



Issue 438

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Is Fatigue Factor Fiction?

“Fatigue makes cowards of us all,” said legendary Green Bay Packers coach, Vince Lombardi, as he warned his players about this insidious threat. In similar fashion, fatigue exerts an influence upon aviation operations daily. Many aviation professionals have felt its effects. Many have suffered its consequences. The NTSB 2016 “Most Wanted List” of Transportation Safety Recommendations leads with, “Reduce Fatigue-Related Accidents.” It states, “Human fatigue is a serious issue affecting the safety of the traveling public in all modes of transportation.”¹ FAA Advisory Circular 117-3, Fitness for Duty, notes that, “Fatigue is characterized by a general lack of alertness and degradation in mental and physical performance.”²

Fatigue can manifest itself in diverse ways. Fatigue research has documented many of its effects and generally describes it as "a decrease in cognitive ability from sleep loss, circadian disruption, or sleep inertia."³ Fatigue is rarely the sole or primary factor in an incident or accident, though it is often cited as a factor in ASRS reported incidents.

CALLBACK presents six reports from various aviation professions that either state directly or imply that fatigue was a contributing factor. You can draw your own conclusions as to the role fatigue played in these ASRS reported incidents.

Sleep Less in Seattle

A routine radio call was a wakeup for this B737 First Officer.

- After being assigned FL390 and a subsequent frequency change, we discovered during the climb that we had leveled at FL380 for approximately 10 minutes. I was the Pilot Flying, but when we changed Center frequencies, I took the call. When I checked in, I stated our altitude (FL380) and, as is my habit pattern, looked at the Mode Control Panel (MCP) altitude window. It read 39,000 and was different from our current altitude, so I checked in by saying, “Seattle, (call sign) FL380, climbing FL390.” I had not noticed that we had been level at FL380 for approximately 10 minutes. I simply assumed we were still slowly climbing to our cruise altitude.... I looked at the MCP altitude window again. It read 39,000. I told Seattle it looked like we were climbing to FL390 but we were level at FL380. Seattle said to climb to FL390. I affirmed that clearance. The Captain also confirmed the clearance over the radio and we climbed to FL390 without incident.

In retrospect, I realize that I had probably entered FL380 into the FMC on the ground before we had received our new paperwork.... This was the last leg of an extremely taxing four-day trip that would have been illegal prior to FAR 117. I was more tired than I realized.... I cannot over-emphasize the importance of fatigue in situations like this. I didn't realize how tired I was.

First Impressions Don't Always Last

A misinterpreted flight instrument led this Air Carrier Pilot into performing a rejected takeoff.

- I was the First Officer and Pilot Flying for this [international] night flight. It was the seventh of eight duty periods and my second of two opportunities in the right seat on this trip. Our preflight preparation was completed for an on time pushback. The weather was VFR, we were heavy at 618,000 pounds, and our first opportunity on the runway resulted in a rejected takeoff.

With the Non Flying Pilot callout of “80 knots,” I recall a quick scan of the Primary Flight Display (PFD), but did not linger to verify 80 [knots] and the green trend line on the PFD speed tape. I believe I instinctively made the inappropriate callout “checked,” but was troubled enough to make at least two quick scans back to the PFD. Regrettably, both times when I glanced down, I saw the right side altitude tape instead of the left side speed tape, and what [registered incorrectly as airspeed] in my mind both times was 40, which was, in reality, the takeoff zone elevation.

Company training kicked in for a perceived malfunction, but I struggled to call it out clearly and precisely. Nevertheless, I communicated the threat and we accomplished the rejected takeoff procedure. When I saw the functioning and decreasing speed tape, my error became clear. There was, in fact, no frozen 40 [knot airspeed] indication. With a safe stop assured...I briefed the Captain on my error.

I have beaten myself up over it, but still can't pinpoint the root cause. [Was it] fatigue on a long trip or less than usual currency in the seat for me? [Was it] a distraction with the centerline lighting, or was the PFD lighting too low? Nevertheless, vigilance and the commitment to speak up are traits that we have emphasized and I took them to heart.

Target Fixation

Preoccupation with a minor problem prevented this Regional Jet Crew from perceiving other critical events.

From the Captain's Report

- We were maintaining 6,000 feet to join the ILS for Runway 11L. Four miles prior to the Initial Approach Fix I selected Heading Mode and inadvertently hit the transfer button causing the ILS frequency to disappear in the Communications 1 standby box. I was distracted by this and tried to fix it. I was fixated on my [ILS] frequency and did not recognize that the autopilot had disconnected. The Pilot Not Flying asked what was wrong. I [corrected] the frequency error and looked up to see that we were low for the approach and then the Ground Proximity Warning System (GPWS) “Too Low Terrain” alert went off. I applied max thrust and started to climb. ATC also said that they were getting a Low Altitude Alert and suggested the 6,000 foot minimum vectoring altitude in that sector. We climbed back through 6,000 feet, leveled off, intercepted the ILS to Runway 11L, and continued the approach.

