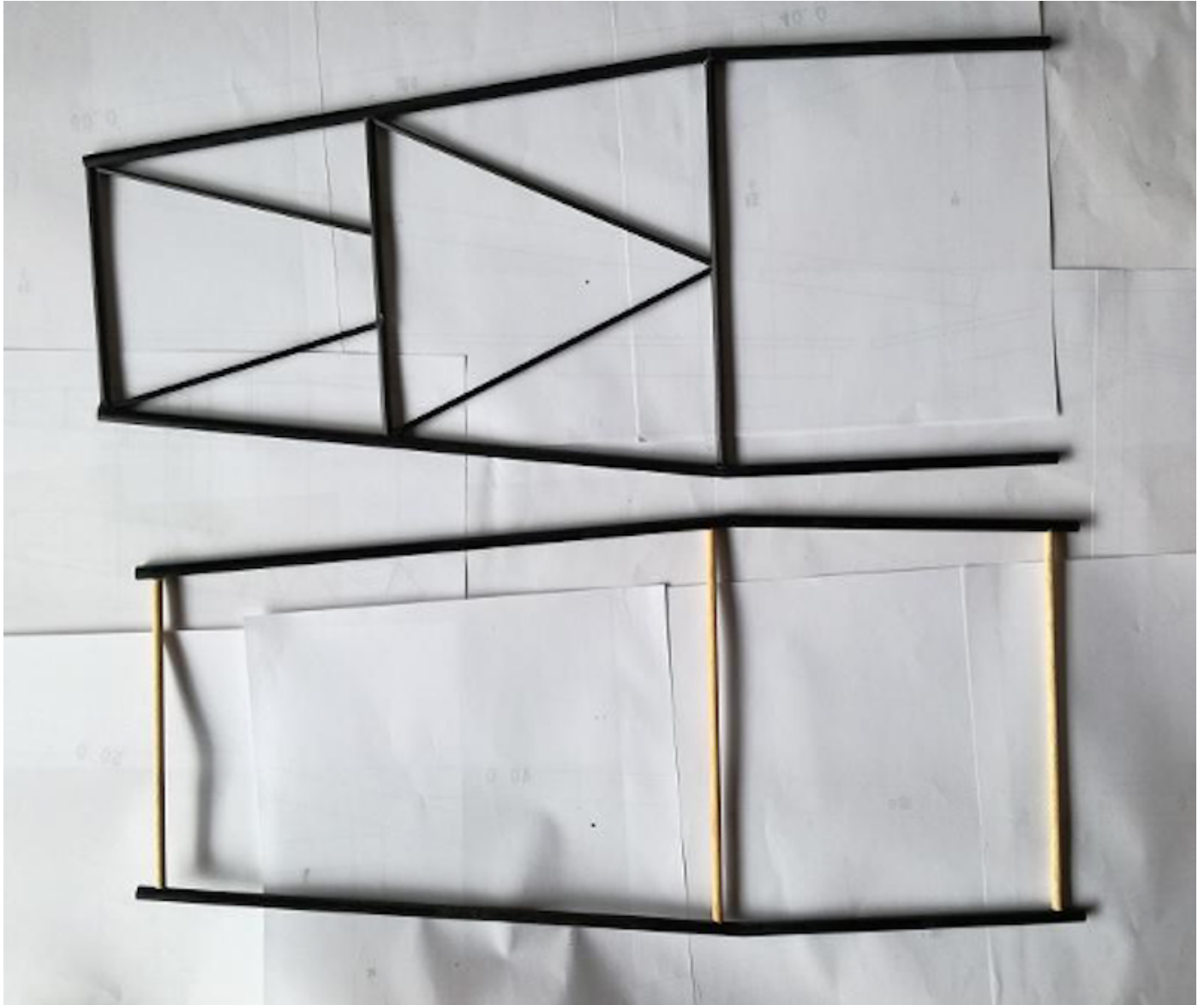
画像67が主翼取り付け部の左右パネルの製作過程です。



画像67 主翼取り付け部左右パネルの製作

中央に見える細い2本の棒は厚さ1mmのヒノキの棒で、Φ7mmの縦通材にΦ5mmの縦部材を接着する時に段差を正確に確保するために敷いたものです。

同様にしてコクピット床面パネルとキャノピーシルも作りました（画像68）。



画像68 コクピット床面構造（上）とキャノピーシル（下）

キャノピーシルには左右の縦通材を繋ぐ部材がありませんので組立の都合上仮の接続部材を3本取り付けてあります。これらは組立が終わったら取り去ります。

