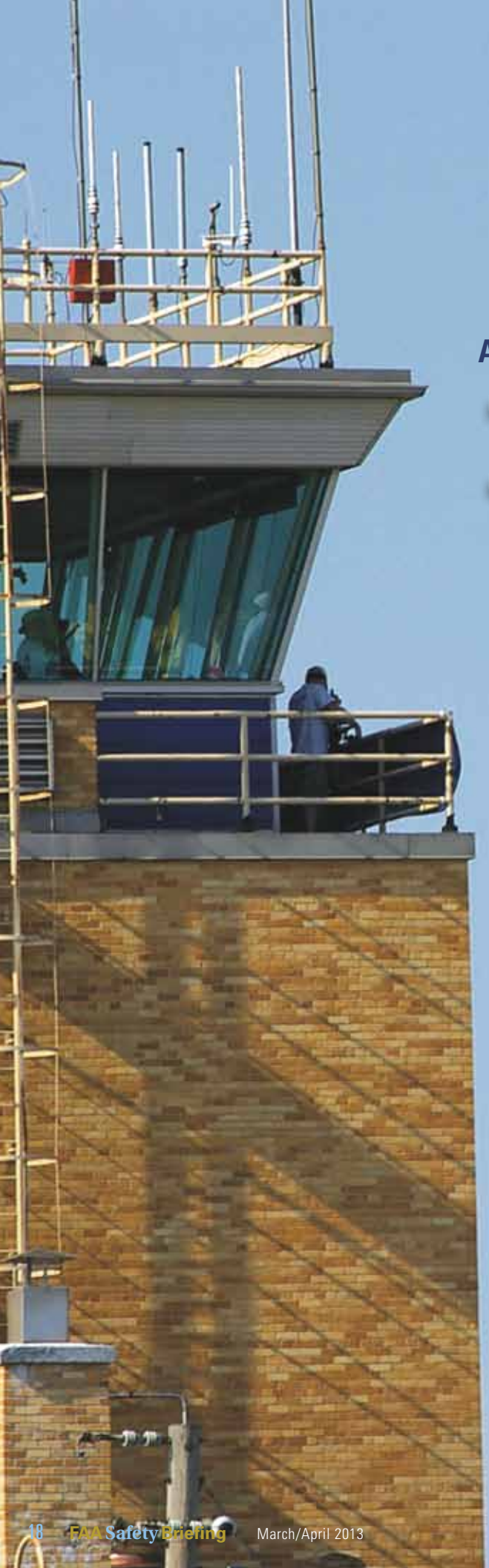

JAMES WILLIAMS

Setting Priorities

Aviate, Navigate, Communicate – and Evaluate Risk

Humans aren't very good at evaluating risk. It's a sad truth that contributes to the potential danger of aviation. One problem is that real danger, or risk, is different from perceived risk. We tend to either over or under "value" the risks we face. The authors of *Freakonomics* explored this topic extensively in the context of parenting. They compared the risks of allowing children to play at a home with a gun and at a home with a swimming pool. What they found is counterintuitive: the home with the pool was more dangerous, because swimming pools accounted for more child deaths a year. This isn't to say that the home with the gun is without risk. The comparison merely illustrates that the risk from the pool is greater. Most people would think that the opposite was true, however, because we tend to overvalue the risk posed by the gun (remembering of course that there is still risk) and undervalue the risk from the pool.

Now let's apply this approach to aviation. Which activity poses greater risk: an hour of pattern work, or an hour-long cross country? You might think it's the cross country, but statistics would argue you're wrong because the majority of accidents occur during the takeoff/initial climb and approach/maneuvering/landing phases of flight. Pilots on a cross country will spend most of their time in the relatively safe en route phase. As in the pool-vs.-gun example, both activities carry risk but one is statistically more dangerous than the other. The hour of touch-and-go landings will occur entirely within the higher risk phase of flight. And consider this number: those higher risk phases of flight account for 77 percent of accidents, but only 17 percent of flight time.

So, what can we do? The first step is to focus on priorities and possible outcomes.

Photo by George Soteropoulos

Priorities

One of the earliest lessons in flight training is the aviation order of operations: Aviate, Navigate, Communicate. In priority order, you should: fly the airplane (Aviate), figure out where you are and where you're heading (Navigate), and, as appropriate, talk to ATC or someone outside the airplane (Communicate). It seems so simple, but it's easy to forget when you get busy in the cockpit.

A famous example of failure to follow the established aviation priorities is the crash of Eastern Airlines Flight 401. In December 1972, the crew of a Lockheed L-1011 *TriStar* became focused on the malfunction of a landing gear position indicator light for the nose gear. The plane subsequently descended into the Everglades northwest of Miami, killing 101 of the 176 people on board (two people died more than seven days after the accident). What happened? The crew – captain, first officer, and second officer/flight engineer – had aborted an approach at Miami when the nose gear light failed to illuminate. There was also a company aircraft mechanic in the jumpseat. The flight was vectored away from the airport at 2,000 feet to allow the crew and mechanic to troubleshoot the problem. The captain instructed the first officer, who was flying, to engage the autopilot. The first officer acknowledged that instruction from the captain and then removed the nose gear light bulb. While attempting to replace it, the light jammed. The crew and mechanic continued to work the problem, and eventually both the second officer and mechanic went below the flight deck to physically check the position of the nose gear.

