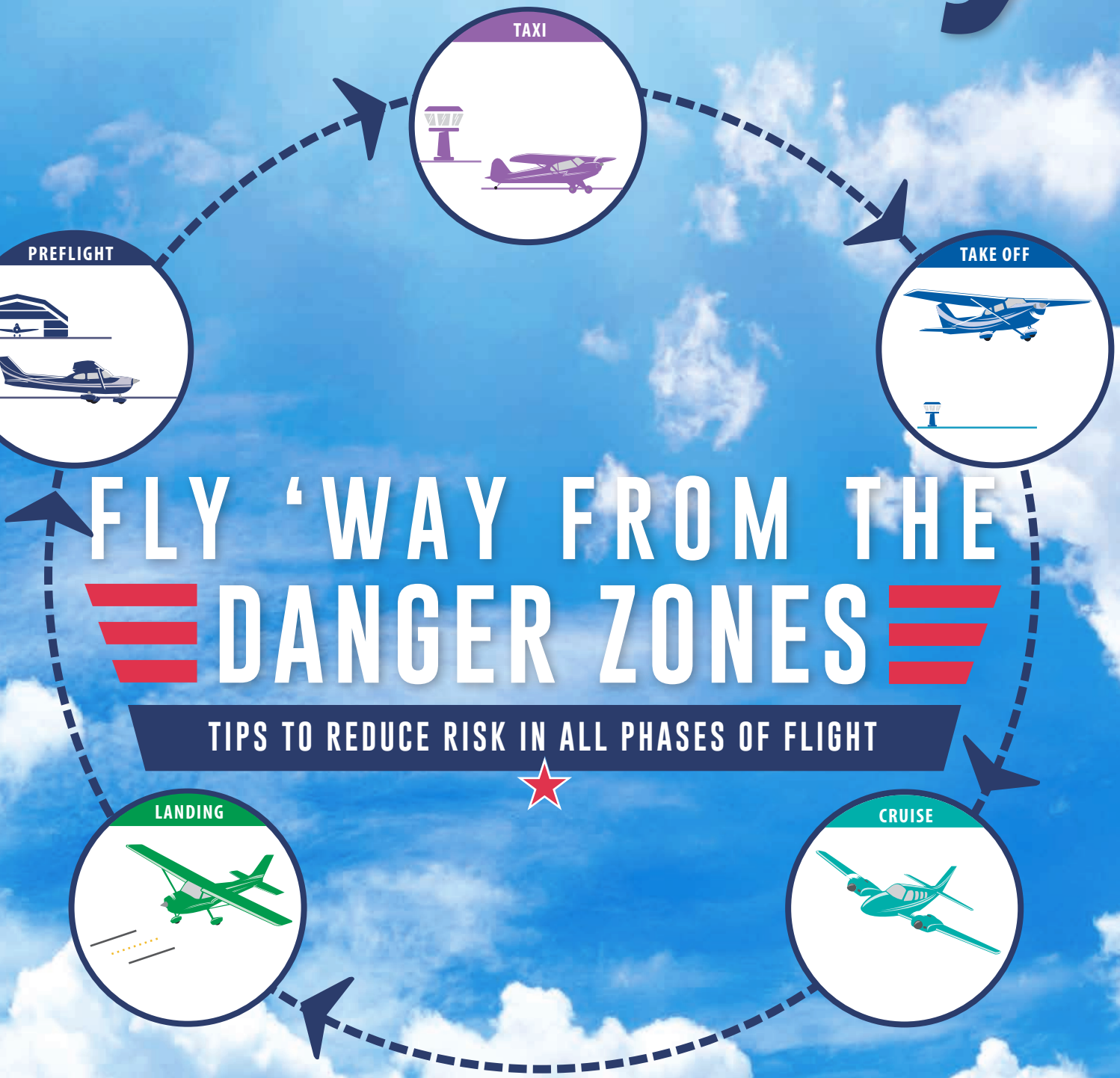
November/December 2022

FAA Safety BRIEFING



FLY 'WAY FROM THE DANGER ZONES

TIPS TO REDUCE RISK IN ALL PHASES OF FLIGHT

U.S. Department
of Transportation

**Federal Aviation
Administration**

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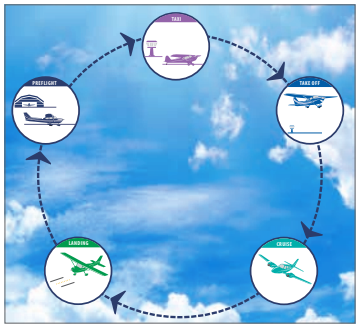
ABOUT THIS ISSUE...



The November /December 2022 issue of *FAA Safety Briefing* explores tips and best practices that help pilots find ways to avoid the "danger zones" where accidents can occur. Articles highlight system safety and risk management in the context of persistent accident factors during preflight; taxi; takeoff and departure; maneuvering flight; and approach and landing.

Contact Information
The magazine is available on the internet at:
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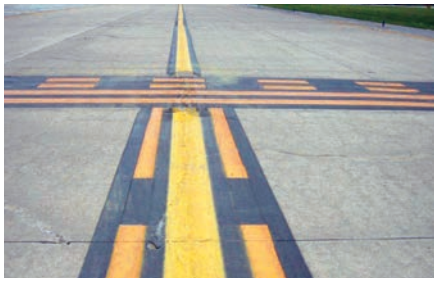
The FAA Safety Policy Voice of Non-commercial General Aviation



DEPARTMENTS

THE DANGER ZONE

It's likely that everyone who loves aviation has by now seen "Top Gun: Maverick," one of the hottest summer 2022 movies, along with the original "Top Gun" film. You're also likely familiar with the opening music, "The Danger Zone" by Kenny Loggins. As the first stanza goes:

Revvin' up your engine/Listen to her howlin' roar
Metal under tension/Beggin' you to touch and go
Highway to the Danger Zone/Ride into the Danger Zone

While riding into the Danger Zone is an inherent occupational hazard for military aviators, that's not the case for either commercial or general aviation. On the contrary, the FAA expects — in fact requires — those who fly in the civilian world for commercial purposes or personal pleasure and convenience to actively avoid the danger zone where accidents can occur.

Shovin' into (System Safety) Overdrive

In that connection, social media is full of lively debate about the "real" cause of GA accidents. Some threads focus on deficiencies in so-called stick-and-rudder skills and suggest — incorrectly — that the addition of

Photo courtesy of the U.S. Navy

> WHAT IS IMPORTANT IS A PRACTICAL UNDERSTANDING OF HOW TO USE SYSTEM SAFETY TO KEEP YOURSELF OUT OF THE AERIAL DANGER ZONE.

risk management to training curricula diverts attention from airplane handling skills. In fact, most accidents have multiple causes. That is why the FAA has focused so much on the concepts of system safety and the discipline of risk management. These terms and their formal definitions may sound abstract. But, as characters repeatedly assert in the slapstick "Airplane!" movie, "that's not important right now."

What is important is a practical understanding of how to use system safety to keep yourself out of the aerial Danger Zone. Think of it as the mortar needed to bind individual regulatory bricks together and build a sturdy barrier to accidents. GA flight operations clearly constitute a complex system with many variables:

- Pilots have different levels of knowledge, skill, experience, ability, and discipline.
- Procedures, such as instrument approaches, can be very complex.
- Equipment, including airframes and avionics, changes rapidly.
- Services, such as those provided by airports and air traffic control, can vary and are already changing as NextGen technologies are deployed in the National Airspace System.
- The flight environment, including weather, is a critical factor in the safety of every flight.
- External factors can have a substantial impact, especially if the pilot doesn't consciously recognize them.

Revvin' Up Risk Management

A key part of system safety approach is risk management, a decision-making process designed to methodically identify hazards, assess the degree of risk, and determine the best course of action. To make system safety and risk management practical for real-world GA operations, the FAA Safety Team (FAASTeam) advocates a simple three-step process:

1. *Perceive*, or identify, the possible hazards associated with each category in the well-known PAVE checklist: Pilot, Aircraft, enVironment, and External Pressures.
2. *Process*, or analyze, by evaluating the severity, probability, and/or exposure of the risk posed by the hazard(s) you identified in step one.
3. *Perform* by finding ways to eliminate or mitigate the severity, probability, and/or exposure of each of the identified hazards.

In this issue, the magazine team explores system safety and risk management in the context of persistent accident factors in various phases of flight: preflight; taxi; takeoff and departure; maneuvering flight; and approach and landing. Accidents in these areas all imply some degree of deficiency in the pilot's knowledge, skill, and risk management abilities. Even the world's best stick-and-rudder pilot is at risk if deficiencies in weather knowledge or risk management ability lead to inadvertent flight into IMC.

So, join us as this issue explores ways to "fly 'way from the Danger Zone!"

AVIATION NEWS ROUNDUP

Vertiport Design Standards Published

In September, the FAA released new design guidelines for vertiports, infrastructure that will support advanced air mobility (AAM) aircraft. The design standards will serve as the initial step to provide key information for airport owners, operators, and infrastructure developers to begin the development of facilities that will support operations of AAM aircraft that are electrically powered and take-off and land vertically.

These vertical takeoff and landing (VTOL) operations will transport passengers or cargo at lower altitudes in rural, urban, and suburban areas.

The design standards include critical information that designers and builders will need to follow to allow for safe takeoffs and landings. Some of those include safety-critical geometry and design elements; lighting, markings, and visual aids; charging and electric infrastructure; on-airport vertiports; and elevated vertiports.

This vertiport guidance will be used until performance-based vertiport design guidance is developed.

The final design standards are based on research conducted by the FAA, collaboration with industry partners, and feedback from the public. Download FAA Engineering Brief No. 105, Vertiport Design, at bit.ly/3fpJwS0.

Pilot-in-Command (PIC) Experience Rule Published

The FAA published a final rule to revise 14 CFR sections 61.159 and 121.436. Detailed information on the amendments can be found in the preamble to the final rule. The most significant changes include section 61.159 (a)(5), which permits, under certain conditions that military time acquired in powered-lift aircraft may now be used towards the 250 hours of airplane time as PIC, required for an air transport pilot airplane certificate; section 121.436 (c) broadens the provisions to allow for the military experience as a PIC in powered-lift aircraft to be credited towards the 1,000 hours of air carrier experience required to serve as PIC under part 121; and section 121.436 (d) permits part 121 PIC time accrued prior to July 31, 2013, to count towards the 1,000-hour air carrier experience requirement.

No associated guidance content was affected by this revision. Questions

#FLYSAFE GA SAFETY ENHANCEMENT TOPICS Please visit bit.ly/FlySafeMedium for more information on these and other topics.

NOVEMBER

Plan Continuation Bias/CFIT — exploring how human biases can compromise effective decision-making and lead to CFIT accidents.

DECEMBER

Aircraft Performance Calculation — best practices for determining and predicting aircraft performance.

on these regulatory changes can be directed to 9-AFS-200-Correspondence@faa.gov.

FAA Launches Interactive Fact Book

Did you know that aerospace community environmental efforts have saved nearly 500 million gallons of fuel since 2010? Or that Florida has the most certificated pilots in the United States with more than 75,000? Do you want to uncover more aviation facts? The most up-to-date facts, data, and visualizations are now available in the new online-interactive FAA Fact Book.

Data views and statistics covering air traffic, aircraft, airspace modernization, pilots and drone operators, lasers incidents, and unruly passengers are at your fingertips. A new section on sustainability has been added with information on efforts to make aviation cleaner, quieter, and more efficient.

Data will continue to be added and refined, with plans for additional visualizations to be added. You can view the FAA Fact Book at bit.ly/faa-fact-book.

New Course Launched for Conducting IFR Self-briefings

The FAA Safety Team launched a new online course (ALC-889: *Conducting Preflight Self-Briefings for IFR Pilots*) to provide instrument flight rules (IFR) guidance on how to conduct a safe and regulatory compliant preflight self-briefing using automated weather resources for student and IFR pilots.

The new course, developed by Flight Service, ensures pilots understand aviation weather basics and how to apply meteorological and aeronautical information in a systematic manner to plan a safe flight. It includes scenarios, real-life examples, videos, reference materials, and practice exercises for pilots to conduct on their own or with a CFII.

To receive appropriate WINGS course credit for this course, be sure you have an account on FAASafety.gov. Once you log in, you can enroll and complete the course at bit.ly/3qTzkUu.

SAIB Issued for All Aircraft Using ADS-B

Special Airworthiness Information Bulletin (SAIB) 2022-16 advises manufacturers and operators of an airworthiness concern about the lack of traffic conflict alerting or collision detection functionality for their Automatic Dependent Surveillance-Broadcast (ADS-B) In systems. Among the SAIB's recommendations is for manufacturers of ADS-B In systems to ensure their systems meet the performance requirements of TSO-C195b or a later revision, and include the ADS-B Traffic Advisory System application or equivalent traffic conflict alerting capability.

Read the SAIB at bit.ly/SAIB2022-16.

FAA Awards $2.7M in Drone Research

The FAA recently awarded $2.7 million to support research on how drones can assist in disaster preparedness and emergencies.

