May/June 2024

# FAA Safety BRIEFING

## IFR Flying

Federal Aviation Administration

U.S. Department
of Transportation

**Federal Aviation
Administration**

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Published six times a year, *FAA Safety Briefing*, formerly *FAA Aviation News*, promotes aviation safety by discussing current technical, regulatory, and procedural aspects affecting the safe operation and maintenance of aircraft. Although based on current FAA policy and rule interpretations, all material is advisory or informational in nature and should not be construed to have regulatory effect. Certain details of accidents described herein may have been altered to protect the privacy of those involved.



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## ABOUT THIS ISSUE...

The May/June 2024 issue of *FAA Safety Briefing* focuses on general aviation instrument flight training and IFR proficiency. Articles in this issue address the importance of having both the right physical and mental flying skills required in today's challenging IFR environment. We also review ways to help you stay proficient and be prepared for emergencies when flying in the clouds.

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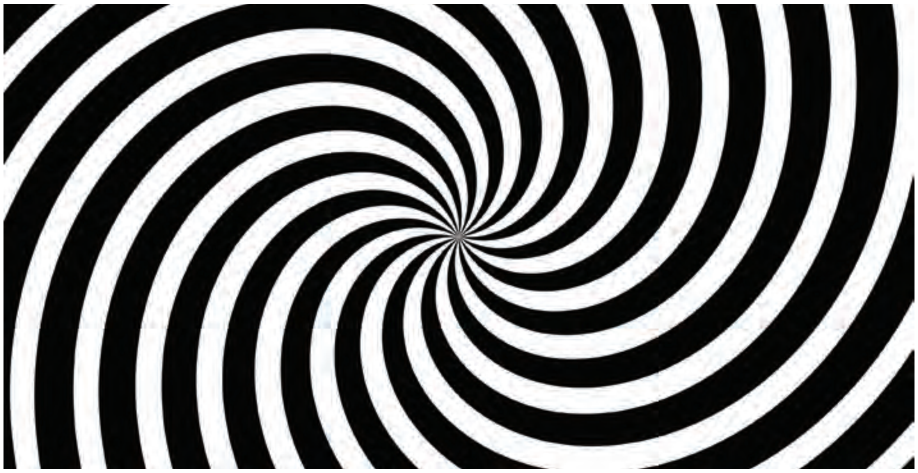
# FAA Safety Briefing

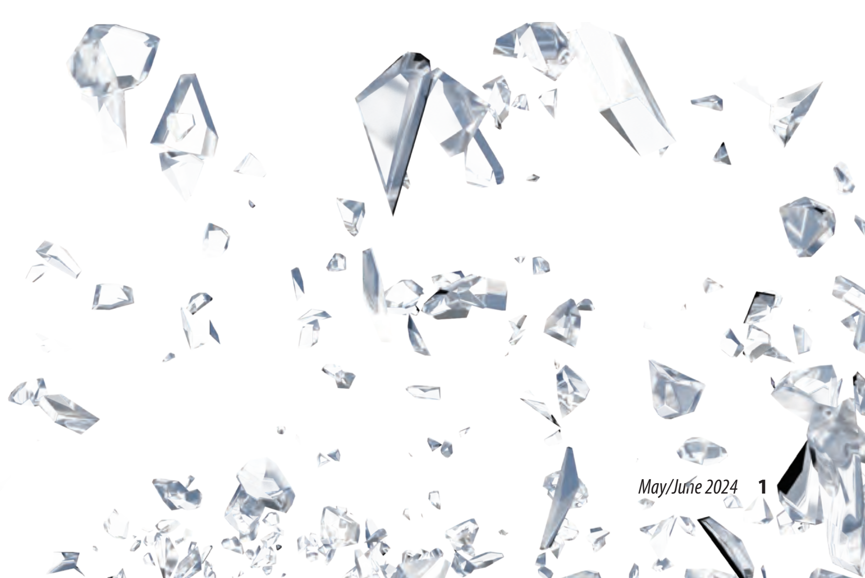
*The FAA Safety Policy Voice of Non-commercial General Aviation*











## DEPARTMENTS

# OF SOUND MIND AND BODY

When it comes to flying by instrument flight rules (IFR), pilots need to learn, practice, and understand a great deal to operate safely in this visually restricted environment. That includes everything from expanding your aeronautical know-how, to executing the necessary procedures and maneuvers with precision, to being a subject matter expert with the avionics to which you are entrusting your life. It's a significant step up from learning how to fly with a real horizon always in sight. But there's one common, and sometimes overlooked element in having what it takes to be a successful and safe instrument pilot — the human element.

> THERE'S ONE COMMON, AND SOMETIMES OVERLOOKED ELEMENT IN HAVING WHAT IT TAKES TO BE A SUCCESSFUL AND SAFE INSTRUMENT PILOT – THE HUMAN ELEMENT.

Human factors loom large in the world of instrument flying and it is something that needs to be both acknowledged and thoroughly reviewed to understand its impact. And it's not just human factors in the physiological sense, but also in the behavioral sense. We can see the latter more with how we're able to effectively interpret and understand technology, maintain composure during an emergency, and/or rationalize the limits of our skills and abilities when external pressures are present.

You'll find human factors covered extensively in many FAA resources, including being front and center in the *Instrument Flying Handbook* (Chapter 3). It's also at the core of nine new FAA Safety Team online courses that cover human performance, safety culture, teamwork, and decision-making, among several other areas. Go to bit.ly/HFcourses to check it out.

This issue of *FAA Safety Briefing* makes for another good resource to help better your understanding of IFR flying and recognize its intersection with human factors. You'll find tips and perspectives that can help you not only navigate the Victor airways, but also steer clear of the many aeronautical pitfalls an IFR environment presents.

For starters, IFR flying is a highly perishable skill requiring a specific set of flight experience requirements to act as pilot in command. But there are myriad ways in which to practice and gain that experience, including some you can employ from the comfort of home. For more on this, proceed direct to, "Into the Future." The article presents several good options to keep your flying skills sharp and shows how varying degrees of fidelity can impact your choices toward gaining and maintaining proficiency.

It's well known that the accident category that has traditionally had one of the highest fatality rates is VFR flight into instrument meteorological conditions (IMC). The article "Maybe Not Today" dives into many of the reasons why this phenomenon continues to plague pilots of all skill levels and provides some sound strategies to keep this killer at bay. It's relevant reading for pilots with or without an instrument rating.

Flying with no visual reference or horizon can cause us humans to do some odd things, many of which are completely contradictory to basic

safety if unprepared. For a closer look at spatial disorientation (an all-too-common term used in NTSB accident reports), see "It's a Confusing World Up There." The article provides a comprehensive overview of "spatial D" and explains how the three-dimensional environment of flight creates sensory conflicts and illusions that make it difficult or even impossible to stay oriented. On that same note, we also hear from the FAA's Federal Air Surgeon, Dr. Susan Northrup, on ways certain medications can sometimes exacerbate those disorienting conditions in the Aeromedical Advisory department.

We hope the information within these pages will help provide a pathway for being a more well-rounded aviator with regard to IFR flight. Remember — having an instrument rating does not necessarily make you a competent all-weather pilot. It is issued on the assumption that you have the good judgment to avoid situations beyond your capabilities. Any instrument training that you undertake should help you learn the essential physical flying skills, but just as important is the ability to cultivate, maintain, and constantly refine the proper mental skills that guide us to safely conduct an IFR flight.

Safe Flying!

# AVIATION NEWS ROUNDUP

### Updated Advisory Circular on Engine Power-Loss Accidents

The FAA recently released AC 20-105C, *Reciprocating Engine Power-Loss Accident Prevention and Trend Monitoring*, which focuses on the circumstances surrounding engine power-loss accidents and recommendations on how to prevent them. The AC also provides charts and advice for engine trend monitoring.

The updated AC highlights and discusses several operational causes of engine failure, including inadequate preflight inspections, fuel contamination and misfuelling, collapsed fuel bladders, exceeding time between overhauls, poor engine operating technique, and maintenance mishandling. Lack of pilot training and mismanagement of the engine control systems by the pilot remains the leading cause of engine failure.

You can find this AC at bit.ly/AC20-105C.

### FAA Expands B4UFLY Services for Drone Pilots

The FAA is now partnering with several companies to offer drone pilots more places to receive official airspace awareness information. The B4UFLY service shows recreational drone flyers where they can and cannot fly.

The FAA has approved Airspace Link, AutoPylot, Avision, and UASidekick to provide services through desktop and mobile applications. These companies will offer multiple ways to access B4UFLY and provide recreational flyers with the latest airspace awareness information directly from the agency. For more information, visit bit.ly/b4ufly.

Drone pilots can also find FAA-approved partners who provide near-real-time airspace authorizations and information at bit.ly/LAANCsuppliers.

### Laser Strikes Increase to Highest Numbers

Dangerous laser strikes topped all previous records in 2023. The FAA received 13,304 reports from pilots last year, a 41% increase over 2022.

Shining a laser at an aircraft is a serious safety threat. Many types of high-powered lasers can incapacitate pilots, many of whom are flying airplanes with hundreds of passengers. Pilots have reported 313 injuries since the FAA began recording data on laser strikes in 2010.

People who shine lasers at aircraft face FAA fines of up to $11,000 per violation and up to $30,800 for multiple laser incidents. Violators can also face criminal penalties from federal, state, and local law enforcement agencies.

To identify laser-strike trends, the FAA's visualization tool shows laser-strike data from 2010 to 2023 and highlights trends by geographic area, per capita data, and by time of day and year. The FAA shares the information, at bit.ly/49HdgRl, to draw attention to the dangerously high rate. Laser report data by year can also be downloaded at bit.ly/3Uaakb1.

The FAA strongly encourages the public to report laser strikes to the FAA and local law enforcement agencies at bit.ly/reportlaser.

Learn more about the dangers of lasers by visiting bit.ly/49swuJX and by reading the article "Blinded By the Light" at bit.ly/BlindedLight.

### FAA Accelerates ATC Hiring by Enhancing College Training Program

The FAA is working to accelerate its training and hiring of air traffic controllers through an Enhanced Air Traffic-Collegiate Training Initiative (AT-CTI) program. The Enhanced AT-CTI program will bolster the current hiring pipeline by allowing the FAA to hire more candidates who can begin facility training immediately upon graduation.

The FAA is authorizing institutions in the AT-CTI program to provide the same thorough curriculum offered at the FAA Air Traffic Controller Academy. After graduating from one of the eligible schools, new hires can immediately begin localized training at an air traffic facility. These graduates must still pass the Air Traffic Skills Assessment (ATSA) exam and meet medical and security requirements. For more information, go to bit.ly/FAACTI.

The Enhanced AT-CTI program is one of the many actions the FAA is taking to increase the number of controllers and improve training following the release of the National Airspace System Safety Review Team

Report. This includes year-round hiring for experienced controllers from the military and private industry, filling every seat at the FAA Academy, and finishing the deployment of upgraded tower simulator systems in 95 facilities by December 2025.

## New Pilot Minute Video Covers BasicMed Requirements

Some pilots may wonder, if I'm on BasicMed would I ever need to come back through the FAA again? In a recent episode of the *Pilot Minute* video series, Federal Air Surgeon Dr. Susan Northrup reviews the requirements for BasicMed and the mental health, neurologic, or cardiac conditions that would require a pilot by law, to be reexamined by an aviation medical examiner (AME). See this and past *Pilot Minute* videos at bit.ly/FAAPilotMinute.

