**[4910-13]**

**DEPARTMENT OF TRANSPORTATION**

**Federal Aviation Administration**

**14 CFR Part 91**

**[Docket No.: FAA-2017-0782; Notice No. 91-348]**

**RIN 2120–AK87**

# Use of Automatic Dependent Surveillance–Broadcast (ADS-B) Out in Support of Reduced Vertical Separation Minimum (RVSM) Operations

**AGENCY:** Federal Aviation Administration (FAA), Department of Transportation (DOT).

**ACTION:** Notice of proposed rulemaking (NPRM).

**SUMMARY:** This proposal would revise the FAA's requirements for application to operate in RVSM airspace. The proposal would eliminate the requirement for operators to apply for an RVSM authorization when their aircraft are equipped with qualified ADS-B Out systems and meet specific altitude keeping equipment requirements for operations in RVSM airspace. This proposal recognizes the enhancements in aircraft monitoring resulting from the use of ADS-B Out systems and responds to requests to eliminate the burden and expense of the current RVSM application process for operators of aircraft equipped with qualified ADS-B Out systems.

**DATES:** Send comments on or before [INSERT DATE **30** DAYS AFTER DATE OF PUBLICATION IN THE FEDERAL REGISTER]

**ADDRESSES:** Send comments identified by docket number FAA-2017-0782 using any of the following methods:

- Federal eRulemaking Portal: Go to http://www.regulations.gov and follow the online instructions for sending your comments electronically.
- Mail: Send comments to Docket Operations, M-30; U.S. Department of Transportation, 1200 New Jersey Avenue, SE, Room W12-140, West Building Ground Floor, Washington, DC 20590-0001.
- Hand Delivery or Courier: Take comments to Docket Operations in Room W12-140 of the West Building Ground Floor at 1200 New Jersey Avenue, SE, Washington, DC 20590-0001, between 9 a.m. and 5 p.m., Monday through Friday, except Federal holidays.
- Fax: Fax comments to Docket Operations at (202) 493-2251.

*Privacy:* In accordance with 5 USC 553(c), DOT solicits comments from the public to better inform its rulemaking process. DOT posts these comments, without edit, including any personal information the commenter provides, to www.regulations.gov, as described in the system of records notice (DOT/ALL-14 FDMS), which can be reviewed at www.dot.gov/privacy.

*Docket*: Background documents or comments received may be read at http://www.regulations.gov at any time. Follow the online instructions for accessing the docket or go to the Docket Operations in Room W12-140 of the West Building Ground Floor at 1200 New Jersey Avenue, SE, Washington, DC 20590-0001, between 9 a.m. and 5 p.m., Monday through Friday, except Federal holidays.

**FOR FURTHER INFORMATION CONTACT:** For technical questions concerning this action, contact Madison Walton, Aviation Safety Inspector, Flight Technologies and Procedures Division, Flight Standards Services, AFS-400, Federal Aviation

Administration, 470 L'Enfant Plaza, Suite 4102, Washington, DC 20024, Federal Aviation Administration, 800 Independence Avenue SW, Washington, DC 20591; telephone (202) 267-8850; e-mail Madison.Walton@faa.gov.

**SUPPLEMENTARY INFORMATION:**

**Authority for this Rulemaking**

The FAA's authority to issue rules with respect to aviation safety is found in Title 49, United States Code (49 U.S.C.). Sections 106(f), 40113(a), and 44701(a) authorize the FAA Administrator to prescribe regulations necessary for aviation safety. Under Section 40103(b), the FAA is charged with prescribing regulations to enhance the efficiency of the national airspace. This proposed rulemaking is within the scope of these authorities as it removes regulatory requirements that the FAA no longer finds necessary for safe operations in RVSM airspace and establishes requirements for the use of qualified ADS-B Out systems to facilitate operations in that airspace.

**I. Executive Summary**

A. Summary of the Proposed Rule

This proposal would permit an operator of an aircraft equipped with a qualified ADS-B Out system meeting altitude keeping equipment performance requirements for operations in RVSM airspace to operate in that airspace without requiring a specific authorization. Under this proposal the FAA would consider a qualified ADS-B Out system to be one that meets the requirements of § 91.227 of Title 14, Code of Federal Regulations (14 CFR).

The requirement for operators to obtain a specific RVSM authorization was first promulgated in 1997 when most aircraft required significant design changes to qualify for

an authorization. At that time, operators lacked familiarity with RVSM operations and were required to submit a detailed application to the FAA for review to obtain an RVSM authorization. This application included information on the operator's compliance with RVSM equipment standards, a description of the operator's RVSM maintenance program, and evidence of initial and recurrent pilot training. Since then, operators have become more familiar with RVSM operations, requirements, and procedures. Additionally, the height-keeping performance of aircraft equipped with ADS-B Out systems can be continually monitored to confirm that these aircraft are meeting RVSM performance standards. Based on the technological advances provided by ADS-B Out systems, detailed applications and specific authorizations for operators of these aircraft to conduct operations in RVSM airspace is no longer required.

Accordingly, under this proposal, the requirement to submit applications for RVSM authorization would no longer be applied to operators of aircraft that are equipped with qualified ADS-B Out systems and meet altitude-keeping equipment performance requirements for operations in RVSM airspace. By eliminating this application requirement, the proposal would reduce both operators' costs and FAA workload, while maintaining the existing level of safety. Additionally, since RVSM airspace has been implemented worldwide, the proposal would also remove the detailed designations of where RVSM may be applied that are currently found in Appendix G of part 91.

