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DEPARTMENT OF TRANSPORTATION

Federal Aviation Administration

14 CFR Part 39

[Docket No. FAA–2023–0668; Project Identifier AD–2023–00199–R; Amendment 39–22453; AD 2023–11–07]

RIN 2120–AA64

Airworthiness Directives; Various Helicopters

AGENCY:

Federal Aviation Administration (FAA), DOT.

ACTION:

Final rule; request for comments.

SUMMARY:

The FAA is superseding Airworthiness Directive (AD) 2021–23–13, which applied to all helicopters equipped with a radio (also known as radar) altimeter. AD 2021–23–13 required revising the limitations section of the existing rotorcraft flight manual (RFM) for your helicopter to incorporate limitations prohibiting certain operations requiring radio altimeter data when in the presence of 5G C-Band interference in areas as identified by Notices to Air Missions (NOTAMs). Since the FAA issued AD 2021–23–13, the FAA determined that additional limitations are needed due to the continued deployment of new 5G C-Band base stations whose signals are expected to cover most of the contiguous United States at transmission frequencies between 3.7–3.98 GHz (5G C-Band). This AD requires revising the limitations section of the existing RFM to incorporate limitations prohibiting certain operations requiring radio altimeter data, due to the presence of 5G C-Band interference. The FAA is issuing this AD to address the unsafe condition on these products. In addition, the FAA is requesting comment on the change to the spurious emission level requirement.

DATES:

This AD is effective June 22, 2023.

The FAA must receive comments on this AD by August 7, 2023.

ADDRESSES:

You may send comments, using the procedures found in 14 CFR 11.43 and 11.45, by any of the following methods:

• *Federal eRulemaking Portal:* Go to *regulations.gov*. Follow the instructions for submitting comments.

• *Fax:* 202–493–2251.

• *Mail:* U.S. Department of Transportation, Docket Operations, M–30, West Building Ground Floor, Room W12–140, 1200 New Jersey Avenue SE, Washington, DC 20590.

• *Hand Delivery:* Deliver to Mail address above between 9 a.m. and 5 p.m., Monday through Friday, except Federal holidays.

AD Docket: You may examine the AD docket at *regulations.gov* by searching for and locating Docket No. FAA–2023–0668; or in person at Docket Operations between 9 a.m. and 5 p.m., Monday through Friday, except Federal holidays. The AD docket contains this final rule, any comments received, and other information. The street address for Docket Operations is listed above.

FOR FURTHER INFORMATION CONTACT:

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SUPPLEMENTARY INFORMATION:

Background

The FAA issued a notice of proposed rulemaking (NPRM) to amend 14 CFR part 39 to supersede AD 2021–23–13, Amendment 39 21811 (86 FR 69992, December 9, 2021) (AD 2021–23–13). AD 2021–23–13 applied to all helicopters equipped with a radio (also known as radar) altimeter. The NPRM published in the **Federal Register** on April 12, 2023 (88 FR 21931). The NPRM was prompted by a determination that radio altimeters cannot be relied upon to perform their intended function if they experience 5G C-Band interference.

In the NPRM, the FAA proposed minimum performance levels for radio altimeters that can be used across the affected fleet. The FAA proposed that a "radio altimeter tolerant rotorcraft" is one for which the radio altimeter, as installed, demonstrates: (1) tolerance to radio altimeter interference at or above a fundamental power spectral density (PSD) curve threshold, and (2) tolerance to an aggregate spurious emission level of −42 dBm/MHz in the 4200–4400 MHz radio altimeter band. For rotorcraft with radio altimeters that meet the proposed minimum performance levels, the FAA proposed to terminate the operational limitations imposed by AD 2021–23–13 with no further action. For rotorcraft with radio altimeters that do not meet the proposed minimum performance levels, the FAA proposed to maintain the requirements of AD 2021–23–13 by requiring revising the limitations section of the existing RFM to incorporate limitations prohibiting certain operations requiring radio altimeter data, due to the presence of 5G C-Band interference as identified by NOTAM until June 30, 2023. On or before June 30, 2023, the FAA proposed to also require, for non-radio altimeter tolerant rotorcraft, revising the existing RFM to incorporate limitations prohibiting these same operations in the contiguous U.S. airspace.

Actions Since the NPRM Was Issued

Since the FAA issued the NPRM, the FAA determined that the spurious emission level as proposed in the NPRM would not necessarily address the unsafe condition from both indoor and outdoor emitters. Additionally, commenters of the NPRM requested the FAA replace the proposed fixed aggregate spurious emission level with a spurious PSD tolerance curve.

The FAA analyzed multiple scenarios to determine the worst case spurious emissions a rotorcraft could be exposed to from either indoor or outdoor 5G C-band base stations. The constraining scenario is a rotorcraft operation on a building or elevated platform with a nearby in-building 5G emitter. Figure 2 of paragraph (g)(1)(ii) of this AD is derived by assuming that the rotorcraft is at least 75 ft laterally from the in-building emitter with conducted spurious emissions of −30 dBm/MHz. No building exit losses are accounted for in this curve.

In this final rule, the FAA replaced the proposed fixed aggregate spurious emission level of −42 dBm/MHz (conducted) with a spurious PSD tolerance curve for 5G C-Band interference from a single base station. This form of the requirement is consistent with the transport and commuter category airplane requirement. Similarly, it does not include an aggregation factor or any base station or aircraft antenna gain factors. The spurious PSD tolerance curve is based on a different spurious emission level than what the FAA proposed in the NPRM (−30 dBm/MHz conducted for a single indoor base station instead of −48 dBm/MHz conducted for a single outdoor base station and an aggregation factor of 6 dB which yielded an effective aggregate level of −42 dBm/MHz).

