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DEPARTMENT OF TRANSPORTATION

Federal Aviation Administration

14 CFR Part 91

Docket No. FAA- 2000- 8490; Notice No. 00 -16] -2

RIN 2120-AH12

Reduced Vertical Separation Minimum (RVSM)

AGENCY: Federal Aviation Administration (FAA), DOT

ACTION: Notice of proposed rulemaking (NPRM)

SUMMARY: This proposed rule would add the New York Flight Information Region (FIR) portion of the West Atlantic Route System (WATRS) to the airspace where Reduced Vertical Separation Minimum (RVSM) may be applied. RVSM saves fuel and minimizes traffic delays by accommodating greater numbers of aircraft in the most fuel-efficient routes available. This is accomplished by reducing the vertical separation between aircraft that fly in RVSM airspace. Safety is maintained by restricting RVSM airspace to aircraft with approved equipment that is operated by crews with proper training to assure high levels of long-range navigation precision. International RVSM planning groups have agreed to implement RVSM in the New York Flight Information Region (FIR) portion of WATRS on November 1,

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2001. This NPRM also proposes to require aircraft that are equipped with Traffic Alert and Collision Avoidance System (TCAS) to incorporate a version of TCAS that is compatible with RVSM operations.

DATES: Comments must be submitted on or before [Insert date 60 days after publication in the Federal Register.]

ADDRESSES: Address your comments to the Docket Management System, U.S. Department of Transportation, Room Plaza 401, 400 Seventh Street, SW., Washington, DC 20590-0001. You must identify the docket number FAA-2000-8490 at the beginning of your comments, and you should submit two copies of your comments. If you wish to receive confirmation that the FAA received your comments, include a self-addressed, stamped postcard.

You may also submit comments through the Internet to <http://dms.dot.gov/> . You may review the public docket containing comments to these proposed regulations in person in the Dockets Office between 9:00 a.m. and 5:00 p.m., Monday through Friday, except Federal holidays. The Dockets Office is on the plaza level of the Nassif Building at the Department of Transportation at the above address. Also, you may review public dockets on the Internet at <http://dms.dot.gov> .

FOR FURTHER INFORMATION CONTACT: Dave Maloy, Flight Technologies and Procedures Division, Flight Standards Service, AFS-400, Federal Aviation Administration, 600 Independence Avenue, SW., Washington, DC 20591, telephone (860) 654-1006.

SUPPLEMENTARY INFORMATION:

Comments Invited

You are invited to participate in this proposed rulemaking by submitting such written data, views, or arguments, as you may desire. You are also invited to submit comments relating to the environmental, energy, federalism, or economic impact that may result from adopting the proposals in this notice. Comments that provide the factual basis supporting the views and suggestions presented are particularly helpful in developing reasoned regulatory decisions. Your comments should identify the regulatory docket number and you should submit two copies of your comments to the address shown above.

Because this proposed rule was developed as a result of an international agreement, comments deemed substantive will be presented for consideration and reviewed by the international community under the auspices of the International Civil Aviation Organization (ICAO). If

considered relevant, the comments will be included for use by all participating member States.

All comments received will be available both before and after the closing date for comments in the Department of Transportation Docket for examination by interested persons.

The FAA will acknowledge receipt of a comment if the commenter includes a self-addressed, stamped postcard on which the following statement is made: "Comments to Docket No. FAA-2000- 8490 ." The FAA will date, time stamp, and return the postcard.

Availability of This Document

You may download an electronic copy of this document, using a modem and suitable communications software, from the FAA regulations section of the FedWorld electronic bulletin board service (telephone: (703) 321-3339) or the Government Printing Office's (GPO) electronic bulletin board service (telephone: (202) 512-1661).

Internet users may reach the FAA's web page at <http://www.faa.gov/avr/arm/nprm/nprm.htm> or the GPO's web page at <http://www.access.gpo.gov/nara> for access to recently published rulemaking documents.

Any person may obtain a copy of this proposed rule by submitting a request to the Federal Aviation

Administration, Office of Rulemaking, ARM-1, 800
Independence Avenue, SW., Washington, DC 20591, or by
calling (202) 267-9680. Communications must identify the
amendment number or docket number of this NPRM.

Background

Introduction

Below flight level (FL) 290 (29,000 feet), air traffic controllers can assign aircraft operating under Instrument Flight Rules (IFR) altitudes a minimum of 1,000 feet apart. Above FL 290, however, the Conventional Vertical Separation Minimum (CVSM) is 2,000 feet.

RVSM is the reduction of vertical separation of aircraft from the conventional 2,000 feet of separation to 1,000 feet of separation between flight levels (FL) 290 (29,000 feet) and 410 (41,000 feet). RVSM is authorized only for aircraft flying in RVSM airspace that have equipment and training to maintain long term navigation precision.

Flight levels are stated in digits that represent hundreds of feet. The term flight level is used to describe a surface of constant atmospheric pressure related to a reference datum of 29.92 inches of mercury. Rather than adjusting altimeters for changes in atmospheric pressure, pilots base altitude readings above the transition altitude

(in the United States, 18,000 feet) on this standard reference. FL 290 represents the pressure surface equivalent to 29,000 feet based on the 29.92" Hg datum; FL 310 represents 31,000 feet, and so on.

The 2,000-foot minimum vertical separation restricts the number of flight levels available. Flight levels 310, 330, 350, 370, and 390 are flight levels at which aircraft crossing oceanic airspace operate most economically. At peak hours these flight levels can become congested. When all RVSM flight levels (FL290-410) are utilized, six additional flight levels are available: FLs 300, 320, 340, 360, 380 and 400.

