Preventing Checklist Errors

A Checklist Checklist

Checklists were developed to ensure consistency and completeness in the performance of complex tasks. Aviation checklists provide an orderly and sequential collection of vital steps for configuring an aircraft for different phases of flight or for resolving abnormal situations.

Since ASRS continues to receive a significant number of incident reports related to checklist errors, perhaps another look at some of the factors affecting proper checklist usage is warranted. See *CALLBACK* Issues #292 and #410.

These recent ASRS reports highlight five items that should be on everyone's Preventing Checklist Errors checklist:

1. Remember to use it
2. Check every item, every time
3. Slow down; confirm critical items
4. Read it correctly
5. If interrupted, restart from the beginning

1. Checklist…………………Remember to Use It

A B757 Captain provides an excellent analysis of a checklist error that led to a rejected takeoff. Workload, time pressure and interruptions all contributed to the checklist oversight.

■ *[The airport] was using the south runways for departure, so we taxied out of the ramp single engine and upon initial contact with Ground, we were told we would now depart on Runway 09R. I had the First Officer immediately start the right engine and slowed our taxi pace to a crawl. After engine start, the First Officer did a great job of changing the Flight Management System (FMS) for the new runway and SID and recalculating takeoff data. We briefed the changes and were at the runway. We checked to ensure we had five minutes of run time on the second engine and the First Officer and I looked at each other and asked if we had done everything we needed to and decided we had. The Tower gave us, "Line up and wait," and we went into position. Soon, takeoff clearance came and I set the EPR, gave the jet to the First Officer, and he called for standard power. The autothrottles would not engage. I checked the Autothrottle Arm switch ARMED, pushed thrust once more to no avail, and then took the jet to discontinue the takeoff…. The Takeoff Warning Horn never sounded because the power levers never went high enough to complete the logic.*

Once clear of the runway with the brake set, we discussed the situation and noticed the flaps were still up. We had failed to configure and run the Before Takeoff check. We configured and confirmed the autothrottles would come on properly once configured, ran the checklist, and departed without further incident.

This event was caused by human factors issues arising from the time compression associated with the sudden change from a very long taxi for takeoff to the shortest taxi route departing aircraft can get. We have standard procedures backed up by checklists to ensure we are properly prepared for each phase of flight. In executing these procedures, we become used to a certain flow of activity as the flight progresses. One such point in the flow of activity is arrival at the hold short point for takeoff. Normally, we would have little left to do at this point but receive takeoff clearance, do the below-the-line items on the checklist, and depart. On this occasion there was an intense flurry of activity packed into the last couple of hundred meters of taxi to start an engine, recalculate performance data and put it in the FMS, change the runway and SID in the FMS, and re-brief the SID. When it was all done, we were sitting at the hold short line, number one for takeoff, and to our tired minds at a very early hour, this meant the next thing was to go below the line and depart, which we attempted to do. Thankfully, the aircraft has design features to alert us to being improperly configured for takeoff and we captured and corrected our error.

The First Officer and I were aware of the potential for missing something in this dynamic time-compressed situation, as evidenced by our talking about whether we had done everything before we accepted the Line Up and Wait clearance, yet we still missed crucial steps.

2. Checklist…………………Check Every Item, Every Time

As this B737 Captain reported, since checklist items are almost always "correct," there can be a tendency to perceive items as correct without actually verifying them. If repetitive use of a checklist leads to automatic responses and seeing what you expect to see, then the very purpose of the checklist is subverted and it can give a false sense of security that everything has been "completed" or "set" properly.

■ *Climbing through FL260, the Cabin Altitude Warning Horn sounded. We accomplished memory items and the QRH for Cabin Altitude Warning Horn/Abnormal*

Pressurization. We returned to our departure airport for maintenance and to refuel.