The day was long with weather in the entire southwest. We flew five legs and were delayed...every leg. An ILS was hampered by fatigue and [selecting] the wrong button on the Communications 1 standby box, followed by fixation on that problem. Fatigue being the cause, a solution is to avoid and recognize it before it hampers safety.

From the First Officer's Report

- The uncommon weather conditions, turbulence throughout every flight, and long delays most likely contributed to our being fatigued.... It appears that fatigue and fixation on a communication [switching] problem were the causes.

Don't Put off until Tomorrow What You Can Do Today

After a lengthy duty day, this Maintenance Technician accomplished a routine engine oil and filter change on a light aircraft. An in-flight engine failure occurred the next day.

- I was instructed to meet the aircraft to conduct routine maintenance that consisted of an oil change and an inspection required by an Airworthiness Directive (AD). The aircraft arrived at dusk and I proceeded to drain the oil, remove and replace the oil filter, add new oil, and complete the inspection. Because it was not common company practice to cut open and inspect every oil filter removed from an aircraft, I set the old oil filter aside to drain and did nothing more with it. I had been on duty for twelve hours and was eager to finish the maintenance and go home.

The aircraft departed early the next morning. That afternoon the aircraft experienced a catastrophic engine failure and made a forced landing.

Some weeks later another maintenance technician located and cut open the oil filter that I had removed. Upon inspection, the filter was glittering with ferrous and non-ferrous metal, an obvious indication that the engine was not airworthy and required immediate attention. Had I cut open and inspected the filter the evening it was removed, I would never have signed off the aircraft as airworthy and the incident would have been avoided.

I believe several factors contributed to this occurrence.... A long duty day and consequent fatigue likely inhibited my better judgment to cut and inspect the oil filter.

Double Checking the Check Valve

A Maintenance Technician improperly installed a bleed check valve on this Regional Jet. The engine failed during the subsequent takeoff roll.

- I was tasked with the functional check of the Number 1 engine low stage bleed check valve. While reinstalling the valve, I accidentally installed it backwards. After it was put back together we [ran] the engine. On the first engine run we had a Bleed-1 Fail message. We reset everything and ran the engine again at power with the APU bleed off. This time no message came into view. We ran the engine a few more times...and didn't receive any abnormal indications.

The next morning the aircraft returned to the gate with a write-up...the number one engine [had] shut down

on takeoff roll at thirty percent power. At Maintenance Control's direction, we returned to the hangar to verify the check valve installation and found that it had been improperly installed.


At the time of re-install I had been up for approximately 18 hours. This is a job I have done before and I am familiar with it. I was tired and installed it incorrectly. I was fatigued and not aware...that I had installed it backwards.

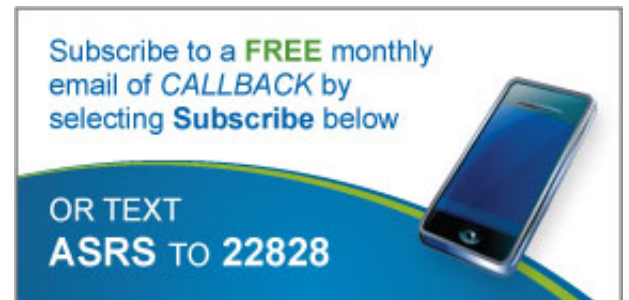
Too Tired to Arm Two Doors

This B757 Flight Attendant cited fatigue in two separate door incidents.

■ Due to fatigue, I failed to arm doors 1L and 1R prior to takeoff. I realized once we were in the air that they weren't armed. My action was to immediately arm the doors. This is the second time due to fatigue I've had a door incident.

1. <http://www.nts.gov/safety/mwl/Pages/mwl1-2016.aspx>
2. FAA Advisory Circular 117-3, October 11, 2012, para. 5.b.
3. Dr. Erin Flynn-Evans, Fatigue Countermeasures Group, Human Systems Integration Division, NASA Ames Research Center.

May 2016 Report Intake		NOTE TO READERS:
Air Carrier/Air Taxi Pilots	4,861	■ Indicates an ASRS report narrative
General Aviation Pilots	1,230	[] Indicates clarification made by ASRS
Controllers	611	Subscribe to
Flight Attendants	567	<i>CALLBACK</i> (Please Read)  NASA ASRS only uses your email address for subscription to CALLBACK. NASA ASRS and the third party used for distribution of emails and handling subscriptions will never share or sell your personal information.
Military/Other	362	
Dispatchers	238	
Mechanics	192	
TOTAL	8,061	



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