

FAA Response: The FAA and other Air Traffic Service Providers provide guidance on recommended pilot actions in events such as aircraft system malfunctions, medical emergencies, and weather encounters. These recommendations are referred to as contingency procedures. In an environment such as the domestic U.S. where direct pilot-communications and radar surveillance is available, ATC assistance is readily available in contingency events such as autopilot failures.

Small Entity Analysis

1. Part 91 and 135 small businesses were not identified in the NPRM Small Entity Analysis. NATA questioned the finding of insignificant impact on small entities and questioned its treatment of part 91 and part 135 businesses.

FAA Response: We have updated the Regulatory Impact Analysis (RIA) published with this final rule. The Small Entity analysis was updated for the RIA.

TCAS

1. A number of commenters asserted that TCAS installation should be a requirement for operation in RVSM airspace.

FAA Response: The FAA does not concur with this assertion for the reasons discussed below.

1,000-foot separation. First, we believe it is important to note that 1,000 ft vertical separation has been applied up to flight level 290 on a global basis, including the U.S., for about 40 years. The 1,000-foot vertical separation below FL 290 is based on basic certification standards for aircraft altimeters, autopilots, and pilot and controller procedures. The current requirements for TCAS equipage are not based on this separation standard.

TCAS and Transponder Equipage Requirements. TCAS equipage is required by parts 121, 125, 129, and 135. Equipage requirements are not related to a specific separation standard or operational procedure. Part 91 § 91.215 requires transponder equipage for operation in Class A airspace. Class A airspace is between FL 180–600 in the U.S.

We estimate that in domestic U.S. operations approximately 90% of flights are currently equipped with TCAS. In addition, all aircraft must be equipped with transponders to operate in U.S. Class A airspace. Aircraft that are transponder equipped, though not TCAS equipped, are still displayed to TCAS equipped aircraft and produce TA's and RA's when within the parameters.

Revision to FAA TCAS Equipage Rules. The FAA published a Final Rule in April 2003 that will, in the January 2005 timeframe, increase the number, percentage and categories of aircraft operating in U.S. domestic airspace that are equipped with TCAS. This is so because in the revised regulations TCAS equipage requirements for turbine-powered airplanes are no longer based on passenger seat configuration. A major provision of the revised part 121 § 121.256, part 125 § 125.224, and part 129 § 129.18 is that, effective January 1, 2005, turbine-powered airplanes of more than 33,000 pounds maximum certified takeoff weight must be operated with one of the following:

- TCAS II that meets TSO C–119b (version 7.0) or a later version
- TCAS II that meets TSO C–119a (version 6.04A Enhanced)
- A collision avoidance system equivalent to TSO C–119b (version 7.0) or later version capable of coordinating with units that meet TSO C–119a (version 6.04A Enhanced)

In addition, these sections contain requirements for new TCAS II installations made after April 30, 2003; requirements for replacement of TCAS II (version 6.04A Enhanced) installations that cannot be adequately repaired with TCAS II (version 7.0) installations; provisions, effective January 1, 2005, for the operation of airplanes with a passenger seat configuration of 10–30 seats and provisions for piston-powered airplanes of more than 33,000 pounds maximum certificated takeoff weight.

Part 91 Aircraft TCAS Equipage. Many business aviation operators equip their aircraft with TCAS voluntarily, as a safety measure.

Other factors. Other factors related to the discussion of TCAS as it relates to RVSM are:

a. *Safety Analysis.* The safety analysis conducted prior to RVSM implementation does not consider the effect of TCAS on risk bearing events such as altitude busts, controller errors, etc. Instead, risk is estimated based on aircraft altitude-keeping errors (technical errors) and operational or human errors. This estimated risk is compared to the agreed Target Level of Safety. The intent is to identify errors and mitigate their occurrence. Nowhere in the safety analysis or in operational evaluation is it assumed that an error event is not significant because risk is mitigated by TCAS when the event occurs.

b. *RVSM Experience.* Since March 1997, in RVSM operations worldwide, approximately 14 million RVSM flight

hours have been accumulated and 6 million RVSM flights have been conducted safely. The criteria for altimeter accuracy, autopilot performance, and altitude alerts, plus the RVSM policies and procedures have been effective since their publication in guidance form in 1994 and in part 91, appendix G in April 1997.

c. *ICAO Aircraft Equipage Standards.* The ICAO RVSM aircraft equipage standards applied worldwide, including Europe, do not include a requirement for TCAS.

d. *TCAS Events.* The events in enroute airspace where TCAS has provided a safety net have not been related to the separation standard applied. Instead, events in enroute airspace where aircraft have come into proximity, generally have related to human error. Such events have occurred in airspace where 2,000-foot vertical separation is applied and in some cases where 60 nm lateral separation was applied.

e. *TCAS II Version 7.0.* In December 2001, we published a revision to Part 91, Appendix G to require that Version 7.0 be incorporated into TCAS II if TCAS is installed on the aircraft and the aircraft is used in RVSM operations. RVSM operations will require Version 7.0 in domestic U.S. operations.

2. One commenter stated the belief that TCAS was a requirement for RVSM in other areas of the world.

FAA Response: Neither FAA regulations nor ICAO standards and policies require TCAS installation in order to conduct RVSM operations. ICAO Annex 6 (Operation of Aircraft), Part 1 (International Commercial Air Transport Aeroplanes) contains the ICAO standard for TCAS II, Version 7.0 installation on an aircraft. ICAO standards call for TCAS II, Version 7.0 installation on aircraft with a take-off gross weight exceeding 33,000 pounds or with a passenger carrying capacity of more than 30.

ICAO Annex 6, Part II (International General Aviation Aeroplanes) calls for aircraft to be equipped with a pressure altitude reporting transponder, but does not call for TCAS installation. TCAS installation policies for individual ICAO regions are published in ICAO Regional Supplementary Procedures (Doc 7030). ICAO Doc 7030 TCAS and transponder installation policies reflect ICAO Annex 6, Parts I and II.

3. Some comments proposed that an operating TCAS should be a requirement for entry into RVSM airspace and also for continued operation in the event of TCAS failure enroute.