G A P 9 8

international scoring system

GAP scoring was developed for **FAI** by Gerolf Heinrichs, Angelo Crapanzano and Paul Mollison.

The idea was to get a fair scoring easily adaptable to any competition everywhere in the world, both for hanggliding and paragliding, with a philosophy easy to understand for the pilot, regardless of the mathematical complexity.

To compare different tasks within the competition and to adapt the scoring to hanggliders or paragliders, different flying sites, pilot's level and task philosophy, before the competition the meet director sets some parameters.

NOMINATION BY ORGANISER

NominalDistance: the minimum task distance that should be worth 1000 points. (in the Alps for a national level hanggliding competition is suggested 60 km, for paragliding 40 km)

MinimumDistance: the distance awarded to every pilot who takes off. It is the distance below which it is useless to measure pilot's performance. As a minimum it should be NominalDistance/10. (in the Alps for hanggliding or paragliding competitions is suggested 10 km)

NominalGoal%: the percentage of pilots in goal the meet director wish to have in a well chosen task. (for national hanggliding competition is suggested to use 30%, for paragliding 10%)

NominalTime: equivalent in time to NominalDistance, is the winner elapsed time below which the task should be devalued. It can be considered as the time necessary to fly NominalDistance. (in the Alps for national competitions is suggested 2 hours)

NominalDistribution is a direct consequence of the first three parameters.

Of course these parameters could not be changed during the competition and are extremely important to get correct results; be careful!

DayQuality

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

DayQuality = LaunchValidity * DistanceValidity * TimeValidity

LaunchValidity

coefficient depending from the percentage of pilots actually present in takeoff who launched. If everybody launches Launch Validity is 1 while if only 20% of the pilots present in takeoff launches it's about 0.1
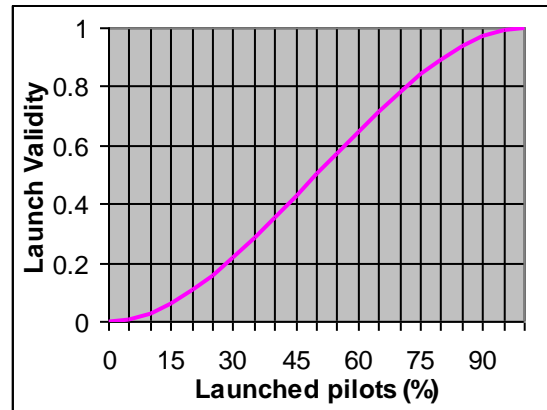
DistanceValidity

coefficient depending from the ratio between ActualDistribution of pilots along the course and the NominalDistribution.
The plus areas increase Distance Validity (max =1) while the minus areas decrease the value.
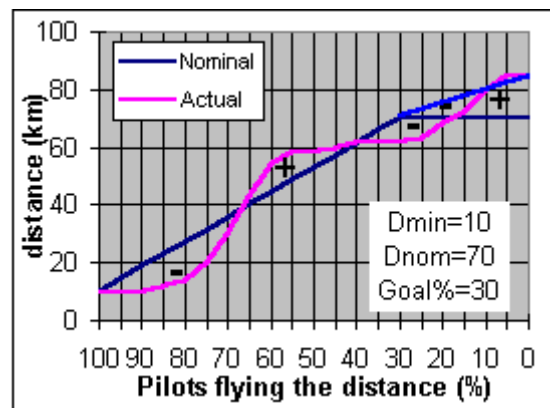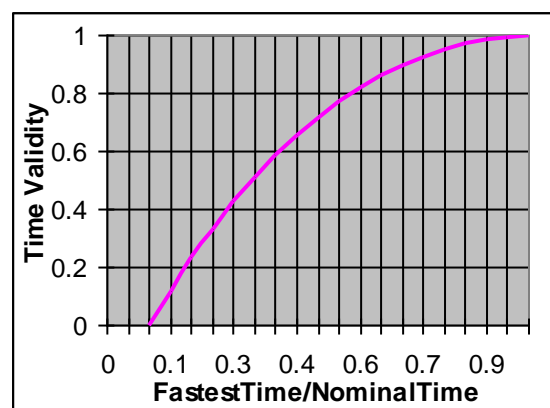

Time Validity

coefficient depending from the NominalTime and the fastest elapsed time.
If the FastestTime is higher than NominalTime, then Time Validity is always1.
If nobody gets goal, fastest time is estimated from MaxDistance and NominalSpeed.

