

GLIDEPATH



The Journal of Wessex Soaring Association. February 2024

From the Guest Editor

Welcome to the February edition of Glidepath. Roger reminded me last month of a promise I made many months ago to write something about GPS Triangle Racing. Little did he know what would happen once I started to write... the article grew to gargantuan proportions. For one month only Glidepath has a guest editor - I hope you enjoy this month's content.

Normal service will resume in March!

Iain Medley-Rose

From The Chair February 2024

Winter Warmer 2024 25th FEBRUARY

I have organised this event at The Horton Inn on Sunday 25th February. If you would like to come along you are very welcome. I aim to arrive around 1pm to eat around 1.30pm. I sent round the Sunday menu for you to make your choices in advance to help the kitchen. Please let me know by email if you would like to be added to the participants.

The Slope Tour 2024

As usual I will be hosting this event, meeting up at Win Green for a run round our most popular slopes hoping to end up at a flyable slope depending on wind direction. Date to be decided. If you are interested in coming along to this event, either as a new member, or anyone that wants a refresher you are VERY welcome, **please let me know by email.**

Compton Abbas MoU 2024

Peter Willis, the chairman of WMAC, has been in discussion with Compton Abbas ATC and we are close to a new MoU for the use of Win Green and Sutton Hill (Death Valley).

This is most likely to involve phoning the tower before and after flying models at either site, so they can advise pilots of our activities.

For the time being, we should not be flying at either site, I will advise when we have something in place.

E Soaring 2024

My plan for this is to keep an eye on the weather, and try and organise fly-ins/comps through the year whenever it looks favourable. So keep an eye on the weather and your inbox !

Very best wishes to all,

Martin.

Let's race!



Racers ready! Lining up ready for the next flight.

Competitive gliding is a funny sport. Many of the competition classes are about duration flying. Some include speed elements where the fastest time to complete a task against a clock is the goal. A couple of classes have a distance covered in a fixed time as part of the scoring. Crucially one of the key things is that there are very few events flown now that pit pilots against each other in a proper air race. Almost no one races slope pylon races any more and as a test of your racing ability there is little to touch it.

The one exception is the world of GPS Triangle Racing. For those of you who have not encountered this class before the simple explanation is:

- a triangular course defined by GPS points
- a fixed maximum start height for crossing the start
- a fixed maximum time on task once you have crossed the start line for your attempt
- a defined time window before the task closes for starts
- the size of the course and the time limits vary between classes.
- always flown in an anti clockwise direction

Hopefully with diagram below you can get a picture of the basic task. In addition at the end of the article I have provided links to some of the resources available - including rules, videos and websites.

The 'entry' level event is the Light Class which encourages the use of F3J/F5J aircraft and the basic avionic set up. Bigger faster planes are used in the Sport class. If you have one of the popular 1:3.5 scale gliders there is a new class for you sponsored by the German magazine Aufwind. Finally there are the longest running classes. 1/3 scale (aerotow only) and SLS class (max TOW limited and any scale you chose). Once again the links at the end of the article and some of the photo resources in this article will flesh out this detail.

**MODELLFLUG
WELTMEISTERSCHAFT**

Vom 11. bis 18. August 2023
NERESHEIM

Modelle: Segelflugzeuge im Maßstab 1:3
bis zu 9 Meter Spannweite
SLS und Scale - Klasse

Wann: täglich 9 - 19 Uhr

Wo: Segelfluggelände Neresheim

Für Essen und Getränke ist gesorgt

GPS
WORLDCHAMPIONSHIP 2023
NERESHEIM

Segelfluggelände Neresheim e.V. • Flugstr. Falkenberg, 73480 Neresheim • info@segelflae.de • www.sfg-nereshheim.de • Instagram: @segelflae

