



# GPS Triangle Regulations for Sport Class-Gliders

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## Contents

1	Definition of GPS Triangle soaring for Sport Class Gliders .....	4
1.1	Purpose and Goals.....	4
1.2	General Rules.....	4
1.3	Use of Telecommunication Devices .....	5
1.4	Insurance .....	6
1.5	Rules of conduct to avoid midair collisions.....	6
1.6	Safety on the flying site .....	7
1.7	Launching and Landing direction.....	7
1.8	Weather Conditions / Interruptions.....	7
2	Sport Class Glider and Technical Equipment .....	8
2.1	Definition of a Sport Class Glider.....	8
2.2	Specification of a Sport Class Glider .....	9
2.2.1	General .....	9
2.3	Number of Sport Class Gliders per Pilot.....	9
2.4	Replacements & Ballast.....	9
2.5	Loss of Parts.....	10
2.6	Navigation & Data-logger .....	10
2.7	Gyros, Auto Pilots & Telemetry.....	10
3	Flying Field.....	11
4	Organization of a GPS Triangle Contest .....	12
4.1	General Rules.....	12
4.1.1	Contest Organization.....	12
4.1.2	Protests.....	12
4.1.3	Pilot & Navigator .....	13
4.1.4	Radio Frequency Control .....	13
4.1.5	Navigation System Frequency Control .....	13
4.2	Definitions .....	14
4.2.1	Definition of the Contest.....	14
4.2.2	Definition of a Heat .....	14
4.2.3	Definition of an Attempt .....	14
4.2.4	Repetition of an Attempt .....	15
4.2.5	Definition of an official Contest Flight (evaluated flight) .....	15
5	Flight and Scoring.....	16
5.1	Preparation (Normal Heat).....	16
5.2	Preparation (Speed Heat).....	17
5.3	Cancelation & Restart of a Group.....	17

5.4	Flight Task and Flight Time .....	17
5.4.1	Speed Heat .....	17
5.4.2	Normal Heat .....	17
5.5	Scoring rawpoints .....	18
5.5.1	Triangle Points .....	18
5.5.2	Landing Points .....	19
5.5.3	Penalty Points .....	21
5.5.4	Evaluation of Points for the Speed Heat .....	21
5.6	Results .....	22
5.6.1	Evaluation of the Results .....	22
5.6.2	Intermediate Score and Final Ranking.....	22

# 1 Definition of GPS Triangle soaring for Sport Class Gliders

## 1.1 Purpose and Goals

GPS Triangle competitions are meant to build a bridge between model soaring and full-size soaring competitions. Its goal is to display cross country soaring competitions of full size soaring in the scale of our model aircraft. The main task when participating a GPS Triangle contest is to fly around a virtual triangle (perimeter ~1,690 km) as often as possible in a period of 30 minutes. In order to obtain comparable results, the maximum starting altitude (usually 400 m) and the maximum starting speed (usually 120 km/h) when crossing the starting line are equal for all pilots. In addition to the before mentioned task, GPS Triangle also provides a special and more exciting task. In the so-called Speed Heat, pilots have to fly around the virtual triangle only one time as fast as possible.

The fascinating aspects of a GPS Triangle contest are:

- Lots of activities in the air (e.g., various gliders flying at the same time, takeoff by hand)
- A lot of flight time for each pilot during the competition
- Offering a wide variety of tactical decisions in combination with optimized teamwork between pilot and helpers.
- Flying with high performance sport- or scale gliders.
- Combining a complex flight task with rules as simple as possible
- Easy organization with only very few helpers

## 1.2 General Rules

For the execution of a GPS Triangle contest, the technology of satellite navigation with data communication from the model to the pilot is used. Together with the use of Data Loggers, the position (latitude, longitude and altitude) of the glider can be determined and verified in real-time. This simplifies both the flying operations and the evaluation of the flight.

Every pilot must use commercially available navigation equipment, compatible to the specifications described in **Appendix 2**. Pilots are not allowed to use more than two onboard systems, whereas, one is the main system and the other is the backup system. The applied system must be certified by the GPS Triangle Committee and the required soft- and firmware-versions need to be installed. Every pilot must control his aircraft himself. In the case that the aircraft is controlled by someone other than the pilot, the competitor will receive a zero score (0) for this round.

The scoring of the individual flights to compute the individual results is based on the logged flight data and is calculated in the contest directors' office. The details of the data to be logged for scoring is shown and explained in **Appendix 2**.

The following flight data from existing and permitted navigation systems can be submitted to the competition officials in order to calculate the results.

The applied system must provide information after the flight about:

- Starting time (in UTC)
- Task starting altitude (in m)
- Task starting speed (in km/h)
- Flight time (i.e., a period starting when glider crosses starting line until it completes last triangle in min:sec)
- Number of triangles (n)
- Average speed, at which the triangles (multiple of 1,690km) were done
- Violation of safety area(s)
- Logging of Motor switch. "Motor off" shall be logged with according time-stamp

*Note: To validate the logger the motor must be switched on for a short time prior to the launch.*

In addition, the system must provide a check code. This is generated based on the data above (e.g., starting time, task starting altitude) and is to ensure that no errors occur when processing the information from the flight card to the stationary evaluation software.

