

Directorate General of Civil Aviation Uçuşa Elverişlilik Daire Başkanlığı Airworthiness Department



# Uçuşa Elverişlilik Emniyet Bülteni

Emniyet Bülten No:	2022-03
Bülten Revizyon No:	00
Tarih:	19.04.2022

Konu:	C-Band Hücresel Sistem (5G) Yayınlarının Uçak Radyo Altimetre Sistemlerine Etkisi
Kapsam:	Tüm Havacılık İşletmeleri
Referans:	1.) FAA Aviation Safety, Special Airworthiness Information Bulletin, "Risk of Potential Adverse Effects on Radio Altimeters", SAIB AIR-21-18R1
	2.) FAA Aviation Safety, Airworthiness Directive, "Air Transport Association of America Code 31, Indicating/Recording System; 34, Navigation.", 2021-23-12
	3.) FAA Flight Standards Service, Safety Alert for Operators, "Risk of Potential Adverse Effects on Radio Altimeters when Operating in the Presence of 5G C-Band", SAFO 21007
Açıklamalar:	Bu Emniyet Bülteni, Uçuş Operasyon Direktifi ve Emniyet Bülteni Talimatının (SHT-OPS UOD/EB) 6'ncı maddesi kapsamında, yaşanan ve yaşanması muhtemel ciddi olayların ve/veya kazaların olası risklerini azaltmaya yönelik yayınlanan tavsiyeler göz önünde bulundurularak havacılık endüstrisinde emniyet seviyesini artırma çabalarına yardımcı olmak amacıyla yayınlanmıştır.
	Bilindiği üzere hücresel veri iletişiminde C-bandı 3.70-3.98 GHz frekansında 5G teknolojilerinin kullanımı yaygınlaşmaktadır. Anılan frekans aralığındaki radyo dalgalarının uçaklardaki radyo altimetre sistemleri ile girişim yapabileceği, bu durumun da özellikle düşük görüş şartlarındaki operasyonlarda (LVO) emniyet riskini artıracağına işaret edilmektedir.
	Amerikan havacılık otoritesi FAA, 5G teknolojisinde kullanılan radyo dalgalarından olumsuz etkilenebilecek uçuş sistemlerini dikkate alarak

#### Tavsiye niteliğinde bilgilerin uygulama zorunluluğu bulunmamaktadır.



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	girişim (interference) olması durumunda otomatik iniş yapılmamasını NOTAM ile belirtmiştir.
	Uçak üreticileri bu sorunu çözebilmek ve radyo altimetre sistemlerinin sağlıklı çalışmasını garantilemek adına alternatif uyumluluk süreçleri (AMOC: Alternative Means of Compliance) geliştirmişler ve FAA'ye onaya sunarak uçuş operasyonlarında emniyet riskini gidermeye çalışmışlardır.
Tavsiyeler:	Radyo altimetre sistemi otomatik iniş ve alçak irtifa operasyonlarında kullanılmaktadır. Radyo altimetre alıcıları çok hassas ekipmandır ve RF emisyonlarında hatalı sonuçlar verebilir. FAA, örneğin, LVO şartlarında inmek için radyo altimetresi gerektiren risk altındaki operasyonları kapsayan AD yayınlamıştır.
	Radyo altimetresine bağlı diğer otomatik emniyet sistemlerinin de etkilenerek yanlış çalışma olasılığı vardır. Etkilenebilecek örnek sistemler:
	Terrain Awareness Warning Systems (TAWS-A)
	Enhanced Ground Proximity Warning Systems (EGPWS)
	Traffic Alert and Collision Avoidance Systems (TCAS II)
	Take-off guidance systems
	Flight Control (control surface)
	Tail strike prevention systems
	Windshear detection systems
	Envelope Protection Systems
	Altitude safety call outs/alerts
	Flight Director
	Engine and wing anti-ice systems
	Automatic Flight Guidance and Control Systems (AFGCS)
	Anormal (eksik veya hatalı) radyo altimetre sinyalleri, özellikle uçuşun kalkış, yaklaşma ve iniş aşamalarında diğer sistemleri etkileyerek bunların beklenmedik bir şekilde çalışmasına neden olabilir. Bu anormal girdiler, emniyetli uçuş ve iniş sağlamak için pilot tarafından zamanında tespit edilemeyebilir. Hatalı radyo altimetre verileri, pilotların aletlere güvenmemesine ve tüm aletli uçuş eğitiminin üzerine inşa edildiği temeli sarsmasına neden olabilir.
	Operatörler ve pilotlar, radyo altimetreye entegre edilen sistemler hakkında farkındalığı geliştirmeli ve hava aracı emniyet sisteminin sesli uyarıları/ikazları ile ilişkili SOP prosedürlerini izlemelidir.

