International Civil Aviation Organization

Fifth Meeting of the Surveillance Implementation Coordination Group (SURICG/5)

Web-conference, 22 – 24 September 2020

Agenda Item 5: Update on surveillance activities and explore potential cooperation opportunities

REVISIONS TO FAA ADVISORY CIRCULAR (AC) 90-114, ADS-B OPERATIONS

(Presented by the United States /Federal Aviation Administration)

SUMMARY

This paper provides a summary of new and revised guidance included in FAA Advisory Circular (AC) 90-114B, ADS-B Operations, published on December 20, 2019.

1. INTRODUCTION

1.1 The requirements for ADS-B in the U.S. are contained in two regulations: Title 14 of the U.S. Code of Federal Regulations §§91.225 and 91.227. Section 91.225 describes the required equipment and airspace; Section 91.227 describes the performance and required broadcast elements. The regulations were published in May 2010 with the date for compliance after January 1, 2020. In preparation for that date, the FAA made a number of significant revisions to Advisory Circular (AC) 90-114A change 1, *ADS-B Operations*. The revisions include policy decisions, clarified guidance, new procedures and resolutions to unforeseen challenges posed by the regulation.

1.2 The following paragraphs contain only summaries of the most significant revisions and new guidance. For a complete understanding of new and revised policy, refer to AC 90-114B, *ADS-B Operations* which was published on December 30, 2019.

2. DISCUSSION

2.1 Transponder operations during formation flying. It is a long standing practice in formation flying for only the lead aircraft to operate the transponder in transmit mode and the pilots of all other aircraft to place their transponders in standby. As published, section §91.225(f) required that, if installed ADS-B Out must be operated in the transmit mode at all times. This posed a challenge for compliance during formation operations. For other operational reasons, and to allow continued use of that practice §91.225(f) has been amended to read "…unless authorized by the FAA or directed by air traffic control (ATC)". Now, consistent with long-standing practice, if the formation flight is receiving ATC services, pilots can expect ATC to direct all non-lead aircraft to "STOP SQUAWK," and should not do so until instructed. For visual flight rules (VFR) formation flights not receiving ATC services,

ATC directs that only the lead aircraft should squawk the assigned beacon code (1200). All other aircraft should disable transponder and ADS-B transmissions once established within the formation."

2.2 Non-Performing Equipment (NPE). The ADS-B Performance Monitor (APM) collects data transmitted by ADS-B Out-equipped aircraft monitored on the surface and airborne. The APM applies established compliance criteria to collected data for more than 40 individual performance checks, assembles relevant information into a flight record, and identifies exceptions to applicable regulations to support various internal and external reporting requirements. Aircraft identified by the APM with exceptions are referred to as non-performing equipment (NPE).

2.3 ADS-B performance during aerobatic flight. The requirement to transmit at all times presents a challenge for operators of aircraft performing aerobatics. Unlike in formation flying, it is desirable for aerobatic aircraft to continue to transmit ADS-B. Flight monitoring has shown that aircraft engaged in aerobatic and agricultural operations may fail to meet applicable equipment performance requirements due to maneuvers that exceed the design limits of the installed GNSS equipment. Aircraft identified by the APM with exceptions to §91.227 resulting from maneuvering characteristics of aerobatic and/or agricultural operations are not considered NPE by the FAA. When not actively engaged in aerobatics or agricultural operations (e.g., when transiting to and from applicable areas of operation), these aircraft are expected to meet ADS-B Out equipment performance requirements.

2.4 No Services Aircraft List (NSAL). In late 2017, the FAA published a notice (82 FR 60302) to the Federal Register announcing changes to ADS-B services including the Traffic Information Service-Broadcast (TIS-B) (refer to Docket Number FAA-2017-1194, Change to Automatic Dependent Surveillance Broadcast Services, at https://www.federalregister.gov). These changes included implementation of a filter within the FAA ADS-B ground system to prevent processing of data transmitted by certain NPE aircraft. Application of the filter is enabled by restricting use of the 24-bit ICAO aircraft address transmitted from NPE aircraft and managed through a list referred to as the No Services Aircraft List (NSAL). NPE aircraft on the NSAL cannot receive ATC services using ADS-B data (but can receive ATC services using radar) and are not provided with TIS-B/ADS-R client services. Owner/operators of aircraft on the NSAL must seek authorization from ATC to operate in the airspace specified by §91.225 as if their ADS-B system was inoperative (see section 2.6).

2.5 Public ADS-B Performance Report (PAPR). To enable public access to ADS-B equipment performance data needed for owner/operators to verify compliance with §91.227 requirements, the FAA provides a free, web-based service called the Public ADS-B Performance Report (PAPR) at https://adsbperformance.faa.gov/PAPRRequest.aspx.

