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By Robert Wright

Risk Management In The Real World

It's all about managing limitations posed by the pilot, the airplane and the weather.

In the first two parts of this series (Aviation Safety, September 2013 and November 2013), I related how I used practical risk management techniques to meet the challenges of using my Beech Bonanza on a typical (for me) multi-stop, multi-week business trip that took place in June 2013. Having been trained in an era before risk management was emphasized (which is still the case, although change is coming), I now recognize I was fortunate to have successfully addressed these hazards without incident. I'd like to say it was my superior piloting skill, but I'm afraid that chance also played a big role. I emphasize this background because, like much of the present general aviation community, I was trained in another era.

In my case, it was the early 1960s, and my instructors were "old codgers" who learned to fly in the 1930s and 1940s. Risk management, scenarios, single-pilot risk-management (SRM) and many other modern concepts weren't part of the training doctrine. After mastering the stick and rudder skills, pilots were expected to learn these concepts, if at all, by gaining "experience" in the real world. Unfortunately, many pilots had no concept of these skills and their relation to safe operations, and many came to grief. I was no different than most of my general aviation peers. I entered the "real world" and gained experience. Along the way, I made some mistakes, principally in dealing with risk-management issues. I can illustrate this by relating how I faced some typical situations, in hopes readers will relate to their own situation and experiences. The best way to do this is to use the familiar PAVE acronym to cover all the potential risk categories. To those for whom this is their first exposure to PAVE, it stands for Pilot, Aircraft, enVironment, External Pressures.

Using supplemental oxygen won't help with the weather, although it may improve your visual acuity, enabling you to spot the approach lights earlier. Especially when cruising at/above 10,000 feet (5000 at night), going on supplemental oxygen before letdown and through the approach to landing can improve pilot performance and ensure we're ready for the coming challenges. Anyone using a personal airplane for regular transportation should consider supplemental oxygen and a pulse oximeter as basic tools, just like an iPad with electronic charting or a flashlight.

Pilot Hazards and Risks

The "pilot" category of risks includes qualification and aeromedical sub-elements. In my case, qualification risks have usually been low. I stay current, flying an average of at least 150 hours a year, mostly for transportation. I have only been away from it briefly, the longest period about five months. Returning to the cockpit was like I never left, at least as far as VFR activity is concerned. With thousands of hours of experience, it's likely the motor skills of flying a single will return rapidly, even after months of inactivity. Automation and IFR proficiency is another matter. I find these skills to be perishable if they are not used regularly.

In my case, I find the aeromedical issues to be a more troubling risk category. In particular, I find that long-duration flights at higher altitudes are a subtle source of hazards and risk. In my younger days, I sloughed off the potential for hazards and did not use supplemental oxygen in my flight operations.

The risk of these operations finally dawned on me during a flight in a Mooney on July 30, 1987. I was en route from Fort Worth, Texas, to San Diego, Calif., a distance of 1001 nm. It was severe clear all the way with virtually no net winds aloft, so I thought I would test the Mooney's excellent specific range capability. I hunkered down at 12,500 feet in long-range cruise and 7.1 hours later landed in San Diego, with 10 gallons remaining. I was very proud of myself, but soon learned the error of my ways as I fought off a splitting headache that lasted for hours.

Afterward, I began to think differently about aeromedical risk. Until 2005, I was based in the northeast U.S., but I retired from the FAA and moved to Albuquerque to be Eclipse Aviation's Director of Flight Training. I was no longer the young

punk—I was better informed, and I knew I would be operating where all flights started a mile above sea level. I finally bought a portable oxygen system and a pulse oximeter to go with it. I used the latter to ensure that my blood oxygen level was at least 91 percent on all high-altitude flights. I also began to use oxygen before descents, especially if there was a demanding approach in store at my destination. I also used my oxygen bottle to occasionally cruise the Bonanza at 16,500 or 17,500 to go direct to my destinations, rather than weaving around the Rockies.

The issue of supplemental oxygen is critical at high altitudes, but dangerous fatigue can occur even at much lower altitudes after long flights. My penchant for covering ground in flights lasting from four to seven hours is giving way to much shorter missions of about three hours, unless conditions are perfect.