#### Tavsiye niteliğinde bilgilerin uygulama zorunluluğu bulunmamaktadır.



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Radyo altimetre sistemi ve uçak üreticilerinin yapması gereken iş ve işlemlerin yanı sıra işleticilerin ve pilotların da aşağıda örnekleri verilen bir takım tedbirleri alması gerekmektedir: 1.) Radyo altimetre konfigürasyonunun risk değerlendirmesi icin ve ucus operasyonunu nasıl etkileyebileceği konusunda Emniyet Yönetim Sistemi (SMS) araçları kullanılmalıdır. 2.) Yolculara bütün taşınır iletişim cihazlarını uçuş moduna almaları veya tamamen kapatmaları ve ayrıca teslim edilen kayıtlı bagajda ise tüm elektronik cihazların tamamen kapatıldığından emin olmaları hatırlatılmalıdır. 3.) Kablosuz geniş band teknolojilerinin kullanımı nedeniyle zararlı girişimin olası etkileri ve pilot müdahaleleri hakkında uçak ve radyo altimetre üreticilerinden bilgi alınmalıdır. 4.) Operatörler, pilotların radyo altimetre sistemindeki olası bozulmayı, bu bağlı güvenlik sistemlerinin ve diğer ekipmanların sisteme fonksiyonlarındaki sapmayı fark etmelerini ve uçuşta olabilecek radyo altimetre anormalliklerini ve yaşanabilecek yanlışlıkları telafi edecek yöntemleri sağlamalıdır. Hatalı altimetre okumaları, altimetre fonksiyon kaybı, güvenlik sistemlerinin ve diğer bağımlı sistemlerin işlevlerindeki kayıp ve bunların arızalanma şekilleri göz önünde bulundurulmalıdır. 5.) Operatörler, mevcut prosedürlerin geliştirilmesini değerlendirirken, hava aracı emniyet sistemlerine dayanan pilottaki güven kaybını göz önünde bulundurmalıdır. 6.) Radyo altimetre anormallikleri yaşayan işleticiler ve pilotlar, en kısa sürede hava trafik kontrolörüne haber vermelidir. Uçuştan sonra da pilotlar, SHGM'ye, hava aracı imalatçısına ve radyo altimetre sistemi üreticisine radyo altimetre kesintileri ve parazit olaylarıyla ilgili rapor göndermeleri önerilir. Sürekli Uçuşa Elverişlilik Yönetimi Kuruluşları (SYK), hava araçlarındaki radyo altimetre sistemlerinin 5G kablosuz geniş band şebeke yayınlarının girişimlerinden etkilenmemesi konusunda sivil havacılık otoritelerince yayınlanan ve örnekleri bülten ekinde verilen yayınları yakından takip ederek uçuş emniyetini artırmak amacıyla gereğini ivedilikle uygulamalıdır. Sefer düzenlenen ülkelerin yetkili otoriteleri tarafından 5G kablosuz geniş bant şebeke yayınlarına ilişkin yapılan NOTAM'lara dikkat edilmesi ve bahse konu NOTAM'larda yer alan hususlara riayet edilmesi önem arz etmektedir.

#### Tavsiye niteliğinde bilgilerin uygulama zorunluluğu bulunmamaktadır.



# Sivil Havacılık Genel Müdürlüğü

Directorate General of Civil Aviation Uçuşa Elverişlilik Daire Başkanlığı Airworthiness Department



	Ekler:
	1.) FAA Aviation Safety, Airworthiness Directive, "Air Transport Association of America Code 31, Indicating/Recording System; 34, Navigation.", 2021-23-12
	2.) FAA Aviation Safety, Special Airworthiness Information Bulletin, "Risk of Potential Adverse Effects on Radio Altimeters", AIR-21-18R1
	3.) FAA Flight Standards Service, Safety Alert for Operators, "Risk of Potential Adverse Effects on Radio Altimeters when Operating in the Presence of 5G C-Band", SAFO 21007
İletişim:	Sürekli Uçuşa Elverişlilik Koordinatörlüğü shy-m@shgm.gov.tr e-posta adresi veya web sitemiz "SHGM'ye sor" uygulaması üzerinden bilgi alınabilir.

#### Tavsiye niteliğinde bilgilerin uygulama zorunluluğu bulunmamaktadır.

[Federal Register Volume 86, Number 234 (Thursday, December 9, 2021)]
[Rules and Regulations]
[Pages 69984-69987]
From the Federal Register Online via the Government Publishing Office [www.gpo.gov]
[FR Doc No: 2021-26777]

### **DEPARTMENT OF TRANSPORTATION**

**Federal Aviation Administration** 

# 14 CFR Part 39

[Docket No. FAA-2021-0953; Project Identifier AD-2021-01169-T; Amendment 39-21810; AD 2021-23-12]

# RIN 2120-AA64

# **Airworthiness Directives; Transport and Commuter Category Airplanes**

AGENCY: Federal Aviation Administration (FAA), DOT.

**ACTION:** Final rule; request for comments.

**SUMMARY:** The FAA is adopting a new airworthiness directive (AD) for all transport and commuter category airplanes equipped with a radio (also known as radar) altimeter. 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). This AD requires revising the limitations section of the existing airplane/aircraft flight manual (AFM) to incorporate limitations prohibiting certain operations requiring radio altimeter data when in the presence of 5G C-Band interference as identified by Notices to Air Missions (NOTAMs). The FAA is issuing this AD to address the unsafe condition on these products.

**DATES:** This AD is effective December 9, 2021.

The FAA must receive comments on this AD by January 24, 2022.

**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 https://www.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.

#### **Examining the AD Docket**

You may examine the AD docket at https://www.regulations.gov by searching for and locating Docket No. FAA-2021-0953; 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 the Docket Operations is listed above.

**FOR FURTHER INFORMATION CONTACT:** Brett Portwood, Continued Operational Safety Technical Advisor, COS Program Management Section, Operational Safety Branch, FAA, 3960 Paramount Boulevard, Lakewood, CA 90712-4137; phone: 817-222-5390; email: operationalsafety@faa.gov.

#### SUPPLEMENTARY INFORMATION:

#### Background

In March 2020, the United States Federal Communications Commission (FCC) adopted final rules authorizing flexible use of the 3.7-3.98 GHz band for next generation services, including 5G and other advanced spectrum-based services.<sup>1</sup> Pursuant to these rules, C-Band wireless broadband deployment is permitted to occur in phases with the opportunity for operations in the lower 100 megahertz of the band (3.7-3.8 GHz) in 46 markets beginning as soon as December 5, 2021; however, the FAA does not expect actual deployment to commence until January 5, 2022. This AD refers to "5G C-Band" interference, but wireless broadband technologies, other than 5G, may use the same frequency band.<sup>2</sup> These other uses of the same frequency band are within the scope of this AD since they would introduce the same risk of radio altimeter interference as 5G C-Band.