The research will explore the use of drones in providing effective and efficient responses to different natural and human-made disasters. It will address coordination procedures among drone operators from federal agencies as well as state and local disaster preparedness and emergency response organizations. The five universities are the University of Vermont, University of Alabama Huntsville, New Mexico State University, North Carolina State University, and Kansas State University.

This is the third round of Alliance for System Safety of UAS through Research Excellence (ASSURE) grants, which brings the total to 20 grants valued at $21 million for the fiscal year 2022.

The ASSURE Center of Excellence is one of six that the agency has established to help advance technology and educate the next generation of aviation professionals. Research conducted through ASSURE is focused on helping the drone community safely grow and integrate into the nation's airspace.

New Rotorcraft Video Posted

We should all understand the performance capabilities and respect the limitations of the aircraft we are flying. Watch this new video from The Rotorcraft Collective for steps to improve helicopter performance planning and power management at bit.ly/3BLk2pN.

"The Rotorcraft Collective" is a group of engineers, pilots, mechanics, accident investigators, and communication specialists from industry and the FAA who produce short safety videos packed with information on topics such as preflight inspections and passenger briefings, helicopter icing, and securing cargo. Produced by the FAA Safety Team (FAASTeam), this series is a collaborative effort between the FAASTeam, United States Helicopter Safety Team (USHST), Helicopter Association International (HAI), and the Helicopter Institute in Dallas.

MEDICAL FACTORS IN AVIATION MISHAPS

Fortunately, medical issues are not the cause of most aviation accidents. Nonetheless, even one is a tragedy. In this article, I will review some of the more common medical issues that have either caused or contributed to a fatal aviation accident.

You might be surprised to know that, by law, an autopsy is performed on occupants of all fatal civil aviation accidents, including passengers. This is usually accomplished by the local coroner's office with assistance from the National Transportation Safety Board (NTSB) and Civil Aviation Medical Institute (CAMI). The latter is part of the FAA's Office of Aerospace Medicine (OAM) and performs the toxicological evaluation of the remains, when feasible. You might wonder, though, why autopsies are required and what has been found.

> **THERE IS SIMPLY NO GOOD REASON TO FLY AFTER TAKING A SEDATING MEDICATION, ALCOHOL, OR AN ILLICIT DRUG.**

Several years ago, the OAM sponsored a study looking at fatal mishaps to evaluate for contributory medical issues (see the technical report at bit.ly/AM-18-8). The author reviewed data from both the NTSB and FAA for a 36 month period beginning in April 2013. In the report, he laid out the three primary reasons for a post-mortem evaluation: 1) to help determine the probable cause of the accident; 2) to help reconstruct the accident; and 3) for injury analysis in order to better protect aircraft occupants in future accidents.

The author then looked at the records of 601 pilots involved in a fatal accident between April 2013 and March 2016. Over 40% had incidental medical findings (IMFs), which are medical conditions not previously known by the FAA, but discovered on autopsy. The NTSB determined that for this group of pilots, the most common medical issues, that were either causal or contributory, were use of a sedating medication, followed by alcohol or illicit drug use, cardiovascular disease, neuropsychiatric problems, and strokes.

A separate study showed that of the impairing over-the-counter medications, diphenhydramine remains the most frequent culprit, found in almost 6% of the pilots who were involved in a fatal accident and for whom toxicology was available. Yet another study found that 15% of pilots in fatal accidents had controlled drugs and over 25% had potentially impairing drugs in their system; often these are taken for a medical condition that is itself impairing.

So what does this mean to you? First, the good news: the general aviation accident rate has steadily decreased over the past decade and the trend remains favorable. However, as a group, we pilots continue to make the same mistakes that lead to accidents. There is simply no good reason to fly after taking a sedating medication, alcohol, or an illicit drug. The attendant cognitive impairment will affect the planning process, go/no-go decision, and en route decisions. The ability to successfully handle an emergency is compromised. These problems are rare in airline and military pilots; both groups have strong safety cultures; we general aviation pilots should strive to emulate this.

What about cardiac disease, which is the most common cause of death in the adult population? With the right lifestyle changes and the proper medical management of risk factors, you can reduce the likelihood of medical incapacitation and extend the years that you are able to enjoy piloting an aircraft. These steps also make it easier to maintain medical certification and is safer for all whether flying under a medical certificate, BasicMed, sport pilot, glider, or ultralight.

Dr. Susan Northrup received a bachelor's degree in chemistry, a medical degree from The Ohio State University, and a master's degree in public health from the University of Texas. She is double board-certified by the American Board of Preventive Medicine in Aerospace Medicine and Occupational Medicine. She is a retired U.S. Air Force colonel and a former regional medical director for Delta Air Lines. She is also an active private pilot.

DR. PENNY GIOVANETTI, DIRECTOR OF AVIATION MEDICAL SPECIALTIES DIVISION

CORONARY HEART DISEASE

Although there have been steady improvements in prevention and treatment, coronary heart disease (CHD) remains the leading cause of adult death in the United States. CHD is also referred to as coronary artery disease (CAD) and involves plaque, a waxy substance that can build up inside coronary arteries. This build up is known as atherosclerosis and occurs over decades, beginning often in teenage years. This results in ischemia, a limitation in the supply of oxygenated blood to your heart muscle. As this blockage increases over time it can lead to complications like angina (chest pain), heart attack(s), abnormal rhythms, and heart failure.

Aeromedical Concerns

Here are some important concerns for pilots diagnosed with CAD. First, CAD can be silent; sometimes it can lead to a rapid occlusion of a coronary artery and the initial presentation is a heart attack. Second, even if you are asymptomatic on the ground, the decrease in oxygen at altitude could lead to ischemia and its complications. Third, stressful situations (e.g., inclement weather encounter, inflight emergencies, etc.) that increase your heart rate can further increase cardiac demand. Finally, carbon monoxide poisoning can exacerbate all of these risks.

While even mild symptoms create distractions from essential flying tasks, over twenty percent of deaths from cardiac disease occur suddenly and unexpectedly after rapid occlusion of a heart blood vessel by a clot. The risk of sudden cardiac death is greater in those who have cardiac disease. That is why it is so important to get symptoms evaluated early, to regularly monitor the disease once diagnosed, and to comply with recommended treatment.

Frequently Asked Questions

If I am diagnosed with CHD, can I ever fly again? Very likely, yes, especially if detected and treated early enough to preserve cardiac function. We look at many factors when deciding whether it is safe for an airman to continue to fly with CHD. These include how much plaque is present and where it is located. The key is whether all areas of the heart will receive an adequate blood supply even under stress. Various treatments such as medication, stenting, and bypass surgery may be necessary to improve blood supply.

If I have a heart attack, can I ever fly again? Once more, a "yes" is likely. We consider many factors. These include: how much heart muscle died and can the remaining muscle pump enough blood sufficient for demand; is the heart rhythm satisfactory; is there angina? We can accept an implanted pacemaker under most conditions, but not a defibrillator.

Can I fly under BasicMed? An airman with CHD who has required treatment or who has had a heart attack must receive a one-time special issuance from the FAA after each event in order to qualify for BasicMed.

How do I get a special issuance? Start with your Aviation Medical Examiner (AME) who can guide you through the process. You can also consult the AME Guide online. Select "disease protocols," then "coronary heart disease," for more detail about recovery times and follow-up documentation.

Who makes the decision about my special issuance? Depending on the specifics of your case, and what class of airman medical certificate you are requesting, the decision may be made by one of the aeromedical certification physicians with experience in cardiology or be referred to the Federal Air Surgeon Cardiology Panel. This panel consists of four to five board-certified cardiologists who will review your clinical information and test results with some of the aeromedical certification physicians and make a recommendation to the Federal Air Surgeon. Depending on the condition and your class of medical certificate, once you obtain a special issuance for your heart disease, your AME might be authorized to grant renewals.

An Ounce of Prevention

The best way to protect your flying status is to prevent CHD in the first place. A few simple steps can significantly reduce disease progression. If you smoke, stop today. Try to exercise for 30 minutes at least five days a week, but any exercise is beneficial. Shed excess weight and aim for a body mass index less than 28. Discuss with your doctor your best steps to lower lipids and blood pressure.

LEARN MORE

AME Guide
bit.ly/AMEguide

Photo courtesy of Textron Aviation.

How Do You Do?
Practical Ways to Practice Risk Management

By Susan K. Parson

In browsing the web last night, I stumbled upon what looks to be an endlessly fascinating collection of "how to" instructions. In a "How to Do Everything" piece that I quickly bookmarked for more leisurely exploration, *New York Times* writer Malia Wollan shares seven years of wisdom collected in her work on the paper's tip column. The author covers everything from the whimsical (e.g., "How to Fake a British Accent") to the practical ("How to Rescue a Cat from a Tree") to the philosophical ("How to Become Less Angry"). Given the just-passed summer season's scary headlines from several of the nation's popular beaches, those who like splashing in the surf might want to read "How to Survive a Shark Attack" before your next trip to the ocean. (*Note: For the full list of topics, see the Learn More section for a link to the article.*)

One topic I didn't find in Wollan's grid is "How to Manage Risk in Aviation." I therefore propose to take a few minutes to offer a short primer on that very subject.

Power + Responsibility

Many of us in the GA community find ourselves operating either as the sole occupant or at least the only pilot aboard the aircraft. Even if your passenger list includes another pilot, someone (you, for purposes of this discussion) has to be the legal pilot-in-command (PIC). FAA regulations (14 CFR section 91.3) clearly state that the PIC is "directly responsible for, and is the final authority as to, the operation" of the aircraft. This rule gives the PIC plenty of power, which comes with plenty of responsibility. The good news is that you also have plenty of resources to help you exercise your PIC power in a safe and responsible way.

The key is to master a skill that the FAA calls "single pilot resource management" (SRM). Let's start with a definition. The FAA *Risk Management Handbook* (FAA-H-8083-2) calls SRM the art of managing all the resources, both those onboard and those from outside sources, to ensure a successful flight. SRM is about gathering information, analyzing it, and making decisions. The pilot must be able to competently perform a number of mental tasks in addition to the physical task of basic aircraft control. These include:

- Situational awareness
- Task management
- Automation management
- Risk management
- Aeronautical decision-making (ADM)
- Controlled-flight-into-terrain (CFIT) awareness

The Risk Management Handbook also offers a very useful observation:

> *Learning how to identify problems, analyze the information, and make informed and timely decisions is not as straightforward as the training involved in learning specific maneuvers. Learning how to judge a situation and "how to think" in the endless variety of situations encountered while flying out in the "real world" is more difficult. There is no one right answer in ADM; rather each pilot is expected to analyze each situation in light*

of experience level, personal minimums, and current physical and mental readiness level, and make his or her own decision.

Now that is no small challenge, especially for GA pilots whose aeronautical experience may be limited. In many flights I have made in airplanes that lacked automation, solid training provided a firm foundation for task management and situational awareness. Looking back, though, I recognize that I would have been much safer with a structured approach for gathering and analyzing information for both preflight and en route decision making.

A Structured Approach

To apply the tenets of SRM in a structured way, the *Risk Management Handbook* suggests regular evaluation of: (1) *Plan*, (2) *Plane*, (3) *Pilot*, (4) *Passengers*, and (5) *Programming*. Let me hasten to assure you that the point of the 5P approach is not to memorize yet another aviation acronym. Instead, you might simply write these words on your kneeboard, or add a 5P reference to your checklist for key decision points during the flight. Items to consider include:

Plan: Basic elements of cross-country planning: weather, route, fuel, current publications, etc. Since any of these factors can change at any time, review and update the plan at regular intervals.

Plane: Onboard equipment constitutes an important resource. Today's technology offers an incredible range of information to assist with overall situational awareness, navigation, weather information, and much more. The key is to know what information is available and how to access it without diverting your attention from essential aircraft control duties. Be proficient with all installed equipment, and familiar with performance characteristics and limitations. Monitor systems and instruments in order to detect any abnormal indications at the earliest opportunity.

Pilot: The "IMSAFE" checklist is a handy tool for identifying hazards to your fitness for flight. You should also take the time to develop, and then periodically review/revise, a set of personal minimums tailored specifically to your own knowledge, skill, and experience. (*See Learn More for a link to tips on developing your own personal minimums.*)

Using all available resources is important in managing risk.

Photo by Civil Air Patrol Col. Jane Davies.

Having enough fuel to give you options is a good strategy.

Passengers: Passengers can be a great help by performing tasks such reading checklist items, watching for traffic, and listening for ATC radio calls. You might also teach regular passengers to assist with switching radio frequencies and basic programming for moving map and multifunction displays. Internal resources also include checklists and verbal briefings. Be mindful, though, that passenger needs — e.g., physiological discomfort, anxiety, or desire to reach the destination — can create potentially dangerous distractions.

Programming: Electronic displays, moving map navigators, and autopilots can reduce workload and increase situational awareness. However, be mindful that the task of programming or operating this equipment can create a dangerous distraction.

