

GAP 2002

User guide to the International Scoring System

GAP scoring was developed for CIVL by
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The idea was to get a fair scoring easily adaptable to any competition everywhere in the world, both for hang gliding and paragliding, with a philosophy that is easy for the pilot to understand, regardless of the mathematical complexity.

You can download:

the RACE2000 scoring program from www.fai.org/hang_gliding/race

the program to validate the GPS tracklog (and much more) from www.compe-gps.org

the executable file needed to upgrade RACE2000 from www.metamorfoosi.com

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To compare different tasks within the competition and to adapt the scoring to hang gliders or paragliders, different flying sites, pilot's level and task philosophy, before the competition the meet director sets some Nominal Parameters:

NominalDistance: the minimum task distance that should be worth 1000 points. (In the Alps, for hang gliding competition is suggested 50-70 km, for paragliding 30-50 km). If a task distance is less than NominalDistance, the day will be probably devalued. There is no penalty for a task that is longer than NominalDistance as long as the task results in an even distribution of the pilots along the course. There would also be no penalty if the NominalDistance parameter was set shorter, as long as it would take a reasonable length of time for the pilots to fly this distance. What constitutes a "reasonable length of time" is explained further down the page.

MinimumDistance: the distance awarded to every pilot who takes off. It is the distance below which it is useless to measure pilot's performance. This distance should be at least one tenth of NominalDistance. (In the Alps for hang gliding or paragliding competitions 10-8 km is suggested). The MinimumDistance parameter is there so that pilots who are about to "bomb out" will not be tempted to fly into the next paddock to get past a group of pilots. It is not in the interests of safety, retrieval or landowners to encourage pilots to try to stretch their flight when they clearly have been beaten on the day by either poor weather or a poor flight.

NominalGoal: the percentage of pilots in goal the meet director would wish to have in a well-chosen task. (For National competitions it is suggested to use 20-30%)

NominalTime: equivalent in time to NominalDistance. It is the fastest elapsed time, below which the task should be devalued.

It can be considered as the time necessary for the fastest pilot to fly the NominalDistance. (In the Alps for National competitions, it is generally suggested at least 2 hours). There is no penalty for having the fastest pilot take longer to complete the task.

NominalDistribution: is a direct consequence of the first three parameters and the maximum distance flown on the task.

This is represented on the distance validity graph.

Keep in mind:

To get a fair competition task, you should normally have pilots in goal and pilots need to be in the air for a period of time so that the competitors make a series of different decisions, thereby sorting out the best pilots from the good ones.

If a pilot reaches goal with just two thermals, then this is not necessarily a good test of skill. This task may have a tailwind and a high cloud base and therefore could be maybe, 100 km long (or it could just be a short task). In this case the fastest time can still be short and the day will be devalued because of the NominalTime factor. In this case there was not much scope for the pilots to make decisions and the day was not such a fair test of skill.

It is important to remember that it is mainly time in the air (to make decisions about the flight) that separates different levels of pilot skill.

Set tasks that will take a reasonable amount of time to complete and have no difficult part at the beginning. A good task will have pilots making many decisions in the air, and the pilots who do not reach the goal would be landing evenly along the course.

How to chose the parameters:

The NominalDistance parameter is the minimum distance that would still result in a good task worth 1000 points. NominalDistance ties in with NominalTime, and these two parameters need to be considered together.

If a task distance is less than NominalDistance, the day will probably be devalued. There is no penalty for a task to be set that is longer than NominalDistance as long as the task results in an even distribution of the pilots along the course.

The suggested distances are not mandatory, as what makes a good NominalDistance length depends on the terrain, the weather that would normally be expected for the duration of the competition and, quite important, the level of skill that you would expect from the pilots in the competition.

MinimumDistance is the distance that, generally, a normal pilot will easily achieve climbing over takeoff and gliding down. It shall not be less than 1/10 of NominalDistance.

