FAA Safety January/February 2018

Your source for general aviation news and information

The Fantastic Four — Unlocking the Superpowers of Basic Airmanship p 10

Where the Heck Are We? — Understanding the Lost Art of Aerial Navigation **p** 14

How to Talk Like a Pilot — The Basic Elements of Aviation Communication p 18



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FAA Safety Briefing is the FAA safety policy voice of non-commercial general aviation.











The January/February 2018 issue of *FAA Safety Briefing* takes a forward-thinking journey "back to the basics" of flying fundamentals. Articles in this edition provide important tips, techniques, and resources that can help you better aviate, navigate, communicate, and mitigate in today's complex operating environment.

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### **Fundamentals**

Two years ago, we devoted the January/February issue of this magazine to the FAA's newly-announced Compliance Philosophy. Because this framework is so fundamental to our safety assurance mission, this "back to basics" edition of *FAA Safety Briefing* provides a perfect opportunity to reinforce the key points — and also to talk about the more recently developed FAA Oversight Philosophy.

#### **Compliance Philosophy**

In the two years since FAA Administrator Huerta first announced the Compliance Philosophy, I've heard a lot of good "it's working" anecdotes. But I've also heard some misconceptions. So let's get back to basics.

The fundamental goal of the Compliance Philosophy is to find safety problems in the National Airspace System (NAS), use the most appropriate and effective tools to fix them before they cause an accident or incident, and monitor to make sure they stay fixed.

I think some of the misconceptions arise from confusion about what constitutes the most appropriate and effective tool. But first let's talk about how the FAA defines compliance. Yes, compliance means that we expect all certificate holders to follow the rules. But it's not possible to make rules that address every possible hazard. So compliance means that we also expect certificate holders to take proactive measures to identify hazards and fix them, so as to manage or mitigate the risk they create in the system.

Under the Compliance Philosophy, we assume that most operators understand that, and that they actively work toward that goal. We are all human, though, and mistakes happen to the best of us. In most cases, failure to comply with the rules happens as the result of things like lack of training, lack of knowledge, diminished skills, or procedures that are not working as they should. So if the certificate holder is both willing and able to comply, we use a "compliance action" to address the problem.

I sometimes hear that a compliance action is a "free pass." This mistaken notion is rooted in the equally mistaken idea that the greatest safety risk to the NAS arises from a specific event or its outcome. On the contrary, the greatest risk comes from an operator who is unwilling or unable to comply with rules and best practices for safety. If the certificate holder is willing and able to comply, and willing to both communicate and cooperate in resolving the safety problem, then a compliance action tailored to that goal is appropriate.

Compliance actions are not, however, appropriate for someone who is unwilling or unable to comply. The FAA continues to pursue enforcement for intentional reckless behavior, inappropriate risk-taking, repeat failures, falsification, failure to fulfill commitments, or deviation from regulatory standards.

In summary, the Compliance Philosophy firmly puts the focus where it should be: to achieve rapid compliance, to eliminate the safety risk, and to ensure positive and permanent changes.

#### **Oversight Philosophy**

The FAA is also getting back to basics in terms of our oversight function. Earlier this year, the agency announced a new Integrated Oversight Philosophy that complements the Compliance Philosophy. While this policy primarily impacts FAA employees, it's important for our stakeholders to be aware of its fundamental aspects.

The Integrated Oversight Philosophy outlines a core set of attributes the FAA will use to unify and advance our eleven oversight systems. If you want the details, the link below will take you to the Integrated Oversight Philosophy Order. For the purposes of this discussion, though, its back-to-basics goals include: Improving consistency, internal collaboration, coordination, and communication across FAA organizations; fostering an environment that allows innovative ways to identify/disclose safety risks and implement systemic fixes; reducing duplicative activities; and improving oversight data collection and analysis.

Now that you know what the FAA is doing to get back to basics, read on for tips and techniques you can use in your personal flying back to basics efforts.

#### Learn More

**Compliance Philosophy** go.usa.gov/xngWC

Integrated Oversight Philosophy go.usa.gov/xngWc ATIS AVIATION NEWS ROUNDUP

#### *New Course Underscores Value of Using NOTAMs to Reduce Risk*

Each year, the FAA's Air Traffic Organization issues a "Top 5" list of hazards in the National Airspace System (NAS). In 2017, two of the identified hazards pertained to issuance/cancellation and prioritization/filtering of Notices to Airmen (NOTAMs). The hazards relate to a lack of, untimely, or outdated NOTAMs and the inability of controllers or pilots to distinguish between applicable NOTAMs in the system.

In response, the *NOTAM 101 – Getting Back to Basics* course was developed to provide stakeholders with a high-level overview of the NOTAM system and a reminder about its importance. The team assembled a task force to address the two issues identified and other areas where there are gaps in the current NOTAM system. The goal is to improve NOTAM policy, management, and training, as well as to address changes that will improve timely NOTAM coordination and dissemination.

NOTAMs have a unique language using special contractions to make communication more efficient. They inform pilots about a change in the NAS, warning anyone concerned about a hazard or the abnormal status of a facility, service, or procedure. NOTAMs contain essential information that is not known far enough in advance to be publicized by any other means. Every user of the NAS is affected by NOTAMs because they indicate the real-time status of the NAS.



In 2016, more than 1.9 million national, inter-

The new FAA Chart Users Guide can help pilots understand information and symbology found on FAA charts.

national, military, and Flight Data Center NOTAMs were issued globally. In that same year, NOTAMs contributed to 34 fatal accidents, 11 serious accidents, and 11 minor accidents in the United States, according to the NTSB.

The NOTAM 101 course is for use by pilots, air traffic control, airport operators, flight dispatch, Flight Service Stations, the Department of Defense, and others. It outlines NOTAM components, types of NOTAMs, common issues and best practices, NOTAM search tool guidance, online resources, and FAA reference documents. Go to https://go.usa.gov/xn5mQ to see the slide deck.

#### *New User Guide for Aeronautical Charts Published*

Check out the revamped and expanded FAA Chart User's Guide. It is available via web and PDF formats. This updated version is a great training and study aid for experienced and novice pilots alike. The reference document helps familiarize anyone looking to further understand information and symbology found on FAA charts and chart publications. Go to bit.ly/2iHjvww to view the guide.

#### *Changes Made to PRM Approach Pilot Training*

Precision Runway Monitor (PRM) training provides guidance on conducting PRM approaches. These are simultaneous, independent approaches to closely spaced, parallel runways. The FAA, together with industry, recently completed an extensive overhaul of the PRM training material.

The centerpiece of this effort is a newly developed training aid titled, "Precision Runway Monitor (PRM) Pilot Procedures." Although the core elements of the training remain unchanged, this new version has been streamlined to reduce completion time and provides the most up-to-date information on how to safely conduct PRM approaches. Go to bit.ly/2zx6Vdg for more information.

#### **New UAS Integration Pilot Program**

The Unmanned Aircraft System (UAS) Integration Pilot Program is an opportunity for state, local, and tribal governments to partner with private sector entities, such as UAS operators or manu-



facturers, to accelerate safe UAS integration. Entities that wish to participate in the program form teams and submit proposals to the FAA to fly more advanced UAS operations, such as beyond visual line-of-sight or over people.

The program is expected to provide immediate opportunities for new and expanded commercial UAS operations, foster a meaningful dialogue on the balance between local and national interests related to UAS integration, and provide actionable information to the Department of Transportation (DOT) on expanded and universal integration of UAS into the National Airspace System (NAS). To learn how to participate in the program, go to bit.ly/2hZKKmN.

#### NTSB Issues New Safety Alert

The National Transportation Safety Board (NTSB) issued Safety Alert 071-17 last October to highlight the potential hazards associated with conducting intersection takeoffs and the need for general aviation (GA) pilots to use all the runway available to them for takeoff.

Intersection takeoffs - where only a portion of

the runway is used for takeoff instead of using the entire length — are, in GA operations, a common practice often associated with a desire to save time. However, pilots may not fully understand the potential risks associated with conducting intersection takeoffs. The NTSB has investigated at least 10 accidents between 2000 and 2015 where pilots were attempting intersection takeoffs.

By reducing the amount of runway used during takeoff, pilots have less runway available to them in the event of a system or engine malfunction during takeoff, to abort the takeoff, or to perform an emergency landing. This increases the risk of injury, death, and aircraft damage.

The safety alert emphasizes the need for pilots to:

- Know their airplane's takeoff and landing performance limitations
- Not feel obligated to accept an intersection takeoff if offered by air traffic control
- Use all available runway length to increase the margin of safety

Read more at go.usa.gov/xnDSr.

#### New Commercial Hot-Air Balloon Safety Program

After a July 2016 balloon accident in Lockhart, Texas, that caused 16 fatalities, the FAA took proactive steps to increase the safety of hot-air balloon tourism. As the result of a year-long FAA "Call to



Please visit www.faa.gov/news/safety\_briefing for more information on these and other topics.

FAA Safety Briefing 3



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#### Federal Aviation Administration

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Action" with the commercial hot-air balloon industry, the Balloon Federation of America (BFA) has developed an "Envelope of Safety" accreditation program for balloon ride operations.

Consumers can use the program to select a ride company or pilot that strives to reach a higher safety standard.