Points Allocation

The available points for each task (1000*DayQuality) are allocated to DistancePoints, SpeedPoints, DeparturePoints, ArrivalPoints, using a function of the percentage of pilots in goal compared to launched pilots.

Points Allocation
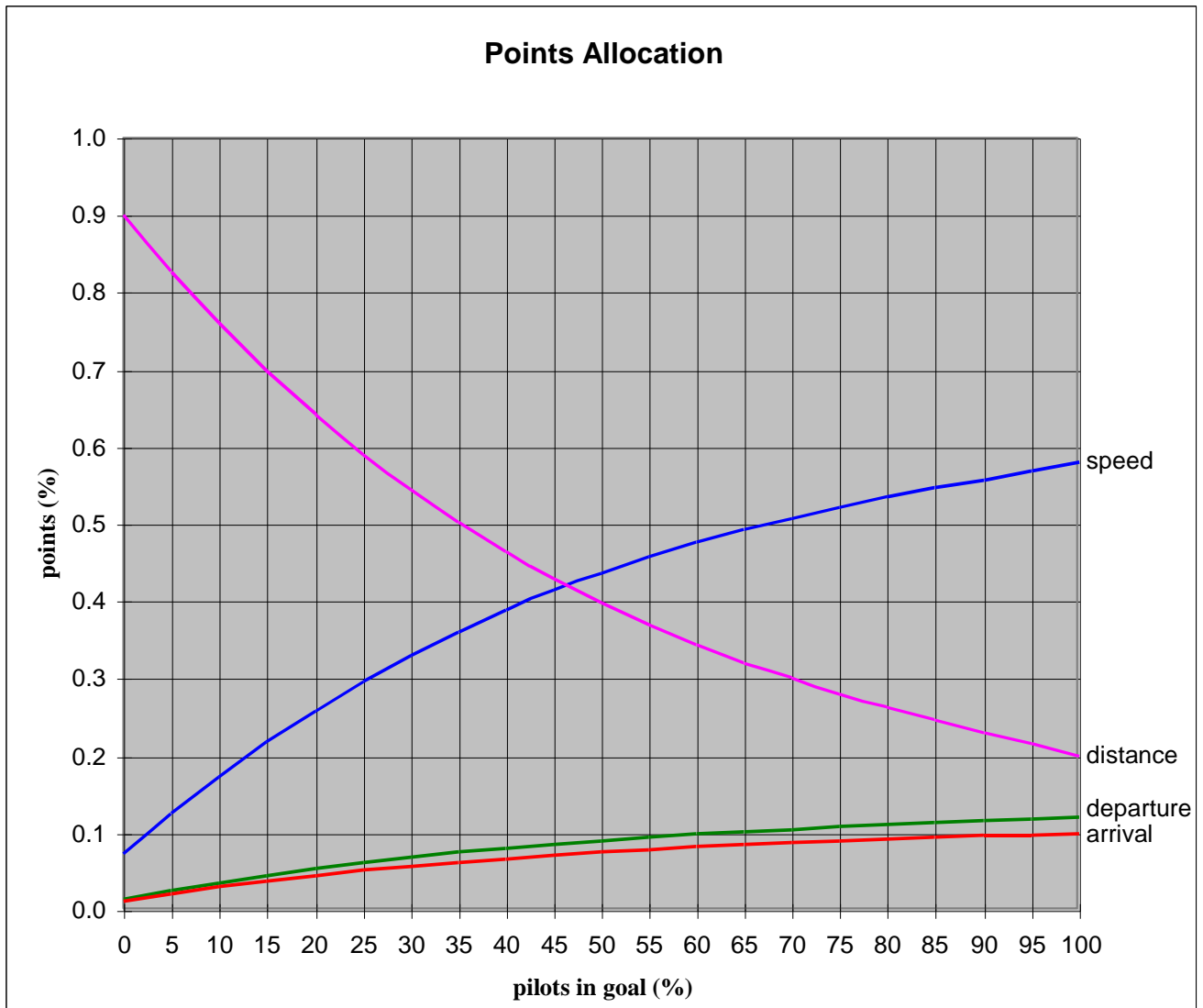
If it's a 1000 points task and 25% of launched pilots made goal there are available approximately 590 points for Distance, 300 points for Speed, 60 points for Departure and 50 points for Arrival.