The use of additional variometers is limited to devices operating on frequencies in the 2,4 GHz band.

Penalties may be imposed by the contest director, with the consent of the Jury, for:

- Unsporting behavior
- Technical Infringements

#### Unsporting behavior:

Cheating or unsportsmanlike conduct, including deliberate attempts to deceive or mislead officials, deliberate interference with other competitors, falsification of documents, use of prohibited equipment or prohibited drugs, airspace violations, or repeated serious rule violations should normally be punished by exclusion from the competition.

Unsportsmanlike conduct shall also be understood as a deliberate attempt by a competitor to influence, intimidate or threaten officials or other competitors or teams in order to gain an advantage over other competitors or teams - regardless of whether this occurs immediately before, during or immediately after the sporting event. This behavior may result in disqualification of the individual or team from the competition.

#### Technical Infringements:

Any competitor using a model or equipment that does not comply in all respects with the rules and regulations of the event or has not been approved by the organizer will be disqualified from the competition.

### 1.3 Use of Telecommunication Devices

The use of any electronic device other than for piloting or navigating the model aircraft is forbidden. Mobile phones have to be switched off or turned into flight mode on the flying site.

## 1.4 Insurance

Each participant must provide sufficient liability insurance with a coverage of at least € 2 million for personal injury and property damage that covers damage resulting from the use of his model airplane.

## 1.5 Rules of conduct to avoid midair collisions

To avoid collisions in the air every pilot needs to obey following rules of conduct to avoid midair collisions, or even collisions on the ground.

- If two models head towards each other in straight line flight, every model has to be steered to the right (aileron right) to avoid a collision.
- In every group the circling direction for thermaling is fixed. Group A is circling left, group B right, group C left and so on.
- Circling models have the right of way. Models flying in a straight line must fly around circling models to avoid collisions.
- Avoiding optical crossings of the models' flight paths is mandatory.
- In case of an abort of crossing the start line, a start-repetition after successfully entering the course or when turning around after missing a turn sector, these maneuvers must always be carried out with consideration for other models in the air.
- Abrupt turning maneuvers must always be avoided in order not to obstruct other pilots on their flight path.
- Models which came to rest after landing have to be removed from the touchdown area by each pilots' helper as quickly as possible.

Midair collisions or collision on the ground are no reasons for a reflight.

## 1.6 Safety on the flying site

The organizer of the competition must clearly mark the boundary between the landing area and the safety area assigned for other activities. (See sketch in 3: "Flying field")

No matter how the layout of the safety zones is realized, the pilot box must be inside the boundary of a safety area at a distance of minimum five (5) meters (See sketch in 3: "Flying field").

The minimum allowed altitude to overfly the pilot box must be 150m AGL independent of the setup of all other safety areas.

The maximum flight altitude is 750m above the launch site - unless it is even lower due to local restrictions.

The maximum specified flight altitude may not be exceeded at any time and must be stored in the competition task-file, so that it can be immediately detected by the navigation system if exceeded. Exceeding the maximum flight altitude before, during or after the scoring flight, will result in a zero score for the pilot for that heat. A check code must not be generated.

The competition director has the right to interrupt the competition out of safety reasons (unsafe conditions) at any time.

## 1.7 Launching and Landing direction

All launching and landings shall take place in an area as designated by the organizer with provisions made for launching and landing into the wind (headwind component).

## 1.8 Weather Conditions / Interruptions

### a) Interruption and Resumption of the competition due to bad visual conditions:

The Contest Director has to ensure that models flying the triangular course below the dedicated entry altitude will always be visible. If this is not the case (i.e. due to low cloud base or fog) the Contest Director has to neutralize the group in flight and interrupt the competition. It is recommended to launch the group again with a lower dedicated start altitude. If this is again not possible the group has to be launched again as soon as the visible conditions permit.

### b) Interruption and Resumption of the competition due to high wind speeds:

The maximum wind speed for contests is twelve (12) m/sec. The contest has to be interrupted or the start has to be delayed by the contest director if the wind speed exceeds twelve (12) m/sec measured three (3) times for at least twenty (20) seconds in a time interval of five (5) minutes about two (2) meters above the ground at the start and landing area.

c) Interruption and Resumption of the competition due to rain:

In the case of heavy and/or persistent rain the ongoing round has to be interrupted. The Contest Director has to neutralize a group in flight and interrupt the competition until the rain will stop. All pilots have to land their planes as soon as possible after the Contest Director neutralized a group in flight. The group which was neutralized will reassume the competition at a later time as soon as the rainfall has stopped.

d) Interruption and Resumption of the speed task due to rain:

In the case of rain, the contest director must interrupt the contest during Speed task. In case the rain stops after an interruption of less than fifteen (15) minutes, the contest starts again with the pilot that was flying; he receives a re-flight.