B. Summary of Costs and Benefits

This proposal would not impose any costs on regulated entities. The FAA estimates that the proposal would result in approximately $35 million (30.8 million of 7% present value) in cost savings during the first 5 years of the rule's implementation primarily

resulting from the ability of operators to operate their aircraft at more fuel efficient RVSM altitudes. The FAA estimates that this proposed rulemaking would save each affected small entity operating aircraft equipped with qualified ADS-B Out systems under parts 91 and 135 a total of $1,630. Savings would result from the benefit of not having to apply for RVSM authorizations and from reduced fuel costs associated with not being restricted from RVSM operations while the authorization is processed.

## II. Background

### A. Statement of the Problem

The current process for obtaining RVSM authorizations was developed when RVSM airspace was initially implemented in 1997 (62 FR 17487; Apr. 9, 1997). At that time, most aircraft were not manufactured to comply with RVSM performance requirements and needed significant modifications to meet the altimetry system performance requirements necessary for flight in RVSM airspace. Since the reduced vertical separation standards employed in RVSM airspace were new to most pilots and air traffic controllers, validation of operational policies and procedures to operate in that airspace was necessary to ensure effective implementation of these reduced vertical separation standards. To assist in accomplishing this task, the FAA established systems to provide height-keeping performance monitoring with the overall goal to ensure that aircraft airworthiness, maintenance, and operational approval requirements resulted in the level of safety and system performance necessary to operate in this airspace on a continuing basis. The technology originally used to monitor an aircraft's performance was limited and capable of only a small number of aircraft observations during a flight.

Since that time, RVSM technology has matured and most aircraft manufactured today that are capable of operating in RVSM airspace are delivered from the manufacturer as RVSM compliant. RVSM airspace has been implemented worldwide, familiarity with operational policy and procedures has significantly increased, and the vast majority of the RVSM capable fleet demonstrates excellent altimetry system performance.[1] Additionally, the increasing equipage of aircraft with ADS-B Out systems makes the current process of obtaining RVSM authorizations for operation of those aircraft in RVSM airspace unnecessary, as ADS-B Out enables continual monitoring of aircraft height-keeping performance and rapid notification of altimetry system error (ASE).

B. History of Vertical Separation Standards

Vertical separation standards establish the minimum vertical distance between aircraft routes in the national airspace system. In the early 1970's, increasing air-traffic volume and fuel costs sparked an interest in reducing vertical separation standards for aircraft operating above Flight Level (FL)290.[2] At the time, the FAA required aircraft operating above FL290 to maintain a minimum of 2,000 feet of vertical separation between routes. Use of these high-altitude routes was desirable because the diminished atmospheric drag at high altitudes results in a corresponding increase in aircraft fuel efficiency. Operators sought, and continue to seek, not only the most direct routes, but also the most efficient altitudes for their aircraft. Increased demand for these high-altitude routes, however, has resulted in greater aircraft congestion in this airspace.

[1] FAA analysis of 22,154 U.S. registered RVSM approved airplanes estimates that 99.9% of those aircraft operate within the ASE containment standards specified in part 91, Appendix G of part 91. The RVSM target level of safety in the national airspace has been met every year since 2003 when RVSM operations started.

[2] Above 18,000 feet, FL are a measure of altitude assigned in 500-foot. increments; FL290 represents an altitude of 29,000 feet with standard atmospheric pressure of 29.92 inches in mercury (Hg).

In 1973, the Air Transport Association of America petitioned the FAA to reduce the vertical separation of high altitude routes from 2,000 feet to 1,000 feet. The FAA denied the petition in 1977, in part because the technology to meet these more rigorous separation standards was neither generally available nor proven. Deficiencies included insufficient aircraft altitude-keeping standards, lack of maintenance and operational standards, and limited altitude correction technology.

In mid-1981, the FAA initiated the Vertical Studies Program. This program, in conjunction with RTCA (formerly the Radio Technical Commission for Aeronautics) Special Committee (SC)-150 and the International Civil Aviation Organization (ICAO) Review of General Concept of Separation Panel (RGCSP), determined:

- RVSM is "technically feasible without imposing unreasonably demanding technical requirements on the equipment."
- RVSM could provide "significant benefits in terms of economy and en-route airspace capacity."
- Implementation of RVSM would require "sound operational judgment supported by an assessment of system performance based on: aircraft altitude-keeping capability, operational considerations, system performance monitoring, and risk assessment."

Following these determinations, the FAA began a two-phase implementation process for RVSM operations for aircraft registered in the United States (U.S.). During the first phase in 1997, the FAA added § 91.706 (Operations within airspace designed as RVSM Airspace) and Appendix G (Operations in RVSM Airspace) to part 91 (62 FR 17487; Apr. 9, 1997). Section 91.706 permits operators of U.S.-registered aircraft to operate in

RVSM airspace outside of the U.S. in accordance with the provisions of Appendix G. Appendix G contains a set of operational, design, maintenance, and other standards applicable to operators seeking to operate in RVSM airspace. It specifies a detailed application process that requires operators to provide evidence that the operator's aircraft design satisfies RVSM performance requirements and has policies and procedures for the safe conduct of RVSM operations. Until recently, it also required that the operator have a specific program for the maintenance of RVSM systems and equipment. The FAA reviews the applications and grants authorizations to operate in RVSM airspace after finding that the applicable requirements are met.