As a result, the FAA is requesting comments on the spurious PSD tolerance curve in figure 2 to paragraph (g)(1)(ii) of this AD.

Comments on NPRM

The FAA provided the public with an opportunity to comment on the NPRM and received submissions to Docket No. FAA−2023−0668 from Sikorsky Aircraft Corporation (Sikorsky), Bell Textron Inc. (Bell Textron), Thales Group (Thales), Air Medical Operators Association (AMOA), and Helicopter Association International (HAI) on behalf of 21 aviation coalition members.

The following summarizes the comments received on the NPRM and provides the FAA's responses.

Request To Clarify AMOC Requirements for PSD Curve

Comment summary: Bell Textron requested the FAA clarify whether alternative methods of compliance (AMOCs) will be required for filters or equipment that meet the fundamental PSD curve.

FAA response: The AD specifies that radio altimeter tolerant aircraft must use a method approved by the FAA. The FAA developed a policy statement and requested public comments on this proposed policy on May 8, 2023 (88 FR 29554). The policy statement provides additional guidance on data submittals and approvals for this method. Therefore, operators will not need an AMOC provided their helicopter meets the fundamental and spurious emissions PSD curve thresholds specified in paragraphs (g)(1)(i) and (ii) of this AD.

Request To Revise Applicability

Comment summary: Sikorsky requested that the FAA revise the proposed AD to exempt helicopters conducting ambulatory, health, emergency, and search and rescue (SAR) operations.

Sikorsky stated that the inability to conduct these lifesaving operations due to the AD would have a negative humanitarian and social impact.

FAA response: The FAA disagrees. The FAA has determined that regardless of the purpose of a flight, erroneous radio altimeter behavior creates an unacceptable risk during the operations prohibited by the AD. To remove those prohibitions from the RFM, operators may modify their helicopters to a radio altimeter tolerant helicopter as defined in paragraph (g)(1) of this AD.

Request To Clarify "Critical Phase of Flight"

Comment summary: In the NPRM, the FAA explained its determination that helicopters with a radio altimeter that demonstrates the tolerances in the AD would not experience interference during a critical phase of flight in the contiguous U.S. airspace. Sikorsky questioned whether by "critical phase of flight" the FAA means the definition in 14 CFR 135.100(c).

FAA response: The commenter is correct that the term "critical phase of flight" in this AD has the same meaning as in 14 CFR 135.100(c): all ground operations involving taxi, takeoff and landing, and all other flight operations conducted below 10,000 feet, except cruise flight.

Request To Clarify "Prohibited Operations"

Comment summary: In the NPRM, the FAA explained its proposed actions and stated that after July 1, 2023, helicopters without an upgraded radio altimeter would be "subject to the prohibited operations." Sikorsky requested that the FAA clarify its use of the term "prohibited operations," as avionic system architecture, redundancies, and associated functional hazard and system safety assessments could cause aircraft manufacturers, operators, and regulators to interpret the term differently.

FAA response: The FAA's use of the term "prohibited operations" in the preamble of the NPRM refers to the four operations listed in figure 3 to paragraph (h) of this AD and figure 4 to paragraph (i) of this AD.

Request To Extend Compliance Time

Comment summary: Sikorsky and HAI requested additional time to comply with the AD. The commenters were concerned that operators will not have sufficient time to equip with an upgraded radio altimeter before June 30, 2023, in order to avoid the flight restrictions. According to HAI, no currently available radio altimeters meet the proposed performance levels, and about one-third of the fleet will need to purchase a different make/model radio altimeter and the appropriate filter solution. The commenters stated that an extension would avoid operational and economic impacts to U.S. transportation, as well as disturbances to aerospace production.

FAA response: The FAA carefully considered the impact of the flight restrictions on the unmodified fleet after June 30, 2023, and did not take the decision to prohibit these operations lightly. The June 30, 2023, date was driven by the unsafe condition over which the FAA has no control. After refraining from operating at the levels authorized by the Federal Communications Commission (FCC) for a year and a half, wireless companies are now able to operate at higher levels, yet still not at the levels authorized. Additionally, the FAA anticipates 19 additional telecommunications companies will begin transmitting in the C-Band after June 30, 2023. Although the FAA continues to work with the companies that intend to transmit in the 3.7–3.98–GHz band near 5G C-Band mitigated airports (5G CMAs), the FAA has no agreement with those companies to provide the FAA

with tower locations and other information necessary to support the current NOTAM/AMOC process. Therefore, the FAA will not be able to extend the June 30, 2023, date.

Request To Change Number of Affected Helicopters

Comment summary: Sikorsky requested that the FAA revise the number of affected helicopters in the estimated costs section of the preamble. Sikorsky stated that the number in the NPRM (1,128 helicopters of U.S. registry) is incorrect as the Sikorsky civil fleet of Model S–76A, S–76A+, S–76/B, S–76C, S–76C++, S–76D, and S–92A helicopters, which utilize single and/or dual radio altimeters, total 1,153. AMOA also stated the proposed AD does not contain an accurate estimate of affected helicopters.

FAA response: The FAA has reevaluated and revised the affected fleet size for U.S registered helicopters. The FAA estimates that approximately 5,500 helicopters of U.S. registry are likely to have a radio altimeter installed and are therefore required to revise their existing RFM or modify to become a radio altimeter tolerant rotorcraft. The FAA also estimates that 1,128 of the 5,500 helicopters of U.S. registry are equipped to be able to perform the operations prohibited by this AD for non-radio altimeter rotorcraft. The FAA has revised the estimated costs of this final rule accordingly.