GPS CLASSES MADE EASY

Key to class specifics

Light - Green

Sport - Blue

1/3 Scale/SLS - Orange

Start conditions

Not above 200 m altitude, VNE 70 km/h

Not above 400 m altitude, VNE 120 km/h

Not above 500 m altitude, VNE 120 km/h

Task Duration

20 minutes. Start window 3-8 mins

30 minutes. Start window 3-10 mins

30 minutes. Start window 3-20 mins

Distances per lap

966m

1690m

2414m

Max Wind Speed

8 m/s

12 m/s

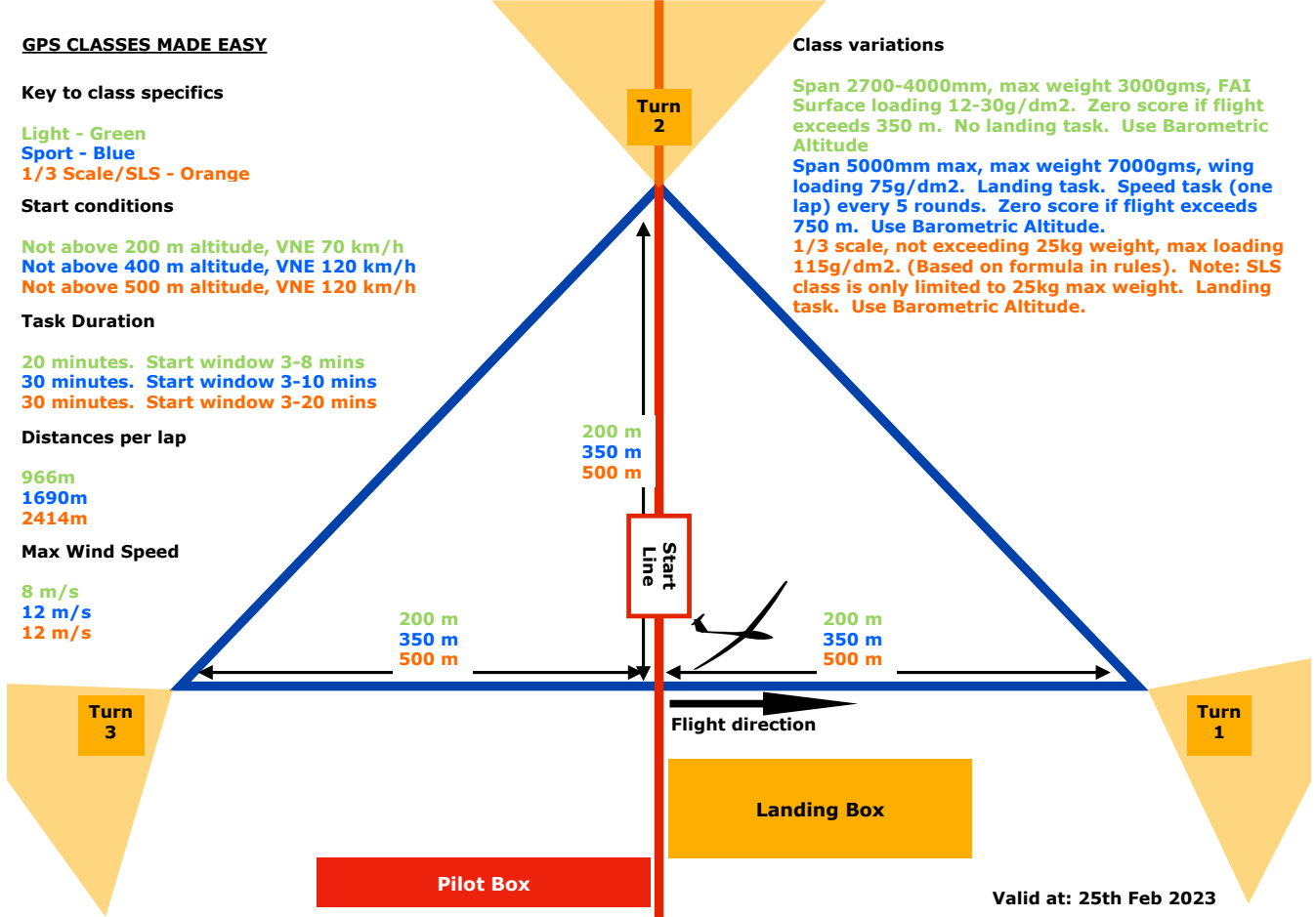
12 m/s

Class variations

Span 2700-4000mm, max weight 3000gms, FAI Surface loading 12-30g/dm². Zero score if flight exceeds 350 m. No landing task. Use Barometric Altitude

Span 5000mm max, max weight 7000gms, wing loading 75g/dm². Landing task. Speed task (one lap) every 5 rounds. Zero score if flight exceeds 750 m. Use Barometric Altitude.

1/3 scale, not exceeding 25kg weight, max loading 115g/dm². (Based on formula in rules). Note: SLS class is only limited to 25kg max weight. Landing task. Use Barometric Altitude.



