May/June 2022

# FAA Safety BRIEFING


## *Let's Talk* Tech ... *and* Weather

Federal Aviation Administration

U.S. Department
of Transportation

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



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## ABOUT THIS ISSUE…

The May/June 2022 issue of *FAA Safety Briefing* focuses on the variety of tools and technology aviators can use to avoid and/or safely mitigate weather risks. Feature articles cover some of the FAA's latest weather research work and programs, including more effective ways to steer clear of turbulence and interpret weather products and resources. We also explore some tips to improve your preflight self-briefings.

**Contact Information**
The magazine is available on the internet at:
**www.faa.gov/safety_briefing**

Comments or questions should be directed to the staff by:

- **Emailing:** SafetyBriefing@faa.gov
- **Calling:** (202) 267-1100
- **Tweeting:** @FAASafetyBrief

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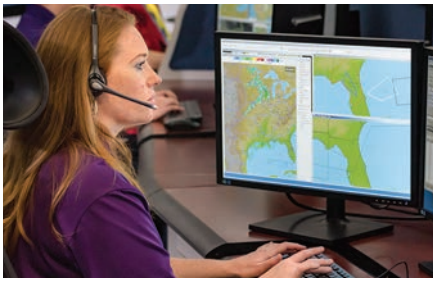

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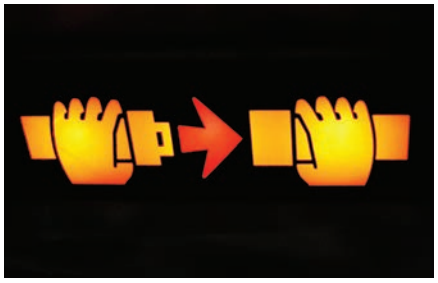

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# JOINING THE CREW

When I joined the FAA nearly a quarter century ago as an Aviation Safety Inspector in the Scottsdale, Ariz. Flight Standards District Office (FSDO), I was excited to start a new phase of my aviation career (more on that shortly). I never imagined having the opportunity to lead the FAA's Flight Standards Service (FS). But when that opportunity came my way, there was no question about my answer. As much as I enjoyed my previous position as the FAA's Flight Program Executive, I was proud to step forward and lead the 5,000-plus dedicated professionals in Flight Standards Service.

> GIVEN MY LIFELONG LOVE OF AVIATION, IT HAS BEEN A PLEASURE TO FIND THAT MY NEW POSITION ALSO INCLUDES THE OPPORTUNITY TO MEET GA PILOTS AND MECHANICS LIKE YOU THROUGH THIS REGULAR DEPARTMENT IN *FAA SAFETY BRIEFING* MAGAZINE.

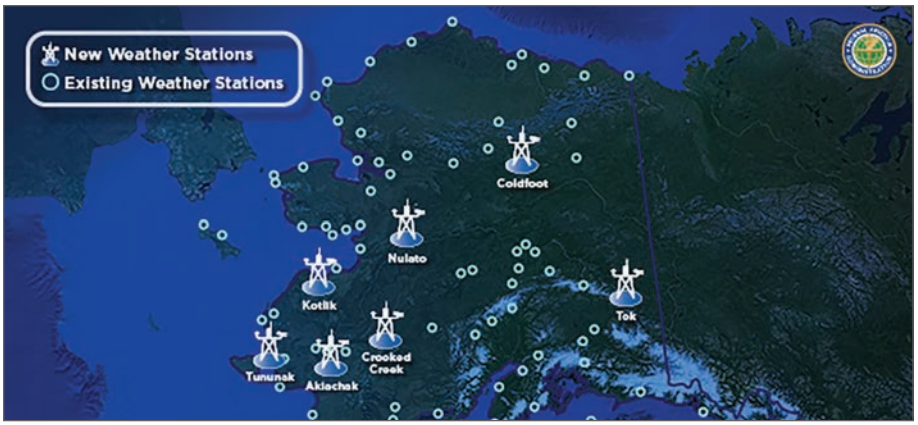
My leadership philosophy starts with people and the team we form from our collective talents. Since starting my new job in mid-March, I have been working to meet as many employees as time and travel allow and to learn about the many issues and challenges facing this organization. Given my lifelong love of aviation, it has been a pleasure to find that my new position also includes the opportunity to meet GA pilots and mechanics like you through this regular department in *FAA Safety Briefing* magazine.

