

STRAIGHT TALK ABOUT

RVSM

Editor's Notes

The growing demand for air travel has nearly saturated the world's airways, but years of careful scrutiny have resulted in the selection of RVSM to relieve the crowded skies. The success of the initial RVSM regions paved the way for RVSM expansion into regions governed by Eurocontrol, Nav Canada, the FAA and other national regulatory agencies. RVSM will continue to affect the operations of every jet and many turboprops for years to come.

RVSM facilitates more on-time departures and arrivals, enhancing the value of airline and business aircraft travel. The airlines have been avid RVSM supporters since its inception because preferred routing, fuel savings and fewer delays will yield greater profits. In fact, the FAA estimates the increased access to fuel-efficient altitudes created with U.S. Domestic RVSM (DRVSM) will deliver approximately \$500 million in fuel savings each year.

The relatively small number of dissimilar airframes has made RVSM certification a manageable task for the airlines. Conversely, the wide array of airframes comprising the business aircraft community has complicated certification. Though nearly every general aviation aircraft has received RVSM certification, maintaining that certification has become a cloudy process for operators. In addition, new Height Monitoring Requirements are now a reality and RVSM flights in Europe have meant a lot of education for everyone.

We invite you to call today for advice—without cost or obligation. We understand the RVSM initial certification and continued compliance needs for your situation.

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RVSM: The Facts

RVSM History

Though the airspace surrounding the world's larger airports has long been very crowded, an increase of daily flights between Europe, North America and Asia in the early 1970s was a warning sign that airway traffic would one day bulge at the seams. It was the foresight of these unavoidable bottlenecks that bore the concept that was later dubbed Reduced Vertical Separation Minimum (RVSM).

In 1978, the International Civil Aviation Organization (ICAO) initiated studies to investigate the feasibility of reducing the vertical spacing between aircraft to increase the number of aircraft that could utilize a given airspace while maintaining an acceptable measure of safety. The detailed plan called for the reduction of the vertical space between aircraft from 2,000 feet to 1,000 feet at flight levels above 29,000 feet, adding six more flight levels. Completed in 1988, these studies proved the goal of RVSM was attainable and RVSM was capable of offering increased traffic density, preferred routing and fuel economy. Above all, it offered all these advantages with the highest levels of safety. Implementation of RVSM was initiated with an evaluation phase in the North Atlantic in 1997.

This evaluation phase was followed with full implementation in this region in October 1998. Since then, many other regions around the world have incorporated RVSM as well. The FAA, Eurocontrol, Nav Canada and other regional agencies supported ICAO in its efforts and have since initiated their own vertical separation programs.

When the FAA published its final ruling on the RVSM mandate, it stated that the FAA required all aircraft and flight crews operating in DRVSM airspace to be RVSM compliant by January 20, 2005. Since then RVSM has become a reality to all operators and the maintaining RVSM certification has become a part of routine operations.





Highlights of RVSM

RVSM Approval Requirements

How your aircraft is operated determines the specific RVSM approval requirements. Part 91 regulations require the aircraft operator to have a Letter of Authorization (LOA) for operations in RVSM airspace and an FAA approved RVSM maintenance program. The LOA will specify that the operator is authorized to conduct operations within the airspace designated as RVSM airspace within the limitations of the LOA. It also specifies the:

- Authorized airplanes the operator is authorized to use in designated RVSM airspace
- Crew Training Requirements
- Responsible Person
- Any deviation to RVSM requirements the operator must follow

The LOA specifically states that in order to exercise your RVSM authority, the operator must maintain their aircraft in accordance with their FAA approved RVSM maintenance program.

The LOA is usually signed by the FAA Principal Inspector for the operator and the Responsible Person for the 91 operator.

Part 91K regulations (fractional operators) require the aircraft operator to have their Management Specifications state that they may operate in RVSM airspace as long as they follow their FAA approved RVSM maintenance program.

Part 121 and 135 regulations require the aircraft operators have their Operation Specifications which state that they are authorized for operations in RVSM airspace.