If nobody gets goal there are a maximum of 900 points available for distance.

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 "Range" kilometres where:

Range = round (3 * MaxDistance / PilotsLanded)   (Range>=3)

and PilotsLanded is the number of pilots who didn't made goal and landed along the course.

With this system each km 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 depends from the number of pilots that will land in that area.

Graphical example:
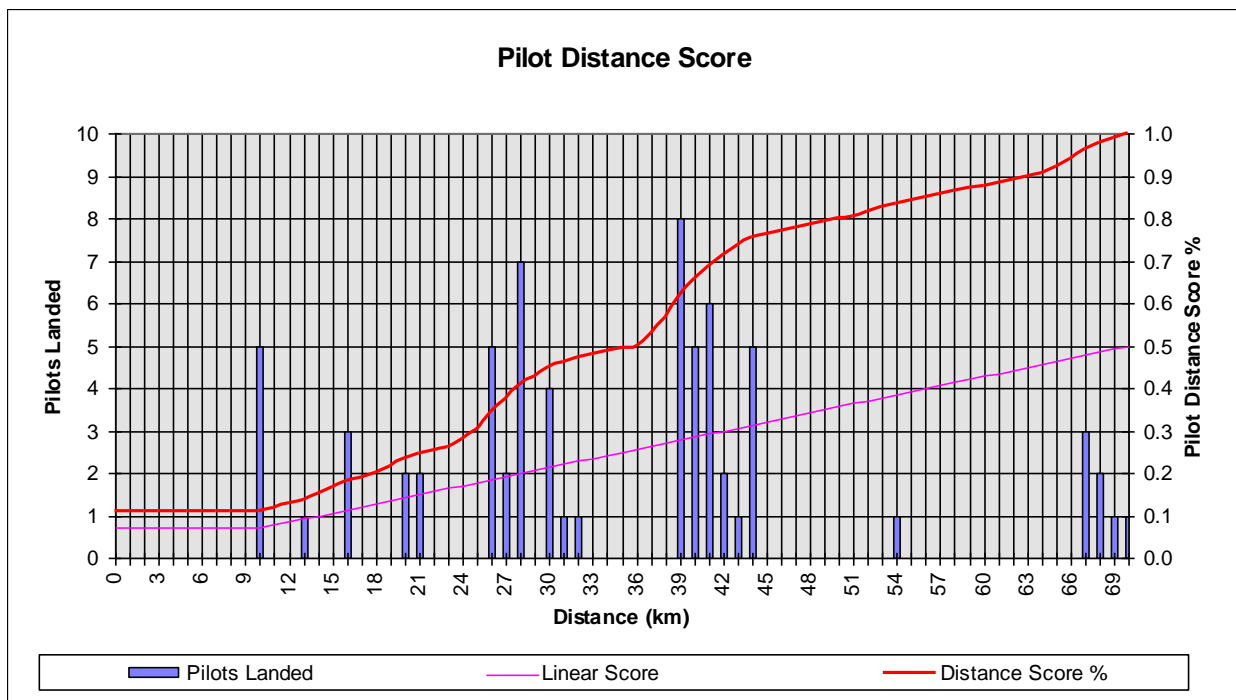
Note that the slope becomes steeper before the area where more pilots landed and less steep just after.
There are two reasons for this: first, for safety (and retrieval) reasons, we do not want to encourage pilots to fly just after a group; second if you land somewhere probably it was difficult just before, then you glided a while before landing.

