CIVL 2018 PLENARY – ANNEXE 23Q

BUREAU PROPOSAL – GAP DISTANCE MEASUREMENT CHANGES

Background:
Since before 2015 there has discussion and changes to the GAP distance measurement formula from using FAI Sphere to WGS 84 ellipsoid and what tolerance on that measurement should be used (i.e. 0.5% or 0.01%/5m).

Issue and Discussion:
There is a significant issue using the current 0.5% turnpoint distance tolerance with large cylinders radii because this results in very large tolerance bands. For example, a 50km radius gives a 250 m tolerance band. At 55 Km/h that results in more than 15 seconds each way to go through the tolerance.

The large 0.5% tolerance band was introduced to handle instruments that use different distance measurement schemes (i.e. ellipsoid vs sphere), even though our rules required use of the FAI sphere. With all instruments using GNSS chips that use many satellites and WGS84 coordinates, the accuracy of the GPS position is easily under 10 meters. This accuracy allows pilots to exploit the large tolerance bands that result when 0.5% is used with big turn point radii.

While many instruments have the option of computing distance on the WGS 84 ellipsoid, many of the hang glider pilots have instruments that only calculate using the required FAI sphere (i.e. 6030s) and do not have current manufacturer support to update the firmware.

Proposal:
Current S7A-XC-CIVL GAP annex May 2017

4.2 Distance

In general, task evaluation occurs in the x/y plain, therefore distance measurements are always exclusively horizontal measurements. The earth model used is the FAI sphere, with a radius of 6371.0 km.

8.1.1 Reaching a turnpoint cylinder

To compensate for different distance calculations and different earth models in use by today's GPS devices (FAI sphere vs. WGS84 ellipsoid), a 0.5% tolerance is used for this calculation. This had to be introduced so that a pilot reading the distance to the next cylinder centre from his GPS device can rely

on having reached the turnpoint when the distance displayed by the instrument is smaller than the defined turnpoint cylinder radius.

Change to:

4.2 Distance

In general, task evaluation occurs in the x/y plain, therefore distance measurements are always exclusively horizontal measurements. The earth model used is:

For hang gliding the FAI sphere, with a radius of 6371.0 km, with the intent to change to WGS 84 ellipsoid in 2019.

For paragliding WGS 84 ellipsoid.

8.1.1 Reaching a turnpoint cylinder

To compensate for the very slight distance measurement differences resulting from the use of different ellipsoid distance algorithms, a 0.05% tolerance is used for this calculation. This had to be introduced so that a pilot reading the distance to the next cylinder centre from his GPS device can rely on having reached the turnpoint when the distance displayed by the instrument is smaller than the defined turnpoint cylinder radius.