

CALLBACK

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Managing Resources – CRM, SRM, and MRM

Crew (or Cockpit) Resource Management – CRM – originated in 1979 from a NASA workshop which found that human factors were the primary cause of most aviation accidents. The focus of commercial pilot CRM training since that time has been on making the optimum use of all available resources – equipment, procedures, and people – to minimize human error and promote safe and efficient flight operations.

Crew Resource Management principles have also been applied to single-pilot and maintenance operations, resulting in SRM (Single-Pilot Resource Management) and MRM (Maintenance Resource Management). This month we look at a selection of ASRS reports that describe breakdowns in the cognitive skill areas so important to error-free cockpit and maintenance operations.

“Slow Down the Pace!”

When rushing to meet schedule replaces adherence to SOPs and flight crew consensus, safety takes a back seat. A B737 First Officer described an entire flight in which the Captain did not seem to realize that the co-pilot was a highly trained resource to be used and consulted.



■ *This was our first flight together. We began by discussing frost removal procedures. After pushback and before I had a chance to finish reading the checklist, the Captain started rolling to the Deice Spot. I tried to slow down the pace due to workload and incomplete checklist. He proceeded to roll to the Deice Spot without clearance. I immediately notified Ground Control that we were already taxiing to the Spot. Before the aircraft rolled to a stop, the Captain reached down and called “Iceman” on frequency and turned packs, APU/engine bleeds off, while calling for the Deice checklist. I was quite confused.*

Before the truck arrived, I noticed an Autofail light had illuminated. We checked the QRH and it required further evaluation. I asked him if he wanted to complete the QRH issue before getting deiced. He said we would continue to get deiced and handle it later. The pace seemed to be all that mattered at this point. The Captain decided to handle the now intermittent light on the

way to the departure runway...After thirty minutes of consulting with Dispatch, at the end of Runway 4R, we taxied back to the gate. Fixed the issue and took off.

En route at FL210 I pulled up ATIS via ACARS. The ATIS reported zero miles visibility; there were no RVR values listed. We both were a little surprised how dramatically the weather dropped and how Dispatch never clued us in. I told the Captain I was off to gather more info from the ATIS if possible. The Captain was now in charge of radios and flying the aircraft. I needed a little extra time to figure out if we could get in with the lack of RVR reports. I contacted Dispatch and got the info I needed. Tower visibility was zero; the RVR was greater than 6,000 feet.

I had just returned from listening to the radios when the Captain asked ATC if we could get direct to the airport. Center responded, “Uh, Sir. You were supposed to cross [fix] at 13,000.” I looked up and saw he had put it in the altitude alerter, but not in the FMC. We were now about 1 mile north of fix and 8,000 feet high. This added to my frustration to say the least. ATC gave us a couple of vectors to get down and we landed uneventfully...

Slow down the pace! This is not a Single Pilot operation...Instead of trying to release the brakes before the door closes, rush through checklists, fly the aircraft, talk to Maintenance, deice crews, the flight attendants, and taxi at 30.9 mph, I think the Captain needs to look at the big picture. The First Officer is a resource many Captains ignore....

Communicate Assertively

In an incident involving a CRJ-200 flight crew, the First Officer had the right CRM idea, but communicated in a non-standard way that caused confusion.

■ *Flying ILS 18C told to maintain 180 knots or greater to FAF at five miles. I kept my speed up around 230 and hit FAF and G/S (Glide Slope) intercept before I realized how close we were. I punched off the autopilot, leveled off, and configured as quickly as possible. I was well above the G/S before starting my descent. Around 1,000 feet I wasn't completely stabilized, but I was on course with the G/S in view and tracking to be stabilized*

shortly...The First Officer stated something like “Should we go around?” or “Maybe we should go around?” I asked, “Are you directing a go-around?” By this time we were close to within parameters and breaking out with the field in sight and there was no response to my question. My judgment was that it was safer to land than execute a go-around. A normal landing was accomplished.

The major cause of the incident was...I let my situational awareness slip and I was thinking we were 10 miles out when we were only 5. I was talking about something other than the approach when I should have been concentrating on flying. My First Officer and I talked about the go-around issue after getting to the gate. The First Officer meant to direct a go-around. Had I realized that I would have executed a go-around...

I'm making an effort to re-emphasize sterile cockpit. We also talked about the importance of standard terminology, stating “GO AROUND” when that is the intention.

Make Standard Callouts

“I have the airplane” is one of the most important standard callouts in multi-pilot operations to ensure that someone is flying the airplane. A CRJ-200 Captain tried to talk a First Officer out of a developing flight condition, but in the process, both crew members lost situational awareness.

Who's got the con?