Upon rechecking the pressurization panel during descent, we discovered we had set 12660 rather than 1226 (destination airport elevation). I did not verify the correct altitude during the Before Start Checklist. I should have looked more closely at the small numbers in the analog windows. I "saw" what I was expecting to see.

Take time to verify every checklist item. We weren't late or rushed, but I was still lulled into responding to the checklist item as "correct." Checklist item settings are almost always correct, but I need to ensure that I closely check every item, every time, before I respond.

3. Checklist…………………Slow Down; Confirm Critical Items

A CRJ700 Captain shared an important lesson on the need to confirm that the correct switch, handle, button, etc. is being activated in accordance with the checklist. In the case of a system malfunction, activating the wrong switch can make a bad situation worse.

■ *While on the arrival…we got a GEN 2 OFF master caution message. I told the First Officer that he had the radios and then looked up the GEN 2 OFF procedure. The procedure in the QRH had me select the generator to OFF/ RESET then AUTO. Looking at the EICAS, I was hoping to see the GEN 2 OFF message extinguish. Instead both EICAS displays filled up with messages and the ADG (Air Driven Generator) deployed. After a few moments of processing what had happened, I looked up and found my hand on the switch for GEN 1. Power was restored to both generators. The APU was started in case GEN 2 should fail again.*

I should have slowed down and confirmed with the First Officer that I had the correct switch and not been in such a hurry to complete the checklist.

4. Checklist…………………Read It Correctly

When an A321 First Officer misread a checklist procedure, the Crew's Flight Management Computer problems doubled.

■ *Just prior to our descent, I noticed that my Nav Display (ND) had just lost its map and showed MAP NOT AVAIL on ND2. I told the Captain who decided to maintain control of the aircraft and radios since his ND1 was still normal and asked me to perform the QRH procedure. At this time the Captain also informed ATC of our degraded status.*

Once I found the procedure for a single Flight Management Guidance Computer (FMGC) failure, the Captain expressed

his concern about these particular reset procedures and asked that we proceed carefully. As I read through the QRH, I made a critical mistake and misread which circuit breaker to pull in order to reset FMGC 2. As a result I pulled the circuit breaker for FMGC 1 and caused a dual FMGC failure. He asked that I call Maintenance Control on the phone for further help…. We were on hold for almost 20 minutes. At this point we were close to the airport and needed to focus on safely flying the plane and the Captain asked that I help him set up for a raw data approach, leaving the FMGC failure to be fixed on the ground.

During this whole time we had been descending on the arrival with multiple Controllers issuing us "Fly direct to..., Cross XYZ at…" instructions, which we advised we were unable. Apparently ATC was confused with what we were unable to do and were not passing the word on to the next Controller. Due to the workload caused by the degraded systems, we were somewhat rushed on a revised STAR and approach with only raw data to navigate with, but we landed without further incident.

5. Checklist…………………If Interrupted, Restart from the Beginning

After resuming an interrupted Taxi checklist at the wrong point, an Air Carrier Flight Crew took off on one runway while their Flight Management System had plans for another.

■ *As we were taxiing out for takeoff, we started the Taxi checklist. Ground Control interrupted that by telling us to switch to Tower and they actually gave us the wrong frequency and then called us back to give us the correct one. After that we completed the Taxi checklist. We were the only ones out there and neither of us felt rushed. After takeoff we turned to a heading of 340 degrees per Tower instructions and, after contacting Departure, they told us to proceed direct to ZEHRN, but we didn't show that in the Flight Management System (FMS); we showed HEFLN. After giving us direct to JERES, Departure told us that HEFLN was used for Runway 30 departures. I double checked the FMS and sure enough, we had the wrong runway selected. While there was no deviation, it could have been serious if this was a true RNAV departure.*

Whenever a checklist is interrupted, it is imperative that the checklist be restarted from the beginning. If it is picked up from where you left off, you may pick up it up at the wrong point as we did. Also, we must verify the runway in the FMS with the heading and the runway number as we line up on the runway.