I've been there! My civilian aviation background includes serving as a pilot, flight instructor, and check airman. My FAA career also includes serving as the part 119 Director of Operations in the legacy Flight Inspection Flight Program, the Flight Standards Flight Program, and the Washington Flight Program, as well as Senior FAA Representative in Afghanistan.

For my first *FAA Safety Briefing* issue, though, I am happy to tee up the topic of technology and weather. Like you, perhaps, I have watched over the years GA aviators acquire weather tools and technology that would have been the envy of every airline pilot not so very long ago. That is just one of the many reasons that it's such a great time to be in aviation. As the magazine team reminds us, though, even the best weather technology isn't very helpful without clear thinking and correct action by the crew. It all comes back to people and to a commitment to staying current in every way — and we're all glad that you have included this publication in your aviation education toolkit. Enjoy this issue, and I'll look forward to meeting you again in the next one.

> EVEN THE BEST WEATHER TECHNOLOGY ISN'T VERY HELPFUL WITHOUT CLEAR THINKING AND CORRECT ACTION BY THE CREW.

# AVIATION NEWS ROUNDUP




## FAA Adding Weather Reporting Stations Across Alaska

The FAA is installing technology across Alaska to provide weather conditions to pilots before they take to the skies. Eight new Automated Weather Observing Systems (AWOS) provide continuous, real-time, and accurate weather information on remote areas of Alaska. The sites, recommended by the Alaska aviation community, should be operational by October 2022.

The eight new stations are Akiachak, Coldfoot, Crooked Creek, Kotlik, Nulato, Perryville, Tok Junction, and Tununak. Weather information from these locations gives all pilots a preview of what to expect when arriving. It allows IFR pilots to conduct instrument approaches to the lowest possible minimums, increasing the safety and predictability of operations. See the press release at bit.ly/AKAWOS for more information.

## 2022 National General Aviation Award Winners Announced

Every year for more than 50 years, the General Aviation Awards program and the FAA have recognized aviation professionals for their contributions to general aviation in the fields of flight instruction, aviation maintenance/avionics, and safety. These awards highlight these individuals' vital leadership roles in promoting safety, education, and professionalism throughout the aviation industry.

Congratulations to the following recipients of the 2022 National General Aviation Awards:

- Amy Hoover of Ellensburg, Wash. — 2022 Certificated Flight Instructor of the Year
- Michael Everhart of Charlotte, N.C. — 2022 Aviation Technician of the Year
- Laura Hermann of St. Bonifacius, Minn. — 2022 FAA Safety Team Representative of the Year

To read more about each award winner, go to generalaviationawards.com/news.

## Changes to Instrument Rating Cross Country Approach Requirement

The FAA reviewed two legal interpretations and determined they were overly restrictive. The Glaser (2008) and Pratte (2012) legal interpretations focused on the requirements of an instrument rating under 14 CFR section 61.65. These interpretations inaccurately concluded that an applicant for an instrument rating must use three different navigation systems to meet these requirements.

This year, on Feb. 28, the FAA rescinded both the Glaser and Pratte legal interpretations, stating that the

## SAFETY ENHANCEMENT TOPICS

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

**MAY**

**Managing Component Failure —**
How pilots should manage system/component failures and prepare for engine failures after takeoff.

**JUNE**

**NORSEE —**
A look at the safety benefits of after-market and non-required safety enhancing equipment (NORSEE).

regulations' plain language requires three different types of approaches, not three different navigation systems. Certificated flight instructors and designated pilot examiners should be aware that the requirements for an instrument rating may be met by performing three different approaches, regardless of the source of navigation. More information is available at bit.ly/14CFR6165.

## New AME Minute Video: Obstructive Sleep Apnea

A recent episode of the Aviation Medical Examiner (AME) Minute video series covers the new obstructive sleep apnea initial and recertification worksheets designed to collect all the necessary information to streamline the certification process. Watch the video at youtu.be/rzqHzH4L1zM. You can also find the FAA's pilot safety brochure on obstructive sleep apnea at bit.ly/FAAOSA (PDF).