Your FAA approved RVSM maintenance program may be a part of your GMM. In this instance, the RVSM section must have a separate FAA approval.

Approval of the operator's RVSM manual in most instances is accomplished by your local FAA Flight Standards District Office stamping the manual approved and affixing the inspector's signature.

Online Resources

FAA RVSM web site: www.faa.gov/about/office_org/headquarters_offices/ato/service_units/enroute/rvsm/documentation/

Eurocontrol RVSM web site: www.ecacnav.com/RVSM

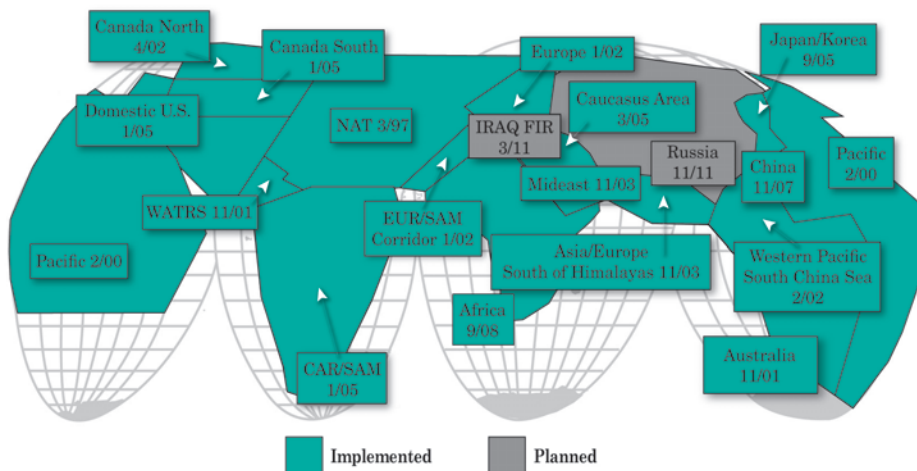
Training syllabus for using TCAS in RVSM airspace:

<http://adsb.tc.faa.gov/TCAS.htm>

www.flightsafety.com/learning/tcas.php

RVSM Ops Manual Providers: www.aviationmanuals.com

www.gln-compliance.com www.avsourcemanuals.com



Maintaining your Aircraft to
RVSM Requirements



FAA Approved Maintenance Program

Your aircraft may be equipped and certified for RVSM airspace, but that's only part of the requirement. You need to have a Letter of Authorization and an FAA approved RVSM maintenance program before operation into RVSM airspace is permitted.

Simple changes to your aircraft can render your RVSM maintenance program unapproved, and therefore your ability to fly in RVSM airspace. A registration number change will invalidate your RVSM maintenance program and your LOA, since the registration number is displayed on your LOA and in some instances, on your program.

Letter of Authorization (LOA)

Any requirements dictated by your Letter of Authorization (LOA) that have changed will void your authorization to operate in RVSM airspace. Registration number changes, crew training not up to date, or a change in the responsible person require the operator to get the changes approved by their FSDO.

Critical Equipment

Each FAA approved RVSM maintenance program will list equipment that is critical for RVSM operations. This equipment, if removed, replaced, or even functional tested, require the maintenance to be accomplished in accordance with the operator's RVSM maintenance program. Operators will need to provide their FAA approved RVSM maintenance program to the maintenance technician to ensure continued compliance when maintaining these critical items.

Changes in Aircraft Ownership

Unlike your typical 91.411 Altimeter Systems and 91.413 ATC Transponder certifications, if you transfer ownership of your aircraft your FAA approved RVSM maintenance program and any authorization for that aircraft to operate in RVSM airspace is no longer valid. The new owner/operator will need to work with their local FSDO and meet the requirements to obtain RVSM operation approval.

Different Operators Utilizing the Same Aircraft

If you are in a situation where you and others operate the same aircraft, each operator is required to have their own FAA approved RVSM maintenance program and authorizations in accordance with the type of operations flown.