Is there another way? Of course! As the NYT writer's article implies, there is always more than one way to rescue a cat, build a treehouse, sing in tune, or whatever else you want to attempt. You may already have your own tried-and-true "how to" in this area, or you may be new to the idea with no established risk management method. Either way, please peruse the SRM description in the FAA *Risk Management Handbook* for potentially useful nuggets. Whatever SRM approach you choose, though, use it consistently and remember that solid SRM skills can significantly enhance the safety of "crew of you" flights.

Susan K. Parson (susan.parson@faa.gov) is editor of *FAA Safety Briefing* and a Special Assistant in the FAA's Flight Standards Service. She is a general aviation pilot and flight instructor.

LEARN MORE

"How to Do Everything" in August 26 *New York Times*
nyti.ms/3wGQ1pt (paid subscription required)

FAA Risk Management Handbook (FAA-H-8083-2)
bit.ly/2kuuDSn

FAA Safety Briefing, Sep/Oct 2019 (Checklist)
adobe.ly/2ZuWKnd

"Your Safety Reserve," *FAA Safety Briefing*, Mar/Apr 2015
bit.ly/FAASB_MarApr15

MAKING THE GRADE

My college French professor had a tough — well, brutal — approach to grading our French language compositions. She kept a copy of each marked-up weekly assignment and reviewed each new submission against the accumulating set. If you made a mistake she had corrected in a previous paper, or if the mistake involved a point of grammar or syntax previously covered in class, you lost a full letter grade for the error.

As you can imagine, this kind of bare-knuckled grading motivated students like me to be exquisitely careful with each assignment. I well remember the day when one of my bolder classmates asked our professor to explain the rationale for her method. Looking down with an expression I'd call disdainful surprise, she uttered something like, "Well! There are still so many mistakes you haven't made for the first time yet. I can't possibly allow you to repeat any!"

Lessons for a Longer Life

I have forgotten many of the things I heard in long-ago college classrooms, but clearly the tough grading scheme and its raison d'être have stuck with me. I've applied the "don't repeat mistakes" idea to many aspects of my life since college. That includes GA flying. But I have expanded the idea to include making every effort not just to avoid repeating my own aviation mistakes, but also those of others. Given that aviation mistakes can do a lot more damage than spoiling an academic grade point average, I've always thought that treating it as a lifelong lesson could help ensure a longer life.

If you are inclined to adapt a similar philosophy — and I hope you will! — there are now many resources to help you learn from the aeronautical mistakes of others.

"NASA" Forms

Commonly known to pilots and air traffic controllers as the "NASA Report," the Aviation Safety Reporting System (ASRS) is a voluntary safety reporting program funded by the FAA and administered by the National Aeronautics and Space Administration (NASA). It is a way to report hazards and safety concerns. Even before the FAA Compliance Program began in its current form, ASRS also gave users a way to report mistakes without fear of punishment. Incidentally, the popular "NASA Report" moniker arises from the fact that NASA, not the FAA, collects, analyzes, and responds to voluntarily submitted aviation safety incident reports and keeps them confidential.

You probably know about the sanctions relief benefit. As the ASRS website notes,

> *The FAA will not seek, and NASA will not release or make available to the FAA, any report filed with NASA under the ASRS or any other information that might reveal the identity of any party involved in an occurrence or incident reported under the ASRS.*

Now let's talk about other benefits. ASRS is essentially a living directory of invaluable information on all types of aviation safety data. It's free, it's confidential, and the database is available to the general public online. The database, along with the free monthly ASRS "Callback" newsletter, can be a major resource to help you avoid making mistakes that other pilots have "pioneered" in their own aviation activities.

> **ASRS LETS YOU GIVE BACK TO AVIATION BY SHARING YOUR OWN MISTAKES IN A NON-PUNITIVE ENVIRONMENT.**

ASRS also lets you give back to aviation by sharing your own mistakes in a non-punitive environment. In addition, anyone who uses the National Airspace System (NAS) can use ASRS to report any type of issue involving the safety of aviation operations. Just to name a few examples, you can use ASRS to report faded ground markings at an airport, an airport drone sighting, or a wake turbulence encounter.

The possibilities are endless. The key ingredient to success is making ASRS part of the "all available resources" you use in your own flying.

Susan K. Parson (susan.parson@faa.gov) is editor of *FAA Safety Briefing* and a Special Assistant in the FAA's Flight Standards Service. She is a general aviation pilot and flight instructor.

LEARN MORE

ASRS – Aviation Safety Reporting System
asrs.arc.nasa.gov

TIPS FOR PERFECT PREFLIGHT PREP

Why Better Preflight Preparation is Paramount to Safe Flight

By Paul Cianciolo

Inadequate preflight preparation is cited as a contributing factor in many general aviation accidents. Even something as simple as a loose fuel cap missed during a preflight inspection can cause chaos. That happened to a student pilot in 2011 during a Robinson R22 helicopter training flight. The fuel cap came off during an autorotation maneuver and sliced off part of the tail rotor. The aircraft ended up on its side, but at least the pilots escaped with minor bruises. Not all accidents have this kind of happy ending.

As the pilot-in-command (PIC), it's your responsibility to determine if the aircraft you are about to fly is airworthy and safe for flight. Knowing if you are fit for flight as the pilot is just as important. You can prepare yourself for better preflight performance with these recommended practices.

Make a Plan

Flight planning is the most important phase of any flight activity as it sets the stage for the entire flight. Review your planned route and look for any unique navigation equipment requirements that may be needed. Double check temporary flight restrictions (TFRs) and special use airspace along your route. Consider alternate plans if the weather bubbles up.

Once you know your aircraft's load of people and things, review the performance for that flight to make sure you are within the center of gravity limits. This gives you time to adjust and reposition if your weight and balance is not within limits. Make sure you are able to meet climb gradient and terrain restrictions based on your aircraft's performance capabilities.

Another potential pitfall is not considering task management. Are you flying alone or with another pilot? If you're flying with another pilot, it's important to be very clear about how you'll split tasks in the cockpit and the specific process and terms used for exchanging control of the aircraft (e.g., "You have the flight controls." "I have the flight controls.") before getting airborne. Read up on crew resource management (CRM) at bit.ly/FAA-CRM. Without clear communication from the very beginning, it won't be smooth sailing. If you are flying by yourself, read up on single-pilot resource management (SRM) at bit.ly/FAA-SRM.

Then there's you. In addition to the legal limits of your flight, consider your personal minimums too. Don't risk flying outside of what you are comfortable with. If the ceiling drops, how low will you go before diverting or landing? How well do you know how to interpret weather information and make operational decisions based on that?

Having weather information available is only part of the weather decision-making equation. Knowing how to acquire, interpret, and make operational decisions based on weather information is essential to safe flying. Read about available weather information sources and get guidance on making well-informed weather decisions at bit.ly/3xutBrZ. Also check out the Advisory Circular 91-92, *Pilot's Guide to a Preflight Briefing*, at bit.ly/3qQRAhh. It provides an educational roadmap for the development and implementation of preflight self-briefings, including planning, weather interpretation, and risk identification/mitigation skills. There are also two preflight self-briefing courses available at FAASafety.gov that earn WINGS credit. See the links in the Learn More section at the end.

Another great way to preflight your go/no-go decision is to score yourself and your flight using a flight risk assessment tool (FRAT) on an app or worksheet. The FAA Safety Team's (FAASTeam) GA-focused FRAT is available as an automated spreadsheet at bit.ly/FAASTeamFRAT. It's based on the PAVE checklist explained in the next section. A FRAT enables proactive hazard identification, is easy to use, and can visually depict risk. It is an invaluable tool in helping pilots enhance their aeronautical decision-making skills and should be a part of every flight.

Always Use Checklists

Preflight checklists are essential to a safe flight — use them. As mentioned above, a good FRAT is based on the mnemonic PAVE. By incorporating the PAVE checklist into preflight planning, you divide the risks of flight into four categories:

Pilot (adobe.ly/2ibKIH0)

Aircraft (adobe.ly/2iePJ4p)

en**V**ironment (adobe.ly/2hus9AX)

External Pressures (adobe.ly/2ioBgQs)

Dive deep into each category with the links above. You can also download and print a PAVE checklist at bit.ly/3qRBpjG.

Another mnemonic that expands on the *Pilot* in PAVE is the I'M SAFE checklist to determine your own fitness to fly.

Illness

Medication

Stress

Alcohol

Fatigue

Emotion/Eating

Several factors can affect your ability to fly safely. Something as common as an antihistamine can have an unintended consequence — in fact, sedating antihistamines are the most commonly detected medication in fatal accidents.

Using a checklist helps you make sure your preflight is complete.

Before your next flight, study up on avoiding adverse drug interactions at bit.ly/3BPxPwO. This may surprise you.

Once you are good to go, it's time to preflight your aircraft. That means the aircraft must be legally airworthy and in a condition for safe flight. To determine if you are airworthy, use the ARROW checklist mnemonic.

Airworthiness Certificate

Registration Certificate

Radio Station License (*international only*)

Operating Limitations

Weight and Balance

Read the first chapter of the FAA's *Plane Sense* handbook at bit.ly/3t6aq6l for more details about the ARROW checklist.

As a safety-minded pilot, make use of a preflight checklist. Never work from memory to ensure that you do not skip or misevaluate the items you are checking. Use the preflight checklist in the airplane flight manual (AFM) and/or pilot operating handbook (POH) as it contains operating procedures and limitations specific to that make and model aircraft. You can also add your own items to your preflight checklists — like items you have missed in the past or are something to watch, aftermarket safety equipment, any airframe modifications, ADS-B procedures, and any red flags from your mechanic. Watch this video about supplemental checklists for aftermarket safety equipment at youtu.be/6i8l7Nup5Hw.

Enhance Your Preflight Inspection

To better prepare for the preflight inspection, consider building a preflight kit. Ensure that you have the most current preflight checklist. Make sure you have a working flashlight that is not your cell phone light. Include any

special tools needed like a fuel sampler, step ladder, safety glasses, or a screwdriver.

Get-there-itis can also affect your preflight performance. That means don't rush your preflight inspection. Plan ahead and consider proper attire to allow adequate time for a thorough inspection in any conditions.

Enforce a preflight "no distraction" policy. Unnecessary conversations, eating and drinking, and using your electronic device can cause you to lose focus and miss a step. Consider leaving your cell phone in the cabin — not in your pocket — until your inspection is complete. If you do get interrupted, go back at least two steps or start from the beginning.

Another tip is to secure your headgear and any personal items sitting on the flight line so they don't cause a distraction if the wind decides to move them. If you wear a flight suit or jacket with zippered pockets, zip up so nothing falls out.

Ensure that all your tie-downs, covers, locking devices, and any ground handling equipment is removed and securely stowed. Taxiing with a towbar attached is not a good look.

When your feet are not on the ground, use caution even if there is a non-skid surface. Make sure to keep three points of contact with the aircraft or ladder when climbing up to inspect.

Use a trusted method to verify the fuel level and correct fuel type. Now that there is supplemental type certificate (STC) approved unleaded avgas alternatives, checking the fuel color is even more important. Don't use the aircraft fuel gauge as the sole measure of quantity. And always check that fuel caps are secure. Just re-read the first paragraph for a good reason why.

If there are rotor blades to check, verify that the blade-tip paths are clear of obstacles. Verbally announce that you are about to move a rotor blade so other people stay clear. Watch the video at youtu.be/GFc_NIgC_E0 for more about rotorcraft preflight.

Then, always do one final walk-around before hopping in your aircraft, taking a few steps back to see the how the entire aircraft looks. The pilot or trained crew member should always be the last person to board.

Conducting countless preflight inspections can lead to complacency because of its repetitious nature. Discipline yourself to detect subtle changes like a reversed safety wire, broken slippage marks, leaks, etc. If you have any doubt about a component's airworthiness, check with your mechanic.

Conduct an Advanced Preflight

If you just got your aircraft back from the shop, then conducting an advanced preflight after maintenance is essential. A significant number of fatal accidents could be avoided if pilots were to conduct a more thorough preflight inspection after a return to service. Read more about what it takes for an advanced preflight at bit.ly/3ANbi24. After maintenance, check systems thoroughly (e.g., flight controls move in the proper direction), or ask qualified maintenance personnel to help re-inspect the aircraft to ensure all systems are a go.

A good preflight may require ducking or contorting your body to complete every item.

Another kind of advanced preflight involves a deep dive into the aircraft's records. Download the FAASTeam's M-Pamphlet, *Advanced Preflight*, at bit.ly/3DF7xid for help on how to conduct a complete review of all maintenance-related data on your aircraft, the steps in extracting the valuable information from this data, and how to develop an additional items checklist to be used in conjunction with the aircraft's preflight checklist for all future preflight inspections.

One last tip is not to ignore service bulletins. Compliance with service bulletins may or may not be mandatory, but you should never ignore them when it comes to safety. Make it a best practice to read, or ask your mechanic to review, any service bulletin that the manufacturer issues for your aircraft. Go to bit.ly/3BzOcfw to learn more about service bulletins and their impact on your aircraft.

Rinse and Repeat

We talked about determining the airworthiness of your aircraft, preflight visual inspections, managing risk, and the use of checklists. As the pilot, it's your responsibility to make sure you and your aircraft are in a safe condition to fly. You are now ready for a perfect preflight prep.

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.