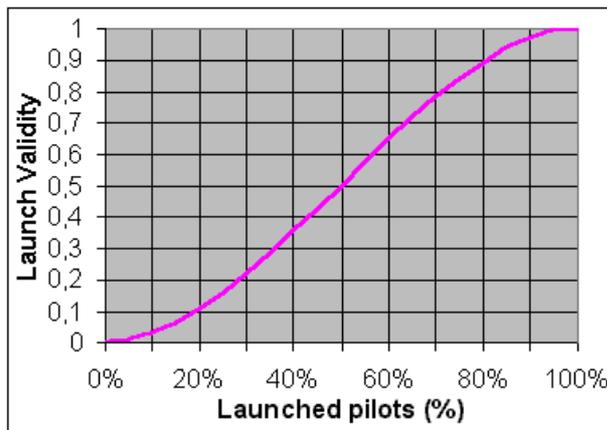
NominalGoal depends on the philosophy of the competition: if it's a pure free distance competition where there are no goals, it should be set to 0% while, if it's a pure race competition where everybody is expected in goal everyday, it could be set to 100%.

The Nominal Parameters could not be changed during the competition and are extremely important to get a fair competition and correct results.

DayQuality

DayQuality varies between 0 and 1 and measures how suitable a competition day is to evaluate pilot's skill. It is obtained by multiplying the three validity coefficients: LaunchValidity, DistanceValidity and TimeValidity

LaunchValidity

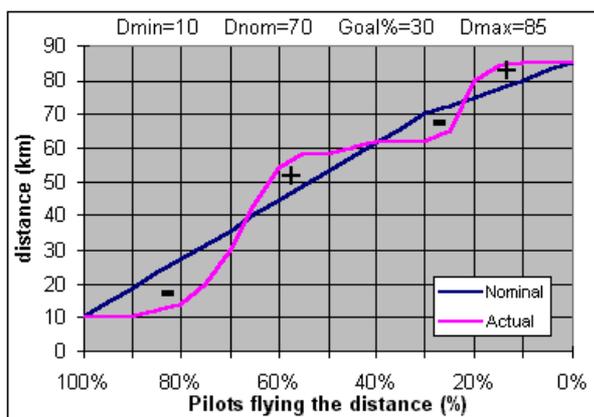


Coefficient depending from the percentage of pilots actually present in takeoff who launched.

If everybody on takeoff launches, LaunchValidity is 1 while if only 20% of the pilots present in takeoff launches, LaunchValidity goes down to about 0.1

Launch conditions may be dangerous, or otherwise unfavourable. If a significant number of pilots at launch think that the day is not worth the risk of launching, then the gung-ho pilots who did go will not get so many points. This is there as a safety mechanism.

DistanceValidity



Coefficient depending from the ratio between actual distribution of pilots along the course and the Nominal Distribution (distribution expected with the given Nominal Parameters).

The plus areas increase DistanceValidity (max =1) while the minus areas decrease the value.

If there is an inconsistent distribution of the pilots along the course (for example many pilots bombed out, a thunderstorm or an area of poor lift somewhere on the task) it means the day was inconsistent and luck could have played a major factor in the results. In this case the day will be devalued to give unlucky pilots the possibility to catch up.

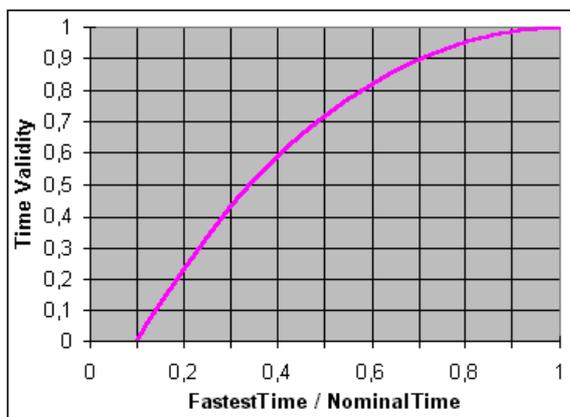
Keep in mind:

If you set tasks that are longer than NominalDistance, the day will not be devalued because of DistanceValidity, if less than NominalGoal percentage of pilots reach the goal, as long as a fair percentage of pilots fly a good distance. This sounds like a vague statement, but the task setter should be trying to set tasks that are reasonable for the day and for the pilots to do. If everyone lands in goal you must ask if this was a valid test of skill (it probably was if the fastest time and the distance flown were reasonably long).