The second phase of RVSM implementation occurred in October 2003, with a second RVSM-related rulemaking action (68 FR 61304; Oct. 27, 2003). This rule introduced RVSM airspace in the U.S. and used the same authorization process previously established under Appendix G to part 91. As established in 2003, the FAA's RVSM program allows for 1,000 feet of vertical separation for aircraft between FL290 and FL410. Before this final rule, air traffic controllers could only assign aircraft operating under Instrument Flight Rules (IFR) flying at FL290 and above to FL290, 310, 330, 350, 370, 390, and 410 since the existing vertical separation standard was 2,000 feet. After the rule changes went into effect, IFR aircraft could also fly at FL300, 320, 340, 360, 380, and 400—nearly doubling capacity within this particular segment of airspace.

The FAA also implemented a performance monitoring program to support implementation of RVSM. This program includes Global Positioning System (GPS)-based height-keeping monitoring units (GMUs) capable of being deployed onboard aircraft during individual RVSM flights. Later, in 2005, the FAA deployed the first of

five passive ground-based aircraft geometric height measurement element (AGHME) sites in the continental U.S. to conduct height-keeping performance monitoring of aircraft passing over each site. Other civil aviation authorities throughout the world have also developed similar height monitoring sites.

In 2008, the FAA reviewed its RVSM program and operator authorization policies. At that time, there were more than 7,000 active RVSM authorizations, covering in excess of 15,000 U.S.-registered aircraft. The FAA's evaluation found the existing processes ensured compliance with the RVSM operating requirements. At the same time however, FAA representatives began meeting with the National Business Aviation Association (NBAA) to develop ways to streamline the RVSM application process to lower the burden on operators to obtain RVSM authorizations and reduce the FAA's workload associated with processing and granting these authorizations. The parties formed the RVSM Process Enhancement Team (PET) within the Performance based Aviation Rulemaking Committee. The PET submitted its final recommendations to the FAA in 2013. As a result the FAA revised existing policies and guidance to facilitate more efficient processing of requests to change existing authorizations and created a job aid to assist inspectors in standardizing review of operator applications.

The FAA also completed rulemaking in 2016 to further reduce the burden on applicants by eliminating the requirement that RVSM applicants include an approved RVSM maintenance program as part of an application for an RVSM authorization. (81 FR 47009, Jul. 20, 2016)

**III. Discussion of the Proposal**

This proposed rulemaking would permit operators of qualified ADS-B Out equipped aircraft to operate without submitting an application for an RVSM authorization when operating where the FAA has ADS-B coverage sufficient to confirm RVSM height-keeping performance. The proposal would eliminate this process for aircraft equipped with qualified ADS-B Out systems as a result of the agency's ability to effectively and continually monitor the height-keeping performance of these aircraft.

A. Specific Requirements for Aircraft Equipped with Qualified ADS-B Out Systems

This proposal would add a new Section 9 (Aircraft Equipped with Automatic Dependent Surveillance-Broadcast Out) to Appendix G of part 91. The proposal would authorize operators of aircraft, equipped with qualified ADS-B Out systems, (i.e. systems that meet the requirements of 14 CFR 91.227) that can be monitored by the FAA to conduct RVSM operations without submitting an application for an authorization to operate in RVSM airspace. The height-keeping performance of these aircraft would be required to be equivalent to that achieved by individual aircraft approved under current provisions of Section 2 of Appendix G.

To be eligible for operations in RVSM airspace an operator's aircraft must meet strict height-keeping performance standards. Under this proposal, an operator would be authorized to conduct flight in airspace in which RVSM is applied when the operator's aircraft complies with the provisions proposed in Section 9. These operations would be conducted in airspace where the FAA has ADS-B coverage sufficient to confirm RVSM height-keeping performance[3]. No specific authorization would be necessary. However, an operator could still operate with an authorization issued under the provisions of

Section 3 of Appendix G if its aircraft are not equipped with a qualified ADS-B Out system. The FAA also notes that if a foreign country requires a specific authorization to operate in RVSM airspace an operator may need to seek authorization under the provisions of Section 3, even if it meets the provisions of proposed Section 9.

When RVSM was first established, the FAA and other international air traffic service organizations developed systems for monitoring aircraft altitude-keeping performance. The systems are used to measure Total Vertical Error (TVE), including ASE. The overall goal of height-keeping performance monitoring is to ensure that airworthiness, maintenance and operational approval requirements result in required system performance and level of safety in the flight environment on an ongoing basis. Aircraft equipped with qualified ADS-B Out systems continuously transmit aircraft geometric position information used to calculate their height-keeping performance.

Operators wishing to take advantage of proposed Section 9's provisions would be required to operate aircraft equipped with a qualified ADS-B Out system installed as specified in proposed Section 9(a)(5) which would allow the FAA to monitor the aircraft height-keeping performance in RVSM airspace where the FAA has ADS-B coverage. This monitoring capability enables the FAA to eliminate the application process for RVSM authorization. The ADS-B Out equipment requirement in proposed Section 9(a)(5) is necessary for aircraft height-keeping performance monitoring, but not for aircraft height-keeping capability. Accordingly, as proposed in Section 9(a)(5), an aircraft that the FAA has previously been found to be operating within required height-

[3] Airspace where the FAA has ADS-B coverage sufficient to confirm RVSM height-keeping performance is depicted at https://www.faa.gov/nextgen/programs/adsb/coveragemap. This coverage area may include airspace in which ADS-B equipage is not required.

keeping performance parameters may be authorized to operate in RVSM airspace when ADS-B Out is inoperable for a specific flight.