One thing not shown in the diagram above is the detail about the launch window and start window. These are defined in the rules and are generally determined by the size of the group flying. The launch window is when you can get your plane airborne and is a period of time before the start window. Most of the time event organisers seem to set it at five minutes and that means all competitors can start onto the course as soon as the start window opens. The Start Window is the period of time in which you have to start the racing task. Your score is zero if you fly your plane in for your attempt before or after the Start Window. So, if the task has a declared Start Time of 1010hrs with a Start Window of 10 minutes you have to make sure your plane crosses the Start Line between 1000hrs and 1010hrs. The other thing to consider is that you can enter the course as many times as you like in the Start Window. As you can see that gives quite a few options with tactics. Most of the time a 1/3 scale glider will take about 2 minutes to do a lap so you can usually get a couple of taster laps at height and a good long sniff around the wider area and still make the end of the Start Window before it closes.

In the last three years I have learnt how to fly GPS triangles and competed in three World Championship events. So rather than explaining much more about the classes I would like tell you more about the fun that can be had racing ten or eleven scale gliders at the same time.



2023 GPS World Masters Segelfliegergruppe Neresheim, Germany

1/3 Scale Class - 11th August to 15th August

Forty six pilots entered this event. The gliders are limited to a maximum wing loading of 115g/sq.dm. Launch is by aerotow.

With five groups (or slots in the UK) per heat (we'd call that a round in the UK) the highest number of planes racing at any one time was kept down to nine or ten for the first day and a half to allow 'new' pilots to get used to things. The Start Window was kept to ten minutes with the first aerotow taking place five minutes before. With three to four very powerful tugs the nine or ten gliders were in the air easily inside the launch window. The idea is that you release from the aerotow at 550m (just over 30 seconds after rise off ground) which gives a zoom to 650m.



Our tug pilots with two of their fleet!

One of the things about this type of racing is timing your start. Going into the course too early is fine but you need to be really certain that you have picked the best conditions if you commit to your first attempt. My standard strategy is to take an early start onto the course in the start window and have a single lap around the course with every expectation that I'll be restarting using the power system in my glider. If you are in the air at the beginning of the start window you can also use the time to fly a long way off the course to explore any possible lift upwind of the course.

the time before the start window is set to close; what all the other pilots are doing; and what is developing in the air. It is staggering how much a 30 second difference in start time onto the course can make. Too early or too late can be a couple of hundred points loss or gain.

All the time you are doing this you and your helper will be: monitoring

There are rules around the flying conduct that minimise contact for this type of event but it does get pretty exciting at the start line as people set up for the best start they can. Ideally you want to get your glider over the start line at about 490m going at 115 km/h. Six or seven gliders of 1/3 scale size crossing the line in 20-30 seconds looks and sounds amazing.

Once on course the racing really begins. Strangely the closest proximity racing is often in the early morning groups where everyone is cruising at the best Lift/Drag. Because the air is pretty neutral most people will be late into the Start Window for their final start and suddenly nearly all the gliders in the group are crossing the start line within the final fifteen to thirty seconds of that window. The gliders are generally very close in terms of speed and sink rate at best Lift/Drag so the whole group is being flown around the course in a very careful slow glider race. You would not believe how tense 15 to 18 minutes of eking out a glide amongst six or seven big scale gliders can be.

During the later morning and afternoon groups the tactics and flying changes. Spotting lift is so vitally important and getting to it first is really crucial. Once you get your glider to the lift, the rate of climb you can extract from your glider becomes really important. The more volatile conditions that occur later in the day show the differences in pilots and planes. Some planes are a little less buoyant but have really good glide angles at a higher speed than others. A good rate of climb is great but if the glide speed isn't as fast the pilot has to balance the height they take in a thermal against moving on. It is this balancing act that takes time to refine. Pushing on too soon

(aggressive pilot) is a very easy way to lose points, but not going for the final fast glide early enough (cautious pilot) will also cost you points. Judging the path any lift is taking is also vital, if it is favourable it can allow the flight of some very fast laps with zero thermalling - just good use of energy management and flaps to gain height every time the glider crosses into lift that is moving along one of the sides of the triangle.

After flying the course the task finishes with a landing in a defined area. For this event the organisation allowed pilots to use their motors to avoid two or three planes heading for the landing area at the same time. One thing about this type of event is that the landing direction is either left to right or right to left - which means the landing can be with a 90° crosswind. Trust me, with nearly 20kg of glider that can be very exciting!