2.6 Inoperative ADS-B and Non-ADS-B Operations.. Section 91.225(g) permits ATC to authorize the operation of aircraft without ADS-B or with inoperative ADS-B in airspace where it is required. This regulatory provision for issuing authorizations to operators of non-equipped aircraft is intended for rare instances in which an operator who does not routinely operate in ADS-B Out airspace has a need to do so. As contemplated in the ADS–B Out rulemaking, the per-operation authorizations were not intended to support routine and regular operations of non-equipped aircraft in ADS–B Out airspace. Under §91.225(g), operators must make requests for ATC-authorized deviations from the requirements in §91.225 to the ATC facility that has jurisdiction over the concerned airspace or airport movement area within the specified time periods. The FAA developed the ADS-B Deviation Authorization Preflight Tool (ADAPT) for use primarily by general aviation operators who do not routinely access ADS-B required airspace and are not equipped with ADS-B. However, any operator of an aircraft whose ADS-B is inoperative may also choose to use ADAPT as a means to request an authorization to operate with inoperative ADS-B. Operators who coordinate certain operations with an FAA Tactical Customer Advocate (TCA) in the FAA's ATC System Command Center should continue

to make requests through the TCA. Refer to the ADAPT section of the SAPT User Guide for additional information (https://sapt.faa.gov/SAPTUserGuide).

2.7 GPS Interference There may be times when the GPS position source cannot meet the required technical performance for compliance with §91.227 due to planned GPS testing. In the event of a scheduled testing outage of GPS, the FAA issues a NOTAM that identifies the airspace and time periods that may be affected. The FAA has determined that it would be impractical to require operators to avoid the affected area based on the chance that an otherwise compliant flight could experience GPS interference. Accordingly, operators should proceed with their intended operation if the only impediment to their operation is possible planned GPS testing. When a NOTAM identifies the airspace and time periods that may be affected by GPS testing, an operator is not be required to alter his or her route of flight to avoid the area based solely on that NOTAM. If an operator encounters actual GPS interference during their flight that results in a degradation of ADS-B Out performance below that required by §91.227, provided the operator has taken the appropriate preflight actions, the FAA does not consider these events to constitute a violation.

2.8 Preflight requirements for certain operators. Operators who need to perform ADS-B Out preflight prediction only need to do so for the intended route of flight to the intended destination. For example, when departure and/or arrival alternate airports are required, no preflight prediction is necessary for the alternate routes. However, if the operator becomes aware of a change that could result in degraded ADS-B Out performance, such as a GNSS satellite outage prior to receiving an ATC clearance for the intended route of flight, then they should conduct a subsequent preflight prediction for the planned flight to ensure that ADS-B Out performance is still predicted to comply with the performance requirements of §91.227(c)(1)(i) and (iii). Once the pilot has received an ATC route clearance, there is no requirement to conduct a subsequent preflight prediction. Therefore, upon receiving a satisfactory preflight availability prediction and an ATC clearance for an intended route of flight, the operator is deemed to have complied with the preflight availability prediction requirement and the performance requirements of §91.227(c)(1)(i) and (iii). The FAA accepts that unanticipated changes in route of flight and environmental conditions may adversely affect ADS-B Out performance.

2.9 Service Availability Prediction Tool (SAPT) outages. The FAA issues a NOTAM in the event of a SAPT outage. Operators who use SAPT as their preflight prediction tool do not need to conduct a preflight prediction for the duration of the outage. Additionally, any flight plans submitted to ATC with a proposed departure time within 90 minutes of SAPT return to service do not require a subsequent preflight analysis. When there is a SAPT outage and an operation falls below the performance requirements of §91.227, provided the operator has taken the appropriate preflight actions with regard to relying upon SAPT, the FAA does not consider these events to constitute a violation.

2.10 Call-sign mismatch (CSMM). In FAA ATC systems, if the aircraft identification (Flight ID) transmitted by the aircraft's ADS-B system does not exactly match the aircraft identification in the flight plan, a call sign mismatch (CSMM) occurs. When a CSMM occurs, the controller is alerted and may take action resulting in a flight delay. Furthermore, ATC may elect to advise the Flight Standards Service of the event and the potential violation of §91.227(d)(8). AC 90-114B includes an expanded explanation and examples of correct and incorrect entries for Flight ID.

2.11 ADS-B Requirements for ADS-R and TIS-B. Since January 2, 2020, the FAA no longer uses ADS-B data from equipment that does not comply with the performance requirements of either TSO-C166b or TSO-C154c to provide ATC surveillance services. As such, the FAA has discontinued TIS-B and ADS-R client services NAS-wide for aircraft not equipped with ADS-B Out that complies with the requirements specified in TSO-C166b, TSO-C154c, or TSO-C199 (Traffic Awareness Beacon System).

2.12 Automatic Dependent Surveillance-Same Link Rebroadcast (ADS-SLR). AC 90-114B includes new information about ADS-SLR. ADS-SLR rebroadcasts (on the same link only) ADS-B messages sent by aircraft on or near a runway; it is available at all airports with an FAA surface surveillance system. Airport structures can block reception of, or create destructive multi-path interference for, direct aircraft-to-aircraft ADS-B messages on an airport surface, impacting use of ADS-B In systems on an airport surface. This effect is mitigated by ADS-SLR.

2.13 Privacy ICAO Address (PIA). The PIA program enables interested aircraft owners to request a temporary ICAO aircraft address, which is not assigned to any owner in the U.S. Civil Aviation Registry (CAR). The program has certain conditions and limitations, including a requirement that the aircraft be U.S. registered and equipped with 1090 MHz ADS-B. The pilot must use a third-party issued telephonic call sign, and the temporary ICAO aircraft address may only be used when flying in domestic U.S. airspace. (Note: The FAA is proposing an amendment to ICAO Annex 10, Volume III which would allow PIA operations outside the U.S., under certain conditions.)

3. CONCLUSION

3.1 The meeting is invited to:

a) note the information contained in this paper; and

b) discuss any relevant matters as appropriate.

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