The entire group of the speed task must be divided into a reasonable number of equal-sized groups of pilots before the start of the speed task. This division is dependent on the total number of participants. The minimum number of participants in one group is ten (10). If the weather is stable only one (1) group is evaluated; if the competition must be interrupted for more than fifteen (15) minutes, then the interrupted group must start from the beginning and the results are evaluated for each group.

## 2 Sport Class Glider and Technical Equipment

### 2.1 Definition of a Sport Class Glider

A Sport Class glider is defined as a radio-controlled glider which is equipped with an electric engine for hand launch and it must comply with the specifications mentioned in paragraph 2.2. Other methods for launching, than launching the model aircraft by hand are not permitted.

## 2.2 Specification of a Sport Class Glider

### 2.2.1 General

Value	Size (Maximum)	Tolerance
Wingspan	5000 mm	20 mm
Wing loading (wing area)	75 g/dm <sup>2</sup>	For measurements the tolerance of the used scale is valid
Weight	7000 g	For measurements the tolerance of the used scale is valid

The wing loading in general is determined by the weight of the aircraft divided by its projected wing area. The projected wing area is defined for the state of all trailing edge surfaces (regularly ailerons and flaps) adjusted in neutral ("Zero-degree") position.

The pilot must always be able to prove that his model complies with the rules.

The information on the official homepage of the manufacturer or in case of self-construction the construction plans apply.

## 2.3 Number of Sport Class Gliders per Pilot

During a GPS Triangle competition each pilot may use a maximum of two Sport Class gliders or two different configurations (related to the geometric outline of the Sport Class glider). These Sport Class gliders are called A-Model and B-Model. Each detachable part of the aircraft which defines its outline must be marked with a distinctive identification label (for instance Model A, Model B). The labels have to be documented on the starting card and for each flight the pilot must checkmark the Sport Class glider used. *(This rule stays active as long as scoring will be done using scorecards)*

## 2.4 Replacements & Ballast

All parts can be interchanged between A-Model and B-Model, as long as the outline of the model is not changed. The "outline" of the Sport Class glider is determined with all trailing edge surfaces (regularly flaps and ailerons) in "0-degree"-position. Changing or replacing components of the radio equipment, navigation system, power unit or electronic items is allowed. Using ballast is permitted. Water ballast is also permitted and can be jettisoned during flight. When ballasting the maximum wing loading limit (see paragraph 2.2.1) must not be exceeded.

## 2.5 Loss of Parts

If the model aircraft loses a part (other than water ballast) during takeoff or flight the aggregate flight will be scored with zero points. The loss of a part after a midair collision or during the landing will not be considered in scoring.

## 2.6 Navigation & Data-logger

For navigation during flight a compatible navigation system has to be used. This system transfers GPS-data from the Sport class glider to a receiving device (Ground station) and/or records relevant flight data in an onboard-logger. Additionally following requirements must be fulfilled:

- The performance of a flight (number of triangles, starting altitude, average speed over all triangles) can be determined immediately after landing using the receiver equipment or a read out of the onboard log file.
- Only systems fulfilling the specification (cf. Section 7 “Appendix 2”) are allowed for the flight navigation and flight evaluation.

The technical details for basic requirements concerning the navigation systems as well as a list of accredited systems is shown in Appendix 2.

## 2.7 Gyros, Auto Pilots & Telemetry

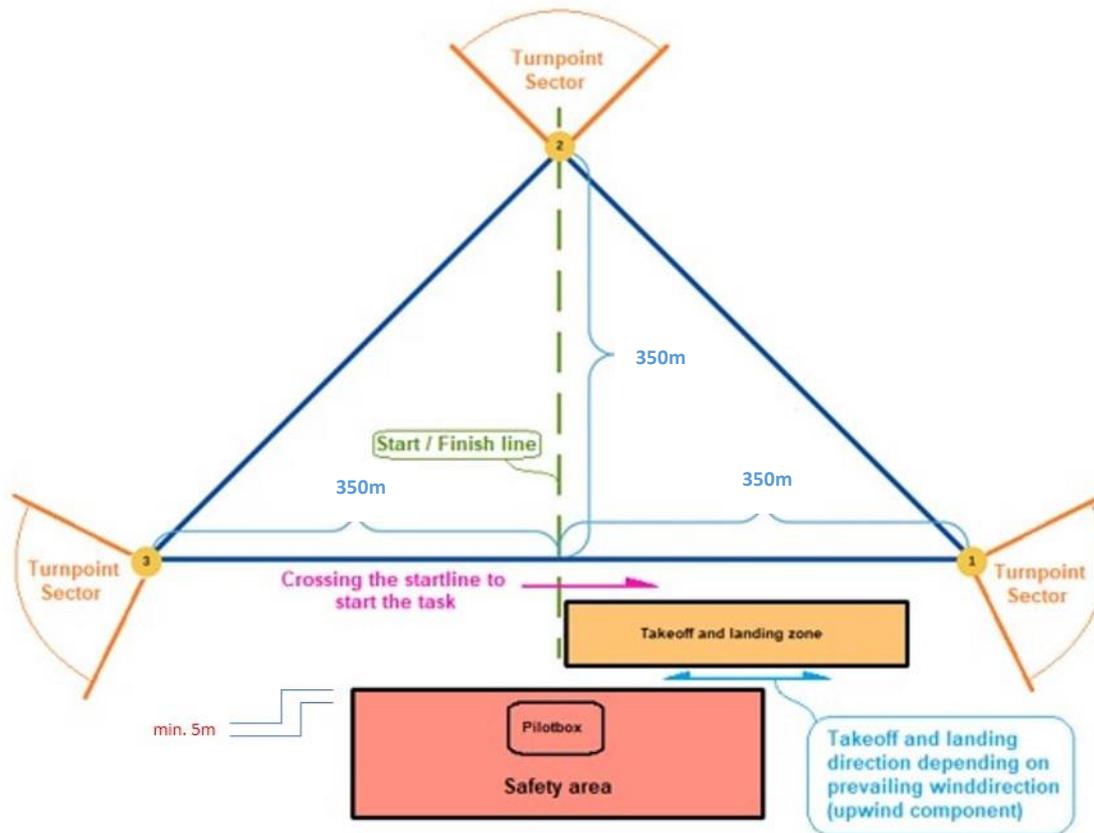
Gyros, flight augmentation systems or Autopilot systems, or the usage of data generated by such systems for flight attitude control are not permitted.