LEARN MORE

Advisory Circular 91-92, *Pilot's Guide to a Preflight Briefing*
bit.ly/3qQRAhh

Airplane Flying Handbook (Chapter 2)
bit.ly/FAA-AH

WINGS Course ALC-683, *Conducting Preflight Self-Briefings for Student and VFR Pilots)*
bit.ly/3f94S6g

WINGS Course ALC-889, *Conducting Preflight Self-Briefings for IFR Pilots*
bit.ly/3qTzkUu

TOP SIX TAXI TIPS

How to Improve Your Ground Game

By Tom Hoffmann

As a student pilot trainee at Long Island's Mac Arthur Airport (ISP) in Islip, NY, my introduction to navigating around an airport was eye-opening to say the least. Besides reviewing my newly purchased Cessna 152 manual in the early days of my training, I was also instructed to become thoroughly familiar with the KISP airport diagram. The task seemed manageable, but on my first few flights I was more intent on listening for my call sign and straddling the yellow taxi line than trying to decipher the array of multi-colored lines, letters, and numbers all clamoring for my attention.

Thankfully my instructor did what good instructors do: he spent time helping me make sense of the airport's sprawling expanse of taxiways, runways, and ramp areas. With four runways and air carrier jets taxiing to and fro, I quickly learned that KISP was no place to wind up somewhere you weren't supposed to be.

Despite that initial intimidation, I soon felt comfortable taxiing my way safely around the airport and was glad I invested extra time to learn the ins and outs of airport sign language. However, as I have learned after several periods of inactivity, keeping yourself up to snuff on airport signage shouldn't be limited to just your primary flight training days. With an average of three runway incursions (RI) each day in the United States, along with the occasional change to taxi clearances and airport markings, it's always a good idea to regularly review airport surface operations and regard them with the same importance as any other phase of flight. With that in mind, I've assembled a list of tips that can help improve your ground game.

1. Expect the Unexpected

With the excitement of the destination in your head, the chatter of anxious passengers, and the ubiquitous changes that crop up, it's understandable that pilots can become distracted and sometimes complacent during taxi. Throw in an unexpected taxi clearance, some marginal weather, and/or a heavy amount of aircraft activity, and you've got a recipe for a potentially deadly runway incursion on your hands.

Take for example the following pilot deviation report, which shows just how close a disoriented Cessna came from being an accident statistic:

> *A Cessna 172 pilot was issued taxi instructions to Runway 35 via Taxiway Alpha which was read back correctly. The C172 taxied off the ramp, failed to make the turn southbound on Alpha, and taxied instead across Alpha. The Cessna then crossed the hold short line on Taxiway Delta for Runway 35 and came in conflict with*

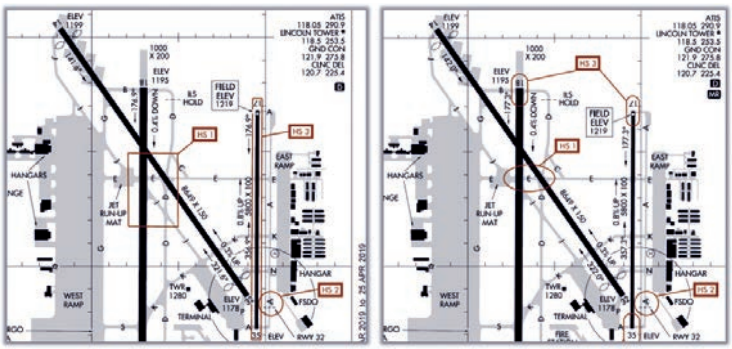
another Cessna coming in for a touch and go on the same runway. In this case, the closest horizontal separation reported was less than 100 feet.

The good news is that by preparing (study the airport diagram before you taxi!), leveraging the technology at your disposal (moving map displays), and having a solid understanding of airport signage, you can significantly mitigate the risk in these types of situations — even at airports with more taxiways than letters in the alphabet. Although it may seem like there are an infinite number of differences between airports, you'll find that markings, signage, and lights are similar and standardized, and used even more consistently than the road signs you might see on your drive to the airport. Don't assume you know all there is to know about signage and markings. You'd be surprised to learn how a clear majority of RIs are caused by a simple mistake with the basics of airport navigation.

2. Don't Get Burned at Airport Hot Spots

An airport surface hot spot is a location on an airport movement area with a history or potential risk of collision or runway incursion where heightened attention by pilots and ground vehicle drivers is necessary. Hot spots are generally found at areas with confusing or complex geometry (e.g., an intersection with multiple runways and taxiways). It's vital to check the airport diagram and know where the hot spots are before you go to any airport — even if you have been there before. Thanks to recent efforts by the FAA's Runway Safety Group, identifying and distinguishing different types of hot spots just became much easier with new standardized symbology (bit.ly/2JP6SeT). The FAA now uses three shapes with two distinct meanings: a circle or ellipse for ground movement hot spots and a cylinder for wrong surface hot spots. Watch this video for an overview on the hot spot changes: youtu.be/XllmW78wFls. Also check out the video series here (bit.ly/FTFD-complex) that covers seven airfield geometry configurations that could result in a runway incursion.

PREVIOUS CURRENT



An example of the changes to Airport Hot Spots on the Airport Diagram chart. A circle or ellipse indicates ground movement hot spots and a cylinder indicates wrong surface hot spots.

3. Wrong Surface Events Happen More Often Than You Think

It can happen to the best of us. After a long taxi at a bustling and somewhat unfamiliar airport, it is not uncommon to find yourself at both a literal and figurative fork in the road before takeoff. "Is that my runway?" you mumble to yourself as you gaze at what appears to be a dizzying display of airfield location, instruction, and direction signs. It doesn't help that you're expecting an intersection takeoff and that you've got a long line of eager aircraft right behind you and looming in the pattern. Unfortunately, this type of scenario that leads to a wrong surface event is more common than you might think. In fiscal year 2021, there were 70 attempted wrong surface departures reported. A vast majority of these situations occurred with general aviation pilots during daytime visual meteorological conditions.

The risks associated with a wrong surface or wrong direction takeoff are serious. The surface you mistakenly use could be closed, under repair, or damaged, or it may not be long enough to use for a safe takeoff. You also run the risk of colliding with other aircraft or vehicles approved to operate on that surface, be it a runway or taxiway. Thankfully, there are several red flags that if caught in time, can help you avoid being on the wrong surface at the wrong time.

As we stated earlier, be aware of any complex geometry or hot spots at your airport. Pilots used to a single runway, non-towered environment can be in for a rude awakening at a larger airfield, with multiple taxiway and runway intersections. Be sure to also listen to ATIS for more than just wind and altimeter setting. You could be missing out on crucial construction notices, runway closures, or runway misalignment warnings.

Another easy way to avoid a wrong surface takeoff is set the heading bug on your heading indicator to the assigned runway heading before you taxi and verify the aircraft is heading this direction when lined up on the runway. Use your magnetic compass to crosscheck the correct heading. Finally, practice active listening and eliminate all distractions in the cockpit. Don't let expectation bias (what you think the taxi clearance will be) influence your actions.

For some good tips on avoiding a wrong surface takeoff, check out this From the Flight Deck video (bit.ly/3UjMxmX) or view the scenarios at faarunwaysafetysimulator.com.

4. When in Doubt, Give ATC a Shout

While it might involve swallowing a bit of pride, if you are ever in doubt as to your position on the airport or your taxi clearance, don't be afraid to stop where you are and ask the tower for help and/or progressive taxi instructions. And if you receive an instruction from ATC that you're uncomfortable with or are unable to comply with, simply state "unable." ATC can and will help you in both cases.

Better to hold short and ask if you are unsure of your clearance.

5. Don't Cross the Line!

Literally, don't cross the line. The hold short line that is — unless you've been specifically cleared to do so. Actually, there are several types of hold short position markings you may encounter while taxiing, all of which deserve careful attention. The first is a taxiway holding position marking, which is a single-dashed yellow line, usually found before the intersection of another taxiway. ATC may direct you to hold short here depending on the amount of traffic at your airport. The second is the holding position markings for Instrument Landing System (ILS) critical areas which resemble a horizontal ladder and span the width of the taxiway.

Then there is the runway holding position marking, which is by far one of the most critical markings on the airport. Sadly, however, it is also one of the most misunderstood and/or overlooked markings as indicated by their mention in hundreds of runway incursion reports each year.

To review, a runway holding position marker is a combination of four yellow lines, two solid and two dashed (see photo above). The dashed lines face the runway while the solid lines are on the taxiway side. When approaching the runway, do not cross the runway holding position marking without ATC clearance at a controlled airport, or without making sure of adequate separation from other aircraft at uncontrolled airports. A helpful memory aid is to "stop for solid, dash through the dashes."

To further alert pilots when approaching a runway holding position marking, all Part 139 airports now use enhanced taxiway centerlines. These enhanced taxiway lines are dashed lines on either side of the centerline 150 feet from the holding position marking. You may also see surface painted holding position markings with a red background and white inscription. These markings are designed to supplement the signs at a holding position and are usually found where the holding position on the taxiway is greater than 200 feet.

6. Be Cool, Stay in School

There are tons of helpful resources available to pilots that can help you keep your taxi and airport navigation skills sharp. Here's a breakdown of some of the ones you might find most useful.

Videos:

- Without a doubt, the FAA's From the Flight Deck video series has some of the most impactful and engaging runway safety content and is definitely worth viewing. The agency recently posted its 100th video of the series which uses cockpit mounted cameras to capture runway and taxiway footage of hot spots and safety sensitive areas around the nation. To watch, go to faa.gov/go/fromtheflightdeck. Many of the videos also cover more general aviation safety challenges a pilot may encounter.

Websites:

ATC can be an ally to avoid taxi incidents. When in doubt, ask.

- The FAA's Runway Safety page is the best place to start faa.gov/airports/runway_safety. It has links to the airport diagrams database, the list of hot spots, airport construction notices, and a host of runway safety resources.
- FAASafety.gov has several runway safety related notices, listings of live seminars around the country, and online courses you can get WINGS credit for (e.g., Tarmac Tales – ALC-670)
- AOPA also offers a host of videos, courses and videos on its runway safety page at bit.ly/3LmjXND.

Handbooks/Guidance/Publications:

- This publication's March/April 2021 issue (bit.ly/FAASB-MarApr21) covered runway safety exclusively and provides a "road map" to the various tools, resources, and strategies airmen can use to steer clear of risk during the ramp-to-runway segment of their journey.
- Chapter 14 of the FAA's *Pilot Handbook of Aeronautical Knowledge (PHAK)* covers runway safety and runway incursion avoidance techniques: bit.ly/PHAKchp14
- A helpful list of runway safety reference documents, including flash cards and airport marking/signage documents: faa.gov/airports/runway_safety/publications
- FAA SAFO 17010, *Incorrect Airport Surface Approaches and Landings:* bit.ly/SAFO17010 (PDF)
- NTSB Safety Alert 033, *Landing at the Wrong Airport:* bit.ly/NTSB-SA33 (PDF)
- AC 91-73B, *Parts 91 and 135 Single Pilot, Flight School Procedures During Taxi Operations:* bit.ly/AC91-73B

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Don't Try This ~~at Home~~ on the Runway

COMMON TAKE OFF AND DEPARTURE ERRORS

By James Williams

We've all seen the quote: "Aviation in itself is not inherently dangerous. But to an even greater degree than the sea, it is terribly unforgiving of any carelessness, incapacity or neglect." Captain A.G. Lamplugh said that in the early days of aviation, and despite our massive technological advancement in the near century since, it still holds true. Aviation has become safer, but that unforgiving nature is still a constant threat.

Takeoffs and departures tend to be an underappreciated area of risk. We focus a lot of energy on taxiing (because of the potential of runway incursions) and approach/landing because those are the most common types of accidents. But takeoff accidents are the second most common, with 115 reported in 2019, according to the latest Joseph T. Nall report.

Takeoff carries with it some unique safety risks and opportunities. Once we have decided that a takeoff is in order, the errors we experience tend to fall broadly into three categories: planning/decision-making, management/attention, and technique errors.

Planning to Fail

The most obvious planning and decision error is not properly calculating, or not calculating at all, the takeoff performance data. This is particularly surprising given the proliferation of easy-to-use apps and programs that can provide a detailed performance calculation with just a few simple clicks or taps. If you prefer crunching the numbers by hand, by all means, do so. But there's no excuse for skipping performance calculations. It seems simple: regularly computing your takeoff data can help you avoid missing a critical factor that might make your no-problem departure into a nail-biter or worse.

These factors might include items like density altitude or unfavorable winds, just to name a couple. It's not uncommon to hear pilots talk about choosing to take off with a tailwind simply because they don't want to taxi to the other end of the airport so as to save time (and money). Some assume that a since a headwind will slightly reduce your takeoff run, a tailwind would only have a slight increase in takeoff distance. But a tailwind takeoff is much worse. In the case of a Cessna 172, it's actually four and a half times worse. While takeoff distances are decreased by 10% for every nine knots of headwind, they are increased by 10% for every two knots of tailwind. So even a few knots of tailwind make for a significant reduction in performance and a much longer takeoff. But if you don't calculate it, you won't know that.