Allocation of Federal Funding

Comment summary: HAI recommended that federal funding be allocated to helicopter operators to help cover the costs associated with equipage. This financial support would alleviate the burden on operators and facilitate the implementation of necessary retrofits.

FAA response: The FAA appreciates the cost to retrofit helicopters with tolerant radio altimeters. However, the FAA's budget does not include allocations for AD costs incurred in modifying privately owned equipment.

Request To Revise Cost Estimates for Modification and RFM Updates

Comment summary: Sikorsky, Bell Textron, HAI, and AMOA commented that the NPRM estimated only the cost to revise the RFM update and did not include costs to replace or modify the radio altimeters. AMOA also stated the NPRM does not realistically address the capacity and likely backlog associated with the modifications.

FAA response: Based on these comments, the FAA has revised the estimated costs to include the costs associated with modifying the helicopter to be a radio altimeter tolerant rotorcraft. The cost analysis in FAA AD rulemaking actions typically considers only the direct costs associated with the specific actions required by the AD. The FAA does not include secondary or indirect costs, such as those resulting from delays or supply issues. The FAA lacks the data necessary to quantify those costs, which might vary significantly among operators; the commenters did not provide such data either.

Comment summary: Sikorsky stated that the FAA's estimate of the hourly labor rate and number of hours associated with updating the RFM is too low. Sikorsky suggested that typical RFM updates/releases include technical writing, peer reviews, airworthiness approvals, and release.

FAA response: The FAA disagrees. The FAA uses 1 work-hour as a standard estimate in ADs that require an administrative function such as a revision to a flight manual.

Concern for Agreed-On Mitigations

Comment summary: Bell Textron, Thales, and Sikorsky expressed concern that the FAA does not have authority to enforce the voluntary agreements between the FAA and the telecommunications companies. Bell Textron requested that the FCC mandate the voluntary mitigations so that already designed filters will be a lasting solution. Thales and Sikorsky also requested that the proposed AD include necessary spurious data that 5G network operators should disclose to the FAA, to determine what action may be necessary to ensure safe aviation operations in the U.S.

FAA response: Thales, Sikorsky, and Bell Textron are correct that the agreements between the FAA and the telecommunications companies have been voluntary because the FAA does not have enforcement authority over the companies' use of licenses they receive from the FCC. However, the FAA, National Telecommunications and Information Administration (NTIA), and FCC have worked extensively and collaboratively with the licensees to ensure that the agreements confirm necessary notification and coordination, that mitigations are in place with network deployments, and that the agreements are enforceable by the FCC. These March 31, 2023, voluntary agreements [1] allow the FAA to continue to address aviation safety when analysis indicates that a proposed base station will exceed the permitted PSD values, which ensures the FAA can protect offshore radio altimeter coupled approaches, hover autopilot modes that use radio altimeters, search and rescue autopilot modes that use radio altimeters, and Category A, B, and Performance takeoff and landing operations without limitations. The FAA disagrees with the request that the AD include necessary spurious data that 5G network operators should disclose to the FAA, because the spurious PSD curve in this AD is based on the spurious emission limits documented in the March 31, 2023, agreement.

The FAA will continue to work with the FCC and NTIA in this regard to ensure continuing aviation safety. As stated in the voluntary agreement letter dated March 31, 2023, the commitments of AT&T, T-Mobile, UScellular, and Verizon will last until January 1, 2028, at which point they will sunset unless extended or reduced by mutual agreement. A mid-term check-in involving the FAA, the FCC, and telecommunications companies will occur in July 2026 to assess the status of aviation's long-term migration to next-generation radio altimeters and the need for the sustainment of these commitments.

Request To Clarify Compliance Methods

Comment summary: Bell Textron requested the FAA clarify the process for determining how a radio altimeter will meet the tolerance requirements in the AD. Bell Textron also requested that the FAA clarify the requirement in the proposed AD of “using a method approved by the FAA.” HAI requested the FAA revise the proposed AD to include a reference to an issue paper, advisory circular, or other means of compliance document that has gone through the public comment process.

FAA response: The FAA developed a policy statement and requested public comments on this proposed policy on May 8, 2023 (88 FR 29554). The proposed policy describes an acceptable framework and method for demonstrating that an airplane or helicopter is radio altimeter tolerant. The policy discusses compliance methods that should be applied to programs for type certificates, amended type certificates, supplemental type certificates (STCs), and amended STCs. The policy proposes methods that may be used for compliance only if approved by the FAA in writing.

Request To Revise PSD Curve

Comment summary: HAI, Sikorsky, and Thales requested that the FAA revise the proposed AD to include the frequency range to which the PSD tolerance curve thresholds apply, a new figure indicating the spurious tolerance similar to the figure with the PSD tolerance curve, and a specification of the altitude dependence for spurious tolerance.

FAA response: The FAA agrees and has added the frequency range to the PSD tolerance curve. Additionally, as explained previously under "Actions Since the NPRM Was Issued," the FAA has replaced the proposed fixed emission level with a spurious PSD tolerance curve.

Request To Allow Modification as Minor Change

Comment summary: HAI requested that the FAA revise the proposed AD to allow modification of the helicopter as a minor change to type design, to help expedite approvals and make the best use of resources.