主翼取付け部の横梁部材の加工

2枚の主翼取付け部パネルの上部にはそれらを繋ぎ、主翼を取り付ける横梁が2本取り付けられます。これらの横梁は10mm角のカーボン角パイプで作りますが、その両端はΦ7mmの縦通材の折れ曲り部に接続するため極めて複

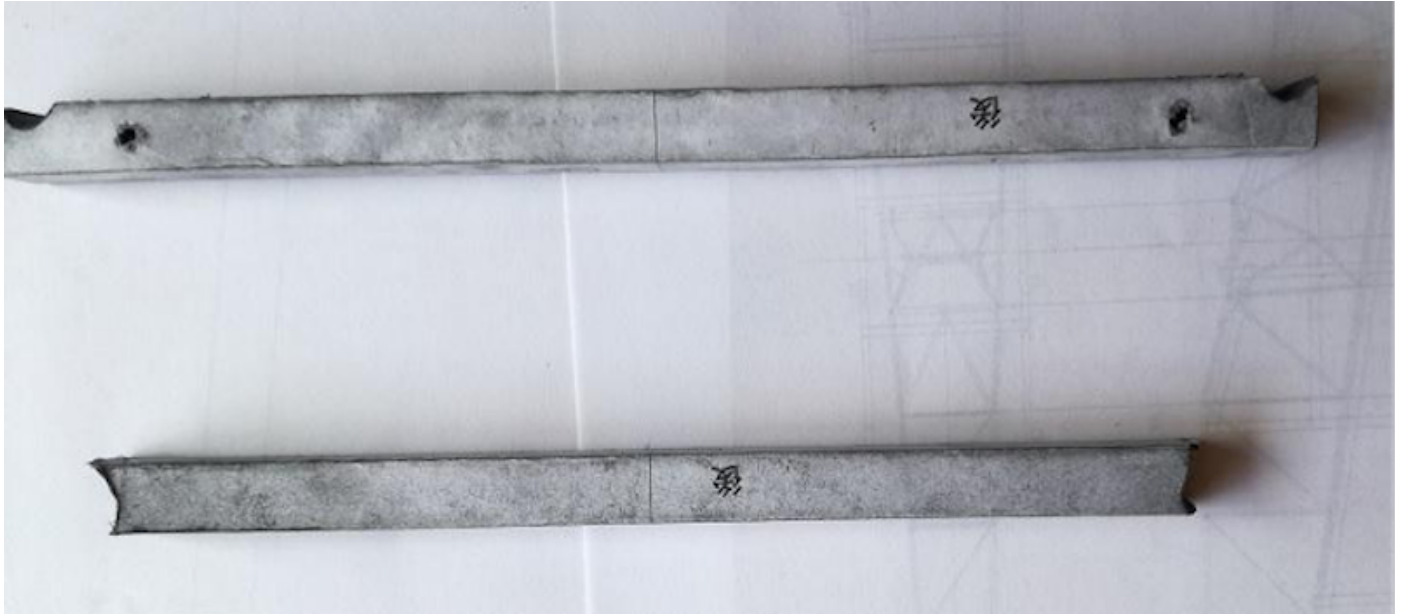
雑な切込形状をしています。この部分の寸法取りに悩みましたが、結局次のようにして解決しました。

まず、横梁と縦通材の接合部の図面から横梁の上下、前後の展開図を書いてそれを実寸で印刷してから切出します（画像69）。写真では良く見えませんが両端に切り込み形状展開図が印刷されています。