To meet the BFA's program requirements, company pilots of balloons that are capable of carrying more than 4-6 passengers must be commercially certificated for 18 months, have a specified amount of flight experience, and hold an FAA second-class medical certificate. Pilots also must pass a drug and alcohol background check, have attended a BFAsanctioned safety seminar within the last 12 months, and be enrolled in the FAA WINGS program. The BFA will verify this information annually, and will check the safety background of pilot applicants by researching FAA accident and incident data.

A second part of the program provides balloon ride operators with a choice of three levels of safety accreditation: Silver, Gold, or Platinum. While any size company can achieve the highest level, the tiered structure is designed with different size

companies in mind. Each level has increasingly stringent safety requirements. The FAA

Even the best multi-million dollar simulators are still poor instruments to measure subtle cognitive impairment in a pilot.

believes the BFA program will enhance safety and professionalism, and will allow consumers to be better informed before they choose a commercial balloon ride operator. Go to bit.ly/2iRkevt for more program details.

## **Getting Help**

The New Year can bring great expectations but also great pressure. Coming on the heels of the holiday season, combined with shorter days, more darkness, and possibly cold or bad weather, the start of a new year can be extra stressful. Feeling overwhelmed at this time of year is not unusual. In fact, I'd say that not feeling a bit overwhelmed is unusual.

You are not alone. At this time of year, and at other times in our lives, many of us have felt the need to reach out to a member of our personal support system or perhaps a professional. However, due to the stigma associated with any kind of mental health treatment, many of us try to cope with difficult situations on our own instead of seeking help from a counselor or therapist.

So what is the situation for pilots, who need to meet a higher medical fitness standard than the general population?

#### It's Okay

Seeing the words "pilot" and "mental health" in the same sentence tends to make people uncomfortable. Most people remember the GermanWings 9525 crash in 2015, an event that caused civil aviation authorities and aerospace medical professionals all over the world to re-examine how they handle issues related to mental health.

Not surprisingly, this level of attention might make pilots reluctant to seek any kind of mental health assistance. This fear isn't new. We know that some pilots have long believed that they face a choice between being a pilot or getting help. Here's what I want you to take from this article: Getting the help you need does not prevent you from holding a medical certificate, and help is not automatically disqualifying.

#### Where to Turn

Whether it's an acute stress buildup or a more chronic issue, finding someone to talk to can be very helpful. Your first step might be a call to your primary care physician. This provider will be familiar with you and with the resources in your area, and thus able to suggest some good options. If a few sessions with a mental health professional can help you resolve the issue, that's fine. If you feel it is helpful to regularly see a professional, that's fine too. In fact, several airlines have even set up Pilot Assistance Programs and peer support groups to help. My point is that seeking help is a good thing.

#### What if I Need More?

If your personal situation requires more than just talking with a professional, please understand

that you are not automatically disqualified. While the details — specific to each airman — are beyond the scope of this article, we want you to know that we have established methods for dealing with conditions that require medication.

Here's what I want you to take from this article: Getting the help you need does not prevent you from holding a medical certificate, and help is not automatically disqualifying.

As you probably know, we began allowing the use of certain antidepressants in 2010. This is part of a broader effort to allow pilots to seek help while maintaining the safety of the National Airspace System (NAS). For a number of once disqualifying conditions, there now is a path to certification.

#### **Common Cause**

As I noted earlier, there are times many of us will need help. Though the information in this article may not be relevant to you, it could be relevant to a friend or hangar mate. I encourage you to share this information with those who need it. Perhaps just knowing that talking to a professional is not a situation that needs to be reported would encourage that person to get help. The priority for everyone involved in the NAS is safety, and being both physically and mentally healthy is a big part of that. As a reminder, follow the recommended IMSAFE pre-flight personal checklist:

- I Illness
- $\mathbf{M}$  Medication
- **S** Stress
- **A** Alcohol
- **F** Fatigue
- E Emotion

The "S" and the "E" refer exactly to what I have been saying — assess your stress level and emotional response before flying and get help when necessary. And when appropriate, do not fly.



# **Ask Medical Certification**

# **Q1**. What is the procedure to resume flying after successful cataract surgery? What documents do you need to furnish to your AME/physician?

A1. You would be eligible for a medical certificate 1-3 months after surgery as long as your visual acuity is stable and within standards for the class of certificate you request, and there are no complications such as residual glare. We would need to see a current status report from your eye surgeon and also the operative report, as different types of lenses require different follow up. Use of unifocal, non-accommodating intraocular lenses is not acceptable.

**Q2.** I have a question pertaining to the current FAA protocol for issuing a medical certificate when the applicant has hypertension. I recall that several years ago the applicant had to submit to a "cardiac work-up" which I believe required a resting EKG and some lab work. I understand this process is no longer followed, and the AME can now issue the certificate if the applicant meets the baseline maximum blood pressure reading specified in the regulations. I believe a statement from the applicant's treating physician is also required attesting to the applicant's blood pressure readings and medication.

#### I'd appreciate clarification pertaining to the current protocol. Thank you.

A2. Uncomplicated hypertension now falls under the program known as CACI (Conditions AMEs Can Issue). Both you and your AME can go to the online AME Guide, select CACI Certification Worksheets, and see exactly what the criteria are. No workup beyond that of good clinical standard of practice is required for initial certification. Simply meeting the baseline maximum blood pressure specified in the regulations (155/95 mmHg) does not exclude the diagnosis of hypertension. Readings in excess of 130/80 should be followed up with your primary care physician to see if treatment is recommended.

**Q3**. I have had atrial fibrillation (A-Fib) most of my life. I started flying before knowing what it was ... it had not been diagnosed at the time. On one flight, while training, I had an irregular heartbeat that prompted my immediate landing. I was soloing as a student pilot in my early twenties.

In 2012 I had a cryoablation procedure that has completely resolved my former condition. What might it take to go back to flight lessons and finally obtain my flight license? I would have to start over, of course, as it has been many years since my early flight lessons.

Unfortunately, I am now 58 but have recently become diabetic. Does this condition by itself disqualify me from flying? Thanks for any answers.

A3. The easy answer first. Diabetes may be considered for special issuance and we have many airmen flying on medication with well-controlled diseases. Regarding your atrial fibrillation (A-Fib), we would need the report from the procedure in 2012, a current status report from your treating physician, and the full report of a Holter monitor done at least three months after the procedure.

Q4. I have a third class medical certificate due in six months. Will I be able to renew my certificate with the above listed medical condition [Macular Degeneration]?

If the answer is yes, are there additional tests or information required? Thanks.

A4. I apologize, but there is insufficient information here for me to advise you. The best course of action is to discuss your situation with your AME. You should bring a copy of your most current ophthalmology evaluation. All of these cases are considered on a case-by-case basis.

Penny Giovanetti, D.O., received a bachelor's degree from Stanford, a master's in Environmental Health and Preventive Medicine from the University of lowa and doctorate from Des Moines University. She completed a 27-year career as an Air Force flight surgeon. She is board certified in aerospace medicine, occupational medicine and physical medicine/rehabilitation. She is also a Fellow of the Aerospace Medical Association and a private pilot.

Send your questions to SafetyBriefing@faa.gov. We'll forward them to the Aerospace Medical Certification Division, without your name, and publish the answer in an upcoming issue.

# **Checklist**

### **Clearing the Cobwebs**

In many parts of the country, winter is the time when pilots herd their light GA airplanes into the hangar for hibernation. While cobwebs can form around our slumbering mechanical friends during these cold and dark months, that's no excuse for allowing such things to obscure the aviation knowledge and skill we pilots will need when spring arrives. On the contrary, winter is a great time to clear any cobwebs that may have formed in what a friend wryly calls the "headset separator" space between your ears.

In the Nov/Dec 2017 "Sim City" issue of *FAA Safety Briefing*, we explored ways pilots can use simulation technology to sharpen and maintain flying skills when the constraints of weather, life obligations, or budget put the brakes on actual aviation activity. I'll use this space to raise awareness of some of the cost-free "back to basics" resources you can use to keep your brain awake while your airplane huddles in the hangar.

#### A Go-to FAA Source

Unless you are training for a certificate or rating, you might not be drawn to a web page called "Airman Testing" — but I would encourage you to check it out. If it's been awhile since you last took a test, flight review, or instrument proficiency check, reviewing the standards for the certificates and ratings you hold is a solid back to basics exercise.

Those who earned certificates or ratings before June 2016 probably haven't seen the new Airman Certification Standards (ACS), the single-source set of knowledge and skill standards that have begun to replace the Practical Test Standards (PTS) format. Because it integrates knowledge and risk management elements with the familiar PTS skill requirements for each Area of Operation and task, the appropriate ACS offers a great place to jumpstart your aeronautical remembrance of things past (apologies to Marcel Proust).

The Airman Testing page (see URL below) also provides a "Reference Handbooks" hyperlink to a wide range of guidance documents: Advisory Circulars, Airworthiness Directives, Regulations, Forms, Policy Statements, FAA Orders and Notices, and FAA H-series Handbooks. Bear in mind that several of the H-series handbooks (e.g., *Pilot's Handbook of Aeronautical Knowledge, Airplane Flying Handbook*) have been recently updated and, in some cases, substantially revised in accordance with recommendations from industry experts.

#### **Aviation Community Resources**

One of my personal goals for this winter is to remove any rust from my knowledge of instrument procedures. I've been perusing the FAA's *Instrument Flying Handbook* and *Instrument Procedures Handbook,* but I have also bookmarked the AOPA Air Safety Institute's IFR Procedures page (bit.ly/2hxvFbk) for a systematic winter review.