The proposal also specifies, in Section 9(a), the essential aircraft equipment and capabilities, including altitude measurement systems; altitude control systems; and altitude alert systems, required to be operational for the aircraft to be eligible for RVSM. The proposed RVSM height-keeping equipment requirements in Section 9(a) are the same as those for non-ADS-B Out equipped aircraft in paragraph (c) of Section 2 of Appendix G. The FAA has determined the current fleet of RVSM approved aircraft consistently meet FAA established safety standards and accordingly has not proposed any changes to the current RVSM equipment standards for ADS-B Out equipped aircraft.[4]

The FAA notes that a Traffic Collision Avoidance Alert System (TCAS) is not specifically required for RVSM operations. Other FAA regulations specify when an aircraft must be equipped with a collision avoidance system. However, for operations in RVSM airspace, aircraft that are equipped with TCAS II must meet Technical Standards Order (TSO) C-119b and be modified to incorporate software Version 7.0, or a later version. This requirement is specified as an aircraft approval requirement in current paragraph (g) of Section 2 of Appendix G. The proposed requirement for operators of ADS-B Out equipped aircraft seeking to operate in RVSM airspace that are also equipped with TCAS II must meet TSO C-119b (Version 7.0), or later, is necessary because earlier TCAS software versions did not incorporate revised alert thresholds for traffic alerts (TA) and resolution advisories (RA) for FL300 through FL420 that are compatible with RVSM operations. These provisions for TCAS II equipped aircraft in paragraph (a)(4) of

[4] The RVSM target level of safety in the national airspace has been met every year since 2003 when RVSM operations started.

proposed Section 9 are identical to current provisions for existing RVSM aircraft approval under Section 2 of Appendix G.

Additionally, the FAA also proposes a single ASE containment requirement for aircraft equipped with ADS-B Out in proposed Section 9(b). This requirement corresponds to limits for ASE containment when RVSM was first established and is consistent with RVSM performance criteria used for aircraft approval in Section 2 of Appendix G. It allows performance monitoring to be applied to each aircraft without relying on aggregated data collected from many aircraft of the same RVSM monitoring group. For these operations, the FAA can rapidly detect when individual aircraft performance has deteriorated outside the proposed ASE tolerance. The proposal would require that aircraft continually meet this requirement to be eligible for RVSM operations under the provisions of this proposed section.

B. Removal of Specific Airspace Designations

As discussed in the "Background" section of this document, RVSM was implemented regionally in a phased approach. Section 8 (*Airspace Designation*) of Appendix G was initially designed to be updated whenever regions added RVSM airspace. The inability to rapidly update these designations caused discrepancies between the airspace listed in Section 8 of Appendix G and the airspace in which RVSM had been applied. Today, however, RVSM has been established between FL290 and FL410 in all flight information regions (FIRs)[5] and requirements have been harmonized throughout ICAO member States. Accordingly, there is no longer a need to update the airspace designations listed in Section 8. The proposed amendment to this section acknowledges RVSM is now

[5]A FIR is airspace of defined dimensions within which Flight Information Service and Alerting Service are provided. All U.S. airspace is contained with designated FIRs.

applied worldwide[6] and removes the detailed RVSM airspace designations from that section.

C. Conforming Amendments

Additional amendments to Appendix G to part 91 are proposed to facilitate the addition of the approval requirements specified in Section 9 for ADS-B Out equipped aircraft.

The proposed changes to Section 1 (*RVSM definition*), recognize that RVSM is no longer a new concept and that RVSM operations have become a standard operation between FL290 and FL410. Accordingly, the proposed changes to this section would remove the "special qualification" designation for RVSM airspace and references referring to operator specific approvals. Since RVSM has now been implemented worldwide, a reference to RVSM airspace identified in Section 8 is no longer needed and would be removed.

The proposed changes in Section 2 (*Aircraft Approval*) and Section 3 (*Operator Authorization*) recognize that aircraft operators may either, use the current aircraft approval process specified in Section 2 and the operator authorization process specified in Section 3, or the authorization process proposed in new Section 9 for aircraft equipped with qualified ADS-B Out systems to obtain authorization to conduct RVSM operations.

Proposed changes to paragraphs (a), (b), and (c) in Section 3 *(Operator Authorization*) would not only allow for an operator to be authorized to conduct flight in airspace where RVSM is applied under the provisions of this section as is currently permitted but would also recognize that operators would be authorized to conduct RVSM operations under the provisions of proposed Section 9.

[6] An operator may choose to review a State's AIP for individual areas where RVSM is applied.

Additionally, under the provisions of current Section 3 (*Operator Authorization*), each operator must provide evidence that each of its pilots has adequate knowledge of RVSM requirements, policies, and procedures when applying for an RVSM authorization. To better clarify the intent of the rule, current Section (3)(c) would be revised to state that "each pilot has knowledge of RVSM requirements, policies, and procedures sufficient for the conduct operations in RVSM airspace".

To ensure the pilots of aircraft of operators who have been authorized to conduct RVSM operations in accordance with proposed Section 9 have knowledge of the requirements, policies, and procedures sufficient for the conduct operations in RVSM airspace, proposed paragraph (b)(3) would be added to Section 4 (*RVSM Operations*). The new provision is identical to revised Section 3(c)(2). Knowledge sufficient to conduct RVSM operations includes, but is not limited to; RVSM FL protocols, flight planning requirements, inflight procedures, and contingency procedures for areas of intended operation. The FAA publishes applicable guidance material in the Aeronautical Information Manual (AIM), Aeronautical Information Publication (AIP), and Advisory Circular (AC) 91-85. Proposed Section 4 has also been revised to specify that an operator may be authorized to conduct RVSM operations under the provisions of Section 3 (as is currently stated) or under proposed Section 9.

Section 5 (*Deviation Authority Approval*) would be revised to eliminate the specific references to Section 3 since the Administrator may authorize deviations from the requirements in § 91.180 and § 91.706 for a specific flight in RVSM airspace for operators who may not meet the provisions of current Section 3 or proposed Section 9.

