



ICAO

International Civil Aviation Organization  
North American, Central American and Caribbean Office  
INFORMATION PAPER

NACC/WG/5 — IP/06  
21/04/17

**Fifth North American, Central American and Caribbean Working Group Meeting (NACC/WG/5)**  
Port of Spain, Trinidad and Tobago, 22-26 May 2017

**Agenda Item 3                      Implementation on Air Navigation Matters**  
**3.7                      National Plan Reports on air navigation implementation**

**AUTOMATIC DEPENDENT SURVEILLANCE-BROADCAST (ADS-B) OUT; ENSURING PREPAREDNESS FOR  
THE 2020 EQUIPAGE MANDATE**

**(Presented by United States)**

**EXECUTIVE SUMMARY**

In 2010, the United States Federal Aviation Administration published a regulatory requirement for all aircraft operating within certain airspace to be equipped with Automatic Dependent Surveillance – Broadcast (ADS-B) Out technology by January 1, 2020, per Title 14 of the United States Code of Federal Regulations (CFR) part 91.225 and 91.227. This requirement will affect both United States and foreign operations. To ensure preparedness throughout the aviation community and prevent any operational disruptions, the FAA is promoting awareness to the international community so that foreign aircraft intending to operate within the affected airspace will be sufficiently equipped with ADS-B Out technology by the time the requirements come into effect. The meeting is invited to note the information presented in this paper.

<i>Strategic Objectives:</i>	<ul style="list-style-type: none"><li>• Safety</li><li>• Air Navigation Capacity and Efficiency</li></ul>
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**1.                      Introduction**

1.1                      Automatic Dependent Surveillance – Broadcast (ADS-B) is one of the most important, underlying technologies in the United States Federal Aviation Administration’s (FAA) plan to transform air traffic control from the current radar-based system to Next Generation Air Transportation System (NextGen), a satellite-navigation-based system. ADS-B is bringing the precision and reliability of surveillance based on satellite navigation to the United States.

1.2                      In 2010, the FAA published a regulatory requirement for all aircraft operating within certain airspace to be equipped with ADS-B Out technology by 21 January 2020, per Title 14 of the United States Code of Federal Regulations (CFR) part 91.225 and 91.227.

1.3 This requirement will affect both United States and foreign operators. To ensure preparedness throughout the aviation community, and prevent any operational disruptions, the FAA is promoting awareness so that aircraft intending to operate within the affected airspace will be sufficiently equipped with ADS-B Out technology by the time part 91.225 comes into effect.

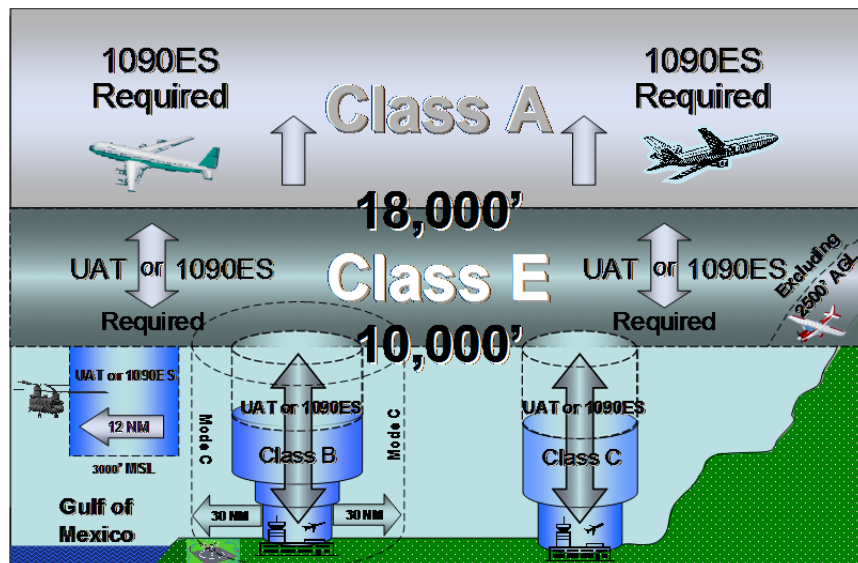
**2. Discussion**

2.1 ADS-B uses Global Positioning System (GPS) technology to determine aircraft position and velocity information, which is then broadcasted to and other equipped aircraft and air traffic controllers via a nationwide network of ground stations. The numerous performance benefits of ADS-B include the ability to: provide more frequent position update rates than radar, deliver more precise location and velocity information for the aircraft, and offer critical in-cockpit traffic information.