During the distraction of troubleshooting, the aircraft began a shallow descent that, in the darkness, the crew did not detect. In fact, their fixation with the gear light continued, along with conversations with ATC, until seven seconds before impact. At that point, the conversation went as follows:

First Officer: "We did something to the altitude."

Captain: "What?"

First Officer: "We're still at 2,000, right?"

Captain: "Hey, what's happening here?"

Seconds later the aircraft slammed into the Everglades.

In this example, a highly experienced and well-trained crew of three professional pilots (with the added bonus of a company mechanic) failed to follow the order of operations. Not one of the three was actually flying the airplane. They paid attention to navigating and to communicating, but apparently none to flying until seconds before impact.

We've all probably had mechanical issues of one kind or another in our flying career. And, in most cases, we'd be lucky to have the assistance of another pilot, much less two other pilots, to troubleshoot the problem. Despite all the advantages the crew in this situation had, the outcome was still disastrous because the entire crew became engrossed in the mechanical issue and no one was left to keep the airplane in the air. While there were other contributing factors in this accident to be sure, the most critical was failure to aviate.

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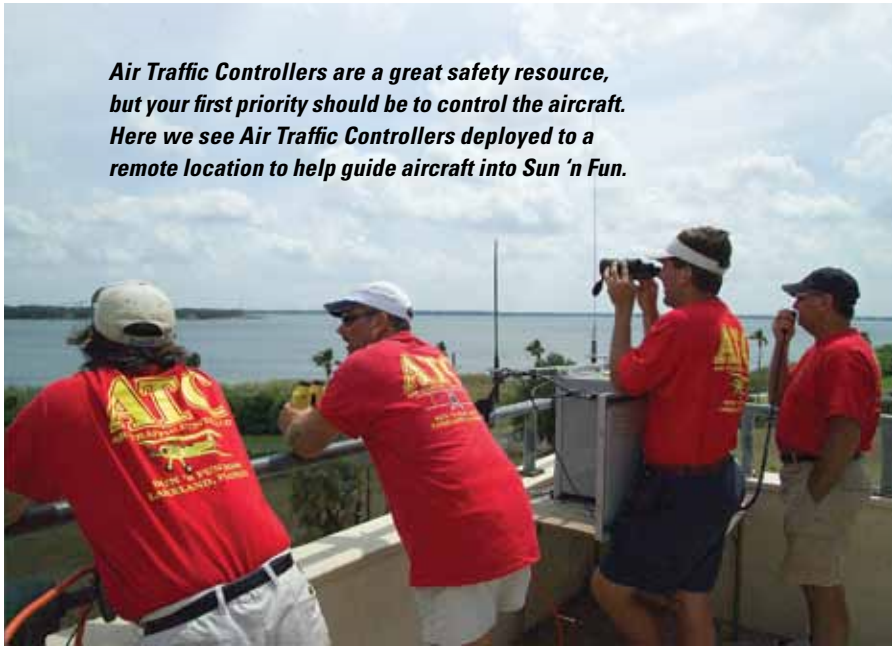
Possible Outcomes

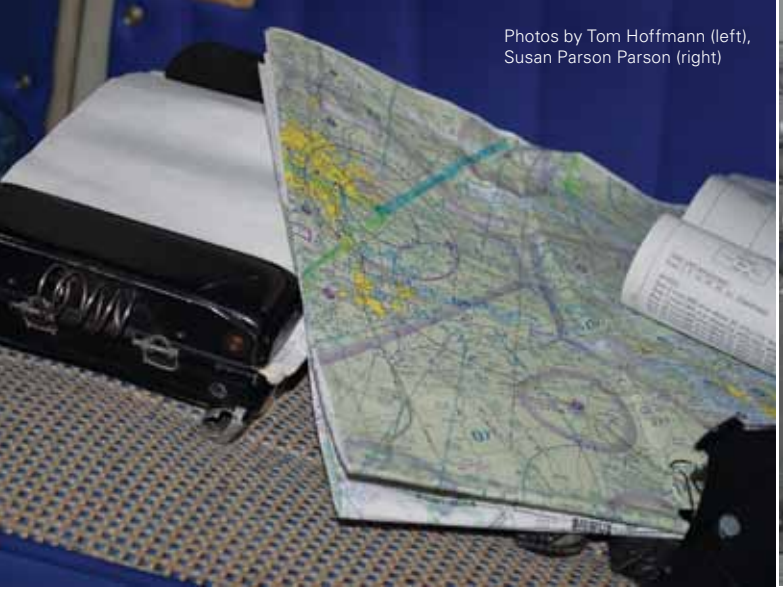
When dealing with an emergency or abnormal situation, the first thing to consider is what outcomes are possible given the circumstance presented. Having options makes it possible to evaluate them and assess how likely they are to occur.