This section would be revised to address the inclusion of proposed Section 9 in Appendix G.

Currently Section 7 (*Removal or Amendment of Authority*) states that the Administrator may revoke or restrict an RVSM authorization or RVSM letter of authorization. This section would be revised to eliminate specific references to the revocation or restriction of RVSM authorizations and letters of authorization and replace those provisions with a more general provision stating that the Administrator may prohibit or restrict operation in RVSM airspace if an operator fails to comply with certain specified provisions. This revision is necessary as the current section only addresses the removal or amendment of authority through operations specifications, management specifications, and letters of authorization. As the proposal would permit RVSM operations to be conducted without a specific authorization document issued by the Administrator, this section has been revised to indicate that the Administrator may prohibit or restrict an operator's ability to operate in RVSM airspace even if that authorization is not specified in operations specifications, management specifications, or a letter of authorization.

D. Implementing Information

The FAA would perform height-keeping performance monitoring on ADS-B Out equipped flights operating at RVSM altitudes for all airspace defined in § 91.225. This monitoring capability is the result of the FAA having access to ADS-B data from flights in RVSM airspace which would be obtained during normal operations. ADS-B Out systems, meeting the performance requirements of § 91.227, transmit the necessary aircraft position information to allow the FAA to perform height-keeping performance

monitoring on a continual basis. This level of monitoring was not previously available due to the limited number and range of AGHME systems or special effort required to fly with a GPS–based monitoring unit (GMU) on board an aircraft for an individual flight. The continual monitoring enabled by ADS-B Out provides increased height-keeping performance data on an individual aircraft basis and enables the FAA to identify poor ASE performance sooner, allowing quicker mitigation of any risk posed by poor performing aircraft. Additionally, in airspace where the U.S. performs ADS-B monitoring, operators of ADS-B Out aircraft would be able to begin RVSM operations immediately. This ability to operate immediately would lower costs and eliminate the delay caused during the processing of an application for authorization.

For operations outside U.S. airspace, where ADS-B height monitoring may not be available, an aircraft that has recently been monitored by the FAA and found to be operating normally could be safely operated outside of FAA-monitored airspace with a high degree of confidence that the performance requirements would continue to be met.

The FAA has developed and maintains guidance for operators, based on statistical performance analysis, on the time interval that aircraft should return to airspace with FAA ADS-B monitoring capability or obtain a traditional RVSM approval to ensure that the aircraft meets applicable performance requirements. Advisory Circular AC 91-85, Authorization of Aircraft and Operators for Flight in Reduced Vertical Separation Minimum (RVSM) Airspace, includes the initial criteria which would be revised with ongoing monitoring experience. The FAA may also expand the airspace in which we collect ADS-B data, through collaboration with other air navigation service providers or operators.

The FAA will maintain a database of aircraft that have been monitored and are performing within the required performance as specified in proposed Section 9. When a new aircraft is entered into service, the operator must have the initial flight in airspace that can be monitored by the FAA in order to take advantage of proposed Section 9. For a new aircraft that is entered into service and cannot be monitored by the FAA (such as manufactured and delivered outside the U.S.), the operator should obtain an approval in accordance with section 3 before operating in RVSM airspace.

In addition, the FAA intends to transition current approvals, issued under section 3, to monitored operations under the provisions of section 9, in order to reduce the operator and FAA administrative burden of maintaining the section 3 approval. Once an operator's fleet of aircraft have been monitored, the FAA intends to notify the operator that the section 3 approval will be terminated and their authority to operate in RVSM transferred to the provisions of section 9. The FAA will allow operators to maintain their section 3 approval if the operator notifies the FAA that a specific authorization is required for operations in another country.

The FAA also plans to share ADS-B performance concepts and monitoring techniques with ICAO, so that other States can perform their own RVSM performance monitoring.[7] The FAA would publish guidance material addressing the frequency, durability, and coverage of our ADS-B monitoring that we find acceptable and work with ICAO to develop guidance applicable to RVSM capable aircraft equipped with ADS-B Out systems. The FAA would make aircraft performance summaries available to operators to assist them in assuring compliance with the RVSM performance

[7] Currently Australia, Thailand, China, and Hong Kong utilize ADS-B Out for RVSM height-keeping performance monitoring. Eurocontrol, Japan, Russia, and other States are considering its use.

requirements. The FAA believes that the implementing actions described in this proposal would reduce operator and FAA workload and expense, with no additional risk.

## IV. Regulatory Notices and Analyses

### A. Regulatory Evaluation

Changes to Federal regulations must undergo several economic analyses. First, Executive Order 12866 and Executive Order 13563 direct that each Federal agency shall propose or adopt a regulation only upon a reasoned determination that the benefits of the intended regulation justify its costs. Second, the Regulatory Flexibility Act of 1980 (Public Law 96-354) requires agencies to analyze the economic impact of regulatory changes on small entities. Third, the Trade Agreements Act (Public Law 96-39) prohibits agencies from setting standards that create unnecessary obstacles to the foreign commerce of the United States. In developing U.S. standards, this Trade Act requires agencies to consider international standards and, where appropriate, that they be the basis of U.S. standards. Fourth, the Unfunded Mandates Reform Act of 1995 (Public Law 104-4) requires agencies to prepare a written assessment of the costs, benefits, and other effects of proposed or final rules that include a Federal mandate likely to result in the expenditure by State, local, or tribal governments, in the aggregate, or by the private sector, of $100 million or more annually (adjusted for inflation with base year of 1995; current value is $155 million). This portion of the preamble summarizes the FAA's analysis of the economic impacts of this proposed rule. We suggest readers seeking greater detail read the full regulatory evaluation, a copy of which we have placed in the docket for this rulemaking.