## Path Set to Eliminate Lead Emissions from GA by the End of 2030

The FAA set a new initiative that outlines how our country can safely eliminate the use of leaded aviation fuel by the end of 2030 without adversely affecting the existing piston-engine fleet.

The effort to remove leaded aviation fuels is based on four pillars of action involving the FAA, the Environmental Protection Agency, fuel suppliers and distributors, airports, engine and aircraft manufacturers, research institutions, associations, environmental experts, communities, and other stakeholders. The four pillars are:

1. Develop Unleaded Fuels Infrastructure and Assess Commercial Viability
2. Support Research and Development and Technology Innovations
3. Continue to Evaluate and Authorize Safe Unleaded Fuels
4. Establish Any Necessary Policies


These pillars leverage and build upon a continuing collaboration with industry through the Piston Aviation Fuel Initiative. For more information, see the press release at bit.ly/FAA_EAGLE. If you have comments, you can email the FAA at 9-AOC-eagle@faa.gov.

## Midair Collision Report Provides Insight on Potential Risk Areas

Midair collisions are a persistent and deadly threat to aviation safety. From 2016 to 2021, there were 43 reports of midair collisions involving general aviation (GA) operations in the United States, resulting in 79 fatalities. Data from the FAA's Aviation Safety Information and Analysis Sharing (ASIAS) GA team indicate that over time, GA operators with Traffic Alert and Collision Avoidance Systems (TCAS) have had a consistently higher Resolution Advisory (RA) rate — an indicator of midair collision risk — as compared to commercial (part 121) operators. This difference prompted ASIAS to study TCAS RA events, particularly within the GA community. The General Aviation Joint Steering Committee (GAJSC) later issued a report on the findings.

Over a three-year period (2015-2018), ASIAS initially studied RA events at three airport locations, relying on data from algorithm-derived RAs, ADS-B equipment, Flight Operations Quality Assurance data, and text-based safety reports. At each location, areas of dense reports, or clusters, were identified and labeled based on the type of event occurring within it. These included Level Flight, Climbing Into Traffic, Descending Into Traffic, Parallel Approach, and Helicopter.


This graphic of RA cluster activity around the Teterboro Airport indicates a majority of TCAS RAs occur northwest of the airport (purple region).

Once the initial results were validated, the study expanded to cover 50 airports in the United States with the most simulated general aviation TCAS RA events. The results for each location were intuitively displayed over a sectional to help depict the particular locations or routes where collision risk may be more likely. Clusters with darker or denser colors indicate areas with the most events. A graph also accompanies each display to illustrate the proximity of aircraft involved in the events. It is worth noting that the reasons for TCAS RA interaction vary with location, not just by airport, but by location at the airport.

While the report does not provide any specific mitigation strategies for avoiding midair collisions, it is the GAJSC's intention that this information can provide the aviation community with useful insight on potential risk areas at certain locations in the NAS. Some air traffic facilities have already used the results to validate changes to VFR routes under development. See the report here: bit.ly/GACollisionStudy.

# PULLING Gs

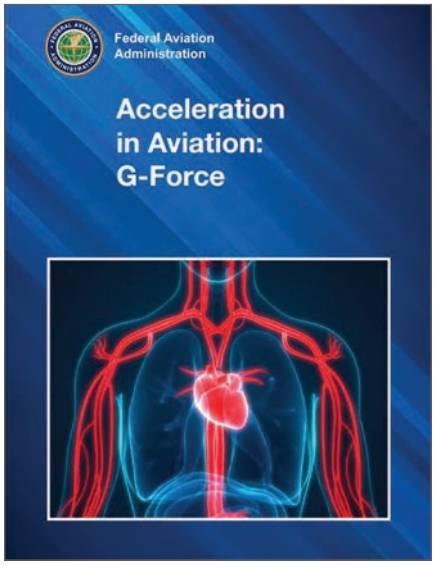
As GA pilots, we tend to think of "G-forces" as a concern for aerobatic pilots, but g tolerance should be a concern for all aviators. Recall from ground school that the term *g* refers to the acceleration from the Earth's gravity. The term g is also used as a shorthand for an acceleration equivalent to gravity. Hence, one can also experience g's in turns and changes in speed, such as recovering from a dive.