Considering this was my first ever scale class event and I'd only had seven flights with the Quintus I was happy with a number of the outcomes. Unfortunately two stupid mistakes cost me about ten places. Hopefully the mistakes made in the 1/3 scale event would prove useful in improving the result in the SLS event!!



Chocofly Nimbus - this one belongs to Philip Kolb (GER)

SLS Class - 16th August to 18th August

Rules for this class are very similar to the 1/3 scale event. The course, entry speed and height and entry window are the same. What is different is that the maximum weight of the plane can be up to 25kg and the scale can be pretty much anything. This year (2023) there was no limit on wing loading - this changes in 2024. Oh, and the other difference is that the Schleppers (tug pilots) have consumed all the beer and gone home so pilots can only fly if they have planes with a motor for launch.

Ideally the best solution is actually a FES - which is light, simple, gives at least two full climbs per battery pack, is almost instant power, has zero impact on CG when in use, and with a good spinner integration offers very little extra drag. The big disadvantages are twofold: prop strikes on take off happen and that can kill your power system just as the plane gets airborne; the tail can be blanked by the wing and be struggling for airflow at the point of lift off.

and go. Orbis and Schambeck offer very good solutions but they are inherently complicated because they use micro switches, propeller positioning and some have retract mechanisms that don't like any grit ingress. Several people had issues at the event. Added to these disadvantages many of the up and go combos are way beyond their recommended load when dragging a 25kg glider off the ground at 400m above sea level. Some installations also change the CG when deployed. My biggest reservation is the slow deployment before power comes in - 20 to 30 seconds.

My choice is a JETEC EDF. It has a simple mechanical operation, doesn't affect the CG when deployed, gives full power in a few seconds after starting. There are disadvantages though. My

set up currently gives 650m of climb at 400m - so I only have one full climb and very little option for more than one restart. The EDF gives a good rate of climb but it uses a lot of mAh and some speed controllers struggle to support partial throttle settings. That issue comes into play if you want to take a slower climb and use the climb phase to sniff around the course for lift and watch what other pilots are up to.

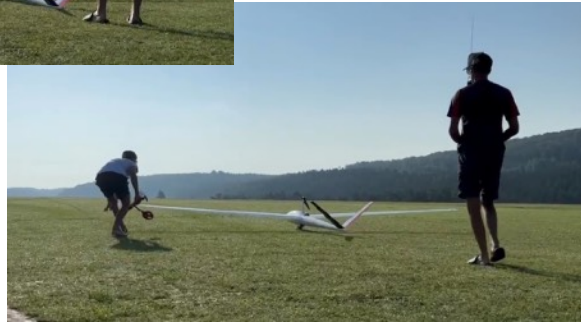
With forty one entries this class saw a different line up of both planes and pilots. Some new faces joined the flight line and some left for home. Two of the new faces had flown up from South Africa, and the Vikings from Denmark also joined in.

Once on the course the racing is very similar to that in the 1/3 scale class. The bigger gliders running at 25kg are very efficient in the glide and do climb well. However the 1/3 scale gliders can also be ballasted to 25kg and that makes the glide performance of those gliders very good. The downside is that some of the 1/3 scale gliders really struggle to get off the ground at this higher weight. I chose to fly without the extra 2.4kg ballast I have for the Quintus because the conditions had not been very strong for the earlier part of the week and none of the thermal forecasts showed an improvement for the SLS event.



What is different though is not having an aerotow. This is an important issue if you only have one full climb with a couple of top ups. Because the start line order is declared for each round you have to launch in that order unless you have a technical issue that then puts you at the back of the queue. If you are first in the launch line up your plane is in the air five minutes before the start window opens. So taking the full height in one go. However stepping the climb can still leave you start the task as soon

isn't a great idea. climb or running a slow with little option but to as the window opens. Careful use of the climb gives you an idea of what the air is doing because the audio variometer we all fly with will indicate the state of the air even under motor power. My glider in still air climbs at about 6m/s, so if the climb rate goes up above that it is in lift, and vice versa. For this type of racing the buoyancy of the air above 300m is the most important information so climbing quickly to 350m is my preferred strategy.



