

RTCA Special Committee 186, Working Group 5

ADS-B UAT MOPS (DO-282), Revision A

Meeting #19

**Proposed Modification to the Pressure Altitude Time of Applicability
Requirements when in the Precision Condition**

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SUMMARY

This Working Paper suggests a modification to the Time of Applicability requirements for reporting of Pressure Altitude when the UAT Transmitting Subsystem is in the Precision condition (MOPS §2.2.7.2.2). The modification would set the TOA for Pressure Altitude to be the 1 Hz epoch, instead of the 0.2 Hz epoch.

Introduction:

Garmin AT has applied for a TSO deviation for this specific item. The UAT MOPS, DO-282 Section 2.2.7.2.2, subparagraph 'a' requires the Time of Applicability of the ALTITUDE field, when in the Precision condition, to be the current 0.2 second epoch. However, many aircraft do not have encoding pressure altimeters that output at a 5 Hz rate. As explained below, since current encoding pressure altimeters do not provide Time of Applicability, the practical effect of this requirement might be to preclude the implementation of the Precision condition completely. This would largely dilute the benefits for surface operations available from use of WAAS-enabled GPS.

The proposed deviation would allow the Time of Applicability of the ALTITUDE in the Precision condition to be the current 1.0 second epoch, if the ALTITUDE field contains the pressure altitude. The Time of Applicability of the LATITUDE and LONGITUDE fields in the Precision condition would remain at 0.2 seconds, as required.

Justification:

1. Many aircraft in service, even those that are certified for IFR navigation, have encoding pressure altimeters installed that have only a 1 Hz output rate. The typical 1 Hz altitude rate for encoding pressure altimeters has been judged adequately safe for operations for these aircraft.
2. The latency of the pressure altitude data for those encoders is not known. Therefore, we cannot be certain about the time of applicability of the pressure altitude data. Since the pressure data source is 1 Hz, one would need to extrapolate altitude to meet the 0.2 Hz requirement. Since we do not know the time of applicability of the data, the distance to extrapolate is really unknown. In the absence of technical standards for vertical rate sources, it is not possible to reliably extrapolate the 1 Hz pressure altitude data to finer time resolution than 1 Hz.
3. GPS position and GPS altitude have an associated time of applicability, and higher report output rates, that would allow use of (or extrapolation of) these parameters to a 0.2 second epoch. However, representatives of the Air Traffic Control community have strongly advocated use of Pressure Altitude for separation services, since use of GPS altitude is not yet operationally appropriate. This precludes the possibility of transmitting GPS altitude data while in the Precision Condition at this time.
4. With the proposed deviation, the increased latency of the 1 Hz ALTITUDE data would typically be 0.4 seconds, and a maximum of 0.8 seconds. As an example of a safety critical use, any suitable conflict detection algorithm should be immune to the effects of an increase in altitude latency of this magnitude.
5. Many of the benefits of the Precision condition are expected to be gained during surface operations. Since surface operations do not involve significant changes in altitude at a 1 Hz rate, the proposed deviation would have no impact on such operations.

Based on these factors, I believe the proposed deviation would have no effect on safety.

Proposal:

The present text of the requirement is as follows:

2.2.7.2.2 Requirements when in Precision Condition and UTC Coupled

When the UAT Transmitting Subsystem is in the Precision Condition, and is UTC Coupled:

- a. At the time of the ADS-B Message transmission, the position information encoded in the "Latitude", "Longitude", and "Altitude" fields shall be applicable as of the start of the current 0.2 second UTC Epoch.

The proposal modifies subparagraph a., as follows:

- a. At the time of the ADS-B Message transmission, the position information encoded in the "LATITUDE" and "LONGITUDE" fields **shall** be applicable as of the start of the current 0.2 second UTC Epoch. If the ALTITUDE TYPE field (see 2.2.4.5.2.2) indicates that the altitude that is being provided in the ALTITUDE field is a Geometric Altitude, then the information encoded into the ALTITUDE field **shall** also be applicable as of the start of the current 0.2 second UTC Epoch. Otherwise, if the ALTITUDE TYPE field indicates that the altitude is a Pressure Altitude, then the information encoded into the ALTITUDE field **shall** be applicable as of the start of the current 1.0 second UTC Epoch.