画像69 切り出した主翼取付け横梁の展開図

切出した展開図を角パイプの周囲に貼りつけます。その上で展開図に沿ってヤスリでパイプを削って両端の加工を完成しました。



画像70 主翼取付横梁の端部加工

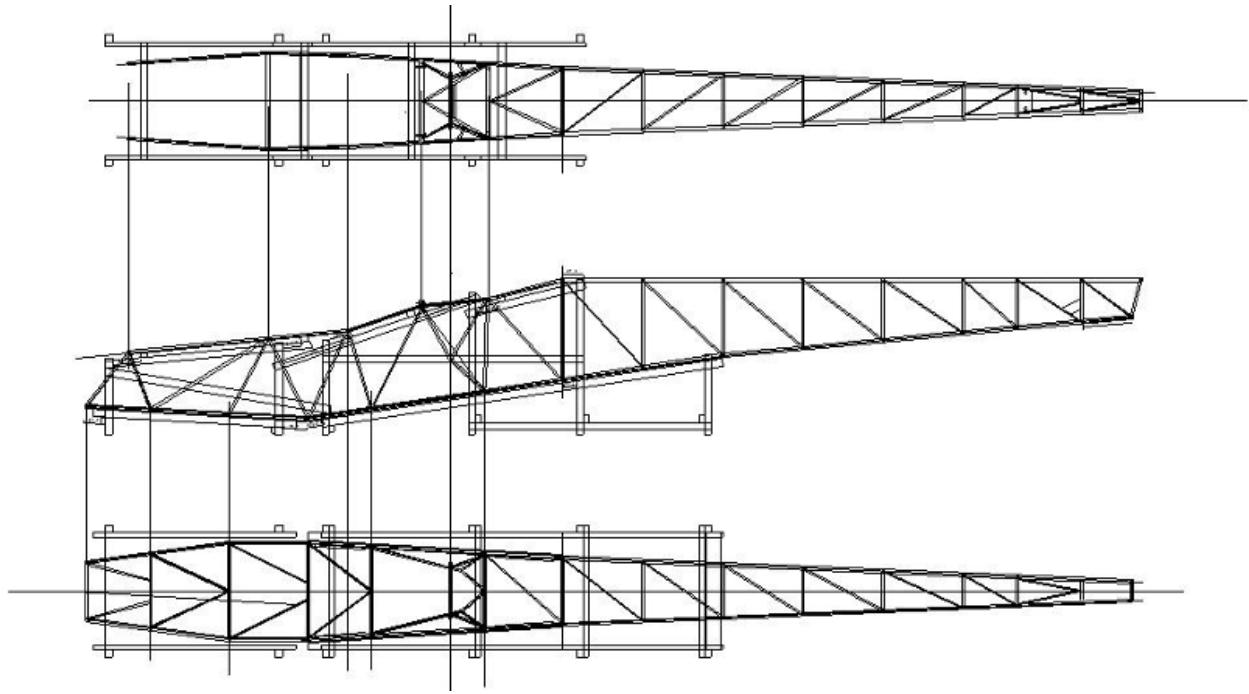
以上でパネルと主翼取付用横梁を作り終えましたが、問題はこれらをどのようにして組立てるかということです。これらのパネルは上下、左右に複雑な角度を持って繋がれます。更に組み上がった前胴と既に完成している後胴を繋ぐにも複雑な角度問題をクリアしなければなりません。組立治具が必須です。

製作その13 胴体組立治具

胴体構造をどのように組み立てるのか悩みましたが、ようやく組立治具の構想を固めて製作しました。

図面

図面23が組立治具の図面です。



図面23 胴体組立治具

いろいろな治具形式を構想しましたが、結局実物小型航空機の組立治具と同じような形式に落ち着きました。比較的太い柱を何本も建て、その間を組立てる胴体の角度と同じ角度を持った梁で繋がります。胴体床面に接する部分は4mm厚シナベニア板を張ってその上に実寸図面を貼り、図面に沿って胴体縦通材を挟む細棒を取り付けて位置決め精度を出すことにしました。実機の組立治具は専用の精密機械で切削や穿孔をして、レーザー測距器等で正確に位置を測定しながら組立てるので極めて正確に出来上がりますが、本治具は手引き鋸で切断、ハンドドリルで穿孔ですので精度はそれ程期待できません。そこで、平面である床パネルを先に作っておいて、組立てる方式にしたことからこのような構造にした訳です。