If IFR isn't your interest or need, click your way to the AOPA Air Safety Institute's Training & Safety/ Safety Spotlights page (see URL below) and peruse the menu of cost-free aviation safety education material. As the page introduction notes, ASI Safety Spotlights "include courses, accident case studies, real pilot stories, quizzes, videos, and publications relevant to each topic." Available topics range from Aerodynamics and Aeromedical to Thunderstorm Avoidance and much more.

The Experimental Aviation Association's (EAA) Advocacy and Safety page also offers a range of material you can use in your winter back to basics brain work. Of particular interest is information about the Type Club Coalition (TCC), which includes contact information for TCC member organizations. Whether you own or rent your aircraft, you can benefit from the extensive information type clubs have developed on specific makes and models. Chances are good that in addition to refreshing facts you already acquired, you'll have a number of "I never knew that!" discoveries.

Make the most of the winter down time, and you'll be all set for the springtime flying season to start.

Susan Parson (susan.parson@faa.gov, or @avi8rix for Twitter fans) is editor of FAA Safety Briefing. She is an active general aviation pilot and flight instructor.

#### Learn More

FAA Website's Airman Testing page www.faa.gov/training\_testing/testing

AOPA Air Safety Institute http://bit.ly/2BJrPnt

EAA Safety Programs http://bit.ly/2AkVvel

# Simple?

### Defining and Refining Basic Skills in a Complex Environment

**BY SUSAN PARSON** 

#### **Back to Basics!**

It sounds so simple, so straightforward, and so clear — except that it's not. In every field I can think of, it's possible to have a lively debate about what constitutes "the basics." Last summer, for example, author George Couros started an interesting social media conversation on the basics in education. Couros observed that the traditional trifecta of reading, writing, and arithmetic is necessary, but not sufficient, to get along in today's world. He posited that while the "three Rs" provide a *sine qua non* foundation for getting along in life, the "four Cs" of critical thinking, communication, collaboration, and creativity are the real basics now. Couros further observed that even these new basics evolve over time.

So it also goes in aviation. We can probably agree that aviation's equivalent of the scholastic basics is the familiar aviate, navigate, and communicate mantra, with the more recent addition of "mitigate" to cover risk management. Just as in education, however, defining the list is only the beginning. That's why we have chosen to focus this issue of *FAA Safety Briefing* on "the basics" of aviate, navigate, communicate, and mitigate, presenting these fundamental skills in the context of how they are practiced in today's complex operating environment.

#### 🛹 Aviate

At the most fundamental level, to aviate means to maintain control of the three As: attitude, altitude, and airspeed. That, in turn, requires mastery of what aviation safety expert Bruce Landsberg calls the "physical airplane," also known as stick-and-rudder skills.

Yes, you need those basics, and yes, you should practice them by striving for attitude, altitude, and airspeed precision on every flight. But wait - there's more. Today's pilots also aviate using the remarkably sophisticated avionics that are the hallmark of modern-made aircraft. The basics thus include the "mental airplane" skills of information management and automation management. I first wrote about these concepts in the March/April 2007 issue of this magazine (then called the FAA Aviation News). In a nutshell, information management includes understanding how your Flight Management System (FMS) is organized so you can quickly find the information you need. Automation management is more than "just" the autopilot. You need to know about the flight director, as well as the many other functions that the avionics will helpfully perform on your behalf (e.g., change the course deviation indicator (CDI) sensitivity).

#### 🔶 Navigate

Though it makes me feel like a dinosaur to say so, navigation was positively primitive when I was learning to fly in the early 1990s. I first learned pilotage and dead reckoning, and I would argue that those remain in the category of fundamental, or foundational, skills that all pilots should have.

As for the rest — well, when I planned a crosscountry flight, I drew the course on a paper chart, measured it with a clear plastic plotter, and used the





quaintly-named E6B "flight computer" to calculate wind correction, ground speeds, and estimated time en route. I also learned the "basics" of VOR and yes — NDB navigation. With NDB facilities fast fading into history, and many ADF receivers relinquishing their panel positions to GPS moving map navigators, a lot of the "basics" needed for navigation in today's National Airspace System have changed.

#### **Communicate**

The basics of aviation communication have perhaps changed the least, because at least for now we mostly rely on verbal radio transmissions. That could be changing with NextGen technologies. In the meantime, back to basics in communication involves striving for maximum precision and polish in the use of our unique Aviation-Speak language.

#### Mitigate

No one disputes the need for solid stick-andrudder skills. But numerous accident reports attest to the fact that no amount of basic "physical airplane" skill can save a pilot who unknowingly ventures into conditions beyond the performance capabilities of



the pilot and/or the airplane. As demonstrated by inclusion in the Airman Certification Standards, risk management has now been recognized as a basic skill for modern aviators.

Want to know more? Read on, and join us for this issue's forward-thinking journey "back to the basics."

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# FUNDAMENTALS

**BY TOM HOFFMANN** 

# Unlocking the "Superpowers" of Basic Airmanship

was never much into comic books as a kid. My older brother, on the other hand, was an avid collector of what I assumed were rare, early-edition comics since they were strictly off limits. But not all of his comics were sentenced to a life of being hermetically sealed in a plastic sleeve. Among the few issues that piqued my interest, and that I was also allowed to touch, were Marvel Comics' Fantastic Four series. Notwithstanding my comic book snobbery, I found this team of mismatched heroes oddly curious and I was fascinated by their unique and complementary superpowers. Incidentally, this was creator Stan Lee's first stab at using a superhero team, a concept that would later thrive in future series he and other writers would develop. As is the case for many teams, power struggles and family squabbles ensued. Despite some inner strife, this team of super-stretchy, disappearing, flame-throwing, and fist-pounding heroes worked harmoniously and ultimately knew what it took to save the day.

So what do superhero superpowers have to do with aviation? A lot! While we may not initially regard them as having superpowers, you might say there is a Fantastic Four team hard at work during every flight. I'm referring, of course, to the four fundamental flight maneuvers: straight-and-level flight, turns, climbs, and descents. These four basic skills, first presented on every aviator's first few flight lessons, are the building blocks for all flying tasks. Student pilots soon learn that a healthy respect and mastery of these basic skills can unlock all kinds of superpower potential.

Of course that doesn't mean you'll fly as fast as a speeding bullet or be more powerful than a locomotive. But it does mean you'll be equipped to "save the day" by capably handling any situation that comes your way. So let's have a look at each of these skills, explore some common execution errors, and review ways you can fine tune your basic airmanship superpowers.

#### In the Beginning ...

As noted earlier, it is imperative for new pilots to understand and execute the four fundamental flight maneuvers. Primary training sets the tone for how well successive flight training and future aviation endeavors will go. If these critical skills are not taught properly in the first 10 to 20 hours of instruction, it is possible pilots may never fully master them.

Experienced pilots have a different issue.

Some veteran pilots mistakenly liken flying an airplane to riding a bike. Consequently, they give short shrift to the notion of practicing these basic skills, an omission that can allow shortcuts, sloppy habits, or a period of inactivity to bite them in the you-know-what. Those "permanently ingrained" skills are actually quite perishable. NTSB aviation accident reports are replete with instances where incorrect control inputs, or a failure to recognize an airspeed reduction or an encroaching stall had deadly results.

The common denominator here for *all* pilots — novice to expert — is practice, practice, and more practice.

#### **Feel the Power**

In my early flight training days, my instructor would routinely admonish my death-grip on the controls and rap my hands with a sectional chart. "No 'white-knuckling," he would say. Even though it robbed me of the ability to more accurately "feel" the airplane — not to mention the sheer physical exhaustion it caused — this habit was hard to break. Using fingertip control and mastering the trim made all the difference in the world.

In addition to feeling the flight controls, pilots can gather important sensory perception clues from hearing and sensing aircraft reactions during flight (e.g., the varying sound of wind against the windshield, engine sounds in different attitude configurations, or the G-force loading sensed during turns or climbs.) Being aware of these seat-of-your-pants flying sensations is an important element of under-



Nose reference for straight-and-level flight

standing and interpreting what is actually happening during various conditions of flight.

The use of visual cue techniques is another important part of early training. When combined with snap-shot reference to cockpit instruments, this type of integrated instruction can be very effective in helping pilots maintain desired attitudes and aircraft control. There are several tips and tricks that can help pilots to master this technique — many of which offer the ability to have some fun at the same time.

One such tip is from FAA Aviation Safety Inspector and National FAASTeam member Fred Kaiser. Kaiser has his beginning flight students visualize key reference points before ever leaving the ground. "I taxi the aircraft to a location where I can put it on the centerline of a long, straight taxiway. Students can see the centerline and get a good view of the horizon," he explains. "After shutting down, I place a

piece of masking tape down the cowling that lines up with the taxiway centerline from the pilot's per-

The four fundamental flight maneuvers, straight-and-level flight, turns, climbs, and descents, are the building blocks for all flying tasks.

spective in the left seat." Kaiser also marks the spot on the tape where the horizon crosses through the windshield just above the tape.

This exercise gives the pilot a solid reference for where the center of the airplane is, and a reference to where the horizon should be in straight-and-level flight. Though designed for a beginner, this technique could also aid an experienced pilot's transition to a new type of aircraft.