In April 2020, RTCA formed a 5G Task Force, including members from RTCA, the FAA, aircraft and radio altimeter manufacturers, European Organisation for Civil Aviation Equipment (EUROCAE), industry organizations, and operators, to perform "a quantitative evaluation of radar altimeter performance regarding RF interference from expected 5G emissions in the 3.7-3.98 GHz band, as well as a detailed assessment of the risk of such interference occurring and impacting aviation safety." <sup>3</sup> Based on the work of the task force, RTCA published a report which concludes that there is "a major risk that 5G telecommunications systems in the 3.7-3.98 GHz band will cause harmful interference to radar altimeters on all types of civil aircraft–

including commercial transport airplanes; business, regional, and general aviation airplanes; and both transport and general aviation helicopters."<sup>4</sup>

The report further concludes that the likelihood and severity of radio frequency interference increases for operations at lower altitudes. That interference could cause the radio altimeter to either become inoperable or present misleading information, and/or also affect associated systems on civil aircraft. The RTCA report refers to FCC Report and Order (R&O) FCC 20-22,<sup>5</sup> which identifies radio

<sup>&</sup>lt;sup>1</sup> The FCC's rules did not make C-Band wireless broadband available in Alaska, Hawaii, and the U.S. Territories.

<sup>&</sup>lt;sup>2</sup> The regulatory text of the AD uses the term "5G C-Band" which, for purposes of this AD, has the same meaning as "5G", "C-Band" and "3.7-3.98 GHz"

<sup>&</sup>lt;sup>3</sup> RTCA Paper No. 274-20/PMC-2073, Assessment of C-Band Mobile Telecommunications Interference Impact on Low Range Radar Altimeter Options, dated October 7, 2020 (RTCA Paper No. 274-20/PMC-2073), page i. This document is available in Docket No. FAA-2021-0953, and at https://www.rtca.org/wpcontent/uploads/2020/10/SC-239-5G-Interference-Assessment-Report\_274-20-PMC-2073\_accepted\_changes.pdf.

<sup>&</sup>lt;sup>4</sup> RTCA Paper No. 274-20/PMC-2073, page i.

<sup>&</sup>lt;sup>5</sup> 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-2021-0953, and at https://www.fcc.gov/document/fcc-expands-flexible-use-c-band-5g-0.

frequencies and power level conditions for the new C-Band services. The RTCA report identified the possibility of interference from both wireless emitters (on base stations, for example) as well as onboard user handsets. The RTCA report and conclusions remain under review, including by federal spectrum regulators. The FAA risk assessment included consideration of the RTCA report, public comments to the RTCA report, and analyses from radio altimeter manufacturers and aircraft manufacturers in support of the safety risk determination. The analyses FAA considered were consistent with RTCA's conclusions pertaining to radio altimeter interference from C-Band emissions. The FAA determined that, at this time, no information has been presented that shows radio altimeters are not susceptible to interference caused by C-Band emissions permitted in the United States.

Additionally, the deployment of C-Band wireless broadband networks is occurring globally. In certain countries, deployment has already occurred in C-Band frequencies. In some countries, temporary technical, regulatory, and operational mitigations on C-Band systems have been implemented while aviation authorities complete their safety assessments. Under the FCC rules adopted in 2020, base stations in rural areas of the United States are permitted to emit at higher levels in comparison to other countries which may affect radio altimeter equipment accuracy and reliability.

The radio altimeter is an important aircraft instrument, and its intended function is to provide direct height-above-terrain/water information to a variety of aircraft systems. Commercial aviation radio altimeters operate in the 4.2-4.4 GHz band, which is separated by 220 megahertz from the C-Band telecommunication systems in the 3.7-3.98 GHz band. The radio altimeter is more precise than a barometric altimeter and for that reason is used where aircraft height over the ground needs to be precisely measured, such as autoland or other low altitude operations. The receiver on the radio altimeter is typically highly accurate, however it may deliver erroneous results in the presence of out-of-band radiofrequency emissions from other frequency bands. The radio altimeter must detect faint signals reflected off the ground to measure altitude, in a manner similar to radar. Out-of-band signals could significantly degrade radio altimeter functions during critical phases of flight, if the altimeter is unable to sufficiently reject those signals.

Many operators need to be able to land in low visibility conditions. These operators employ specially certified equipment and flightcrew training in order to be able to fly closer to the ground during approach in instrument conditions, in some cases all the way through the landing phase, without visual reference to the runway environment. These operations can only be conducted with reference to actual height above the ground, as measured by a radio altimeter.

Additionally, automatic and/or manual flight guidance systems on airplanes facilitate low visibility operations and rely on accurate radio altimeter inputs. These inputs determine when and where the aircraft flares for landing, when power reductions are made for landing, and when automated crosswind controls and other control inputs are made. Anomalous (missing or erroneous) radio altimeter inputs to these systems may cause the aircraft to be maneuvered in an unexpected or hazardous manner during the final stages of approach and landing, and may not be detectable by the pilot in time to maintain continued safe flight and landing. Inaccurate radio altimeter data can result in pilots not trusting their instruments, eroding the foundation on which all instrument flight training is built.

Although the FAA has determined the operations immediately at risk are those requiring a radio altimeter to land in low visibility conditions, a wide range of other automated safety systems rely on radio altimeter data. Harmful interference to the radio altimeter could cause these systems to operate in an unexpected way. The FAA continues to work with inter-agency and industry stakeholders to collect data on potential effects to these systems to determine whether additional mitigations are necessary. The FAA determined, however, that mandatory action is not immediately required for these systems.

The FAA plans to use data provided by telecommunications providers to determine which airports within the United States have or will have C-Band base stations or other devices that could potentially impact airplane systems. NOTAMs will be issued, as necessary, to state the specific airports where the data from a radio altimeter may be unreliable due to the presence of 5G C-Band

wireless broadband signals.<sup>6</sup> For this reason, this AD requires flight manual limitations that prohibit certain operations requiring radio altimeter data at locations that will be identified by NOTAMs. Due to the dynamic nature of both the base station activation and the ongoing process of identifying the resulting affected airspace, including potential consideration for variability in C-Band deployment conditions such as radiated power levels and locations, the FAA has determined that NOTAMs are the best means to communicate changes in restrictions at affected airports.