It is not permitted to connect the telemetry-receiving unit with the radio control transmitter (e.g. Speed Indicator Signal with Flap Function) in order to send a corrective signal to the model.

Doing so will result in disqualification from the GPS Triangle contest.

### 3 Flying Field

The flying field and the virtual triangle design:



The position and the size of the Take-off and Landing Zone as well as the Safety Zone may vary because of geographical circumstances of the flying field (see 5.6.2). The Take-off and Landing Zone conforms to the minimum width of the airstrip of 25 meters and a length of at least 80 meters. The position of the pilot box inside the Safety Zone can be chosen freely by the contest director, but has to be at least minimal 5m apart of its outside boundaries. The sketch above is not true to scale. The view into the area in which the triangle is placed should be unrestricted.

The altitude band of the Safety Zone above the Pilot box has to be at least 150m AGL.

Depending on the terrain the organizers of the competition may declare Security Zones which are defined by an outline and a height band. If one of these Security Zones is violated, the aggregate flight will be scored with zero points.

## 4 Organization of a GPS Triangle Contest

### 4.1 General Rules

#### 4.1.1 Contest Organization

The contest organization provides the following personnel:

- Contest director: He is responsible for the entire GPS Triangle contest and shall not participate as active pilot in the contest.
- Supervisor of Flying (SOF): He responsible for coordination of departures, landings, times and weight of the models. Every pilot having finished the official task will announce his landing. The SOF will confirm the correct landing procedure (see 5.6.2) on the control card except for the Speed-Heat (there are no landing points).
- Evaluation officer: He is responsible for entering the flight results and creating intermediate and final ranking lists
- Jury: three persons well knowing the GPS Triangle contest rules and being able to decide in cases of doubt or problems. Jury members which are also pilots must be replaced by other persons for questions / problems concerning themselves.
- Tasks of the jury: Possible irregularities, or decisions made by the contest director or the supervisor of flying respectively can be claimed by every competitor. In case of an appeal the jury has to come together to decide whether or not the appeal will be overturned.
- The reason for a complaint in verbal- or in written form is to get a correction without the need of a formal protest. It is recommended to submit a complaint before submitting a protest.

#### 4.1.2 Protests

Protests have to be submitted to the contest director in written form and in English language. Furthermore the protest is linked to a fee amounting to 100 Euro. The jury which has been nominated prior to the start of the competition has to come together and has to agree on a decision in this case. A simple majority within the jury members is sufficient to refuse or grant a protest. The protest fee is only going to be refunded if the protest is granted. No appeal or protest can be lodged against the decision of the jury.

## Deadlines for submitting protests

### Prior to the start of the event:

A protest against the validity of participation, the qualification of the participants (pilots), the competition rules, the flying field and the competition area, the processing of glider models, the jury or other officials has to be submitted at least one hour before the event starts.

### During the event:

A protest against a decision of the contest director, other officials, or against a mistake or irregularity committed by another participant during the event must be submitted as soon as the competition allows. The complaint must not be filed any later than 90 minutes after the start time frame of the respective group in which the incident occurred. Note: A protest against official results must be submitted immediately after the official results have been published on the airfield, but no later than at the award ceremony.

### 4.1.3 Pilot & Navigator

The participants are randomly assigned to a group by the GPS Triangle Evaluation Software. During a flight, a pilot may be assisted by a single navigator. It is of importance that only pilot and navigator are inside the Pilots Area. The noise level has to be reduced to a minimum. As a consequence voice prompts (except beeps and similar sound signals) should be transmitted via headphones.

### 4.1.4 Radio Frequency Control

Only frequencies authorized by the national authorities may be used; it is the responsibility of the participant to ensure this. The contest director or the Supervisor of Flying are authorized to perform a frequency control at any time.