#### **On the Straight and Level**

The first of the four fundamental flight maneuvers, straight-and-level flight, is a condition in which you are essentially preventing the other three basics (turns, climbs, and descents) from happening. It requires you to detect deviations in direction and altitude as soon as they occur and apply flight control corrections precisely, smoothly, and accurately. This further reinforces the benefit of a light touch, with just enough of an input to correct the deviation, and not overcontrol the aircraft. With proper trim and smooth air, control inputs may not even be necessary. The altimeter and attitude indicator can help with maintaining a straight-and-level condition, but your primary source should be the natural horizon in relation to a reference point on the nose



An illustration of the vector-based lift forces in a turn.

of the aircraft, as well as off each wingtip. This last bit is an important point, since a common error is to try holding the aircraft straight and level by using the nose alone as a reference. This practice can result in dragging one wing low while using rudder pressure to compensate. Scanning both wingtip reference points also has the benefit of helping you scan for traffic, terrain, weather, and improving your overall situational awareness.

#### To Everything — Turn, Turn, Turn

I recall learning the definition of a turn as one of those memorable "say what?" moments in my fledgling flying days. "Horizontal component of lift overcoming centrifugal force" seemed like a mouthful for a 16-year-old to recite, let alone comprehend. Some good ground instruction, along with a few crude drawings quickly cleared up my understanding of the vector-based lift forces and how the four primary controls (ailerons, elevator, rudder, and throttle) all play a role in executing a coordinated turn. Ailerons bank the wings and determine the rate of turn; the elevator increases the vertical component of lift needed to maintain level flight; the rudder coordinates the turn by counteracting adverse yaw; and the throttle provides thrust which may be used for airspeed to tighten the turn. Integrating these inputs is important because uncoordinated turns can lead to loss of control incidents, especially during low altitude maneuvers. Good turn coordination also goes back to being able to "feel" the airplane, and recognize slips and skids without having to rely on instruments.

As with other maneuvers, always make turns with smooth, precise, and accurate flight control inputs along with outside visual reference points when able. Depending on the bank angle, the degree and type of control input will vary. Shallow turns require a bit more aileron input during the turn to overcome the aircraft's natural stability, whereas with steep turns, the tendency of the aircraft to overbank must be countered with aileron input opposite the turn.

#### What Goes Up ...

I'm sure the *Fantastic Four's* Human Torch goes by a different set of rules when blazing through the skies, but for us pilots, the ability to climb is limited by the thrust available. It is therefore important to know the appropriate power settings and pitch attitudes that will give you the climb performance you need.

For example, to achieve the best rate of climb  $(V_y)$ , use the airspeed where the most excess power is available over what's required for level flight.  $V_y$  provides the greatest gain in attitude in the least amount of time. Resist the notion that increasing pitch attitude here will give additional altitude gain. Although pulling up for a faster climb might seem intuitive, especially in a high stress situation, it will in fact decrease the rate of altitude gain.



Best angle of climb versus best rate of climb.



Best glide speed provides the greatest forward distance for a given loss of altitude.

To achieve the best angle of climb  $(V_x)$ , which is a considerably lower airspeed than  $V_y$ , use the airspeed where the most excessive thrust is available over what's required for level flight. This steeper climb configuration will get you greater altitude over a given distance and help you clear those trees looming upwind after takeoff.

Remember too that with adequate right rudder during a climb, you have the power to ward off those left-turning tendencies conspiring to steer you off course.

#### ... Must Come Down

As with climbs, 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.

However, it's often the strictly gravity-powered descents that require the most attention. During a glide, lift and gravity tend to have a bit of a tug-of-war struggle. Gravity inevitably wins, but the key is trying to gain as much forward motion as possible before reaching terra firma. Without power, pitch control is your biggest ally in maintaining a best glide speed, the speed that strikes a delicate "Goldilocks-like" balance between induced and parasite drag. In other words, maintaining anything other than best glide speed will cause your rate of descent to increase.

This cardinal rule gets many pilots in trouble, especially when faced with an inflight engine failure at low altitude. Sadly, there have been far too many failed attempts to "stretch" a glide by pulling back and decreasing airspeed. The physics never favor the pilot, and will invariably lead to an increased descent rate and sometimes an inadvertent stall.

When maintaining best glide speed, use outside visual references to aid in your pitch control and make the trim your new best friend. Note how everything looks, feels, and sounds in this configuration as well, so that you will be quickly and intuitively aware of variations that require an adjustment.

#### **Use Your Power Wisely**

Much has changed in aviation in the last 100 years, but the importance of learning and master-

ing the four fundamental flight maneuvers is a constant. These "fantastic four" skills comprise the very core of basic airmanship and provide critical

A healthy respect and mastery of basic skills can unlock all kinds of superpower potential.

insight into the aerodynamic laws that govern our ability to fly. They're also key components in defeating the archenemy of pilots — loss of control.

Whether you're a fledgling flyer or a practiced pilot, avoid the "one and done" mentality when it comes to learning the four fundamentals. Instead, make sharpening these skills a regular part of your everyday flight plans. Honing these skills may not help you save the universe, but they most certainly can help you live to fly another day ... which is always a feat worthy of superhero status.

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

#### Learn More

FAA Airplane Flying Handbook (FAA-H-8083-3B), Chapter 3, Basic Flight Maneuvers https://go.usa.gov/xnNKZ



# WHERE THE HECK ARE WE?

# Understanding the Lost Art of Aerial Navigation

BY JAMES WILLIAMS

here are a couple of things in life that bother me in ways that are completely out of proportion to how important they actually are. First, is the calculation of a tip at a restaurant — an issue that is admittedly outside the scope of this magazine. Second is our general sense of direction, or lack thereof. This one is very much a relevant topic, as it is a core skill for pilots. Our technology-enabled lifestyle appears to have exacerbated this deficiency.

#### The Magenta Haze

As the saying goes, a blessing can also be a curse. In my experience, the magnitude of the blessing also holds true for the curse. The Global Positioning System (GPS) is a prime example of that motto. GPS has revolutionized countless industries, including those that rely on navigation technology. Across all modes of transportation, GPS moved navigation from a mental exercise of some complexity to a purely push-button affair. In aviation, the magenta line has blotted out virtually every other navigation method. Yes, GPS makes navigation very easy and very accurate, but some (including me) fret about the curse it inflicts on "children of the magenta line" — pilots whose total reliance on GPS robs them of situational awareness.

Here's how the curse of the magenta line plays out in the simpler example of a car. GPS-based navigation, whether built-in or phone-based, has become fairly ubiquitous. Many people no longer drive anywhere (even locally) without GPS guidance. In my neighborhood, there are several exits that lead to different roads and different basic directions. The direction I'm taking determines which exit I use. Common sense? Yes — but I've noticed that many people now follow the GPS guidance even if it's not the most efficient route. Since the system automatically plots your location, it's easy to become complacent and not worry about where exactly you are.

GPS-enabled loss of situational awareness might not sound like a big deal, but knowing where you are without total reliance on the machine is an important skill — especially for aviation.

#### Where to Start?

Let's do a quick roundup on the navigation skills and tools we might be neglecting because of homage to the magenta deity.

First is pilotage. This simple and basic method relies on comparing the landmarks and features you see on a chart with what you see from the air. Pilotage is a skill that can be scaled for the task at hand. Depending on the distance between your checkpoints and the visibility, you might simply fly from one to the next. In other cases, though, you might combine pilotage with the next basic skill, dead reckoning.

Dead reckoning is a skill imported from nautical navigation. It involves navigating by flying predetermined headings at a predetermined speed for a predetermined time. Dead reckoning was an important skill in the nautical world because cross-



The magnetic compass is a foundation of navigation.



ing large bodies of water required operating without any visual reference to land. On long voyages, a captain's ability to dead reckon could literally be the difference between life and death for his crew and his vessel.

Even with GPS, I contend that it's both useful and important for pilots to have a basic working knowledge of these foundational skills.

#### **Tools of the Trade**

Now let's talk about the tools of navigation. In the dark days before GPS became the sole navigation method for pretty much everybody, we had things called Navaids. These included VORs (Very High Frequency Omnidirectional Range) and non-directional beacons (NDBs).

VORs are the more common and useful of the two radio-based Navaids. VORs allow you to track in a specific direction to the station and, if equipped

*ad-hoc* NDBs. The 800-pound gorilla of navigation, of course, is GPS. As you probably know, GPS uses a network of satellites to pinpoint your location anywhere on the globe. GPS deserves every bit of praise it receives, but as discussed previously, its dark side

is that it can tempt pilots into

Yes, GPS makes navigation very easy and very accurate, but some fret about the curse it inflicts on "children of the magenta line" — pilots whose total reliance on GPS robs them of situational awareness.

complacency and a potentially dangerous loss of situational awareness.

with Distance Measuring Equipment (DME), can

(ADFs). NDBs are essentially nothing more than

radio transmitters that the ADF can point to. Even

some commercial AM radio stations can function as

NDBs are used in Automatic Direction Finders

also tell you how far you are from the station.



An ADF instrument and receiver.



A GPS-based Nav/Com radio.

#### Leveling the Ledger

Think of this collection of navigation skills and tools we've discussed as a collection, each with its own assets and liabilities. The balance sheet below offers a quick summary.

