

Year 2 Proposal, High Altitude claims, ANDS Committee

To summarise, this proposal asked for altitudes above 50,000 feet (changed to 15,000 metres) to be validated by the use of heights calculated from GPS data from a flight recorder authorised by IGC for High Altitude flights. This will entail a FR with a particularly high performance GPS engine. This proposal generated much correspondence between the proposer, Bernald Smith and the ANDS, GFAC and SC3 committees. The GFAC and ANDS committees were the acknowledged experts in GPS and will produce the specification for a flight recorder for high altitudes. Not all differing opinions on operational matters were able to be resolved so within the wording below suggested by the SC3 committee there are alternate versions reflecting the opinions and discussions for decision by IGC Plenary. Some of the differences were generated by the desire to specifically cover an attempt at the World Altitude Record in the general category while SC3 and GFAC were in favour of making the rules for any high altitude flight, including World and Continental records, General and Feminine.

One logical query which arises is the difference in absolute altitudes because of the difference between the GPS ellipsoid base and the sea level base for barograph measurements. We are advised that this is a variable, from +65m (213ft) at 60N 025W, S of Iceland and -102m (335ft) at 03 077E, S of India. Considering the heights being measured and the suggested margin of 150 metres it was felt that this was insignificant in relation to the absolute altitude, and could be ignored. Only the first record claim which uses GPS will be involved as later claims would be also measured from the ellipse and will therefore have the same baseline as the previous GPS height. It was considered that any attempt to take the ellipse – sea level distance into account would be very complex and basically unnecessary. The margin applied should be sufficient to ensure that the new claim is definitely higher than the preceding one.

Starting with first paragraph in the wording below, the margin needed to exceed the current margin has received general agreement from the committees involved. (New wording in green)

Discussion had determined that the use of GPS would generate a relatively small error which would not change markedly with height. GFAC then pointed out that errors with electronic pressure sensors are much less than the possible errors with a mechanical barograph. It was felt that if the margin for GPS height needed only a fixed amount, it would be reasonable to incorporate a new margin for electronic sensors at the same time. Should the meeting decide that this was a move beyond the remit for the original proposal we ask that it should be accepted as a year one proposal.

The proposed wording shows the two alternate versions of the transition between barometric and GPS measurement. The first (in Red) is as asked for by Bernald Smith, a “sudden death” crossover at 15,000m.

The second (in Blue) has a transition band of 1000m where both barometric and GPS heights are compared and the lowest taken. The intention of the transition band of 1km (3,281ft) is to minimise anomalies where IGC measurement changes from pressure to GNSS as altitude increases. If there was

a sudden change it would, for instance, be possible to have a record based on GPS altitude that was lower in Pressure Altitude than the previous Pressure Altitude record, due to differences in atmospheric temperature and pressure at the time of the two records

It can be seen that in both versions, some new requirements are included. The need to record barometric pressure as well as GPS altitude was seen as a good security measure.

The reference to solar flux radiation was included to avoid the possibility of major errors being generated through severe fluctuations in the sun's radiation, which are known to occur from time to time.

Finally, it was logical to indicate that in a gain of height claim, the low point of the flight must be measured by the same means as the highest point, ie: either GPS or barometric measurement.

It is considered that either of the two alternative versions will achieve the intention of the original proposal. A decision is needed as to which of the two is the preference of the IGC Plenary.

Year 2 Proposal, measurement of high altitude flights

3.1.3 International record achievement margins

- a. A new record claim must exceed the current value by 1 km for distance, 1 km/h for speed, 3% for altitude using mechanical barograph data, 1% using electronic pressure data, or 150m using GPS height data.
- b. When a new international record ...etc

Alternative 1, no transition band

4.5.3 Altitude evidence

- a. Up to 15,000 metres (except for position recorders, see para A-7 of the Appendix to Chapter 4), pressure data recorded by an FR or barograph shall be used. (See 5.2.3 on alternate release altitude evidence for duration flights).
- b. Above 15,000 metres, GPS altitude from an FR approved for high altitude use (HAFR) shall be used.
See Annex B and the Technical Specifications for IGC FRs for HAFR use.
- c. For all record altitude flights, both GPS and pressure altitudes shall be recorded. During after-flight analysis, the profiles of the GPS and pressure altitudes must correspond to ensure that no anomaly is present in the data.
- d. Claims using altitude data from an HAFR must include evidence that there was no sunspot solar flux radiation in the preceding 24 hours that exceeded the high of the preceding 96 hours.
- e. For gain of height record claims having a high point above 15,000 metres, the evidence for the low point shall also come from GPS data.
- f. The altitudes at which a glider crosses a start or finish line or the boundary of a start or finish OZ are determined by linear interpolation between the altitudes at the last fix before crossing and the first fix after crossing.

Alternative 2 - with transition band

4.5.3 Altitude evidence

- a. Below 15,000 metres (except for position recorders, see para A-7 of the Appendix to Chapter 4), pressure data recorded by an FR or barograph shall be used. See 5.2.3 on alternate release altitude evidence for duration flights.
- b. From 15,000 to 16,000 metres, the lesser value of the recorded GPS altitude from an FR approved for high altitude use (HAFR) and pressure altitude data shall be used.
See Annex B and the Technical Specifications for IGC FRs for HAFR use.
- c. Above 16,000 metres, GPS altitude data from a HAFR shall be used.
- d. For all record altitude flights, both GPS and pressure altitudes shall be recorded. During after-flight analysis, the profiles of the GPS and pressure altitudes must correspond to ensure that no anomaly is present in the altitude evidence.
- e. Claims using altitude data from a HAFR must include evidence that there was no sunspot solar flux radiation in the preceding 24 hours that exceeded the high of the preceding 96 hours.

- f. For gain of height record claims having a high point above 15,000 metres, the evidence for the low point shall come from the same method of height measurement as the highest point..
- g. The altitudes at which a glider crosses a start or finish line or the boundary of a start or finish OZ are determined by linear interpolation between the altitudes at the last fix before crossing and the first fix after crossing.