Finally, the FAA notes that in accordance with paragraph (h) of this AD, any person may propose and request FAA approval of an alternative method of compliance (AMOC). The proposed AMOC must include specific conditions that would address the unsafe condition (e.g., by providing information substantiating that certain aircraft or altimeter models are not susceptible to C-Band radiofrequency interference).

#### **FAA's Determination**

The FAA is issuing this AD because the agency has determined the unsafe condition as described previously is likely to exist or develop in transport and commuter category airplanes with a radio altimeter as part of their type design.

#### **AD Requirements**

This AD requires revising the limitations section of the existing AFM to incorporate limitations prohibiting certain operations requiring radio altimeter data when in the presence of 5G C-Band wireless broadband signals as identified by NOTAM. These limitations could prevent dispatch of flights to certain locations with low visibility, and could also result in flight diversions.

#### **Compliance With AFM Revisions**

Section 91.9 prohibits any person from operating a civil aircraft without complying with the operating limitations specified in the AFM. FAA regulations also require operators to furnish pilots with any changes to the AFM (14 CFR 121.137) and pilots in command to be familiar with the AFM (14 CFR 91.505).

#### **Interim Action**

The FAA considers this AD to be an interim action. If final action is later identified, the FAA might consider further 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.

An unsafe condition exists that requires the immediate adoption of this AD without providing an opportunity for public comments prior to adoption. The FAA has found that the risk to the flying public justifies forgoing notice and comment prior to adoption of this rule because radio altimeter anomalies that are undetected by the aircraft automation or pilot, particularly close to the ground

<sup>&</sup>lt;sup>6</sup> The FAA's process for issuing NOTAMs is described in FAA Order 7930.2S, Notices to Air Missions (NOTAM), December 2, 2021.

(e.g., landing flare), could lead to loss of continued safe flight and landing. The urgency is based on C-Band wireless broadband deployment, which is expected to occur in phases with operations beginning as soon as January 5, 2022. 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).

In addition, the FAA finds that good cause exists pursuant to 5 U.S.C. 553(d) for making this amendment effective in less than 30 days, for the same reasons the FAA found good cause to forgo notice and comment.

#### **Comments Invited**

The FAA invites you to send any written data, views, or arguments about this final rule. Send your comments to an address listed under ADDRESSES. Include "Docket No. FAA-2021-0953 and Project Identifier AD-2021-01169-T" at the beginning of your comments. The most helpful comments reference a specific portion of the final rule, 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 https://www.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 Brett Portwood, Continued Operational Safety Technical Advisor, COS Program Management Section, Operational Safety Branch, FAA, 3960 Paramount Boulevard, Lakewood, CA 90712-4137; 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.

#### **Regulatory Flexibility Act**

The requirements of the Regulatory Flexibility Act (RFA) do not apply when an agency finds good cause pursuant to 5 U.S.C. 553 to adopt a rule without prior notice and comment. Because the FAA has determined that it has good cause to adopt this rule without notice and comment, RFA analysis is not required.

#### **Impact on Intrastate Aviation in Alaska**

For the reasons discussed above, this AD will not affect intrastate aviation in Alaska.

#### **Costs of Compliance**

The FAA estimates that this AD affects 6,834 airplanes of U.S. registry. 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
AFM revision	1 work-hour × \$85 per hour = \$85	\$0	\$85	\$580,890

As previously discussed, there may be other impacts to aviation; however there remains uncertainty as to cost due to various factors such as which airports within the United States have, or will have, base stations or other devices that could interfere with aircraft radio altimeters.

#### 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.

#### 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 adding the following new airworthiness directive:



# AIRWORTHINESS DIRECTIVE

www.faa.gov/aircraft/safety/alerts/ www.gpoaccess.gov/fr/advanced.html

**2021-23-12 Transport and Commuter Category Airplanes:** Amendment 39-21810; Docket No. FAA-2021-0953; Project Identifier AD-2021-01169-T.

# (a) Effective Date

This airworthiness directive (AD) is effective December 9, 2021.

# (b) Affected ADs

None.

# (c) Applicability

This AD applies to all transport and commuter category airplanes equipped with a radio (also known as radar) altimeter. These radio altimeters are installed on various transport and commuter category airplanes including, but not limited to, the airplanes for which the design approval holder is identified in paragraphs (c)(1) through (19) of this AD.

- (1) The Boeing Company
- (2) Airbus SAS
- (3) Bombardier Inc.
- (4) Embraer S.A.
- (5) Gulfstream Aerospace Corporation
- (6) Gulfstream Aerospace LP
- (7) Textron Aviation Inc.
- (8) Pilatus Aircraft Limited
- (9) Fokker Services B.V.
- (10) Saab AB, Support and Services
- (11) DeHavilland Aircraft of Canada Limited
- (12) Airbus Canada Limited Partnership
- (13) ATR-GIE Avions de Transport Régional
- (14) Yaborã Ind[uacute]stria Aeronáutica S.A.
- (15) MHI RJ Aviation ULC
- (16) BAE Systems (Operations) Limited
- (17) Lockheed Martin Corporation/Lockheed Martin Aeronautics Company
- (18) Viking Air Limited
- (19) Dassault Aviation

# (d) Subject

Air Transport Association (ATA) of America Code 31, Indicating/Recording System; 34, Navigation.

#### (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 (e.g., landing flare), 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) Airplane/Aircraft Flight Manual (AFM) Revision

On or before January 4, 2022: Revise the Limitations Section of the existing AFM by incorporating the limitations specified in figure 1 to paragraph (g) of this AD. This may be done by inserting a copy of this AD into the existing AFM.