If everyone lands short of goal, was it an unsuitable task but still a good test of pilot skill?

You also can have the case where a task that is shorter than the NominalDistance, has a DistanceValidity of 1. This will happen when a large percentage of the pilots fly a large percentage of the course but, in this case, you still have a practical devaluation because there will be little spreading between pilots' scores.

TimeValidity



Coefficient depending from the NominalTime and the fastest elapsed time.

If the fastest time to complete the SpeedSection is longer than NominalTime, then TimeValidity is always equal to 1.

If the fastest time is quite short the day is probably not a good measure of pilot skill because there would not be many decisions to make and, because of this, luck can distort scores as there will be little possibility to recover any accidental loss of time.

Keep in mind:

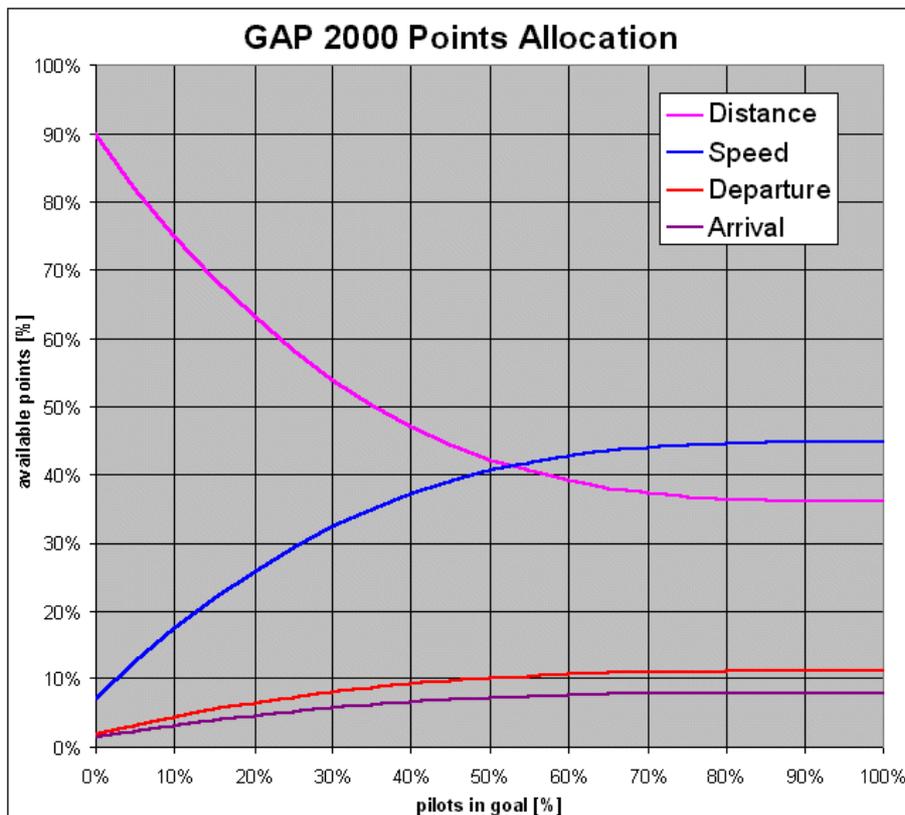
There needs to be reasonable Nominal Parameters set and the task setter needs to set reasonable tasks to get a good and fair competition!

TAKE CARE WHILE CHOOSING THE NOMINAL PARAMETERS

You could NOT change them after the competition started!