Aircraft Hazards and Risks

The aircraft itself can be a source of risk. Besides the obvious need to control risk through preventive maintenance and prompt correction of discrepancies, you must also account for the level of equipment you have and whether all of it is operational. Over a 30-year period, I've owned a Mooney and two Bonanzas. All served me well; I can't remember a single trip cancellation resulting from maintenance issues, and there were only two delays while away from home base, one for each Bonanza. I did experience equipment failures on all three aircraft, but they didn't delay a trip because I was able to mitigate the risk.

The Mooney experienced three vacuum pump failures, which also took out the autopilot. This increased the risk factor, but by staying VFR and keeping trip legs short, I was able to mitigate it and complete the missions. The first Bonanza also experienced a vacuum pump failure that disabled the autopilot. I mitigated that risk in a similar manner.

For those of you who do not fly high-performance aircraft, this is a good time to point out that neither the Mooney nor the Bonanza are stable instrument platforms like, say, a Cessna 182. I find hand-flying them in instrument conditions for long periods greatly elevates pilot fatigue and complicates task and workload management.

It also should go without saying that there are limitations resulting from operating single-engine, non-turbocharged, non-ice-protected aircraft for transportation. I spend a lot of time planning around these limitations to manage risk and, as related in the aforementioned first two articles in this series, I have still managed to complete most of my missions.

It isn't just the presence and readiness of the aircraft's equipment that affects risk—its performance envelope also is a crucial factor. For example, takeoff performance is affected by density altitude, something I'll get to in a moment. However, one factor that always limits an aircraft's performance envelope in terms of range and endurance is the amount of fuel available. Given my operating profile of long flights of four or more hours, this often plays a role in my risk management process.

Both Bonanzas I have operated have a maximum endurance with full fuel (74 usable gallons) of about six hours, at my typical power settings. My hard rule about fuel reserves is to always land with an hour remaining, or 90 minutes if fuel availability at the destination is uncertain. I have flown to these limits on quite a few occasions, and gone beyond them when I had alternate risk mitigations available. I've already discussed a seven-hour mission, but that was in a Mooney with 8.3-hour endurance at the long-range-cruise power setting used.

My longest Bonanza non-stop flight was 5.5 hours from Santa Rosa, Calif., to Colorado Springs, Colo., a distance of 848 nm. I knew the tailwind component would be very light, about five knots, but it was severe clear and, as it turned out, the ride was amazingly smooth all the way. I elected to fly 10 knots slower than normal at 11,500 feet and expected to land with about an hour reserve. Sure enough, I landed with 11 gallons remaining, about an hour at the long-range power setting.

This flight pushed the limits in another area. I had no supplemental oxygen and had to climb to 14,000 feet twice, once to clear the Sierras and another to clear the Rockies. Both of these climbs and descents were only about 15 minutes each so I was in compliance with FAR 91.211(a)(1)—barely. In this case, all the other risks were low. The endurance and oxygen issues were mitigated by changing my power setting and flying as low as possible to clear terrain, which was still certainly higher than most of my flights when I was based in the

Eastern U.S.

Would I make this kind of flight today? No. I am now based in the West, and I have and use supplemental oxygen. I also am getting away from long-endurance flights. I also must acknowledge that age plays a factor, and with my new Medicare card I have decided to increase margins all around.

Environmental Hazards

The environment in which we fly is a major source of general aviation risk. Convective activity, icing and very low ceilings

are critical potential weather hazards, while terrain, airports, airspace, ATC and other factors also can generate risk. In the first two articles in this series, I described recent flights in which I addressed icing, convection and special use airspace. However, since I fly all over the U.S., I am constantly evaluating terrain hazards, along with other environmental risks, such as high density altitudes.

This played out most interestingly in my occasional stops at Telluride, Colo. (TEX). This is an interesting town that, for a number of years, was about halfway between some of my business activity in Wichita, Kan., and various locations in California. I would often leave midday and decide to RON at Telluride. I reasoned that, since the airport is at 9070 feet msl, I wouldn't have to climb out as far the next morning. You can imagine that the density altitude can be quite high at TEX on a hot summer day when it's 80 degrees. That's a density altitude of more than 12,000 feet. I always planned my departures for early in the morning and tried to stay a couple of hundred pounds below gross weight.

