"We Might NOT Make It"

By Shane Jordan and Robyn Shank

True story. Several years ago, a routine flight in a regional jet departed Denver, Colorado, for Helena, Montana, after sunset. VFR weather was forecasted for Helena before and after the ETA, so an alternate was not required. IFR fuel reserves were not uploaded. As the flight continued towards Montana on that seemingly clear night, it was evident that off in the distance, the valleys were obscured with low clouds, illuminated by the faint and distorted orange city lights. The Bozeman and Missoula ATIS reports verified the crew's concern, reporting ¼ mile visibility and fog. Due to mountainous terrain, the Helena ATIS was not available until the jet got closer. Confirmed by Helena Tower, visibility was about 1 mile with a 300-foot ceiling, slightly above the ILS minimums. A winter storm, motivated by 150-kt winds aloft, was not expected to arrive for another 3-4 hours but had quickly blanketed the region. The crew was caught off-guard.

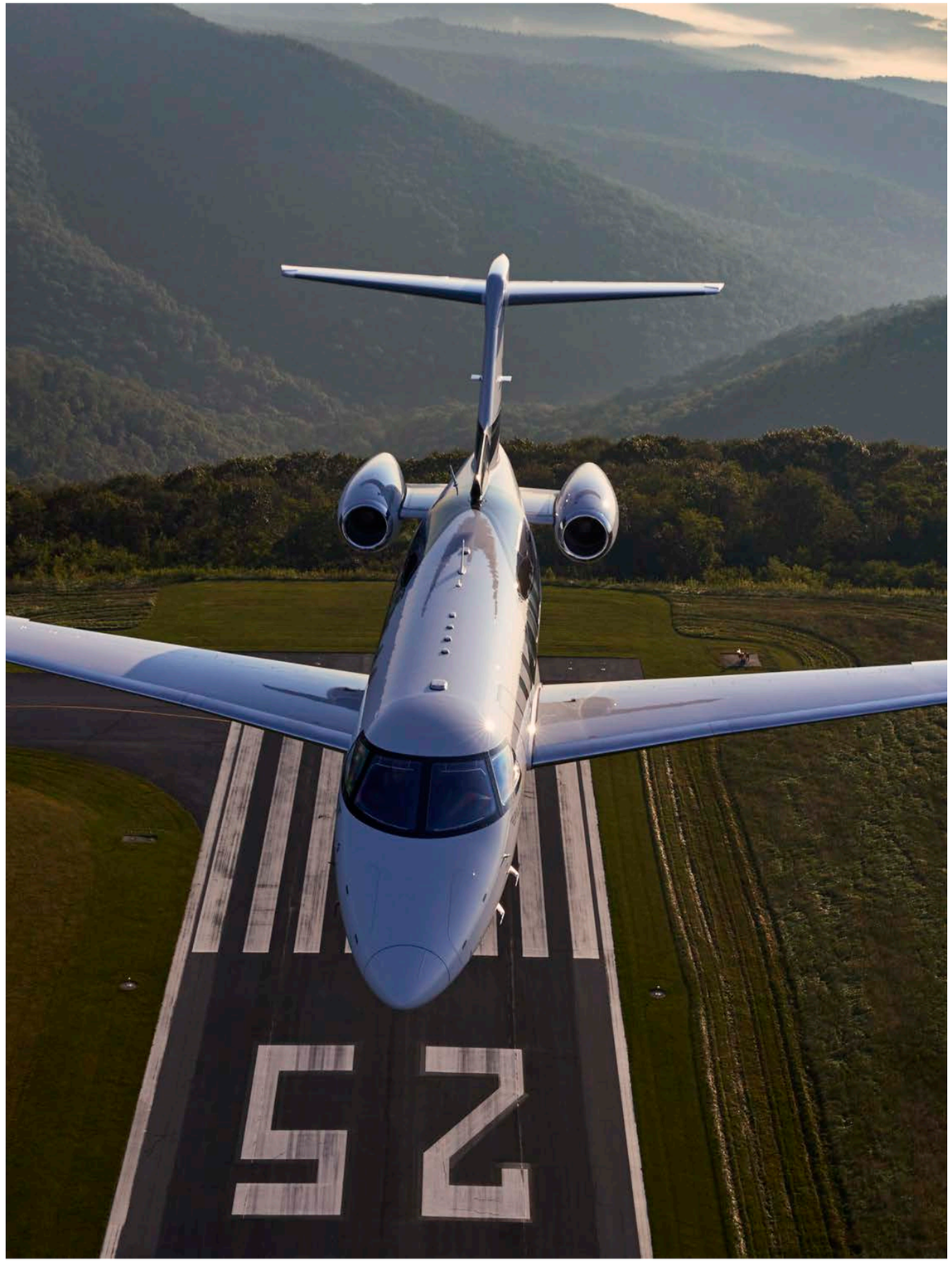
The captain and first officer briefed and loaded ILS Z RWY 27, the only approach that offered a low enough DA. They were cleared to join the DME arc from the south and captured the localizer inbound for a typical approach in Helena's non-radar environment. The first officer was the flying pilot on this leg, and the captain observed no discrepancies.