## Latest GA Activity Survey Underway

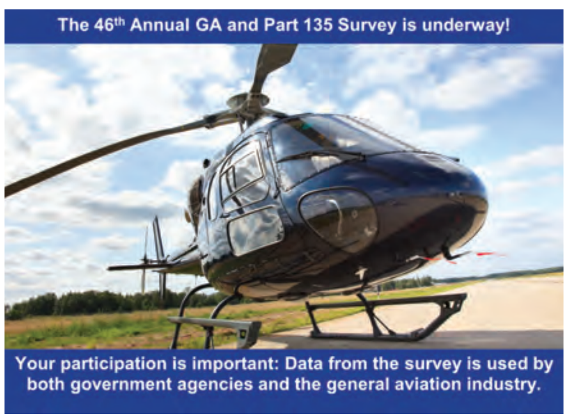
The FAA's 46th annual General Aviation and Part 135 Activity Survey (GA Survey), reporting on the calendar year 2023, is now underway. The GA Survey is the only source of information on the GA fleet, the number of hours flown, and the ways people use GA aircraft.

Data from this survey are used by governmental agencies and industry to compute safety metrics such as fatal accident rates; understand the impact of the GA industry on jobs, economic output, and investments in aviation infrastructure; track the success of safety initiatives, including avionics recommendations; determine funding for infrastructure and service needs; and assess the impact of regulatory changes.

Selected participants will receive an email or postcard invitation asking them to complete the survey online. A mail survey is sent to those not completing online. The survey only takes 10-15 minutes to complete and your responses are confidential.

The FAA and industry need accurate data on a broad range of aircraft. Your participation is voluntary, but we need your help. We encourage everyone who is contacted to respond to the survey so that all aviation activity is represented. If you have questions, call 800-826-1797 or email infoaviationsurvey@tetratech.com.

Previous survey results can be reviewed at bit.ly/GenAvSurvey.




Your participation is important: Data from the survey is used by both government agencies and the general aviation industry.

## HAI Undergoes Rebrand to Encompass All Vertical Aviation

In response to the rapidly expanding vertical aviation industry, Helicopter Association International (HAI) has changed its name to Vertical Aviation International (VAI). By widening its focus to encompass all vertical aviation, the association will expand its advocacy with legislators and regulators and provide a forum where all sectors of vertical flight can collaborate on shared challenges, such as vertical aviation infrastructure, certification of new technology, and the safe integration of that technology into the airspace.

VERTICAL AVIATION INTERNATIONAL

The decision to rebrand stems from the rapid expansion and technological evolution occurring in the vertical aviation industry. In addition to a new logo, VAI has renamed its annual conference and trade show VERTICON. The first edition of the show will be held in Dallas in March 2025.

VAI is currently developing a new website, verticalavi.org, which will be launched in late summer 2024. In the meantime, visitors can go to Rotor.org.

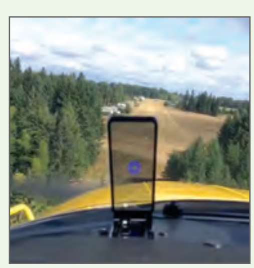
VAI is open to all manufacturers, operators, suppliers, vendors, pilots, maintenance technicians, and aviation professionals who serve or support aircraft capable of vertical or short takeoff and landing.

## #FLYSAFE GA SAFETY ENHANCEMENT TOPICS

Please visit bit.ly/FlySafeMedium for more information on these and other topics.

**MAY**

**Human Factors —** emphasizing the benefits of human factors training for pilots.



**JUNE**

**Regulatory Roadblock Reductions —** how streamlining the certification/approval of GA safety equipment can help owners adopt these technologies.

**DR. SUSAN NORTHRUP,** FAA FEDERAL AIR SURGEON

# MISFORTUNE WITH MEDICATIONS

Given the IFR theme of this issue, I thought it would be useful to review several fatal accidents in which spatial disorientation and/or medication possibly contributed to the outcome (special thanks to Dr. Loren Groff at the NTSB for his assistance) and explain why we place restrictions on some of these conditions/medications. Here are a few examples listed by the NTSB's Case Analysis and Reporting Online (CAROL) number (carol.ntsb.gov).

CEN21LA089: A student pilot with a passenger on board, took off into night, instrument conditions despite having been advised that he could not carry passengers and was specifically told not to fly that day due to weather. At his Class III medical six months earlier, he had not disclosed his history of ADHD (attention deficit hyperactivity disorder) nor the use of Vyvanse, an amphetamine. The latter's concentration greatly exceeded the therapeutic level and both it and the ADHD would have made him prone to impulsivity and poor decision-making. Following 20 minutes of erratic flight after take-off, he entered a spiral descent that led to a fatal crash.

CEN14GA135: The commercial instrument pilot impacted the terrain on a fire-spotting mission in marginal VFR conditions. The Cessna 210 was instrument equipped but not maintained for instrument flight. There was no evidence that the pilot obtained a weather briefing prior to flight. Three weeks prior to the accident, the pilot had started nortriptyline, an anti-depressant also used for chronic pain, and tramadol, a synthetic opioid used for pain control. Neither is authorized for use when flying. While the pilot had disclosed the chronic knee pain, he began both medications after his last FAA medical examination.

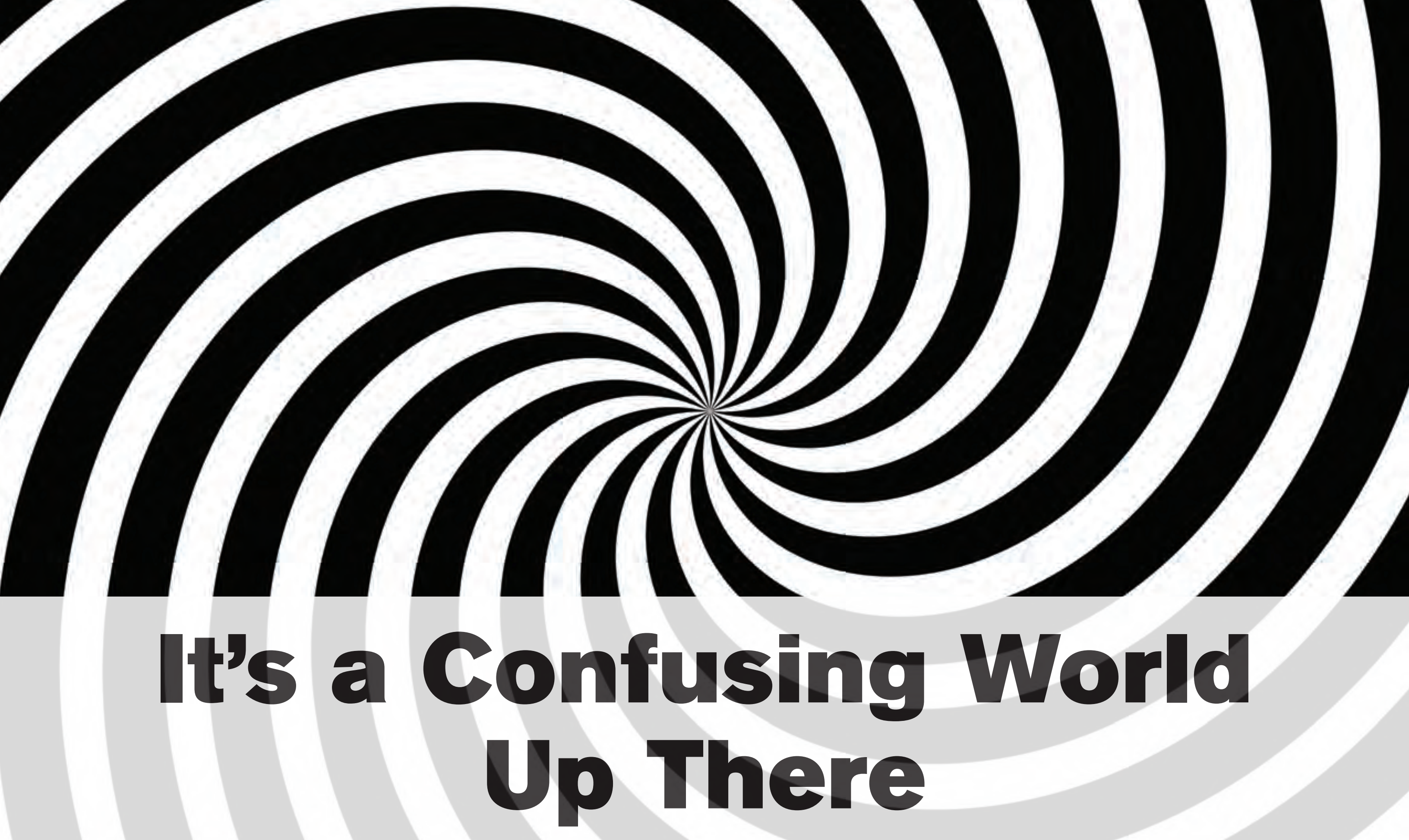
ERA17FA180: The non-instrument rated private pilot and his passenger were in a fatal crash following continued flight into IMC conditions and probable spatial disorientation. While the pilot did have over 80 hours of instrument experience, he had no instrument time logged in the past year and was not instrument rated. The pilot had not disclosed the use of imipramine, an anti-depressant not authorized for use by the FAA due to cognitive impairment and sedation, as well as doxylamine, a sedating antihistamine with a 60-hour no-fly period following use.

> **WHAT IS CLEAR IS THAT SOME MEDICAL CONDITIONS AND MANY MEDICATIONS CAN IMPAIR BOTH JUDGEMENT AND THE ABILITY TO CONTROL AN AIRCRAFT.**

CEN14FA042: A flight instructor and private pilot impacted rising terrain while on an instrument approach during a combined business trip and instrument training flight. The mishap was at night in instrument conditions at the end of a long day which began approximately 13 hours earlier and after almost 6 hours of flying over three legs. Toxicological testing showed the presence of dextromethorphan in the blood of the flight instructor and diphenhydramine at therapeutic levels in the blood of the private pilot receiving instruction. Both medications cause cognitive

impairment and drowsiness. The FAA period for the residual concentration to be clinically insignificant is 48 and 60 hours, respectively. It could not be determined who was the pilot flying at the time of impact.

Looking at these accidents, it is clear that experience does not prevent spatial disorientation or controlled flight into terrain accidents. Pilots ranging from students to instructors, sport pilots to commercial pilots are represented. What is clear is that some medical conditions and many medications can impair both judgement and the ability to control an aircraft. There are reasons that these are considered incompatible with flying and disqualifying for an FAA medical. Flying either as a sport pilot or under BasicMed offers no protection from the impairment from these different conditions and medications. Of the total accidents between fiscal years 2019 and 2023, the percent positive for psychotropic medications (affecting the mind) rose from approximately 8.5% to approximately 13%. These medications include antidepressants, antipsychotics, anxiolytics, and stimulants with antidepressants the most common. Please note that this does not reflect accidents related to other conditions or medications. Remember, sometimes the best decision is not to go; you may save your life.



# It's a Confusing World Up There

## The Specifics of Spatial Disorientation

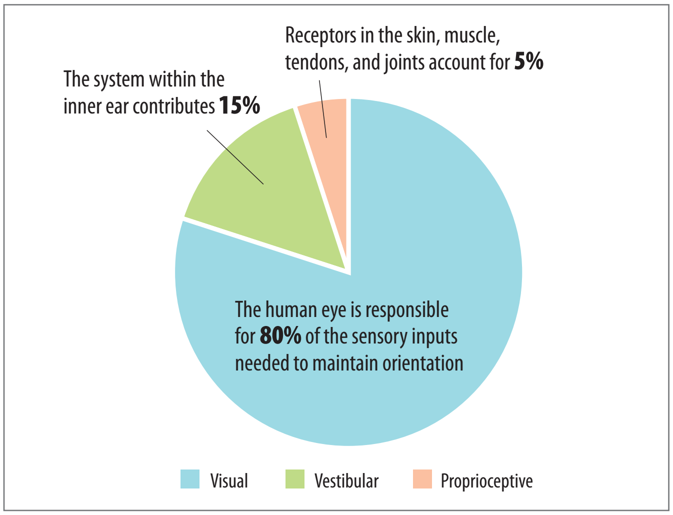
*By Nicole Hartman and Rebekah Waters*

It's sobering to search the National Transportation Safety Board (NTSB) database for accidents caused by spatial disorientation, or "spatial D." The query produces page after page of accidents — hundreds of aviators have succumbed to this confusing condition. Statistics show that between 5 to 10% of all general aviation accidents are attributed to spatial disorientation, and 90% of those are fatal. NTSB data suggests that spatial D is a more common occurrence at night or in limited visibility weather conditions. All pilots are susceptible to the optical illusions that may cause loss of aircraft control at any time. Let's take a closer look at the causes of spatial disorientation, review the types, and discuss strategies for preventing this source of aviation accidents.