In conducting these analyses, the FAA has determined that this proposed rule: (1) has benefits that justify its costs, (2) is not an economically "significant regulatory action" as defined in Section 3(f) of Executive Order 12866, (3) is "nonsignificant" as defined in DOT's Regulatory Policies and Procedures; (4) would not have a significant economic impact on small entities; (5) would not create unnecessary obstacles to the foreign commerce of the U.S.; and (6) would not impose an unfunded mandate on state, local, or tribal governments, or on the private sector by exceeding the threshold identified above. These analyses are summarized below.

**i. Who is Potentially Affected by this Rule?**

All operators intending to conduct operations between FL290 and FL410 (RVSM designated Airspace) and have 1,000 feet vertical separation applied. This applies to operations conducted under parts 91, 91K, 121, 125, and 135.

**ii. Assumptions**

- Present value estimates based on OMB guidance using a 7% discount rate.
- This proposed rule would become effective in 2018.
- The analysis period is 5 years from 2018 to 2022.

The average equipage rate of ADS-B Out in RVSM airspace will be 83% in 2018, 95% in 2019, and reach 100% on January 1, 2020.

**iii. Benefits and Cost Savings of this Rule**

The proposal would permit an operator of an aircraft meeting equipment requirements for operations in RVSM airspace and equipped with a qualified ADS-B Out system to operate in RVSM airspace without requiring application for a specific authorization. This rulemaking proposes to eliminate this application requirement, thereby reducing

both operators' costs and FAA workload, while maintaining the existing level of safety. The biggest savings comes not from the paperwork savings but from fuel savings. Currently operators without RVSM approval must operate their airplane at lower altitudes.

Total savings during the first 5 years of the rule's implementation would be approximately $35.3 million ($30.8 million present value at 7%).

B. Regulatory Flexibility Determination

The Regulatory Flexibility Act of 1980 (Public Law 96-354) (RFA) establishes "as a principle of regulatory issuance that agencies shall endeavor, consistent with the objectives of the rule and of applicable statutes, to fit regulatory and informational requirements to the scale of the businesses, organizations, and governmental jurisdictions subject to regulation." To achieve this principle, agencies are required to solicit and consider flexible regulatory proposals and to explain the rationale for their actions to assure that such proposals are given serious consideration." The RFA covers a wide-range of small entities, including small businesses, not-for-profit organizations, and small governmental jurisdictions.

Agencies must perform a review to determine whether a rule would have a significant economic impact on a substantial number of small entities. If the agency determines that it would, the agency must prepare a regulatory flexibility analysis as described in the RFA.

However, if an agency determines that a rule is not expected to have a significant economic impact on a substantial number of small entities, Section 605(b) of the RFA provides that the head of the agency may so certify and a regulatory flexibility analysis is

not required. The certification must include a statement providing the factual basis for this determination, and the reasoning should be clear. The FAA estimates that this proposed rulemaking would save each affected small entity operating aircraft equipped with qualified ADS-B Out systems under Part 91 and Part 135 $1,630[8] from not having to apply for an RVSM authorization and from reduced fuel cost associated with not being restricted from RVSM operations while the authorization is processed. The FAA then compared this cost saving with a weighted average aircraft value of representative aircraft that would potentially be affected by this rule (See following table).

**Weighted Average Aircraft Value**

| Class | Most Common Type | Count in US MASPS* | Retail Value** | Weighted Values |
|---|---|---|---|---|
| Very Light Jet | Cessna Citation Mustang | 266 | $3,459,900 | $920,333,400 |
| Light Jet | Cessna Citation CJ3 | 328 | $6,900,000 | $2,263,200,000 |
| Mid-Size Jet | Cessna Citation Excel/XLS | 588 | $5,800,000 | $3,410,400,000 |
| Super Mid-Size Jet | Cessna Citation Sovereign | 290 | $18,093,350 | $5,247,071,500 |
| Large Jet | Gulfstream IV | 620 | $7,200,000 | $4,464,000,000 |
| | | 2,092 | | $16,305,004,900 |
| | | **Weighted Average:** | **$7,793,979** | |
| *Source for aircraft counts: US Minimum Aircraft System Performance Specification - 18 Aug 2016 | | | | |
| **Source for average retail value: Aircraft Bluebook, Spring 2016 Vol. 16-1 | | | | |

Owners of new turbojet or turboprop airplanes would receive a benefit of $1,630 per new airplane. But, for new turbojet or turboprop airplanes whose value exceeds $3 million, the cost savings of less than $2,000 is not economically significant. If an agency determines that a rulemaking will not result in a significant economic impact on a substantial number of small entities, the head of the agency may so certify under Section 605(b) of the RFA. Therefore, as provided in Section 605(b), the head of the FAA

[8] Total relief of $1,630 for each Part 91 and Part 135 aircraft seeking authorization equipped with ADS-B Out is the sum of the estimated $214 per application preparation relief, plus the per aircraft fuel savings estimate of $1,416.

certifies that this rulemaking will not result in a significant economic impact on a substantial number of small entities.

C. International Trade Impact Assessment

The Trade Agreements Act of 1979 (Public Law 96-39), as amended by the Uruguay Round Agreements Act (Public Law 103-465), prohibits Federal agencies from establishing standards or engaging in related activities that create unnecessary obstacles to the foreign commerce of the United States. Pursuant to these Acts, the establishment of standards is not considered an unnecessary obstacle to the foreign commerce of the U.S., so long as the standard has a legitimate domestic objective, such as the protection of safety, and does not operate in a manner that excludes imports that meet this objective. The statute also requires consideration of international standards, and where appropriate, that they be the basis for U.S. standards. The FAA has assessed the potential effect of this proposed rule and determined that it would have the same impact on domestic and international entities and thus has a neutral trade impact.

