CALLBACK

From NASA's Aviation Safety Reporting System

Issue 461 June 2018

Resolution Advisories and Traffic Insight

The Traffic Alert and Collision Avoidance System (TCAS) is designed to monitor potential airborne conflicts as they develop between suitably equipped aircraft. With TCAS installed, the system displays proximate traffic for the flight crew. TCAS issues Traffic Advisory (TA) notifications when a conflict becomes credible, and it provides Resolution Advisory (RA) command guidance when a pilot must actively monitor or adjust the aircraft flight path. Current generation TCAS II RAs command vertical escape maneuvers that increase or maintain separation between aircraft when a threat is perceived. TCAS has proven to be effective in reducing collision potential between aircraft, but the system has also caused confusion in the cockpit.

ASRS has received reports of false TCAS indications and invalid RAs that have resulted in reduced separation and safety between aircraft. RA climbs have been reported that either should have been issued as RA descents or should not have been issued at all. Dangerous aircraft flight paths have resulted from ghost target intruders. Near miss incidents without any TCAS warnings have been reported as well.

This month *CALLBACK* shares reported incidents of illogical TCAS and RA indications and some ensuing problems that were generated as a result. Several lessons may be gleaned. Chief among them is the notion that safety, judgment, and common sense may temper procedural obedience when evaluating and responding to TCAS advisories.

Heads Up!

A de Havilland Dash-8 crew had the traffic in sight when they received an RA. A dilemma was created when the RA, which directed a climb toward the traffic, contradicted the crew's solution to the airborne conflict.

■ *We were told to contact…Approach. We switched over to the new frequency and called multiple times with no response. We noticed traffic on our TCAS moving toward us at 4,500 feet. We were at 4,000 feet. We had the traffic in sight, which was a helicopter. We were still unable to contact Approach. Within seconds the traffic that was called out to us as a "maintain vertical speed" by our TCAS became a "monitor vertical speed." Traffic was descending into us and was inside the bubble on the TCAS display. It went from 400 feet above to 300 feet to 200 feet. We had him in sight the entire time. We received an RA to "adjust vertical speed" and [a command to] climb 200 to 500 feet per minute (fpm). Immediately the Captain and I agreed that was not at all appropriate as the traffic was slowly descending from above onto and toward us. We pushed the nose over and started a descent and turn away from the oncoming traffic. It was, without a doubt in my mind, the correct maneuver to keep the situation from [deteriorating]. After receiving a "clear of conflict" indication and watching the traffic pass overhead, we returned to our assigned altitude…and heading. Shortly after that, Approach finally responded to our calls, and we reported the incident to them.*

RA Go-Around

An inopportune RA resulted in a go-around for this A321 crew. The go-around subsequently induced its own issues.

■ *We were on final approach…for the ILS, descending normally through about 1,800 feet and slowing from about 180 knots with gear down and flaps just selected to configuration 3. Autopilot 2 and autothrust were engaged, and we were in Approach Mode. I was…flying, and the Captain (CA) was…monitoring. We got a TCAS RA with "climb, climb" and climb indications on the PFD. There had been no traffic alerts and no indications of other traffic in front of us. The weather was VMC. I began a climb to comply with the RA, and a few seconds later we got a "clear of conflict" advisory. I leveled the aircraft at about 2,300 feet and began a slight descent to the missed approach altitude of 2,000 feet that was already set. Simultaneously, I called, "Go around," while pushing the thrust levers to Takeoff/Go-around (TOGA) and then retarding them to the climb detent. I also called for go-around flaps. The CA raised the gear and began to retract the flaps. However, the thrust remained at full power, and airspeed continued to accelerate rapidly. The CA continued to raise the flaps to up, and I disengaged autothrust and reduced thrust some more. During this time we may have experienced a flap or gear overspeed, although we did not get any advisory messages. Because of the RA and our relatively low altitude, I did not want to pull thrust any closer to idle since I did not feel it was safe. A few moments later we received a second RA as we passed over the departure end of [the] runway. As I responded, it went away, and we continued the missed approach with vectors to an uneventful landing. We reported the missed approach and*

RAs to…Tower, who replied that they had no traffic in the area. We believe the RAs may have been erroneous.

Clear Weather, Clear Choice, and Clear of Traffic

An Embraer Captain received an RA shortly after takeoff. Careful evaluation of the threat and a timely decision prevented the problem from escalating.

