

CALLBACK

From NASA's Aviation Safety Reporting System



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Three Important Aspects of CRM:

COMMUNICATION, COMMUNICATION, and COMMUNICATION



NASA sponsored the first workshop on the topic of Cockpit (later “Crew”) Resource Management (CRM) in 1979. That workshop was a direct outgrowth of research begun in the mid-seventies at the NASA Ames Research Center. This work was aimed at addressing some of the problems underlying several accidents (notably the 1972 L-1011 Everglades accident and the B737 that crashed in the same year attempting a go-around at Chicago’s Midway airport). One of the early observations of this research was that many of these problems seemed to be related to decision-making, crew coordination, leadership, and communications skills.

In 1986, NASA Ames convened a workshop¹ to review the progress made in CRM and to explore methods of improving training that stressed coordinated crew performance.

In the ongoing evolution of CRM, current training acknowledges that human error cannot be totally eliminated. Therefore, CRM now focuses on threat and error management and the development of countermeasures which are centered on error avoidance, trapping errors before they are committed, and mitigating error consequences. This threat and error management approach relies on a non-punitive safety culture in which errors are examined in the light of “lessons learned” in order to facilitate better training.

While the ASRS *CALLBACK* newsletter regularly provides such lessons in all aspects of aviation, this month’s issue focuses on communication, one of the many elements of effective Crew Resource Management.

A Cockpit in Need of a Climate Change

One of the most important aspects of communication in the cockpit is that it establishes the interpersonal climate between crew members and is therefore a key element in setting the tone for the management of the flight. In this report from a C750 Co-Pilot, we get one perspective on an incident that involves a rather stormy “interpersonal climate.”

■ *I was Second-In-Command and Pilot Flying on the... Arrival. There were a series of published altitudes and speeds plus a NOTAM changing some of those speeds. Approach gave me a descent to 8,000 feet, which I understood to mean unrestricted except for the speeds. I was achieving this using Vertical Speed mode with the autopilot*

engaged. I was descending through about 9,500 feet and slowing from 250 to 220 knots when the Captain began to argue that I should use VNAV instead of VS, despite the fact that I was meeting the speed and altitude restrictions another way. I suggested we could talk about technique and automation on the ground. Suddenly the speed began to increase above 250 knots and I realized that the Captain had engaged the VNAV without my consent and the Flight Director was commanding a speed of 340 knots. By the time I recognized this, went back to VS, and deployed the speed brakes, we had crossed the next fix and exceeded the speed limit of 220 by about 20 knots....

I think this situation could have been avoided if the Captain had either: a) left me to continue to meet all clearances and regulations the way I was doing it, or b) taken the controls and met those same restrictions his way. I suggest that no one should interfere with the flight controls unless there is some breach of safety; not because of differences of technique and certainly not merely to achieve their own way.

While the climate of a flight depends to a large extent on the attitude and conduct of the Captain, every crewmember should be aware of the importance of a good working atmosphere and strive to employ the communication skills that are vital to achieving it.

A Sea Level State of Mind

Citing the fact that they were not used to operating over high terrain, these B200 Pilots were not fully aware of their altitude above ground until it “appeared” to the Captain that “we were getting extremely low.” A serious lack of communication, highlighted by the Co-Pilot’s unannounced change to the altitude preselect, could have made a bad situation much worse.

■ *We were being vectored and were descending to 7,000 feet on the right downwind to Runway 16. The assigned altitude (7000) was set in the altitude preselect by my Captain-qualified Co-Pilot...and was automatically armed for capture. It was a clear night and we reported the runway in sight. Shortly thereafter we were given a 90-degree turn to the base leg and cleared for the approach. This heading would put us just outside the Final Approach Fix.*

The autopilot was engaged and I was using Heading mode while still descending. Because I was unfamiliar with the airport and terrain, my intent was to join the final outside the Final Approach Fix and allow the autopilot to capture the glideslope intercept altitude. I would then capture the glideslope and track it down like a normal ILS.