Scanner Error

Errors also arise from aircraft management and attention. During takeoff, our focus should be mainly outside the cockpit, but don't exclude cockpit instruments entirely. We should be making sure all the information is in alignment. Does what you're seeing and hearing outside match what your instruments are saying? Specifically, does your airspeed indicator match what you see through the windshield? Does your engine sound, feel, smell, and look to be operating normally according to your instruments and other info? If you see something a bit off, you can either abort or alter your post-lift-off itinerary depending on the

anomaly. Managing the aircraft and your attention to it is a balancing act, so working up a good scan for takeoff is worth the practice. That's because you also need to ensure that your runway environment is clear and stays that way.

Do Try This at Home?

Experience can be a harsh teacher. But when dealing with technique, it can be hard to learn without actually doing. It's one thing to know, academically, that when I push the throttle forward for departure, I'm going to have a left turning force that I have to counter with right rudder. It's another thing to know exactly how much right rudder correction to apply in real life.

To do some learning from experience without risking bending metal or breaking bones, I fired up a PC simulator and made a bunch of mistakes. I mean, I made a ton of errors. I even made a list to ensure I covered most of the common takeoff errors. The biggest takeaway for me from all of these screw-ups was how much they tended to compound — a result that can lead to a classic snowball debacle where you're "chasing the needle" in an attempt to regain control. This was especially true of the left-turning tendency. Rudder errors often led to swerving back and forth across the runway. It was even worse with a sharp throttle movement that felt at times like it verged on unrecoverable even on a wide airline-sized runway. Seeing how much smooth throttle and rudder application helped with taming this issue was a great use of simulation.

Pitch and speed errors didn't feel as immediately sketchy as rudder errors, but they have a special place in my memory as it was an area I struggled with early in my training. I had a bit of experience in one type of airplane before my formal training started, so my first instructor told me to "just pull back a little and let the plane fly off." I did precisely that, at least in my estimation. My prior experience gave me an incorrect impression of what just a little pullback on the elevator meant in our training aircraft. Not using a proper attitude for takeoff makes for a longer, and possibly unstable ground roll. Of course, the opposite is true as well. Over-controlling the elevator, especially shortly after liftoff, can create another "chase the needle situation," this time in the vertical plane and with the risk of a stall.

Then there are wind correction errors. We've already touched on tailwinds, best handled by planning. But crosswinds are generally a fact of life. You can plan to minimize them, but you must correct for them while on the takeoff run and initial climb. Even if you don't have too much trouble getting off the ground, you will find yourself getting blown into areas your fellow pilots and ATC don't expect you to occupy. This, in turn, can cause conflicts with other aircraft or potential obstacles that

Takeoff attitude can be critical, especially when dealing with obstacle clearance.

wouldn't be a problem if you were on course. It could happen at my old training airport, where they could run two GA patterns that required airplanes on the smaller runway, which was the one we preferred, to turn crosswind as soon as possible to give them more margin. If you were getting shoved north by the wind, it would be possible to create a potential conflict.

> **It seems simple, but regularly computing your takeoff data can help you avoid missing a critical factor that might make your no-problem departure into a nail-biter or worse.**

That's why training in a "safe" environment is a great way to build experience while limiting or eliminating risk. Whether it's through simulation or real-world flying with a good instructor, putting in the practice is essential. Doing a few practice performance calculations in your downtime is a great way to build proficiency with whatever tool you use and gives you a chance to practice your go/no-go decision-making and risk mitigations. That practice will make the calculations on an actual flight quicker and easier. If you have access to some kind of simulator, they are a great way to practice skills to the point of failure and in whatever condition you want. This lets you practice in "hard mode" so that, hopefully, real life is easy.

The biggest thing is to avoid letting problems snowball. Practicing shows you how these errors can blend into each other and worsen a bad situation. Learning how to intervene early and with the correct amount of force can help to stop that snowball before it becomes an avalanche.

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

LEARN MORE

FAA *Airplane Flying Handbook*, Chapter 6: Takeoffs and Departure Climbs
bit.ly/AFHChap6

Going Up? Taking Control of Your Takeoffs, *FAA Safety Briefing*, March April 2016, p. 14:
bit.ly/FAASB-MarApr16

Runway conditions can affect your takeoff performance.

SHINY SIDE UP!

Photo courtesy of Textron Aviation.

Avoiding Loss of Control

By Susan K. Parson

Goose: "No. No, Mav, this is not a good idea."

Maverick: "Sorry Goose, but it's time to buzz the tower."

Ever been tempted to do something "daring" (read: "stupid") in an airplane? If so, a little voice in your head, much like the Mother Goose character in the original "Top Gun" movie, may have guessed what you were thinking and urgently issued a "don't do it!" warning. A wise pilot would have listened and stood down. A wise guy pilot like the Maverick character would brush off the warning and barrel ahead, risking a lot more damage than the tower chief's spilled coffee.

Impromptu stunts (aka "stupid pilot tricks") are among the ways that some pilots find themselves in a loss of control (LOC) situation during phases of flight that should carry less risk. If you are among the many pilots who shun such behavior, great. But you can still be at risk, because a far more common way to lose control in cruise flight is continued VFR into IMC.

Loss of control in flight (LOC-I) persists as the leading cause of fatal GA accidents in the United States and commercial aviation worldwide. Preventing LOC-I in GA has thus been one of the "most wanted" items on the National Transportation Safety Board's (NTSB) Most Wanted List of Safety Improvements.

If you need a definition, check out the FAA's *Airplane Flying Handbook*. It defines LOC-I as "a significant deviation of an aircraft from the intended flightpath [that] often results from an airplane upset." It observes that maneuvering is the most common phase of flight for general aviation LOC-I accidents to occur, while cautioning that LOC-I accidents can — and do — occur in all phases of flight. The handbook appears to state the obvious when it notes that preventing loss of control is the pilot's most fundamental responsibility; after all, what could be more important? With all the authority that the regulations (i.e., 14 CFR section 91.3) confer to the pilot in command (PIC), the expectation is that as PIC, you are fully in control of your aircraft.

The unfortunate reality is rather different. Far too often, performing maneuvers that should be well within the capabilities of a certificated pilot melts pilot mettle and aircraft metal.

Signal to Noise

When it comes to ideas on how to reduce or eliminate LOC-I, pretty much everyone agrees that appropriate training is a critical piece of the answer. There is also broad agreement that, as the FAA states in the *Airplane Flying Handbook*:

> *To prevent LOC-I accidents, it is important for pilots to recognize and maintain a heightened awareness of situations that increase the risk of loss of control. Those situations include: uncoordinated flight, equipment malfunctions, pilot complacency, distraction, turbulence, and poor risk management — like attempting to fly in instrument meteorological conditions (IMC) when the pilot is not qualified or proficient. […] To maintain aircraft control when faced with these or other contributing factors, the pilot must be aware of situations where LOC-I can occur, recognize when an airplane is approaching a stall, has stalled, or is in an upset condition, and understand and execute the correct procedures to recover the aircraft.*

There is less agreement when it comes to the question of how to ensure that pilots actually get the appropriate training.

As you may know from debate in recent years, the FAA maintains that there is a difference between the larger universe of what is required for training, and the subset that constitutes what is appropriate for "checking" — more colloquially known as testing. Until June 2016, the testing standard (formerly the Practical Test Standards, or PTS; now the Airman Certification Standards, or ACS) for the slow flight and stalls area of operation framed the slow flight task to require flight at an airspeed at which any further increase in angle of attack would result in a stall. This construct required an applicant to perform the "slow flight" maneuver with the stall warning activated. Many of us who were certificated in those days can remember having gritted teeth and a white-knuckled grip while the stall horn blared incessantly.

With the release of the first private pilot – airplane ACS in June 2016, the FAA revised the slow flight evaluation standard to reflect maneuvering without a stall warning (e.g., aircraft buffet, stall horn, etc.). The agency explained this change in Safety Alert for Operators (SAFO) 16010 as one approach to addressing LOC-I accidents in general aviation, noting that the previous inclusion of a maneuver that required intentional disregard of the stall warning activated is neither desirable nor intended. Rather, the point of the slow flight task is to assess the applicant's ability to operate safely at the low airspeeds and at high angles of attack used during the takeoff/departure and approach/landing phases of normal flight. As revised, the slow flight task verifies that the applicant has learned airplane cues in that flight condition, how to smoothly manage coordinated flight control inputs, and the progressive signals that a stall may be imminent if there is further deviation from this condition.

Loss of control in flight (LOC-I) persists as the leading cause of fatal GA accidents in the United States and commercial aviation worldwide.

Not everyone was on board. One of the primary concerns was that removing the requirement to test an applicant at what pilots like me learned as "minimum controllable airspeed," or MCA, meant that instructors would not bother to ensure that pilots are still trained and proficient at maneuvering near the critical angle of attack (AOA) — or, just as important, understand what happens beyond the stall warning.

Train As You Fly

In addressing this concern, the FAA asserted in SAFO 16010 (since replaced by SAFO 17009) that a pilot is still expected to "know and understand the aerodynamics behind how the airplane performs from the time the stall warning is activated to reaching a full stall." To ensure that at least some aspect of "checking" would drive specific training in this area, the agency revised the evaluation standards in the June 2017 editions of the ACS for the private pilot - airplane and the commercial pilot - airplane certificates.

With the primary focus on understanding aerodynamics associated with flying slow in different phases of flight, there is now only one knowledge element for slow flight available for evaluators to select for the practical test. The FAA refined and consolidated the risk management elements. In the skill task section of the slow flight task, the current phrasing requires an applicant to "establish and maintain an airspeed at which any further increase in angle of attack, increase in load factor, or reduction in power, would result in a stall warning (e.g., aircraft buffet, stall horn, etc.)."

The "MCA" task element never disappeared from the practical test requirements — after all, it is not possible to perform a full stall task required on the private pilot - airplane practical test without first passing through that flight condition. Still, to more clearly convey the expectation for evaluation of an applicant's ability to recognize the indications of impending and full stalls, the FAA added a

requirement for the applicant to "acknowledge cues of the impending stall and then recover promptly after a full stall has occurred."

Here's a practical, real-world way to think about the rationale for this approach to the slow flight and stall tasks:

- Slow flight — that is, flight at the airspeeds and configurations used in the takeoff/departure and approach/landing phases of flight — is a normal operation that should not be performed with continuous activation of the stall warning.
- Except in the case of a thoroughly briefed full stall maneuver, a pilot should always treat the stall warning as an "abnormal" situation, and promptly perform the stall recovery procedure.
- A pilot should always treat an unbriefed/unintentional full stall as an emergency and execute a prompt and correct stall recovery.

You have probably heard the cliché that one definition of insanity is doing the same thing over and over again while (somehow) expecting different results. The aviation community was not making headway against LOC-I by testing pilots in a way that encouraged, indeed *required*, intentional disregard of the stall warning. Accordingly, it only made sense to try a new approach.

If you're wondering how discussion of evaluation standards applies to you, it helps to remember that a good pilot is always learning and training. Make every flight count! If you are heading out to fly with no particular destination or purpose in mind, make it your purpose to practice maneuvers that will sharpen your ability to maintain aircraft control in all phases of flight. Review the applicable ACS and aim to meet the same tolerances you'd expect to achieve with a designated pilot examiner in the right seat. If you don't feel comfortable practicing a particular ACS maneuver, hire an instructor to help you scrape off the rust. It will be worth every penny you spend, and it will help you confidently keep your aircraft under control in all phases of flight.

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LEARN MORE

FAA *Airplane Flying Handbook* (FAA-H-8083-3B)
bit.ly/2lYzSoN

FAA SAFO 17009 – *Airman Certification Standards (ACS): Slow Flight and Stalls*
bit.ly/2KtjDNk

IT'S ALL IN YOUR APPROACH

Top Tips to Fine Tune a Final Approach and Landing

By Tom Hoffmann

You're almost there. On your culinary quest for the perfect midday meal, you successfully navigated a non-routine taxi clearance, nailed a perfect takeoff, and enjoyed an exciting and happily uneventful cruise portion of your flight. The only thing left is to fulfill that inevitable Newtonian principle: what goes up, must come down — smoothly and hopefully in one piece. So before you sink your teeth into that juicy airport diner cheeseburger deluxe, you must carefully set the table for a successful landing. Let's take a look at some ways to fine tune your approach and get you on your way to culinary bliss — or whatever other happy diversion might bring you to your destination.

Maintain a Stabilized Approach

Have you heard these words before? Well, it's not just a buzz term in aviation safety. It's a critical lifesaving way to approach every flight since most landing accidents are caused by — you guessed it — an unstabilized approach. The General Aviation Joint Safety Committee also found cause to highlight the importance of this subject in its list of safety enhancements (SE) that are designed to prevent or mitigate leading accident causal factors. After an extensive review of accident data, the committee's Loss of Control Working Group developed an SE (gajsc.org/safety-enhancements) focused squarely on promoting and emphasizing the use of a stabilized approach and landing.