RVSM has been successfully established in the North Atlantic (NAT) and in Pacific airspace. Increasing the number of flight levels available in the WATRS airspace is projected to enhance operator benefits in a similar way to those achieved in the NAT (i.e., mitigation of fuel penalties attributed to the inability to fly optimum altitudes and tracks).

This proposed rule complies with international agreements under which the international aviation community, including the United States, plans to implement RVSM in the New York FIR portion of the WATRS airspace. Based on three years of successful RVSM operations in the

NAT, the users, Air Transport Association (ATA), International Air Transport Association (IATA), International Civil Aviation Organization (ICAO), and the New York Oceanic Capacity Enhancement Task Force (NYOCETF) have requested the FAA to implement RVSM in WATRS airspace as well.

Why RVSM in WATRS Airspace is Necessary

Air traffic in WATRS airspace has increased steadily in the past few years and is projected to continue to increase. Between 1997 and 1999, the annual traffic count in the WATRS airspace increased from 72,020 to 109,044 flights. This represents an increase of 51 percent. This is a result of several years of economic downturn followed by a resurgence of activity. The Office of International Operations for New York Center estimates a similar increase over at least the next several years, assuming the economy stays healthy. A substantial portion of the increase is the Europe to Caribbean traffic that overflies the WATRS airspace.

Unless action is taken, as traffic increases, the opportunity for aircraft to fly at fuel-efficient altitudes and tracks will be significantly diminished. In addition, air traffic service providers may not be able to

accommodate greater numbers of aircraft in the airspace without invoking restrictions that can result in traffic delays and fuel penalties.

RVSM has been implemented successfully in the North Atlantic (NAT) and in the Pacific

With air traffic levels increasing annually worldwide, FAA airspace planners and their international counterparts continually explore methods of enhancing the air traffic control (ATC) system's ability to accommodate traffic in a safe and efficient manner. NAT MNPS (Minimum Navigation Performance Specifications) airspace was chosen to be the first airspace for RVSM introduction because it is the busiest oceanic airspace in the world and traffic is forecast to continue to increase. The NAT Traffic Forecasting Group Report shows that the number of annual flight operations increased 28 percent between 1993 and 1998 with a forecast 65 percent rise over the 1994 level of 164,500 by 2004.

On March 27, 1997, RVSM was implemented from FL 330 to FL 370 in the NAT MNPS. On October 8, 1998 the RVSM airspace was increased from FL 310 to FL 390 (inclusive). In designated NAT MNPS airspace, tracks are spaced 60 nautical miles (NM) apart. Between FLs 310 and 390

(inclusive), aircraft are separated vertically by 1000 feet.

All aircraft operating in this airspace must be appropriately equipped and capable of meeting required lateral navigation performance standards of part 91, section 91.705 and vertical navigation performance standards of part 91, section 91.706. Operators must follow procedures that ensure the standards are met. Flight crews must also be trained on RVSM policy and procedures. Each operator, aircraft, and navigation system combination must receive and maintain authorization to operate in the NAT RVSM/MNPS airspace.

The North Atlantic Systems Planning Group (NATSPG) Central Monitoring Agency (CMA) monitors NAT aircraft fleet performance to ensure that a safe operating environment is maintained.

Pacific RVSM was implemented on February 24, 2000. The Asia/Pacific Approval Registry and Monitoring Agency performs the function of the CMA in the Pacific.

Prior to the introduction of RVSM, 27 percent of flights in NAT airspace were issued clearances on tracks and at altitudes other than those requested by the operators in their filed flight plans. These flights were, therefore, generally conducted at less than optimum tracks

and altitudes for the aircraft, resulting in time and fuel inefficiencies.

The NAT Implementation Management Group (IMG) has observed the following improvements in NAT operations due to the introduction of RVSM:

1. Fifty percent of the fuel penalty attributed to NAT system operation was eliminated. The total NAT system fuel penalty is estimated based on track design, meteorological forecast, cruise level and traffic congestion penalties.
2. Twenty five percent fewer fixed tracks were required to be published. This allows more airspace for operators to fly preferred tracks.
3. There was a five percent increase in flights cleared to fly both at the altitude and on the track that the operator requested.

Most WATRS operators already have experience with RVSM

Approximately 60% of the operations in the WATRS airspace are conducted by aircraft and operator combinations that already have experience with RVSM operations. This is because some of the WATRS operators conduct operations worldwide and therefore, have been required to obtain RVSM approval to operate in NAT and

Pacific RVSM airspace. Aircraft that have been approved for RVSM are approved for RVSM in any area of the world where it is applied. This high percentage of operators that already have RVSM experience has encouraged WATRS planners to expeditiously implement RVSM in WATRS airspace.

Applying RVSM to the New York Flight Information Region (FIR) of WATRS

The New York Oceanic Capacity Enhancements Task Force (NYOCETF) provides oversight for plans and policy related to:

1. Changes to separation minima
2. Issues relating to traffic management
3. Airspace/ATS Routes
4. Standardization of ATC and Operator procedures
5. Contingency procedures
6. Communication issues
7. Status of oceanic ATC automation

The Task Force is using the policy and criteria developed in other ICAO forums to build the RVSM program for the WATRS airspace.

Projected increases in WATRS air traffic and the successful implementation of RVSM operations in the NAT and the Pacific support the implementation of RVSM in WATRS airspace. WATRS operators and Air Traffic Service (ATS) providers have requested that RVSM be pursued aggressively.

The NYOCETF is developing WATRS RVSM implementation plans. The New York ARTCC Plans and Procedures Manager chair the Task Force. The Task Force chairperson and representatives will oversee the two phases of the WATRS implementation process, which are (1) the system verification phase and (2) the initial operational capability/operational trials phase.