FAA response: The FAA disagrees. Under 14 CFR 21.95, minor design changes may be approved before an applicant submits to the FAA any substantiating data. Radio altimeters are critical sensors that must be shown to perform their intended function, and the modified hardware or software must be shown to still meet the aircraft-level system safety requirements. For example, a filter may alter the radio altimeter performance, which may have an appreciable effect on reliability, operational characteristics, or other characteristics affecting airworthiness. For this reason, the FAA determined that FAA approval of the method used for the modification is necessary before operators could show compliance with this AD.

Request To Clarify Need for Substantial Redesign of Radio Altimeters

Comment summary: In the NPRM, the FAA stated that the radio altimeter modifications would not require a substantial system redesign, because operators could readily replace radio altimeters or install filters. Bell Textron commented that anything other than a simple filter is a substantial system redesign and requested the FAA provide clarification that some radio altimeters will require substantial system redesign.

FAA response: The FAA acknowledges that certain radio altimeter changes may require a substantial system design at the radio altimeter or radio altimeter integration level. For some radio altimeters, hardware or software design changes may be needed to address attenuation effects of additional filtering. However, some of these changes may not be considered a substantial system design. For example, the FAA has allowed many of the radio altimeter filtering that was implemented as AMOCs to AD 2021–23–12 to be certified as a minor technical standard order (TSO) change as the change was not extensive enough to require a substantially complete investigation.

Request for FAA To Retain NVG Exemptions

Comment summary: AMOA expressed concern about the proposed AD's effect on Exemption No. 18973, which provides relief to helicopter air ambulance operators conducting operations under part 135 with night vision goggles (NVGs). The commenter stated that the exemption is tied to NOTAMs for identifying areas where the radio altimeter is unreliable, and in the NPRM, the FAA advised that NOTAMs would no longer be used to communicate the location of the 5G C-Band environment. Sikorsky also noted that the NPRM does not address this exemption.

FAA response: The FAA acknowledges that Exemption No. 18973 and related exemptions providing relief for helicopter operations under parts 91, 135, and 141 with NVGs remain in the public interest. The FAA is aware of the issue raised by the commenters and will address with follow-on actions for those exemption holders.

Request for AD Applicability for Offshore Operations

Comment summary: In the NPRM, the FAA proposed to retain the prohibition on offshore operations from AD 2021–23–13. HAI and Sikorsky noted that the NPRM does not specify where or how far off shore the AD would apply. HAI explained that typically, offshore oil rigs are situated 3 to 200 miles from the shore, making it crucial to determine the range of the restrictions. Sikorsky commented the NPRM has no guidance with respect to offshore operations and asked for clarification of the proposed FAA offshore applicability limit from the U.S. coastline.

FAA response: The flight restrictions required by this AD are limited to the airspace of the contiguous U.S., which means the prohibitions are applicable everywhere in the contiguous U.S. to include the airspace overlying the waters up to 12 nautical miles from the coast, including from the islands of those states. The FAA notes that based on the most susceptible radio altimeters, 5G C-Band interference could extend up to 20 nautical miles beyond the boundaries of the airspace of the contiguous U.S. on non-radio altimeter tolerant rotorcraft, so rotorcraft operators should also exercise caution in operating in those areas.

Request for Continued Collaboration

Comment summary: HAI stated that, given that FAA will no longer have access to 5G C-Band emitter locations after June 2023, enhanced communication and collaboration between FAA and industry stakeholders will be paramount. HAI offered to assist FAA in tailoring where barometric minimums should be required under a formal information-sharing agreement.

FAA response: FAA appreciates the effort HAI and the rotorcraft offshore industry have gone through to protect the safety of those operations and looks forward to continued collaboration with all stakeholders on sharing data on offshore 5G C-Band mitigation efforts.

Request To Change Limitations

Comment summary: Bell Textron commented there are hover modes that provide workload relief under VFR (visual flight rules) conditions and, because the operation is under VFR, the pilot would be attentive and mitigate any hazards. Bell Textron requested that the FAA change the proposed prohibition of "Engaging hover autopilot modes that require radio altimeter data" to "Engaging hover autopilot modes that require radio altimeter data for safe flight (*e.g.,* those approved for IMC [instrument meteorological conditions] or IFR [instrument flight rules] conditions where visual reference is not adequate for detection and response)."

FAA response: The FAA disagrees. The FAA considered both VFR and IFR operational scenarios and could not rule out an unsafe condition when operating under VFR conditions. Additionally, the proposed language is vague and could lead to operator confusion and operations with unsafe conditions.

Comment Summary: Bell Textron commented that there are approach modes other than SAR modes that could result in an unsafe condition if there is erroneous radio altimeter data. The commenter further stated that if there are visual references, the pilot can safely mitigate hazards

from erroneous radio altimeter data. Bell Textron requested the FAA change the proposed prohibition of "Engaging Search and Rescue (SAR) autopilot modes that require radio altimeter data" to "Engaging Search and Rescue (SAR) approach or similar low altitude/low speed autopilot approach modes that require radio altimeter data where visual reference is not adequate for detection and response."

FAA response: The FAA disagrees. If there are autopilot modes similar to SAR modes, where the radio altimeter data is used to hold altitude, the hover mode prohibition will cover those modes. The FAA disagrees that if there are visual references, the pilot can always safely mitigate hazards from erroneous radio altimeter data while in SAR modes.

No change to the proposed hover mode prohibition is necessary as a result of this comment. Where both barometric minimums and radar altimeter minimums are available as options in an approach, a non-radio altimeter tolerant rotorcraft may still conduct those approaches using the barometric minimums.