### 4.1.5 Navigation System Frequency Control

The contest director assigns each pilot/navigator team a maximum of two frequencies for the transmission module of the GPS system in the glider model. The correct setting of the frequency is up to each pilot. It is recommended to make use of the four-eye principle (pilot/navigator are monitoring each other). There is a maximum of two frequencies for a pilot / navigator team. The operation of a navigation system with a frequency other than the assigned one will result in a zero score of this heat for the pilot.

The pilot disadvantaged by the incorrectly set frequency will receive a reflight in another group of the same heat. If this is not possible, the same group has to fly again. The causing pilot is excluded from this flight. For the re-flying pilots of this group the better of the two achieved results is valid.

This rule is not applicable for navigation systems with frequency hopping.

## 4.2 Definitions

### 4.2.1 Definition of the Contest

A GPS Triangle contest consists of at least three GPS Triangle heats.

After 6 heats (more than 5) the worst score of each pilot will be discarded (discard heat) from the overall results. For each competition the maximum number of discard heats is one (1), regardless of the number of heats flown.

One out of six heats (for the case, that more than 5 heats are flown) has to be a Speed Heat. The Speed Heat is announced by the SOF during the briefing and taking weather conditions into account.

The Sport Class glider or configuration used for the Speed Heat must have been used in at least two (2) of these six (6) heats. Therefore it has to be used at least once in a heat which is not the Speed Heat. If this is not the case, the Speed Heat will be judged with zero points.

### 4.2.2 Definition of a Heat

For each heat, the GPS Triangle Evaluation Software equally distributes (random) the participating pilots into groups. The number of pilots determines both the individual group size and the number of groups.

A normal Heat always consists of at least 2 groups, whereby, each contains a minimum of 3 and a maximum of 13 pilots. However, a Speed Heat consists of solely one group containing all participating pilots, as long as the weather conditions permit. Should the weather conditions require an interruption of more than 15 minutes, the Speed Heat has to be repeated or a separate classification using group scoring will be applied (See paragraph 1.8.d)

A heat consist of one or more attempts for the pilot as per 4.2.3 and 4.2.4 and subsequently the official flight (see section 4.2.5)

When distributing the pilots into groups, it must be guaranteed that two pilots of one team are not assigned to the same group and subsequently do not have to fly at the same time. Therefore, the pilots need to inform the officials about their team membership when signing up for the contest. In a single heat, each competitor of pilot/navigator team will fly as a pilot once and help once as a navigator.

### 4.2.3 Definition of an Attempt

An attempt begins with the take-off of the sport class glider from the pilots' or his helpers' hand. Any other method of launching is not permitted. The attempt is completed when the sport class glider reaches the predefined starting altitude of the heat. Note that in the speed heat it is not allowed to switch on the motor again after reaching the predefined starting altitude and after the motor has been switched off.

#### 4.2.4 Repetition of an Attempt

An attempt may be repeated if the sport class glider has not reached the predefined starting altitude of the heat. The number of repetitions is not limited as long as the official Flight Window of the group is open.

However, after the first attempt, it is not allowed to replace any parts of the scale glider. This applies to all mechanical parts (see Paragraph 2.4).

The engine or self launch system can only be used within the default start time window and before overflying the start line to start the new working time (evaluated flight). The engine can be switched on again to regain altitude for a new evaluated flight, as long as the start time window is still open. However, the previous evaluated flight is cancelled.

This is not applicable for the Speed heat. After reaching the task altitude for the first time, it is not allowed to use the engine again. If the pilot decides to restart because of penalty points, he can do so, but without using the engine a second time.

If the engine is turned on during the evaluated flight, it will be judged with zero points. Zero points will also be rewarded, if the flight has not been started before the start time window has been closed. The flight will also result in a zero score if the engine is switched on a second time in the speed heat after the task altitude has been reached for the first time.

It is the pilots' right to change his model without breaking rule 4.2.1 if:

- a) His Sport class model has collided with another Sport class model during the flight and his glider model cannot be repaired in time or
- b) His Sport class model was damaged during landing by another landing Sport class model.

#### 4.2.5 Definition of an official Contest Flight (evaluated flight)

After a completed attempt the pilot must start the official evaluated flight by crossing the starting line at or below the predefined starting altitude with a maximum of 120 km/h. If the pilot flies too high or too fast when crossing the starting line he may accept a penalty or needs to re-cross the starting line. Each pilot can do only one official evaluated flight per heat.

## 5 Flight and Scoring

### 5.1 Preparation (Normal Heat)

In a Normal Heat, the groups are randomly determined via the GPS Triangle Evaluation Software. It has to be made sure that the two pilots of a helper team are never assigned to the same group. Should a heat consist of more than three groups, the pilots of the same team may not be assigned to consecutive groups within the heat. The Contest Director sets a start time window for each group and announces this time window before the start of the heat. The start time window determines within which time from the start time all pilots of the group have to have flown over the starting line. The duration of the start time window depends on the number of pilots in a group and is between 5 minutes and 59 seconds and 10 minutes and 59 seconds long. The start time window is given in whole minutes, counting the last minute to the start time window.

