

NOTICE

U.S. DEPARTMENT OF TRANSPORTATION
FEDERAL AVIATION ADMINISTRATION

N 8900.538

National Policy

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2/18/20

Cancellation Date:
2/18/21

SUBJ: Automatic Dependent Surveillance-Broadcast (ADS-B) Out Preflight Procedures

- 1. Purpose of This Notice.** This notice explains the specific preflight procedures for certain operators using Automatic Dependent Surveillance-Broadcast (ADS-B) in compliance with Title 14 of the Code of Federal Regulations (14 CFR) part 91, §§ 91.225 and 91.227, and informs the responsible Flight Standards offices, International Field Offices (IFO), principal inspectors (PI), and aviation safety inspectors (ASI) of the procedures for ensuring operators are conducting the proper preflight procedures for ADS-B Out.
- 2. Audience.** The primary audience for this notice is the Flight Standards Safety Assurance offices' aviation safety inspectors (ASI). The secondary audience includes the Safety Standards and Foundational Business offices.
- 3. Where You Can Find This Notice.** You can find this notice on the MyFAA employee website at https://employees.faa.gov/tools_resources/orders_notices. Inspectors can access this notice through the Flight Standards Information Management System (FSIMS) at <http://fsims.avs.faa.gov>. Operators can find this notice on the Federal Aviation Administration's (FAA) website at <http://fsims.faa.gov>. This notice is available to the public at http://www.faa.gov/regulations_policies/orders_notices.
- 4. Background.** Compliant ADS-B systems depend on input from a Global Positioning System (GPS), also referred to as a position source. Section 91.225 does not dictate what kind of position source must be used, and variations in position source performance can affect ADS-B Out in two specific broadcast elements required by § 91.227. During certain GPS constellation geometries, some position sources may produce values for accuracy and integrity that are less than required by the rule. To ensure compliance with the performance requirements of § 91.227, operators of aircraft equipped with these position sources should conduct a preflight availability prediction for those aircraft for each flight. This notice will help you identify which position sources those are and what procedures should be followed. Note that this information will pertain mostly to operators of air transport category aircraft, but it is determined by the type of installed GPS.
- 5. Variants of GPS Receivers.** Variations in GPS performance affect ADS-B Out in two specific broadcast elements required by § 91.227: Navigation Accuracy Category for Position (NACp) and Navigation Integrity Category (NIC). Four different variants of GPS receivers are currently in use as a position source that can meet ADS-B Out rule performance requirements, to

varying degrees, when adequate numbers of GPS satellites are in view. During certain GPS constellation geometries, some of these position sources may produce values for NACp and NIC that are less than required by the rule. Selective availability (SA) is a feature that deliberately degraded the GPS satellite signal, resulting in a less accurate reported position and has an impact on the broadcast NACp and NIC. SA was deactivated in 2000.

a. SA-On. SA-On GPS receivers assume SA is still active (on), thereby unnecessarily inflating integrity and accuracy bounds of the positions that are no longer degraded by SA. Most GPS receivers that are only compliant with Technical Standard Order (TSO)-C129, Airborne Supplemental Navigation Equipment Using the Global Positioning System (GPS), are SA-On receivers.

b. SA-Aware. SA-Aware GPS receivers are designed to recognize that SA is inactive and optimize the performance from GPS. GPS receivers that comply with the performance requirements of TSO-C196, Airborne Supplemental Navigation Sensors for Global Positioning System Equipment Using Aircraft-Based Augmentation, are SA-Aware receivers.