New Height Monitoring Requirements



Background

The FAA has recently clarified the requirements for “Height Monitoring.” This is where your aircraft is either measured from the ground automatically by an Aircraft Geometric Height Measurement Element (AGHME) Station, or in-flight by a GMU Technician, in order to double-check that your aircraft is indeed flying within RVSM standards. AGHME Stations are strategically placed across the US and Canada. The AGHME system does not require that any special monitoring devices be installed on an aircraft in order that it be monitored. It is necessary, however, that the aircraft have an operational Mode S transponder. Future AGHME software development will relax this requirement to that of an operational Air Traffic Control Radar Beacon System transponder.

More can be learned about height monitoring requirements at: www.faa.gov/air_traffic/separation_standards/aghme/

The height-keeping performance of aircraft is a key element in ensuring the safe operations of RVSM airspace. The RVSM monitoring standards are considered the minimum requirement needed to maintain the safety of operations in RVSM designated airspace.

In conjunction with internationally agreed upon changes to ICAO Annex 6, Operation of Aircraft, Parts I & II, applicable on 18 November 2010, the following standard and recommended practice was adopted by the International Civil Aviation Organization (ICAO):

Operators, who have been issued an US RVSM LOA for a fleet of several aircraft, need to ensure that a minimum of two of those aircraft of each [RVSM] type grouping have their height-keeping performance monitored, at least once every two years or within intervals of 1,000 flight hours per airplane, whichever period is longer. If an operator aircraft type grouping consists of a single airplane, monitoring of that airplane shall be accomplished within the specified period.

Long Term Requirements

The Federal Aviation Administration will implement the standard above for RVSM Monitoring requirements. Operators that have been issued a U.S. RVSM authorization will be required to conduct initial monitoring within six months of date of issue and must conduct monitoring every two years or within intervals of 1,000 flight hours per aircraft, whichever period is longer, in accordance with the aircraft categories as presented in the current version of the (North American) RVSM Minimum Monitoring Requirements chart.

The RVSM Minimum Monitoring Requirements chart is coordinated with the North American Approvals Registry and Monitoring Organization (NAARMO) and updated periodically to reflect changes in aircraft data. The RVSM Minimum Monitoring Requirements Chart is posted to the FAA RVSM webpage in documentation section “Monitoring Requirements/Procedures.” The Monitoring requirements become applicable on 18 May 2011 and operators have until 18 Nov 2012 to comply.

Compliance

Operators found not in compliance will be required to show reason for not meeting the requirements including flight hour data to justify the 1,000 flight hour provision if the last successful monitoring exceeds a two year period.

Operators found not in compliance with the minimum monitoring requirements risk suspension of their RVSM authorization. Reinstatement of RVSM authorization will be granted upon the operator demonstrating they have met the minimum monitoring requirements.



Operating in Europe



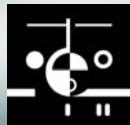
RVSM Flights in Europe

The FAA forwards U.S. aircraft and operator approval and monitoring flight information to Eurocontrol. When the FAA approves U.S. aircraft and operators for RVSM and when a successful monitoring flight is completed, the aircraft and operator information is stored on the FAA/US RVSM Approvals/Monitoring Database. This database is maintained at the FAA Technical Center in Atlantic City, NJ. The U.S. Database information is forwarded to Eurocontrol.

It takes time for U.S. operator/aircraft approval information to get to the FAA Technical Center database and then over to Eurocontrol. That is the reason that, at times, an approved U.S. operator is not yet listed on the Eurocontrol database when the operator contacts the Eurocontrol User Support Cell. Eurocontrol expects each operator to contact the appropriate staffer on the Cell prior to starting RVSM operations in Europe.



Questions and Answers



Am I required to have ACAS/TCAS for RVSM operations?

Not in the United States, or the NAT and PAC oceanic areas. However, Eurocontrol has mandated the use of ACAS II in European airspace for all aircraft over 15,000 kg (33,000 lbs) and as of 2005, aircraft 12,500 lbs and over are required to have ACAS II. Operation in RVSM airspace (excluding Europe) does not include a TCAS requirement. It does, however, require MOPS 7 software for TCAS II-equipped aircraft. That is TCAS version 7.0 software.