System Verification Phase

During the system verification phase, unapproved aircraft will continue to be separated vertically by 2,000 feet. Operators and aircraft that have not already been approved for RVSM will begin to receive RVSM approval in accordance with section 91.706 and Appendix G (or their equivalent for foreign operators). The overall objectives of the system verification phase are to:

1. Confirm that the target level of safety (TLS) will continue to be met.

2. Confirm that aircraft approved for RVSM operation demonstrate altitude-keeping performance that meets RVSM standards. This will be achieved by:

- Identifying and eliminating any causes of out-of-tolerance altitude-keeping performance, in general or for specific aircraft groups and
- Monitoring a sample of RVSM-approved aircraft and operators that is representative of the total population.

3. Verify that operational procedures adopted for RVSM are effective and appropriate.

4. Confirm that the altitude-monitoring program is effective. The principal purpose of this phase has been to gain confidence that the operational trial phase can begin.

Initial Operational Capability/Operational Trials Phase

When the objectives of the system verification phase have been met, initial operational capability will be declared and RVSM will be implemented at designated flight levels. The first year after implementation is considered the operational trials phase. The objectives of the operational trial phase are to:

1. Continue to collect altitude-keeping performance data.

2. Increase the level of confidence that safety goals are being met.

3. Demonstrate operationally that there are no difficulties with RVSM implementation.

Beginning November 1, 2001, only RVSM approved operators and aircraft will be cleared to operate in the New York FIR portion of the WATRS airspace between FLs 290 and 410 (inclusive). Aircraft that are not RVSM compliant (e.g., State aircraft, ferry and maintenance flights) will only be cleared to operate between FLs 290 and 410 (inclusive) after coordination with the first and notification given to subsequent oceanic centers. Notification constitutes approval. A 2,000-foot vertical separation will be applied to such aircraft.

Provided that all requirements continue to be met, at the end of one year, RVSM will be declared fully operational.

Altitude-Keeping Performance

For the past three years, the FAA, in conjunction with the NATSPG, has monitored aircraft altitude-keeping performance of RVSM approved aircraft. A major objective of monitoring is to establish that the altitude-keeping performance of the aircraft fleet operating in airspace

where RVSM is applied continues to meet minimum requirements.

Altimeter system error (ASE) is the major component of aircraft altitude-keeping performance. In the past three years, 42,648 measurements of altimetry system error have been taken for over 3,400 different airframes. Those measurements have shown that the altitude-keeping performance of aircraft approved for RVSM operations is significantly better than the minimum requirement. For group aircraft, the ASE requirement established for RVSM is that average ASE not exceed 80 feet and 99.9% of ASE observed not exceed 245 feet. The monitoring results have shown that actual average ASE is -4 feet and 99.9% of ASE is within 156 feet.

The FAA has determined that the appropriate method of assessing collision risk is the Reich collision risk model (CRM). As noted in AC No. 91-70, Oceanic Operations, collision risk refers to the number of midair accidents likely to occur due to the loss of separation in a prescribed volume of airspace for a specific number of flight hours.

Collision Risk Methodology (CRM) was used to develop the requirements for safe implementation of a 1,000-foot vertical separation standard. The United States supported

the methodology used to derive the accepted level of safety for RVSM implementation.

The TLS that is being used in the NAT, the Pacific, and the WATRS airspace to assess safety is no more than five fatal accidents in 1 billion flying hours. The level of safety was developed using historical data on safety from global sources. One precedent used was a period of 100 to 150 years between midair collisions. When the TLS of 5 accidents in a billion flying hours is projected in terms of a calendar year interval between accidents in the WATRS, it yields a theoretical interval between midair collisions of more than 600 years. The accepted level of safety is consistent with the acceptable level for aircraft hull loss and is based on the precedence of extremely improbable events as they relate to system safety, the basis for certain requirements in certification regulations such as 14 CFR 25.1309.

To ensure that the TLS is met, the FAA is monitoring the total vertical error (TVE) and the remaining CRM parameters that are critical for safety assessment (probability of lateral and longitudinal overlap). TVE is defined as the geometric difference between the aircraft and the flight level altitude. To monitor TVE, the FAA has deployed measurement systems that will produce estimates of

aircraft and flight level geometric altitude. The overall goal of 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 a continuing basis. One such measurement/monitoring system is a Global Positioning System (GPS)-based monitoring system (GMS). The GMS has been used extensively in the NAT along with ground based Height Monitoring Units (HMUs).

The on-going assessment of risk in the NAT over the past two years has shown that the TLS of 5 accidents in 1 billion flight hours can be met. All sources of error related to aircraft performance and to human error have been assessed.

Current Requirements

The FAA published 14 CFR Section 91.706 (Operations within airspace designated as Reduced Vertical Separation Minimum Airspace.) and Appendix G to Part 91 (OPERATIONS IN REDUCED VERTICAL SEPARATION MINIMUM (RVSM) AIRSPACE) in April 1997. They are based on the ICAO Manual on RVSM, NAT Doc 9574. Technical and operational experts from the FAA, the European Joint Airworthiness Authorities (JAA), the aircraft manufacturers, and pilot associations developed the criteria in a joint FAA/JAA working group. Section

91.706 requires that aircraft and operators meet the requirements of Appendix G and receive authorization from the FAA prior to flying in airspace where RVSM is applied.

Appendix G contains requirements in eight sections:

1. Definitions
2. Aircraft Approval
3. Operator Authorization
4. RVSM operations (flight planning into RVSM airspace)
5. Deviation Authority Approval
6. Reporting Altitude-keeping Errors
7. Removal or Amendment of Authority
8. Airspace Designation

Flight Standards Handbook Bulletin for Air Transportation (HBAT) 99-11A and General Aviation (HBGA) 99-17A entitled "Approval of Aircraft and Operators for Flight in Airspace Above Flight Level 290 Where 1,000 Foot Vertical Separation Minimum Is Applied", has been distributed through Flight Standards District Offices (FSDOs). This document provides guidance to FAA Flight Standards inspectors on the process and procedures to follow before approving an operator and its aircraft for RVSM operations. It details inspector responsibilities for assessment of airworthiness approval, maintenance program approval, and operations approval requirements in the rule.