出来上がった治具

画像71が組み上がった胴体組立治具です。



画像71 完成した胴体組立治具

柱は15×15のヒノキ棒、梁は15×10のヒノキ棒で作し、それらをネジで組み付けました。柱には梁が取り付け位置が正確に決まるように実寸の図面を貼りつけてあります。貼りつけた図面に沿って梁を組み付けたところ、まずまずの精度で組み上がりました。

この治具に完成している後胴と前胴パネルを載せてみました（画像72）。



画像72 組立治具への仮搭載

割合うまく機能しそうです。

製作その14 前胴主要構造組立と前後胴体の結合

胴体組立治具を用いて完成している前胴パネルを組み立てました。当初は前胴だけを組立てて、後胴との結合はもっとずっと後にしようと思っていましたが、前胴の組立は後胴と結合して行う方が容易であることが判明したので、一体組立になりました。今後重量管理は胴体として一体で行う必要があります。組立て作業中の状況です。



画像73 組立治具上で組立中の前胴

画像74は主脚が取り付けられる台形状のトラス構造の組立状況です。治具の左右の梁に開けた穴を通して竹ひごを渡して組立部品を保持しています。



画像74 主脚取付用トラス構造の組立

別の角度からです。



画像75 主脚取付用トラス構造の組立（胴体前方から見る）

主翼を取り付ける2本の梁は微妙な角度を持って従通材に取りつきます。主翼の前後桁間の距離とも正確に一致させる必要がありますので、画像76のような簡易位置決め治具を作って取り付けました。この写真は取り付け作業後に撮ったので梁間を繋ぐブレースが邪魔して正規の位置にセットできていませんが、様子は理解頂けるとと思います。



画像76 主翼取付梁の位置決め治具

完成した胴体主要構造

組立が完了して治具から降ろしました。画像77が完成した胴体主要構造です。さすがカーボンロッド製です。非常に軽くこの状態で僅か710gです。



画像77 完成した胴体主要構造

胴体の前部、コクピットに当たる部分です。



画像78 コクピット部の構造

胴体中央部です。上部の2本の横梁が主が主翼取付け部になります。



画像79 胴体中央部

主脚を仮に取り付けてみました。



画像80 主脚の仮取付

なかなか良い感じです。このように書くと、恰もスムーズに組立が進行したように思われがちですが、実際はかなり大変でありトラブルも発生しまし

た。

トラス構造の部品点数は後胴も含めて165本もあります。カーボンパイプからこれを切出してキッチリ繋がるように正確な寸法と、端面の斜め加工をダイヤモンドやすりで一本一本施す作業が延々と続きました。手が真っ黒になる日が続いた訳です。

主脚が取り付け台形構造も脚を取り付けてみて初めて若干斜めになっていることが判明しました。原因を探ると治具に開けた穴位置が左右で若干ずれていたため、竹ひごが斜めに取り付いていたことが判りました。一度組立てた台形構造をバラして修正後再組み立てしました。

未だ組立ては瞬間接着剤で仮組みした状態ですので、衝撃を加えると分解します。今後大きな荷重や衝撃が加わる部位に補強を施してから、各接合部にエポキシ樹脂を盛って本接着します。

製作その15 操縦桿ジンバル機構

胴体主要骨格結合部のエポキシ樹脂塗布の合間を縫って、操縦桿のジンバル機構を製作しました。

実機のジンバル機構

三田式 3 型改 1 はタンデム式複座機なので前後席に操縦桿があり、左右に倒すことでエルロンを、前後に押し引きすることでエレベータを操作します。前席と後席の操縦桿は連動しており、どちらかを操作すれば他方も動きます。操縦桿をこのように前後左右に可動にするために、その下部にはジンバル機構があります。実機のジンバル機構の写真が画像81です。