On September 1, 1994, my policy regarding Telluride changed. For departure, the density altitude was about 11,000 feet. I was at my usual 250 pounds or so below gross weight in my first Bonanza. The takeoff seemed to take forever and, as I slowly climbed out, I looked at the surrounding terrain. There is nowhere to go in the event of an engine failure, just rocks. For those unfamiliar with the airport, it sits on top of a plateau, almost like an isolated aircraft carrier. After that takeoff, when I had to go to Telluride, I flew into Montrose (MTJ), about 30 miles away and situated in a flat valley, where the airport elevation is less than 5800 feet, so density altitude issues aren't as severe. Rental cars are also much cheaper at MTJ than at TEX.

External Pressures

External pressures can be very subtle, or they can become cumulative to the point they put you in a difficult situation from which it's hard to extricate yourself. There was one day in particular for me, more than 40 years ago, that hammered home this type of situation.

I had just finished active duty in the USAF and was working in several part-time flying jobs while finishing my MBA at the University of Massachusetts in Amherst. A local owner-pilot asked me to give him some dual instrument instruction in his Piper Cherokee 180 while we flew from Westfield, Mass., to Chatham, New Brunswick, Canada, a distance of 427 nm, and longer on the airways. I readily agreed. The day before the flight, I carefully checked the Cherokee and made a short flight to ensure everything was working. I even looked at the logs and performed a VOR accuracy check. The airplane had a full IFR panel for its day and everything worked, but it had no autopilot, not even a wing leveler.

I also checked the weather and from the forecast, it sounded like we'd have real, rather than simulated, IMC for the flight. Sure enough, the next day it was IMC the whole way, and there was a we would have to deal with low IFR in Maine and Canada.

We got off early and landed at Fredericton, New Brunswick, to clear Canadian customs and refuel. It was already low IFR there, about 400 and one, if I recall. It turns out that I had to fly the entire trip, since the Cherokee owner was really spooked by the actual weather and was extremely nervous about flying in cloud.

The next leg was even more exciting. We were briefly in the sunshine on top at 7000 feet as we approached Chatham, which at the time was an active Canadian Air Force base. I had secured advance verbal permission to land (times were more casual back then, especially in Canada). The weather, however was 100 and ¼ mile. Amazingly, the Canadian controller offered us a precision radar approach, which I accepted and flew to a landing.

We were behind schedule after the Cherokee owner had a lengthy meeting in town, and I realized the last half of the trip back would be in darkness. We landed at Bangor, Maine (BGR), to clear U.S. customs and refuel, and the weather again was about 400 and one. As we departed, it was dusk and soon I was feeling the effects of the long flying day. Fortunately, the owner had ceded the left seat on this final leg. The weather was looking really marginal at Westfield, and the new ILS there was not yet commissioned.

There was a pretty strong wind on the surface from the southeast. Unfortunately, this meant I would be conducting a VOR circling night approach in moderate rain with the ceiling right near the MDA. I executed the approach and landed, after asking the tower to crank the runway lights to full intensity. I had flown about 10 hours, nearly all of it in actual IMC, and my "duty day" was about 16 hours long.

Can you all recognize the many red flags these flights presented? I had the full range of PAVE hazards and risks in play, not just external pressures. But I had boxed myself in by not reaching a prior understanding with the owner about cancelling the flight, or perhaps laying over in BGR to at least mitigate some of the risk on that final leg. As the flight progressed, my fatigue, nightfall and deteriorating weather had created an insidious risk increase.

Safety? Utility? both?

Some of you might be aghast at the risks I assumed on this flight, as the hazards multiplied. Others of you may wonder what the big deal is. You might conclude it all was legal and is what I had trained to do when I earned my instrument rating.

At this point in my flying career, I'm now in the former camp. To undertake such a flight today would require some additional risk mitigations before continuing. These could include an autopilot, an RON stop in Bangor to address the fatigue, or some other combination. I also would be concerned about night IMC with low-IFR conditions in a single engine, single-vacuum-pump and -alternator airplane, as well as a night circling approach in limited visibility at minimums.

If I was able to mitigate the risks to acceptable levels, I could still have flown the mission and this is what you should strive for in your own flight operations. Remember that safety and utility are not mutually exclusive and that with proper risk identification, assessment and mitigation techniques, you can usually—but not always—have it both ways.

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Are Autopilots Optional?
Training vs. The Real World