Report to the IGC Plenum

Scoring Software Testing Group

Jan. 13th 2011

Actions in 2010:

The major scoring issue in international competitions 2010 has been the obvious need to secure the version of the script used for scoring FAI competitions. This can be done easily enough by downloading the latest version before the competition and so making sure that the script used is unmodified. It is also easy to add an version check-sum and encryption key for unlocking to the file.

The scoring guide for FAI competitions will be part of organizers handbook that is currently being developed.

The question of geometric paradox has been risen from inside the group and an short explanation of this problem is annexed to this report. A meeting is called to address this issue with chairmen of the sporting code and Annex A groups.

Description of the geometric paradox by Rick Sheppe, member of the group:

Delegates should know that a geometric paradox exists.

There are two earth models, the sphere and the ellipsoid. Ideally, the software used for flight planning, flight evaluation, scoring, and in-flight calculations should all use the same earth model. Furthermore, the designers of programs should all use the same geometric algorithms. This should be obvious to all. Any other situation has the potential to produce discrepancies and disputes.

One of the Scoring Software Committee's responsibilities is to investigate the possibility of establishing computational standards for the scoring of gliding competitions. At present, no such standards exist.

In practice, scoring programs use a combination of earth models and geometrical algorithms. For example, it is common for the ellipsoid to be used for tasking and for calculation of credited distances, while the sphere is used to determine whether a line has been crossed, and a third model (Cartesian) is used to display flight tracks on a screen.

The reason that a combination of methods must be used is that the algorithms for performing certain necessary calculations are not available in all earth models. For example, using the ellipsoid, it is practically impossible to determine if the glider has crossed a line. This has implications for starts, finishes, assigned areas, and prohibited airspace. Consequently, programmers must arbitrarily switch to the sphere to determine the crossing of a line.

The blending of earth models and algorithms by the authors of scoring programs is not specified by IGC; nor do we know if the various scoring programs are blending the algorithms in the same way.

The root cause of this confusion is the lack of mathematical rigor in the General Section. The GS specifies how to calculate the distance between two points, but it is mute on the subjects of bearings and lines.

It is the Committee's opinion that the problem should be addressed before it causes trouble in a competition.

The Scoring Software Committee recommends that the delegates consider these possibilities:

1. Wait for the GS to improve and hope for the best in the meantime.
2. Mandate the use of a single scoring program
3. Return to the spherical earth for Annex A calculations.

The members of the Scoring Software Committee are happy to discuss this issue with the delegates at the 2011 Plenary.

Members of the group:

Visa-Matti Leinikki (chairman), Peter Ryder, Angel Casado, Hans Trautenberg, Tim Shirley and Peter Platzer, Rick Sheppe

Helsinki, January 13^{h} 2011

Visa-Matti Leinikki