It discusses timing, process, and maintenance and operations material that the operator should submit for FAA review and evaluation normally at least 60 days before the planned operation in RVSM airspace. Operators under Title 14, Code of Federal Regulations (14 CFR) part 91 receive FAA approval in the form of a Letter of Authorization (LOA), and operators under 14 CFR parts 121, 125, and 135 receive Operations Specifications (OPS-SPEC) approval.

For operations over the high seas outside the United States, 14 CFR 91.703 requires that aircraft of U.S. registry comply with Annex 2 (Rules of the Air) to the Convention on International Civil Aviation. Annex 2, amendment 32, effective February 19, 1996, reflects the change from 2,000 feet to 1,000 feet vertical separation for Instrument Flight Rules (IFR) traffic between FL 290 and FL 410, based on appropriate airspace designation, international agreements, and conformance with specified conditions.

General Discussion of the Proposal

The proposal would allow operation of civil aircraft of U.S. registration in WATRS airspace where RVSM is applied. It is based on improvements in altitude-keeping technology. These improvements include:

- Introduction of the air data computer (ADC), which provides an automatic means of correcting the known static source error of aircraft to improve aircraft altitude measurement capability.
- Development of altimeters with enhanced transducers or double aneroid for computing altitude.

Under this proposal, airspace or routes in the WATRS airspace where RVSM is applied would be considered special qualification airspace. Both the operator and the specific types of aircraft that the operator intends to use in RVSM airspace would have to be approved by the appropriate FAA office before the operator conducts flights in RVSM airspace.

Implementation of a 1,000-foot vertical separation standard above FL 290 offers substantial operational benefits to operators, including:

- Greater availability of the most fuel-efficient altitudes. In the RVSM environment, aircraft are able to fly closer to their optimum altitude at initial level off and through step climbing to the optimum altitude during the enroute phase.
- Greater availability of the most time and fuel-efficient tracks and routes (and an increased

probability of obtaining these tracks and routes). Operators often are not cleared on the track or route that was filed due to demand for the optimum routes and resultant traffic congestion on those routes. RVSM allows ATC to accommodate a greater number of aircraft on a given track or route. More time and fuel-efficient tracks or routes would therefore be available to more aircraft.

- Increased controller flexibility. RVSM gives ATC greater flexibility to manage traffic by increasing the number of flight levels on each track or route.
- Reduction of pilot and controller work load. When controllers are required to re-route aircraft from their filed track and/or altitude they are required to re-coordinate and revise clearances. Pilots are required to re-program aircraft navigation systems (which has been a major cause of navigational errors). RVSM will reduce the number of re-routes required and therefore reduce both pilot and controller workload.

- Enhanced flexibility to allow aircraft to fly across route systems. Operators are often required to remain at lower, less fuel-efficient altitudes until the aircraft crosses a route system. RVSM makes more flight levels available at higher, more fuel-efficient altitudes to allow aircraft to cross route systems.
- Enhanced safety in the lateral dimension. Studies indicate that RVSM produces a wider distribution of aircraft among different tracks and altitudes, resulting in less exposure to aircraft at adjacent separation standards. RVSM reduces the number of occasions when two aircraft pass each other separated by a single separation standard (e.g., 60 NM laterally). The benefit to safety is that, in the event of a gross navigation error, the deviating aircraft is less likely to find another aircraft on the adjacent route at the same flight level.

This amendment to 14 CFR part 91, Appendix G, Section 8 would add the New York FIR portion of the WATRS airspace to the list of airspace where RVSM can be applied.

TCAS (Traffic Alert and Collision Avoidance System) II,
Version 7 for RVSM Operations

Currently, 14 CFR sections 121.356, 125.224, and 135.180 require that certain aircraft be operated with TCAS II, or an equivalent, and the appropriate class of Mode S transponder. Certain other aircraft may be operated with TCAS I or an equivalent. Airworthiness Directives issued to the avionics manufacturers in 1994 require that those aircraft that are required to be TCAS II equipped be equipped with TCAS II, Version 6.04 Enhanced.

Approximately 90% of the flights now conducted in RVSM airspace are equipped with TCAS II, version 6.04 Enhanced.

This proposed rule would require that aircraft operated in RVSM airspace and equipped with TCAS II, be modified to incorporate collision avoidance system logic software version 7.0, or a later version. This requirement is added because, as further explained below, only version 7.0 incorporates revised alert thresholds for traffic alerts (TA) and resolution advisories (RA) for flight levels (FL) 300 through FL 420 that are compatible with RVSM operations. The alert thresholds in Version 6.04 Enhanced are not totally compatible with RVSM operations. This proposal is specifically related to TCAS II operating characteristics needed in RVSM airspace and would not amend

or be affected by rules that require that TCAS be installed in an aircraft.

TCAS I is compatible with RVSM operations and no modifications are necessary.

Why this proposed rule would require Version 7 of TCAS II.