Points Allocation

The available points for each task (1000*DayQuality) are allocated to Distance points, Speed points, Departure points and Arrival points, using a function of percentage of pilots getting the Arrival Line (within the Zero Score time) compared to launched pilots.



Out of the total of 1000 points that are available for a full value task, if 25% of launched pilots crosses the Arrival Line, there are available approximately:

582 Distance points
293 Speed points
73 Departure points
52 Arrival points

If nobody completes the SpeedSection there are a maximum of 900 points available for Distance plus 18 points for Departure but, of course, no points for Speed and Arrival.

Only the pilots with Speed points (and not those just completing the SpeedSection) are considered to calculate the percentage of pilots in goal.

With this points allocation a fast pilot who lands just before the Arrival line is not too heavily penalised on days where most of the competition field makes it.

If Arrival line and Goal are the same, pilots who want to win such days must calculate their final glide in such a fashion that they need may to risk landing short in order to be fast.

The organisers have the option to put the "Arrival" line and the "Goal" line in two different places (reasonably just a few kilometres apart); who crosses the Arrival line gets the "Time" points (Speed + Departure + Arrival) he deserves but, if he doesn't cross the Goal line, will lose 20% of his own Speed points.

This new option will increase both safety (especially with paragliders) and fairness because a pilot will always try to get the Goal line, in order not to lose 20% of his Speed points, but he doesn't need to be in hurry.

Keep in mind:

If a good task does not produce 1000 points, that does not matter as long as there is a reasonable spread of points in between pilots. A day that has a small spread of points between pilots will have less weight towards the final scores regardless of the winner score. To find out the importance of a task within a competition, do not look at the winner score: what really counts is the spreading between pilots' scores i.e. the Task Weight Coefficient.