■ During the cruise phase of flight we were given a crossing restriction based on the VOR. The instructions were to cross a DME fix south of the VOR at 26,000 feet. The First Officer was flying. When he began the descent, he accidentally depressed the Take Off and Go-Around [TOGA] button which is located in the thrust lever. This resulted in the autopilot being disconnected. The First Officer heard the autopilot disconnect alarm but thought that I had disconnected the autopilot...I reached up and silenced the alarm and he interpreted the autopilot disconnect and me silencing the alarm as me having taken over the controls. I never announced that I had taken control of the aircraft. He then used the vertical speed scroll wheel to select down which resulted in pitch mode instead of vertical speed mode due to the TOGA function having accidentally been selected. The aircraft pitched down quickly. I attempted to talk and mentor him out of the flight condition, however he thought I had assumed control of the aircraft and he was not making control inputs. I did not realize he was no longer flying until we reached our assigned altitude and I instructed the First Officer to level off, and he didn't. I assumed the controls, however we were already through our assigned altitude...

Pilots should always assume that they are flying unless someone announces otherwise....

Single-Pilot Automation Management

Situational awareness in single-pilot operations can be enhanced by automation, rather than diminished. The

pilot must know what to expect and use all available tools if the situation changes from what is expected. An improvised transition to a procedure turn resulted when a Beech-36 pilot and ATC failed to recognize in advance the need to fly an entire approach transition procedure.

■ This was my first flight to [this airport]. The ASOS reported winds from 330 degrees at 7 knots, 6 statute miles visibility in haze and overcast skies at 1,500 feet. Since the field elevation is 550 feet and the minimum inbound altitude for the ILS Runway 20 approach is 2,000 feet, I was a bit apprehensive when the Center Controller told me to expect a visual approach. About 10 miles from the VOR (at an Initial Approach Fix), the Controller cleared me down to 3,000 feet. As I neared the VOR, I was still in the clouds and requested a lower altitude. The Controller said 2,500 feet was the lowest he could give me, but that I could join the localizer and shoot the ILS approach to Runway 29. I passed the outer marker. He told me to maneuver as required, maintain 2,500 feet until established inbound and cleared me for the ILS 29 approach.

After reading back the clearance, I decided to hand-fly the procedure turn rather than take the time to reprogram my GPS, since I was so close to the outer marker and the final approach course. I turned off the autopilot, flew back to the VOR and began to fly the procedure turn outbound. I glanced at my altimeter and realized that I had inadvertently descended about 150 feet below my 2,500 feet clearance. I immediately climbed back to 2,500 feet and flew the rest of the procedure turn. As I joined the localizer, the Controller asked if I was established inbound. I confirmed that I was established, descended to 2,000 feet, intercepted the glide slope and landed without incident.

Lessons learned: Since this was my first flight to [this airport] and the reported ceiling was so close to the minimum inbound altitude, I should have (a) taken advantage of all the tools available to me, rather than rely on the Controller's comment about expecting a visual approach, and (b) requested the ILS Runway 29 approach starting at the IAF for a 7 nm DME arc, programmed my GPS, activated my GPS and let the autopilot do the work. When the Controller cleared me to maneuver as required, instead of disconnecting the autopilot, I should have flown the procedure turn using the heading bug and altitude preselect to minimize my workload.

Situational Awareness in Maintenance

Distractions, unexpected events, and schedule pressure are all factors that reduce situational awareness. Unfortunately, these factors are commonplace in Maintenance. An Inspector and Mechanic both reported on the chain of events that contributed to a main gear tire hub cap departing a B737-700 aircraft.

■ Inspector's Report: I was the Inspector for the right wing and right main gear. A Mechanic changed the #3 main tire, but left the hub cap loose. There were many

factors contributing to this including: moving the aircraft in the middle of the job, the Mechanic working the tire was called for a drug test during the job, and a general hurried atmosphere. The Mechanic signed off the job card and so did I. I did a walkaround after the tire change, but did not find that the hub cap was loose. The aircraft made it two flights before the #3 hub cap came off.

■ **Mechanic's Report:** I changed three main gear tires, #1, #3, and #4 on a B737-700 aircraft. We started with #4, was finishing up on #4, I started #3. After putting on the tire I put the hub cap on with the three bolts, but I didn't have any tools, so I got up to get some. I decided to move the tire over by the table that the other tire was leaning on. When I did, the table moved and both tires fell over. So I got someone to help me pick them up. After

moving them to a better location it was time to swap the aircraft with a hangar line overnight aircraft. After swapping the aircraft, the Hangar Supervisor came and got me for a random drug screening. When I got back, the tire was done. I do not recall ever going back to tighten or safety the hub cap. The next day they found a hub cap on or near the runway. They determined it was off an aircraft. At that time they started looking for the aircraft that had lost it. They found the aircraft that was missing the #3 hub cap.

When inevitable work interruptions occur, a Mechanic usually has the option of noting on the job card or write-up that the job is unfinished ("hub cap in place, not tightened"), or tagging the part to increase situational awareness.

ASRS Alerts Issued in August 2010	
Subject of Alert	No. of Alerts
Aircraft or aircraft equipment	7
ATC equipment or procedures	9
Airport facility or procedure	6
Other	1
TOTAL	23

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August 2010 Report Intake	
Air Carrier/Air Taxi Pilots	2978
General Aviation Pilots	1065
Controllers	944
Cabin/Mechanics/Military/Other	503
TOTAL	5490