2.2 The improved accuracy, integrity and reliability of ADS-B over radar means controllers may be able to safely reduce the mandatory separation between aircraft. ADS-B also provides greater surveillance coverage, since ADS-B ground stations are much easier to place than radars. Remote areas without radar coverage, such as the Gulf of Mexico and parts of Alaska, are now covered by ADS-B.

2.3 The FAA published Federal Regulation 14 CFR 91.225 and 14 CFR 91.227 in May 2010 for ADS-B Out equipage after 1 January 2020. This rule mandates performance requirements for ADS-B avionics that will be required to fly in certain airspace. The rule does not prescribe nor preclude various position source methods, nor does it mandate ADS-B In equipage. Similar to the United States transponder rule, the ADS-B rule does not apply to any aircraft that was not originally certificated with an electrical system or that has not subsequently been certified with such a system installed, including balloons and gliders.

2.4 ADS-B in the United States NAS operates on two frequencies (links): 1090 MHz and 978 MHz. Equipment choices include either a Mode S transponder-based 1090 Extended Squitter (ES), or a Universal Access Transceiver (UAT) operating on 978 MHz. Aircraft operating above Flight Level (FL) 180 (18,000 feet), must be equipped with a Mode S-transponder-based ADS-B transmitter. Aircraft operating below 18,000 feet and within United States airspace must be equipped with either a Mode S transponder or UAT equipment. The below graphic illustrates these requirements.



2.5 The FAA has completed deployment of ADS-B ground radios and has called on aviation users to equip their aircraft in advance of the 1 January 2020 mandate.

2.6 The FAA has been working collaboratively with both the airline industry and the general aviation community in the United States to ensure awareness of this requirement. On 28 October 2014, FAA senior officials met with more than 80 industry representatives of pilots and operators, manufacturers and suppliers at an “ADS-B Call to Action” meeting to identify and address barriers to equipping with ADS-B Out by 1 January 2020, as required by FAA regulations. The participants agreed that the aviation community must work together to meet the mandate’s schedule, and the industry participants identified a number of potential barriers to meeting the mandate and developed corresponding action plans in working sessions.

2.7 Accomplishments thus far in Equip 2020, include:

- Published the Final Rule Technical Amendment to change the ADS-B Out Technical Standard Order (TSO) from “meet requirements” to “meet performance requirements”. This change eliminates the implication that experimental or light sport aircraft needed to obtain design or production approval for their ADS-B out solutions.
- Published the ADS-B out GPS receiver transition period exemption process (see paragraph 2.9 and 2.10 for further information).
- Developed an equipage tracking database to help track equipage trend, to promote awareness of available solutions and focus industry resources on those aircraft that do not already have solutions available.
- Obtained commitment from the aircraft certification services to prioritize ADS-B system certifications.
- Conducting on-going outreach to operators, installers and equipment manufacturers.

2.8 Many airlines equipped early on with GPS as part of the transition to satellite-based navigation, however this early equipage does not include the capabilities of the latest GPS receivers. Early-generation GPS receivers may experience brief periods where they do not meet the FAA’s required performance for ADS-B Out. Airplane manufacturers are upgrading GPS receivers across in-production aircraft models, but have said the upgraded receivers will not be available until 2018 to 2020. Operators must install ADS-B Out by 1 January 2020. The FAA approved a five year limited exemption (Exemption 12555), applicable only from 91.227(c)(1)(i) & (iii) requirements under the following conditions:

- Each operator seeking exemption must notify the FAA.
- Operators covered under the exemption must develop and execute a plan to equip their aircraft to meet the requirements of 14 CFR §91.227(c) prior to January 1, 2025.
- Operators of SA-Aware equipped aircraft are not required to conduct pre-flight verification. They are exempted from the performance requirements in 14 CFR §91.225 when their ADS-B Out equipment is not predicted to meet the requirements of §91.227(c)(1)(i) and (iii).

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- Operators of Selective Availability-On (SA-On) equipped aircraft must conduct pre-flight verification. They may operate in airspace specified in §91.225 when their ADS-B Out equipment does not meet the requirements of §91.227(c)(1)(i) and (iii) **and** the FAA determines there is a backup means of surveillance. The FAA plans to make this determination available through the Service Availability Prediction Tool (SAPT).

2.8 Exemption 12555 is applicable to both United States and foreign operators and the FAA expects that most air carriers will apply for this exemption. Further detail can be found at: <http://www.faa.gov/nextgen/equipadsb/exemption/>

2.9 States with operators that intend to operate within the United States affected airspace are encouraged to promote awareness of this upcoming requirement. Timely installations will allow the approving authority to ensure that the equipage installations are compliant with the requirements; will allow the operators sufficient preparation to account for the expense and time needed to complete the installation; and will ensure that aircraft can operate in United States airspace on January 1, 2020.

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