Fineworx AN66 - Fred Cappucio (FR)

Good indexing (i.e. how accurately you can fly your glider around the task triangle is important in some conditions. However at this particular event the ability to read the air and get into the scarce and not always strong lift was really important. Usually there are two pilots per team. Unfortunately my flying partner in the event took an early bath in the 1/3scale event so I relied on help from Jos, my wife. She knows very little about soaring but did a superb job, and on at least two flights she absolutely saved the day by spotting the lift I needed. Again, in this type of event there is a need to be able to read what is happening in the air as the glider flies through it. Sometimes the temptation to take lift and not press on has to be suppressed (cautious flying). Trusting that two minutes flight time and 50m height loss will still put the glider into lift on the next triangle is a hard decision to make. But if the lift is not yet strong enough to hold the glider in thermal turn taking the lap is often the best choice (aggressive flying).

Thermal soaring with several big scale gliders in the same space at the same altitude is pretty intense. However, there is a level of etiquette and airmanship that prevails. In one case there were three of us that crossed the start line very close together at the same altitude. I was in front and felt the lift first. I called to the pilot if the glider behind that I was about to thermal turn to the right and we all three peeled into the thermal in formation. Because of the safety implications of an incident there are defined turn directions for each group (alternating left and right) and we also use the barometric altitude telemetry to warn each other of our height when appropriate. Combined with the usual rules of the air and a very firm application of the never have visible crossing the opportunity for mid airs is reduced.

As it turned out the winner flew a 1/3 scale glider. The highest placed 'unlimited' glider was a Schambeck Quintus, flown by Florian Schambeck himself, in tenth place. Amongst a great many pilots there is a feeling that the 1/3 scale gliders are the future and the bigger planes will not be so popular for competition.

Those pilots who don't have the bigger scale planes like, for instance the Schambeck Quintus, can ballast their 1/3 scale gliders to the maximum weight. Again the performance of the bigger planes can be better, the 1:2.6 Schambeck Quintus is 8.8m span compared to the Horky Quintus at 7.6m. However if you fancy it you can ballast the Horky Quintus to the same weight as the Schambeck Quintus and therefore end up with a significantly higher wing loading, which for a gliding distance event can be a massive advantage.

In this type of event the level of consistency required is very high. I have to say that only having nineteen flights with the plane before the SLS event was a handicap. Although the plane is great to fly I have to say that as I've never flown anything over five metres span until this plane there has been a learning curve. I had one technical issue leading to a zero score and made one significant mistake. If both of those hadn't occurred I'd have finished 12th in the SLS event. So, with the massive learning experience I can only hope to better my performance in 2025 SLS World Masters.

These events were a massive undertaking by the organisers. Lunch, dinner, power for charging, hanger space for all the planes and evening activities were all provided. As well as catering for all the flyers and their crews the organisers succeeded in attracting several hundred spectators and several television crews. A superb achievement!



What to practice

Without doubt there are some skills that it is worth practicing for this type of event. Key things are:

Get a good start. 490m at 110km/h at the start line is good. As soon as the task started voice prompt is heard select full thermal flap and zoom. At that sort of speed there will be a gain of up to 50m. That is one more lap.

Get the best glide set up. The right flap setting and the right airspeed make a massive difference. Flying at what seems to be the 'best glide' trim is often way to fast and whilst the four laps will be at 60km/h average, the winner of a still air slot will have done six to eight laps at 53km/h.

Get the very best climb you can. Centre your thermals and really extract the best climb. This is something I see a lot of UK pilots struggle with. You need to fly to your senses and to the variometer tones. There is a lag on the vario so the more you fly the better you get at centring the lift.

Get to the lift. Before you are due to fly, look around at the sky, know where the thermal triggers are, look at the lift patterns during the day, and understand the lift behaviour at the different heights. As well as doing all the observation on the field before and during the flight you need to find a weather application, that gives the expected daily thermal behaviour, that works for you. Then you need to validate it for reliability.

Get a plan. Always fly to the correct strategy. Have a plan, know when it is not working and change it. If you formulate your plan and there is a delay before you fly - check your plan. The air mass changes at least once per flight because we are flying for over 40 minutes. You need to respond to that and that preparation and discipline can be practiced.

Get good at doing mental arithmetic. You need to be able to work out how many metres of height you need to complete the task as the 30 minute window unfolds. You also need to know how many laps you can make in the time remaining with the altitude you have. You also need to work out how many metres of climb to take to finish the task. The more you fly the better you get at these calculations. Every flight is different because the lift strength, sink strength, wind direction and lift sources are variables.

