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**Eighth Meeting of the North American, Central American and Caribbean Directors of Civil Aviation
(NACC/DCA/08)**

Ottawa, Canada, 31 July to 2 August 2018

**Agenda Item 6: NAM/CAR Regional Safety/Air Navigation/Aviation Security/Facilitation
Implementation Matters
6.2 Safety Implementation Matters**

**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 (U.S.) Federal Aviation Administration (FAA) 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, according to Title 14 of the U.S. Code of Federal Regulations (14 CFR) sections 91.225 and 91.227. This requirement will affect all flights in the designated airspace. To prepare the aviation community and prevent any operational disruptions, the FAA is promoting the new mandate to the international community so that foreign aircraft intending to operate within the affected airspace will be equipped with the appropriate ADS-B Out system by the compliance date	
<i>Strategic Objectives:</i>	<ul style="list-style-type: none">• Safety• Air Navigation Capacity and Efficiency
<i>References:</i>	<ul style="list-style-type: none">• Automatic Dependent Surveillance – Broadcast (ADS-B) Out Performance Requirements to Support Air Traffic Control (ATC) Service Final Rule (75 FR 30160, May 28, 2010; Docket No. FAA-2007-29305)• 14 CFR §91.225 and §91.227

1. Introduction

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

1.2 ADS-B is part of the International Civil Aviation Organization (ICAO) Global Air Navigation Plan (GANP) and was endorsed by the ICAO Member States during the ICAO 38th Assembly in 2013. The U.S. presented a working paper at the ICAO 39th Assembly highlighting the January 1, 2020 mandate to equip all aircraft with ADS-B Out that will use the affected airspace in the U.S. NAS.

1.3 In 2010, the FAA published a regulatory requirement for all aircraft operating within certain airspace to be equipped with a specific version of ADS-B Out technology by January 1, 2020, in accordance with Title 14 of the U.S. Code of Federal Regulations (14 CFR) sections (§) 91.225 and 91.227.

1.4 This requirement will affect all flights within the designated airspace. To prepare the aviation community and prevent any operational disruptions, the FAA is promoting the mandate so that that foreign aircraft intending to operate within the affected airspace will be equipped with the appropriate ADS-B Out technology by the compliance date.