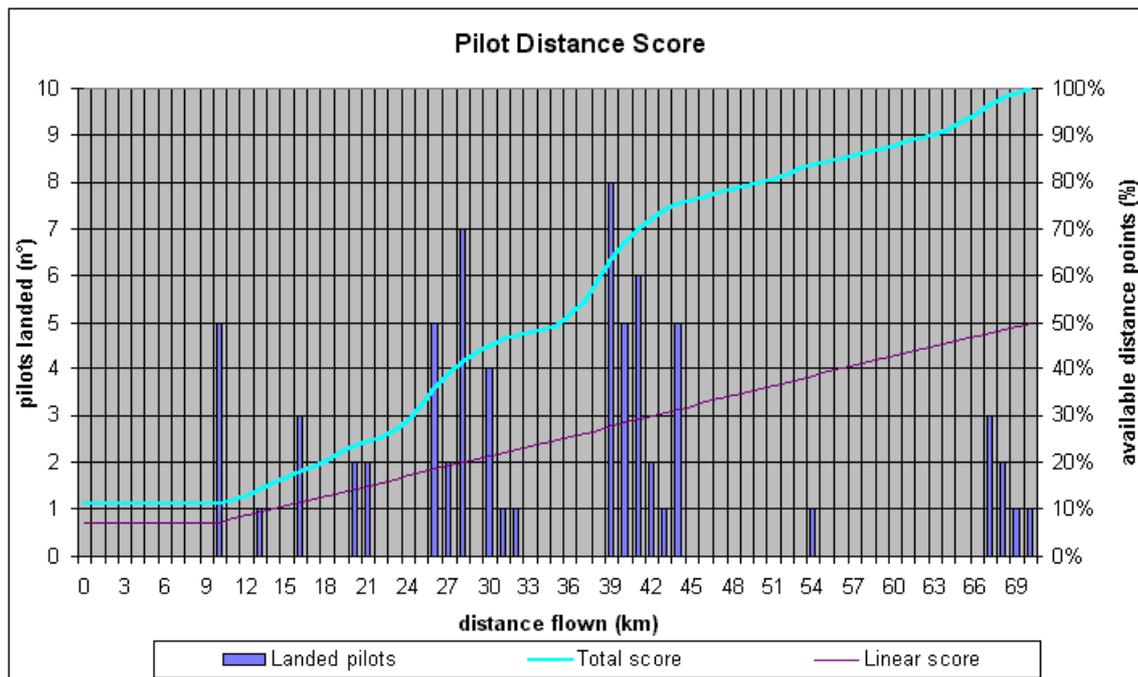
Pilot Distance Score

One half of the available distance points are assigned to the pilots linearly with the distance flown while the other half is assigned taking into consideration the difficulty of the kilometres flown.

To measure the relative difficulty of each kilometre we consider the number of pilots landed in the successive few kilometres (depending on pilots landed and distance flown).

With this system each kilometre has a different value depending on the relative difficulty (for example upwind and downwind) but, nevertheless, it's easy for the pilot to judge this value because it simply depends from the number of pilots that will land in that area.

Graphical example:



Note that the slope becomes steeper before the area where more pilots landed and less steep just after! There are two reasons for this:

- for safety (and retrieval) reasons, we do not want to encourage pilots to fly just after a group
- if you land somewhere, probably you got in trouble just before, then you glided a while before landing.

Keep in mind:

if you are flying an easy part of the task (for example tailwind along a ridge) where nobody will land, you will get only half the points per kilometre compared to old linear scoring systems.

Pilot Speed Score

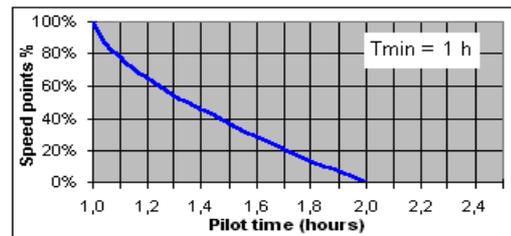
Speed points are assigned to the pilot with a function of FastestTime and PilotTime. Slow pilots will get zero points for speed if their elapsed time is longer than FastestTime plus the square root of FastestTime. (times measured in hours)

FastestTime = 1 hour

80% Score time = 1:05

50% Score time = 1:21

Zero Score time = 2 hours

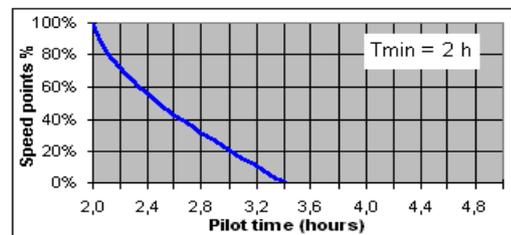


FastestTime = 2 hours

80% Score time = 2:08

50% Score time = 2:30

Zero Score time = 3:24 (3.4 hours)

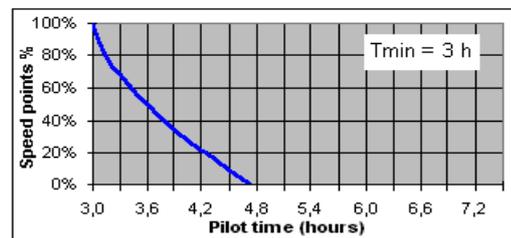


FastestTime = 3 hours

80% Score time = 3:09

50% Score time = 3:37

Zero Score time = 4:42 (4.7 hours)

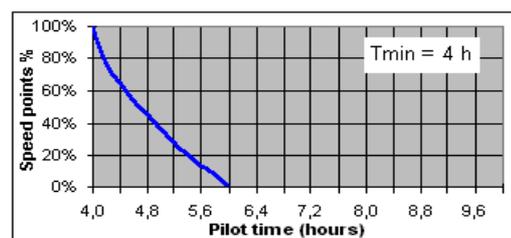


Fastest Time = 4 hours

80% Score time = 4:11

50% Score time = 4:43

Zero Score time = 6 hours



Remember:

- who gets the Arrival line but not Goal will lose 20% of his speed points -

Keep in mind:

If the zero speed score ratio is fixed then, in a short task, slow pilots will be more likely to get zero Speed points and therefore there will be a group of pilots with the same (or very similar) points for the day. On a long task, those same pilots would run out of day and land before goal, hence getting rid of this evident anomaly.