1. BACKGROUND. RVSM was implemented in North Atlantic Minimum Navigation Performance Specifications Airspace (NAT MNPSA) in March 1997. In preparation for RVSM implementation, the North Atlantic System Planning Group (NATSPG) Operations/Airworthiness (Ops/Air) group reviewed the effect that RVSM would have on the operation of TCAS II, Version 6.04 Enhanced in NAT oceanic airspace. The group recognized that TCAS II, Version 6.04 Enhanced was designed with a TA alert threshold of 1,200 feet for FL 300 through FL 420 and would produce inappropriate TA's for aircraft that were separated in RVSM airspace by 1,000 feet vertically, especially in certain situations. For example, the group recognized that in situations where two aircraft were separated by 1,000 feet vertically and one nautical mile or less longitudinally, on the same track and proceeding in the same direction at approximately the same speed, TA's could be received in the cockpit repeatedly over an extended period of time. The group observed,

however, that the traffic levels in oceanic airspace are low relative to continental operations and operations are relatively stable (i.e., aircraft generally climb or descend infrequently). For this reason, it concluded that TCAS II, Version 6.04 Enhanced was acceptable during the early stages of RVSM operations in oceanic airspace provided pilots were informed on the operating characteristics of TCAS II, Version 6.04 Enhanced operations in RVSM airspace. To do this, the group developed and distributed a document to educate pilots on these characteristics. The document also recommended that pilots limit their vertical speed to 1,000 feet per minute when close to other aircraft to reduce the number of unnecessary alerts.

RVSM has been implemented for over 3 years in North Atlantic airspace and since February 2000 in the Pacific Oceanic Flight Information Regions. In that time, TCAS II, Version 6.04 Enhanced has proven generally acceptable for RVSM operations in oceanic airspace, however, multiple TA events have, in fact, been found to occur in situations where aircraft are on the same track, speed and direction with one nm or less longitudinal spacing.

2. EFFECT ON SAFETY. TCAS provides an aural TA in the form of the announcement "Traffic, Traffic" in the cockpit. The

"Traffic, Traffic" announcement repeated over a period of time distracts the pilot from the execution of his or her duties and produces the potential to cause a pilot error. As an example, during the flight, pilots program navigation computers with a series of numbers representing positions on the route of flight. A distraction while programming the navigation computer can cause the pilot to make an error that results in the aircraft straying from its assigned route and posing a hazard to itself and other aircraft.

3. INCREASE IN RVSM OPERATIONS. As air traffic increases in areas where RVSM is currently implemented and as RVSM is implemented in new areas, there will be more aircraft conducting RVSM flights and increased exposure to distracting TA's. Air traffic in NAT and Pacific oceanic airspace where RVSM has already been implemented is projected to increase 4-6% each year. New RVSM implementations are planned in the near future in airspace over the Western and South Atlantic, the western Pacific, and the Caribbean. The number of RVSM flights will continue to increase and therefore, the probability of aircraft experiencing distracting multiple TA's will also increase.

4. TCAS II, VERSION 7.0 COMPATIBILITY WITH RVSM OPERATIONS.

To avoid the potential for an increase in distracting TA's that can lead to pilot errors, aircraft that are used in RVSM operations that are equipped with TCAS II systems must be modified to incorporate a version of TCAS that is compatible with RVSM operations. TCAS II, version 7.0 was designed to be compatible with RVSM operations and mitigates the occurrence of unnecessary TA's in RVSM operations. In TCAS II, version 7.0, the TA alert threshold between flight levels 300 and 420 is reduced from 1,200 feet to 850 feet. This revision will eliminate unwarranted TA's between aircraft that are correctly separated by 1,000 feet vertically in RVSM airspace.

5. ICAO AND FOREIGN STANDARDS

ICAO Annexes and civil aviation authorities in foreign countries have already established standards and requirements for specified aircraft to be equipped with TCAS II, version 7. ACAS II is the ICAO term that describes aircraft collision avoidance systems and related equipment. To comply with ICAO ACAS II Standards, version 7 must be incorporated in TCAS II. The aircraft covered and compliance dates for ACAS II (TCAS II, Version 7) are discussed in the paragraphs below.

a. PART 91, SECTION 91.703 REQUIREMENTS APPLICABLE TO US OPERATORS

Various countries through out the world have adopted the ICAO Annex 6 requirements discussed below for ACAS II equipage in their airspace. In some major areas, countries and regions have adopted accelerated equipage compliance dates. Because 14 CFR 91.703 requires US operators to comply with the regulations of the countries in which they are operating, the ACAS II equipage requirements of foreign countries have already required US operators to plan to equip with Version 7.

Section 91.703 is entitled "Operations of civil aircraft of U.S. registry outside of the United States". Paragraph 91.703 (a) (2) states that each person operating a civil aircraft of U.S. registry outside the United States shall "[w]hen within a foreign country, comply with the regulations relating to the flight and maneuver of aircraft there in force".

b. ICAO ANNEX 6 STANDARDS FOR ACAS II EQUIPAGE.

ICAO Annex 6 (Operation of Aircraft), Part 1 (International Commercial Air Transport - Aeroplanes), paragraph 6.18 contains standards calling for TCAS II, Version 7 (ACAS II) equipage for specified aircraft by 1 January 2003. Paragraph 6.18 is entitled "Aeroplanes

required to be equipped with an airborne collision avoidance system (ACAS II). Specifically, it states that all turbine-engine aircraft with a maximum certified take-off mass (gross weight) that exceeds 15,000 kg (33,000 pounds) or authorized to carry more than 30 passengers shall be equipped with ACAS II by January 1, 2003. Annex 6 also calls for all aircraft to be equipped with a pressure altitude reporting transponder that operates in accordance with the relevant provisions of ICAO Annex 10.

c. ASIA/PACIFIC REGIONAL STANDARDS FOR ACAS II.

