

# ACAS II Bulletin – No RAs in close encounter

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Pilots are familiar with situations in which TCAS II Resolution Advisories are generated when the aircraft are in close proximity and we have covered these cases in previous ACAS Bulletins. Today, for a change, we will describe a scenario in which no RAs were generated despite close proximity of the aircraft involved, and provide an explanation of why that happened.

An arriving westbound Airbus 320 (blue aircraft in the diagram below) was descending to FL130 at a rate of just below 1000 ft/min. A departing northbound Airbus 319 (brown aircraft) was climbing to FL120. While the A320 and the A319 were converging vertically, Traffic Advisories were generated for both when they were 1205 ft and 7.3 NM apart. When the aircraft were 5.5 NM apart and levelled off at their respective cleared levels (FL130 and FL120) the TAs terminated.

Once the aircraft were level, the controller, by mistake, cleared the A319 to climb further to FL190 (i.e. through the level of the A320). Simultaneously, in order to comply with its STAR, the A320 made a right turn and the A319 made a left turn to follow its SID.

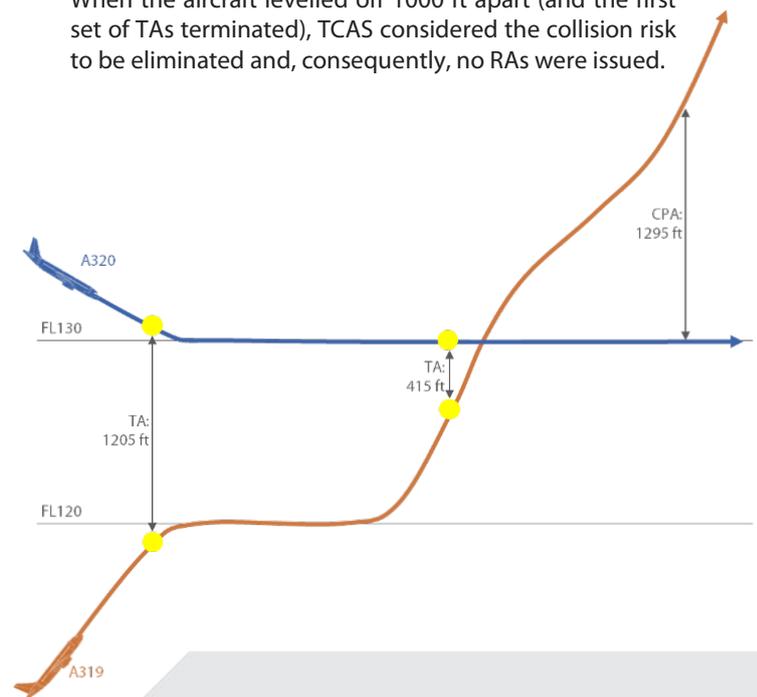
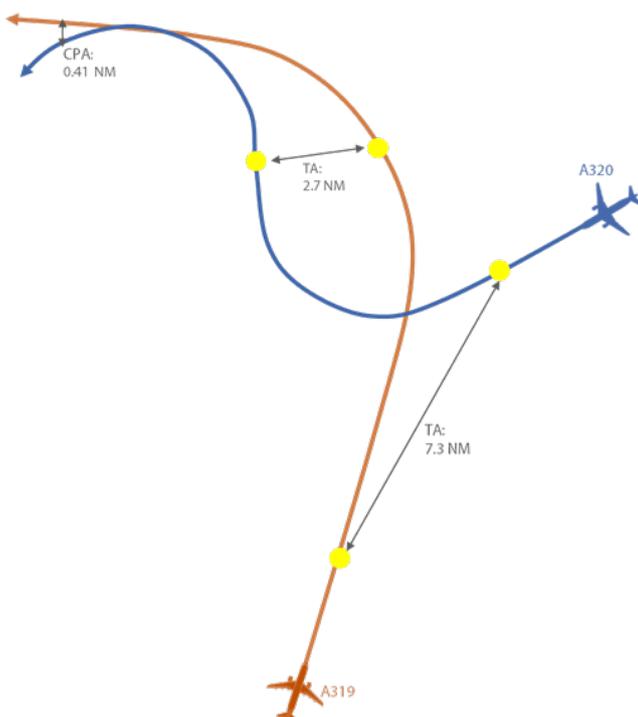
The aircraft were converging horizontally, so as soon as the A319 started to climb a loss of ATC separation was inevitable.

At this point, it should be recalled that the criterion for issuing an RA is a need to achieve a safe vertical distance from a threat aircraft, rather than to ensure that standard ATC separation is maintained.

Both aircraft received TAs again when they were 415 ft and 2.7 NM apart (at which point separation had already been lost). Soon after the TA, the A319 passed through the level of the A320. After 63 seconds, the TAs terminated when the aircraft diverged both horizontally and vertically. No RAs were issued. At the Closest Point of Approach, the A319 passed 1295 ft above the A320 at the horizontal distance of 0.41 NM.

Despite the close proximity of the two aircraft, the criteria for RA generation were never met in this encounter. That was surprising to both airlines involved in the incident as well as the ATC unit. Consequently, the aircraft trajectories were subject to analysis in the ensuing investigation.

When the aircraft levelled off 1000 ft apart (and the first set of TAs terminated), TCAS considered the collision risk to be eliminated and, consequently, no RAs were issued.



But why were no RAs generated when the A319 started to climb? To answer this question we need to briefly explain how TCAS logic determines whether another aircraft is a threat.

Broadly speaking, using a set of altitude dependent parameters, TCAS II performs two tests on any detected target to determine if it poses a threat. First, a *Range Test* determines if the aircraft are currently close in range, or are projected to be close in range within the specified time threshold. If the *Range Test* passes, the logic will perform an *Altitude Test* to determine whether the aircraft are projected to be close in altitude (i.e. vertically separated by less than the specified threshold) within a critical time threshold around closest approach.

If both tests pass, an RA will be generated. For more details see [EUROCONTROL ACAS Guide](#), chapter 10.

When the A319 started to climb, it was doing so at a rate of over 2000 ft/min. Because of the high rate, the logic predicted that the A319 would pass through the other aircraft's level and the altitude at the CPA would be above the RA generation threshold, so no RA was issued.

This incident serves as a learning point that RAs will not always be generated when there is a loss of ATC separation. The opposite is also true – many RAs will be issued before ATC separation minima are violated and even when ATC separation minima will not be violated. We will provide an illustrative example in the next issue of ACAS Bulletin.

#### Learning points:

- In some cases, RAs might not be issued despite close proximity if TCAS establishes that there is no risk of collision.
- The objective of an RA is to achieve a safe vertical distance from a threat aircraft, rather than to ensure standard ATC separation.

#### Further reading:

- [EUROCONTROL ACAS Guide](#)