### Seeing Isn't Always Believing

Spatial orientation is our natural ability to maintain our body's orientation and/or posture in relation to the surrounding environment (physical space) at rest and during motion. The three-dimensional environment of flight is unfamiliar to our bodies and creates sensory conflicts and illusions that make spatial orientation difficult. The numerous sensory stimuli (visual, vestibular, and proprioceptive) during flight vary in magnitude, direction, and frequency and can lead to sensory mismatches resulting in disorientation. This condition is known as spatial disorientation — the inability of a pilot to correctly interpret aircraft attitude, altitude, or airspeed in relation to the Earth or other points of reference.

Becoming spatially disoriented is the result of a properly functioning human system, which we are hard-wired to trust, misinterpreting our actual position or orientation in space. It goes against our natural instincts to accept that our orientation isn't what it appears to be. Even a brief loss of orientation while in flight for 10-15 seconds can result in an unusual aircraft attitude putting the pilot and passengers at risk for an accident. The sensory inputs needed to maintain orientation automatically and subconsciously used to orient ourselves include visual, vestibular, and proprioceptive.



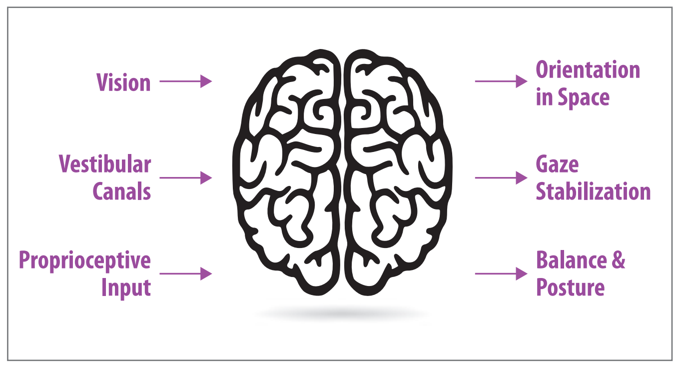

The visual system includes the eye and its component parts that are necessary for visual acuity (focus), depth perception, and assessing the body's position in space relative to other objects both fixed and moving. During flight, visual reference is the largest contributor to accurate spatial orientation. By using visual references, the pilot can gather information about distance, speed, and depth. Any condition that deprives the pilot of natural visual references, such as clouds, fog, haze, darkness, terrain, or sky backgrounds with indistinct contrast (i.e., arctic whiteout or clear, moonless skies over water) can rapidly cause spatial D.

The vestibular system includes the sensory organs contained within the inner ear that detect relative motion of the head in space within its axes of movement. It consists of two major components: the semicircular canals that detect changes in rotational acceleration, and the otolith organs that detect linear (straight) acceleration. Your vestibular system's primary function is to detect rotational and translational movements of the head and generate a corresponding response signal. But this system was designed to function on the ground in a 1G environment (normal gravity). Accidents can occur due to a combination of vestibular illusions and poor visibility. When the body is subjected to certain forces that cause a vestibular illusion, vision is often the only sense that can contradict these false perceptions. However, in darkness or other poor visibility conditions, it is much easier to be deceived by an illusion and to ignore information provided by your instruments.

Proprioception is a term that encompasses the human sensation of the body's (trunk/limbs) position as it relates to space and forms the foundation about which the other sensory organs guide desired movements within that space. Proprioceptive sensory inputs give us a reference to posture and the relative position of our body in relation to our environment.

## Prone to Puzzlement?

It is important to recognize that even when a pilot's visual, vestibular, and proprioceptive systems are working properly, associated underlying medical conditions or human factors can increase the risk for spatial D. There are both external and internal factors that will increase a pilot's susceptibility to spatial disorientation. Any visual condition that reduces a pilot's ability to maintain orientation to the horizon (i.e., clouds, haze, night conditions, terrain) will increase the risk of spatial D. Additionally, a pilot may be more vulnerable to spatial disorientation as a result of age, fatigue, stress, anxiety, or get-there-itis. Some medical conditions, medications, smoking, alcohol, and other drugs that affect the visual, vestibular, or proprioceptive sensory inputs can also increase susceptibility. Be sure to read the Aeromedical Advisory in this issue for examples of how certain medications can exacerbate spatial D.




**The brain combines sensory signals (left) in order to maintain control of the body.**

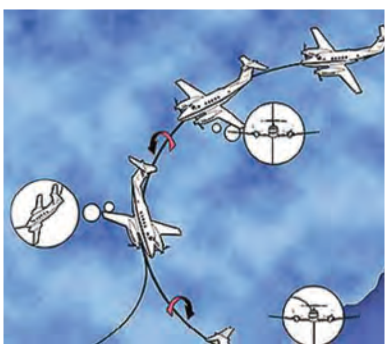
## Don't Trust Your Gut

Without visual references (e.g., VFR at night/low visibility and IFR flying), pilots can become disoriented, especially in situations like low visibility or turbulent weather, where sensory inputs can be conflicting or misleading. When visual cues are absent, your body will turn to your vestibular system for information. The vestibular system is complex and can be easily deceived in certain flight conditions. When motion makes this system unreliable, pilots experience vestibular illusions. These dangerous illusions are the most likely culprits of spatial disorientation.

There are six types of vestibular illusions you may encounter while flying IFR. The most common illusion, "the leans," occurs after a sudden return to level flight after a gradual and prolonged turn. If the rotational acceleration of the turn is 2 degrees per second or lower, your vestibular system will not detect this movement. When you level out after a turn like this, you may experience the illusion that your aircraft is banking in the opposite direction. If you rely on what your body is telling you, you might lean in the direction of the original turn to regain what you think is the correct vertical posture.

If a pilot is in a turn long enough for the fluid in the ear canal to move at the same speed as the canal, the "Coriolis illusion" can occur — the most dangerous vestibular illusion. A sudden head movement, such as looking down at something you dropped during a prolonged turn can give you the false sensation of rotation or acceleration on an entirely different axis. When disoriented by this illusion, you might maneuver the aircraft into a dangerous attitude while trying to correct your aircraft's perceived attitude. This is why it's so important to practice moving your head as little as possible during instrument cross-checks or scans. Make sure you keep your head as still as possible when reaching for charts and other objects on the flight deck.

A prolonged coordinated constant-rate turn could cause the sensation of flying straight and level. This is when you are in danger of experiencing the "graveyard spiral." Aircraft tend to lose altitude in turns unless you compensate for the loss in lift. When making a constant-rate turn, you may notice a loss of altitude, even though you aren't experiencing the sensation of turning. This creates the illusion of being in a level descent. Your gut might tell you to pull back on the controls in an attempt to climb or stop the descent. If you listen to your gut instead of trusting your instruments, the spiral will tighten and increase the loss of altitude. This could lead to a loss of aircraft control.



The "somatogravic illusion" occurs during rapid acceleration and creates the same feeling as tilting your head backward. Pilots experiencing this feeling can mistake it for a climb, especially while flying IFR. This disorientation could make you want to push the aircraft into a nose-low or dive attitude. A rapid deceleration could make you feel the opposite sensation and urge you to pull up, putting you in danger of a nose-up or stall attitude.

When you make a sudden return to straight and level flight after a climb, it can feel like you are tumbling backward. This is known as "inversion illusion." The disorientation you feel from this might lead you to push your aircraft abruptly into a nose-low attitude, which can intensify the illusion.

Like the "inversion illusion," the "elevator illusion" is also caused by an abrupt change. A sudden upward vertical acceleration, as can occur in an updraft, can stimulate your otolith organs and create the illusion of being in a climb. This could make you want to push the aircraft into a nose-low attitude. An abrupt downward vertical acceleration, usually in a downdraft, has the opposite effect making you want to pull the aircraft into a nose-up attitude.

### Do Your Eyes Deceive You?

Spatial disorientation can also be caused by visual illusions. Your mind believes what it sees, which can be dangerous for pilots. "False horizon" occurs when your mind uses inaccurate visual information, like a sloping cloud formation, when trying to align your aircraft with the actual horizon. This type of illusion can be disorienting and lead you to place your aircraft in a dangerous attitude. "Autokinesis" is another visual illusion that can happen when flying at night. If you are attempting to align your aircraft with a stationary light, autokinesis could create the illusion that the light is moving. When this happens, you become disoriented and could potentially lose control of your aircraft.

> **It goes against our natural instincts to accept that our orientation isn't what it appears to be.**

### Combating Spatial D

Reviewing the NTSB data reveals that there are many causes of spatial disorientation, but the outcome for the majority of the accidents is the same — fatality. So, what can you do to avoid these dangerous situations? "Preflight weather planning is critical to avoiding an inadvertent encounter with instrument conditions," said Katherine Wilson, senior human performance NTSB senior human performance investigator. "But if a pilot finds themself in that situation, it is important they trust their instruments and exit the conditions as quickly and safely as possible."

Your first line of defense against spatial D should be practice, practice, and more practice. Undergo regular training on spatial disorientation recognition and recovery techniques so you will be aware and prepared for potentially disorienting situations. Consider experiencing spatial D firsthand, either with a flight instructor or in a simulator.

You could also immerse yourself in the visual and vestibular illusions that you might encounter at a spatial disorientation laboratory. Many universities and the military use labs to simulate various flight conditions and scenarios to train pilots to recognize and cope with spatial D. Experience the disorientation in a controlled environment, and practice overcoming what your body is telling you so you can commit to trusting your instruments. To learn about training offered by the FAA go to bit.ly/FAACAMIED.

**Your first line of defense against spatial D should be practice, practice, and more practice.**

Set yourself up for success — to help prevent spatial disorientation, pilots should:

- Obtain training and maintain proficiency with flying instruments before flying with less than three miles visibility.
- Use and rely on your flight instruments, especially at night, in reduced visibility, and in featureless and sloping terrain. Be sure to test your flight instruments before each flight as well as during your preflight and taxi.
- Maintain night currency if you intend to fly at night. Include cross-country and local operations at different airports.
- Do not attempt VFR flight when there is the possibility of getting trapped in deteriorating weather.
- If you are flying with another pilot and start to experience spatial D, transfer control. Pilots rarely experience visual illusions simultaneously.
- Plan your transition to instrument flying before you enter IMC. Start your instrument scan while you are still in visual conditions.
- Avoid movements in the cockpit that are prone to cause spatial disorientation when flying by reference to instruments. Sudden head movements, or the classic "reaching down to pick up a dropped pencil" may bring on sudden disorientation.

In addition to these tried-and-true methods of combating spatial D, it is also important to:

- Study and become familiar with unique geographical conditions in areas where you plan to operate.
- Check weather forecasts before departure, enroute, and at your destination. Be alert for weather deterioration.
- Consider practicing maneuvers that illicit illusions with your flight instructor to maintain proficiency.
- Contact your FSDO for opportunities to use a full motion simulator and experience the illusions you might encounter.
- Set personal minimums for VFR and IFR flight designed to minimize your exposure to conditions that increase your risks.

Remember, once you enter instrument conditions, completely commit to instrument flying. Attempting quick transitions to visual flight because you spotted a hole in the clouds or caught a glimpse of the ground below may cause spatial disorientation that could have been avoided by maintaining a proper instrument scan. Although it's tempting to reengage in visual flight when going in and out of clouds, keep the instrument scan and don't transition back to visual flying until you have the necessary visibility and visual references to do so safely. Resist this temptation, and follow the strategies mentioned above to make sure you have a safe and successful flight no matter what flying conditions you encounter!