#### Figure 1 to paragraph (g) – AFM Revision

(Required by AD 2021-23-12)			
Radio Altimeter Flight Restrictions			
When operating in U.S. airspace, the following operations requiring radio altimeter are prohibited in the presence of 5G C-Band wireless broadband interference as identified			
by NOTAM (NOTAMs will be issued to state the specific airports where the radio			
altimeter is unreliable due to the presence of 5G C-Band wireless broadband			
interference):			
Instrument Landing System (ILS) Instrument Approach Procedures (IAP) SA			
CAT I, SA CAT II, CAT II, and CAT III			
<ul> <li>Required Navigation Performance (RNP) Procedures with Authorization</li> </ul>			
Required (AR), RNP AR IAP			
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			

#### (h) Alternative Methods of Compliance (AMOCs)

91.176(a)

(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 (i) 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.

#### (i) Related Information

For more information about this AD, contact Brett Portwood, Continued Operational Safety Technical Advisor, COS Program Management Section, Operational Safety Branch, FAA, 3960 Paramount Boulevard, Lakewood, CA 90712-4137; phone: 817-222-5390; email: operationalsafety@faa.gov.

# (j) Material Incorporated by Reference

None.

Issued on December 7, 2021. Gaetano A. Sciortino, Deputy Director for Strategic Initiatives, Compliance & Airworthiness Division, Aircraft Certification Service. [FR Doc. 2021-26777 Filed 12-7-21; 2:00 pm]



# SPECIAL AIRWORTHINESS INFORMATION BULLETIN

**SAIB:** AIR-21-18R1 **Date:** December 23, 2021

 SUBJ: Risk of Potential Adverse Effects on Radio Altimeters
 Date:
 December 23, 202

 This document contains information and recommended action. The contents of this document do not have the force and effect of law and are not meant to bind the public in any way. This document is intended only to provide clarity to the

public regarding existing requirements under the law or agency policies.

# Introduction

This Special Airworthiness Information Bulletin (SAIB) informs aircraft manufacturers, radio altimeter manufacturers, operators, and pilots of the planned deployment of wireless broadband networks in the 3700-3980 MHz bands (C-Band).<sup>1</sup> C-Band wireless broadband deployment is permitted to occur in phases with the opportunity for operations in the lower 100 megahertz of the band (3.7-3.8 GHz) in 46 markets beginning as soon as December 5, 2021; however, the FAA does not expect actual deployment to commence until January 5, 2022. This SAIB recommends that radio altimeter manufacturers, aircraft manufacturers, and operators voluntarily provide to federal authorities specific information related to altimeter design and functionality, specifics on deployment and usage of radio altimeters in aircraft, and that they test and assess their equipment in conjunction with federal authorities. Results from that testing and assessment should be reported to the appropriate civil aviation authorities (CAAs) and spectrum regulators. The FAA is currently collaborating with the Federal Communications Commission (FCC) and the National Telecommunications and Information Administration (NTIA) to assess the need for mitigation beyond the recommended action in this SAIB.

# Background

For the past 15 years, the 3 GHz band globally has been the subject of harmonization activity for mobile broadband, both at the International Telecommunication Union and within regional groups. A number of countries already have allocated and assigned spectrum for wireless deployments in the 3 GHz range and additional countries are following suit. Many countries around the world are already deploying wireless networks in the bands from 3300-4200 MHz; some countries have implemented temporary technical, regulatory and operational mitigations, including temporary proximity and power restrictions, on wireless broadband networks operating in bands ranging from 3700-4200 MHz. There have not yet been proven reports of harmful interference due to wireless broadband operations internationally, although this issue is continuing to be studied. In the United States, there has been wireless broadband deployment in the 3.65-3.7 GHz band since 2007. The FCC started a proceeding to authorize mobile broadband service in the 3.55-3.7 GHz band in December 2012 and adopted final rules in April 2015 and October 2018. Commercial deployment started in September 2019, with no known issues for altimeters to date.

With respect to 3.7-4.2 GHz, the FCC first sought comment on introducing mobile broadband into the band in 2017. In March 2018, the MOBILE NOW Act directed the FCC to evaluate the feasibility of commercial wireless deployments in the 3.7-4.2 GHz range. The FCC started a proceeding in May 2018 and adopted the C-band Report and Order authorizing flexible use of the 3.7-3.98 GHz band in March 2020. In February 2021, the FCC completed an auction of the 3.7–3.98 GHz frequency band and subsequently issued licenses to several wireless network providers subject to license conditions

<sup>&</sup>lt;sup>1</sup> This revision clarifies the radio altimeter anomaly reporting request.

about deployment timing and parameters. Under the FCC's rules, actual wireless broadband deployment will occur in phases with operations beginning only in the lower 100 megahertz of the band (3700-3800 MHz) and only in 46 markets as soon as December 5, 2021. (*See* 47 CFR § 27.1412(b)(1), which specifies the 46 market areas as Partial Economic Areas (PEAs) 1-4, 6-10, 12-19, 21-41, and 43-50. A list of PEAs is available at <u>https://www.fcc.gov/oet/maps/areas</u>).

Radio altimeters operate between 4200-4400 MHz. Currently, the FAA's approval process for radar altimeters is based on FAA Technical Standard Order TSO-C87A, Airborne Low-Range Radio Altimeter. TSO-C87A does not provide criteria for compatibility with adjacent band operations, including potential impacts associated with wireless communications system deployments. RTCA formed a task force to assess the interference impact of wireless broadband operations in the 3700-3980 MHz band on radio altimeters. Based on the work of the task force, RTCA published a report entitled, "Assessment of C-Band Mobile Telecommunications Interference Impact on Low Range Radar Altimeter Operations" (RTCA Paper No. 274-20/PMC-2073). Additional information about RTCA can be found at <a href="https://www.rtca.org/about/">https://www.rtca.org/about/</a>. The RTCA report is under review. The FAA is actively participating in the RTCA/SC-239 committee, which is developing adjacent band-compatible minimum operational performance standards (MOPS) for future radio altimeter designs. The FAA encourages radio altimeter manufacturers to participate in the international radio altimeter standards development activity conducted jointly by RTCA and EUROCAE to establish a common set of performance requirements and compliance demonstration methods to promote compatibility with the international adjacent-band spectrum environment.