So what exactly is a stabilized approach? A pilot is flying a stabilized approach when they establish and maintain a constant angle glidepath towards a predetermined point on the landing runway. Every runway is unique, but a commonly referenced optimum glidepath follows a 3:1 principle or descent ratio. This means that for every 3 nautical miles (nm) flown over the ground, the aircraft should descend 1,000 feet, simulating a 3-degree glideslope.

3:1 — Keeping the Odds of Safety in Your Favor

Further evidence of how important a proper descent ratio is during approach was revealed during a high-energy approach analysis performed by the Aviation Safety Information Analysis and Sharing (ASIAS) program, a collaborative government and industry initiative. The study compared actual stable and unstable approaches of business aviation operators to the common 3:1 descent ratio from four distinct distances from the runway: 20, 15, 10 and 5 nautical miles from touchdown. Flights that were above the 3:1 descent ratio, and not stable, often had high rates of descent and high approach speeds. The analysis showed that when a flight is above the optimum 3:1 descent ratio (even at 20 nautical miles from touchdown), the approach is more at risk of being unstable when closer to the runway (i.e., 500 feet to 1000 feet height above touchdown). In fact, the study showed that chances of being unstable can double as you increasingly fly above a 3:1 flight path profile (see figure 1).

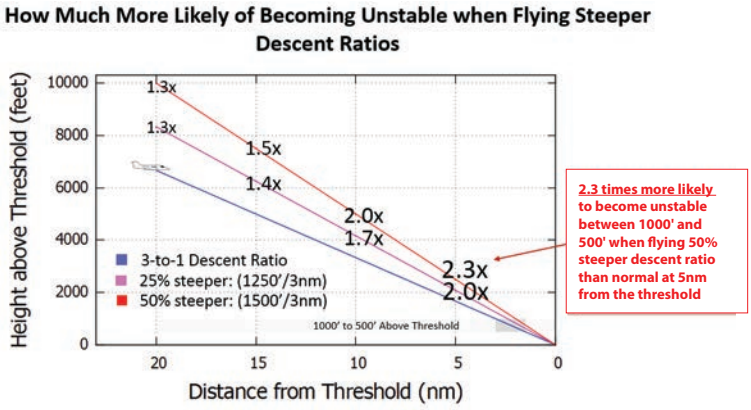


Figure 1

To help you stay on a 3:1 glidepath, estimate your descent rate by multiplying your groundspeed in knots by five (e.g., 90 knots x 5 = 450 feet per minute descent rate). Or halve your airspeed and add a zero at the end (e.g., 100 knots / 2 (+ 0) = 500). To determine your appropriate altitude for a 3-degree approach on final, multiply your distance from the runway by three, add two zeroes, and add the touchdown zone elevation. For example, if you're three miles out with a touchdown zone elevation of 100 feet, your calculation would be: 3 (miles) x 3 = 900 + 100 = 1,000 feet). This will help you cross the runway threshold at 50 feet and hold your aiming point for the flare. You can also use a visual approach system such as a VASI or PAPI, or a precision instrument approach to help maintain a proper glidepath.

The Need for Speed

Of course airspeed plays an important role with a stabilized approach and landing too. Pilots should be familiar with the appropriate pitch and power settings required to execute different types of descents. The key to maintaining balance and order during descent is recognizing the need to offset surplus thrust — caused by the reduction in lift and induced drag — by decreasing power.

Having accurate control of both descent angle and airspeed will allow pilots to achieve the objective of a stabilized approach, which is reaching a desired touchdown point (ideally the center of the first third of the runway) with a minimum of floating before touching down. On approach, power and pitch attitude are adjusted simultaneously as necessary to control the airspeed and the descent angle, or to attain the desired altitudes along the approach path.

If the approach is too high, lower the nose and reduce the power. When the approach is too low, add power and raise the nose.

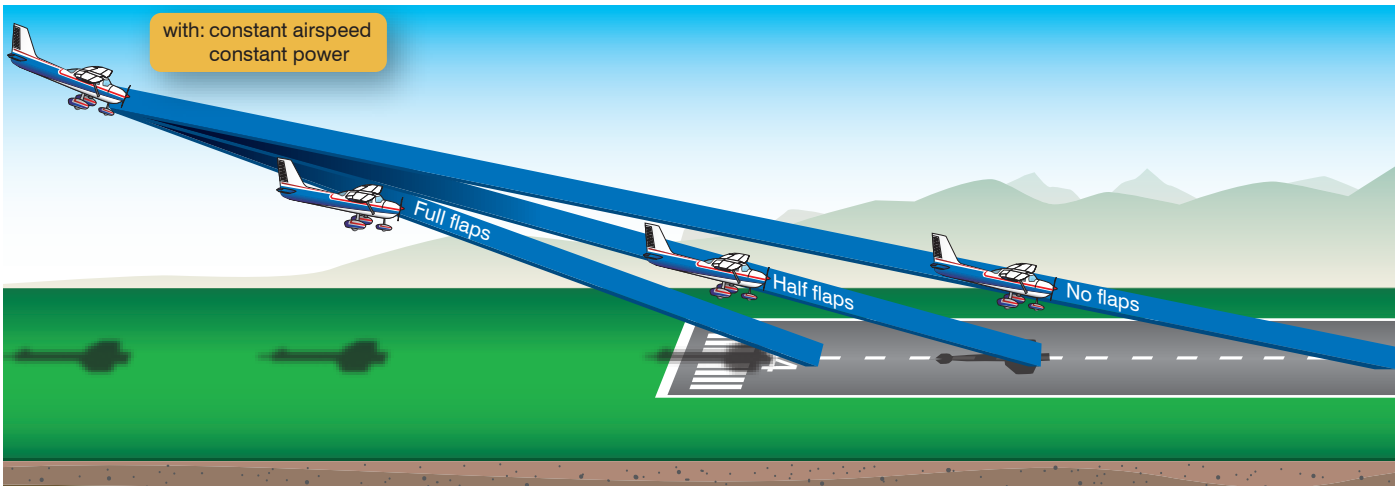


Figure 2: Effect of flaps on the landing point.

Flaps can also assist with power management on approach. The increased drag from flaps allow you to have a steeper descent angle without an airspeed increase. Just remember that incremental flap deployment allows for smaller adjustments of pitch and power. See figure 2 for a visual on how flaps can affect your approach angle.

The Eyes Have It

Understanding and practicing proper traffic pattern procedures is critical to your safety as well as the safety of your fellow pilot. Know your airport's traffic pattern, especially when there are parallel runways in use. Observe and listen intently for where other pilots are operating in the vicinity. Scan for traffic using short, regularly spaced eye movements that bring successive areas of the sky into the central visual field. Each movement should not exceed 10 degrees, and each sky segment should be observed for at least one second to enable detection. This slow and steady approach helps compensate for the limitations the human eye has in being able to detect targets. To help make yourself easier to detect (and avoid), turn your lights on. For more collision avoidance tips, see the article "Going Your Separate Ways" in the Jul/Aug 2022 issue bit.ly/3dA2THC.

Pilots and flight instructors may also find it helpful to review a recent GAJSC study on midair collisions that shows particular locations and routes at 50 U.S. airports where collision risk may be more likely. See the report here: gajsc.org/2022/04/mid-air-collision-report.

Is That My Runway?

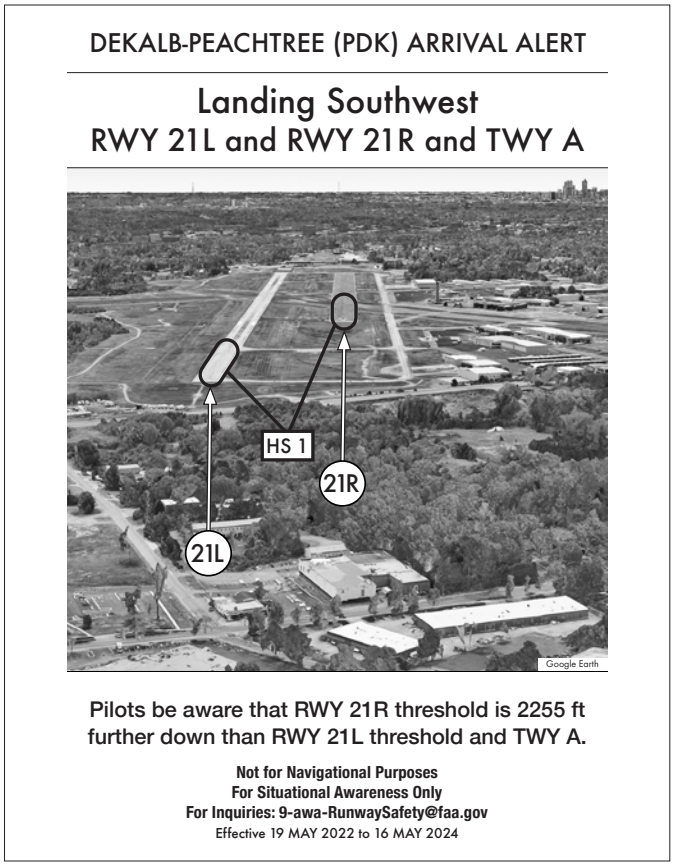
Ok, so you're right on target with your airspeed and glidepath during your approach, but imagine the feeling of dread when discovering the numbers on the runway are not what you were expecting. Or worse, there are no numbers and you've lined up on an active taxiway! Worse yet, your 3,000 foot runway seems to have grown several thousand feet as you realize you're approaching the wrong airport. It happens, and more frequently than you might think. Wrong surface events like these can be extremely deadly. The good news is there are lots of red flags and tools that can help you avoid them.

Everything from an airport's size, to runway layout, to activity levels, can contribute (sometimes in concert) to leading a pilot astray. Parallel runways seem to be among the most common triggers for mistaken identity. Often a shorter and narrower parallel runway can get overlooked by a pilot approaching an airport and be mistaken as a taxiway. A different colored surface on each of the runways can add to the confusion.

Parallel runways can also be staggered laterally and horizontally, sometimes by several thousand feet. A pilot cleared to land on a 3,500-foot Runway 36R may not notice it is much further apart and set back than its 36L sibling — with the latter's clearly marked threshold, touchdown zones, and 8,000 feet of roomy space luring you to land. On the flip side, sometimes an adjacent taxiway can have the same effect, especially when offset parallel runways are in place. What you might think is 36R is actually a taxiway for 36L. The real 36R could be offset further back and harder to discern. The blue taxi lights on "36R" should give away the fact that it's not a runway, but that's not always a given with someone who's already mentally committed to land.

Consider also how Mother Nature can impact a pilot's ability to correctly discern the right runway. Glare from the sun and wet pavement, snow cover, and fog can all make a landing (or departure) much more challenging. Always check the weather and try to anticipate any visibility restrictions that could present problems at your destination. If your arrival at a new destination has you approaching right before sunset on a due west heading, consider rearranging your arrival time so it is easier to pick out the correct runway, or for that matter, the correct airport.

To avoid lining up at the wrong airport, use nearby geographic features or landmarks to your advantage. Is



The new Arrival Alert Notices visually depict approaches with a history of misalignment risk, like the staggered parallel runways seen here at PDK.

your airport due east of a lake or large factory? In addition to reviewing your sectional chart, Google Earth maps can give you an excellent bird's eye view of what to expect on arrival, including other area airports or features that could appear to be airports (e.g., drag strips, a closed road, a well-lit main street).

Another best practice to confirm you have the right airport (and runway) is to use any and all cockpit instrumentation and navigational aids at your disposal. Even if you're VFR, dial in an approach and/or use GPS to confirm your position (set up a GPS waypoint on the assigned landing runway). When you're cleared for landing, double check that you are using the runway assigned, not just what you expected to be in use. If you are ever in doubt of your approach or landing, perform a go around and promptly notify ATC.

Also be sure to make use of the FAA's many tools and resources to help you stay on track. The *From the Flight Deck* video series now has over 100 videos highlighting helpful departure and arrival tips at airports all across the nation, including a new set of videos that cover operations at airports with complex geometry. See the all the videos here faa.gov/flight_deck. The FAA's Runway Safety Pilot Simulator has several training scenarios that highlight the many contributing factors to wrong surface events — faarunwaysafetysimulator.com. Another tool is the new Arrival Alert Notice (AAN) which visually depicts the approach to a particular airport with a history of misalignment risk. There are currently 11 AANs are listed here faa.gov/airports/runway_safety/hotspots/aan.

That's the Brakes

While you may have greased the touchdown and can see the airport diner on the horizon, your landing is not quite done. There's still the matter of braking and safely exiting the runway. Boldmethod.com provides six important braking tips in the article here: bit.ly/BrakingTips. Of note is the emphasis on maximizing aerodynamic braking instead of relying on just your mechanical toe brakes. The FAA's *Pilot Handbook of Aeronautical Knowledge* advises pilots to hold back-elevator pressure to maintain a positive angle-of-attack after the main wheels make initial contact with the ground, and to hold the nose wheel off the ground until the airplane decelerates. Then, as the airplane's momentum decreases, back-elevator pressure is gradually relaxed to allow the nose wheel to gently settle onto the runway.