The scoring system tries to overcome this problem but, of course, it is important to set tasks that require the pilots to be in the air for a reasonable amount of time.

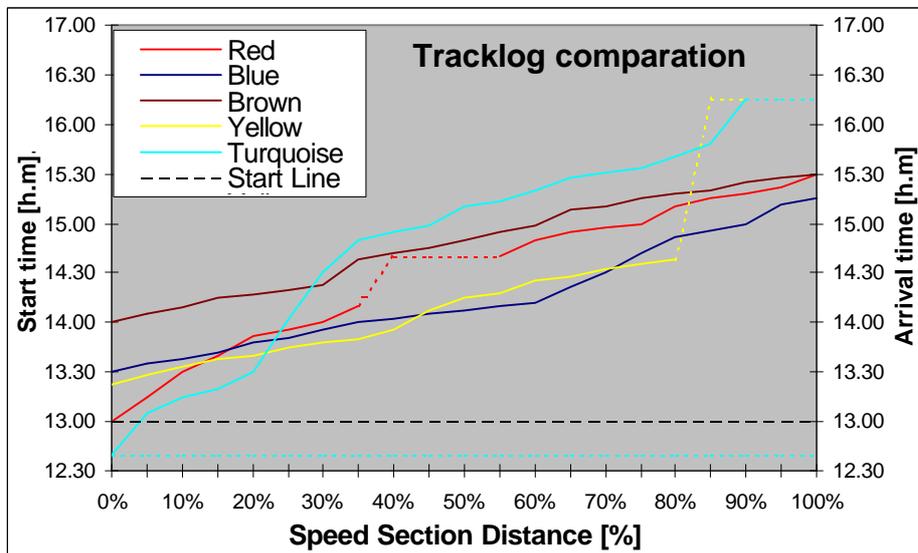
Pilot Leading Bonus

Better known as the "early bird bonus" is provided to encourage the pilots to take off early and rewards the risk involved in being in the leading group.

This bonus is the only modification from GAP2000 and now accurately rewards the pilots which are leading and using better the earlier part of the day (not to waste useful thermals waiting on takeoff). Now pilots will get points even if landed before the Arrival line.

GAP2002 (if used in conjunction with Compe-GPS 4.03 or above) considers the tracklogs of all the pilots started and calculates the Leading Coefficient (Lc) by comparing the area included between each tracklog and the StartLine (i.e. the horizontal line going through the Earliest Start time, among pilots completing the SpeedSection).

If other programs are used to validate the tracklogs then, for each pilot, only a straight line from Start to Arrival could be considered but, of course, results would be less accurate.



Red started first but Blue was the first pilot crossing the Arrival line; Yellow lead for a long while but landed short.

Brown was fastest (thus will get more Speed points) but started late; he likely had pilots in front to show him the thermals thus will get less Departure points.

If a pilot lands along the course (Yellow and Turquoise) or his tracklog is interrupted (Red) his tracklog is completed as shown by the dotted lines. A pilot landing just short of goal would be less penalised and could even get full departure points if he lead for a long while. If a pilot (Turquoise) starts before the Start Line, his Leading Coefficient is calculated from the horizontal line passing through his own Start time.

The pilot who used best the earliest part of the day (i.e. Blue, who shows the smallest area) gets all the available Departure points, while the others gets their points according to the same formula used for the Speed points (for the same reasons).

If the task in the example is full value and 30% of pilots made the Arrival line, then Blue will get all of the available 81 Departure points; Yellow 50 points, despite he landed out, because was leading for a long while; Red gets 45 points because he started early but was quite slow; Brown gets full Speed points but receives only 18 Departure points because he started very late; Turquoise gets 0 points because he started early but was clearly too slow.