Comment Summary: Bell Textron stated there can be Category A or B procedures that provide an alternative means to determine the height above the ground. The commenter requested the FAA change the proposed prohibition of "Performing takeoffs and landings in accordance with any procedure (Category A, Category B, or by Performance Class in the Rotorcraft Flight Manual or Operations Specification) that requires the use of radio altimeter data" to "Performing takeoffs and landings in accordance with any procedure (Category A, Category B, or by Performance Class in the Rotorcraft Flight Manual or Operations Specification) that requires the use of radio altimeter data without the option to alternatively use barometric data or visual references."

FAA response: The phrase "that requires the use of radio altimeter data" in the prohibition raised by the commenter is intended to limit the applicability of that prohibition to procedures that rely on the data provided by the radio altimeter. If the RFM contains an alternative procedure for a Category A, B, or performance class takeoff or landing using a means that does not rely on radio altimeter data, then that procedure is not prohibited by this AD.

Request for PSD Curve Changes

Comment summary: Thales and Sikorsky requested the FAA clarify several aspects of the PSD curve in figure 1 to paragraph (g)(1) of the proposed AD: whether no elevation mask is taken into account at and below 350 feet above ground level (AGL); at which base station emission power the PSD curve corresponds (62 dBm/MHz or 65 dBm/MHz); and whether the radio altimeter performance criteria in the curve explicitly covers any 5G emitter station up to 65dBm/MHz in the applicable 3.7–3.98 GHz band, for the foreseeable future. Sikorsky requested that the FAA revise the proposed AD to include a PSD curve that reflects the reduced EIRP levels for helicopters operating at the 188 priority airports (5G CMAs) with reduced power levels.

FAA response: The notch in the PSD curve does not mean that no elevation mask is taken into account below 350 feet AGL. The elevation mask is taken into consideration below 350 feet AGL and is a fundamental consideration in how the PSD curve was established. The PSD curve was calibrated to cover 5G C-Band emitter stations up to 65 dBm/MHz in the applicable 3.7–3.98 GHz band.

The FAA disagrees with revising the AD to include a PSD curve for helicopters operating at airports with reduced power levels. The radio altimeter tolerant rotorcraft PSD curve was established to

provide safe operation anywhere in the contiguous U.S. regardless of whether a helicopter is operating at a 5G CMA.

Comment summary: Sikorsky requested the FAA revise the PSD curve in figure 1 to paragraph (g)(1) of the proposed AD to change the height above ground at −6 dBm/MHz from 270 feet to 370 feet, and at −16 dBm/MHz from 300 feet to 400 feet. Sikorsky stated its request was based on several factors, including the minimum safe obstacle avoidance distance and the typical decision height used for radio altimeter critical operations associated with missed approach points (MAPs) during point in space (PINS) approaches. Sikorsky further stated that radio altimeters are not operationally used above 1000 feet, and therefore there is little value for any PSD restrictions above 1000 feet operationally.

FAA response: The FAA assumed an emitter base station height of 350 feet based on consensus reached in rotorcraft industry group meetings. Additionally, FAA analysis of existing emitter base station height data shows that, while higher emitters do exist, they are infrequently adjacent to helipads. Second, the FAA assumed the rotorcraft was no closer than 50 feet above and 75 feet laterally from the emitter. The vertical distance was based on pilot feedback and the lateral distance was based on common lateral separation from the main rotor tip recommendations of 2 main rotor diameters from the tip of the rotor, selecting a 30 foot rotor as the smallest rotor in this class of aircraft with the antenna under the main rotor mast. An operator of an individual model rotorcraft with a larger rotor diameter may request approval of an AMOC to the AD on the basis of separation distance. Third, the FAA assumed that the emitter was active at the full rural power level of 65 dBm/MHz allowed in FCC Report and Order FCC 20–22.[2] The FAA then evaluated the resulting curve against data from radio altimeters and found it to be achievable with current technology using filters that have been developed. Based on data from existing emitters, if the height reduction from 370 feet to 270 feet, as requested by the commenter, were adopted, it would result in many more landing scenarios unprotected from interference because emitters on towers at about 250 feet as opposed to the accepted assumption of 350 feet are much more common. For this reason, the FAA did not adopt this request.

The FAA has re-evaluated the need for PSD performance requirements above 1000 feet and agrees with the reasons provided by the commenter. The PSD curves specified in this AD have been changed accordingly.

Request for HTAWS Risk Assessment

Comment summary: Bell Textron commented the helicopter terrain avoidance warning systems (HTAWS) discussion in the preamble of the NPRM mixes HTAWS functionality with separate radio altimeter functionality. The commenter requested that the NPRM discussion be revised to clearly distinguish between the stand-alone HTAWS and the hazards associated with the stand-alone radio altimeter and suggested the following language:

Unlike the Terrain Awareness and Warnings Systems (TAWS) in transport airplanes, most Helicopter Terrain Avoidance Warning Systems (HTAWS) do not rely on radio altimeter inputs. Radio altimeter data is used for vertical situational awareness in low visibility conditions (*i.e.,* snow and dust blown up by rotor down wash) and as an input into several procedures and automated system.

FAA response: The FAA agrees the proposed language provides a clearer distinction between the stand-alone HTAWS and the hazards associated with the stand-alone radio altimeter. However, no

change to the final rule is necessary since the language referenced by the commenter does not appear in the final rule.

Comment summary: HAI requested that the FAA include in the final rule the particulars of the FAA's risk assessments on all rotorcraft systems where an incorrect radio altimeter reading would result in an unsafe condition, requiring mitigation.

FAA response: The FAA assessed the risk of radio altimeter anomalies on operations coupled to automated functions and determined that these were the hazards that constituted an unsafe condition. The FAA provided additional information about its unsafe condition determination in the preamble of the NPRM and AD 2021–23–13. Additionally, the FAA acknowledges that radio altimeter anomalies could lead to increased flightcrew workload and flightcrew desensitization to warnings that could rise to an unsafe condition and result in additional rulemaking.