Consider another example, which involves the October 2006 accident of a Cirrus SR-20 in New York City. The Cirrus owner and an instructor were attempting to turn around in the East River corridor. They slammed into an apartment building when they could not complete the turn in the space available. It was essentially an urban box canyon with a "roof" of 1,100 feet, which was the base of the overlying Class B airspace. Unfortunately, the aircraft hit

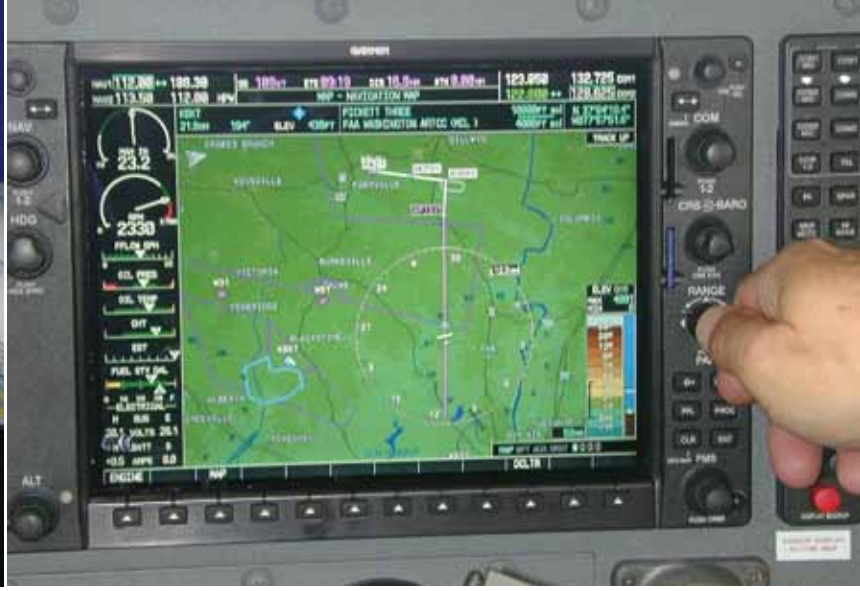


Air Traffic Controllers are a great safety resource, but your first priority should be to control the aircraft. Here we see Air Traffic Controllers deployed to a remote location to help guide aircraft into Sun 'n Fun.

Photo by H Dean Chamberlain



Photos by Tom Hoffmann (left), Susan Parson Parson (right)



Navigating, whether by electronics, or by chart, should be secondary in your priority system.

the 500-foot tall building around the 300-foot level. The NTSB later concluded that the aircraft was in a 40 to 45 degree bank, when the minimum bank angle to complete the turn would have been 50 degrees.

It's easy to sit at home and say, "I would never do that," and file the accident away as something that happens to other people. But that's not a productive attitude, and it doesn't help improve the system. After all, no pilot gets up in the morning and says, "I'm going to do something stupid that no other pilot would do, and it's going to cause an accident." Instead, let's look at the cultural issues that could have contributed to the pilot's inability to perceive and appropriately evaluate all available options.

Part of the PIC's responsibility for preflight planning and conduct of the flight is to avoid situations that require a choice between breaking regulatory barriers and breaching physical barriers.

The NTSB mentions the problem in its accident report:

> *The pilots may have been concerned about the consequences of inadvertently penetrating the Class B airspace or flying over Manhattan Island. However, in a situation such as this, pilots should place a higher priority on maintaining aircraft control.*

The report goes on to describe how the pilots could have prevented the accident by climbing above the buildings, or by requesting clearance to enter the Class B airspace. But look at the situation from the perspective of a pilot arriving at the north end of the East River exclusion area. You start to turn, but you seem to be running out of room to complete it. What are your options? You can continue with the turn in hope that everything will work out, or you can climb and run wide over Manhattan. So what are the possible outcomes of each of those options?

You might just make it with the first option, or end up in the kind of accident scenario that actually occurred. Taking the second option might give the building occupants a scare, but it would have eliminated the danger. Of course there are likely to be regulatory repercussions, but the accident scenario alternative is far worse.

There is a third option. As the NTSB suggests, the pilot could request permission to transition north until it is possible to make a safe turn. While ATC might be reluctant to grant such a request, remember that the pilot in command holds the ultimate authority and responsibility for safety of the flight. The PIC can declare an emergency and request ATC assistance in finding a place to turn around.

The point of these illustrations is to combine two important concepts: realistic risk evaluation/mitigation, and order of operations. Part of the PIC's responsibility for preflight planning and conduct of the flight is to avoid situations that require a choice between breaking regulatory barriers (e.g., Class B airspace) and breaching physical barriers (e.g., the ground or an obstacle such as a building). But when such a choice must be made, it's important to evaluate the risk, make the best choice for safety of flight, and remember the mantra of Aviate, Navigate, Communicate.

A final thought: if you think you might be in an emergency, then you probably are. Use the PIC's authority and declare an emergency. It's always better to explain your actions from a safe place on the ground than to have the NTSB speculating about them in a report you aren't around to read.

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