Keep in mind:

Even if a pilot doesn't get the Arrival line he will still get some Departure points if he started early enough, was fast enough and landed close enough to the Arrival line.

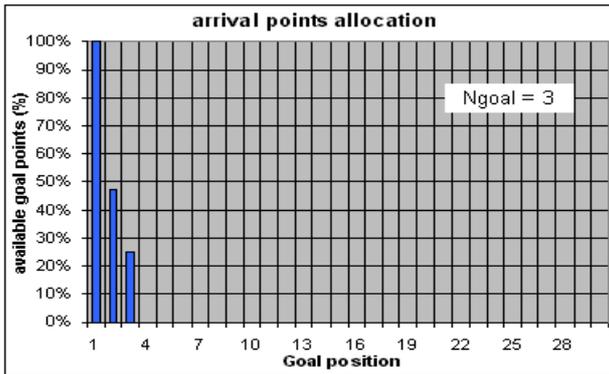
Even if two pilots started and arrived with equal times the Departure points would still be different, especially if one pilot was leading for most of the course compared to the other.

Pilot Arrival Bonus

The Arrival Bonus is provided to reward pilots for racing to the Arrival line and is a pure position score, which does not consider the differences in Arrival time.

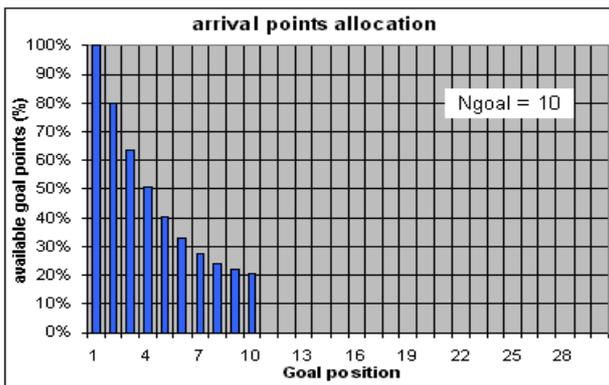
The first pilot completing the SpeedSection gets the maximum available Arrival points while the others get points accordingly to their arrival position regardless of time delay.

The last pilot will always get a minimum of 20% of the available Arrival points.



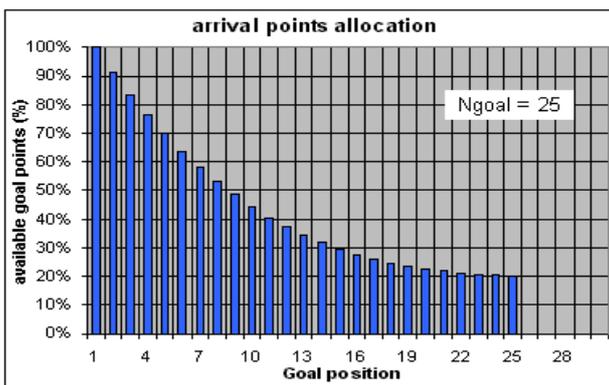
example:

3 pilots in goal



example:

10 pilots in goal



example:

25 pilots in goal

Keep in mind:

The Departure and Arrival bonus system is there to reward the pilot who leads out.

If you lead out, you make decisions yourself and you take more risks of bombing out or being slower. If you follow other pilots, you might get a faster time, but your overall points will be less than the pilot who flew with the same elapsed time (or maybe a slightly slower one), but who flew in front of you for most of the course.

- GAP is designed to reward the pilots who make the decisions -

Summary

Pilot Score is, of course, the sum of Distance points, plus Speed points, plus Departure bonus and Arrival bonus ... and the best pilot wins! ☺

The GAP scoring system rewards the pilot which takes his own decision and stays in front of the others. Waiting on takeoff for the others pilots to fly, then follow to go safer and faster, is a less valuable tactic with this scoring.