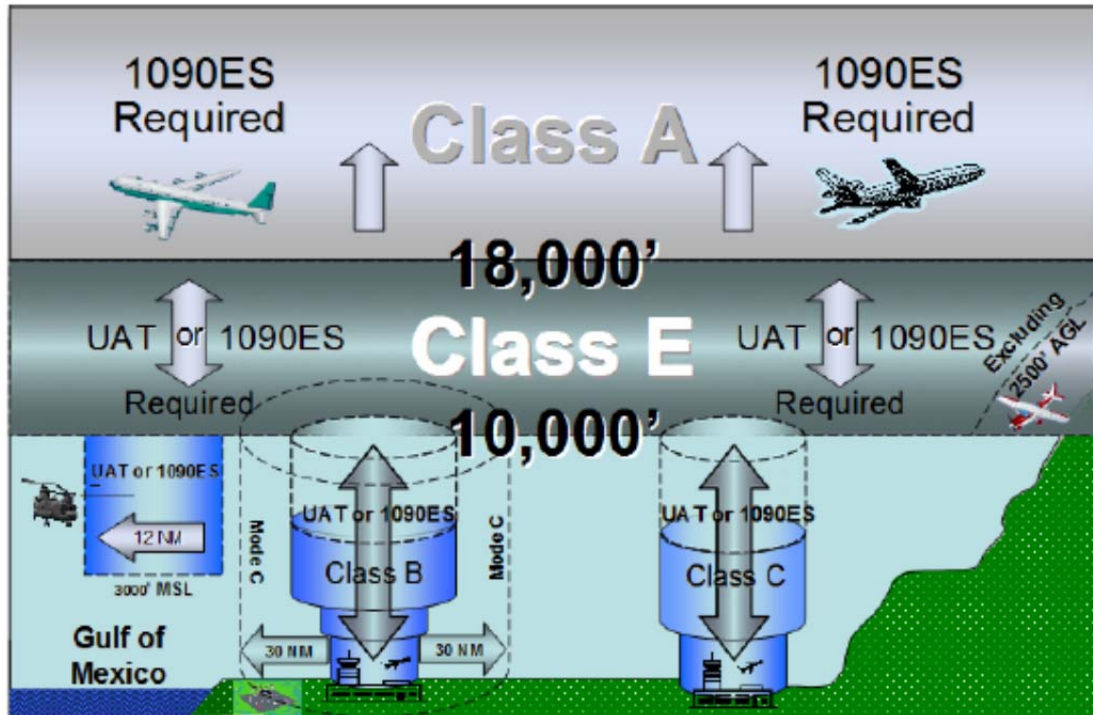
2. Discussion

2.1 ADS-B Out uses Global Navigation Satellite System (GNSS) technology to determine specific aircraft information, which is then broadcast directly to other equipped aircraft and to air traffic controllers. Its numerous performance benefits 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 Out over radar means controllers may be able to safely reduce the mandatory separation between aircraft. ADS-B Out 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 “Automatic Dependent Surveillance – Broadcast (ADS-B) Out Performance Requirements to Support Air Traffic Control (ATC) Service Final Rule” (75 FR 30160, May 28, 2010; Docket No. FAA-2007-29305) 14 CFR §91.225 and §91.227 for ADS-B Out equipage after January 1, 2020. This final rule mandates performance requirements for ADS-B Out avionics that will be required to fly in certain airspace. The final rule does not preclude other position source methods, nor does it mandate ADS-B In equipage. Sections 91.225 and 91.227 do 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 U.S. 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 180 must be equipped with a Mode S-transponder-based ADS-B Out transmitter. Aircraft operating below 18,000 feet and within the U.S. NAS must be equipped with either a Mode S 1090ES transponder or UAT equipment. The graphic below illustrates these requirements.



2.5 The FAA's service contractor has completed the deployment of ADS-B ground stations, the FAA is using ADS-B information to provide ATC services in all en route facilities and in over 80% of FAA terminal facilities. The FAA has called on aviation users to equip their aircraft in advance of the January 1, 2020 mandate.

2.6 The FAA is collaboratively working with commercial operators, the avionics industry, and the general aviation community in the U.S. to ensure awareness of this mandate. On October 28, 2014, FAA senior officials met with pilots, operators, manufacturers, and suppliers at an "ADS-B Out Call to Action" meeting to identify and address barriers to equipping with ADS-B Out by January 1, 2020. Formed as a result of the Call to Action, Equip 2020 first met in November 2014 and has met at least quarterly since then. Equip 2020 was given 32 tasks, reflecting barriers to ADS-B Out implementation, to resolve. Approximately 100 representatives from industry and the FAA regularly attend Equip 2020 meetings and Equip 2020 has become a valuable forum for developing and implementing solutions towards meeting the 2020 mandate.

2.7 Many airlines equipped early on with GPS as part of the transition to satellite-based navigation. Early-generation GPS receivers with the Selective Availability (SA)-On feature may experience brief outages of the FAA's required performance for ADS-B Out. Airplane manufacturers are upgrading GPS receivers across airplane models, but have said the upgraded receivers will not be available for all ADS-B avionics until 2018 to 2020. Operators must install ADS-B Out by January 1, 2020 and may use earlier-generation GPS equipment that has been qualified for ADS-B.

2.8 To provide some relief to operators whose GPS equipment is affected by those brief outages, the FAA approved a five-year limited exemption (Exemption 12555), applicable only from §91.227(c)(1)(i) and (iii) requirements, subject to the following conditions:

- Each operator seeking exemption must notify the FAA and submit an initial upgrade plan by August 1, 2018.
- Operators covered under the exemption must develop and execute a plan to equip their aircraft to meet the requirements of §91.227(c) prior to January 1, 2025.
- Operators of SA-Aware equipped aircraft are not required to conduct pre-flight verification. They may operate in airspace specified in §91.225 when the ADS-B Out equipment is not predicted to meet the requirements of §91.227(c)(1)(i) and (iii).
- Operators of SA-On equipped aircraft must conduct pre-flight verification. They may operate in airspace specified in §91.225 when the 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 SAPT.

2.9 Exemption 12555 is not an extension of the requirement stated in §91.227, but rather an acknowledgement that these operators were prepared to equip early and their efforts should be recognized and lauded. The exemption has been granted with conditions and limitations to aircraft operators, on a time-limited basis from January 1, 2020 through December 31, 2024, from 14 CFR §91.227(c)(1)(i) and (iii). This exemption is applicable to both U.S. and foreign operators. Further details of both the exemption requests and the FAA's decision (Exemption No. 12555) can be found in FAA Docket No. FAA-2015-0971 at <https://www.regulations.gov/>.

2.10 It must be emphasized that compliance with Exemption 12555 requires carriage of equipment that meets the performance requirements of Technical Standards Order (TSO)-C166b, *Extended Squitter Automatic Dependent Surveillance-Broadcast (ADS-B) and Traffic Information Service-Broadcast (TIS-B) Equipment Operation on the Radio Frequency of 1090 Megahertz (MHz)*. Equipment manufactured under the provisions of TSO-C166b incorporates standards published in RTCA/DO-260B, *Minimum Operational Performance Standards for 1090 MHz Extended Squitter Automatic Dependent Surveillance-Broadcast (ADS-B) and Traffic Information Services-Broadcast (TIS-B)*, Section 2, dated December 2, 2009. ADS-B equipment manufactured to earlier standards (e.g, RTCA/DO-260A) do not comply with 14 CFR §91.225 and §91.227.

3. Conclusion

3.1 The safety and operational benefits of ADS-B Out are significant and the U.S. aviation community is collaboratively working to implement the specific requirements for the U.S. NAS.

3.2 States with operators that intend to operate within the U.S. 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 all U.S. airspace on January 1, 2020.

3.3 The Meeting is invited to take note of the information provided. The FAA encourages States with operators that intend to operate within the U.S. affected airspace to promote awareness of this upcoming requirement.