SAFETYGRAM

December 2015

If you're a holiday shopping procrastinator, December 21st means there's very little time left to buy gifts. But for aviators, December 21st marks the shortest daylight hours of the year in the northern hemisphere. What that means to individual aviators probably depends on their personality. If you're a "glass half full" type, it means there's no easier time to update your night currency. Instead of getting home after midnight when you get your requisite 3 night take offs and landings, now you can be home at a reasonable time for dinner. If you tend to view the water level in the glass the other way, it means it's tougher to fly if you're not night current. Either way, "night" is a specific currency with good reason.

While the majority of my flying in recent years is during daylight hours, I used to fly at night quite a bit. Night flying can offer some amazing views and great flying. But with those come an amount of sensory deprivation that can cause trouble if you're not careful. One of my most amazing night flights was during a meteor shower. The night was particularly dark (new moon) and there was no background light from the ground, so the view was particularly spectacular. The only problem was the random light streaks in my peripheral vision from the meteors contributed to a severe sensory illusion after a while that made me feel like I was upside down and in a steep dive. Thankfully, I had another pilot with me that could fly the aircraft as I stared at the instruments for a while to "re-cage" my brain.

The experience I just described was the result of subconscious peripheral vision signals to my brain being misinterpreted; it's worth re-emphasizing that all this occurred at the subconscious level. The net result for me was extreme spatial disorientation (spatial D). Many pilots get similar but less extreme spatial D at night from something as innocuous as lighted power lines that go up a mountain, or the contrast of lights on an angling shoreline vs. a dark body of water. There's a bunch of other ways for your eyes to subconsciously trick and your brain at night, but the solution is always the same: trust and fly your instruments. Normally, I want folks looking outside and clearing for traffic. But if you start getting spatial D, it's time to fly off the attitude indicator and the rest of the instruments for a while until things clear up. No matter what, the instruments need to be in your cross check at night.

On top of visual illusions at night, the sensory deprivation can aggravate vestibular (inner ear) illusions caused by acceleration/deceleration. I used to think my ears were just for hearing until my flight training taught me there's a bunch of other cool stuff in my ears that help my brain figure out which way is up. In fact, our inner ear augments our vision to help orient the brain. However, the inner ear's signal to the brain can actually be fooled by a number of things – particularly in the flight environment. Normally your eyes override those incorrect signals, but with the lack of visual cues available at night it's easy for your brain to get confused. Rolling into a turn very slowly or rolling out of a prolonged turn quickly can trick the inner ear and confuse you about which way is up. The experience I described earlier involved a prolonged

period of slowly rolling into and out of bank repeatedly. My inner ear confused my brain (on top of the confusing peripheral vision signals). Again, thank goodness for instruments!

Even if your brain doesn't get confused about which way is up, landing at night presents other challenges due to the lack of visual cues. "The black hole effect" always sounded like something from a bad 70s sci-fi movie to me…until I experienced it firsthand. Even if a runway has the proper lights, the lack of visual cues surrounding the runway can make it very difficult to determine the proper glidepath. If the airfield has no visual or instrument (VASI/PAPI/ILS/LPV) glidepath guidance (or if you don't use what's available), the black hole effect has a tendency to trick people into landing well short of the runway – resulting in CFIT. If you're going to go into one of those fields at night, do yourself a favor and figure out the terrain and glideslope while you're still on the ground. For example, on a straight in approach at 1 mile from the field you should be 300' AGL, 2 miles 600' AGL, etc. Also, if you haven't brushed up on pilot controlled lighting in a while, you may want to peek at AIM chapter 2 again.

If you've never experienced trying to land in a "black hole" at night or haven't had your brain tell you that straight and level isn't straight and level, you probably will someday. If you're not prepared, night time sensory illusions can easily lead to spatial D and be deadly without proper recognition and correction. I've read reports that place the night spatial disorientation accident fatality rate around 90%. Anything that serious is best figured out on the ground before you ever actually encounter it in flight. However, the cure is always simple for whatever might cause spatial D at night: be familiar with your route and keep the instruments in your crosscheck.

Hopefully, I haven't scared you out of flying at night. I'll mention again that some of the most spectacular sights I've seen from the air happened at night; the northern lights and Milky Way are even more amazing at altitude, for example. I guess I'm a glass half full kinda guy when it comes to flying – what a great time to update my night currency and take in the sights! I'll just make sure I prepare myself and bring the instruments into my crosscheck a little extra so I get to share the experience in a positive way.

Clear skies and fair winds!

Links:
Spatial D:
http://goflightmedicine.com/spatial-disorientation/

Aviation Week Accident Case Study:
http://aviationweek.com/business-aviation/spatial-disorientation-cockpit-quick-killer

FLY SAFELY!

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