Without warning, the glideslope needle deflected up, then down, then up, then down again. Simultaneously, the low-speed awareness strip rapidly shot up, activating the stick shaker despite being locked on the proper approach speed. The captain declared a missed approach and took command of the airplane as the pilot flying. While on the published missed approach, they received clearance for a second attempt at a DME ARC to ILS Z RWY 27 from the north to determine if the erroneous needle deflection was an anomaly. The captain experienced the same results on the second approach, at precisely the same point over a hill inside the Final Approach Fix, forcing them to execute a second missed approach. Fuel critical, the captain declared an emergency. He was confused about why the airplane behaved the way it did and why they were going missed again. None of it made sense. Helena Tower then reported the airport just went below minimums and was no longer an option.

With the help of ATC, it was determined that Great Falls was reporting 9,000-foot ceilings, and they were cleared direct. ATC's initial ceiling report was misread. The actual ceiling was 900 feet, still the most favorable in unfavorable conditions. Facing another approach to lowering ceilings with an airplane whose instrumentation the crew no longer trusted, the captain briefed the first officer that they only had one attempt, flying on borrowed time. Already well below minimum fuel reserves when they left Helena for Great Falls, flying at night and in mountainous terrain with low visibilities, the captain briefly thought to himself, we might not make it. Under extreme stress, the captain knew this was their only chance, so he intentionally dipped below the glideslope at the first sign of the ground environment, desperately seeking visual conditions for a successful landing. They had 700 pounds of fuel remaining, which might have bought them 15-20 minutes if the runway environment did not come into sight.

When we experience danger or a perceived threat, our sympathetic nervous system kicks into high gear to increase the amount of oxygen needed to make the energy for fighting or fleeing: elevated heart rate, increased blood pressure, and faster, shallow breathing. Acute stress, such as the situation above, happens in aviation. Danger or a perceived threat can come from severe weather encounters – turbulence, icing, convective activity – or even a minor mechanical failure. Maybe the airplane that just landed before us blew a tire and closed the only runway, forcing an unplanned alternate. Pilots must be on their A-game at all times.

When I first heard this story from the captain (my brother), I felt like I was there (perceived threat). Even though I was sitting comfortably in my home, I experienced an adrenal surge. My heart rate increased, and my stomach filled with familiar butterflies—my sympathetic nervous system in play, "fight-or-flight." The phrase "fight-



or-flight" represents our ancestors' choices when faced with imminent danger in their environment. This is nature's fundamental survival mechanism. Without it, well, let's not go there.

When our "fight-or-flight" response system is activated for months to years like we experience in the modern world, chronic or long-term stress results. Chronic stress has been associated with increased biological aging, suppressing abnormal regulation of immune function, impairment of brain structure and function, increased susceptibility to some types of infection, and worsening conditions like anxiety, depression, heart disease, and some forms of cancer.

Chronic stress is loosely defined as prolonged and constant stress that can negatively affect health. In aviation, pilots encounter difficulties adjusting to time zone changes, dealing with long duty shifts, hours and hours of sitting, inadequate and inconsistent sleep, traffic to and from airports, time away from loved ones, care of and concern about passengers, and most recently, the burden of COVID-19. Some pilots continually deal with relational stress brought on by the nature of our flight schedules and their tendencies to change due to maintenance delays, flight cancellations, or weather diversions. These unforeseen changes sometimes make it impossible for us to follow through with social commitments like family engagements, school, sporting events, or professional ones like doctor or dental appointments, further compounding the stress.

Counter-play to our sympathetic nervous system is the parasympathetic nervous system responsible for "rest and digest." It basically undoes the work of the sympathetic nervous system's acute stress response. We want a quick and efficient reset to reduce the amount of time we are under pressure. The nervous system's ability to adapt between the sympathetic and parasympathetic nervous system is measured by heart rate variability. Think about the balance between these two nervous systems as a mass scale; we want the scale to balance. A balance between the two is foundational to better health and wellness.

The vagus nerve is our 10th cranial nerve and is commonly referred to as the "wandering" nerve because it runs from the brain through the face and thorax to the abdomen. It is the longest and most complex of the cranial nerves and chiefly responsible for the body's "rest and digest" response. It commands the return from "fight or flight" to pre-arousal states in blood pressure, breathing, and heart rate. Think of your vagus nerve as air traffic control, monitoring many moving parts to ensure all the physiological airplanes return safely and efficiently to their destinations. Without it, we'd be a nervous wreck!

Because the vagus nerve is critical in stress management and our overall well-being, we must know how to measure it and take care of it. We refer to its health as vagal tone. The stronger our vagal tone, the better. When it is strong, it lends itself to grace under pressure, and that is precisely what pilots need. A weak vagal tone slows the "rest and digest" response, thereby keeping us chronically stressed. We know what chronic stress does to our overall health – it diminishes it.

Our upcoming article will cover how to determine your vagal tone through heart rate variability and how to improve it. You can get started today by simply practicing slow and deep breathing from your belly. Place a hand over your heart and the other hand on your stomach. Breathe in for a count of five through your nose, pause, and slowly release through your mouth for a count of ten. Start when you are in a comfortable position, such as a chair or lying down, and then try to breathe like this during times of stress. When you do this type of deep breathing, you are calling the vagus nerve to action.

Had the captain slept poorly in the nights leading up to the Helena incident, been under chronic financial or relational stress, or experienced poor health from an unknown medical condition, the outcome might have been very different. He was able to work under the primal "fight-or-flight" response, not dwell on the instrumentation failure, consciously abandon the emotion of not surviving, and deal with the problem to create a solution. Grace under pressure. He specifically said, "it would have been very easy just to give up" (flee).

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