**Table: Start time window (in minutes plus 59 seconds) depending on the group size**

<b>Pilots per Group</b>	<b>Start Time Window in Minutes</b>
<b>3</b>	5
<b>4</b>	5
<b>5</b>	5
<b>6</b>	6
<b>7</b>	7
<b>8</b>	8
<b>9</b>	9
<b>10</b>	10
<b>11</b>	10
<b>12</b>	10
<b>13</b>	10

The start time window is communicated by the contest director as soon as possible. Nonetheless, the start time window opens not earlier than 5 minutes after the last Sport Class glider of the preceding group has landed. If a heat consists of less than four (4) groups, the start time window opens not earlier than 15 minutes after the last Sport Class glider of the preceding group has landed. The pilots have to be ready to take off not later than 5 minutes before the start time window opens.

## 5.2 Preparation (Speed Heat)

In the Speed Heat the next Sport class model to be launched is taking off as soon as the previous Sport class model has passed Turning Point 1 after overflying the starting line. Under these circumstances there is the least risk of a collision between a Sport Class glider which is being started and a Sport Class glider flying at high speed.

## 5.3 Cancellation & Restart of a Group

The contest director may stop the competition if one or more reasons for such an interruption occur. These circumstances are shown in Paragraph 1.8.

## 5.4 Flight Task and Flight Time

A GPS Triangle contest consists of two different flight task types performed in two different heat types.

Independent from the heat type, the following rules must be followed:

- The finish line must be crossed with a speed of at least 20 km/h; otherwise the crossing and also the last round will not be counted.
- After landing the pilot must fill out the scorecard and submit it to the SOF if landing points have to be deducted. The SOF confirms with his signature. The Pilot also confirms with his signature, that he agrees with the scoring.

### 5.4.1 Speed Heat

The flight task of the Speed Heat is to pass all the Turning Points of the defined triangle, in the defined order, exactly once and in the lowest time possible.

### 5.4.2 Normal Heat

The flight task in a normal heat consists in flying around the defined triangle as many times as possible within the specified flight time (usually 30 minutes). The flight time starts with the last crossing of the starting line within the predefined start time window.

## 5.5 Scoring rawpoints

The score is computed by the triangle points, the landing points, and the penalty points.

$$\text{Rawpoints} = \text{Triangle Points} + \text{Landing Points} - \text{Penalty Points}$$

The score for the Speed Heat is the result of the speed-related points for flying around the triangle deducting all the cumulated penalty points.

$$\text{Rawpoints} = \text{Rawpoints for } \frac{\text{individual average speed}}{\text{best average speed}} - \text{Penalty Points}$$

### 5.5.1 Triangle Points

Every pilot gets 200 rawpoints per completed triangle. If there is more than one pilot in a group having the same number of completed triangles, the points for the last triangle are calculated as follows:

- Only the pilot with the highest average speed over all his triangles gets 200 rawpoints for the last triangle
- Pilots with the same amount of completed triangles are getting points for their last triangle related to their overall average speed. These points reflect a proportion in relation to the highest possible score of 200 rawpoints, which the pilot with the highest average speed will get. The points in this case are calculated as following:

$$\text{Rawpoints for the last absolved triangle}_{\text{pilot}} = 200 * \left( \frac{v\emptyset_{\text{pilot}}}{v\emptyset_{\text{fastest Pilot}}} \right)$$

$$\begin{aligned} v\emptyset_{\text{pilot}} &= \text{average speed of the according pilot} \\ v\emptyset_{\text{fastest Pilot}} &= \text{average speed of the fastest pilot} \end{aligned}$$

Hereby the average speed is calculated as follows:

$$\begin{aligned} \text{average speed } v\emptyset &= \frac{(\text{number } (n) \text{ of triangles} * \text{course distance of 1 triangle in km})}{\text{flight time in h}} \end{aligned}$$

## 5.5.2 Landing Points

The landing zone has to be marked properly. Its width has to be at least 25 meters and its length at least 80 meters.

The direction of landing is declared by the SOF and has to be visibly displayed. If the wind conditions change the SOF may change the landing direction within the current group. Altering the landing direction is only viable, if no glider model is currently in the landing process.

Note that in the Speed Heat no landing points are awarded.

In every other heat there will be landing points for the pilot.

400 landing points are awarded, if:

- The Sport class model came to a full rest inside the landing zone. That means at least one part of the Sport class models' fuselage is inside the boundaries of the landing zone.
- The landing must always take place by crossing the base line of the landing zone first (Not mandatory to do it in flying manner). Crossing the side line of the landing zone is not permitted and results in 0 landing points.
- The Sport class glider is immediately capable of starting again.