## G-LOCing

Humans are designed to operate in a 1 g environment in our everyday world. This is also true of most situations in the cockpit, but GA airplanes are typically capable of 3.8 g's in the normal category and 4.4 in the utility category. A level 60 degree bank imposes an acceleration of 2 g's and 75 degrees 4 g's. Clearly, this can be a factor for the aircraft. But what about the pilot?

Think of your heart as a pump. When you are sitting or standing, your heart must overcome a fluid column of around a foot in height to perfuse (or supply) your eyes and brain with blood. It is greater for a taller person than one who is shorter, which is why someone who's shorter has an increased tolerance to g's. It's the same for people with higher blood pressure — but at the cost of increased risk of heart disease, kidney disease, and strokes. As you engage in maneuvers that increase g's, you are, in effect, increasing the height of the fluid column that your heart must overcome. On average, each additional g reduces pressure by 22 mm Hg at eye level.

As g's increase, pilots typically notice a progressive loss of vision from their peripheral vision towards the center. This may be followed by greyout, blackout, and eventually lead




to a loss of consciousness, called g-induced loss of consciousness or GLOC. Those of you who have had your eye pressure checked know that it ranges between 10 and 20 mm Hg for most (average blood pressure is 120/80 or less). Eye pressure must also be overcome to perfuse the eyes; thus, vision is usually lost before consciousness. But in the event of a rapid g increase, as you might encounter in upset recovery, you could go immediately to GLOC without warning.

If you experience symptoms from g-loading, the only solution is to reduce the g-load and let your body recover. Progression to GLOC can be fatal. Even if the controls are relaxed after GLOC, the following confusion lasts an average of a minute before full recovery … a long time close to the ground.

## Why Me?

You may be thinking that the g-limits of a normal category airplane like yours will mean you're not in any danger. After all, competition and fighter pilots often withstand over 8 g's. However, remember that these pilots are selected for tolerance, have specific training, engage in fitness programs to increase resistance, and do not fly when ill. Fighter pilots also have g suits.

Factors that can reduce g tolerance include illness, dehydration, fatigue, fasting, and some medications. Additionally, your general fitness and smoking habits can negatively impact your g tolerance. Also, your g tolerance is not a static thing. Much like your health in general, your g tolerance can vary over time. Just because you tolerated a 3 g turn years ago doesn't mean you could do the same today.

What can you do? Stay well-hydrated and maintain a well-balanced exercise program with a mix of aerobic and resistance weight training. Activity that is only aerobic in nature may decrease g tolerance.

Like our aircraft, all of us have a limit to our g tolerance. Unlike our aircraft, ours can vary considerably. Exceeding either is not a good path to a happy ending for your flight.

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

### LEARN MORE

Pilot Minute: Why is Acceleration Tolerance Important for General Aviation?
**bit.ly/G-ForceLOC**

Acceleration in Aviation: G-Force
**bit.ly/AccGForce**

# ALLERGIES AND ALLERGY MEDICATION

The spring months bring welcome warmth but also an unwanted stowaway — seasonal allergies. In terms of fitness for flight, allergies usually fall into the category of a condition that pilots can manage without assistance from an Aviation Medical Examiner (AME) or other physician.

Remember, though, that the swollen, boggy, nasal and sinus tissues associated with allergies are a prime setup for ear and sinus blocks, which can be incapacitating. And just because you can safely ascend does not mean you can safely descend. The swelling seen in both allergies and "colds" can turn some air passageways into one-way valves — expanding air can escape, but one cannot "repressurize" on descent. If the symptoms are bad enough to interfere with your ability to act as pilot in command, then you should ground yourself until the symptoms have subsided.

It's similar, but not identical, to dealing with fatigue. If you feel fatigued, you should ground yourself until you can get sufficient rest. Once rested, no medical clearance is required to return to flight status.

So what's different with allergies? Some of the most common over-the-counter (OTC) medications used to treat them can be more problematic than the allergies themselves. The chief offender is diphenhydramine (common trade name: Benadryl®). It is one of the most prevalent and commonly used medications, both alone and in combination products, and its prevalence can create a problem. Since diphenhydramine is an OTC medication and widely available, it doesn't occur to most pilots that it might be disqualifying. But it is.