Request To Clarify Effect of Future TSO

Comment summary: Thales requested clarification regarding retrofitting with a 5G tolerant radio altimeter and the effect of a future TSO.

FAA response: Some rotorcraft may install filters between the radio altimeter and antenna or with an upgraded radio altimeter to become a radio altimeter tolerant rotorcraft. The FAA expects that the eventual new TSO will establish an internationally harmonized performance requirement, which will follow the existing international technical consensus on the establishment of the minimum operational performance standards (MOPS). The FAA considers this AD an interim action because additional rulemaking may be necessary once a new radio altimeter TSO is developed, approved, and available.

Request To Change Unsafe Condition Statement

Comment summary: In the NPRM, the FAA stated it was proposing the AD because radio altimeter anomalies that are undetected by the automation or pilot, particularly close to the ground, could lead to loss of continued safe flight and landing. Bell Textron commented that “continued safe flight and landing” is associated with Category A rotorcraft and not Category B rotorcraft. The commenter requested the FAA revise that language to instead state that it could result in an unsafe condition.

FAA response: The FAA disagrees. The FAA has evaluated the hazards associated with both Category A and B helicopter operations and determined that the severity of those hazards could lead to loss of continued safe flight and landing.

Comments Beyond Scope of NPRM

Comment summary: The FAA also received and reviewed comments that were unrelated to the actions proposed in the NPRM or that did not make a request that the FAA can act on. These comments included questions about alternative technologies, which have not yet been developed, and future broadband towers outside of the locations authorized by the FCC. These comments are outside the scope of this AD.

Additional Change From the NPRM

The FAA has added a terminating action in paragraph (j) of this AD for rotorcraft that have been modified to radio altimeter tolerant rotorcraft by allowing for the removal of the limitations from the RFM.

Conclusion

The FAA reviewed the relevant data, considered any comments received, and determined that air safety requires adopting this AD as proposed in the NPRM, except for the changes described previously. Accordingly, the FAA is issuing this AD to address the unsafe condition on these products.

Interim Action

The FAA considers this AD to be an interim action. The FAA considers that this AD is an interim action. Once the TSO standard for radio altimeters is established, which will follow the existing international technical consensus on the establishment of the MOPS, the FAA anticipates that the MOPS will be incorporated into the TSO. Once a new radio altimeter TSO is developed, approved, and available, the FAA might consider additional rulemaking.

Justification for Immediate Adoption and Determination of the Effective Date

Section 553(b)(3)(B) of the Administrative Procedure Act (APA) (5 U.S.C. 551 *et seq*.) authorizes agencies to dispense with notice and comment procedures for rules when the agency, for "good cause," finds that those procedures are "impracticable, unnecessary, or contrary to the public interest." Under this section, an agency, upon finding good cause, may issue a final rule without providing notice and seeking comment prior to issuance. Further, section 553(d) of the APA authorizes agencies to make rules effective in less than thirty days, upon a finding of good cause.

Although the FAA provided the public with an opportunity to comment on the NPRM, as previously explained, this final rule contains a new requirement in figure 2 to paragraph (g)(1)(ii) of this AD for demonstrating a radio altimeter meets the tolerance for spurious emissions. The FAA is requesting public comments on this new requirement. However, the unsafe condition addressed by this AD requires the immediate adoption of this AD without providing this opportunity for public comments prior to adoption. Radio altimeter anomalies that are undetected by the aircraft automation or pilot, particularly close to the ground, could lead to loss of continued safe flight and landing. To address this unsafe condition, the actions required by this AD must be accomplished before the compliance date of June 30, 2023. The FAA based this date on the changes to the 5G C-Band environment beginning on July 1, 2023. These changes include increased wireless broadband deployment and transmissions closer to the parameters authorized by the FCC. Accordingly, notice and opportunity for prior public comment are impracticable and contrary to the public interest pursuant to 5 U.S.C. 553(b)(3)(B).

The FAA finds that good cause exists pursuant to 5 U.S.C. 553(d) for making this amendment immediately effective for the same reasons the FAA found good cause to forgo notice and comment. In addition, the earlier operators learn of the requirements in this AD, the earlier they can take action to ensure compliance. An effective date less than 30 days would ensure the AD is codified earlier, thereby increasing awareness of its requirements.

Comments Invited

The FAA invites you to send any written data, views, or arguments about the spurious emissions PSD tolerance curve as specified in figure 2 to paragraph (g)(1)(ii) of this final rule. Send your comments to an address listed under **ADDRESSES** . Include "Docket No. FAA–2023–0668 and Project Identifier AD–2023–00199–T" at the beginning of your comments. The most helpful comments reference a specific portion of the figure, explain the reason for any recommended change, and include supporting data. The FAA will consider all comments received by the closing date and may amend this final rule because of those comments.

Except for Confidential Business Information (CBI) as described in the following paragraph, and other information as described in 14 CFR 11.35, the FAA will post all comments received, without change, to regulations.gov, including any personal information you provide. The agency will also post a report summarizing each substantive verbal contact received about this final rule.