**Nicole Hartman and Rebekah Waters are *FAA Safety Briefing* associate editors and technical writer-editors in the FAA's Flight Standards Service.**

**LEARN MORE**

Spatial Disorientation Fact Sheet
**bit.ly/SDFactSheet**

Pilot Safety Brochure & Visual Illusions Brochure
**bit.ly/PilotSafety**

Aeronautical Information Manual (AIM), Chapter 8
**bit.ly/AIMweb**

Instrument Flying Handbook, Chapter 3
**bit.ly/43H2Ygx**

NTSB Visual Illusions Safety Alert, SA-052
**bit.ly/NTSBSA**

NTSB Reduced Visual References Safety Alert, SA-020
**bit.ly/NTSBSA**

Condition Inspection, a look at specific medical conditions, *FAA Safety Briefing*, Mar/Apr 2020
**adobe.ly/3alrx7z**

# INTO THE FUTURE

## How Leveraging Technology Can Help Build Proficiency in a Busy World

***By James Williams***

The most indispensable resource of this, or any age, isn't money. It's time. Time can be used to generate money, build experience, enjoy yourself, or any number of other things. But time is finite and flows in only one direction, at least until Doc Brown can get the flux capacitor working and the Delorian up to 88 miles per hour. Concurrent with the passage of time, we have the natural trend that erodes the skills we work hard to attain/create. But what does any of this have to do with IFR (instrument flight rules) flying and how does technology play a role in keeping pilots' skills sharp?

### The Triangle of Proficiency

With instrument training, there is a tendency to sometimes conflate currency with proficiency. Currency is easily defined (see Title 14, Code of Federal Regulations (14 CFR), section 61.57 (c)). Proficiency is more challenging to delineate. While proficiency is defined in the Airman Certification Standards and Practical Test Standards testing documents, on an individual day-to-day basis, it is based more on an individual's assessment. It's similar to art in that it's subjective and based on an individual's appraisal.

Garmin Photo

**Modern Electronic Flight Bag (EFB) software allows you to practice skills like flight planning and briefing anywhere and anytime.**

There is a test for both proficiency and art. In art, a piece is worth what someone will pay for it. Proficiency is safely completing your flight in the conditions as they exist.

Your flying skills, particularly instrument skills, decay if they are unused, and the essential resource to prevent that degradation is time spent exercising those skills. While money is certainly a consideration, time is genuinely the most constrained resource. With limited resources to address a problem, the first step is to state your objective. How do we define proficiency in a meaningful way we can use?

Our former editor, Susan Parson, covered this topic in 2010 with her concept of the "Proficiency Triangle." The three sides of this triangle are *Planning*, *Performance*, and *Procedures*. These components are core facets of proficiency and give us areas to focus on and exercise. While we tend to think of proficiency in terms of the latter two aspects (performance and procedures), planning is probably more important. Planning is critical, as it can prevent you from having to test the other two components in a way that you may not be able to pass. We also don't think of planning as a perishable skill we can practice, but it is. In fact, it can be practiced easily and from anywhere.

Performance is a prominent component. If you can't control the aircraft, it's all moot. But aircraft control is best thought of as being on a sliding scale. How does your ability to control an airplane in clear blue smooth skies compare to that in a large turbulent cloud? Even for proficient pilots, there are bound to be differences. And that leads into the final facet of the triangle, procedures. Being unfamiliar with a process or procedure means that you likely to need to focus more of your attention on that process. That means less attention on things like aircraft control. We have a limited amount of what physiologists call attentional resources, so the more of that resource that goes into the process's basic function, the less that can be allocated to aircraft monitoring and control (and that's without going down the rabbit hole around multitasking and whether humans can do it in a remotely effective way). But to be sure, having experience and proficiency with procedures allows you more attention for other tasks. Improving any of these facets is good, but maintaining proficiency in all three is the best way to maximize your safety. So, how do we accomplish this?

### A Mixed Approach

The best way to stay proficient is to fly several times a week, if not daily. But this presents a significant challenge for most of us who aren't professional pilots or have more disposable income. In addition, training conditions (smooth low clouds without the threat of thunderstorms or icing) to truly hone instrument skills can be challenging to find, even if you don't have obstacles like full-time employment to worry about. This is where fidelity becomes essential. We can practice flight planning and go/no-go decision-making relatively easily. With modern flight briefing and planning suites, it's simple to have a few canned flight plans you can brief, review, and decide on in a few minutes, even if you don't intend to fly.

> **Your flying skills, particularly instrument skills, decay if they are unused, and the essential resource to prevent that degradation is time spent exercising those skills.**

Where we need to get more creative is with performance and procedures. Obviously, practice approaches and procedures in the real world are the best in many ways, but we have limitations. We can't control the weather and using view-limiting devices doesn't quite capture the real experience. But whether we are trying to practice performance or procedures does change our approach to some extent. Focusing on procedures could start with a computer or tablet. Garmin offers software that will let your machine "run" simulated Garmin avionics to allow you to manipulate the systems virtually and learn how to operate them. While this is a lower fidelity approach, it is an excellent tool for learning how these systems function so that you already have a base knowledge level as we add stress factors. From there, aviation training devices (ATD) will add actual hardware switches, buttons, and knobs that replicate the real cockpit systems. This is a nice validation step, but ATDs aren't always available as that high-quality hardware and validation increases the cost of acquisition out of reach for many people. But you can always use a computer and commercial flight simulator software to get many benefits in your home.

### The Virtual Super Skyway

I've been a long-time proponent of using simulation for proficiency and training. I used a computer with an old-school monitor and X-Plane 6 to pre-fly my cross-country flights in my dorm room the day before training. Even with the much lower-quality visuals of the late 1990s to early 2000s, it was a great way to see the route before a flight. Since 2020, the flight simulator space has enjoyed a renaissance with the return of Microsoft Flight Simulator 2020 (FS2020) after more than a decade out of the market. Microsoft is planning a follow-up Flight Simulator 2024 to be released later this year with various improvements over the current program. This means we have two high-quality

RedBird photo

A RedBird ATD.

commercially available flight simulators that can drive innovation. See "Fly into the Matrix" (bit.ly/FlyInVR) from our Jan/Feb 2021 issue for a deeper dive into personal computer simulation. The bottom line is that FS2020 and X-Plane are great programs that can be useful. I prefer X-Plane for a couple of reasons, including slightly better physics/airplane handling and easier flight setup. FS2020 has a better visual presentation, especially if you have a higher-end graphics processing unit (GPU), but it isn't quite as well set up to "do work" in terms of ease of set up for specific tasks.  These are relatively small differences overall, and the situation hasn't changed much since late 2020, when I wrote the other article.

Both programs are available on a trial/demo basis for free or very low cost. X-Plane, as a downloadable demo, is a great way to ensure it will run well on your system before investing in a full copy. FS2020 is available as part of Microsoft's monthly subscription, Game Pass. A PC-only Game Pass subscription is a relatively cheap way to test FS2020. Even at lower visual settings, both programs are a great way to hone your skills in weather that would be dangerous to try in real life without support. This lets you practice both the flight performance and procedures you want to brush up on.

To add even more realism, there are services like PilotEdge and VATSIM (Virtual Air Traffic Simulation Network) that provide virtual air traffic services so you can practice procedures with ATC, in some cases guided by actual air traffic controllers. This kind of extension of computer-based flight sims allows for very realistic IFR operations and practice. Especially on a weak point for many pilots, radio communications. Getting virtual radio reps can make you more comfortable and means you have more attention to focus on other tasks. The addition of air traffic services is a significant advancement since I was learning to fly and allows you to practice IFR operations in a much more realistic fashion than having your instructor provide canned instructions.

### To VR or not to VR . . .

That is the question. There are additional costs, both financial and time, that virtual reality (VR) imposes versus a traditional monitor-based PC system. You will need more powerful and expensive components and will also have to spend time getting everything properly set up. However, VR technology, once properly qualified, could help bring down the cost of flight training and make routine training more attainable.

The advantage VR provides is best summed up in one word — immersion. It does make you feel much more connected to the experience. For practicing the performance aspect, immersion can help. I still remember when that fact really hit me. I was practicing a touch-and-go, and my final approach got a bit unstable. I could "feel" it in a very similar way to what I would in a real airplane. That connection makes the experience a much higher fidelity one. Regarding practicing aircraft control, the higher the fidelity, the better. Unlike process and procedure practice, where reducing fidelity can be valuable, aircraft control is a different beast. Especially in a consequence-free virtual environment, you want the most realistic conditions.

**A PC based system with VR.**

### Building Your Own Triangle

We've discussed dissecting proficiency into planning, performance, and procedures. From there, we looked at ways to hone each of those facets. I would propose a second triangle, a fidelity triangle. The fidelity triangle consists of high, medium, and low-fidelity approaches. It's not necessarily equilateral, but varies based on available time and conditions. High-fidelity training, i.e., flying the airplane, will likely be the short leg in this shape. Lining up the conditions, an instructor, and disposable income can be challenging. It's also a good block of time. The minimum time commitment for a flight would be 2-3 hours total for an hour in the air. This isn't to say you shouldn't take advantage of the opportunity; it's just that the chances will be limited in our busy lives.

The medium-fidelity training would be ATD or computer simulation. There's a spectrum in quality from a high-end ATD, to a VR setup, to a basic computer. While it's not the real thing, it offers better availability and controllable conditions. When possible, try to work in periodic sessions in an ATD as a good check-up. It can be a cost-effective way to ensure you are on a good path regarding your proficiency. ATDs may also allow you to log the time and experience under certain circumstances. You can use your home-based system to brush up on any deficiencies the ATD sessions uncover. If you're working from home, you can also pop in and do a quick approach or any other procedure that's giving you trouble before your next check-up.

**The wide variety of technology available to us today gives us many daily opportunities to work towards greater proficiency.**

Low-fidelity training can still serve a purpose. This would include things like practice briefings and planning. Although I would argue that the task's fidelity is high as it's functionally the same regardless of intent to fly, from an effort and ease of operation standpoint, it is much more accessible than the above-listed tasks. You can even do it in a waiting room before an appointment or meeting. Other low-fidelity tasks include working with training software to dig into your avionics suite or reading manuals or safety publications like this one. Keeping your mind engaged in aviation is an excellent way to keep proficiency a priority. It also can inform your priorities for higher fidelity training. Did you see conditions in a briefing or accident report and wonder how you might deal with them? Why not give it a try in the virtual environment of an ATD or PC sim? That experience can then feed back into your personal minimums and future flight planning.

How you balance that triangle in pursuit of a well-honed proficiency triangle will depend on your circumstances. Over time, you can refine your triangle and balance your fidelity needs to stay proficient. This will change over time and will require rebalancing. The wide variety of technology available to us today gives us many daily opportunities to work towards greater proficiency.  But once you have a base, you can work from there and find the right mix to keep you safe and proficient in the future.

James Williams is *FAA Safety Briefing*'s associate editor and photo editor. He is also a pilot and ground instructor.

**LEARN MORE**

"A Virtual Plan for the Real World," *FAA Safety Briefing*, Nov/Dec 2017
**bit.ly/3VFGjRt**

# MAYBE NOT TODAY . . .

## Avoiding the Perils (and Regrets) of VFR into IMC

***By Sabrina Woods***

*(Editor's Note: This article originally appeared in the Jul/Aug 2018 issue of* FAA Safety Briefing *and was updated for this issue.)*

In 2009, a non-instrument-rated pilot originally planned for a much-anticipated cross-country trip, but instrument meteorological conditions (IMC) conditions at the airport prevented the pilot from leaving on the intended day. After two days of waiting, IMC still prevailed; however, several witnesses observed the pilot and the pilot's son at the fuel dock. They all assumed that the pilot would taxi back to the hangar since the ceilings were between 200-400 feet above ground level (AGL). Instead, the airplane departed and disappeared into the overcast clouds. Multiple witnesses heard the airplane continuously change speed and direction, followed by the sound of the airplane impacting the ground. Airplane components were found in two locations — at the main wreckage site and along a debris path that consisted of the outboard portions of the left wing and left stabilator. Both the pilot and son suffered fatal injuries in the crash.

