CALLBACK
From NASA's Aviation Safety Reporting System
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CRITICAL EQUIPMENT FAILURES

Good fortune, often called luck, has been aptly defined as success that results when preparation meets opportunity. Rarely is preparation more important than when a pilot or flight crew meets opportunity in the form of a challenging critical equipment failure or combination of failures. ASRS defines a critical equipment failure as an equipment problem that is vital to the specific flight and circumstances, such that the equipment's failure or malfunction could significantly impact the safety of flight.

Pilots and flight crews continually train to handle airborne emergencies that involve critical equipment failures. Training and preparation include individual study, informal discussions, seminars and other forums, ground schools, briefings, and formal simulator sessions, during which critical equipment failure procedures are perfected.

Operations manuals and Quick Reference Handbooks (QRHs) are replete with emergency and abnormal procedures, but they cannot address every contingency. Because an equipment failure may be critical in one situation and not in another, good judgment and prioritization skills are paramount. Pilots and flight crews must often improvise, particularly if a failure is not addressed in approved publications exactly as it is experienced, or if a combination of failures causes cascaded problems or secondary effects.

Reports shared this month describe some less frequent critical equipment failures. They clearly herald the need for careful, comprehensive individual and crew preparation so that good fortune results when opportunity knocks.

An Elevated Cable Concern

This Cessna 177 pilot experienced a dangerous flight control problem. The source was discovered to be a peculiar oversight, which was not directly related to flight controls.

■ *As I was returning home from flying,...I had no issues or weather to avoid. Once I was about 25 miles east of [my destination], I attempted to go around some thunderstorms and work my way in [to land]. I experienced some turbulence and decided to turn back to [a different airport]. During this time I realized that I could not pitch the nose forward, and my elevator seemed unresponsive to my control inputs. I ended up being able to pull the yoke back and pitch up but not able to do the opposite. I was able to control the aircraft using power settings and trim to divert to [the other airport] and land safely. As maintenance was...done, it was discovered that the battery was not latched in place and thus fell onto the elevator control wire, burning it in half. The rudder control was close to also being burned through. I believe this could have been a much worse situation.*

A Takeoff Tale

Late during the takeoff roll, this A321 Captain was surprised with a ride to remember when the aircraft flexed its muscles and exhibited a mind of its own.

■ *The aircraft TOW (Take-Off Weight) was approximately 140,000 pounds, the Center of Gravity (CG) 17.7 [percent], and the takeoff trim setting 2.7 [units] nose up. During the takeoff roll, approximately ten knots prior to rotate speed, the nose gear began lifting off of the runway. Nose down force [was] applied to the sidestick controller, [but] failed to control pitch. At five knots prior to rotate speed, the nose gear became fully airborne, and the aircraft continued an uncommanded rotation until fully airborne. For several seconds the sidestick controller was unable to overcome the continued increase in pitch. As the automated pitch trim system continued to trim, normal flight characteristics were restored after approximately 20 to 30 seconds. [The] aircraft accelerated near the flap speed limit until control of the aircraft was restored.*

Both Dispatch and Maintenance were fully debriefed about this incident. I am waiting for the results of their investigations. Improper aircraft loading and/or errors in the [performance calculations] are suspected. Feedback from Dispatch and Maintenance are required to determine the cause of the incident.

A Life Support Situation

When an A321 Captain discovered during flight that a critical life support system was unserviceable, prompt action was taken to ensure the safety of the passengers, aircraft, and crew.

■ *A routine check at cruise altitude indicated [that the] crew oxygen pressure was zero. ATC was advised that we would need to descend and divert. Dispatch was contacted, and after a short discussion, we agreed on diverting. ATC,*

flight attendants, and passengers were all notified. QRH and overweight landing procedures were complied with, followed by a normal approach, landing, rollout, and taxi-in. Station Operations did an outstanding job of taking care of our passengers in the middle of the night. Contract Maintenance was unable to service our oxygen bottle or complete an overweight landing inspection. The flight crew was released to the hotel.

Electrical Efficacy

A B777 First Officer reported various electrical anomalies at cruise. Not stated is how or if the conditions were resolved, but the report exemplifies the phenomenon that multiple, "unrelated" aircraft system failures may correlate to a power distribution problem.