TCAS version 7.1 will soon be offered as an upgrade by all of the major TCAS manufacturers, and also makes two important safety enhancements. Version 7.1 changes the current TCAS II aural warning from “Adjust Vertical Speed, Adjust” to “Level Off, Level Off.” It also corrects missed and late TCAS reversals. TCAS reversals were introduced in TCAS version 7.0 to adapt to changing situations where the original sense had clearly become the wrong thing to do, in particular the situation when one of the pilots decides not to follow the Resolution Advisory (RA), or is instructed by ATC to perform a particular maneuver. The solution in Change 7.1 introduces improvements to the current reversal logic to address late issuance of reversal RAs and potential failures to initiate reversal RAs.

TCAS version 7.1 also makes four other minor enhancements to the system. Version 7.1 corrects an issue when descending through 1,000 ft AGL. 7.1 also modifies the “Datalink Capability Report” (the TCAS status report sent by the TCAS processor to the Mode S transponder) to tell the systems that the TCAS processor is Hybrid Surveillance-capable. And 7.1 also allows for the transmission of the TCAS processor part number and software level, and corrects TCAS multi-aircraft logic issues which reduces the risk of “close-encounters” of multiple aircraft in RVSM airspace.

The enhancements introduced in TCAS version 7.1 proved to be significant enough to warrant mandates by both the International Civil Aviation Organization (ICAO), and the European Aviation Safety Agency. ICAO has mandated TCAS version 7.1 by January 1, 2014 for forward fit aircraft, and January 1, 2017 for retrofit aircraft. EASA has stepped their time-table up by comparison with forward fit aircraft due by March 1, 2012, and retrofit aircraft by March 1, 2014.

Can I use my TCAS system in RVSM airspace?

Yes! However, additional training and proficiency in TCAS operation must be demonstrated prior to obtaining RVSM operational approval. This is because the 1,200 foot vertical detection range of the original TCAS was designed for the 2,000 foot vertical separation standard. For a training syllabus, visit: www.faa.gov/ats/ato/150_docs/tcas_5.doc.

How do I know if RVSM certification is available for my aircraft?

Start by calling your aircraft OEM or a service provider such as Duncan Aviation. They will know the current and future RVSM certification status of your aircraft model. Another source is: www.faa.gov/ats/ato/150_docs/GA-RVSM-0201.doc. Also, the appropriate SB regarding RVSM for your aircraft will verify if the altimetry equipment currently installed in your aircraft is adequate for RVSM approval.



What if my aircraft is not included in any group solution?

Your aircraft will have to be individually approved (see page 8). RVSM-compliant altimetry equipment must be installed by an existing or new STC. Then the aircraft, with the RVSM-compliant equipment installed, must undergo a trailing cone test flight to verify the existing SSEC (Static System Error Correction) or determine new correction. A second STC (operational) must be developed that incorporates the new SSEC, maintenance procedures for continued airworthiness, MEL requirements and operational procedures. Some facilities capable of performing flight tests and developing an operational STC include:

AeroMech, Inc:	<i>www.aeromechinc.com</i>
Aerodata Systems:	<i>www.aerodatasys.com</i>
Flight Test Associates:	<i>www.flttest.com</i>
Kohlman Systems:	<i>www.kohlmansystems.com</i>

Following FAA acceptance of the operational STC, the operator must follow the operator approval steps outlined on page 7 of this book.

What does “SSE” and “SSEC” mean?

Static System Error (SSE) is the difference between the altitude indicated by the aircraft altimetry (ports, probes, plumbing, etc.) and actual altitude. Static System Error Correction (SSEC) is the correction applied to new or existing altimeters that enables them to measure altitudes to RVSM standards (+/- 20 feet). We have found that very few existing altimetry systems meet RVSM tolerances. This is due to the lack of technology available when they were built.