The ICAO Regional Supplements for the Middle East/Asia and the Pacific are published in the ICAO document entitled "Regional Supplementary Procedures" (ICAO Doc 7030). Those regional supplements call for TCAS II, Version 7 equipage for the aircraft specified in Annex 6 by 1 January 2000. Since version 7 was not widely available from avionics manufactures, most aircraft were not able to meet that date. In response, the Asia/Pacific Air Navigation Planning and Implementation Regional Group (APAN/PIRG) has adopted a regional policy that calls for the specified aircraft to be equipped by January 1, 2002.

d. NORTH ATLANTIC REGIONAL STANDARDS FOR ACAS II.

The ICAO Doc 7030 Regional Supplement for the NAT Region calls for TCAS II, version 7.0 equipage for the

aircraft specified in Annex 6 by March 31, 2001. The ICAO NAT Region encompasses most of WATRS airspace.

e. EUROPEAN COUNTRY REQUIREMENTS FOR ACAS II.

The requirements for ACAS II equipage in European countries have been published in the European Regional Supplements contained in ICAO Doc 7030: European Supplement paragraph 16.1 (Carriage and operation of ACAS II) calls for the aircraft specified in Annex 6, Part 1 to be ACAS II equipped by 1 January 2000. In response to the lack of availability of version 7, the European Civil Aviation Conference (ECAC) member States have granted exemptions to allow aircraft to continue to operate until 31 March 2001 with TCAS, Version 6.04 Enhanced.

f. REQUIREMENTS FOR TCAS II, VERSION 7 IN COUNTRIES IN THE PACIFIC AND ASIAN REGIONS.

The ICAO Bangkok office has conducted a survey of countries in Asia and the Pacific to determine those countries that have established or plan to establish requirements for ACAS II equipage in their airspace. To date, 28 countries have established or are developing requirements for operators to equip by the ICAO Annex 6 compliance date of 1 January 2003 or sooner. This list includes: Australia, China, Japan, Korea, New Zealand and Singapore.

6. EFFECT OF LINKING TCAS II, VERSION 7 EQUIPAGE TO RVSM OPERATIONS

The proposal is that aircraft used in RVSM operations and equipped with TCAS II be equipped version 7.0 because it is compatible with RVSM operations. Because other countries and ICAO Regions are already requiring ACAS II (Version 7), however, the economic and aircraft engineering impact directly related to this proposal will be minimal.

RVSM is currently applied only in certain major oceanic airspaces outside the US - the NAT and Pacific. As detailed above, requirements for TCAS, Version 7 have already been established for operators and aircraft operating outside the US to destinations in Europe, Asia and the Pacific. Since operators will already be required to equip with TCAS II, Version 7 to operate in the airspace of most countries in the Pacific and European regions, the effect of requiring TCAS II, version 7.0 for RVSM operations after March 31, 2002 will be minimal.

7. JUSTIFICATION FOR COMPLIANCE DATE

The FAA proposes that operators be required to incorporate Version 7.0 software into TCAS II equipment when used in RVSM operations after March 31, 2002. The following are factors the FAA considered in arriving at this proposed date.

First, an earlier date has not been proposed because adequate numbers of Version 7.0 units and upgrade kits have not been available to operators. This is one reason that European aviation authorities delayed the TCAS II, Version 7.0 requirement for European airspace to March 31, 2001. A large number of U.S. operators will be complying with the European requirements for their operations. In proposing a compliance date for this amendment, the FAA has allowed adequate time for additional Version 7.0 units and upgrade kits to be made available following the European compliance date, for other operators. This will allow 12 months after the initial demand for Version 7.0 to meet the European requirement, for adequate numbers of modified TCAS units to be made available to operators not covered by the European requirement.

Second, incorporation of version 7.0 in TCAS II units is not a major aircraft engineering effort. Incorporation of version 7.0 is a software change. Existing equipment is removed from the aircraft and the Version 7.0 software modification is accomplished by an authorized service facility. Considering these factors, the FAA believes establishing a requirement for incorporation of version 7.0 for operations after March 31, 2002 will provide adequate time for all aircraft operating in RVSM.

Regulatory Evaluation Summary

Proposed changes to Federal regulations must undergo several economic analyses. First, Executive Order 12866 directs 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 requires agencies to analyze the economic impact of regulatory changes on small entities. Third, the Trade Agreements Act (19 U.S.C. section 2531-2533) 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 also requires the consideration of international standards and, where appropriate, that they be the basis of U.S. standards. And fourth, the Unfunded Mandates Reform Act of 1995 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).

In conducting these analyses, the FAA has determined this rule: 1) has benefits which do justify its costs, is not a "significant regulatory action" as defined in the Executive Order and is not "significant" as defined in DOT's

Regulatory Policies and Procedures; 2) will not have a significant impact on a substantial number of small entities; 3) reduces barriers to international trade; and 4) does not impose an unfunded mandate on state, local, or tribal governments, or on the private sector. These analyses, available in the docket, are summarized below.

This proposal amends 14 CFR part 91, appendix G, section 8 (Airspace Designation) by adding the New York FIR portion of the WATRS airspace to the list of airspaces where RVSM would be implemented. The benefits of this proposed rulemaking are (1) an increase in the number of available flight levels, (2) enhance airspace capacity, (3) permit operators to operate more fuel/time efficient tracks and altitudes, and (4) enhance air traffic controller flexibility by increasing the number of available flight levels, while maintaining an equivalent level of safety.

The FAA estimates that this proposed rule would cost U.S. operators \$26.0 million for the fifteen-year period 2001-2015 or \$23.3 million, discounted. The costs can be considered voluntary as they would be incurred only by operators that participate in WATRS RVSM. However, operators of non-RVSM aircraft would still be able to fly above or beneath the WATRS RVSM airspace. Benefits would begin accruing in 2001. Estimated benefits, based on fuel

savings for the commercial aircraft fleet over the years 2001 to 2015, would be \$34.7 or discounted at \$19 million.