Confidential Business Information

CBI is commercial or financial information that is both customarily and actually treated as private by its owner. Under the Freedom of Information Act (FOIA) (5 U.S.C. 552), CBI is exempt from public disclosure. If your comments responsive to this AD contain commercial or financial information that is customarily treated as private, that you actually treat as private, and that is relevant or responsive to this AD, it is important that you clearly designate the submitted comments as CBI. Please mark each page of your submission containing CBI as "PROPIN." The FAA will treat such marked submissions as confidential under the FOIA, and they will not be placed in the public docket of this AD. Submissions containing CBI should be sent to David Swartz, Continued Operational Safety Technical Advisor, COS Program Management Section, Operational Safety Branch, FAA; phone: 817–222–5390; email: *operationalsafety@faa.gov*. Any commentary that the FAA receives that is not specifically designated as CBI will be placed in the public docket for this rulemaking.

Costs of Compliance

The FAA estimates that there are approximately 5,500 helicopters of U.S. registry that are likely to have a radio altimeter installed. The FAA also estimates that 1,128 of the 5,500 helicopters of U.S. registry are equipped to be able to perform the operations prohibited by this AD for non-radio altimeter rotorcraft. The FAA estimates the following costs to comply with this AD:

Estimated Costs

Action	Labor cost	Parts cost	Cost per product	Cost on U.S. operators
RFM revision for non-radio altimeter tolerant rotorcraft (Retained action from AD 2021–23–13)	1 work-hour × $85 per hour = $85	$0	$85	$467,500
RFM revision for non-radio altimeter tolerant rotorcraft (new requirement)	1 work-hour × $85 per hour = $85	0	85	467,500

The FAA estimates the following costs for operators who elect to modify their helicopter to be radio altimeter tolerant:

Estimated Costs for Modification

Action	Labor cost	Parts cost	Cost per product
Modification (replacement)			Up to $40,000 per helicopter (includes labor and parts).
Modification (filter)	Up to 24 work-hours × $85 per hour = $2,040	Up to $8,000.	Up to $10,040 per filter.

Authority for This Rulemaking

Title 49 of the United States Code specifies the FAA's authority to issue rules on aviation safety. Subtitle I, section 106, describes the authority of the FAA Administrator. Subtitle VII: Aviation Programs describes in more detail the scope of the Agency's authority.

The FAA is issuing this rulemaking under the authority described in Subtitle VII, Part A, Subpart III, Section 44701: General requirements. Under that section, Congress charges the FAA with promoting safe flight of civil aircraft in air commerce by prescribing regulations for practices, methods, and procedures the Administrator finds necessary for safety in air commerce. This regulation is within the scope of that authority because it addresses an unsafe condition that is likely to exist or develop on products identified in this rulemaking action.

Regulatory Findings

This AD will not have federalism implications under Executive Order 13132. This AD will not have a substantial direct effect on the States, on the relationship between the national government and the States, or on the distribution of power and responsibilities among the various levels of government.

For the reasons discussed above, I certify that this AD:

(1) Is not a “significant regulatory action” under Executive Order 12866,

(2) Will not affect intrastate aviation in Alaska, and

(3) Will not have a significant economic impact, positive or negative, on a substantial number of small entities under the criteria of the Regulatory Flexibility Act.

List of Subjects in 14 CFR Part 39

- Air transportation
- Aircraft
- Aviation safety
- Incorporation by reference
- Safety

The Amendment

Accordingly, under the authority delegated to me by the Administrator, the FAA amends 14 CFR part 39 as follows:

PART 39—AIRWORTHINESS DIRECTIVES

1. The authority citation for part 39 continues to read as follows:

Authority: 49 U.S.C. 106(g), 40113, 44701.

§ 39.13 [Amended]

2. The FAA amends § 39.13 by:

a. Removing Airworthiness Directive (AD) 2021–23–13, Amendment 39–21811 (86 FR 69992, December 9, 2021), and

b. Adding the following new AD:

2023–11–07 Various Helicopters: Amendment 39–22453; Docket No. FAA–2023–0668; Project Identifier AD–2023–00199–R.

(a) Effective Date

This airworthiness directive (AD) is effective June 22, 2023.

(b) Affected ADs

This AD replaces AD 2021–23–13, Amendment 39–21811 (86 FR 69992, December 9, 2021) (AD 2021–23–13).

(c) Applicability

This AD applies to all helicopters, certificated in any category, equipped with a radio (also known as radar) altimeter. These radio altimeters are installed on various helicopter models including, but not limited to, the helicopters for which the design approval holder is identified in paragraphs (c)(1) through (20) of this AD.

(1) Airbus Helicopters

(2) Airbus Helicopters Deutschland GmbH

(3) Air Space Design and Manufacturing, LLC

(4) Bell Textron Canada Limited

(5) Bell Textron Inc.

(6) Brantly International, Inc.

(7) Centerpointe Aerospace Inc.

(8) Columbia Helicopters, Inc.

(9) The Enstrom Helicopter Corporation

(10) Erickson Air-Crane Incorporated, DBA Erickson Air-Crane

(11) Helicopteres Guimbal

(12) Siam Hiller Holdings, Inc.

(13) Kaman Aerospace Corporation

(14) Leonardo S.p.a.

(15) MD Helicopters Inc.

(16) PZL Swidnik S.A.

(17) Robinson Helicopter Company

(18) Schweizer RSG LLC

(19) Scotts-Bell 47 Inc.

(20) Sikorsky Aircraft Corporation

(d) Subject

Air Transport Association (ATA) of America Code 3444, Ground Proximity System.

(e) Unsafe Condition

This AD was prompted by a determination that radio altimeters cannot be relied upon to perform their intended function if they experience interference from wireless broadband operations in the 3.7–3.98 GHz frequency band (5G C-Band). The FAA is issuing this AD because radio altimeter anomalies that are undetected by the automation or pilot, particularly close to the ground, could lead to loss of continued safe flight and landing.

