

Time to RSVP Your RVSM

by Stan Smith

RVSM (Reduced Vertical Separation Minimum) in the domestic U.S. airspace, otherwise known as DRVSM, is less than two years away. Slated to be implemented January 20, 2005, every operator without RVSM certification will be restricted from flying above 28,000 feet (FL280).

Are there any ways around this restriction? And if not, what do you need to do to become RVSM certified? The answer to the first question is (almost) an unequivocal no. The answer to the second question is to start the process sooner than later.

What is RVSM anyway? In the simplest terms it means the implementation of 1,000-foot spacing between aircraft for all hemispheric altitudes above FL290 up to FL410. As you recall, IFR hemispheric altitudes presently jump from 1,000- to 2,000-foot increments above FL290; meaning FL300, FL320, FL340, FL360, FL380 and FL400 are not used.

The original reason for the 2,000-foot increment is a lack of altimeter accuracy in the thin atmosphere at high altitudes, meaning an unacceptable margin of safety at 1,000-foot increments. RVSM takes advantage of advances in altimeters, autopilots and altitude-alerting systems to permit safe, 1,000-foot spacing. Availing pilots and ATC those extra flight levels reduces airspace saturation and allows earlier climbs, optimum altitude assignments and more direct routing, which reduces flight times and saves fuel.



RVSM is presently mandated in the North Atlantic, Europe, West Atlantic Route System (WATRS - that airspace controlled by NY Flight Information Region), Pacific Region, and Northern Canadian Domestic airspace, and as of this writing is scheduled for implementation over the 48 contiguous states, Alaska, Southern Canadian Domestic airspace, Atlantic and Gulf of Mexico high offshore airspace where the FAA provides air traffic services, and the San Juan Flight Information Region in January 2005. The Caribbean Region and South America have indicated their intent to implement on the same date.

What You Can Expect

Let's elaborate on the question of circumnavigating the RVSM restrictions once implemented. The exceptions include air ambulance flights, state aircraft (i.e.: military flights on missions specifically exempted) and some ferry flights. Unapproved aircraft may be permitted, at ATC discretion, to climb through RVSM airspace to cruise altitudes at or above FL430.

You may have heard about some operators requesting and receiving ATC clearance to climb and cruise at RVSM flight levels without certification. This has primarily occurred in the Pacific region where controllers have more airspace and have tried to accommodate aircraft. However, it is not an approved procedure and certainly can not be considered a viable option when flight (fuel) planning. The FAA is looking to standardize compliance requirements, and I would expect them to follow the European model of little to no leniency, especially once DRVSM is implemented.

If one airplane is non-compliant, then ATC must provide that air-

craft 2,000-foot separation from all other aircraft. DRVSM could be phased in as far as incremental flight levels, as was done over the North Atlantic. But the FAA has announced that such increments present more problems than solutions and are therefore not expected.

So what does a Part 91 operator need to be certified to fly in RVSM airspace? The short answer is a Letter of Authorization (LOA) from the FAA. But, before issuing you an LOA, the FAA is obligated to ensure that, (1) your airplane is capable of safe altitude separation in RVSM airspace, (2) the operators understand the equipment required and procedures required for RVSM operations, and (3) your maintenance procedures ensure aircraft equipment reliability. Let's walk through the RVSM approval process:

Step 1: Meet the FAA

To receive an LOA, the first step is to make an appointment with your FAA Flight Standards District Office for a pre-application meeting. You can expect to discuss your operation and the FSDO's specific requirements for approval. To this end, there are four major requirements the FSDO will want to verify before they will issue your operation an RVSM LOA:

- RVSM pilot training
- Certification of the aircraft
- Written RVSM procedures specific to your operation
- Written maintenance procedures to maintain, inspect and return to service RVSM critical components

Following that, they will cut you loose to gather all the pertinent information and develop your own RVSM application to convince them of your ability to comply.

"Pre-application meeting" is somewhat of a misnomer in that there is no printed application for which you simply fill in the pertinent data. You must develop your own application that addresses your specific operation, aircraft and circumstances. A sample application is available online at http://www1.faa.gov/ats/ato/150_docs/Sample%20Application.doc.

Step 2: RVSM Pilot Training

FAR 91 Appendix G requires only Part 135 and 121 operators to demonstrate initial and recurrent pilot training for RVSM operations, seemingly ignoring Part 91 operators. The next paragraph however states that each operator must validate and demonstrate that "each pilot has an adequate knowledge of RVSM requirements, policies and procedures." This appears to leave it open to interpretation and up to the FSDO issuing the LOA. It's a great question to ask your inspector at the pre-application meeting, but don't be surprised when the answer is, "Show me a certificate of completion from a credible RVSM training course."

