

## Cold Weather Altimetry

### BACKGROUND

Barometric instruments measure the change in barometric pressure to give altitude information. They are calibrated to ISA condition. Therefore, if there is any deviation from such environment, an error will be induced. If the temperature is higher than the ISA, the error will cause altitude information to be under-read, and will therefore not be of great safety concern. However, if the temperature is lower than ISA, the error will cause the altitude information to be over-read, causing a safety concern, especially regarding terrain clearance. ICAO PANS-OPS recommends cold altimetry correction to be applied when ambient temperature is ISA-15 or lower.

In practice, however, it is not so straightforward. When approaches were categorised by precision and non-precision only, correction application was relatively straightforward. The introduction of new approaches such as GPS, RNAV AR, GBAS, SBAS, and new FMS based approach has complicated matters.

Guidelines to pilots are also unclear. Different regulators have different viewpoints and opinions on what and how corrections should be applied. Manufacturers may have a different view from the regulators. Operators are employing different policies, and their pilots may be applying different mitigations if they deemed their company policy insufficient. Air traffic services providers may be employing a different procedure that is assumed by pilots and operators. Avionics manufactures may have different thoughts as well. Instrument procedural designers may be employing different assumptions during their design processes. This may create an unwanted situation such as traffic in the same airspace adopting different correction strategies thus, the required separation is lost.

### POSITION

Many aircraft are currently equipped with instruments that require corrections applied by the flight crew to ensure safe operations in cold weather. Ideally, the latest technologies can be applied to them now. However, the cost and logistics required for retrofitting the world fleet are enormous.

After balancing risk, associated cost, and potential improvement, IFALPA proposed from "a future date that is to be determined (TBD)," that all newly built aircraft should be equipped with flight instrument that is capable of self-temperature-compensation, that works together with the next-generation navigation systems where vertical navigation will not be affected by temperature. Thus, cold weather altimetry correction by flight crew will not be necessary. Such systems should ensure environmental parameters entered by pilots are cross-checked with sensed parameters.

Before such system is in place, ICAO should co-ordinate with aircraft manufacturers, avionics manufacturers, navigation system providers, air traffic service providers, procedural designers, regulators, operators, and pilots to achieve a harmonised approach with regards to cold weather operations, by ensuring a harmonised approach and common procedure in winter altimetry correction.