**Flying VFR into IMC is still one of the most lethal causal factor for GA mishaps.**

In 2019, a non-instrument-rated commercial pilot encountered fog shortly after departing for a visual flight rules (VFR) aerial application flight in an aircraft not equipped for instrument flight rules (IFR). The pilot attempted to fly above the fog layer and divert to a local airport. However, aircraft tracking data shows the airplane entered two spiraling turns, the second of which involved a rapid descent in the direction of the fatal accident site. Investigators determined this to be consistent with the effects of spatial disorientation in IMC conditions. They also were not able to determine if the pilot received an official weather briefing before the flight.

In 2021, a non-instrument-rated pilot departed in a helicopter shortly after sunset in visual meteorological conditions (VMC). About an hour into the fight, the pilot encountered snow showers and IMC conditions that were forecast to move through the route of flight. Radar data showed that after entering the area of weather, the pilot began a right descending turn and the helicopter crashed in a rural, wooded area. Investigators believed that operating in a helicopter not approved for IFR flight and with no instrument rating, in addition to the overcast skies, snow showers, and a lack of terrestrial illumination in a remote area, were conducive to spatial disorientation and subsequent loss of control in this unfortunate fatality. There was also no evidence the pilot reviewed the weather or received a briefing before the flight.

### Shocked!

Each year, the Richard G. McSpadden Report (formerly the Joseph T. Nall Report) provides a detailed analysis of general aviation (GA) accident data and safety trends. A look at the most recent finalized data from the report in 2021 indicates there were 938 non-commercial, fixed-wing accidents, with an overall lethality rate of 17.7%. More than 80% of the accidents that occurred in IMC were fatal, compared to 15% of those that occurred within VMC. As the preceding accident summaries demonstrate, flying VFR into IMC is still one of the most lethal causal factors for GA mishaps. For this reason, the National Transportation Safety Board (NTSB) has determined it to be a significant safety hazard for the GA community.

What stands out is that, unlike most of the other mishap causal factors, this particular rate of occurrence has remained stubbornly fixed — drifting between a 79 to 92% fatal accident rate for VFR into IMC over the last several decades. *Decades*! This is despite several significant upgrades in weather forecasting technology and a continued safety awareness effort focused on this subject. My research left me shocked and more than just a little concerned about why this particular phenomenon keeps occurring.

### So Why Does It Still Happen?

The FAA, NTSB, and various aviation safety advocates from industry and academia alike have tried to determine what happens when a pilot finds themselves in the incredibly hazardous situation of being VFR and then flying into IMC conditions. Some researchers have theorized that cockpit technologies are insufficient at depicting meteorological conditions in real-time. Others believe that pilots get distracted or overestimate their aeronautical abilities. Others even go so far as to accuse aviators of being willful in disregarding the dangers and deem flying VFR into IMC as negligence.

While I think some of these ideas have merit (others, not so much), I, too, have a couple of different theories to offer on how VFR into IMC can happen. I humbly present to you what I call the "just around the river bend" bad idea; the "where'd everybody go?" gaffe; and the "there's no place like home" hot spot. Let me explain further ….

**Others even go so far as to accuse aviators of being willful in disregarding the dangers and deem flying VFR into IMC as negligence.**

### It's Just Around the River Bend … ?

In this situation, a pilot is flying along when the visibility starts to deteriorate. Instead of diverting from the undesirable condition or even just landing the aircraft, the pilot continues, thinking that clearer conditions might be just "around the river bend." Or worse, they rely on the latest weather app to "shoot the gap" and try to fly through the inclement weather.

Adrian Eichhorn photo

As you might notice in a previous article I wrote, "Weather … Or Not? Weather Technology in the Cockpit" (adobe.ly/3VmDMf0), I discussed the FAA's Weather Technology in the Cockpit (WTIC) program to educate pilots on the inherent inaccuracies, latencies, and limitations of weather displays in the cockpit. Information that you see on your favorite weather app might not be real-time, with lagging delays of up to 20 minutes! This means that the hole a pilot might try to slip through is no longer there upon arrival.

Another reason some pilots are reluctant to turn around is what human factors scientists call "sunk cost bias." In general, we are often reluctant to turn away from something when we feel we have already put a certain amount of time, effort, and money into it. We would rather hang on just a little longer because we value the very real "wasted" effort more than the intangible hazard. Regardless, waiting for a hole that might never manifest, prioritizing the extra money you burned, or trying to get to your destination is just a bad idea when dealing with foul weather or poor visibility.

### Where'd Everybody Go?!

Another reason pilots might unwittingly find themselves in a bad "VFR into IMC situation" is because the conditions change without the pilot observing it happening. Picture this: You are flying along in VFR conditions when you take a moment to fiddle with your radio that keeps emitting a high-pitched squeal when you key the mic. Once satisfied that the squelchy situation is resolved, you look up to find yourself on the cusp between marginal VFR conditions and IMC. The soup is getting worse with every passing minute, and the "where'd everybody go?!" panic starts to set in.

This scenario is more common than you might think and is often the result of distraction — when something not pertinent to the task at hand captures and holds your attention; or fixation — when you are overly focused on one specific task to the detriment of all others. Poor situational awareness, lack of experience in interpreting changing weather conditions, and overestimating one's own abilities are also common culprits in missing the shift from VMC to "not-VMC." These mistakes can break down the efficacy of your aeronautical decision-making making, which can lead to additional errors and an increase in risk. Mitigate them by creating systematic procedures that work for you and your aircraft type, and by creating and closely following a scan pattern.

> **Even though we all know there is no place like home, sometimes it is better if the getting-there desire waits in deference to a safer course of action.**

### There's No Place Like Home

Very similar to the "just around the river bend" bad idea is the overwhelming desire to just get home. Colloquially this is called "get-home-itis" or "get-there-itis"; however, most theorists refer to it as plan continuation bias. It is like the former because the aversion to sunk costs is the same. But get-home-itis often goes much deeper because the pilot is particularly keen to accomplish their goal even though things have changed and there are indications that doing so is very risky (see the Air Safety Institute video in Learn More). Sometimes complacency — I've done it before, so why shouldn't it work this time? — over-reliance on technology, and good ol' fashioned pride can get in the way of a person's making the safer, albeit seemingly inconvenient choice.

Victims of plan continuation bias can be internally motivated (e.g., wanting to get home to a waiting family member), externally motivated (e.g., wanting to get the rental back to avoid additional charges), or a combination of both. When it comes to flying VFR into IMC, this bias can compel a pilot to make unsafe choices in their aeronautical decision-making. An excellent and rather sad example is in the very first paragraph of this article. Even though we all know there is no place like home, sometimes it is better if the getting-there desire waits in deference to a safer course of action.

### An Ounce of Prevention …

Benjamin Franklin once penned that "an ounce of prevention is worth a pound of cure." Granted, Mr. Franklin was talking about fire safety; however, the axiom rings true today and is easily applicable to a host of different situations. Thorough pre-flight planning and being conscious of your skill set and experience level aids in thwarting VFR into IMC tragedies. The best time to take preventative measures is by building a solid "Plan A" and a "Plan B" before you go fly. If you are anything like me, you will even build a "Plan B++." In your plans, you should consider

what alternate courses of action will be available if the weather or visibility starts to turn sour, when you should consider adopting those courses of action, and a realistic assessment of your own personal minimums so that you know exactly what you need to do to avoid ever getting close to a bad situation.

Trust me on this. Being in the thick of things is no time to try and reconnoiter and develop a Plan B. Spatial disorientation, in particular, often goes hand-in-hand in VFR into IMC accidents. When it comes to deteriorating weather conditions, if you are not instrument-qualified, the best course of action is to remain in VFR conditions and land the plane as soon as possible.

To put a different twist on an oft-quoted line from the famous final airplane scene in Casablanca: If that plane leaves [VMC], you'll regret it — soon and for the rest of your life. Because if you do the right thing, then maybe not today, and maybe not tomorrow, you will eventually get where you're going, but without the regrets that you — or the loved ones you leave behind — would have if you fall prey to a VFR-into-IMC accident.

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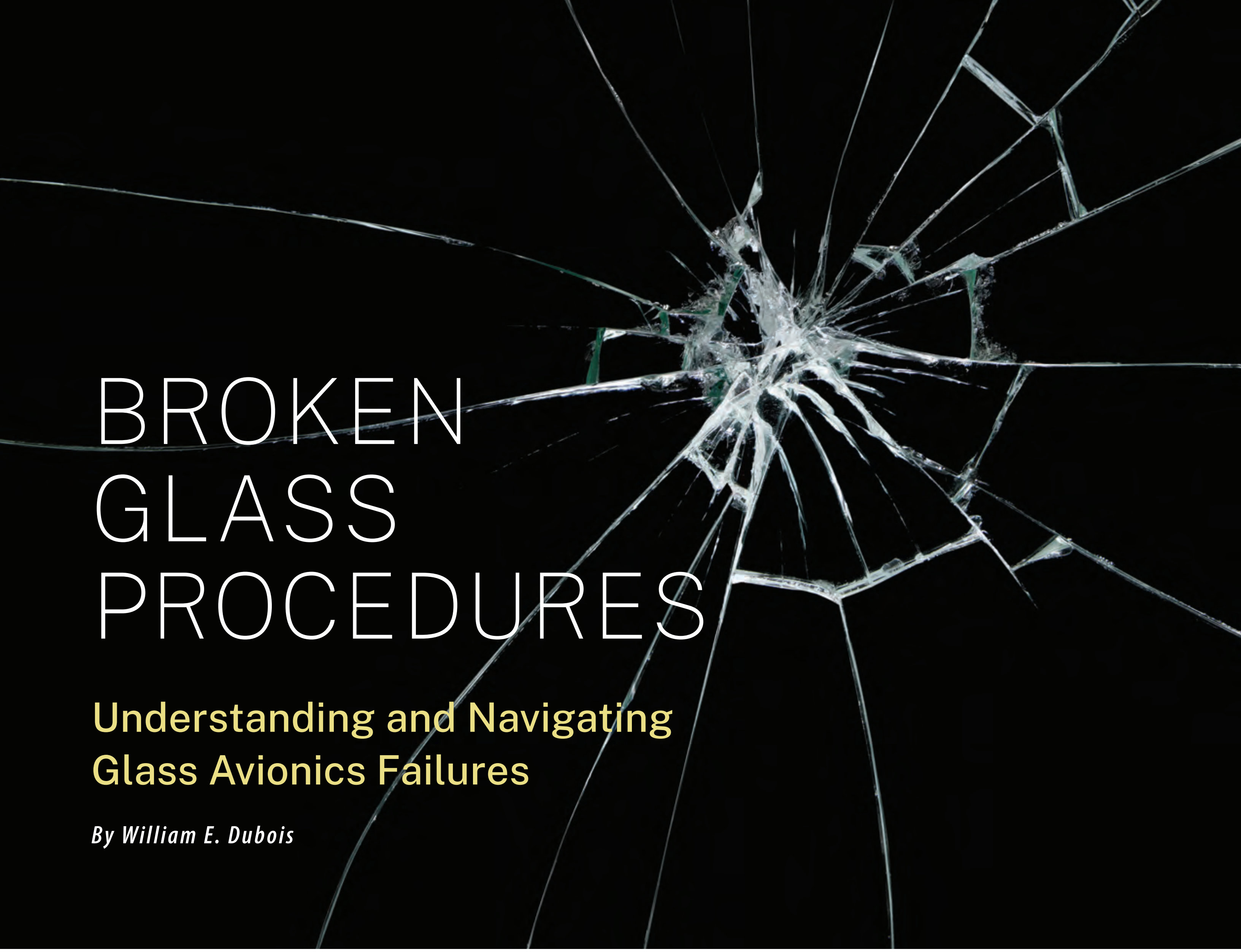
SKYbrary "Inadvertent VFR into IMC"
**bit.ly/3VLDTkD**

AOPA Air Safety Institute, "Accident Case Study: In Too Deep"
**bit.ly/4alhf6u**



# BROKEN GLASS PROCEDURES

## Understanding and Navigating Glass Avionics Failures

***By William E. Dubois***

Instead of "break glass in case of emergency," in the modern flight deck, "broken glass" is an emergency in and of itself — a first-rate emergency that can spiral out of control with mind-numbing speed. Sure, modern glass avionics are the gold standard for reliability — much more reliable, on average, than their analog pneumatic- and electric-gyro predecessors. That said, anything that humankind makes can break. And when reliability meets Mr. Murphy, the next steps for pilots flying glass are different from those flying steam.