In addition to fuel savings, many non-quantifiable or value-added benefits would result from the implementation of RVSM in WATRS. Input from air traffic managers, controllers, and operators has identified numerous additional benefits.

Through implementation of RVSM in the North Atlantic (NAT) and Pacific (PAC) regions, operators and controllers have realized some additional benefits. The major additional benefits as identified by air traffic managers and controllers are:

- Enhanced capacity
- Reduced airspace complexity
- Decreased operational errors in these regions
- Reduction of user-requested off course climbs for altitude changes
- Improved flexibility for peak traffic demands
- More options in deviating aircraft during periods of adverse weather

The benefits outlined above for RVSM in the NAT and PAC regions are anticipated in WATRS as well. There should be expected efficiencies through reduced airspace

complexity, increased flight levels, and fewer altitude changes with crossing traffic.

Operators can expect increased performance due to greater airspace capacity eliminating current restrictions to desired airspace. Operators can also expect increased aircraft performance and decreased delays due to improved airspace efficiency. Specific benefits cited by aircraft operators are:

- Decreased flight delays
- Improved access to desired flight levels
- Reduced average flight times
- Increased availability of step climbs
- Increased likelihood of receiving a clearance for weather deviations
- Seamless, transparent, and harmonious operations between the NAT and WATRS regions
- Consistent procedural environment throughout the entire flight
- Reduced impact of adverse weather by permitting aircraft deviations to other airways without any efficiency loss.

Implementation of RVSM in WATRS should result in increased user satisfaction.

The benefits described in this section are compelling in number and operational impact. These benefits are also significant in that they are enjoyed both by air traffic service providers and aircraft operators.

TCAS II Version 7 is also included in this rule as described in a previous section. There is no economic impact to operators upgrading to TCAS II Version 7 because many destination countries served by U.S. air carriers already require this equipment.

Initial Regulatory Flexibility Determination

The Regulatory Flexibility Act of 1980 establishes "as a principle of regulatory issuance that agencies shall endeavor, consistent with the objective of the rule and of applicable statutes, to fit regulatory and informational requirements to the scale of the business, organizations, and governmental jurisdictions subject to regulation." To achieve that principle, the Act requires agencies to solicit and consider flexible regulatory proposals and to explain the rationale for their actions. The Act 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 proposed or final rule will have significant economic

impact on a substantial number of small entities. If the determination is that it will, the agency must prepare a regulatory flexibility analysis (RFA) as described in the Act.

However, if an agency determines that a proposed or final rule is not expected to have a significant economic impact on a substantial number of small entities, section 605(b) of the 1980 Act provides that the head of the agency may so certify and an RFA is not required. The certification must include a statement providing the factual basis for this determination, and the reasoning should be clear.

Operators that met the Small Business Administration (SBA) small entity criteria were extracted from the 44-day traffic sample of Enhanced Traffic Management System (ETMS) data. These operators were cross-referenced with the Central Monitoring Agency (CMA) and the Asia Pacific Approvals and Monitoring Organization (APARMO) databases to determine if they operated any RVSM-approved aircraft. The small entity operators with RVSM-approved aircraft were not considered further in this impact determination.

The list of potential small entity operators, taken from the traffic sample, was used to identify six operators currently reporting financial data to the FAA

Bureau of Transportation Statistics. Revenue information for these small entities for year 1999 was obtained from the *Air Carrier Financial Statistics Quarterly*. The operators were then ranked with respect to their total operating revenue. Using this financial data, the impact threshold of \$305,540.00 was determined for the six small entity operators. The impact threshold, which is calculated as 1% of the 1999 median impacted small business annual revenues, was compared to the cost of compliance.

Research of operators in WATRS has revealed that implementation of RVSM in WATRS would impact only one small entity operator. Moreover, the costs of implementing RVSM are not mandated by the FAA. These costs will be voluntarily incurred by those small operators who wish to participate in the RVSM program in WATRS. The FAA, therefore concludes that a substantial number of small entity operators would not be significantly affected by the proposed rule. Accordingly, pursuant to the Regulatory Flexibility Act, 5 U.S.C. 605(b), the Federal Aviation Administration certifies that this rule would not have a significant impact on a substantial number of small entities.

International Trade Impact Statement

The Trade Agreement Act of 1979 prohibits Federal agencies from engaging in any standards or related activities that create unnecessary obstacles to the foreign commerce of the United States. Legitimate domestic objectives, such as safety, are not considered unnecessary obstacles. The statute also requires consideration of international standards and where appropriate, that they be the basis for U.S. standards. In addition, consistent with the Administration's belief in the general superiority and desirability of free trade, it is the policy of the Administration to remove or diminish to the extent feasible, barriers to international trade, including both barriers affecting the export of American goods and services to foreign countries and barriers affecting the import of foreign goods and services into the United States.

In accordance with the above statute and policy, the FAA has assessed the potential effect of this proposed rule and has determined that it would impose the same costs on domestic and international entities and thus has a neutral trade impact.

Federalism Implications

The regulations proposed herein would not have a substantial direct effect on the States, on the relationship between the national government and the States, or on the distribution of power and responsibilities among the various levels of government. Therefore, in accordance with Executive Order 12612, it is determined that this proposal would not have sufficient federalism implications to warrant the preparation of a Federalism Assessment.

Paperwork Reduction Act of 1995

The reporting and record keeping requirements associated with this rule remain the same as under the current rules and have previously been approved by the Office of Management and Budget under the provisions of the Paperwork Reduction Act of 1980 (Pub. L. 96-511) and have been assigned OMB Control Numbers 2120-0026. The FAA believes that this rule does not impose any additional record keeping or reporting requirements.