	ASSETS	LIABILITIES
Pilotage	Simple, relatively easy; doesn't require any equipment in the aircraft or on the ground; excellent for maintain- ing situational awareness when done properly.	Relies upon good visibility and readily identifiable landmarks; may require a more circuitous routing.
Dead Reckoning	Easy to execute; doesn't depend on ground stations or satellites; allows for direct routing; not necessarily contingent on good visibility.	Requires more detailed planning than pilotage; requires instruments like magnetic compass and preferably a directional gyro; vulnerable to changing conditions like wind and aircraft perfor- mance when used in isolation.
VOR	Reliable; provides clear position infor- mation; precise; relatively easy to use; no requirement for visual reference.	Requires nav radios and antennas; lim- ited range and reception; dependent on ground station; can't fly "direct." Fewer VORs than there once were.
ADF	Reliable; simple; easy to use; no visual reference required.	NDBs are fast disappearing from the NAS; not as precise as VOR/GPS; vul- nerable to distortion around water; positional information dependent on proximity to the NDB; limited range.
GPS	Accurate; reliable; excellent posi- tion information; no visual reference required; "direct to" anywhere; no range limitations.	Weak GPS signal can be jammed; "direct to" can limit situational aware- ness; complexity and variety of avion- ics requires more familiarity with the specific unit. Also requires recurring database updates.

#### Out in the World

No method of navigation is perfect, even if GPS seems pretty close. The most obvious implication from the "balance sheet," though, is that it's not wise to rely on any single method of navigation. So I contend that mastering the "basics" of today's navigation means developing, and maintaining, a working knowledge of each navigational tool.

Let's start with pilotage and dead reckoning. Pilotage is very fundamental and, for those flying primarily for pleasure, it's a great way to reconnect with the "flight-seeing" benefits that might have attracted you to aviation in the first place. Make it a point to practice pilotage on a regular basis. Even better, practice pilotage with the vanishing art of dead reckoning. It can be very satisfying to find that you really can get from point A to point B within three minutes of ETA, with nary a glance at the moving map's magenta line.

It's also a good idea to keep up your skills using VOR (and, if you still have it, ADF) navigation. Don't



give your installed VOR/ADF equipment a free ride! Even if you use GPS as your primary source of navigation, set useful frequencies in the VOR/ADF boxes, and use them to cross-check the accuracy of GPS.

Before you roll your eyes about using "ancient" tools to cross-check GPS, remember that GPS does have weaknesses and even failures. I have personally experienced a GPS signal loss, which is not uncommon since GPS is a fairly weak signal. That makes it easy to jam or spoof, even accidently. While the FCC works hard to separate those frequencies from potential threats, the exponential growth of wireless communication makes it difficult to do so. There is also the chance of failure in your GPS antenna or hardware.

Using multiple navigation tools and skills also counteracts the GPS-induced loss of situational awareness, because it keeps you actively engaged in the flight. Rather than simply following the magenta line after takeoff, you actually have to look outside for pilotage, to reflect on where you are for dead reckoning, and to select and change frequencies when using VOR/ADF. This practice does add a bit of workload — especially if you are out of practice — but you can still use it in a less busy phase of flight. So look for opportunities to work basic navigational skill practice into normal flights. Practice these skills so that they will be ready and waiting should you actually need to use them sometime.

You'll be a better pilot — and that's what back to basics is all about.  $\searrow$ 

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

#### Learn More

*Pilot's Handbook of Aeronautical Knowledge* - Chapter 16: Navigation https://go.usa.gov/xnBCK

"Navigation Know-How" – FAA Safety Briefing-November December 2017, p 18 https://go.usa.gov/xnBC9

Instrument Flying Handbook https://go.usa.gov/xnBCN





# HOW TO

### THE BASIC ELEMENTS OF AVIATION COMMUNICATION

ave you ever seen the 1960s television series *Dragnet* with Sgt. Joe Friday? He was that no nonsense kind of detective who did everything by the books. A "just the facts" gumshoe, Joe Friday took his job seriously, and was always professional and precise.

Sgt. Joe was no gabby blabbermouth who talked a lot just to hear himself speak. No, sir! He spoke in concise, fact-based, monotone dialogues:

"This is the city: Los Angeles, California. I work here. I'm a cop."

Even if you've never seen the show, you already know where it takes place, who Sgt. Joe is, and what he does — in just four short phrases. It's clear, concise, and to the point. He gave you "just the facts, ma'am." That's all the information you need for situational awareness.

Let's take this cue from Sgt. Friday as we consider the basic elements of aviation communication.

#### **Be Concise, but Be Precise**

Brevity is important in "aviation-speak," but precision and understanding is key. Your radio transmissions should be as concise as possible while still ensuring that the controller understands what you want to do. Equally important is for you, the pilot, to understand exactly what ATC wants you to do. This principle also applies to non-towered airfields. Radio calls to the Unicom frequency should be as brief as possible to shorten your time on air, but they must also be accurate to help you and other pilots see and avoid. Here are a few tips:

**Write everything down.** Get into the habit of writing down ATIS information, taxi instructions, and ATC clearances. This is especially helpful for instructions that are complex. Write down basically everything you'll need to read back to the controller.

Here's why. The act of writing information confirms what you think you heard. It reinforces your understanding of what you need to do, and it allows you to plan what to say before you say it. It also helps reduce the possibility that you'll forget part of the instruction and have to request "Say Again?" to get it right.

Take advantage of the sequence that ATC uses to issue IFR clearances and use the CRAFT acronym to jot down your clearance instructions in the order they're given — Clearance limit, Route, Altitude, Frequency, and Transponder.

With your notes in front of you, you can speak clearly, confidently, and without pauses ("ums and

ahs") or hesitation. Your notes will also allow you to cut out excess verbiage and shorten up your readbacks to just the facts. "Runway 25" can shorten to "25," for example.

Don't get sloppy. Make sure you read back ALL of the facts. Don't shorten "taxi to runway 25, via taxiway Hotel, hold short 27," into "taxi to 25 hold short 27!" You have to acknowledge that you know a taxiway route is required to reach your destination.

At non-towered fields, many pilots will use the jargon, "taking the active," when they're about to move onto the runway. It may sound cool, but it's not. Non-towered fields do not have an "active" runway and, more importantly, such transmissions convey no useful information. Transmit "departing 27" instead so your fellow aviators will know which runway is in use.

Taxi diagrams serve a purpose. Use them. You can jot everything down on your taxi diagram, either with traditional pen and ink or by using the annotation features in most popular aviation apps. Get into the habit of drawing out the route you're instructed to take right onto your taxi diagram. Do this even at your home airport, and for every flight. This best practice verifies your assigned route and confirms accuracy. It will help you think about what you want to say before you key the mic, and it will also help you avoid runway incursions.

**Use your call sign.** Every time you transmit, identify your aircraft by its call sign — which is your aircraft's type, model or manufacturer's name, followed by the digits/letters of the FAA registration number, aka tail number. Call sign aircraft identification is a mandatory requirement by the FCC (the body that governs radio communications). That said, you can certainly add concise information about color or paint scheme in busy, non-towered airspace (or, as requested, at events like air shows) to help other pilots spot you quickly.

Once you have established two-way radio communication, it's common for ATC to abbreviate call signs on subsequent communications by using just the aircraft prefix and the last three digits/letters of its registration. Once the controller has used such abbreviations, you can follow suit.

#### **Aim for Professionalism**

Take all your radio calls seriously. You are a certified, professional pilot, and just like Sgt. Friday, you should take a no nonsense, disciplined approach to your transmissions. Always strive to use standard phraseology.

Manage the mic. Make sure it's not stuck in the transmit position. Do not transmit just to transmit. For heaven's sake, please do not use the frequency for personal conversations.

For non-towered airfields, take into account that a Common Traffic Advisory Frequency (CTAF) may be shared by several airfields. Always begin and end your transmissions with the airport name. Self-announced radio calls or Unicom requests are intended to enhance situational awareness.



"It drives me nuts when pilots say 'any traffic in the area, please advise," says Sarah Patten, Air Traffic Control Specialist at FAA Potomac TRACON. "It's my biggest pet peeve." She adds that "by asking any traffic in the area to advise, they're inviting every plane to key up at the same time, resulting in an indecipherable squeal, and they're also not accounting for any aircraft in the area that may not have a radio. The airport I fly out of, for example, has quite a few of these," Patten explains.

"A better option for pilots might be to use a second com radio to monitor the CTAF," suggests Patten, "and to recognize that it's always important to scan for traffic no matter where you're flying." Patten adds that it is important to monitor the CTAF

Effective communication is the critical link between pilots and controllers in the air traffic control system. Always be accurate, brief, professional, polished, and courteous in all your radio transmissions.

in the vicinity of airports. "By assuming that everyone in the area is talking on the radio, it's easy to get complacent with traffic scanning, which can lead to some nasty surprises," cautions Patten.

Lastly, don't announce your every position or action, only the ones that prevent conflicts in flight, the traffic pattern, or during taxi. Some airports, especially ones that share a congested frequency, desperately need pilot discretion when making radio calls. Keep in mind that all communication frequencies are typically a party line, and only one person can talk at any one time.

Remember — effective pilot/controller communications are key to safe operations.

Here are a few resources you can use to improve



your radio technique.