Once the nose wheel is on the ground and directional control is established, carefully apply the brakes. Maximum brake effectiveness is just short of the point where skidding occurs. Be wary of how a tailwind or a wet runway can affect your landing rollout and braking effectiveness. FAA Advisory Circular 91-79A, *Mitigating Risks of a Runway Overrun Upon Landing*, provides guidance on how pilots can mitigate risks associated with a runway overrun, including hazards like contaminated runways, high density altitude, or excess airspeed.

With your airplane safely parked and secured, you are free to proceed to a well-deserved meal. Funny how that burger tastes a little better after a safe and smooth landing. Bon appetit!

Tom Hoffmann is the managing editor of FAA Safety Briefing. He is a commercial pilot and holds an A&P certificate.

LEARN MORE

FAA Fly Safe Fact Sheet – Stabilized Approach and Landing
bit.ly/3fbgXb2

FAA *Airplane Flying Handbook*, Chap. 8, Approaches and Landings
bit.ly/AFHChap8

FAA Runway Safety web page
faa.gov/airports/runway_safety

FAA Advisory Circular 91-79A, *Mitigating Risks of a Runway Overrun Upon Landing*
bit.ly/AC91-79A

READY TO FLY?

Every flight, whether it's with a drone or a traditional aircraft, goes through the same phases from preflight to postflight, with each having its own distinct challenges and areas of risk. Every pilot is responsible for being prepared for this array of potential issues. We've outlined a few questions and tips to help you be prepared for each phase of your next drone flight and respond calmly to any situation that may arise.

Preflight:

Am I prepared for this flight today? This means:

- Do I have my Part 107 pilot certificate or TRUST completion certificate with me?
- Do I have the required FAA airspace authorizations and, if applicable, required waivers, and have them with me?
- Is my aircraft registered and does it show the registration number on the outside surface?
- How am I feeling today? Do I have any health issues that would prevent me operating my drone safely today?
- Have I checked the weather, airspace, and NOTAMs where I'm going to be flying my drone (winds, visibility, flight restrictions, local laws, etc.)?
- Have I programmed any geo fence areas to help me avoid areas I can't fly over (if your software allows)?
- Is my drone in safe condition for flight? Check that each part of the drone is in working order, the drone and controller are fully charged, you have extra charged batteries if you plan on flying longer, and the batteries are in good condition.
- Am I standing in a safe place to operate this flight for the entire time I'm flying?
- Does my proposed operation require additional crew members, and do all crew members understand their assigned duties (person flying, visual observers, camera operator, remote pilot in command)?
- Have I identified areas nearby where other aircraft may be flying and do I have a plan to watch those areas and maneuver away as needed?

Take Off:

- Is the area around me clear of people and structures?
- Is my controller connected to the drone?
- Can I see enough of the airspace in all directions to see and avoid other aircraft in time to maneuver safely away?

During Flight:

- Is the area I'm flying over clear of people?
- Can I still see my drone and enough of the surrounding airspace?
- Is my controller still connected and I am able to maintain control?
- Is my drone behaving as expected (i.e., are the controls responding correctly to my inputs)?
- What areas can I land in if there is an issue with my drone?

Postflight:

- Is my drone in good condition or did it impact anything in flight?
- Are my batteries still in good condition?

- Did I have any issues with connectivity or the ability to control my aircraft?
- Have I turned off the controller, drone and other equipment I used and stored them safely?

As a drone pilot, it is important for you to take time after your flight to evaluate what went well (or not so well) during each stage of your flight. Consider how you could have done better, what you would do differently next time, and what went well so that you can build on that for the next flight.

You might ask yourself whether it's really necessary to follow all these steps every time you go fly a drone. The answer is yes! Following this list not only helps you ensure you are operating safely and responsibly, but when used regularly, this will become second nature to you and you'll be able to move through it very quickly. We encourage all pilots to think of these questions throughout their flight. Being proactive in your preparation makes for a smooth drone flight and improves the safety of your operation for you and those around you.

Autumn Alderdice is an aviation safety inspector with the FAA's Training and Simulation Group.

LEARN MORE

Notices to Air Missions
notams.aim.faa.gov/notamSearch

A NEW DAWN FOR AVIATION MAINTENANCE TRAINING

By now you've likely heard about the FAA's changes to part 147 regulations for aviation maintenance technician schools (AMTS). But do you know what exactly the rule changes and how that might affect you as either a prospective aviation maintenance technician candidate or training provider? Let's take a look at the revised regulation and see what impact the new changes will have on the aviation maintenance industry.

The new part 147 rule — save for a few amendatory instructions we'll cover later — went into effect on Sep. 21, 2022. Although an FAA rulemaking effort was already underway, Congress directed the agency in December 2020 to publish interim final regulations for new AMTS requirements under Section 135 of the Aircraft Certification, Safety, and Accountability Act.

What is Part 147?

In general, the part 147 regulations lay out specific requirements an AMTS must meet in order to provide aviation maintenance training that is designed to qualify someone for a mechanic (aka, AMT) certificate with airframe and/or powerplant rating. Those requirements cover four main areas:

- The facilities, materials, and equipment appropriate to the AMTS
- A provision for an adequate number of qualified instructors
- Quality control procedures (attendance, records, etc.)
- The curriculum

We'll first look at the curriculum since this was the focal point of the proposed regulation change. An AMTS curriculum shows what the school will train its students on, so they will have the knowledge and skills to be prepared to test for a mechanic certificate. Under the previous regulation, AMTSs needed to have their curriculums approved by the FAA and were required to include the subject areas and course content items found within the part 147 appendices. However, mechanic applicants were then tested using the Mechanic Practical Testing Standards (PTS). This resulted in differences between the curriculum standard and the testing standard, which was confusing to AMTS and mechanic applicants alike.

ACS Alignment

Under the new rule, AMTSs can create their curriculum without the need for FAA approval, provided it still meets the regulatory requirements of subject areas and skill training. The guiding document for developing the curriculum is now the Mechanic Airmen Certification Standards (ACS). The ACS is the new and more comprehensive testing standard that has already replaced the Practical Test Standards (PTS) for several airmen certificates (see faa.gov/training_testing/testing/acs). The Mechanic ACS includes high level subject areas and standards with which the curriculum must now align. The FAA developed the ACS in cooperation with an industry working group established under the Aviation Rulemaking Advisory Committee (ARAC). The goal in creating the ACS was to drive a systematic approach to the airmen certification process, including knowledge test question development and conduct of the practical test. Part 147 references the ACS and provides a link to where it can be found (see Learn More).

An AMT student working on an airplane engine.

Regarding those amendatory instructions mentioned earlier, the incorporation by reference of the mechanic ACS is echoed in 14 CFR part 65, which covers the knowledge, experience, and skill requirements for AMTs. However, to accommodate AMT applicants who prepared under the old curriculum requirements and the PTS, the FAA will not begin using the ACS as the testing standard until after July 31, 2023. Until then, the Mechanic PTS will continue to be used for anyone testing for a mechanic certificate or added rating. This schedule also provides time for AMTSs to begin preparing students using the ACS as the curriculum standard.

So what exactly does all of this mean? Bottom line is that as of Sep. 21, 2022, AMTSs began using the ACS as the training standard, and beginning Aug. 1, 2023, the FAA will begin using the ACS as the testing standard for anyone who tests for a mechanic certificate.

Customize and Optimize

Another significant change is that the new regulation does away with the minimum time-based requirements (previously 1,900 hours for both an

airframe and powerplant certificate). Instead, the new rule allows for a more flexible, performance-based standard. It also allows the AMTS to develop a curriculum that is more suited to that particular school and does not preclude the school from including additional course content beyond what's in the ACS. Please note that a compliant AMTS curriculum still needs to include the high level subject areas listed in the Mechanic ACS, as well as the broader course content items, concepts, and practical projects under each high-level subject.

The AMTS community has applauded the new rule and believes it provides the opportunity to modernize and reorganize curriculum requirements with much needed flexibility in subject matter selection and instruction delivery methods. For example, an AMTS will no longer need to seek approval for a distance-learning training program; it would just need to be described in the school's Operating Specifications (OpSpecs). While the FAA won't approve an AMTS curriculum, schools will be held to what they develop in their OpSpecs and must adequately describe how they plan to develop and deliver their curriculum. Rather than the FAA telling the AMTS how to deliver the curriculum, the AMTS tells the FAA how it will deliver the curriculum to ensure the student has the knowledge and skills necessary for attaining a mechanic certificate and associated ratings. In addition, an AMTS must also provide a description of its facilities, equipment, and materials, as well as how it will provide the necessary qualified instructors.

Additional Changes

It's worth noting a few other changes to part 147 that provide some additional flexibility for an AMTS. For example, the change to section 147.15 allows an AMTS to provide training at any fixed location other than its primary location, including locations outside of the United States. This might be helpful for a school that is unable to teach a certain skill or subject, like welding, at its primary location, or allow an AMTS to partner with a high school to provide training as an additional location of the AMTS. The additional locations must meet all part 147 requirements and would need to have facilities, equipment, and materials appropriate to the curriculum and the number of students being taught at that location.

Also, instead of quality of instruction being based on a nationwide norm, AMTSs need to maintain a pass rate of at least 70% of students who took a written, oral, or practical exam within 60 days of graduation during a three-year reporting period. This change provides a standard that does not vary over time or depend on the performance of other AMTS.

The new 147 rule also requires that an AMTS have a quality control system by either being accredited, or by having an FAA-approved quality control system that contains specified procedures. However, accreditation must be by an accrediting agency that is recognized by the U.S. Department of Education. Since most AMTSs are accredited in this manner, this will relieve them from needing FAA approval of grading and attendance policies.

There's added flexibility with instructor requirements too. AMTS instructors may be an FAA-certificated mechanic or be a "specifically-qualified" individual to teach a portion of the school's curriculum. An AMTS will need to demonstrate that any non-certificated instructors are qualified to teach their assigned content. The 25:1 student-to-instructor ratio in shop/lab classes is retained, but the requirement that the one instructor in that ratio be FAA certificated was removed.

A Good State of Repair

With 187 FAA-certificated part 147 programs that enroll approximately 20,000 students across the country, the improvements and regulatory relief provided by the new part 147 regulations are likely to have a widespread and lasting impact on the aviation maintenance community. Under the new rule, AMTSs will have a greater say in how and what they teach, and as a result will be better suited to meet the demands of the evolving aviation community. And with the ability to make training available in more places, AMTSs may also be able to expand enrollments and foster a much-needed growth of the aviation maintenance workforce.

Tom Hoffmann is the managing editor of *FAA Safety Briefing*. He is a commercial pilot and holds an A&P certificate.

LEARN MORE

New 14 CFR Part 147 regulations
bit.ly/14CFRpart147

Mechanic ACS
bit.ly/Mechanic-ACS

FAA Safety Team course – Part 147 Overview (ALC-823)
bit.ly/ALC823

FAA Safety Team Notice – Part 147
bit.ly/NOTC2403

Part 147 FAQ document
bit.ly/147IFR

MEET THE FAA'S OFFICE OF ACCIDENT INVESTIGATION AND PREVENTION

This issue provides loads of helpful safety tips and accident mitigation strategies. But did you know that there is an FAA team tasked with collecting and analyzing accident data to identify trends and help drive creation of these corrective measures? They are the FAA's Office of Accident Investigation and Prevention (AVP). Their mission: To make air travel safer through investigation, data collection, risk analysis, and information sharing. Let's meet the team.

AVP comprises four divisions, each with unique duties supporting its safety mission.

The *Accident Investigation Division* provides the FAA's direct link to the National Transportation Safety Board (NTSB) during major or significant aviation accident investigations.

A duty officer is on call around the clock to respond to accident and incident notifications. Investigators keep a "go-bag" packed and ready to launch with a moment's notice.

While the NTSB conducts investigations to determine probable cause and contributing factors, the FAA conducts a parallel investigation that supports the NTSB while also identifying risk in any of the FAA's nine areas of responsibility. These include performance of FAA facilities or functions, competency of the airmen involved, aircraft airworthiness, adequacy of regulations, and whether any regulations were violated. If the investigation uncovers systemic or critical risks, AVP has the resources to influence an immediate fix within FAA before waiting for the final report from the NTSB..

Next up is AVP's *Safety Analytical Services Division*. This group focuses on analyzing and sharing accident and safety data. They provide in-house safety analytics; safety metrics; manage programs like Aviation Safety Information Analysis and Sharing (ASIAS), Aviation Safety Reporting System (ASRS) and the General Aviation Activity Survey; and collaborate with safety teams like the General Aviation Safety Joint Safety Committee (GAJSC). The division also closely supports InfoShare, an aviation safety conference that promotes open discussion of case studies, best practices, and solutions for safety-related issues.

AVP's Safety Analytical Services Division also manages the FAA's Safety Community of Interest – Safety Data and Analysis Team (SDAT). SDAT's primary purpose is to enable objective, data-informed risk-based decision-making across the FAA and its affiliates. This division also uses predictive data analytics to proactively identify and act on emerging safety risks.