D. Unfunded Mandates Assessment

Title II of the Unfunded Mandates Reform Act of 1995 (Public Law 104-4) requires each Federal agency to prepare a written statement assessing the effects of any Federal mandate in a proposed or final agency rule that may result in an expenditure of $100 million or more (in 1995 dollars) in any 1 year by State, local, and tribal governments, in the aggregate, or by the private sector; such a mandate is deemed to be a "significant regulatory action." The FAA currently uses an inflation-adjusted value of $155 million in lieu of $100 million. This proposed rule does not contain such a mandate; therefore, the requirements of Title II of the Act do not apply.

E. Paperwork Reduction Act

The Paperwork Reduction Act of 1995 (44 U.S.C. 3507(d)) requires that the FAA consider the impact of paperwork and other information collection burdens imposed on the public. The FAA has determined that there is no new requirement for information collection associated with this proposed rule.

F. International Compatibility

In keeping with U.S. obligations under the Convention on International Civil Aviation, it is FAA policy to conform to ICAO Standards and Recommended Practices to the maximum extent practicable. The FAA has reviewed the corresponding ICAO Standards and Recommended Practices and has identified no differences with these proposed regulations.

G. Environmental Analysis

FAA Order 1050.1F identifies FAA actions that are categorically excluded from preparation of an environmental assessment or environmental impact statement under the National Environmental Policy Act in the absence of extraordinary circumstances. The FAA has determined this rulemaking action qualifies for the categorical exclusion identified in paragraph 5-6.6 and involves no extraordinary circumstances.

**V. Executive Order Determinations**

A. Executive Order 13771, Reducing Regulation and Controlling Regulatory Costs

Executive Order 13771 titled "Reducing Regulation and Controlling Regulatory Costs," directs that, unless prohibited by law, whenever an executive department or agency publicly proposes for notice and comment or otherwise promulgates a new regulation, it shall identify at least two existing regulations to be repealed. In addition,

any new incremental costs associated with new regulations shall, to the extent permitted by law, be offset by the elimination of existing costs. Only those rules deemed significant under section 3(f) of Executive Order 12866, "Regulatory Planning and Review," are subject to these requirements.

This proposed rule is expected to be an EO 13771 deregulatory action. Details on the estimated costs savings of this proposed rule can be found in the rule's economic analysis.

B. Executive Order 13132, Federalism

The FAA has analyzed this proposed rule under the principles and criteria of Executive Order 13132, Federalism. The agency has determined that this action would not have a substantial direct effect on the States, or the relationship between the Federal Government and the States, or on the distribution of power and responsibilities among the various levels of government, and, therefore, would not have Federalism implications.

C. Executive Order 13211, Regulations that Significantly Affect Energy Supply, Distribution, or Use

The FAA analyzed this proposed rule under Executive Order 13211, Actions Concerning Regulations that Significantly Affect Energy Supply, Distribution, or Use (May 18, 2001). The agency has determined that it would not be a "significant energy action" under the executive order and would not be likely to have a significant adverse effect on the supply, distribution, or use of energy.

**VI. Additional Information**

A. Comments Invited

The FAA invites interested persons to participate in this rulemaking by submitting written comments, data, or views. The agency also invites comments relating to the economic, environmental, energy, or federalism impacts that might result from adopting the proposals in this document. The most helpful comments reference a specific portion of the proposal, explain the reason for any recommended change, and include supporting data. To ensure the docket does not contain duplicate comments, commenters should send only one copy of written comments, or if comments are filed electronically, commenters should submit only one time.

The FAA will file in the docket all comments it receives, as well as a report summarizing each substantive public contact with FAA personnel concerning this proposed rulemaking. Before acting on this proposal, the FAA will consider all comments it receives on or before the closing date for comments. The FAA will consider comments filed after the comment period has closed if it is possible to do so without incurring expense or delay. The agency may change this proposal in light of the comments it receives.

Proprietary or Confidential Business Information: Commenters should not file proprietary or confidential business information in the docket. Such information must be sent or delivered directly to the person identified in the FOR FURTHER INFORMATION CONTACT section of this document, and marked as proprietary or confidential. If submitting information on a disk or CD ROM, mark the outside of the disk or CD ROM, and identify electronically within the disk or CD ROM the specific information that is proprietary or confidential.

B. Availability of Rulemaking Documents

An electronic copy of rulemaking documents may be obtained from the Internet by—

1. Searching the Federal eRulemaking Portal (http://www.regulations.gov);
2. Visiting the FAA's Regulations and Policies web page at http://www.faa.gov/regulations_policies or
3. Accessing the Government Printing Office's web page at http://www.gpo.gov/fdsys/.

Copies may also be obtained by sending a request to the Federal Aviation Administration, Office of Rulemaking, ARM-1, 800 Independence Avenue SW, Washington, DC 20591, or by calling (202) 267-9677. Commenters must identify the docket or notice number of this rulemaking.

All documents the FAA considered in developing this proposed rule, including economic analyses and technical reports, may be accessed from the Internet through the Federal eRulemaking Portal referenced in item (1) above.

**List of Subjects**

14 CFR Part 91

Aircraft, Air traffic control, Aviation safety.