The FAA is currently conducting a risk assessment to ascertain whether further mitigation is warranted in addition to the recommended actions in this SAIB. The FAA is basing its risk assessment on the conditions in the FCC Report and Order (R&O) in the Matter of Expanding Flexible Use of the 3700-4200 MHz Band (FCC 20-22) and 3GPP specification TS 38.104 V17.2.0 (2021-06). Further, in the event that wireless broadband deployment conditions evolve, if the FAA becomes aware of further relevant information or guidance, or if additional information further validates concerns of potential harmful interference, the FAA will update its risk assessment.

Therefore, in preparation for the December 2021 wireless network deployment in the 3700-3800 MHz band, the FAA recommends the following actions and requests that affected parties voluntarily submit information for consideration by the FAA, FCC and NTIA prior to the planned wireless network deployments:

# **Radio Altimeter Manufacturers**

- 1. We request that radio altimeter manufacturers submit receiver radiofrequency (RF) selectivity, interference tolerance masks, and baseline operational specifications for each model number in production or still in use, and approximate numbers of each radio altimeter model currently in service in the United States; and, if appropriate, mark submissions as proprietary. This information can be submitted to the FAA at <u>OperationalSafety@faa.gov</u> and should indicate "Radio Altimeter SAIB" in the subject line. The FAA will provide any information you submit to the FCC and NTIA subject to those agencies' processes for protection of confidential information, where such protection is requested.
- 2. We recommend radio altimeter manufacturers complete analysis or testing of each model number either in production, supported, or still being employed, to determine the susceptibility to interference from fundamental emissions in 3700-3800 MHz which is available for wireless broadband in December of 2021 and the full 3700-3980 MHz band which will become available later, as well as potential spurious emissions in the 4200-4400 MHz band, and assess this susceptibility for compatibility with the adjacent spectrum environment in accordance with the FCC R&O and 3GPP specification, as well as the

environment in other countries in which each radio altimeter could be operated. We encourage radio altimeter manufacturers to work with the FAA to facilitate this process.

- 3. Report instances of erroneous altimeter performance to the FAA and FCC, or other appropriate civil aviation authorities (CAAs) and spectrum regulators. If the equipment is susceptible to harmful interference, determine what design changes are necessary to remediate.
- 4. Collaborate with aircraft manufacturers on design changes and issue guidance to operators on potential retrofit plans for radio altimeters susceptible to harmful interference, if necessary.
- 5. Determine any necessary operational restrictions or actions needed to address in-flight radio altimeter anomalies in order to maintain safe operations with radio altimeter equipment susceptible to harmful interference and communicate this information to CAAs, operators, and pilots.

# Aircraft Manufacturers

- We request that aircraft manufacturers submit approximate numbers of each radio altimeter model installed on each aircraft currently in service in the United States; and, if appropriate, mark submissions as proprietary. This information can be submitted to the FAA at <u>OperationalSafety@faa.gov</u> and should indicate "Radio Altimeter SAIB" in the subject line. The FAA will provide any information you submit to the FCC and NTIA subject to those agencies' processes for protection of confidential information, where such protection is requested.
- Communicate with radio altimeter suppliers and the FAA to ascertain equipment susceptibility to harmful interference caused by fundamental emissions in the 3700-3800 MHz and 3700-3980 MHz band, as well as spurious emissions in the 4200-4400 MHz band. We encourage aircraft manufacturers to work with the FAA to facilitate this process.
- 3. Conduct testing and analysis of the effects of loss of function, and erroneous or misleading radio altimeter data from potential harmful interference caused by fundamental emissions in the 3700-3800 MHz and 3700-3980 MHz band, as well as spurious emissions in the 4200-4400 MHz band, due to wireless broadband deployment. We encourage aircraft manufacturers to work with the FAA to facilitate this process.
- 4. Evaluate the potential for harmful interference on the different types of aircraft in the manufacturer's fleet based on aircraft architecture and radio altimeter integration, including cascading effects.
- 5. Determine any operational restrictions necessary or actions to take to maintain safe operations with radio altimeter equipment susceptible to harmful interference due to wireless broadband operation in the 3700-3800 MHz band. Restrictions and other actions should address all systems that use the radio altimeter. Information regarding such restrictions or other actions should be communicated to operators, pilots, and each CAA for the country in which the aircraft operates. Revise aircraft flight manual procedures, if appropriate.
- 6. Update operators' anomaly reporting process to ensure accurate recording and reporting of erroneous radio altimeter readings to the aircraft manufacturer.
- 7. Collaborate with radio altimeter manufacturers and issue guidance to operators on retrofit plans for radio altimeters susceptible to harmful interference due to wireless broadband operation in the 3700-3800 MHz band.

# **Operators and Pilots**

- 1. Review the 14 CFR Part 5 requirements for Part 121 certificate holders, if appropriate. Other certificate holders should use the Safety Management Systems (SMS) tools to assess the risk to each type of radio altimeter configuration and how it impacts typical flight operations.
- 2. Remind passengers that all portable electronic devices allowed for transport in checked baggage (including smartphones and other devices) should be turned off and protected from accidental activation and that compliance is mandatory for lithium battery-powered portable

electronic devices. See 49 CFR 175.10(a)(18).