Pilot Speed Score

Speed points are assigned to the pilot with a function of FastestTime and PilotTime. Slow pilots will get 0 points for speed if their elapsed time is longer than FastestTime + square root (FastestTime).   [Time in hours]
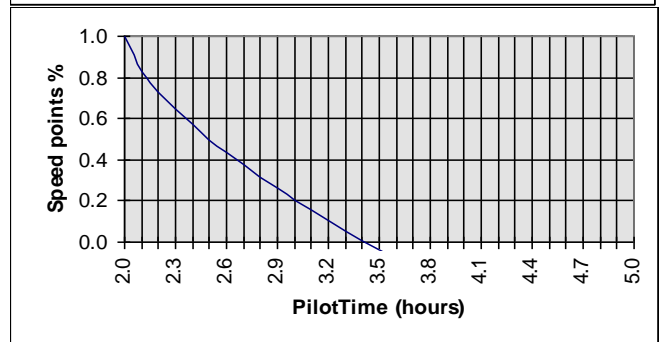
In short tasks you have proportionally more time to recover the time lost.
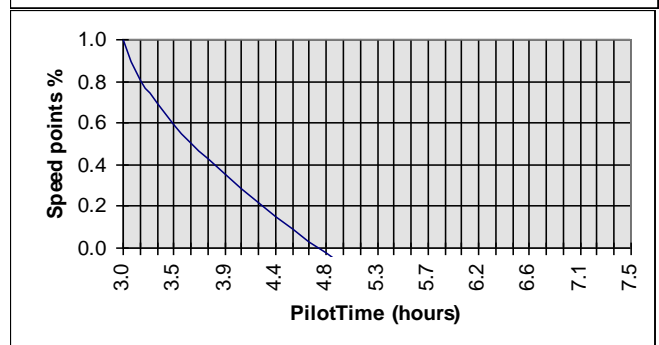
Examples:

FastestTime = 1 hours
80%ScoreTime = 1:05
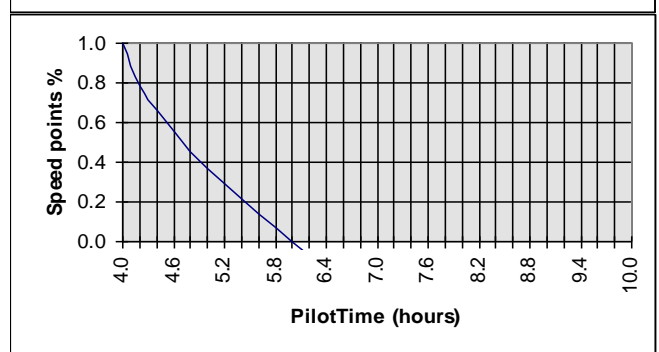50%ScoreTime = 1:21
ZeroScoreTime = 2 hours
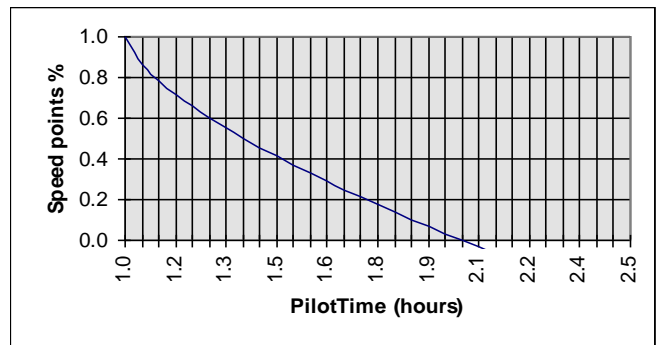
FastestTime = 2 hours
80%ScoreTime = 1:08
50%ScoreTime = 1:30
ZeroScoreTime = 3.4 hours
                (3:24)

FastestTime = 3 hours
80%ScoreTime = 1:09
50%ScoreTime = 1:37
ZeroScoreTime = 4.7 hours
                (4:42)

FastestTime = 4hours
80%ScoreTime = 1:11
50%ScoreTime = 1:43
ZeroScoreTime = 6 hours

Pilot Departure Bonus

The "early bird bonus" is provided to encourage fast pilots to take off early and reward the risk involved in being in the leading group.