#### 1. Learn the Lingo.

Pilots will find the Pilot/Controller Glossary very helpful in learning what certain words or phrases mean. Good phraseology is concise, it's accurate, and it's the mark of a professional pilot. Jargon, chatter, gabbiness, and slang have no place in proper, professional ATC communications. All pilots can benefit from reviewing the P/C Glossary from time to time to sharpen up phraseology and technique. You'll find a copy of the Glossary here: go.usa.gov/xn43f.

If your aircraft is hibernating for the winter or if you haven't flown in a while, stay sharp by listening to liveatc.net, the live feed of ATC communications. It's a great way to listen to the way controllers speak, keep up on the lingo, and pick up a few phrases you didn't know as you wait for spring.

#### 2. Review the AIM.

The FAA Aeronautical Information Manual (AIM) is your one stop, back to basics guide for flight information and ATC procedures. You'll want to check out Chapter 4 on Air Traffic Control and section 2 of that chapter on radio communications, phraseology, and technique. The AIM was recently updated last year. Visit faa.gov/air\_traffic/publications to make sure you have the most up to date version.

#### 3. Listen Before You Transmit.

Many times you can get all the information you need on the active runway just by listening to ATIS.

Likewise, when you're switching frequencies, stop, listen, and make sure it's clear you're on the right frequency before you start transmitting. You also want to avoid "stepping on" another pilot who is already transmitting when you join the frequency.

"Pilots should listen not only to hear if someone is talking before they key up, but they should also listen to what is being said," advises Patten. "I can't tell you how many times I've issued an instruction to a plane, only to have someone else immediately check in before the first plane can read back the instructions. That makes it harder for me to verify that the first plane received my instruction, and frequently creates more work for both the pilot and the controller," says Patten.

Likewise, if you're instructed to monitor a frequency, do just that and listen only. The controller will initiate contact as needed.

A good practice when you have a non-urgent request is to let ATC know by transmitting your call sign with the word "request." The controller will acknowledge and let you know when he or she has the opportunity to listen.

#### **Be Courteous and Keep It Classy**

Effective communication is the critical link between pilots and controllers in the air traffic control system. Always be factual, accurate, brief, professional, polished, and courteous in all your radio transmissions. These are the basic elements of proper aviation communication and are the keys to ensuring a strong bond between you and the controller. Practicing and perfecting these basics will not only enhance safety for you, but for all users in the airspace system.

Jennifer Caron is an assistant editor for FAA Safety Briefing. She is a certified technical writer-editor, and is currently pursuing a Sport Pilot Certificate.

#### Learn More

Aeronautical Information Manual's Pilot/Controller Glossary go.usa.gov/xn43f

FAA Safety Team (FAASTeam) Radio Communications Phraseology and Techniques go.usa.gov/xRFvk

Aeronautical Information Manual faa.gov/air\_traffic/publications/media/aim.pdf

# **Angle of Attack**

### GA Safety on the Right Track Steady Progress Reported at Annual Safety Summit

"2017 may end up being our safest year ever." That was the exuberant leadoff message from FAA Administrator Huerta during his fifth and final General Aviation Safety Summit last October. Although final numbers are still being tabulated, all indications favor fiscal year 2017 as being the safest year on record for general aviation. At the time of this writing, the GA fatal accident rate was estimated to have dropped below the not-to-exceed target rate of 1 per 100,000 flight hours to just 0.84. In total, there were 209 fatal GA accidents in FY 17, with 347 fatalities. As recently as 2011, those numbers were 278 and 469 respectively.

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"We all know there's no silver bullet when it comes to making GA safer," said Administrator Huerta. "It's an issue that needs to be approached from many angles — some regulatory, some technological, some educational."

By working with industry partners, the FAA has made meaningful progress on all fronts. On August 30, 2017, the FAA finalized the part 23 rule that overhauls airworthiness standards for GA airplanes and paves the way for new entrant technologies like electric and hybrid propulsion. Together with streamlining the approval process for Non-Required Safety Enhancing Equipment, or NORSEE, these actions aim to decrease the time to get safety-enhancing technologies to the marketplace.

Another area that has received increased attention is with airman education. The General Aviation Joint Steering Committee (GAJSC) is integral to that effort, with a collaborative approach to targeting and communicating key safety issues for pilots and mechanics.

The GAJSC is also one of the driving forces behind the FlySafe campaign, which relies on help from industry partners like the Aircraft Owners and Pilots Association, Experimental Aircraft Association, General Aviation Manufacturers Association, and Helicopter Association International to disseminate information on preventing loss of control accidents. The campaign has reached millions via articles, online resources, emails, and social media platforms. (For more, go to go.usa.gov/xnjrr or visit www.faa.gov/news/safety\_briefing for a list of safety enhancement GA fact sheets.) In collaboration with aviation training community experts, the FAA is also updating key elements of the airman certification system to include an enhanced focus on risk management in the Airman Certification Standards documents that are beginning to replace the Practical Test Standards.

"Education and technology have all been linchpins for us to move the needle on GA safety," says Jim Viola, Deputy Director of the Office of General Aviation Safety Assurance. "We're extremely proud of the progress made, but we must continue to stay vigilant to keep general aviation safety moving in the right direction."

That means continuing to find new ways to communicate safety and encourage the development and use of both new and existing tools. One proven effective approach involves

We're extremely proud of the progress made, but we must continue to stay vigilant to keep general aviation safety moving in the right direction.

data. Using data, the FAA and industry are working together to identify risk, pinpoint trends through root cause analysis, and develop proactive safety strategies.

The GA community and the FAA are moving toward using de-identified GA operations data in the Aviation Safety Information Analysis and Sharing (ASIAS) program to help detect risks before they become accidents.

"General aviation's engagement in ASIAS is crucial," says Administrator Huerta. "We need to continue using data to identify trends and direct our efforts where they're needed most."

Tools are now available to the GA community to help explore and understand their own flight data and look for potential risks. Go to http://go.usa.gov/cZugh for more information.

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





### Hone Your Flying Skills with Six Basic Risk Mitigation Steps

**BY PAUL CIANCIOLO** 

n the popular TV show "American Ninja Warrior," competitors tackle a series of challenging obstacle courses on their continuing quest for physical excellence. To be a winner, participants must be at peak performance and have a solid plan for dealing with whatever hurdles come their way.

But let's try putting it in aviation terms. Do you have what it takes to become the next *American Ninja Pilot*? All you need to do is takeoff, cruise, land, and taxi your aircraft safely while staying in compliance with regulations to win. Sounds easy, *right*? Not so fast.

While "winning" can sometimes be easier for new pilots — those with a fresh certificate and newfound understanding of the rules — it can be a riskier endeavor for pilots that think they know everything about flying. So, on your quest for aviation excellence, up your flying game by checking out these six basic risk mitigation steps outlined by some of the FAA's *flying ninja masters*.

#### **1. MAINTAIN PROFICIENCY**

Poor training in any skill set increases the potential for an undesirable outcome. Just like athletes, pilots must continually train to be at their best.

"Don't assume the skills you had a couple months ago are still present," counsels Aviation Safety Inspector (ASI) Shawn Hayes, acting manager of the General Aviation and Commercial Division's Airmen Certification and Training Branch. "Practice doesn't make perfect; perfect practice makes perfect."

That perfect practice Hayes refers to is unique to every pilot, because no pilot is proficient in all situ-

ations. Self-assess your aeronautical abilities. Then work on those less-than-perfect skills with a flight instructor.

"If it's been more than six months, then it is time to get back to basics," notes ASI Heather Metzler, FAASTeam Program Manager at the FAA's Little Rock Flight Standards District Office. "Every GA pilot should consider creating a training plan with an instructor, and flying that plan at least every six months."

Another great way to maintain your proficiency is to earn a set of WINGS. The FAA's WINGS Pilot Proficiency Program allows pilots to maintain currency and proficiency in the basics of flight to enjoy a safer and more stress-free flying experience. There are online courses, local in-person seminars, and webinars available at FAASafety.gov to improve your skills and knowledge. As an added bonus, completing a WINGS phase satisfies the FAA flight review requirement.



#### 2. PLAN EACH FLIGHT

Planning is an essential step that GA pilots can take to avoid pilot errors. Plan each flight before it takes place, even when you're flying to a familiar airport. Preflight planning enables you to gain situational awareness and make an informed go/no-go decision.

"We all probably remember our 'chair flying' days when we were student pilots," explains Hayes. "It doesn't end there; *trust me*. Try to rehearse a flight before you accomplish it."

Flight planning should not only include the route of flight; it should also include a review of pertinent airport diagrams. It's essential to take time during the preflight planning process to review airport diagrams, especially any "hot spots" that you might encounter along your taxi route (more on this later). Even the best *ninja warriors* take time to practice each obstacle course before a competition.



#### 3. USE SET PROCEDURES

You can't remember everything; after all, even a ninja is only human. That's why using and adhering to checklists and set cockpit procedures is so important on every flight. Routine use of set procedures to complement mandatory actions can greatly reduce the risks arising from human errors.

"Mitigating risk at an individual level can be as simple as using a checklist, mnemonic, personal minimums, and a flight risk assessment tool," advises ASI Jeffrey Smith, FAA's Flight Standards Service Compliance Philosophy Focus Team member. "The key is that your strategy needs to address the hazards and risks unique to you and your flight. The method needs to be repeatable and used routinely. Make sure to evaluate your performance after each flight to see if your risk mitigation is working."



Use of a flight risk assessment tool or FRAT is one strategy that every *ninja pilot* should use.