Unfunded Mandates Reform Act of 1995 Assessment

The Unfunded Mandates Reform Act of 1995 (the Act), enacted as Pub. L. 104-4 on March 22, 1995, is intended, among other things, to curb the practice of imposing

unfunded Federal mandates on State, local, and tribal governments.

Title II of the Act 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 a \$100 million or more expenditure (adjusted annually for inflation) in any one year by State, local, and tribal governments in the aggregate, or by the private sector; such as a mandate is deemed to be a "significant regulatory action."

This proposed rule does not contain such a mandate. Therefore, the requirements of Title II of the Unfunded Mandates Reform Act of 1995 do not apply.

International Civil Aviation Organization and Joint Aviation Regulations

In keeping with U.S. obligations under the Convention on ICAO, it is FAA policy to comply with ICAO Standards and Recommended Practices (SARP) to the maximum extent practicable. The operator and aircraft approval process was developed jointly by the FAA and the JAA under the auspices of NATSPG. The FAA has determined that this amendment does not present any difference.

Environmental Analysis

FAA Order 1050.1D defines FAA actions that may be categorically excluded from preparation of a National Environmental Policy Act (NEPA) environmental assessment or environmental impact statement. In accordance with FAA Order 1050.1D, appendix 4, paragraph 4(j), regulations, standards, and exemptions (excluding those, which if implemented may cause a significant impact on the human environment) qualify for a categorical exclusion. The FAA proposes that this rule qualifies for a categorical exclusion because no significant impacts to the environment are expected to result from its finalization or implementation.

Energy Impact

The energy impact of this proposed rule has been assessed in accordance with the Energy Policy and Conservation Act (EPCA) and Public Law 94-163, as amended (42 U.S.C. 6362). It has been determined that this proposed rule is not a major regulatory action under the provisions of the EPCA.

List of Subjects in 14 CFR Part 91

Air-traffic control, Aircraft, Airmen, Airports,
Aviation safety, Reporting and record-keeping requirements.

The Proposed Amendment

For the reasons discussed in the preamble, the Federal
Aviation Administration proposes to amend part 91 of Title
14 of the Code of Federal Regulations as follows:

PART 91--GENERAL OPERATING AND FLIGHT RULES

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

Authority: 49 U.S.C. 106(g), 1155, 40103, 40113,
40120, 44101, 44111, 44701, 44709, 44711, 44712, 44715,
44716, 44717, 44722, 46306, 46315, 46316, 46502, 46504,
46506-46507, 47122, 47508, 47528-47531.

2. In Appendix G, amend Section 2 by revising paragraph
(g), and adding a new paragraph (h) *and revision section 8* to read as follows:

APPENDIX G TO PART 91 -- OPERATIONS IN REDUCED VERTICAL
SEPARATION MINIMUM (RVSM) AIRSPACE

* * * * *

Section 2. Aircraft Approval

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(g) Traffic Alert and Collision Avoidance System
Compatibility With RVSM Operations: All aircraft. After

*nmw
12-11-00*

March 31, 2002, unless otherwise authorized by the FAA, if you operate an aircraft that is equipped with TCAS II in RVSM airspace, it must be a TCAS II that meets TSO C-119b (version 7.0), or a later version.

(h) If the FAA finds that the applicant's aircraft comply with this section, we will notify the applicant in writing.

* * * * *

3. In Appendix G, Section 8 is revised as follows:

Section 8. Airspace Designation

(a) RVSM may be applied in the NAT in the following ICAO Flight Information Regions (FIRs): New York Oceanic, Gander Oceanic, Sondrestrom FIR, Reykjavik Oceanic, Shanwick Oceanic, and Santa Maria Oceanic. RVSM may be effective in the Minimum Navigation Performance Specifications (MNPS) airspace within the NAT. The MNPS airspace within the NAT is defined by the volume of airspace between FL 285 and FL 420 extending between latitude 27 degrees north and the North Pole, bounded in the east by the eastern boundaries of control areas Santa Maria Oceanic, Shanwick Oceanic, and Reykjavik Oceanic and in the west by the western boundaries of control areas Reykjavik Oceanic, Gander Oceanic, and New York Oceanic,

12-12-00
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excluding the areas west of 60 degrees west and south of 38 degrees 30 minutes north.

(b) RVSM may be applied in the Pacific in the following ICAO Flight Information Regions (FIRs): Anchorage Arctic, Anchorage Continental, Anchorage Oceanic, Auckland Oceanic, Brisbane, Edmonton, Honiara, Los Angeles, Melbourne, Nadi, Naha, Nauru, New Zealand, Oakland, Oakland Oceanic, Port Moresby, Seattle, Tahiti, Tokyo, Ujung Pandang, and Vancouver.

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12-12-00

(c) RVSM may be applied in the New York FIR portion of the West Atlantic Route System (WATRS). The area is defined as beginning at a point 38°30'N/60°00'W direct to 38°30'N/69°15'W direct to 38°20' N/69°57'W direct to 37°31'N/71°41'W direct to 37°13'N/72°40'W direct to 35°05'N/72°40'W direct to 34°54'N/72°57'W direct to 34°29'N/73°34'W direct to 34°33'N/73°41'W direct to 34°19'N/74°02'W direct to 34°14'N/73°57'W direct to 32°12'N/76°49'W direct to 32°20'N/77°00'W direct to 28°08'N/77°00'W direct to 27°50'N/76°32'W direct to 27°50'N/74°50'W direct to 25°00'N/73°21'W direct to 25°00'05"N/69°13'06"W direct to 25°00'N/69°07'W direct to 23°30'N/68°40'W direct to 23°30'N/60°00'W to the point of beginning.

Issued in Washington, DC, on December 6, 2000.



Acting
Ava L. Mims
Director, Flight Standards Service

*nm
12-12-00*