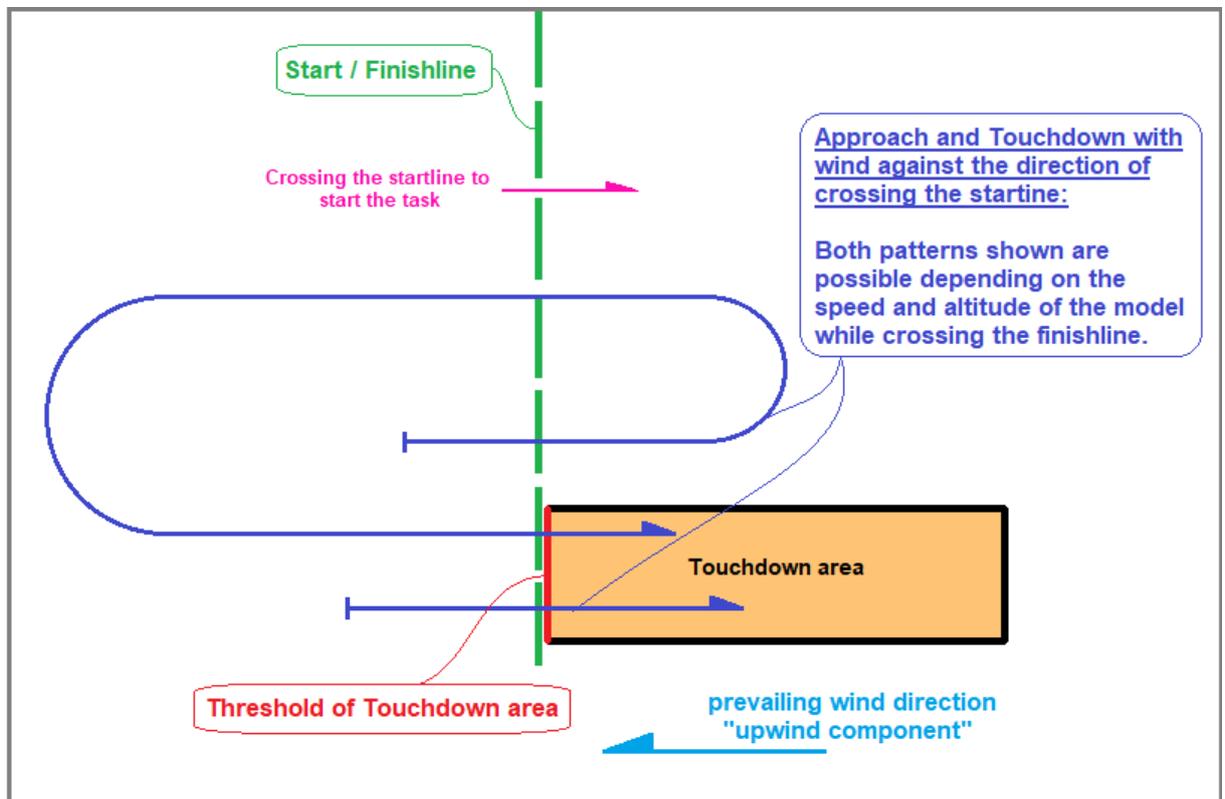
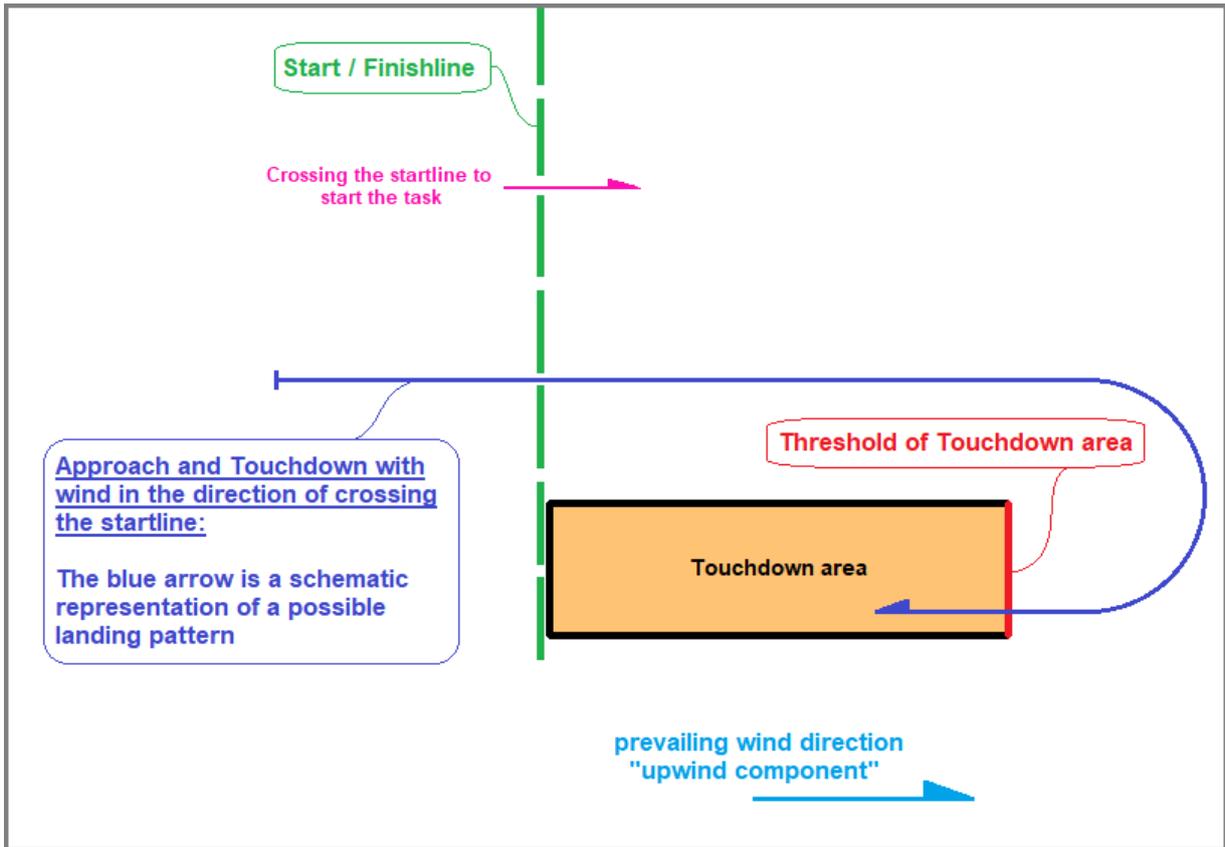
0 landing points are awarded, if:

- The landing sequence is completed against the previously declared direction of landing
- The base line of the landing is not crossed
- The landing zone was entered over one of the side lines
- The Sport Class glider was touched by the pilot or his helper before it came to a complete halt
- 
- The Sport Class glider lands and comes to rest outside of the landing zone with no part of its fuselage touching the landing zones boundaries.
- A part of the Sport class model enters the Safety Area

To avoid several simultaneous landing approaches, the Contest Director or the SOF can instruct a pilot to switch on the engine for safety reasons. This then doesn't affect the pilots' score.

If the engine is switched on without the instruction of the Contest Director after overflying the start line and the start line is not overflown again within the start time window, the flight is judged with 0 points.

The following schematic depicts flight paths for potential landing sequences according to the prevalent wind direction. The position of the start/finish line as well as the position of the landing zone may vary because of the geographical conditions of the airfield. However, the layout of the airfield should be as implemented as close as possible to the Sketch depicted in 3 "Flying field".



### 5.5.3 Penalty Points

Crossing the starting line above the predefined starting altitude and/or at a speed above the maximum starting speed of 120 km/h, the pilot gets penalty points as follows:

$$PenaltyPoints = 50 + 2 * (Starting\ Alt. - Max.\ Starting\ Alt.) + 2 * (Entry\ Starting - Max.\ Starting\ Speed)$$

The pilot may accept a penalty and start the official contest flight or may do a new attempt in re-crossing the starting line as long the start time window is open. The penalty points are deducted from the total rawpoints score of the pilot.

Note: violating a safety zone (area, height) will result in 0 points for this flight.

Launching out of a safety zone is possible in case it is necessary and permitted by the organizer.

### 5.5.4 Evaluation of Points for the Speed Heat

For a Speed Heat only the average speed over one flown lap is crucial. The pilot with the highest average speed over this lap is awarded with 200 rawpoints. The other pilots are getting a proportionate result according to the following formula:

$$Rawpoints_{Pilot} = \left( \frac{v_{Pilot}}{v_{Best}} * 200 \right) - PenaltyPoints$$

$v_{Pilot}$  = Average speed of the according pilot

$v_{Best}$  = Highest average speed

## 5.6 Results

### 5.6.1 Evaluation of the Results

For every group there is a separate classification of 1000 points. The pilot with the highest score in rawpoints – possible Penalty Points taken into consideration – is awarded with 1000 points. The other pilots in this group are getting proportionate scores in relation to the highest score within the group.

$$Points_{pilot} = \frac{Raw - points_{pilot}}{Raw - points_{Best}} * 1000$$

Rawpoints<sub>pilot</sub> = Points of the pilot

Rawpoints<sub>Best</sub> = Best score of a pilot in this group

It is neither possible in Normal Heats nor in Speed Heats for a pilot to get a result lower than 0 points. The calculation methods, definitions and algorithms for the evaluation of the results are shown in Appendix 2.

### 5.6.2 Intermediate Score and Final Ranking

The evaluation officer creates an intermediate score list after each heat. The results have to be made public by the Contest Director not more than 30 minutes after the heat was completed (Chance to appeal and protest).

The cumulated points are the final results according to 5.7. If there are six (6) heats or more, the worst heat of a pilot is not added to the final result. Before publishing the final ranking, the contest director must control the final calculation of the results according to a standardized check list.

If multiple pilots reached the same final score, the ranking of these pilots depends on the following criteria sorted in order of priority:

1. The highest score omitted for calculation.
2. The overall number of completed triangles
3. The highest average speed in one of the Normal Heats.
4. The highest score in one of the Speed Heats.