With previous scoring systems the best tactic to recover on your opponent was to start a few minutes after him, then catch him. His best tactic was to wait for you and fly with you. Everybody was always waiting on takeoff because both had to follow the same tactic!

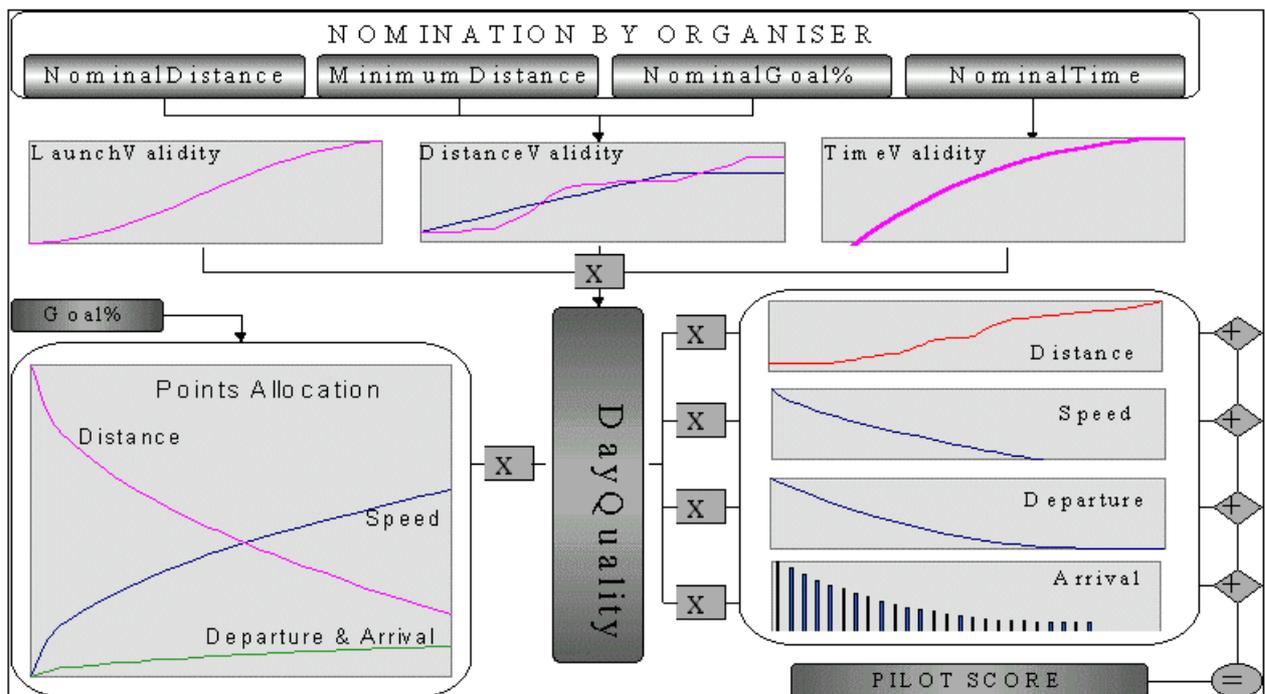
With this scoring system a good tactic to recover points to your opponents is to start early and fly fast. This way you force your opponents to take the risk of being an early bird with you, or wait for more pilots to be in the air for safer (scoringwise) flying.

With GAP2002 scoring, even if the day quality is 1, the winner will automatically get 1000 points only if the task is a "race to goal".

In an elapsed time task the winner gets 1000 points only if he is the fastest one, got first to Arrival and also used best the earlier part of the day, leading for most of the task.

If nobody reaches goal the maximum available are 900 points for Distance plus 18 points for Departure.

Note that, when DayQuality=1 (even if the winner does not take 1000 points) it's still a full value day because, although the winner has not gained as many points as he could have, this does not influence other pilot's score.



Nice and safe flying ☺

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