Determining SSEC for RVSM certification is a complex and expensive process. It typically involves extensive flight testing using a trailing cone or specially calibrated chase aircraft. The data gathered by these means is compared with cockpit data to determine the SSEC.

What happens if my aircraft does not meet the “Group Criteria?”

If the existing aircraft systems, airframe structure and/or flight test data of your aircraft do not meet the acceptable group parameters, group approval may not be possible. If possible, you may opt to correct the limiting condition(s). Another option is to continue certification efforts under an individual, non-grouped approval. Each aircraft that is approved individually (non-grouped) requires a unique operational STC and, depending on the existing equipment, may also need a separate equipment STC.

Am I required to obtain a new LOA (Letter of Authorization) before I fly into a new RVSM region?

No! However, the operator must address the subjects that are unique in the new RVSM area of operations. (See IG 91RVSM, Paragraph 11.)



Key Terms



ACAS – Airborne Collision Avoidance System

ACO – Aircraft Certification Office

ASC – Aircraft Service Change

ASE – Altimetry System Error

DRVSM – Domestic RVSM - United States airspace

FSDO – Flight Standards District Office

GMM – General Maintenance Manual

GMU – GPS Monitoring Unit

HMU – Height Monitoring Unit

ICAO – International Civil Aviation Organization

LOA – Letter of Authorization

MEL – Minimum Equipment List

MNPS – Minimum Navigation Performance Specification

MOPS – Minimum Operation Performance Standards

NAT – North Atlantic Tracks

NPRM – Notice of Proposed Rule Making

OEM – Original Equipment Manufacturer

PAC – Pacific Ocean airspace

RNP – Required Navigation Performance

RVSM – Reduced Vertical Separation Minimum

SB – Service Bulletin

SSE – Static System Error

SSEC – Static Source Error Correction

STC – Supplemental Type Certificate

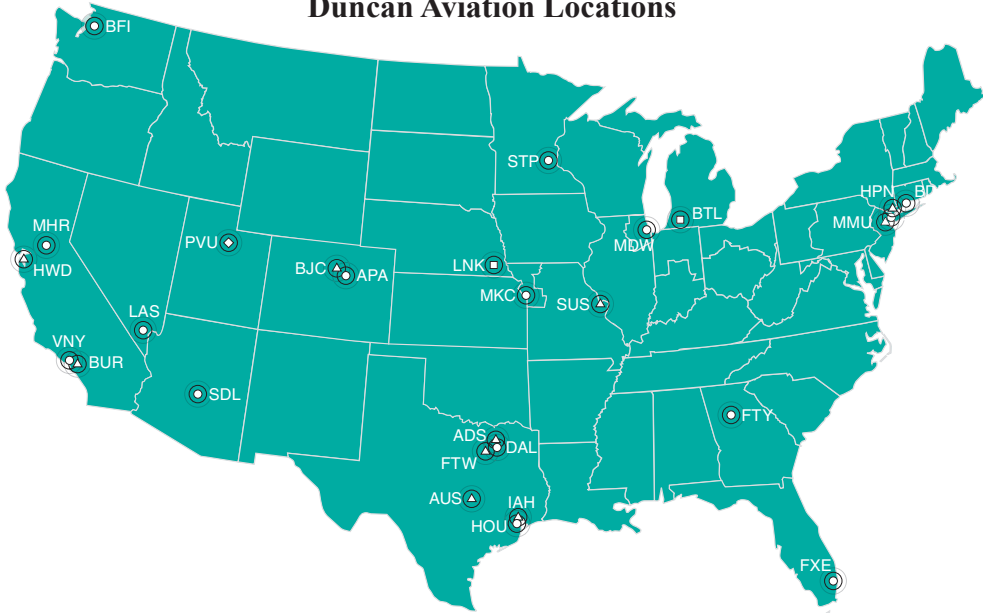
TC – Type Certificate

TCAS – Traffic Collision Avoidance System

WATRS – Western Atlantic Route System



Duncan Aviation Locations



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