"A comprehensive FRAT can help make sure you have adequately considered the areas or risks pertinent to your flight," notes Smith. "You should use the tool every time you fly so it becomes a natural part of your preflight, even when pressed for time."

There are many free FRATs out there. The FAA Safety Team (FAASTeam) developed one that is available on the App Store for iOS devices at bit.ly/FAAST-FRAT. If apps don't appeal to you, the FAASTeam has a Windows and Mac spreadsheet version available at go.usa.gov/3sJWA.

Other basic, risk-mitigation strategies include setting up anticipated navigation and communications frequencies before you taxi, copying clearances from air traffic control, maintaining a sterile cockpit during critical phases of flight, and using proper taxi procedures including appropriate taxi speeds.

#### 4. PREVENT TAXI CONFUSION

Now that you made it through the course, don't trip up at the finish line. You're better than that!

Taxi confusion most commonly occurs when a pilot is taxiing at an unfamiliar airport. Low-visibility conditions increase the potential for confusion. Request progressive taxi instructions when taxiing at a controlled airport. Progressive taxi instructions are an excellent mitigation strategy to ensure compliance with taxi clearances and avoid runway incursions. Have access to the airport diagram when taxiing; it's the same diagram used during your preflight planning.

Also pay attention to any "hot spots" on airport diagrams, which highlight complex runway/taxiway configurations and can help prevent confusion at these locations. Make the use of airport diagrams a standard operating procedure to prevent getting disqualified from the game for prematurely crossing a line.

#### **5. ENSURE SITUATIONAL AWARENESS**

Make sure you know what is going on around you at all times, and that starts during your preflight planning. If you reframe your situational awareness to cover all phases of flight, you are more likely to reduce pilot errors.

"Be keenly aware of what's happening around you," explains ASI Kevin Clover, the FAASTeam operations team lead. "Mix that together with your life experience and all you've learned about aviation. Then, take appropriate action to keep things safe. Or, in short: *Perceive, Process, Perform*."



Garmin photo

To help perceive the airspace around you better, add a little technology to your arsenal. The use of ADS-B offers real-time precision and shared situational awareness. Free traffic, weather, and flight information are available on Automatic Dependent Surveillance-Broadcast (ADS-B) In receivers that can receive UAT broadcasts. These services are available across the nation to aircraft owners who equip with ADS-B In.

#### 6. MANAGE AIRCRAFT LIGHTS

This one may go against your ninja instincts, but you want to be seen. GA pilots often overlook daytime use of aircraft lights. Exterior aircraft lights make an aircraft operating on the airport surface more conspicuous. Aircraft lights also allow others to have some idea of the pilot's intentions. Proper use of aircraft lights should be a defined step in your set standard operating procedures.

"Make yourself as visible as possible," echoes Aviation Safety Analyst Brad Zeigler. "Good aircraft lighting isn't just for night flight. Anti-collision lights, strobes, and landing lights increase your visibility during the daytime too."



#### WINNING IS EVERYTHING

We all know that takeoffs are optional, but landings are mandatory. In contrast to ground-based activities, once you accept the challenge and become airborne, your only option is to finish the "race."

To prevent a loss of control, use the six basic steps outlined here to mitigate your risks. They can help prevent a hazard from causing harm and reduce risk to a more tolerable or acceptable level. The best pilots train year-round in order to earn *American Ninja Pilot* status. So before you set a course and take off for Mount Midoriyama, make sure you cover all the *obstacles* ... and the basics.

Paul Cianciolo is an associate editor and the social media lead for FAA Safety Briefing. He is a U.S. Air Force veteran, and a rated aircrew member and volunteer public affairs officer with Civil Air Patrol.

### A Very Particular Set of Skills Your Comments Needed on AMT School Curriculum

There's no doubt that the regulations for aviation maintenance technician schools (AMTS) need changing. The FAA is working to modify these regulations, known as the 14 CFR part 147 rules, that oversee the curriculum, and the operations, for AMTS.

Let's take a look at the issues concerning the rule changes, and how you can get involved.

#### **The History**

AMTS rules were created back in 1962. Since then, the rules have undergone amendments, but substantial changes to the rule itself have not been made. Beyond that, no changes to the curriculum have been made since 1992.

#### The Issue

Since the 1992 curriculum was published, it is clear that general aviation and business aircraft technology has evolved. In addition, there have been advances in many other aspects of the industry, such as rotorcraft technology, composites, unmanned aircraft systems, glass panels, avionics, and much more.

In a nutshell, the curriculum has not changed to keep up. Consequently, many experts assert that the current curriculum does not adequately prepare AMT students for the future that lies ahead.

#### **The Proposal**

To modernize and reorganize the course curriculum, the FAA proposes to remove the course content items from the part 147 appendices, and place them in the AMTS' OpSpecs where they can be revised without the need for rulemaking. This process allows schools to propose amendments to their curriculum as needed to keep pace with changes in aviation technology.

#### **The Process**

To get this idea moving, the FAA proposed a new part 147 rule back in 2015. After the public and many industry groups weighed in, the agency evaluated comments and determined that changes needed to be made.

The FAA is working on a supplemental proposed rule, and a draft Advisory Circular 147-3C, for public

review and comment. The publication of the supplemental notice of proposed rulemaking, or SNPRM, begins a 60-day comment period for everybody

— that includes you, the industry, and any and all interested parties — to take a look at the proposed rule and submit comments, suggestions, or propose alternative ideas.

#### **Get Involved**

By law, you have a say in the process to create rules. The FAA needs and values your comments. The most helpful comments reference a specific portion of the proposal, explain the reason for any recommended change, and include supporting data. The agency reviews each and every public comment we receive. Your comments do indeed make a difference, as evidenced by this new, proposed part 147 rule that was re-drafted to respond to and acknowledge public comments and suggestions.

#### You Have a Particular Set of Skills

Your experience and knowledge on all things aviation are valuable, and your comments and suggestions are in demand. Help us to help modify the rules that govern AMTS to ensure that techniciansin-training remain on the cutting edge of new aviation technology.

In the near future, the proposed rule and the draft advisory circular will be published in the Federal Register. We strongly encourage you to visit the Register at www.federalregister.gov. Sign up for email alerts. Be the first to find out when you can review the new rule, and send us your comments. We want to hear from you!

For more information on how the rule change process works, check out the articles, "What is the Federal Register, and Why is it Important," and "Out for Comments — Why Does it Take so Long to Process a Rule?" in the 2016 November/December issue of *FAA Safety Briefing*.

Jennifer Caron is an assistant editor for FAA Safety Briefing. She is a certified technical writer-editor, and is currently pursuing a Sport Pilot Certificate.

# Vertically Speaking

### FAA Rotocraft Safety Continuum on Track

Webinars and presentations that explain and clarify the recently issued FAA Rotorcraft Safety Continuum for Systems and Equipment Policy designed to make helicopters safer — will be coming to an event or a computer near you.

The FAA Rotorcraft Standards Branch, Helicopter Association International, AHS International, and the General Aviation Manufacturers Association plan to coordinate the presentations to answer questions about the policy and remove any misconceptions.

In June 2017, the FAA published its policy statement for part 27 normal category rotorcraft systems and equipment whose purpose, "is to facilitate a more rapid incorporation of advances in technology for systems and equipment by recognizing a balanced approach between the risk and safety benefits for installing such technology." The hope is that more flexible certification policies will make safety technology more accessible, easier, and less expensive to install so more lives will be saved. This safety technology includes autopilots and primary flight displays, which typically include attitude, altitude, and airspeed indicators.

Currently, FAA rotorcraft certification regulations (parts 27 and 29) divide helicopters into two aircraft types: Normal Category (up to nine passengers and 7,000 pounds) and Transport Category (greater than 7,000 pounds and up to 20,000 pounds, with some additional requirements for helicopters over 20,000 pounds.)

The policy, which applies to helicopters under part 27, will be divided into four classes. These further divisions were necessary to eliminate the onesize-fits-all approach that can discourage installation of the equipment. We realize that holding smaller



Flexible certification policies will make installation of safety technology, like this Primary Flight Display/Multi-Function Display easier.

basic helicopters to the same standards of larger and more complex helicopters could impede safety by making safety equipment too expensive to install on smaller helicopters.

The classes are divided as follows: Class I covers helicopters with reciprocating engines and five or less occupants, including the crew. Class II covers helicopters with single turbine engines, space for five or less occupants, including the crew, and a maximum gross weight of up to 4,000 pounds. Class III covers helicopters with single turbine engines, six or more occupants, including the crew, and a maximum gross weight over 4,000 pounds up to 7,000 pounds, while Class IV covers helicopters with twin turbine engines.

Each class has a set of standards and level of scrutiny, with Class IV having the highest level of scrutiny because these helicopters are the larger and most sophisticated aircraft. Class I has the least scrutiny.

Based on comments received when the policy was issued for public comments, some members of the helicopter community were expecting that the policy would address specific equipment installations, especially for Single Engine Instrument Flight Rule (IFR) helicopter approvals.

"This policy was not meant to address specific equipment regulations," said Jorge Castillo, Rotorcraft Standards Branch regulations and policy group manager. "Instead the policy was issued to spell out broad expectations to allow flexibility in the installation of systems and equipment for all part 27 approvals, not just IFR."

