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# Follow the TCAS RA?

*Note: This paper supersedes 12ATSBL04 of the same name.*

## BACKGROUND

Following the EUROCONTROL report on TCAS RA compliance in 2020, both IFALPA and IFATCA issued a joint statement as a reminder to the pilot and controller community, <https://www.skybrary.aero/bookshelf/books/5842.pdf>.

The Eurocontrol study analysed radar data of TCAS RA events taken over a 12 month period over the core area of Europe. In a first Analysis, it reports only 38% of the RAs were followed correctly, and 34% were even manoeuvred in the opposite direction. Although a second analysis with a less rigid methodology puts the accuracy of radar recordings into perspective, 45% of the RAs were still not followed correctly. The results of the studies continue to cause concern with the "TCAS RA not followed" being one of the top 5 ATM operational risk priorities.

While RAs are rare events, when they do happen the situation may be critical and correct action must be taken promptly. Recurrent training should improve flight crew and controllers understanding of how TCAS works, how they should respond to RAs, and the limitations of TCAS. However, monitoring programmes have identified a number of situations where pilot responses were incorrect. Aircraft operators and training providers should consider making these the focus of recurrent training sessions.

As an immediate reaction to the mid-air collision near Überlingen, Germany, north of Lake Constance, IFALPA issued a Safety Bulletin (03SAB004) in August 2002, promulgating the very first Eurocontrol ACAS bulletin and emphasising the need to "Follow the RA". At the end of the decade, monitoring programmes had identified that pilot responses to RAs were still inappropriate to a significant degree. IFALPA issued a Briefing Leaflet based on Eurocontrol ACAS Bulletin No 12 of February 2011, "TCAS Pilot training issues" (12ATSBL04).

To address issues identified with reversal RAs and with human factors associated with the aural annunciations, TCAS v7.1 was developed and mandated through ICAO SARPs

and European legislation. However, in some airspaces, earlier versions are still allowed.

### IMPORTANCE OF PILOT TRAINING

ACAS training is crucial to ensure that pilots correctly interpret and react to Traffic Advisories (TA) and Resolution Advisories (RA). **Prompt and correct reaction to RAs is fundamental** and pilots should be trained in accordance with PANS-OPS Volume III, Section 4, Chapter 3 to always follow an RA, even if they believe to have visually identified the intruder. The consequences of not reacting to an RA are potentially disastrous, and responses that are too weak or too aggressive can have a negative impact on the effectiveness of TCAS.

Operators should establish clear procedures for TCAS events, including proper callouts and task sharing, ATC calls and phraseology.

ACAS Training Guidelines for Pilots are provided in Attachment A to PANS-OPS Volume III, Section 4, Chapter 3. TCAS training should be comprised of academic and practical manoeuvre parts, including the different standards (e.g., 6.04a, 7.0, 7.1), theoretical background on the various modes (TA/RA respond times, differences in displays, reversal RA's), low level and high level encounters.

Training should target the full comprehension of the system as well as practical hands-on training to proficiency, including system failures and contingency procedures. Academic training should include a discussion about non-normal situations as Essential Item. It should be emphasised that scenarios in which following an RA "would jeopardise the safety of the aeroplane" are extremely rare.

Concerning a possible (LEVEL OFF or CLIMB) RA during Emergency Descent, the ICAO FLTOPS Panel in its 4th Meeting recommended to continue to operate TCAS equipment in TA/RA mode and follow any RA, based on a relative risk assessment.

Even the decision to select "TA only" mode should be taken with due diligence and probably be limited in accordance with procedures, e.g., when performance is degraded after an engine shutdown.

TCAS Training needs to be included in regular recurrent training and (if possible, depending on simulator fidelity levels) be introduced as a surprise to provide a startle effect to a sudden event.

Both Auto Pilot and manual manoeuvres should be included.

All training manoeuvres should be flown to the full recovery, including return to automated flight.

Eurocontrol ACAS Bulletin No 18 contains information on notable operational events and lessons learned, including operational guidance on how to deal with RAs while turning and the issue with visual acquisition,

<http://www.skybrary.aero/bookshelf/books/3166.pdf>

#### TCAS VIDEOS

There are TCAS training videos clips produced by NATS and Flight Safety Foundation available on Skybrary, <https://www.skybrary.aero/index.php/Toolkit:TCAS>

## Attachment 1

Source: Eurocontrol ACAS Bulletin 7, March 2006

### Event 6: Opposite manoeuvre to RA to follow ATC avoiding instruction

A B767 is maintaining FL290 heading West. An A319, heading South-East, is at FL270 on a converging track. The aircraft are controlled by two different ATC units (the vertical boundary is FL285).

The A319's pilot requests for a higher cruising level. Due to a coordination error between the two ATC units, the A319 is cleared to climb to FL290 with the B767 whilst in conflict.

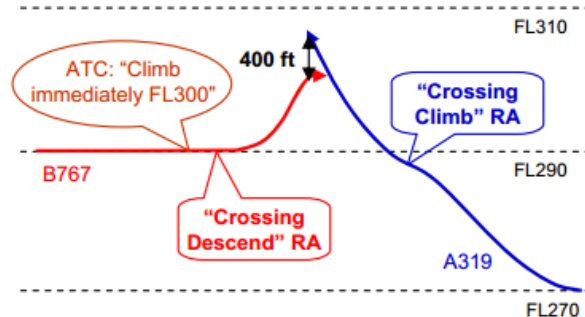
Following Short Term Conflict Alerts triggered in both ATC units, **the B767 is instructed to climb immediately to FL300** and the A319 to "expedite descend FL270".

However, almost at the same time, each aircraft receives a coordinated RA opposite to the ATC instruction.

- The B767 receives a "Crossing Descend" RA. **The pilot disregards the RA and follows the ATC instruction to climb.**
- The A319 receives a "Crossing Climb" RA. The pilot correctly reacts to the RA by increasing the rate of climb.

Because of the B767 pilot's opposite manoeuvre to the RA, the very small vertical separation between the aircraft does not increase. Consequently, the A319 receives an "Increase Climb" RA and the pilot increases the rate of climb to 5000 fpm. The B767's pilot eventually recognises the "Descend" RA and stops the climb just before the "Clear of Conflict".

Despite the large vertical deviation of the A319 (3000 ft), the aircraft passed at **400 ft and 0.3 NM**.



#### **Pilots must follow all RAs!**

The [ACAS Bulletin n°1](#) describes several hazardous events where some pilots reacted in the opposite direction of the RA for different reasons (ATC instruction, visual acquisition, stress, etc.).

Previously, the ICAO regulation was not sufficiently explicit. Therefore, ICAO revised the ACAS procedures and pilot training guidelines to require pilots to follow all RAs. The ICAO PANS-OPS Doc 8168 was updated in November 2003 and as described in the [ACAS Bulletin n°5](#), the ACAS procedure now clearly states that:

**"Pilots shall respond immediately by following the RA as indicated, unless doing so would jeopardise the safety of the aeroplane"**

However, Event 6 shows that there are still some pilots who do not follow RAs, and who even manoeuvre in the opposite sense of the RA, whereas the ICAO PANS-OPS Doc 8168 also states that:

**"Pilots shall not manoeuvre in the opposite sense of an RA"**