画像81 実機のジンバル機構 左=前席 右=後席

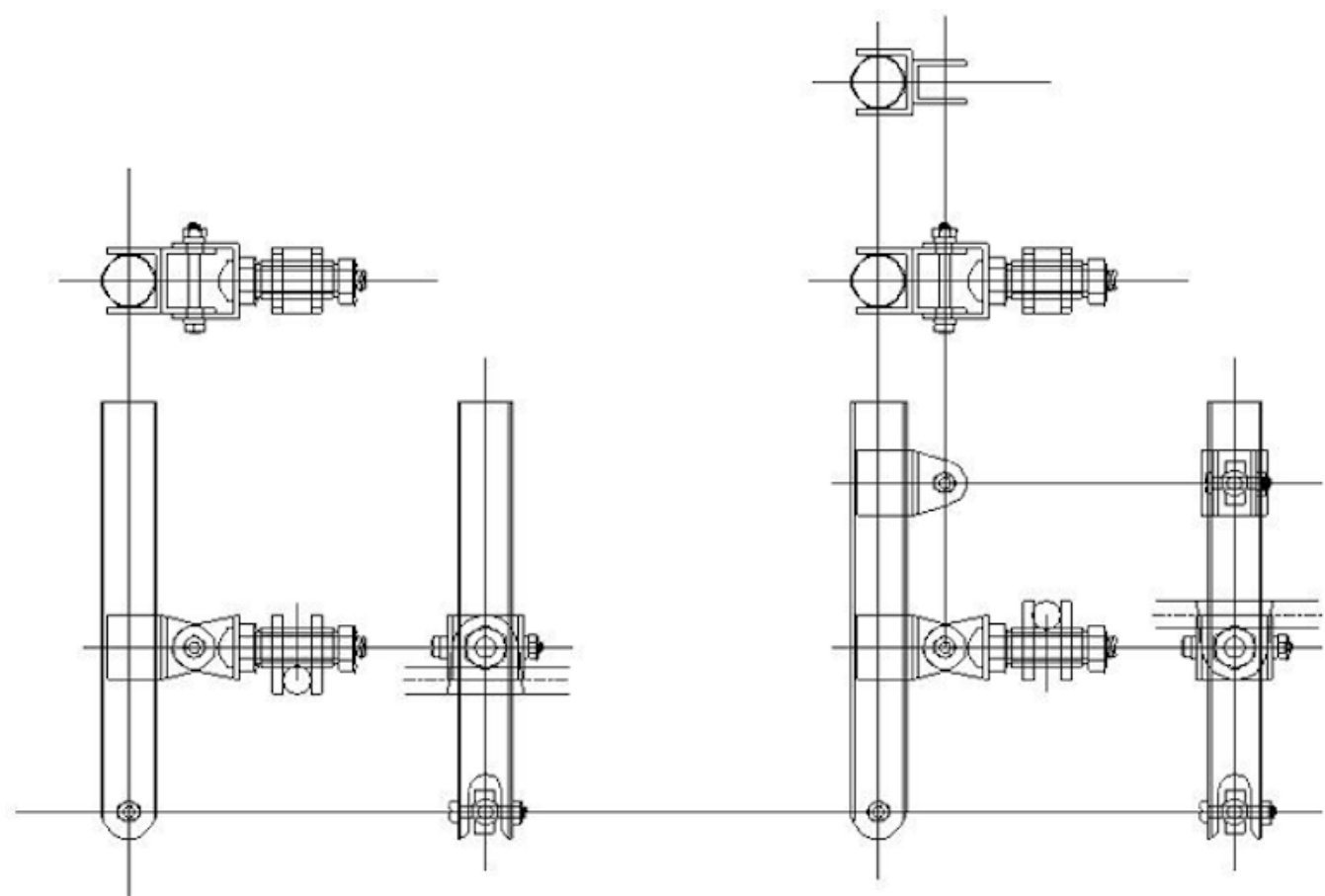
前席は座席が取り付く胴体下部横梁の中央上側に取り付けられています。エルロン用に操縦桿を左右に回転させる軸（前後方向の軸）が横梁に取りつき、その軸の前部にエレベータ用の操縦桿を前後に回転させる軸（左右方向の軸）が取り付けられ、その前に操縦桿が取り付けられています。