There are various training centers around the country that offer RVSM pilot training. FlightSafety International, for instance, offers the initial three-hour course for approximately \$500 (no charge to "full service" customers). The class covers theory and general operating procedures in various RVSM airspaces. If you are strictly interested in DRVSM, don't be confused when the curriculum includes more than RVSM. Minimum Navigation Performance Specification (MNPS), Required Navigation Performance (RNP), RNP-10, and RNP-5 instruction is included as each pertains not necessarily to RVSM, but to RVSM-designated airspace in Europe, the

Pacific and the North Atlantic. The advantage is you kill several training birds with one stone, but remember to compartmentalize the different subjects.

Step 3: **Certification of Aircraft**

Your airplane must meet stringent RVSM airworthiness standards to be approved. These standards will include the requirement for dual independent altimetry systems, ATC altitude reporting equipment, automatic altitude control system, altitude deviation alerting and, if TCAS II is installed, version 7 software is required. If the airplane is not physically in compliance, then you must have the work performed.

Your airplane will fall into one of two categories – *group-approved* aircraft or *nongroup-approved* aircraft. Group-approved aircraft have been manufactured and/or RVSM modified to a “nominally identical design” as aircraft already flight tested and RVSM certified. If your aircraft model is group approved but is not modified, there is an STC or SB you can accomplish to qualify.

Nongroup aircraft are defined as those that do not qualify as group aircraft or are presented as an individual aircraft for approval. All nongroup aircraft must be flight tested to certify the installation design. Note: “Flight testing” should not be confused with “flight monitoring” which occurs later in the approval process to ensure individual aircraft meet altitude standards.

If you don't already have that information readily available, contact the aircraft manufacturer or design organization to obtain RVSM airworthiness approval documentation. If the aircraft is

already in service, this could be a Service Bulletin (SB), Aircraft Service Change (ASC), Supplemental Type Certificate (STC), or other format the FAA accepts.

If the aircraft is new or still in production, the documentation may be included in the Airplane Flight Manual, a Type Certificate Data Sheet, or other format found acceptable. If the aircraft is nongroup approved, you will have to develop and provide the flight test data to support your application.

The FAA will need a complete description of the equipment and configuration (as described by the SB, STC, AFM, etc.) installed in your aircraft. This should be documented and as part of the original airworthiness or maintenance logbook entry and presented for verification.

If your aircraft requires or is equipped with TCAS II, you must incorporate a version of TCAS II that meets TSO C-119b (Version 7.0), or a later version. The purpose of version 7.0 software is to avoid nuisance Resolution Advisories (RA) that can occur with the older software at higher flight levels and 1,000-foot intervals.

Obviously, this part of the process requires research concerning specific modifications. It can be time-consuming, expensive, and result in significant downtime during maintenance. Good planning might permit modifications during scheduled maintenance inspections.

Step 4: **RVSM Flight Operations**

The third step is to develop and document operational procedures, which ensure compliance from an operational standpoint. This normally means an RVSM Operations Manual that is approved and carried on board the airplane. It will

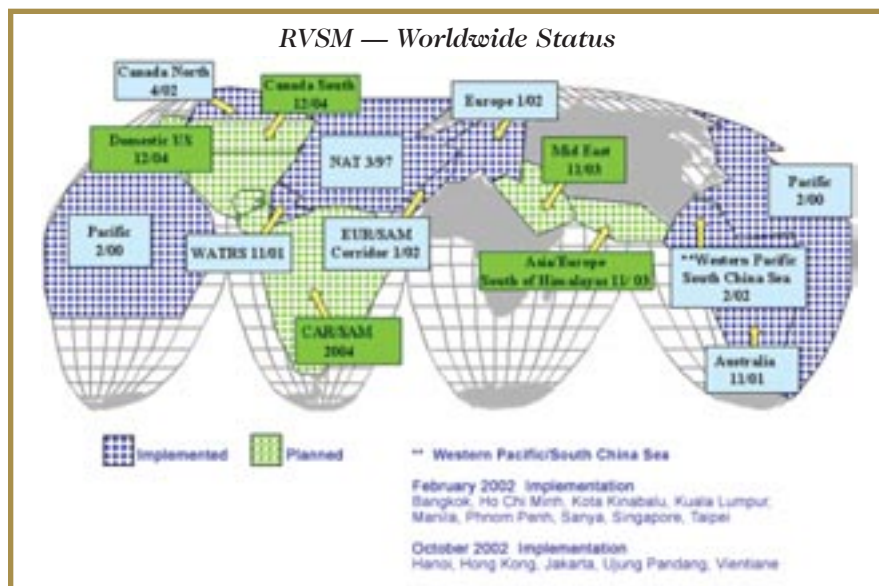
address standard RVSM procedures such as periodic altimeter crosschecks and established ATC RVSM phraseology. It will also cover various contingencies such as equipment failure and turbulence, which would affect precise altitude control. Most operators will combine their RVSM and MNPS/RNP procedures into one manual due to the vertical and horizontal navigation requirements on the NATS, in Europe and the Pacific regions already in effect. For operators expecting to operate solely in DRVSM airspace this may not be required, at least in the near future.