To spread the word, Andy Shaw, Rotorcraft Standards Branch engineer and the FAA contact person for the policy, briefed the policy at the December 2017 European Aviation Safety Agency Rotorcraft Symposium in Cologne, Germany. The FAA plans to discuss the policy during the February-March 2018 HAI HELI-EXPO helicopter convention. An FAAindustry webinar took place a few months ago, and others are planned.

Gene Trainor is a technical writer and editor in the FAA Rotorcraft Standards Branch.

# **Flight Forum**

#### L'Echo My Echo

Passed 107. Looking through the new maps that the FAA has begun to post. Would I need to apply for a waiver for Echo 5 airspace in order to operate in San Diego outside of its many major airport facilities? My Phantom notes that I'm in Echo, however some areas have the 700/1200 floor, but some of these maps in echo have 0 as the floor. I'm assuming that means down to the SFC. Cheers!

— Eric

Congrats on earning your remote pilot certificate, Eric! As you noted, you will need to apply for an airspace authorization to fly within the lateral boundaries of the surface area of Class E airspace designated for an airport. The airspace that appears on the "class E5 airspace" layer surrounding San Diego depicts areas in which class E airspace begins at 700 feet above the surface. If the Class B shelf does not start until 700 feet, then it is Class G underneath and no authorization is needed.

Grids with zeros on the UAS facility maps indicate areas within controlled airspace around airports and other aircraft operating areas, like hospital helipads, where requests to operate will require further coordination and FAA safety analysis. These steps can take additional time to process and may result in additional safety mitigations by the remote pilot. The maps are a tool to help tailor remote pilot requests to align with locations and altitudes when they complete airspace authorization applications at www.faa.gov/uas/request\_waiver.

#### Fly on Class 3 Med Then Switch to Basic-Med?

I qualify for BasicMed. However, I have a current/valid Class 3 medical certificate that expires March 2018. May I continue to fly on that certificate, then switch to BasicMed before my certificate expires? Thanks!

— Bob

Hi Bob, thank you for your email. Yes, you can hold both your third-class medical certificate and BasicMed at the same time. You can continue to fly using your third-class medical certificate until it expires in March 2018 and, assuming you have completed the BasicMed requirements, you can switch to BasicMed before your third-class expires. For dual BasicMed and third-class holders, after your



Q: Is there an all-in-one website that can help me decide if I need to equip and what equipment options I have?

A: Yes! Go to faa.gov/go/equipadsb

third-class expires, you can continue to fly under BasicMed for up to 48 months from the date of the comprehensive medical exam signed by a statelicensed physician, and 24 calendar months from the last completion date of a BasicMed medical education course.

FAA Safety Briefing welcomes comments. We may edit letters for style and/or length. If we have more than one letter on a topic, we select a representative letter to publish. Because of publishing schedule, responses may not appear for several issues. While we do not print anonymous letters, we will withhold names or send



personal replies upon request. If you have a concern with an immediate FAA operational issue, contact your local Flight Standards District Office or air traffic facility. Send letters to: Editor, FAA Safety Briefing, AFS-921, 55 M Street, SE, Washington, DC 20003-3522, or e-mail SafetyBriefing@faa.gov.

# Postflight

### **Aviation or Flying?**

Aviation, with its airways and electronic navigation stations and humming autopilots, is a science. Flying, with its chugging biplanes and swift racers, with its aerobatics and its soaring, is an art. (...) Aviation or Flying, take your choice. There is nothing in all the world quite like either one of them.

Richard Bach
A Gift of Wings

Airplanes raise us above the patterns of streets, forests, suburbs, schools, and rivers. The ordinary things we thought we knew become new or more beautiful, and the visible relationships between them on the land, particularly at night, hint at the circuitry of more or less everything.

> — Mark Vanhoenacker Skyfaring: A Journey with a Pilot

Regular readers will know that I have long cherished Richard Bach's *Gift of Wings* as "the" lodestar, because the beautifully written essays so deftly

It seems appropriate — even essential — to acknowledge the equal importance of the Flyer's more poetic approach to defining the basics of aviation. express the many dimensions of our collective love for Aviation and/or Flying. A few years ago, though, I was delighted to discover a second touchstone book in Mark Vanhoenacker's *Skyfaring*. As he writes in an early chapter, "so high above

the world, open to more of the planet and sky than any species has the right to see, we find room for introspection in one of the last places we might have thought to look for it."

#### The Science and the Art

If you haven't read these books, I commend them to you — along with the beautifully presented 2015 *Living in the Age of Airplanes* film, which tells the compelling story of how the airplane has so utterly changed the world in little more than a century.

These works are wonderful on their own terms, but I have a special reason for recommending them here and now. We have devoted this issue of *FAA Safety Briefing* to what back to basics means in terms of the aviate-navigate-communicate-mitigate framework. We have necessarily focused almost exclusively on what Bach calls the "science" that he defines as the realm of the Aviator. So it seems appropriate — even essential — to close this edition by acknowledging the equal importance of the Flyer's more poetic approach to defining the basics. Here's why.

Whether you are sky-bound as a pilot or as a passenger, the complexities of the modern world can add an incredible hassle-factor to, well, everything. I don't have to describe the irritations and inconveniences that so often bedevil today's airline passengers. For GA pilots, there are challenges of weather, of time, of expense. For airline pilots, there are also challenges of weather and time, coupled with getthe-job-done pressures that can bring stress, fatigue, and a weary sense of been there, done that routine.

#### **Rekindling the Flame**

As you may have guessed, all three of the works I recommend here provide a reinvigorating tonic for such weariness. They give voice to the art and the beauty airplanes provide. They remind us of the heart and the soul. They evoke the melody and the verse for music that quickens every Flyer's heart, reminding us of the joy we find in the sky both as pilots of our own aircraft and as passengers privileged by the perspective that mechanical wings provide.

So as part of your winter back-to-aviation-basics activities, don't forget to include the art along with the science. Get the books and the film. Curl up by the fire, savor them, and let them rekindle your love for both Aviation and Flying ... because there truly is nothing in all the world quite like them.

Susan Parson (susan.parson@faa.gov, or @avi8rix for Twitter fans) is editor of FAA Safety Briefing. She is an active general aviation pilot and flight instructor.

# FAA Faces



# **Heather Metzler**

FAA Safety Team Program Manager, Little Rock Flight Standards District Office



As a native of Arkansas and lifelong aviator, Heather Metzler serves the aviation community in one of the FAA's most important roles — as a FAA Safety Team (FAASTeam) program manager, or FPM. In this capacity, she provides

general aviation (GA) safety outreach, training, and education alongside a group of FAASTeam volunteer representatives in the Little Rock Flight Standards District Office's (FSDO) area of responsibility.

"One of the best parts of my job," she notes, "is working with the fantastic FAASTeam volunteers who are making a big difference in aviation safety."

Having flown more than 100 aircraft types, Heather fits right in with the dedicated and highly experienced aviation professionals that work at each FSDO. A combination of operations and airworthiness inspectors work as a team to provide support and oversight of federal aviation regulations. Each FSDO has two FPMs who work closely with the inspectors to provide analysis and trends to the FSDO manager. Together, the managers continually develop and evaluate local plans to reach out to the GA community.

Heather grew up in and around aviation, spending her weekends hot air ballooning and banner towing with her father. She soloed on her 16th birthday, and became a flight instructor while attending college. She started flying corporate aircraft as a contract pilot in Cessna Citations soon after graduating from college.

Heather did a brief stint with Continental Express flying the Embraer ERJ145. However, airline flying with a young family and a corporate pilot husband vectored her back to Arkansas. She started her own company for contract flying and aircraft management, where she flew aircraft types ranging from single engines and light twins, to turboprops and jets.

In 1996, Heather started volunteering with the FAA as an aviation safety counselor (now known as a FAASTeam representative). She was hired as an FAA Aviation Safety Inspector in 2010, and later became the local FPM.

Heather advises pilots to conduct a personal aviation safety audit before taking to the skies. Ask yourself: When was the last time you flew with an instructor and did air work, takeoffs and landings, goarounds, or reviewed airport signs and markings?

"If it's been more than six months, then it is time to get back to the basics," Heather explains. "Think about when you were learning to fly. If you missed a couple of days or weeks between lessons, the next lesson would likely be a review of what you accomplished the last time before moving on to something new. Does that change once you receive your pilot certificate? *I don't think so*. Every GA pilot should consider creating a training plan with an instructor, and flying the plan at least every six months."

Heather keeps her personal proficiency plan on track by flying with friends and as a volunteer pilot with Civil Air Patrol's Arkansas Wing. In CAP, she is able to share her passion for flying through orientation flights for young cadets.

Heather realizes that sometimes pilots just have challenging flying days. This recognition aligns with the FAA's compliance philosophy, which recognizes that non-compliance with a rule can be caused by a lack of knowledge or diminished skills. Remedial training is one method to get the pilot back to basics and back in compliance. This individually tailored training is based on the deficiency that was the root cause of the non-compliant action.

"When I discuss remedial training with an airman I often hear, 'I wish I had known how to stay proficient *before* this happened," she explains. "I believe the FAASTeam's proactive approach with outreach and education, along with providing remedial training when needed, helps put us on the right track for reducing the number of GA accidents."

Paul Cianciolo is an assistant editor and the social media lead for FAA Safety Briefing. He is a U.S. Air Force veteran, and a rated aircrew member and public affairs officer with Civil Air Patrol.



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