To understand what those operational differences are, we first need to look under the cowl and understand the magic that drives the displays. While the system architecture of glass panel avionics varies by manufacturer and model, all share some basic DNA: the "glass" display itself, the pilot interface, and the black boxes that drive the system. Let's start with the boxes.

### Little Boxes

A glass panel system is controlled by two different black boxes, in concept (more on that in a moment). The first box is called an attitude and heading reference system, or AHRS in our acronym-laden lexicon. The AHRS is responsible for interpreting pitch, bank, and heading info. It does this using accelerometers, mini gyros, a magnetometer, and

**While the system architecture of glass panel avionics varies by manufacturer and model, all share some basic DNA: the "glass" display itself, the pilot-interface, and the black boxes that drive the system.**

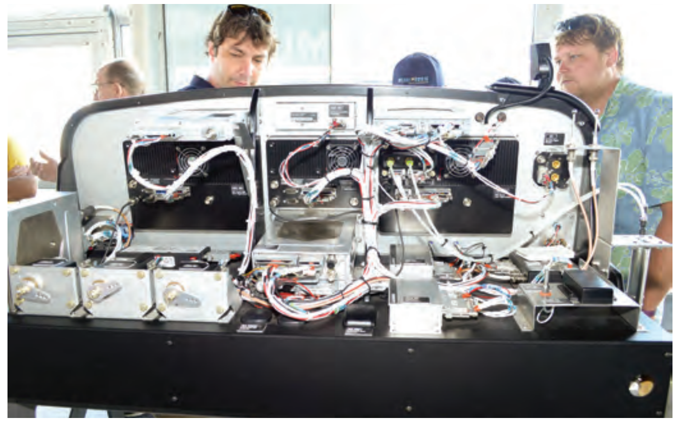
… well … magic. The second box is the air data computer, or ADC, and it's responsible for altitude, airspeed, and vertical speed number crunching and display.

There may be one of each type of box in the aircraft, or, in some installations, there may be dual AHRS and/or dual ADCs. Increasingly, there are units in the field where the ADC and the AHRS systems are combined into a single box, called, you guessed it, an ADAHRS. And, in some systems, the boxes themselves are gone, with the hardware for both built right into the pilot display, an approach that greatly simplifies installation, and reduces weight, cost, and complexity.

All this variability, along with the rapid pace of technological advancement in contemporary avionics, means that you need to spend some time with the Pilots Operating Handbook (POH) and/or flight manual supplement for any glass panel-equipped aircraft you fly so that you know how the systems are laid out. Flying glass without this knowledge would be akin to jumping into a strange airplane without first understanding how its fuel system is designed. Not to mention, it's your responsibility under 14 CFR section 91.103, *Preflight action,* to familiarize yourself with all available information regarding the flight, which includes the proper use of avionics installed in the aircraft.

## Pilot Interface

The newest glass panel systems are driven by touch screens that feature smartphone-esque icons sporting highly intuitive menus. That said, the bulk of the glass systems found in the general aviation fleet are still button, knob, and softkey driven, often with less than intuitive menus and button press chains required to achieve the desired results. These analog-entry glass panel systems all feature inverse workload: once mastered, they are great workload reducers in the air; but to master them, expect significant ground study.

A peak behind the panel of a modern glass cockpit.

To avoid draining the aircraft's battery, a ground power supply is recommended for in-airplane ground work. As an alternative, investigate the availability of flight simulators or training devices in your area that match up to the avionics in the aircraft you will be flying. Sims have several other advantages over sitting in the airplane pressing buttons and practicing flows, including the fact you can practice (safely) in simulated flight, as well as on the ground — and they are cost-effective compared to burning avgas or JetA.

Additionally, some glass avionics systems have "emulators," or desktop computer programs that mimic the flight deck systems so that you can learn — and keep sharp with — the flows from the comfort of home.

**Contrary to popular belief, a glass panel system isn't totally high tech. The ADC still uses the aircraft's ol' fashioned pitot static system to connect to the flight environment.**

## Two Screens

The vast bulk of contemporary glass installations on light GA airplanes feature a pair of display panels, the pilot side panel being called the primary flight display, or PFD; and a second display of the same size on the copilot side called an MFD, for multi-function display. The PFD is generally used to display the flight instruments, while the MFD displays navigation and in some cases, engine data.

The beauty of two screens, beyond being beautiful to the eyes of many pilots, is the fact that the screens can often flip-flop data. So not only do the dual screens provide a greater ecosystem of situational awareness, but they also serve a redundancy role. If the PFD screen suffers a failure, the flight data can merely be shifted to the MFD or in some cases, a backup electronic display.

Of course, now everything you need to see and know to control flight is on the wrong side of the airplane. So here's your first tip and challenge: on your next instrument proficiency check, shoot an approach using the MFD. Flop your data and dim, or cover, your PFD — as, generally speaking, most manufacturers discourage disabling the PFD by pulling its circuit breaker.

Bonus points for getting with a flight instructor to get some right-seat time. If you are flying alone and lose your PFD, that experience will make MFD flying more natural. That said, if you are not an instructor yourself, you might find the landing sight picture (and the opposite hand throttle/yoke operation) disconcerting at first, which is why some practice with an instructor is in order.

Of course, in a real-life display failure, you are now essentially flying on one mag. Sure, like magneto systems, the odds of losing both are pretty remote, but why take the chance? If you've lost one display, it's time to get on the ground at the nearest airport.

> **In the case of an alternator failure in a glass flight deck, it's critical to quickly shed load on the electrical system.**

### Reliability's Weakness

Despite the greatly improved reliability of glass avionics compared to legacy avionics, if there is a failure in a glass system, their architecture makes them more prone to system-wide failures. That means you can lose all of the flight data, compared to analog systems failures, where you are more likely to only lose either the air-driven or power-driven instruments — leaving you with at least a 50% solution.

Hence, in glass flight decks, there is a need for standby instruments.


### Standbys

Standby, or emergency backup instruments, might be a set of analog instruments, or they can be an independent miniature glass panel system. Either way, the standby system is your lifeboat in the "IFR sea." Should the worst happen to your primary system in hard IFR, you can still aviate and navigate to an island of safety.

At least in theory.

Because the reality is that standbys are both small and inconveniently located, typically low down on the panel. Yes, you can fly on them. And yes, it will be a "stressfest." So that's your second tip and challenge for today: on your next IPC, shoot a hooded approach on your standbys.

### It's Not as Modern as You Think

Contrary to popular belief, a glass panel system isn't totally high-tech. The ADC still uses the aircraft's ol' fashioned pitot static system to connect to the flight environment. That, in turn, means that contemporary glass panels can fall victim to the same pitot-static failures that legacy avionics do, so it pays to review the symptoms of pitot and static blockages. Also contrary to popular belief, the systems won't necessarily alert you to a pitot-static problem, and, for the same reason, it can be hard for pilots to recognize such failures in analog systems — they are subtle and tricky to recognize.

### Power Hungry

When it comes to being prepared for emergencies, the number one thing to understand about glass avionics actually has nothing to do with the glass itself directly, but rather with the glass's food. Modern avionics have ferocious appetites for electricity. So much so, that an alternator failure is possibly a greater emergency than an avionics failure. This is because once the battery is drained — and the battery-backup, if so equipped — the glass shuts down along with the radios and all the rest.

An alternator failure in a glass-equipped flight deck is a much more serious matter than it is in a legacy flight deck. First off, once the battery is dead, all flight instrument data on the glass is lost — rather than just a portion of it. Additionally, the time from alternator failure to system failure is dramatically reduced, due to the power-intensive nature of glass avionics.

In the case of an alternator failure in a glass flight deck, it's critical to quickly shed load on the electrical system. Unplug any personal devices that are suckling on the airplane's USB ports. Then promptly follow the checklist to shut down any unnecessary aircraft power usage.

Speaking of unnecessary power use, in IFR conditions, consider proactively lightening the load on your electrical system. This means not taxing the aircraft's electrical

systems by using it as a charging port for crew and passenger tablets, phones, or laptops — their charging load can increase the risk of an electrical system failure.

Lastly, don't expect the lights to stay on as long as the POH says they will after an alternator fails; that number is based on a factory-new battery. As batteries age, their stored load capacity decreases. In an alternator failure, the clock is ticking on your glass avionics. Actually, it's not so much a clock, as a stopwatch. It is critical to get to VFR conditions, or safely on the ground as quickly as possible.

> **For maximum preparedness, take the time on the ground to study the architecture of the glass panel systems of any glass aircraft you fly.**

### The Right Stuff

In all flying, the key to emergency survival is preparedness. In the case of glass IFR flight, avionics failures are less likely, but when failures happen, they are more likely to be widespread. Additionally, know that glass avionics are more vulnerable to aircraft electrical system failures than legacy systems are, and be ready to act swiftly.

For maximum preparedness, take the time on the ground to study the architecture of the glass panel systems of any glass aircraft you fly. Practice flows — standard, atypical, and abnormal/emergency — parked on the ground, in a sim, or using an emulator. And review those tricky pitot-static failures, and how they would manifest on your glass display.

In the air, put those IPCs to good use by practicing with the MFD and the standbys. Consider some right-seat time. Right-screen, right-seat practice equips you with the right stuff for a glass emergency.

In flight, keep the load light — the power load. Just like weight affects aircraft performance, so too does the load on the electrical system.

And should it happen — should the infamous red "Xs" appear, or a screen go dark — unplug and navigate to the nearest port in the storm, be that below the weather, above the weather, or on the ground at the nearest airport or airstrip. Time is not on your side. But if you are prepared, there will be time enough.

**William E. Dubois is a widely published aviation writer and the ground school program manager for Infinity Flight Group. He holds a commercial pilot certificate with an instrument rating and is a dual-accredited master ground instructor.**

**LEARN MORE**

Instrument Flying Handbook, Chapter 11, *Emergency Procedures*
**bit.ly/43H2Ygx**

"How One GPS Source Crashed A Pilot's Navigation Equipment In IMC," *Boldmethod*, June 14, 2018
**bit.ly/3TRI6BV**

"Flying With A GPS Failure Below Class B Airspace," *Boldmethod*, May 28, 2020
**bit.ly/43BdvMa**

"As the Gyro Spins," *FAA Safety Briefing*, Sep/Oct 2015, Page 17
**https://bit.ly/SepOct15**

# Pilot Minute

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Susan Northrup, MD, MPH
Federal Air Surgeon

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Airman Education Programs

Produced by the Civil Aerospace Medical Institute (CAMI)

JAMES WILLIAMS

# CHECKING YOUR CHECK

As we delve into all things instrument flight rules (IFR) in this issue, we see that currency and proficiency play a big part in flight safety. Many of us aren't everyday aviators, so when we get a chance to take to the air, we want to use that time to do something fun, not just bore holes in the sky, pun intended. This can lead to an attempt to minimize the "work" we must do to stay proficient. Sometimes we clear the bar just enough to meet the legal standards and move on to more enjoyable endeavors, an approach that can put us in a potentially deadly situation. When it comes to flying, especially instrument flying, being just good enough isn't good enough.

> RATHER THAN TRYING TO GET AWAY WITH THE MINIMUM, YOU SHOULD LEAN IN AND USE THE IPC AS A REAL TEST OF YOUR SKILLS.