Note: Some GPS receivers manufactured with a TSO-C129a approval are SA-Aware, and, therefore, have the same NACp and NIC availability as TSO-C196() approved equipment. Operators should check with their GPS receiver supplier to verify whether their installed TSO-C129() GPS receiver is SA-On or SA-Aware.

c. Satellite-Based Augmentation Systems (SBAS). Satellite-Based Augmentation Systems (SBAS) receivers also use the additional signals from geostationary satellites specifically designed for aviation use, improving the quality and robustness of positioning performance. GPS receivers complying with TSO-C145, Airborne Navigation Sensors Using The Global Positioning System Augmented By The Satellite Based Augmentation System (SBAS), or TSO-C146, Stand-Alone Airborne Navigation Equipment Using The Global Positioning System Augmented By The Satellite Based Augmentation System (SBAS), are SBAS receivers. The wide area augmentation system (WAAS) is the designation of the SBAS system available in North America and is the term often used when making reference to SBAS in the United States. Most U.S.-registered General Aviation (GA) aircraft with compliant ADS-B Out have WAAS as their position source.

d. Aircraft-Based Augmentation System (ABAS). Aircraft-Based Augmentation Systems (ABAS) sensors tightly integrate GPS measurements with inertial reference/navigation sensor data, improving the quality and robustness of positioning performance.

6. GPS Performance Prediction. This paragraph and paragraph 7 explain which operators should perform a preflight prediction. See Table 1, Preflight Availability Prediction, below for a summary of this information.

a. SA-On and SA-Aware. In order to ensure compliance with the performance requirements of § 91.227, operators of aircraft equipped with TSO C129() or TSO-C196() GPS as the ADS-B position source are expected to perform a preflight availability prediction for the intended route of flight (route and time) using available GPS satellite information and guidance

published in Advisory Circular (AC) 90-114, Automatic Dependent Surveillance-Broadcast Operations. See paragraph 7 for further guidance.

b. SBAS and ABAS. Operators of aircraft equipped with WAAS (TSO-C145 or TSO-C146) receivers do not need to conduct a preflight availability prediction. Operators of aircraft equipped with specific ABAS that have been reviewed by the FAA and are approved for ADS-B operations also do not need to conduct a preflight availability prediction. The preflight procedures described in this notice do not apply to operators of aircraft equipped with only SBAS or ABAS position sources.

7. Operations Conducted Under Exemption No. 12555. Operators approved to conduct operations under the conditions and limitations of Exemption No. 12555 should adhere to the guidance provided in this section. (Refer to FAA Order 8900.1, Volume 3, Chapter 2, Section 3, Exemption 12555, for more information on Exemption No. 12555.)

a. SA-Aware. Under the conditions of Exemption No. 12555, operators with receivers meeting the performance requirements of TSO-C196() (SA-Aware) may operate in designated airspace for which ADS-B Out is required when the aircraft's NACp and NIC do not meet the performance specified in § 91.227. For these operations, the operator does not need to conduct any preflight availability prediction.

b. SA-On. Operators conducting operations under Exemption No. 12555 equipped with TSO-C129() (SA-On) receivers may operate where ADS-B Out is required with performance below that specified in § 91.227 when the FAA determines use of backup surveillance is available.

(1) These operators must perform a preflight prediction, using any of the methods described in paragraph 8. However, in the event that the preflight prediction indicates NIC and NACp values below required by § 91.227, the operator must use the FAA Service Availability Prediction Tool (SAPT) to verify the presence of backup surveillance.

(2) The SAPT prediction to determine the presence of backup surveillance should be completed no more than 3 hours before the planned departure time. If air traffic control (ATC) in the departure jurisdiction requires flight plan submission earlier than 3 hours prior, the SAPT for backup surveillance should be run just prior to flight plan submission.

Table 1. Preflight Availability Prediction

Equipment	Preflight availability prediction?		After 2024
	Years 2020-2024		
	Exemption 12555	No Exemption	
SA-On	Yes SAPT will determine backup surveillance and exemption authorizes flight if prediction results in NIC <7 and/or NACp <8.	Yes If prediction results in NIC <7 and/or NACp < 8, operator should re-plan the flight or request ATC authorization.	Yes If prediction results in NIC <7 and/or NACp < 8, operator should re-plan the flight or request ATC authorization.
SA AWARE	No Exemption authorizes flight without the need for preflight prediction	Yes If prediction results in NIC <7 and/or NACp < 8, operator should re-plan the flight or request ATC authorization.	Yes If prediction results in NIC <7 and/or NACp < 8, operator should re-plan the flight or request ATC authorization.
SBAS/ABAS	No	No	No