The maximum available points for each pilot are about 1/5 of his own speed points and are full awarded to the first pilot who launches and also makes goal. Pilots not making goal are not considered for the departure bonus.

The other pilots will score accordingly to their speed points and their departure delay after the first pilot launched that made goal.

With this formula a fast pilot will get more departure points than a slow pilot taking off at the same time.

If the departure delay is bigger than 1/3 NominalTime, the departure bonus is 0.

Example with NominalTime = 150 minutes   (2,5 hours)
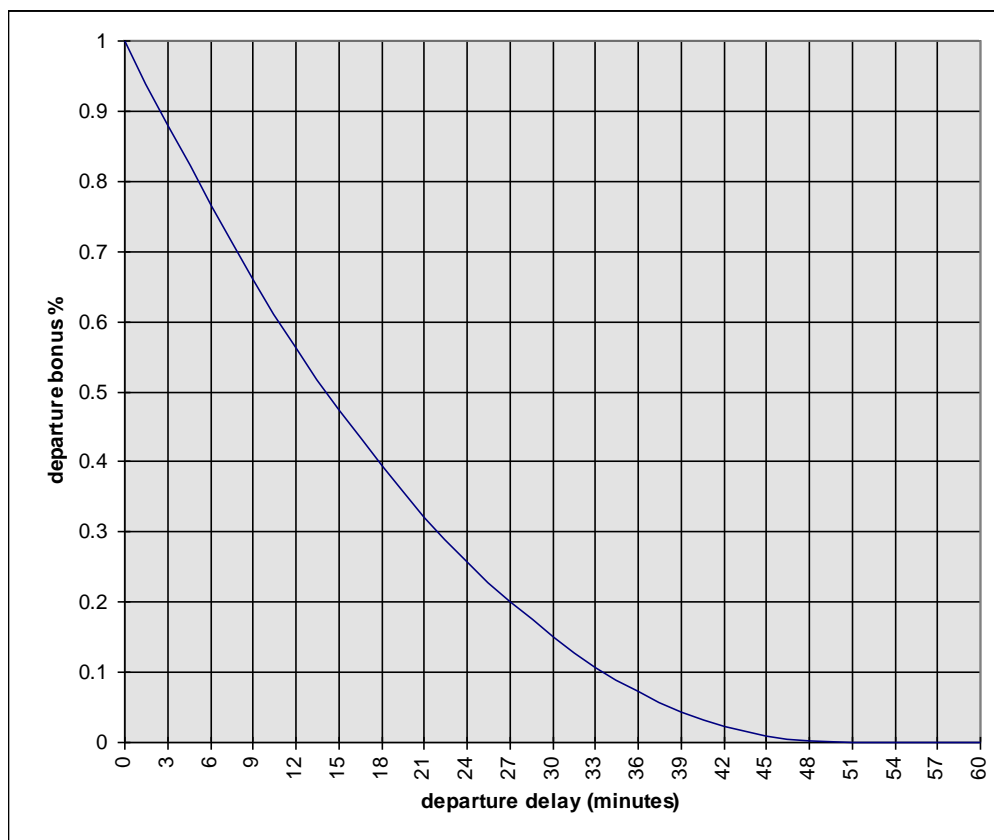
If a pilot launches with a departure delay of 1/10 of the NominalTime gets a departure bonus of 0.47 his own speed points.

Fast pilots will get more points taking-off early because they will stay in front for more time.
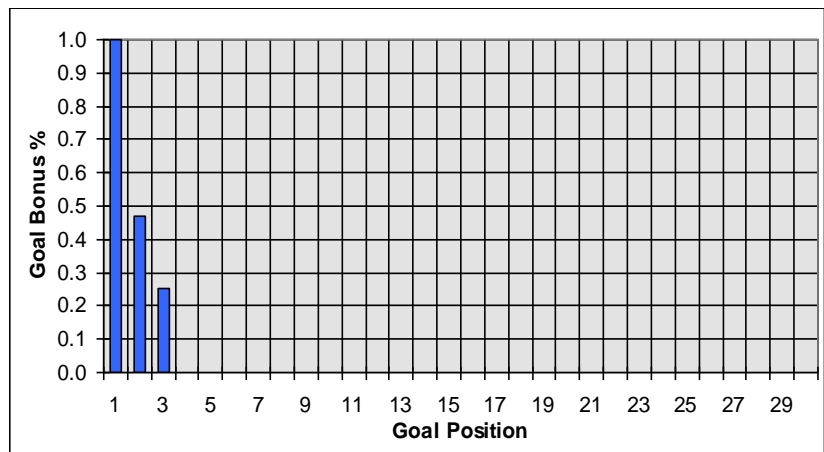
Pilot Arrival Bonus