## Where to Start?

Title 14, Code of Federal Regulations (14CFR), section 61.57(c) lays out the basic currency requirement to fly under IFR: six approaches, holding, and intercepting and tracking of courses, all within the last six calendar months. This would be the "easiest" way to stay current as these can be done using actual or simulated instrument conditions and don't require evaluating your skills. You may need a safety pilot if you are meeting the requirements using a view-limiting device, but the safety pilot is not required to be an instructor. This is the equivalent of your take-offs and landings for passenger currency. So long as you do them, and the aircraft is airworthy after that, you've met the requirement. You may also complete the same tasks in paragraph (c) in an approved Aviation Training Device (ATD) without the involvement of an instructor.

The other path to IFR currency is found in 14 CFR section 61.57(d), the instrument proficiency check (IPC). An IPC may be accomplished instead of the requirements in paragraph (c) above but must be completed if currency lapses. Some pilots prefer to do an IPC because, from a time and cost perspective, they can be "cheaper." Even the most efficient routing is unlikely to allow you to do six approaches, holding, etc., in less than a few hours of flying time, especially in busier areas where you may have to be sequenced in long queues. The requirements of an IPC include air traffic control clearances and procedures, flight by reference to instruments, navigation systems, instrument approach procedures, emergency operations, and postflight procedures. For more information on how to conduct an IPC, the FAA issued Advisory Circular (AC) 61-98D. While the AC covers many different checks, Chapter 5 is the most relevant to this subject. Chapter 5 is brief (less than four pages) but covers almost everything you need to know about an IPC from an instructor's point of view. From there, we can extrapolate what will likely come up on an IPC as a participant.

## Lean In

In the AC under Preflight Considerations, there is a key statement that may get overlooked: "The flight instructor should structure


an IPC like that of the flight review, *tailoring the check to the needs of the pilot*." [Emphasis mine]. It goes on to suggest that the instructor should analyze the pilot's experience, background, and abilities utilizing realistic scenarios to ensure that the pilot is ready to encounter IMC on their own. The instructor is then supposed to review their plan of action with the pilot so that everyone agrees on the check terms. This is where it's essential as the pilot receiving the check that you are really honest with the instructor. Rather than trying to get away with the minimum, you should lean in and use the IPC as a real test of your skills. It may make for a longer IPC, but the end result is a higher skill level and greater confidence, which may make the difference when things start to get rough.

**James Williams is *FAA Safety Briefing's* associate editor and photo editor. He is also a pilot and ground instructor.**

**LEARN MORE**

AC 61-98D, *Currency Requirements and Guidance for the Flight Review and Instrument Proficiency Check*
**bit.ly/AC6198DIPC**

REBEKAH WATERS

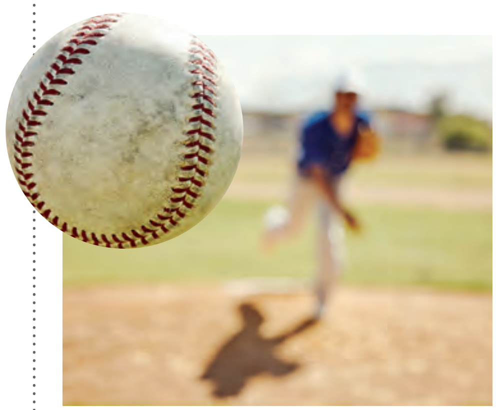
# KEEPING YOUR EYE ON THE DRONE

Anyone who's ever played baseball likely remembers the first thing they learned: "Keep your eye on the ball." You've probably passed on this sage tip at least once. Well, when it comes to drone flying, keeping your eyes on your drone is not only a great tip, but it's also mandatory.

Whether you are a part 107 pilot, or you fly for fun as a recreational flyer, you must maintain visual line of sight (VLOS) with your drone at all times. This requirement can be one of the most confusing parts of flying a drone. One reason is that the FAA has not set a maximum distance for this requirement. This is because the maximum distance you can maintain VLOS depends on several factors, such as the size of your drone, weather conditions, your visual acuity, and obstacles, to name a few.

### Why VLOS?

To understand how to effectively keep your eye on the drone, let's look at why this is a requirement. Section 44809(a)(4) tells recreational flyers: "The aircraft is operated in a manner that does not interfere with and gives way to any manned aircraft." Drone pilots must "see-and-avoid" manned aircraft. Some might ask, "Why can't I use my camera to satisfy these requirements?" With today's technology, even the best cameras cannot replace the function of a pilot's ability to see-and-avoid. In a crewed aircraft, the pilot can turn and look in any direction quickly to scan for obstacles. An effective scan must encompass all areas of the environment in which a hazard could be present. In this case, think about yourself as the pitcher instead of the batter. If you have "tunnel vision" from relying on your camera, would you notice the runner trying to steal second? You must use your eyes, unaided by any device other than corrective lenses, to see-and-avoid other aircraft, people, and property on the ground.



### The "And" and "Or" of VOs

Another common area of confusion is that the FAA uses both "and" and "or" when talking about visual observers (VOs). Section 107.31(a), *Visual line of sight aircraft operations*, says "the remote pilot in command, the visual observer (if one is used), **and** the person manipulating the flight control of the small, unmanned aircraft system must be able to see the unmanned aircraft throughout the entire flight." It goes on to list four things that must be accomplished by VLOS: **know the location of the drone; determine its attitude, altitude and direction; watch the airspace for other air traffic or hazards; and make sure the drone does not endanger the life or property of another.** But in section 107.31(b) it says, the ability to do these four things must be exercised by the remote pilot in command and the person manipulating the controls, **or** the visual observer.

Let's help this make sense. First, how can the remote pilot in command be someone other than the person manipulating the controls? Well, you may be training someone to fly, but you are still the one in charge and ultimately responsible for the flight. Next, is it **and** or is it **or**? VOs could be used for several reasons like allowing you to use your camera for photography or giving you time to look away from the drone to complete other aspects of your operation. What section 107.31(b) says is that no matter what is happening, at least one person in your operation must have eyes on the drone and the surrounding airspace. What section 107.31(a) says is that everyone involved in the operation *must have the ability to see the drone* even if one of them looks away from the drone. In other words, if your VO alerts you to a potential hazard, can you immediately put your eyes back on your drone?

Remember, when it comes to VLOS, your primary responsibility is to see-and-avoid other aircraft. Your drone is the ball, not the image sent back to you by the camera. So, whether it's you or your visual observer, make sure you always keep your eye on your drone!

**Rebekah Waters is an *FAA Safety Briefing* associate editor. She is a technical writer-editor in the FAA's Flight Standards Service.**

**LEARN MORE**

AC 91-57C, *Exception for Limited Recreational Operations of Unmanned Aircraft*
**bit.ly/AC91-57C**

AC 107-2A, *Small Unmanned Aircraft System*
**bit.ly/SmallUAS**

REBEKAH WATERS

# MASTERING BALLISTIC PARACHUTE SYSTEMS MAINTENANCE

A pilot entered the clouds in instrument meteorological conditions (IMC). Around the same time, he experienced engine failure and the aircraft descended abruptly. With all the alert systems squawking, he didn't have time to wonder if his ballistic parachute system was properly maintained and inspected. He only had time to make the split-second decision to deploy it and bring the aircraft down safely. If he had waited even 30 seconds longer, it could have been too late. He, and his passenger, escaped major injuries thanks to this system, and the story has a happy ending.

Ballistic parachute systems are designed to safely return an aircraft to the ground in the event of an emergency, such as engine failure, structural damage, or other hazards that might lead to a crash. The systems are launched by a solid rocket that fires at over 100 miles per hour and deploys a parachute in less than one second. They come installed standard on some Cirrus aircraft and can be installed on many other small aircraft, including helicopters.

These systems require regular inspection and maintenance as specified by the manufacturers. Mechanics must receive proper training on the maintenance procedures specific to the system installed on the aircraft they are inspecting and/or maintaining. Before beginning maintenance, it's important to familiarize yourself with the emergency precautions related to the deployment and operation of the rocket to prevent major injuries or even death from accidental rocket activation.

Cirrus photo

When conducting a maintenance inspection, look for signs of wear, corrosion, or damage as directed by the manufacturer. Always follow the manufacturer-recommended replacement schedule for components such as the rocket motor, parachute, and lines. Just because it is sitting, unused, doesn't mean it has maintained being in a safe condition for flight. These systems also need periodic testing. Always follow the manufacturer's directions for testing. Don't forget to document what you've done. Maintain detailed records of inspections, replacements, and any maintenance performed in the aircraft maintenance records.

Other required maintenance includes mandatory and unscheduled canopy inspections and repacks by the factory. This involves removing the parachute container from the aircraft for inspection and repacking them at regular intervals. These intervals vary depending on the style and whether the system is mounted internally or externally. Check the manufacturer recommendations for specific schedules. Unscheduled factory inspections are required in certain situations. These include signs of damage or tearing and any time the parachute is deployed, whether accidentally or intentionally. These systems must also be sent back to the factory whenever there is a breach of the inner cap on the canister or upper cap, or if the parachute itself has gotten wet or exposed to other contaminates. Finally, if there is any situation where you might be uncertain of the reliability of the unit due to any type of abuse, exposure, or wear, remove it and send it for an unscheduled canopy inspection and repack.

> **ALL ROCKET MOTORS HAVE AN EXPIRATION DATE AND MUST BE REPLACED ACCORDINGLY.**

Rocket replacement is another important part of periodic maintenance. All rocket motors have expiration dates and must be replaced accordingly. These dates are printed on the placards on the sides of the parachute container and rocket. But don't ship the rocket back! Without the proper packaging and documentation, it is illegal and dangerous to ship loaded rockets and propellant. Instead, contact the manufacturer for service instructions on how to safely disassemble and dispose of the rocket properly.

Even when inspected and maintained correctly, these systems have a maximum service life, so check with the manufacturer to know when the system will need to be replaced. Hopefully, most pilots won't ever need to use this last resort feature. If the time does come to use it, it will be too late to make sure it's in good shape. So, if you inspect an aircraft equipped with a ballistic parachute system, always follow the manufacturer's guidelines. Routine inspection and maintenance are crucial and could make the difference between life and death.

**Rebekah Waters is an *FAA Safety Briefing* associate editor. She is a technical writer-editor in the FAA's Flight Standards Service.**

GENE TRAINOR

# SIMULATORS SAVE LIVES

Since people began flying helicopters, weather has played a large role in accidents. Unintended flight into instrument meteorological conditions (UIMC) is among the most dangerous situations that can contribute to an accident.

For the layman, UIMC occurs when pilots unintentionally fly into weather where visibility is so limited that all they can see are clouds and/or precipitation. It also can occur over unlit terrain or a large body of water on moonless nights when a visual horizon is not visible.

RedBird photo

If pilots fly lower in an attempt to maintain visual contact with the ground, they risk hitting towers, wires, terrain, or other obstacles. If they continue at their present altitude or higher, they risk UIMC. This can result in spatial disorientation, which occurs when pilots cannot determine a helicopter's position, motion, and altitude relative to the earth or their surroundings. Pilots will then need to rely on their helicopters' instruments to maintain aircraft control, turn around before entering these conditions, or just land. Without adequate training, this can be a terrifying and dangerous situation.

### Consider Simulators

Simulators allow pilots to experience hazardous situations as if they were in an aircraft but in a safe environment. The FAA urges pilots to use simulators to practice how to recover from UIMC. Pilots also can assess the risks of continuing with a flight.

The United States Helicopter Safety Team (USHST), a government-industry safety advocacy group, issued a helicopter safety enhancement (H-SE) in 2018, calling on the helicopter community to increase simulator training. Not only do simulators help pilots navigate UIMC, spatial disorientation, and other risky weather-related conditions, they can also help with better decision-making; loss of control; loss of tail rotor effectiveness; and vortex ring state conditions. Several of these situations occur simultaneously.