Another consideration is your Minimum Equipment List (MEL). If you are operating without an MEL, one is not necessarily required for RVSM. However, if you do take advantage of operating with an MEL you must ensure that the stricter RVSM limitations are included. A typical example would be the requirement for an operational altitude alerter that could not be deferred for flight in RVSM airspace.

Step 5: **RVSM Maintenance Requirements**

With your application for an LOA, you should submit a maintenance program that describes your plan to maintain, inspect and repair RVSM-required equipment. These procedures are normally part of the manufacturer's continuous airworthiness maintenance program for RVSM group-approved aircraft or must be an equivalent program approved by the FAA.

The inspector will want to review your maintenance manual, structural repair manual, standards practices manuals, illustrated parts catalogs, maintenance schedule and MMEL/MEL as appropriate to your airplane and installation.



Step 6:
Height Monitoring Test Flight

As you recall, we previously discussed *group-approved* and *non-group-approved* aircraft. In order for your airplane to be group-approved then another like-kind airplane was previously modified and extensively flight tested. Based on those test results and the fact that in order for you receive RVSM authorization your airplane must be built or modified to a “nominally identical design,” your airplane is not required to be extensively flight tested. It must, however, make one flight where it is height monitored (vs. flight tested).

If your airplane was not *group-approved* or you simply elect to seek authorization under *non-group* criteria then you will have to complete extensive certification flight testing. Since this testing is more comprehensive and inclusive of any height monitoring, the height monitoring flight will not be required in this case.

If your authorization is predicated on *group-approval*, then height monitoring will be required. But you heard not everyone has to be monitor tested? That’s true for large operators with large, similar-

type fleets, such as airlines. Not every airplane delivered to an airline requires a height monitoring flight, but rather a percentage of those deliveries. That percentage is a variable number based on the number of tests accomplished and the relative pass rate.

Although this could change (and hopefully will), I am unaware of any general aviation Part 91 operators who has not had to comply with the height-monitoring test when using *group approval*. The height monitor testing can be accomplished in any of three ways.

Original height monitoring was for traffic flying the NATS from North America to Europe. For this purpose, ground-based height monitoring units (HMU) are located at Gander, Newfoundland and Strumble, Wales. Since the advent of European RVSM, three more sites are available throughout Europe. Using ground-based radar these sights are able to very accurately determine and record your altitude. Operators can still use these HMUs.

The latest height-monitoring capability is using a GPS Monitoring Unit (GMU). This is a portable unit that is carried on board the air-

craft. The test portion requires about 30 minutes of cruise flight above FL290. There are several contractors who provide GMU testing for a fee.

The third type of height monitoring is not yet available. In preparation for DRVSM, several FAA Aircraft Geometric Height Monitoring Elements (AGHME) are expected to become operational sometime in the summer of 2003. Similar in function to the HMU, the AGHMEs will be ground-based.

The LOA may be issued prior to the height-monitoring flight. You have a six-month grace period after receiving your LOA or implementation of DRVSM until the height-monitoring flight must be accomplished. The data from the flight will be forwarded to the FAA. If the test results are favorable, your LOA will not be rescinded.

Receiving Your LOA

When the FSDO is convinced you can meet all these obligations, they will issue you an LOA. The LOA will be aircraft- and operator-specific and valid for two years unless restricted or rescinded. You have reciprocity in that you may use one RVSM authorization to operate in any RVSM-designated airspace, but the operator is responsible to ensure compliance with different rules and procedures.

When you buy or sell an airplane, the LOA is not transferable. For your initial LOA, it is likely your FSDO will want to know all the RVSM regions of intended operation to ensure compliance and some FSDOs have added caveats to the LOA requiring further review prior to operating in other RVSM regions. Since the LOA will expire after two years, you should certainly expect to demonstrate compliance with the particulars of other regions at that time.

How Long Does This Take?

Obviously this varies with the situation. If your aircraft requires engineering and/or modification you need to start planning now. Once the airplane is physically compliant, you should expect a minimum of 60 to 90 days for the FSDO to process, verify, approve and issue an LOA. The FAA is presently training more inspectors to meet the anticipated demand as January 2005 nears.

So What Happens in the Airplane?

Once you're trained and certified with RVSM ops manual and LOA in hand, what can you expect while flying? It could be rather anti-climatic, I'm afraid. Other than increased reliance on automation, greater diligence monitoring altitude and familiarizing yourself with new flight levels, it is pretty much ops normal. You can expect ATC to inquire if you are RVSM-certified prior to entry into any RVSM airspace. You must be more concerned about forecast and reported turbulence.

You may even think it was all a bunch of hoey, until you cross paths with that 747 or C-5, closing at 900 knots and 1,000-foot separation. Then you'll be very glad to know that you and everyone else above 28,000 feet know what they're doing.

The author would like to thank Mr. Robert Swain for contributing his expertise on this subject. Bob is the FAA DRVSM Program Lead and AFS RVSM Program Manager in Washington, D.C.



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