The Arrival Bonus is provided to reward pilots for racing to goal and is a pure position score which consider the arrival position in goal.
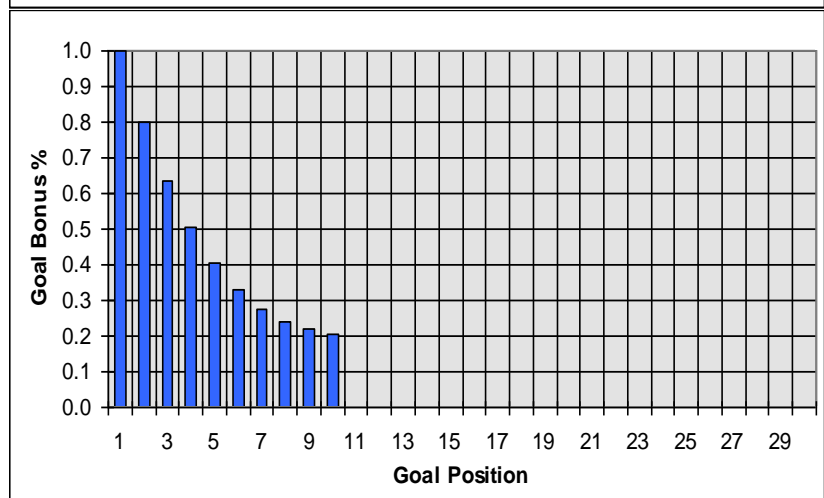
The first pilot in goal gets the available ArrivalPoints; the others get points accordingly to their arrival position regardless of time delay.
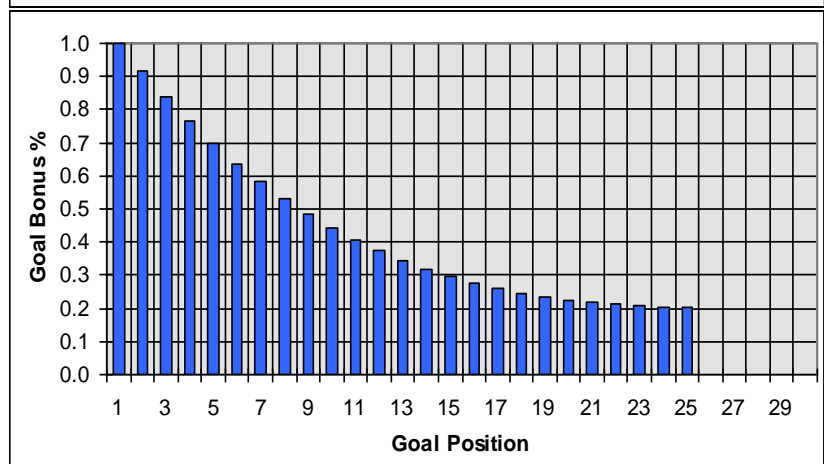
Examples:

3 pilots in goal:

10 pilots in goal:

25 pilots in goal:

Pilot Score

Pilot Score is, of course, the sum of Distance Points plus Speed Points plus Departure Bonus and Arrival Bonus... and the best pilot wins!

Summary

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 the GAP scoring, even if the day quality is 1 the winner will get automatically 1000 points only if the task is a race to goal. In an elapsed time task the winner gets 1000 points if he is the fastest one and the first one to launch between the pilots that will make goal and, by consequence, the first pilot in goal.

Note that, if DayQuality=1, even if the winner does not take 1000 points it is still a full value day because this does not influence the other pilot's score.

nice flying,
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