Get good at landing. The landing area isn't that hard to get the plane in, but you need to be able to land uphill, downhill, across the wind and sometimes downwind. And don't roll out of the landing area because that halves your landing bonus. Which is worth about two laps on most flights

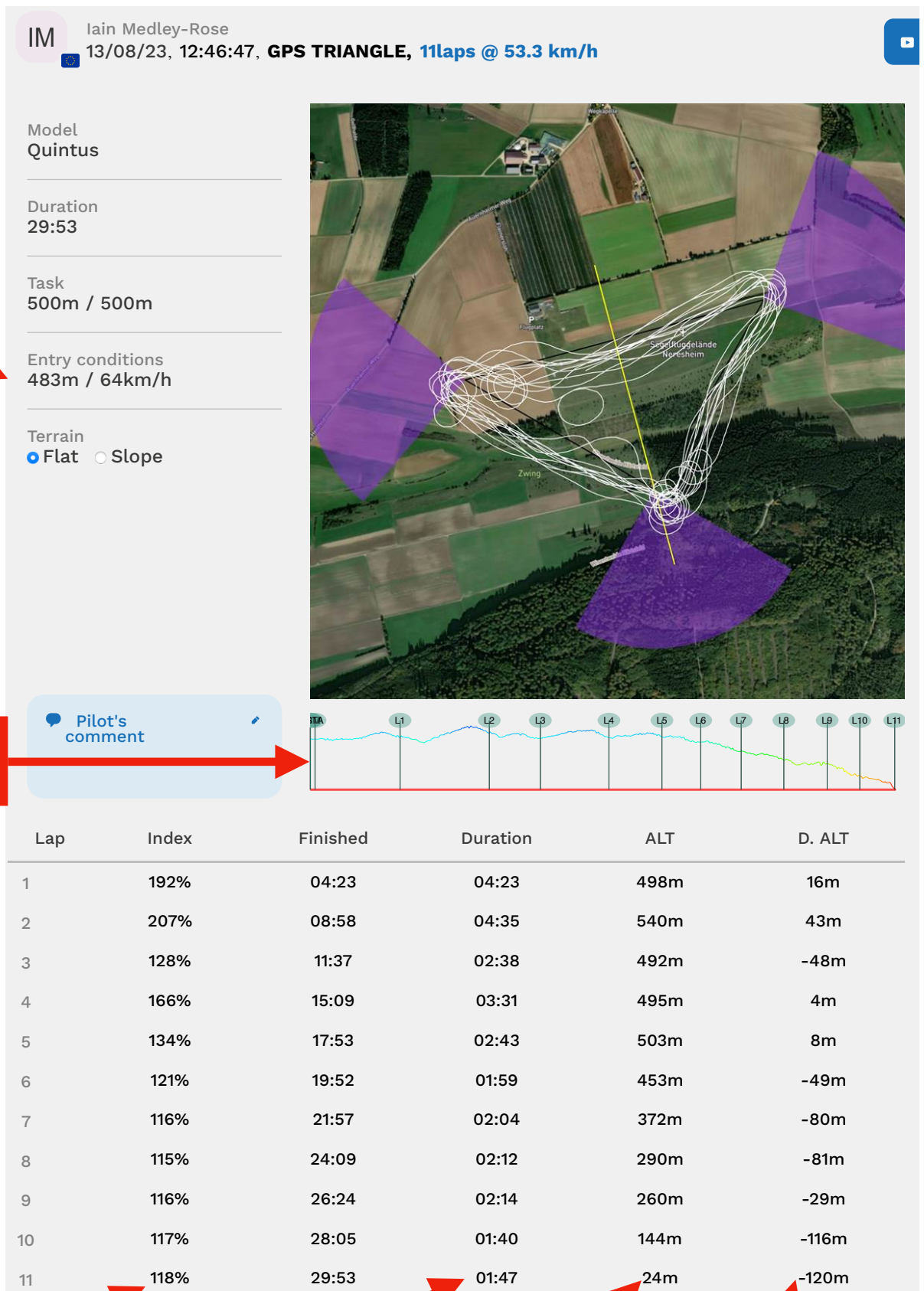
Get better at indexing. Finally, get more accurate at flying the course. A lot of people get really hung up on this early on. It is important - but getting a 118% index when the winner of the group is getting 112% isn't a huge problem - your average speed will be a bit slower so maybe 40 points. Getting 123% index when everyone else is doing 106% indexes for a ten lap flight is very poor- you've lost at least a lap to them. That is a 100 points.