■ *The aircraft arrived from ZZZZ that day with numerous entries in the Aircraft Maintenance Logbook (AML). ZZZ Maintenance worked to clear the issues (all electrical) including an engine run by the Captain and me while at the gate.… We departed…within 10 minutes of our scheduled departure time.*

Approximately two hours into the flight, we started observing several electrical issues, including flickering cabin lights, loss of all In-Flight Entertainment (IFE), failure to log onto CPDLC, failure of the SATCOM system, failure of all electrical door locking systems (cabin doors, boarding doors, galley, etc.), and the electrical synoptic indicated the Left Main AC Bus was without power. We were cruising at FL370. Smooth air [existed] and no mountain wave was reported. Our cruise airspeed was approximately 290 knots. Without notice, the airspeed jumped to 320 knots, setting the overspeed warning clacker off and disconnecting the autopilot. We did not lose any altitude, and the airspeed went back to our desired mach. I'm not certain why this happened. The airplane had a lot of systems not functioning. I was buried in manuals and checklists at the time of the event. I have been in turbulence and mountain wave, experiencing plenty of airspeed fluctuations. This incident was very different and had no forewarning of the huge jump in airspeed.

I think the Captain did a great job controlling the aircraft. We had compound events and cabin calls all happening at the same time. Perhaps calling the [Relief Pilot] up earlier from his crew break would have alleviated our workload. As the Pilot Monitoring, I could have done more monitoring.… I'm uncertain if this was a true overspeed or part of the electrical anomalies happening with this airplane.

A Bad Landing That Got Worse

When this B737 Captain directed a go-around, a critical equipment failure altered the plan.

■ *The First Officer (FO) was landing on Runway 1 with a slight tailwind and 40 flaps. The FO rounded out slightly high, got a little wing rock, and began settling. The FO flared as the plane touched down and then skipped into the air. I caught the speed brake handle as it tried to deploy and said to go around. I put my right hand behind the throttles to ensure that they were going forward. The throttles were locked in idle power. I tried again, [but they were still] locked. I took the plane and landed in the remaining runway. I was not pleased, and had no idea why the throttles were locked.*

Blazin' Batteries, Batman

While taxiing to the gate, an Embraer 145 Captain experienced an electrical problem. Procedural compliance and situational awareness resulted in solving a problem that could have ended poorly.

■ *After landing, we taxied and held short on Taxiway S. Operations were backed up on the taxiways and ramp due to weather complications and traffic congestion. We received a Master Warning and BATT 1 OVERTEMP Engine Indicating and Crew Alerting System (EICAS) warning. We confirmed the battery to be overtemping (70 degrees C at this time) and completed the immediate action items.… I instructed the First Officer to run the Battery Overtemp QRH [Procedure]. As [the First Officer] retrieved that, I informed ATC that we may need assistance and noticed the [battery] temperature continuing to increase. After the immediate action items and QRH [procedure] were completed, the temperature continued to run away, so we asked for priority handling and had Airport Rescue and Firefighting (ARFF) dispatched should the battery ignite or a fire situation start. We were given…priority handling to return to the gate promptly, and ARFF met us at the gate. ATC relayed our situation to the Company and I briefed the Flight Attendant.… We were able to deplane expeditiously rather than evacuate, and ARFF confirmed there was no fire, but the battery temperature was extremely hot. The last temperature we saw on the EICAS was 80 [degrees] C, but a ground person or firefighter…told us after the event that it had reached 100 [degrees C]. The plane was written up after giving Dispatch the information necessary for their report.*

ASRS Alerts Issued in March 2019	
Subject of Alert	**No. of Alerts**
Aircraft or Aircraft Equipment	8
Airport Facility or Procedure	3
ATC Equipment or Procedure	2
Hazard to Flight	2
TOTAL	**15**

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March 2019 Report Intake	
Air Carrier/Air Taxi Pilots	5,373
General Aviation Pilots	1,355
Flight Attendants	908
Controllers	519
Military/Other	291
Mechanics	248
Dispatchers	117
TOTAL	**8,811**