後席は座席が取り付く胴体下部横梁の中央下側に取り付けられます。前後の機構を連動させるために、操縦桿の最下部に取り付けた連結棒で前席操縦桿と繋がれています。また、ジンバルより上に座席下を通して機体後部に繋がるリンクが取り付けられています。これがエレベータ用操縦リンクです。

前席が横梁の上側、後席が下側に取り付いているので連結棒は斜めに取りつきます。従って当然前後方向の軸（エルロン用）も傾斜しています。

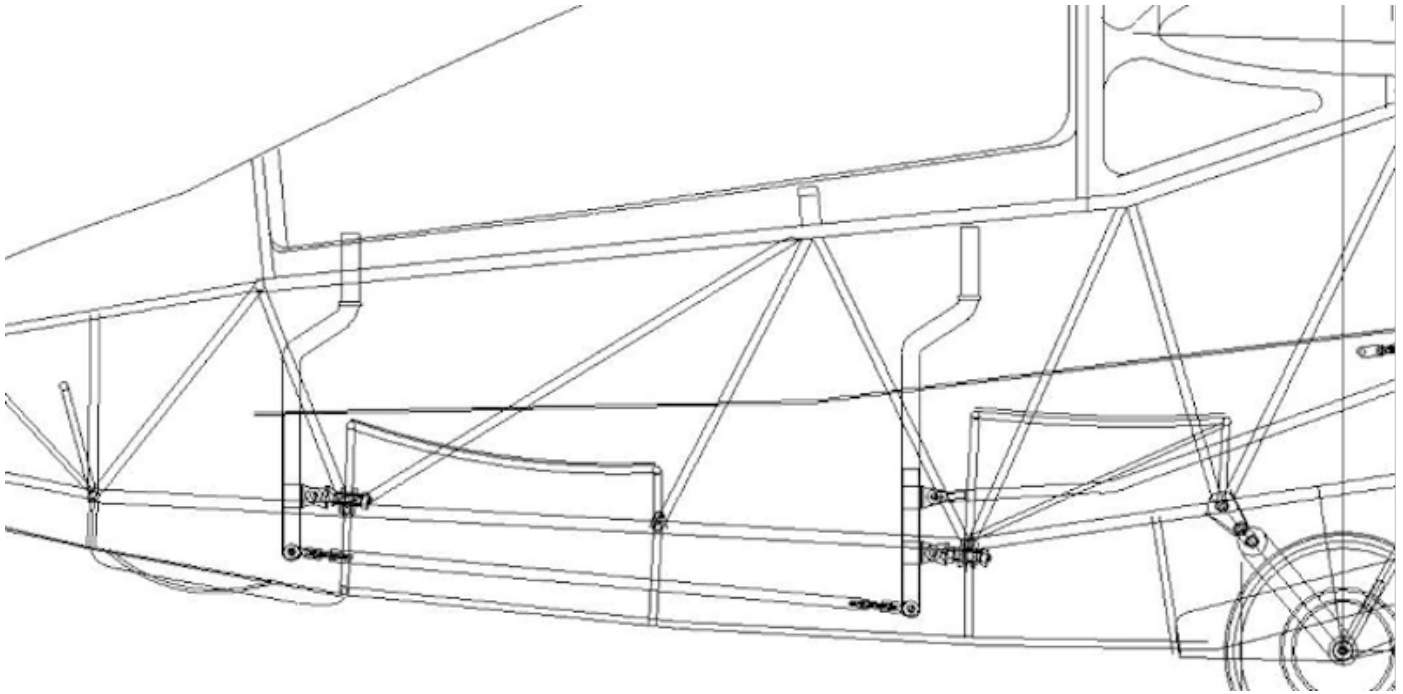
図面

実機の機構を真似て設計したジンバル機構図です。



図面24 操縦桿ジンバル機構

両ジンバル機構の連結図です。



図面25 ジンバル機構連結図

エルロン軸は外径7mm内径5mmの短いカーボンパイプの両端に内径4mmのジュラコンブッシュを取付け、その中を4mmボルトが貫通します。ボルトの先端にはホームセンターで購入したアルミチャンネルから切出したコ材を組み合わせたヒンジを取り付け、その前にやはりホームセンターで購入したアルミパイプを取り付けます。このパイプには後日操縦桿を製作して挿し込みます。