■ *We were taking off [from] Runway 15L at IAH. ATC told us to line up and wait. Once cleared for takeoff, ATC instructed us to fly runway heading and maintain 2,000 feet. I was the Pilot Flying (PF). We took off and leveled… at 2,000 feet as instructed. ATC instructed that there would be traffic crossing overhead at 3,000 feet and to stay level at 2,000 feet. We stayed at 2,000 feet and had the traffic in sight. At this time, the TCAS system sensed the traffic and gave an RA to climb. I disregarded this RA and stayed level at 2,000 feet. We had the traffic in sight the whole time, and we were complying with ATC instructions. I believe if I would have followed the RA, this would have caused a major issue and possibly a midair collision.*

My FO, my jump-seater, and I all had the traffic in sight the whole time. Once the traffic was clear,… ATC instructed us to climb unrestricted to 16,000 feet. We proceeded on our way uneventfully.

I believe, in this…situation, that the TCAS was wrong. If I [had] not [had] the traffic in sight, we would have immediately followed the RA, but [since] we did have the traffic and we knew he would be crossing overhead, the best action was to stay level at 2,000 feet and [let] the traffic pass overhead.

Close Encounters

The first hint of conflict for this B737 pilot was a Controller-issued level-off and a tight turn toward the airport. The threat may have been avoided if the TCAS had issued an alert.

■ *We were vectored off of the arrival…and told to expect the visual to Runway 22L. The Controller gave us a left turn to 340 degrees and a descent from 4,000 feet to 3,000 feet.*

Passing through 3,250 feet and…approaching final, the Controller called out a traffic alert and told us to level off. We leveled at 3,150 feet. He then told us to make a tight left turn toward the airport. He called traffic off our right side, which we were unable to acquire visually. I immediately turned the autopilot off.… [I] was flying mostly by instruments and monitoring bank angle and altitude and was, thus, unable to scan outside for traffic. The Captain was looking outside and unable to see the conflict. I did look down at my MFD and saw a yellow traffic target on the right side of our aircraft symbol at +100 feet.

We were subsequently cleared for the visual approach once the traffic was no longer a factor, and we landed the aircraft normally. Oddly, we did not receive a TCAS RA or TA aural alert. One hundred feet of vertical separation is the closest I have ever been to another aircraft, and I consider this a near miss event.

There were no crew errors made which contributed to this event. We followed all ATC instructions as precisely as possible. I believe this was…a bad vector…which led to a near miss event. It is also possible that…the GA aircraft was…[where] he should not have been.

Communicate and Coordinate

Miscommunication and a suspicious TCAS indication combined to produce this airborne conflict. The Controller immediately issued new clearances to avoid a collision.

■ *Aircraft X checked onto my frequency at FL340 requesting FL360. As soon as I was able, I climbed him to FL360. At this point, he was approximately 40 miles from opposite direction traffic, [which was] climbing. I anticipated separation and climbed Aircraft Y to FL350 (I believe he was out of FL310 when this was issued). A few minutes later, I noticed Aircraft X was leveling at FL355.*

Concerned now [that Aircraft X] might be traffic with Aircraft Y, I asked Aircraft X to report level at FL360. No response. I attempted again; no response. I then noticed Aircraft X descending (FL354) head-on into Aircraft Y. Two immediate clearances were issued, one to Aircraft X (30 degrees right, no response) and one to Aircraft Y (descend to FL330).

Shortly after the immediate clearances were issued, Aircraft X responded and told us he was trying to [contact] us and was turning left 30 degrees. I can only assume we kept blocking each other out, although I never heard him transmit anything. He went on to tell me that there was a ghost target 400 feet above where he was (FL355). [I observed] no traffic 400 feet above [him]. He leveled off without saying anything and stayed there for several minutes. I queried him on receiving a TCAS RA, and he said that he did not receive one. The [radar return] for Aircraft X was in the vicinity of [only] two others: Aircraft Y, now at FL340, and another carrier at FL390, directly above [Aircraft X and Aircraft Y].

Avoiding a ghost target, in my opinion, was the right move on his part. I wish he would have advised us prior to taking action.… Had the pilot of Aircraft X decided to descend to FL350 or FL345 on his own to avoid the conflict, there very well could have been a midair collision.

ASRS Alerts Issued in April 2018	
Subject of Alert	**No. of Alerts**
Aircraft or Aircraft Equipment	7
Airport Facility or Procedure	4
ATC Equipment or Procedure	7
Hazard to Flight	2
Other	3
TOTAL	**23**

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April 2018 Report Intake	
Air Carrier/Air Taxi Pilots	5,486
General Aviation Pilots	1,325
Controllers	508
Flight Attendants	514
Military/Other	326
Mechanics	260
Dispatchers	142
TOTAL	**8,561**