**The Proposed Amendment**

In consideration of the foregoing, the FAA proposes to amend Chapter I of title 14, Code of Federal Regulations as follows:

**PART 91—OPERATION AND FLIGHT RULES**

**GENERAL**

1. The authority citation for part 91 continues to read as follows:

Authority: 49 U.S.C. 106(f), 106(g), 1155, 40101, 40103, 40105, 40113, 40120, 44101, 44111, 44701, 44704, 44709, 44711, 44712, 44715, 44716, 44717, 44722, 46306, 46315, 46316, 46504, 46506-46507, 47122, 47508, 47528-47531, 47534, articles 12 and 29 of the Convention on International Civil Aviation (61 Stat. 1180), (126 Stat. 11)

2. Amend Appendix G to part 91 by:

a. Revising the definition of Reduced Vertical Separation Minimum (RVSM) Airspace in Section 1;

b. Revise paragraph 2(a) in Section 2;

c. Revise paragraphs 3(a), 3(b) introductory text, 3(c) introductory text, and 3(c)(2) in Section 3;

d. Revise paragraphs 4(b)(1) and 4(b)(2) and add paragraph 4(b)(3) in Section 4;

e. Revise the introductory text and paragraph 5(b) in Section 5;

f. Revise the introductory text in Section 7;

g. Revise Section 8;

h. Add Section 9.

The revisions and additions read as follows:

Section 1. Definitions

Reduced Vertical Separation Minimum (RVSM) Airspace. Within RVSM airspace, air traffic control (ATC) separates aircraft by a minimum of 1,000 feet vertically between FL 290 and FL 410 inclusive. Air-traffic control notifies operators of RVSM airspace by providing route planning information.

* * * * *

Section 2. Aircraft Approval

(a) Except as specified in Section 9 of this appendix, an operator may be authorized to conduct RVSM operations if the Administrator finds that its aircraft comply with this section.

* * * * *

Section 3. Operator Authorization

(a) Except as specified in Section 9 of this appendix, authority for an operator to conduct flight in airspace where RVSM is applied is issued in operations specifications, a Letter of Authorization, or management specifications issued under subpart K of this part, as appropriate. To issue an RVSM authorization under this section, the Administrator must find that the operator's aircraft have been approved in accordance with Section 2 of this appendix and the operator complies with this section.

(b) Except as specified in Section 9 of this appendix, an applicant seeking authorization to operate within RVSM airspace must apply in a form and manner prescribed by the Administrator. The application must include the following:

(1) * * *

(2) * * *

(3) * * *

(c) In a manner prescribed by the Administrator, an operator seeking authorization under this section must provide evidence that:

(1) * * *

(2) Each pilot has knowledge of RVSM requirements, policies, and procedures sufficient for the conduct of operations in RVSM airspace.

Section 4. RVSM Operations

(a) * * *

(b) * * *

(1) The operator is authorized by the Administrator to perform such operations in accordance with Section 3 or Section 9 of this appendix, as applicable.

(2) The aircraft –

(i) Has been approved and complies with Section 2 this appendix; or

(ii) Complies with Section 9 of this appendix.

(3) Each pilot has knowledge of RVSM requirements, policies, and procedures sufficient for the conduct of operations in RVSM airspace.

Section 5. Deviation Authority Approval

The Administrator may authorize an aircraft operator to deviate from the requirements of § 91.180 or § 91.706 for a specific flight in RVSM airspace if -

(a) * * *

(b) At the time of filing the flight plan for that flight, ATC determines that the aircraft may be provided appropriate separation and that the flight will not interfere with, or impose a burden on, RVSM operations.

* * * * *

Section 7. Removal or Amendment of Authority

The Administrator may prohibit or restrict an operator from conducting operations in RVSM airspace, if the Administrator determines that the operator is not complying, or is unable to comply, with this appendix or subpart H of this part. Examples of reasons for amendment, revocation, or restriction include, but are not limited to, an operator's:

* * * * *

Section 8. Airspace Designation

RVSM may be applied in all ICAO Flight Information Regions (FIRs).

Section 9. Aircraft Equipped with Automatic Dependent Surveillance – Broadcast Out

An operator is authorized to conduct flight in airspace in which RVSM is applied provided:

(a) The aircraft is equipped with the following:

(1) Two operational independent altitude measurement systems.

(2) At least one automatic altitude control system that controls the aircraft altitude –

(i) Within a tolerance band of ±65 feet about an acquired altitude when the aircraft is operated in straight and level flight under nonturbulent, nongust conditions; or

(ii) Within a tolerance band of ±130 feet under nonturbulent, nongust conditions for aircraft for which application for type certification occurred on or before April 9, 1997 that are equipped with an automatic altitude control system with flight management/performance system inputs.

(3) An altitude alert system that signals an alert when the altitude displayed to the flight crew deviates from the selected altitude by more than –

(i) ±300 feet for aircraft for which application for type certification was made on or before April 9, 1997; or

(ii) ±200 feet for aircraft for which application for type certification is made after April 9, 1997.

(4) A TCAS II that meets TSO C–119b (Version 7.0), or a later version, if equipped with TCAS II, unless otherwise authorized by the Administrator.

(5) Unless authorized by ATC or the foreign country where the aircraft is operated, an ADS-B Out system that meets the equipment performance requirements of § 91.227 of this part. The aircraft must have its height-keeping performance monitored in a form and manner acceptable to the Administrator.

(b) The altimetry system error (ASE) of the aircraft does not exceed 200 feet when operating in RVSM airspace.

Issued under authority provided by 49 U.S.C. 106(f), 40103(b), 40113(a), and 44701(a) in Washington, DC, on July 26, 2017

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Deputy Director,
Flight Standards Service
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