- 3. Remind passengers to set all portable electronic devices in the cabin and any carried on the aircraft to a non-transmitting mode or turn them off. *See* 14 CFR 91.21, 121.306, 125.204 and 135.144.
- 4. Seek information from the manufacturers of the aircraft and the radio altimeter on possible effects of harmful interference due to wireless broadband deployment in the 3700-3800 MHz band and possible pilot interventions.
- 5. Operators should ensure their pilots are aware of the potential degradation of the radio altimeter capabilities and any means to compensate for in-flight radio altimeter anomalies. Consider both erroneous altimeter readings and loss of altimeter function.
- 6. Operators should ensure their pilots are aware of the potential degradation to the capabilities of safety systems and other equipment dependent upon radio altimeters and any means to compensate for resulting anomalies. Consider both the loss of function of the safety systems and other dependent systems and the manners in which they may malfunction.
- 7. Operators should consider the potential loss of pilot trust in dependent aircraft safety systems in the assessment of existing and the development of new crew procedures.
- 8. Operators and pilots who experience radio altimeter anomalies should notify air traffic control, as soon as practical. Post flight, pilots are encouraged to submit detailed reports of radio altimeter disruptions or interference events, as soon as practical, using the *Radio Altimeter Anomaly Reporting Form* available on the FAA website at <a href="https://www.faa.gov/air\_traffic/nas/RADALT\_reports/">https://www.faa.gov/air\_traffic/nas/RADALT\_reports/</a>

**For Further Information, Contact:** Charisse R. Green, Aerospace Engineer, Aircraft Information Systems Section, 950 L'Enfant Plaza SW, 5th Floor, Washington, DC 20024, e-mail: OperationalSafety@faa.gov.



U.S. Department of Transportation Federal Aviation Administration



SAFO 21007 DATE: 12/23/21

Flight Standards Service Washington, DC

#### http://www.faa.gov/other\_visit/aviation\_industry/airline\_operators/airline\_safety/safo

A SAFO contains important safety information and may include recommended action. Besides the specific action recommended in a SAFO, an alternative action may be as effective in addressing the safety issue named in the SAFO. The contents of this document do not have the force and effect of law and are not meant to bind the public in any way. This document is intended only to provide clarity to the public regarding existing requirements under the law or agency policies.

**Subject:** Risk of Potential Adverse Effects on Radio Altimeters when Operating in the Presence of 5G C-Band Interference.

**Purpose:** This SAFO provides information and guidance to operators regarding the risk of potential adverse effects on radio altimeters when operating in the presence of 5G C-Band wireless broadband signals, and the role of Notice to Air Missions (NOTAMs) in identifying the geographic areas where certain operations requiring a radio altimeter are prohibited in the presence of 5G signals (in the C-Band) by Airworthiness Directives (ADs) <u>2021-23-12</u> and <u>2021-23-13</u>.

**Background:** The Federal Aviation Administration (FAA) adopted new ADs (AD <u>2021-23-12</u> and AD <u>2021-23-13</u>) for all transport and commuter category airplanes, and all helicopters, equipped with a radio altimeter. The radio altimeter is an important aircraft instrument, and its intended function is to provide direct height-above-terrain/water information to a variety of aircraft systems<sup>1</sup>. Commercial aviation radio altimeters operate in the 4.2-4.4 GHz band, which is separated by 220 megahertz from the C-Band telecommunication systems in the 3.7-3.98 GHz band.<sup>2</sup> These ADs were prompted by a determination that radio altimeters cannot be relied upon to perform their intended function if they experience interference. The ADs require revisions to the limitations section of the existing aircraft/airplane flight manual or rotorcraft flight manual, as applicable, to incorporate limitations prohibiting certain operations requiring radio altimeter data when in the presence of 5G C-Band interference in areas and at airports identified by NOTAMs. The FAA issued these ADs to address the unsafe condition on these products.

The radio altimeter is more precise than a barometric altimeter and for that reason is used where aircraft height over the ground needs to be precisely measured, such as during autoland or other low altitude operations. The receiver on the radio altimeter is typically highly accurate, however it may deliver erroneous results in the presence of out-of-band radiofrequency emissions from other frequency bands. The radio altimeter must detect faint signals reflected off the ground to measure altitude, in a manner similar to radar. Out-of-band signals could significantly degrade radio altimeter functions if the altimeter is unable to sufficiently reject those signals.

<sup>&</sup>lt;sup>1</sup> Radio altimeters are also known as radar altimeters or RADALT.

<sup>&</sup>lt;sup>2</sup> The FAA expects deployment to commence January 5, 2022.

While the FAA issued ADs <u>2021-23-12</u> and <u>2021-23-13</u> to address operations immediately at risk (e.g., those requiring a radio altimeter to land in low visibility conditions), a wide range of other automated safety systems rely on radio altimeter data whose proper function may also be affected. Anomalous (missing or erroneous) radio altimeter inputs could cause these other systems to operate in an unexpected way during any phase of flight - most critically during takeoff, approach, and landing phases. These anomalous inputs may not be detected by the pilot in time to maintain continued safe flight and landing. Operators and pilots should be aware of aircraft systems that integrate the radio altimeter, and should follow all Standard Operating Procedures related to aircraft system aural warnings/alerts.

These systems include, but are not limited to:

- Class A Terrain Awareness Warning Systems (TAWS-A)
- Enhanced Ground Proximity Warning Systems (EGPWS)
- Traffic Alert and Collision Avoidance Systems (TCAS II)
- Take-off guidance systems
- Flight Control (control surface)
- Tail strike prevention systems
- Windshear detection systems
- Envelope Protection Systems
- Altitude safety call outs/alerts
- Autothrottle
- Thrust reversers
- Flight Director
- Primary Flight Display of height above ground
- Alert/warning or alert/warning inhibit
- Stick pusher / stick shaker
- Engine and wing anti-ice systems
- Automatic Flight Guidance and Control Systems (AFGCS)

**Discussion:** Initial deployment of 5G wireless broadband networks in the C-Band is expected to begin on January 5, 2022 and be limited to 46 predetermined areas known as Partial Economic Areas (PEAs), <u>https://www.faa.gov/newsroom/faa-statement-5g.<sup>3</sup></u> The FAA will issue NOTAMs to identify the areas, airports and heliports where the radio altimeter is unreliable due to the presence of 5G C-Band interference. The NOTAMs will also note exceptions for operators holding an FAA-approved alternative method of compliance (AMOC) with the applicable AD.<sup>4</sup>

To address the prohibitions in the two ADs, the FAA will use four types of NOTAMs to identify the areas, airports and heliports where the radio altimeter is unreliable. Operators should be aware that additional aircraft systems integrated with the radio altimeter might not function normally in areas identified by such NOTAMs, due to the presence of 5G C-Band interference.