AVP's *Safety Management and Research Planning Division* is the lead for safety management across the FAA, spearheading the U.S. State Safety Program (SSP), the FAA Safety Management System (SMS), the AVS SMS, and AVS Safety Culture activities. The team facilitates stakeholder collaboration across the agency and within industry to conduct safety risk assessments, identify hazards, mitigate risk, and promote safety. They provide policies, guidance, tools, and training to conduct safety management and safety culture activities. Through the SMS and an enriched positive safety culture, this team enables the FAA to use safety data to target areas of greater risk. AVP also advises and collaborates with ICAO on international standards for safety management and safety culture initiatives. The division's Research, Engineering, and Development Team manages research that helps develop and/or update FAA safety regulations, standards, and guidance.

Finally, the *Management Services and Recommendations Division* provides management support and manages FAA safety recommendations programs. Encompassing multiple program areas – including HR, training, and budget – the Management Services Branch helps get the right people and resources to perform AVP's critical safety missions. The Recommendations Branch manages FAA responses to NTSB and FAA Safety Recommendations, which include FAA employee submissions, responses to the NTSB, and those from foreign civil aviation authorities. Incredibly, this team has made tremendous progress during the pandemic in closing NTSB safety recommendations, as they continue to focus on communicating the steps the FAA has taken to enhance safety.

Since safety culture influences the effectiveness of SMS, ultimately driving safety performance, AVP is a key player in the work of promoting a positive safety culture throughout FAA. All of AVP's directorates contribute to this important work.

"We focus on learning, flexibility, and open communication," said Executive Director Kimberly Pyle. "To drive down the accident rate, we must learn from the past, leverage and share the data we have to make changes and take action so that we can all better manage risk moving forward."

Learn more about AVP at bit.ly/FAA-AVP.

GENE TRAINOR

A VAST DIFFERENCE FOR SAFETY

Helicopters and their crews rescue people worldwide from sinking boats, the sides of cliffs, and during medical emergencies. They transport workers to oil rigs, tourists across the Grand Canyon, and presidents, prime ministers, and other leaders to high-level meetings.

It doesn't matter where on the planet these flights occur. Helicopters need to take off and land safely for a well-functioning international airspace system. As the skies will likely get more crowded with the emergence of vertical take-off and landing vehicles (VTOL), also known as urban air mobility vehicles, the importance of a worldwide culture of safety increases.

The Vertical Aviation Safety Team (VAST) has taken on the mantle of championing safety internationally on this front. VAST is a public–private initiative to enhance worldwide flight operations safety in all segments of the vertical flight industry. A notable contribution was its coordination of the recent VAST 2022 Global Conference in the Dallas-Fort Worth area. The October conference, an outgrowth of the FAA International Rotorcraft Safety Conferences, featured presentations on surviving helicopter crashes, and how pilots can avoid birds, drones, fixed-wing aircraft, and utility wires. Mechanics received updates and training from major helicopter manufacturers, such as Bell, Airbus, Sikorsky, Leonardo, and Schweizer. The VTOL community discussed vertiports, performance criteria, community acceptance, and how hydrogen-powered vehicles work.

"Vertical aviation is a global endeavor," said Jim Viola, Helicopter Association International president and VAST industry representative. "We draw from an international workforce and economy to build, operate, fly, and fix aircraft around the world. So it makes sense that improving safety in vertical aviation must also be a global effort."

VAST was announced June 1, 2021, as the successor to the International Helicopter Safety Team, later known as the International Helicopter Safety Foundation, with a vision of zero fatal helicopter accidents worldwide.

The goals of this government-industry volunteer organization are:

- Establish the organization as the world's most trusted source for vertical flight safety information and resources.
- Establish working groups to represent key segments and issues relevant to the global VTOL industry.
- Formalize leadership positions, working groups, and advisory roles for participating organizations and individuals.
- Identify, collect, harmonize, and deliver centralized access to safety information and resources from participating stakeholder entities.
- Provide and coordinate a forum where regional safety teams, safety authorities, and other industry stakeholders can work together on vertical flight safety issues.

The organization has about a dozen chapters worldwide, including the United States Helicopter Safety Team (USHST), chaired by Karen Gattis of the FAA and Nick Mayhew of CAE, an international high technology company. The USHST is likely best known for its "safety enhancements" (H-SEs) that provide a step-by-step process to improve rotorcraft safety. See ushst.org for more details.

The USHST is among VAST's most active chapters. Other chapters exist in Brazil, Canada, Chile, Europe, India, Mexico, New Zealand, and Japan.

Pilots and mechanics are urged to visit VAST's website https://vast.aero, which contains hundreds of reports, videos, and event listings all geared toward helicopter and VTOL safety.

John Franklin, Head of Safety Promotion at the European Aviation Safety Agency (EASA) spoke about VAST at the October conference. Franklin said that aviation is getting safer and safer.

"This means that if we are going to reduce accident rates further, it is vital that we collaborate at a global level to learn from each other what works and what doesn't," Franklin said. "No single organization has all the answers. Through our collaboration with VAST, we are able to pool our ideas and also our resources to reach the rotorcraft and VTOL community in new and innovative ways that help to grab their attention."

Gene Trainor is a technical writer/communications specialist for the FAA Compliance & Airworthiness Division.

LEARN MORE

VAST Website
vast.aero

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 more than 15,000 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.

Air Show Aficionado

A quick note to congratulate the team on the outstanding Safety Briefing for July/August [2022]. Really enjoyed the airshow issue. As EAA and the fly-ins have been a part of my aviation experience since the mid-60s, I enjoyed all of the articles. All the very best.

— Kim

Hello! Thank you for your note and feedback on the July/August "All About Air Shows" issue. This was a fun issue to write and we're glad you enjoyed it. As you can see, there's a lot that goes on behind the scenes at air shows and aviation events to keep them both enjoyable and safe. We were proud to showcase the incredible efforts of these individuals and the impact they have on spreading the joy of aviation!

Kudos on 57 Seconds Videos

I absolutely love your "57 Second" videos; I've watched them all. I just finished the one on component system failures. I have an FAASafety.gov account, and I like getting Wings credits. Pilots, and the public, sometimes give the FAA, and well-meaning FAA employees, a hard time, as I'm sure you well know. But I'm grateful for the FAA's efforts to keep pilots, and the public, safe. Thank you for your safety videos.

— John

The "57 Seconds" videos are well-designed quick reminders for pilots and a very positive effort on the part of the FAA to promote pilot safety (and the FAA WINGS program). Please keep up this important service to pilot safety.

— David

Thank you for the feedback. "57 Seconds to Safer Flying" is an instructional video series designed to provide brief and informative overviews of many critical aviation safety subjects. We look forward to provide future videos. Have a look here for the latest: bit.ly/57Seconds

South Pole Salutations

Wow, what a tremendous issue! I'm not kidding when I say, it makes me want to go to work for the FAA! I'm a corporate pilot flying small jets under Part 91. I used to be an avionics and aircraft systems design engineer, and prior to that I was a communications engineer who developed some of the early satellite communications systems at Amundsen-Scott South Pole Station, at the geographic South Pole in Antarctica (I wintered over twice at the Pole). Every article in this recent edition touched on some aspect of my career, including working at the South Pole. AWESOME!

— Brent

Thank you for the kind words on the Sep/Oct 2022 issue that covers FAA's Flight Program Operations. We certainly appreciate your enthusiasm for aviation safety and the impact you've had on the industry during your career. We wish you the best of luck in your new flying endeavor!

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

SUSAN K. PARSON

DOWN BUT NOT DONE

Every day, my daddy told me the same thing. 'Once a task is just begun, never leave it till it's done. Be the labour great or small, do it well or not at all.' — Quincy Jones

Let's say that you successfully completed each phase of your flight without making any of the mistakes we've explored in this issue of *FAA Safety Briefing* magazine. Let's also say that you didn't have any other bobbles or wobbles in your aeronautical proficiency. In fact, let's go so far as to say that you just finished something pretty close to the mythical Perfect Flight, or at least what you might describe to others as The. Best. Flight. Ever.

Great! But before you pop the champagne cork or the topper for any other celebratory beverage, remember that being safely *down* is not the same as being completely *done*. If you simply hopped out of the aircraft, fastened the tiedown ropes, and skipped off to the terminal, you have just marred the picture of your Perfect Flight.

Inspect the Airplane

We all know about — and hopefully know all about — the importance of conducting a thorough preflight inspection. We've even turned the adjective "preflight" into both a noun (*e.g., I've finished the preflight*) and a verb (*e.g., Did you preflight the aircraft?*) The scarcity of similar syntax for postflight inspection gives evidence of the reality that both the concept and the practice of a similarly thorough postflight inspection are not nearly as well ingrained in aviation practice.

But they should be. Whether you rent from the FBO, participate in a flying club, or are the sole proprietor of your plane, good airmanship — which includes the concept of good aviation citizenship — means that you strive to leave the aircraft in a condition as good as, if not better than, the way you found it. You probably don't have to think too many years back to recall the frustration of finding that the last pilot didn't bother to refuel. Or perhaps you have discovered a mechanical malfunction that had to have been visible to the previous pilot, had that person only bothered to make a postflight inspection.

To be the kind of pilot you would like to follow in the airplane's next flight, consider the flight to be incomplete until you have conducted a thorough postflight inspection and, of course, documented and acted on any problems. While checking things like oil level immediately after you shut down is not a great (or especially useful) idea, you can still use the preflight checklist as a guide to your postflight look at the airplane. Better yet, you could use it to develop a specific postflight inspection checklist tailored to your own aircraft.

> **REMEMBER THAT BEING SAFELY *DOWN* IS NOT THE SAME AS BEING COMPLETELY *DONE*.**

Inspect Your Performance

Before too much time elapses, you should also include a personal performance review in your "down but not done" activities. If the ambient temperature is not too hot or too cold, consider taking five or ten minutes to sit quietly in the airplane and mentally replay every aspect of the flight you just finished. Make a few notes on your kneeboard while it's all fresh in your mind, and then set aside some time later on for a deeper dive into your "coulda/shoulda/woulda done [fill in the blank] better" self-critique.

Got passengers? Provided there is a clear and safe pathway from airplane to airport or FBO lobby, send them in ahead of you. In addition to giving you space to review and reflect on the flight, it will also enable a distraction-free postflight inspection.

As the opening quote advocates, "once a task is just begun, never leave it till it's done."

Susan K. Parson (susan.parson@faa.gov) is editor of *FAA Safety Briefing*. She is a general aviation pilot and flight instructor.

KIMBERLY PYLE

Executive Director, FAA Office of Accident Investigation and Prevention

Kimberly Pyle did not grow up wanting to work in aviation. As the child of Peace Corps volunteers, Kimberly wanted to find a career where she could be of service to others. In fact, it was when she was living in a third world country, witnessing how a U.S. government program was able to improve lives, that Kimberly considered government work herself. Working as a staffer in the U.S. Senate, and then in the U.S. House of Representatives, Kimberly believed that the right policies might ultimately make a difference in the lives of many people.

"I wanted to work in a field with a positive benefit on society," she said. "While working in Congress was tremendously insightful, I still felt like there was more I should be doing."

Thanks to an opening in the air traffic systems development branch that popped up in a *Washington Post* classified ad search, Kimberly turned her eyes to the FAA. Her international childhood had given her plenty of opportunities to experience aviation around the world, and her family had a number of pilots who were avid aviation fans. Kimberly decided to take a chance on a mission that had little to do with politics.

"I got the job, and the first time I visited an FAA facility and saw all the behind the scenes work that goes into making flying safe, I knew I made the right choice," she noted. "This was a place where I could contribute my talents and join a larger team working to make aviation safer."

Since joining the FAA, Kimberly continued to learn, holding many roles throughout the agency. She worked in air traffic systems development, communications, congressional relations, safety culture, runway safety, global safety program management, air traffic safety, and technical training, prior to her current role as the executive director for the Office of Accident Investigation and Prevention. Here she manages and coordinates the accident investigation program, data modernization, predictive analytics, safety management system programs, and the NTSB and FAA safety recommendations. She also serves as the chair of the FAA's Safety Culture Executive Steering Committee, which supports safety culture transformation in the agency.

Executive Director of Accident Investigation and Prevention Kim Pyle (right) with Air Traffic Organization COO Tim Arel (left) and MIA Tower Operations Manager Brian "Goldie" Gouldthorpe (center).

Kimberly sees having the right culture, data, and workforce focused on safety management and communication as the next challenge for the agency.

"The national airspace system of tomorrow is not going to be served by the same approaches we took in the past. For one, technologies have changed dramatically," she explains. "Are we using everything we have learned in the last 100-plus years of flight, plus all the advanced capabilities we have available today to continue to push safety forward?"

New methods and actions are needed to prevent accidents. One such method is strengthening the predictive analytic and risk forecasting capacities to be capable of recognizing risk in advance, and then sharing that information with stakeholders.

"I'd like to see us leverage the incredible amount of data that we have collected to supplement how we manage safety," she notes. "Knowledge is power, and shared knowledge is a force multiplier. The more knowledge we can get into the minds of all of our stakeholders — and especially the pilot community — the safer the system will be as we deal with emerging risks in the future."

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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Aerobatic performer and
Red Bull Air Race pilot Kevin Coleman
takes *FAA Safety Briefing* for a "spin."

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