Links/Resources:

GPS Triangle Racing main web site - <https://gps-triangle.net/> including the [rules](#)
Facebook Pages: [GPS Triangle Eurotour](#); [UK GPS](#); [Chocofly](#); [SLS Photo Album](#); [1/3 WC Photos](#)
[German TV report](#)
[2023 post WC Movie](#)
[RCModelspot - the scoring and league portal](#)
BMFA In The Air Tonight (ITAT) videos: [Part 1](#); [Part 2](#)
[An example flight.](#)
NewRCSoaringDigest - [Three is the Magic Number](#), [Road to Gruibingen](#) and [Road to Ulm](#).
[TUD Modelltechnik Glasflügel 604](#)
[HModel Quintus](#)

What the GPS recording looks like on RCModelspot.

The data from the airborne kit that we upload from our Android phones translates into a trace showing the track of the glider, the altitude changes and also calculates the lap speeds, the average speed of the flight and calculates the number of completed laps in the working time.



Entry Height and Speed

Altitude graph

How close to the perfect lap you got

Time for each lap.

Altitude at the end of the lap

Altitude loss or gain for lap

HM Quintus (in the box) - AKA Big Orange.

Racing planes in this class are becoming a little more specialised but the rate of development is far slower than that seen in the F3 and F5 classes where people competing at the top level are often changing their planes every couple of years. The investment of time and money by both manufacturers and pilots slows this down in 1/3 Scale and SLS GPS classes.

I've chosen the Quintus made by Radim Horky (HMODEL CZ). Because of the size of these planes one significant factor was that the plane can be produced in a transportable form (itB or in the box). This gives a two piece fuselage and a six panel wing so a 7.66m span glider with a fuselage of 2.7m can be easily fitted into a normal car.

Normal equipment for these gliders is a retractable wheel and some means of launching. The outline has to be within the limits defined in the rules but control surfaces are able to be set up in a modern fashion and scale spoilers/airbrakes/parachutes are not required.

Colour schemes are not required to be scale either and there is no demand to have a pilot, or even a glazed canopy.

So as you can see I have a very customised colour scheme that works perfectly for racing. My power system is ideal for 1/3 scale racing where aerotow is the primary launch method. I always fly the glider at or near maximum weight for 1/3 scale and do have an extra wing joiner that adds 2.4kg for SLS Class.

The power system is a MigFlight Jetec E100 EDF that provides plenty of power for rise of ground and easily gives 650m of total climb per set of 12s 6000mah Lipo. Careful power management and use of any thermals gives

another 50 to 100m when flying SLS Class. On average I get between 120 and 180 seconds of motor run, which is a lot less than a FES system (Front End Sustainer). More people are using Jetec systems because they offer a benign operation, and there is zero risk of a propeller strike to the runway on take off.



In some ways this is actually the easiest plane to fly I have ever owned. As you would expect from the size it is super smooth and very stable. Tracking in a straight line is superb and the thermal turning is really good. Stall behaviour is really benign and I've managed to get a tiny tip stall out of it trying very hard in a tight thermal turn in weak lift. Landing is pretty easy, even cross wind. The only time it feels challenging is cross or down wind onto a downhill landing field.

Having the onboard avionics is incredibly important for this type of racing. As well as defining the racing course there are lots of bits of telemetry that are useful.

Airspeed for each flight

condition is really important. The altitude is also used a lot for calculating your glide, your timing and your strategy during the 30 minute flight.

Quintus itB

| | |
|--------|----------------|
| Span | 7660mm |
| Length | 2700mm |
| Weight | 18kg to 20.4kg |

Controls -six servo wing (three per side) giving ailerons, flaperons, flaps and crow brakes. Elevator (with snap flap mixing), rudder, motor (lift and lower, esc), retractable undercarriage aerotow release. Presets for Thermal, distance, speed and normal. Switchable mixing for coupled aileron rudder. Controlled by 12 servos and one esc.

Sensors - GPS, ASI, Variometer (with static pressure compensation), backup ASI and variometer.

Calendar

Sun 25th February Winter Warmer, Horton Inn
Date TBA - Slope Tour (see From the Chair for more details).

Contacts

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