The following describes the types of the NOTAMs the FAA expects to issue:

<sup>&</sup>lt;sup>3</sup> Subsequent implementation phases can be expected after December 5, 2023.

<sup>&</sup>lt;sup>4</sup> Please see paragraph (h) of AD 2021-23-12 and AD 2021-23-13 for information specific to the ADs, and FAA Advisory Circular 39-10 for general information regarding AMOCs.

**Airspace:** An airspace NOTAM will delineate a three-dimensional area where the radio altimeter is unreliable due to the presence of 5G C-Band wireless broadband interference. Operations identified by AD 2021-23-13 are prohibited in this airspace, unless the operator has an FAA-approved AMOC.

Example Airspace NOTAM:

• ZHU AIRSPACE RDO ALTIMETER UNREL WI AN AREA DEFINED AS XXXNM RADIUS OF XXXXXXXXXXXXXXXX (VOR/DME) SFC-5000FT AGL. HEL OPS REQUIRING RDO ALTIMETER DATA FOR OFFSHORE INSTRUMENT OPS, HOVER AUTOPILOT MODES, SAR AUTOPILOT MODES, AND CAT A/B/PERFORMANCE CLASS TKOF AND LDG NOT AUTHORIZED EXC FOR ACFT USING APPROVED ALTERNATIVE METHODS OF COMPLIANCE DUE TO 5G C-BAND INTERFERENCE PLUS SEE AIRWORTHINESS DIRECTIVE 2021-23-13

**Aerodrome:** An aerodrome NOTAM will identify any public airport or heliport (with an instrument approach procedure) where the radio altimeter is unreliable due to the presence of 5G C-Band wireless broadband interference, and the operations at that airport or heliport that are prohibited by the ADs, unless the operator has an FAA-approved AMOC.

Example Aerodrome NOTAM for airports:

• BDL AD AP RDO ALTIMETER UNREL. AUTOLAND, HUD TO TOUCHDOWN, ENHANCED FLT VISION SYSTEMS TO TOUCHDOWN NOT AUTHORIZED EXC FOR ACFT USING APPROVED ALTERNATIVE METHODS OF COMPLIANCE DUE TO 5G C-BAND INTERFERENCE PLUS SEE AIRWORTHINESS DIRECTIVE 2021-23-12

**Instrument Approach Procedure (IAP):** An IAP NOTAM will identify the public and special IAPs affected by 5G C-Band interference, and prohibited by the ADs unless the operator has an FAA-approved AMOC.

Example IAP NOTAM against impacted approaches (SA CAT I / II, CAT II, III, or RNP AR):

• BDL IAP BRADLEY INTL, WINDSOR LOCKS, CT. ILS RWY 06 (SA CAT I AND SA CAT II), AMDT 13A... ILS RWY 06 (CAT II AND CAT III), AMDT 38A... RNAV (RNP) Z RWY 06, AMDT 1... RNAV (RNP) Z RWY 24, AMDT 1... PROCEDURE NOT AUTHORIZED EXC FOR ACFT USING APPROVED ALTERNATIVE METHODS OF COMPLIANCE DUE TO 5G C-BAND INTERFERENCE PLUS SEE AIRWORTHINESS DIRECTIVE 2021-23-12

**Special IAP:** A special IAP NOTAM will identify an IAP (except SA CAT I / II, CAT II, III, or RNP AR), at a private landing location, affected by 5G C-Band wireless broadband interference, and the operations prohibited by the ADs unless the operator has an FAA-approved AMOC.

Example Special IAP NOTAM for airplanes:

• SPECIAL COOK CANYON RANCH, RANGER, TX. RNAV (GPS) RWY 17, ORIG...RDO ALTIMETER UNREL. AUTOLAND, HUD TO TOUCHDOWN, ENHANCED FLT VISION SYSTEMS TO TOUCHDOWN NOT AUTHORIZED EXC FOR ACFT USING APPROVED ALTERNATIVE METHODS OF COMPLIANCE DUE TO 5G C-BAND INTERFERENCE PLUS SEE AIRWORTHINESS DIRECTIVE 2021-23-12

# **Recommended Action:**

- Domestic and foreign operators and pilots should be familiar with the content of this SAFO, ADs 2021-23-12 and 2021-23-13, and Special Airworthiness Information Bulletin (SAIB) AIR-21-18. The FAA notes that SAIB AIR-21-18, which recommended reporting actions if radio altimeter anomalies occur, has been updated, effective December 23, 2021.
- 2. Domestic and foreign operators and pilots should evaluate the effects of the 5G C-Band NOTAMs on their flight activities and locations.
- 3. Domestic and foreign operators and pilots should review the aircraft systems that integrate the radio altimeter. They should be aware of the potential degradation of the radio altimeter capabilities, the potential degradation to the capabilities of safety systems and other equipment dependent upon radio altimeter data, and any means to compensate for in-flight radio altimeter anomalies for their specific aircraft.

**Contact:** Direct questions or comments regarding this SAFO to the Flight Technologies and Procedures Division, Flight Operations Group at (202) 267-8790 or e-mail: <u>OperationalSafety@faa.gov</u> for operational issues.