We recognize that some pilots may lack access to simulators. Properly trained instructors using view-limiting devices in flight represent a good alternative and provide real-world conditions conducive to spatial disorientation training.

### Simulator Training Matters

The Rotorcraft Collective, a government-industry group, recently published a video that retells the time flight instructor Terry Palmer met some pilots waiting for their helicopter to be serviced in Shreveport, La. While they waited, she offered UIMC instruction in her flight simulator. The pilots crashed in every scenario.

These pilots had traveled to Shreveport under visual flight rules. Clouds were minimal, and the pilots could see obstacles and terrain several miles ahead of their helicopter's flight path. After their UIMC training, the pilots were en route back to Boston when they encountered weather outside New York City. They landed their helicopter. They knew they lacked the expertise to push through thanks to the simulator training. One of the pilots called Palmer to tell her that she saved their lives. According to Palmer, they scheduled additional simulator training to improve their instrument proficiency. Watch the video at bit.ly/3xsHFFp.

The USHST Safety Analysis Team (SAT), the group that developed the simulator H-SE, among others, studied 104 fatal helicopter accidents from 2009 to 2013 and determined that 52 accidents fell into three occurrence categories: UIMC, loss of control, and low-altitude operations. Of these 52 fatal accidents, the team determined that 21 could have been avoided through simulator training. More than half (12) were UIMC.

"This H-SE targets greater use of simulation at all levels … initial professional helicopter training and during recurrent training sessions," the SAT's report states. "This will allow pilots to learn from their mistakes in a safe environment and will make them less likely to repeat the error during actual flight."

UIMC is a risk every pilot faces. Be prepared. Train in a simulator.

**Gene Trainor is a technical writer/editor in the FAA's Aircraft Certification Service.**

**LEARN MORE**

USHST Video, *56 Seconds to Live*
**ushst.org/56secs**

USHST Video, *Simulation: Learn From Your Mistakes*
**bit.ly/4amizpl**

"A 360-Degree Approach to IMC," *Rotor*, March 2021
**bit.ly/43u9mcl (PDF)**

Spatial Disorientation Induced by a Degraded Visual Environment
**ushst.org/recommended-practices**


Check out our GA Safety Facebook page at **Facebook.com/groups/GASafety.**

If you're not a member, we encourage you to join the group of nearly 16,000 participants in the GA community who share safety principles and best practices, participate in positive and safe engagement with the FAA Safety Team (FAASTeam), and post relevant GA content that makes the National Airspace System safer.

## Auspicious Admission

**I was a Delta Airline pilot for 34 years, and now I'm retired and flying general aviation operations. I was familiar with the Aviation Safety Reporting System (ASRS) and Aviation Safety Action Program (ASAP), and we used to be able to report within 24 hours an incident and then get maybe get a letter of caution or warning instead of a violation, if warranted. Do we have anything like this self-reporting program for me now? Thank you!**

**— Chris**

*Hi Chris. Thanks for reaching out and welcome to the general aviation community! Fortunately, the ASRS also applies to part 91 flying, and we encourage you to participate!*

*NASA's ASRS welcomes all users to report any safety issue, especially information that could help prevent an accident. They protect your identity and the identity of all other parties involved. The personally identifying information will not be shared outside of NASA, including with the FAA, unless the report involves criminal activity or an accident. Further, if the event became known to the FAA by some other means and the FAA takes legal enforcement action, then the FAA will not impose any civil penalty or certification suspension if certain criteria are met.*

*Regarding the 24-hour period for filing a report — while you can submit a report at any time, you are encouraged to complete the report in as timely a manner as practical. Doing so helps ensure that any critical safety-related information is relayed by NASA to the FAA sooner. It also helps you as the reporter to remember all the details of the event. However, if the reporting is to be used for waiver of legal enforcement sanction, then the report must have been filed within 10 days after the event (or the date when you became aware or should have been aware there was a violation).*

*ASRS collects the de-identified information and the reporter's narratives to spot deficiencies and discrepancies in the National Airspace System (NAS). These narratives provide a rich source of information for understanding the nature of hazards and enhance the basis for human factors research and recommendations for future operations.*


*For more information on voluntary reporting, read "Sharing is Caring" at bit.ly/48OV0Va, "See a Safety Issue? File a NASA Report" at bit.ly/49NJN8N, and "Break a Rule? See a Safety Issue?" at bit.ly/4a94Sdw.*

*Remember, report as many times as you need, as often as you need — there's no limit!*

**From the FAA's GA Safety Facebook Group**

## Real-Life IFR Flight into IMC

**One contributor to the Facebook group posted a video of his experience with the conditions and interactions with ATC in total IMC. Thanks for sharing!**

**Check it out for yourself at bit.ly/4a9z88Q.**


**For more stories and news, check out our blog "Cleared for Takeoff" at medium.com/FAA.**

*Let us hear from you! Send your comments, suggestions, and questions to SafetyBriefing@faa.gov. You can also reach us on X (formerly known as Twitter) @FAASafetyBrief or on Facebook at facebook.com/FAA.*

*We may edit letters for style and/or length. Due to our publishing schedule, responses may not appear for several issues. While we do not print anonymous letters, we will withhold names or send personal replies upon request. If you have a concern with an immediate FAA operational issue, contact your local Flight Standards Office or air traffic facility.*

TOM HOFFMANN

# WITH MY HEAD IN THE CLOUDS

Many people say imitation is the sincerest form of flattery. I agree in some cases, but I'd argue there's great value in authenticity. Various businesses have touted that truth in campaign strategies over the years. A few that stand out to me are Coke (It's the Real Thing), Wild Turkey (Accept No Imitations), and Porsche (There is No Substitute). It harkens to consumers having a "genuine" experience. While these are all fairly subjective regarding what is actually the best, there's something to be said about enjoying or experiencing something that is the standard-bearer, or as many soda drinkers would affirm, the real thing.

In this IFR-focused issue, we point out the many ways and means that pilots have to gain flying experience when solely guided by instruments. It might involve simulation training firmly on the ground using a full flight simulator, flight training device, or an aviation training device. If it's a nice sunny VFR day, it might involve launching into the air with a view-limiting device, or if the weather works out, flying in actual instrument meteorological conditions (IMC) — the real deal. While receiving training for my instrument rating during a New England fall, I didn't have to rely much on the first two options as IMC was pretty plentiful. Up to that point, I had only received limited IFR training under a hood or view-limiting glasses. I have nothing against those at all, as I know IMC opportunities are difficult to seek out in some parts of the country. However, having the experience of real-world instrument conditions did make a big difference, in my opinion.

First, there are some visual, aural, and sensory experiences offered by IMC flight that are difficult to recreate in a simulated environment or with view-limiting devices. On the latter, they can help improve your instrument scan, but gaps in these devices can inadvertently clue in a student to the type of scenario or unusual attitude a flight instructor is attempting to present.

There are also a few subtle things you can only experience in actual IMC, like the buffet you might feel when you first enter a cloud layer, the sounds and varying levels of visual obscuration you might encounter when flying through precipitation, or simply just seeing your windshield completely enveloped in gray. To a novice flyer, these experiences could be quite startling and anxiety-inducing, especially during an initial encounter. I felt that having the ability to see, hear, and feel these subtleties during training provided me with an additional layer of confidence and preparation that I carried with me on subsequent IFR flights.

The gradual and often hard-to-detect onset of IMC conditions during flight is also difficult to simulate. Real-world inadvertent IMC encounters don't typically mimic the binary situation experienced when donning a hood that instantly places you in the clouds. There's value in being able to see and experience firsthand that gradual loss of visibility and ground reference leading up to IMC, and being able to correctly react before the situation worsens. Look no further than the sheer volume and fatality rate of VFR into IMC accidents to see the life-saving value of this experience.

**THE GRADUAL AND OFTEN HARD-TO-DETECT ONSET OF IMC CONDITIONS DURING FLIGHT IS DIFFICULT TO SIMULATE.**

Yet another benefit is the ability to set more realistic personal minimums based on these real-world experiences. Personal minimums should be set to provide a solid safety buffer between the skills required for the specific flight you want to make, and the skills available to you through training, experience, currency, and proficiency. An essential step in establishing personal minimums includes assessing your experience and comfort level with certain flight conditions (e.g., low ceilings and visibilities).

Be honest in your assessment, but don't be afraid to adjust those minimums as you gain experience with certain conditions. Having pre-set hard numbers based on specific personal parameters you've established with firsthand experience will make it much easier to make smart no-go or divert decisions than having a vague sense that you can "probably" deal with the conditions you're in. It's a case where having your head in the clouds can actually help you see more clearly.

PAUL CIANCIOLO

# STEPHEN BROWN

*Aircrew Program Manager, FAA's Boston Flight Standards District Office*

What do a lobster, a pot, and chowder have in common? To New England local Stephen Brown, they are the three components needed to make a five-star instrument-rated pilot — translated to qualification, currency, and proficiency. A safe pilot understands all three.

Our crustacean friend can navigate the depths without the need to see, even when Poseidon churns up the seafloor, causing subaquatic instrument meteorological conditions (IMC). One could say he's a qualified captain, but that doesn't mean he won't get caught in a trap.

"Each year, we have so many people who are instrument-rated and continue into IMC conditions they should be avoiding. They think they can do it because they are rated," Stephen explains. "Being qualified is great, but that should be considered a knowledge/decision skill, not a regular operational skill."

If you don't want to go from lobster pot to stock pot, stay current. Think of currency as your license to learn.

"What I see as being current for IFR flights is that you have demonstrated the skill set to go out and learn more," he notes. "You can fly in selected conditions to improve your skills and have an instructor conduct an instrument proficiency check. You need to hone and develop those skills."

This is where our culinary trifecta is perfected into a good cup of chowder — with proficiency. That means you can apply those skills in varying conditions and situations and know the conditions and situations to avoid.

"A proficient pilot knows that the hardest decision is the internal debate to cancel before a flight," he said. "Being a proficient pilot also means being able to fly your aircraft without automation in difficult situations. It involves being able to change the level of automation you are using at any given moment without it being a factor."

With more than 8,000 hours as an airplane and glider flight instructor, Stephen is still all about improving his skills and flying as much as he can. He has flown more than 100 makes and models ranging from powered parachutes to gliders, ski planes, and small corporate jets.

Before joining the FAA in 2009, Stephen earned a bachelor's degree in aviation from Daniel Webster College and a master's degree with a focus in simulation from Embry-Riddle Aeronautical University. He has worked or flown for Comair, Embry-Riddle, Sporty's Pilot Shop, and Cape Air. He was also an aviation program director at the University of Cincinnati and Daniel Webster College.

At the FAA, Stephen's most memorable role was his nine-year stint as an FAA Safety Team (FAASTeam) program manager where he was integral in educating fellow pilots. Now, he is an aircrew program manager in the Boston FSDO assigned to Cape Air. He oversees the regulatory involvement of the regional airline's aircrew designated examiners.

"The funny thing that led me to the FAA is an intervention at AirVenture in Oshkosh. I would occasionally help with what is now the KidVenture portion, maybe do a seminar or two, and would just be generally involved," he reminisces. "One day, a bunch of us were watching the aerial performance from some picnic tables, and I realized that all the FAA people I had worked with were sitting around me. One of them looked at me and said, 'Steve, this is an intervention.' That's when I decided I needed to come to work for the FAA, somehow, some way."

So, this is your intervention: next time you fly for that $100 hamburger — try upgrading to a lobster chowder. And to keep you safely out of the stock pot, remember the three ingredients needed to make a five-star instrument-rated pilot: qualification, currency, and proficiency.

**Paul Cianciolo is an associate editor and the social media lead for *FAA Safety Briefing*. He is a U.S. Air Force veteran and an auxiliary airman with Civil Air Patrol.**

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# Look Who's Reading *FAA Safety Briefing*

**When not breaking the sound barrier, NASA Research Test Pilot Nils Larson keeps current on general aviation safety.**