8. Prediction Methods. Operators may use any of the following preflight availability prediction methods:

a. Operator-Selected Preflight Availability Verification Tool. Operators of large fleets of aircraft or users of flight planning programs may wish to use their own preflight availability verification tool. The operator is responsible for selecting a tool that accurately predicts the performance for their aircraft.

b. SAPT. Operators may use the FAA-provided preflight availability prediction tool, called the Service Availability Prediction Tool (SAPT) (<https://sapt.faa.gov>).

c. Third-Party Interface. Operators may use a third-party interface, incorporating FAA GPS performance prediction data without altering performance values, to predict NACp/NIC performance outages for the aircraft's predicted flightpath and times.

9. Prediction Model Parameters. The operator should use a model appropriate to their equipment, including the type of GPS receiver and the demonstrated capability to track satellites at a given mask angle.

10. Flight Planning Guidance. Predictions should be conducted within 24 hours of departure and as close to departure time as feasible, but with sufficient time to re-plan the flight in the event a segment along the planned route is predicted to have insufficient GPS service availability. The prediction should be reevaluated prior to flight if new information (i.e., a Notice to Airmen (NOTAM)) provides notice of an unscheduled GPS satellite outage.

11. Actions. Inspectors with oversight responsibility of an air carrier or operator should:

a. Determine Preflight Availability Prediction. Determine whether the operator is expected to perform an ADS-B preflight availability prediction. Do this by verifying the type of position source (GPS) that is connected to their compliant ADS-B Out system.

(1) If the position source is a WAAS (TSO-C145 or TSO-C146) receiver or an ABAS receiver as described in subparagraph 6b, the operator does not need to perform a preflight prediction, and no further action is required with respect to this guidance.

(2) If the position source is neither a WAAS nor ABAS receiver, determine whether the operator is covered under Exemption No. 12555 and proceed as follows.

b. Ensure Means of Compliance. Ensure that the operator has a means to comply with the preflight availability prediction procedures as appropriate to the type of installed GPS equipment and whether the aircraft are covered by Exemption No. 12555. An operator's ADS-B preflight planning process should:

- Include identification of flights or aircraft that require completion of a preflight prediction.
- Identify the preflight prediction system (or systems) to be used.
- Include a means to document completion of a satisfactory prediction for each flight where a prediction is required.
- Retain documentation of prediction completion for a suitable period of time, such as three months.

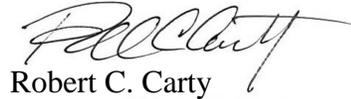
12. References. Refer to the following for more information:

a. Point of Contact. Contact the ADS-B Lead, Paul Von Hoene, via phone at 202-267-8916 or email at paul.vonhoene@faa.gov for assistance or questions related to Exemption No. 12555 and this Notice.

b. Documents. Refer to the current editions of the following:

- AC 20-165, Airworthiness Approval of Automatic Dependent Surveillance-Broadcast OUT Systems.
- AC 90-114, Automatic Dependent Surveillance-Broadcast Operations.
- Order 8900.1, Volume 3, Chapter 2, Section 1, Exemptions, Deviations, Waivers, and Authorizations.
- Order 8900.1, Volume 6, Chapter 15, Section 1, Regulatory Oversight of ADS-B Equipment and Applicable Performance Requirements.
- Notice to Airmen Publication, Part 3, Section 1, Automatic Dependent Surveillance-Broadcast (ADS-B) Out Preflight Responsibilities.
- Exemption 12555 in Regulatory Docket No. FAA-2015-0971 at <http://www.regulations.gov/#!docketDetail;D=FAA-2015-0971>.

13. Disposition. We will incorporate the information in this notice into FAA Order 8900.1 before this notice expires. Direct questions concerning the information in this notice to the Flight Technologies and Procedures Division at 202-267-8790.



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