アルミパイプの最下部には大型ラジコン機のリンケージ用ベアリング入りロッドエンドを取り付けてその間をφ6mmのカーボンロッド製連結棒で繋がります。連結棒には3mmネジを取り付けて長さ調整を可能にします。後席用ジンバル機構のパイプの上部にはやはりロッドエンドを取り付けてあり、ここにエレベータ方向に向かうリンケージが取り付けます。

製作

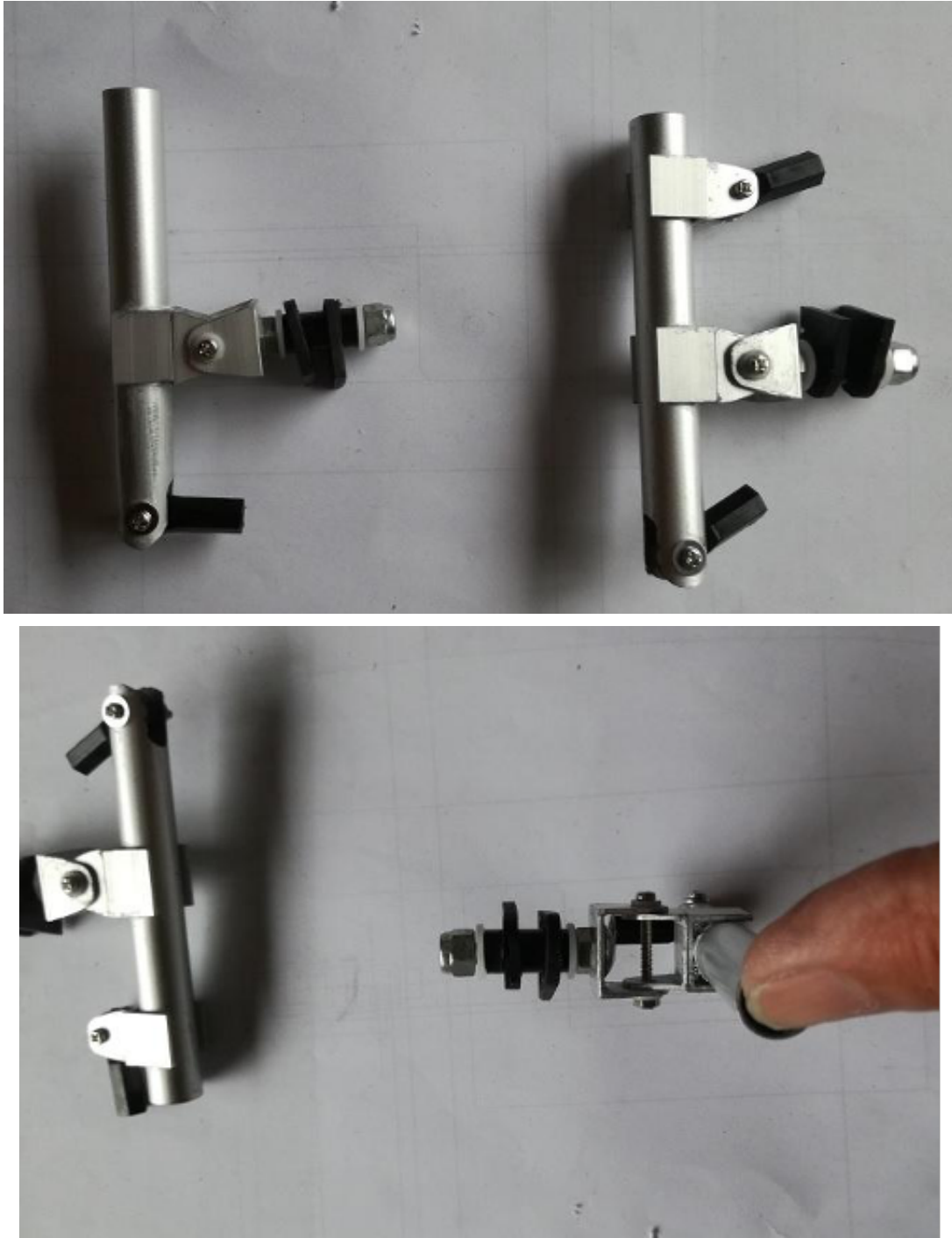
図面に基づいて作った部品がこれです。



画像82 ジンバル機構の部品

エルロン軸のパイプは2mm厚のカーボン板から切出した2枚のステーに挿し込まれ、このステー2枚で胴体下部横梁を挟んで取り付ける機構です。

ジンバル部分を組立てました。



画像83 組み立てたジンバル機構

前後のジンバルを連結棒で繋いだ状況です。



画像84 連結したジンバル機構

機体への取付

早速、機体に取り付けてみました。





画像85 ジンバル機構の取付テスト



画像86 ジンバル機構のアップ図

略、期待通りのジンバル機構ができあがったと喜んでいたのですが、続いて行ったエレベータ操縦系統の製作時に思わぬ落とし穴を見つけて改修を余儀なくされました。

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The Trailing Edge

As we wrap up the July issue, we think about how truly fortunate we are.

[The NEW RC Soaring Digest Staff](#)



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

The July issue of RCSD was our biggest and most ambitious yet. We are truly fortunate at being able to attract such an immensely talented group of writers who have contributed to this issue and past issues. Furthermore, they are scattered all over the globe including some of the remotest places on the planet. We really think that we may trigger a tourism boom in the Faroe Islands with an unprecedented number of those carrying big, glider-shaped suitcases.

We are also very proud of our record of carrying Japanese-language content and even including a few phrases of French here and there (see below). We hope this trend continues and that each issue will have a balance of languages from all the communities in which RC soaring flourishes. It's amazing how immaterial cultural differences seem when what we all want is to just stretch out that day of soaring just that little bit longer. Maybe even into the night as shown in the beautiful photo which accompanies the photo we selected for *The Trailing Edge* this month. We'll let our good friend and repeat contributor Régis Geledan explain:

"Un soir d'été il y a quelques années nous avons eu l'idée d'essayer la technique du light painting. Dominique Nivelles, le pilote sur l'image, a totalement modifier son Easy-Glyder avec de nombreux bandeaux LEDs.

On a fait de nombreux essais avant de réussir cette image. Il y a un peu de technique et beaucoup de chance car l'appareil photo ne doit pas bouger et il fallait impérativement rentrer dans le cadre.

Au final on a surtout passer un super moment comme souvent des que l'on vole. Lieu: landes de Bartres près de Lourdes."

Merci beaucoup, Régis!

Thanks to all those who contributed the great articles for this issue. We can't believe how lucky we are to have you here. Thanks also to you, the reader, for reading them. For those who would like to contribute an article the August deadline is **2021-08-08**. Yes, a little less than a month as we continue our inexorable march to our first-calendar-day-of-the-month target by December of this year.



Please forgive us if we hawk a little merch to help keep the wheels spinning and keep RCSD free. You can help out, if you so choose, with the purchase of one of the soon-to-be-collectable *RCSD Cover Photo T-Shirts*. You can get the [January](#), [February](#), [March](#) and [April](#) editions now and May, June and July will be out shortly.

Trying to recruit talent for your electric aviation startup or green tech company? There's no better audience for your onboarding message than RCSD readers. We're putting together our *Friends of RCSD* program (previously known as the *Corporate Sponsorships* program). If you feel it might be for you please [get in touch](#).

If you don't want to miss the August issue when it comes out, please [subscribe to our mailing list](#). Also, follow us on [Facebook](#), [Instagram](#) and [Twitter](#) for even more complementary content.

So how did we do? [Let us know](#) your thoughts. Thank you all so much for reading and until next time...fair winds and blue skies!

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