While looking outside at the runway, it appeared that we were getting extremely low as I was turning base to final. There were no lights below us; it was just black. I disengaged the autopilot, added power and leveled the aircraft until we were on the glideslope. The remainder of the approach and landing was uneventful. After recognition of the condition we did get the automated “glideslope” warning. We did not reach the parameters to get a “terrain” warning. There was no altitude alert from ATC.

I discovered that prior to the autopilot capturing 7,000 feet, the Co-Pilot had changed the preselector to 5,000 feet. The airport elevation was ~5,400 feet and the touchdown zone elevation was ~5,300 feet. There was no communication from him about the change in the altitude preselector.

In our operation the Non-Flying Pilot controls the altitude preselector but is supposed to call changes to the Flying Pilot who should verbally acknowledge the change. This did not happen in this case. The altitude selected should be that assigned by ATC or called for by the Pilot Flying.

We normally fly on the East Coast at elevations near sea level. This was a factor in the delayed recognition of the low altitude condition on my part. Subconsciously 7,000 or even 5,000 feet didn't ring a bell as being low to me.

I am a former airline pilot and most of my training and operations involved extensive CRM. My Co-Pilot...has strictly a general aviation background and appears to have never had much CRM training and practice. These different backgrounds sometimes conflict. He is not receptive to debriefing after a flight and examining what went wrong and how to prevent such occurrences in the future....

Since the Co-Pilot was apparently short on “CRM training and practice,” perhaps more extensive briefings by the Captain would have provided an opportunity for CRM “OJT” and improved the teamwork on this flight.

“The Co-Pilot Went Silent”

In addition to the basic function of transferring information, good communication helps the crew develop a shared mental model of the operational procedures to be utilized during the flight. It also enhances situational awareness and enables

individual crew members to contribute effectively to the decision-making process.

In the following report, a lack of communication between the Pilots of a CL300 led to an off altitude alert, a TCAS TA, and a Tower warning to descend. It also left the Captain wondering why the aircraft was climbing in the first place.

■ Approach gave us the following instructions, “Heading 090 to intercept the ILS Runway 06 localizer; cleared approach; maintain 2,000 feet until established; cross [Fix] at 1,500 feet.” [I] read back the clearance to Approach, set 1,500 feet in the altitude alerter, and stated “[Fix] at 1,500 feet” to the Co-Pilot. Previously we had briefed that [Fix] was a “Mandatory” altitude. The Co-Pilot intercepted the localizer at 2,000 feet and I then became immersed in the checklist.

Approach handed us off to Tower and during the switchover two things happened. First we got a 300 foot Altitude alert followed by a TA. This was followed by Tower warning us to stop climbing immediately and descend. I was stunned for a minute because I expected us to be descending, when in fact, we had climbed almost 500 feet. I saw that we were at 2,500 feet before the copilot began to descend.

I think that we had a communication failure of epic proportions.... I know that the Co-Pilot either did not understand the importance of the 1,500 foot restriction or felt that I communicated something else. What happened is just as much my fault as the Flying Pilot's fault. Contributing to the problem is an inexperienced Co-Pilot who didn't think to disengage the autopilot and hand fly the airplane if the automation isn't working as planned.... It is easy to take things like the crossing restriction for granted when a pilot has been in and out of [this airport] many times. Maybe I did not emphasize it enough? The debrief with the Co-Pilot was very disappointing....

Communication in the cockpit is vital and without it there cannot be the teamwork that leads to a truly safe environment for flight. The Co-Pilot went silent and I can't tell why and that is a bad situation.

The Captain makes salient observations about the need to establish good communication and about the role of teamwork in flight safety. For operational reasons, many crew members form part of a new team on every flight, so it is important that the culture of their operation encourages the type of communication that allows teamwork to flourish.

1. NASA/MAC Conference Publication 2455 (Orlady, Foushee, 1987)

ASRS Alerts Issued in February 2014	
Subject of Alert	No. of Alerts
Aircraft or Aircraft Equipment	4
Airport Facility or Procedure	4
ATC Equipment or Procedure	4
Company Policy	1
TOTAL	13

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February 2014 Report Intake	
Air Carrier/Air Taxi Pilots	4,490
General Aviation Pilots	898
Controllers	585
Flight Attendants	374
Mechanics	195
Dispatchers	143
Military/Other	124
TOTAL	6,809