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FEDERAL AVIATION ADMINISTRATION (FAA) REGULATORY ENVIRONMENT FOR RADIO ALTIMETERS

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SUMMARY

The Federal Aviation Administration (FAA) has issued multiple Airworthiness Directives (AD) for aircraft that use radio altimeters to support specific operations due to a determination that radio altimeters cannot be relied upon to perform their intended function if they experience interference from 5G transmitters operating in the 3.7-3.98 GHz frequency band. The FAA expects to revise the current radio altimeter Technical Standard Order (TSO) after completion of the minimum operational performance standards (MOPS) by RTCA, Inc. Special Committee 239 (SC-239).

1. INTRODUCTION

1.1 The Federal Aviation Administration (FAA) currently has two Airworthiness Directives (AD) in force due to potential interference to radio altimeters. The following discussion explains the current FAA regulatory environment for radio altimeters as well as an outlook on the future environment.

2. DISCUSSION

2.1 In 2021, the FAA issued Airworthiness Directives (AD) for fixed-wing transport and commuter aircraft (AD 2021-23-12) as well as rotorcraft (AD 2021-23-13) based on a determination that radio altimeters cannot be relied upon to perform their intended function if they experience interference from 5G transmitters operating in the 3.7-3.98 GHz frequency band (5G C-band) as identified by Notice to Air Missions (NOTAMs). The ADs required revising the limitations section of the aircraft flight manual (AFM) or rotorcraft flight manual (RFM) to incorporate limitations prohibiting certain operations

requiring radio altimeter data when in the presence of 5G C-Band interference. The prohibited fixed-wing transport and commuter aircraft operations[1] are:

- Instrument Landing System (ILS) Instrument Approach Procedures (IAP) Special Authorization (SA) CAT I, SA CAT II, CAT II, and CAT III.
- Automatic landing operations.
- Manual Flight Control Guidance System operations to landing/head-up display (HUD) to touchdown operation.
- Use of Enhanced Flight Vision System (EFVS) to touchdown under 14 CFR 91.176(a).

The prohibited rotorcraft operations are:

- Performing approaches that require radio altimererer minimums for offshore operations. Barometric minmums must be used instead.
- Engaging in hover autopilot modes that require radio altimeter data.
- Engaging in search and rescue autopilot modes that require radio altimeter data.
- Performing takeoffs and landings in accordance with any procedure that requires the use of radio altimeter data.

2.2 The AD provided a path for aircraft manufacturers to submit an Alternative Method of Compliance (AMOC) in order to relieve the restrictions of the AD. The AMOC process required submission of radio altimeter interference tolerance data which could be used, along with 5G C-band transmitter deployment information, to determine which NOTAM'd airport runways the limitations in the AFM did not apply to.

2.3 However, effective 1 July 2023, the FAA presumes that 5G C-band emitters will be deployed extensively across the 48 contiguous states in the U.S. and as such, the AMOCs previously used are untenable going forward. Therefore, new ADs (Transport/commuter: AD 2023-10-02, rotorcraft: AD 2023-11-07) have been issued for fixed-wing transport and commuter aircraft as well as rotorcraft that specify effective isotropic power spectral density (PSD) levels at the outward face of the radio altimeter antenna, both for 5G C-band fundamental and spurious emissions, for which an aircraft's radio altimeter must be able to withstand without losing intended function to be considered as a radio altimeter tolerant airplane. Radio altimeter installations that do not meet the PSD levels are considered non-radio altimeter tolerant airplanes. For radio altimeter tolerant airplanes the AFM/RFM prohibited operations would be allowed at 5G C-band mitigated airports (5G CMAs) in conjunction with C-band Licensee Voluntary Commitments[2].

2.4 In addition, as of February 1, 2024, FAA Part 121 aircraft operating to/in the U.S. are required to have radio altimeters that are not susceptible to 5G C-Band interference.

[1] Required Navigation Performance (RNP) Procedures with Authorization Required (AR) and RNP AR IAP were prohibited in AD 2021-23-12, but removed in AD 2023-10-02.
[2] https://www.fcc.gov/ecfs/document/1033142661477/1

2.5 In the future, FAA is expecting to revise the Technical Standard Order (TSO) for airborne low-range radio altimeters (TSO-C87a) to incorporate new radio altimeter minimum operational performance standards (MOPS) that are currently being developed in RTCA, Inc. Special Committee 239 (SC-239). The FAA hopes that the new MOPS provides a minimum level of interference rejection by radio altimeters that will make them compatible with any possible interference sources; however, it is recognized that the dynamic and evolving international mobile telecom environment is difficult to pin down so additional compatibility considerations outside of new minimum radio altimeter equipment interference rejection capability may still need to be considered by civil aviation authorities.

3. CONCLUSION

3.1 The meeting is invited to note the information in this paper and provide questions and comments.

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