(f) Compliance

Comply with this AD within the compliance times specified, unless already done.

(g) Definitions

(1) For purposes of this AD, a “radio altimeter tolerant rotorcraft” is one for which the radio altimeter, as installed, demonstrates the tolerances specified in paragraphs (g)(1)(i) and (ii) of this AD, using a method approved by the FAA. No actions are required by this AD for radio altimeter tolerant rotorcraft.

(i) Tolerance to radio altimeter interference, for the fundamental emissions (3.7–3.8 GHz), at or above the power spectral density (PSD) curve threshold specified in figure 1 to paragraph (g)(1)(i) of this AD.

Figure 1 to paragraph (g)(1)(i)— *Fundamental Effective Isotropic PSD at Outside Interface of Rotorcraft Antenna*

(ii) Tolerance to radio altimeter interference, for the spurious emissions (4.2–4.4 GHz), at or above the PSD curve threshold specified in figure 2 to paragraph (g)(1)(ii) of this AD.

Figure 2 to paragraph (g)(1)(ii): *Spurious Effective Isotropic PSD at Outside Interface of Rotorcraft Antenna*

(2) For purposes of this AD, a "non-radio altimeter tolerant rotorcraft" is one for which the radio altimeter, as installed, does not demonstrate the tolerances specified in paragraphs (g)(1)(i) and (ii) of this AD.

(h) Retained Rotorcraft Flight Manual (RFM) Revision for Non-Radio Altimeter Tolerant Rotorcraft

For non-radio altimeter tolerant rotorcraft: On or before January 4, 2022, revise the Limitations Section of the existing RFM for your helicopter by incorporating the limitations specified in figure 3 to paragraph (h) of this AD. This may be done by inserting a copy of this AD into the existing RFM for your helicopter. The action required by this paragraph may be performed by the owner/operator (pilot) holding at least a private pilot certificate and must be entered into the aircraft records showing compliance with this AD in accordance with 14 CFR 43.9(a)(1) through (4) and 14 CFR 91.417(a)(2)(v). The record must be maintained as required by 14 CFR 91.417 or 14 CFR 135.439.

Figure 3 to paragraph (h)— *RFM Revision*

(i) RFM Revision for Non-Radio Altimeter Tolerant Rotorcraft

For non-radio altimeter tolerant rotorcraft, do the actions specified in paragraphs (i)(1) and (2) of this AD.

(1) On or before June 30, 2023, revise the Limitations Section of the existing RFM for your helicopter by including the information specified in figure 4 to paragraph (i) of this AD. This may be done by inserting a copy of this AD into the existing RFM for your helicopter. The action required by this paragraph may be performed by the owner/operator (pilot) holding at least a private pilot certificate and must be entered into the aircraft records showing compliance with this AD in accordance with 14 CFR 43.9(a)(1) through (4) and 14 CFR 91.417(a)(2)(v). The record must be maintained as required by 14 CFR 91.417 or 14 CFR 135.439. Incorporating the RFM revision required by this paragraph terminates the RFM revision required by paragraph (h) of this AD.

(2) Before further flight after incorporating the limitations specified in figure 4 to paragraph (i) of this AD, remove the RFM revision required by paragraph (h) of this AD.

Figure 4 to paragraph (i)— *RFM Revision for Non-Radio Altimeter Tolerant Rotorcraft*

(j) Terminating Action for RFM Limitations

(1) Modifying the rotorcraft from a non-radio altimeter tolerant rotorcraft to a radio altimeter tolerant rotorcraft terminates the limitations in paragraph (i) of this AD for that rotorcraft.

(2) After modifying the rotorcraft to a radio altimeter tolerant rotorcraft, the limitations specified

by paragraph (i) of this AD may be removed from the RFM.

(k) Alternative Methods of Compliance (AMOCs)

(1) The Manager, Operational Safety Branch, FAA, has the authority to approve AMOCs for this AD, if requested using the procedures found in 14 CFR 39.19. In accordance with 14 CFR 39.19, send your request to your principal inspector or responsible Flight Standards Office, as appropriate. If sending information directly to the manager of the Operational Safety Branch, send it to the attention of the person identified in paragraph (l) of this AD. Information may be emailed to: *AMOC@faa.gov*.

(2) Before using any approved AMOC, notify your appropriate principal inspector, or lacking a principal inspector, the manager of the responsible Flight Standards Office.

(3) AMOCs approved for AD 2021–23–13 are approved as AMOCs for the requirements specified in paragraph (h) of this AD until June 30, 2023.

(l) Related Information

For more information about this AD, contact David Swartz, Continued Operational Safety Technical Advisor, COS Program Management Section, Operational Safety Branch, FAA; phone: 817–222–5390; email: *operationalsafety@faa.gov*.

(m) Material Incorporated by Reference

None.

Issued on June 15, 2023.

Michael Linegang, Acting Director,

Compliance & Airworthiness Division, Aircraft Certification Service.

Footnotes

1. A copy of the letter from AT&T, Verizon, T-Mobile, and UScellular dated March 31, 2023, documenting their voluntary commitments to transmit within mitigated parameters is in Docket No. FAA–2023–0668 and can be found on the FCC's website at: https://www.fcc.gov/ecfs/search/search-filings/filing/1033142661477.

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2. FCC Report and Order (R&O) FCC 20–22 in the Matter of Expanding Flexible Use of the 3.7–4.2 GHz Band, adopted February 28, 2020, and released March 3, 2020. This document is available in Docket No. FAA–2023–0668, and at https://www.fcc.gov/document/fcc-expands-flexible-use-cband-5g-0.

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