## Frequently Asked Questions

**Q: What is the concern with diphenhydramine?**
Diphenhydramine is a sedating antihistamine. In fact, it is such an effective sedative that it is used in most OTC combination pain relief medications (i.e., Tylenol PM®) intended for bedtime use, and it is the sole active ingredient (i.e., Zzzquil®) in most OTC sleep aids. Even if diphenhydramine doesn't put you to sleep, it can dramatically impair your cognitive abilities, which are critical to your safety.

**Q: Is diphenhydramine (Benadryl) the only concerning sedating allergy medication?**
No, there are others, such as chlorpheniramine (Coricidin®) and doxylamine (found in Vicks NyQuil®). If the box warning says "May cause drowsiness" or if it advises the user to "be careful when driving a motor vehicle or operating machinery," then the medication is NOT safe for flying.

**Q: Are there allergy medications that I can take and still fly?**
Yes, there are a number of non-sedating antihistamines available. These include loratadine (Claritin®), desloratadine (Clarinex®), and fexofenadine (Allegra®). If one of these medications controls your symptoms without making you sleepy, you may use them and continue flying with no wait time if you have no adverse effects during an initial 48-hour ground trial for any new medication.

**Q: What if I have to take diphenhydramine?**
For some aviators, diphenhydramine may be the most or only effective solution. In that case, you should be aware that laboratory testing has demonstrated an extremely long period of impairment associated with diphenhydramine. This is why you should wait five times the maximum pharmacologic half-life (or 60 hours) before returning to flight.

## Resources

One of your best resources is the Allergy – Antihistamine & Immunotherapy Medication page in the AME Guide: bit.ly/30LJsF1 (PDF). It describes in detail what medications are allowed, require a wait time, or are unacceptable.

### ADDITIONAL RESOURCES

OTC medications you can take and still be safe to fly
**bit.ly/32N7FpR**

Medications and Flying Brochure
**bit.ly/3DUiMQY**

FAA TV: Why is the FAA Concerned About Over-the-Counter Sleep Aids?
**bit.ly/373zx0T**

Do Not Issue-Do Not Fly (DNI-DNF) list from the Guide for AMEs
**www.faa.gov/go/dni**

If you have any questions, don't hesitate to contact an AME or your Regional Flight Surgeon's (RFS) office.

HELP US STAY

# ON TRACK

WITH THE

## 44TH ANNUAL

## GENERAL AVIATION AND PART 135 ACTIVITY SURVEY


**Complete your survey today!***

IT ONLY TAKES 15 MINUTES!

Receiving responses to the GA survey from all aircraft is essential to assess the need for aviation infrastructure and evaluate the impact of safety and aviation initiatives.

**Survey invitations were sent to a select group of aircraft owners/operators.*

## Understanding Flight Hours and Safety Metrics

Reporting your flight hours is critical because of the direct linkage to computing accurate accident rates.

- ☒ **Not Reporting Your Hours = Higher Calculated Accident Rate**
- ☑ **Reporting Your Hours = Lower Calculated Accident Rate**

More Accurate

**QUESTIONS? CALL 800-826-1797 OR EMAIL INFOAVIATIONSURVEY@TETRATECH.COM**

By Tom Hoffmann

# LEVERAGING LEIDOS

## *Making the Most of Your Online Flight Service Weather Briefing*

*"It's not information overload. It's filter failure."*— **Clay Shirky**

As a child of the 70s, I had a front-row seat for some pivotal periods of the information age. When I reflect on my first real office job, the centerpiece of my computer-less desk was an old beige analog phone flanked by a never-ending mound of paperwork and sticky notes. I look back on those times with a certain amount of fondness, reveling in the ability to stay laser-focused on my duties and use the phone as a primary means to conduct business. There were no emails, websites, or viral cat videos to distract us from the tasks at hand. But in what seemed like the blink of any eye, the personal computer, followed soon by broadband internet, simultaneously enabled and disabled certain aspects of work and life as we knew it.

The transition gave us instant access to troves of information, but it also overwhelmed us with choices. That seems to describe life for many people today, even more so thanks to the supercomputers we carry around in our pockets that incessantly vie for our attention.

Pilots are familiar with the plight of information overload. Glass cockpit technology has modernized the way we fly and can convey multitudes of information about what's happening with our airplanes, even predicting what could happen. Processing that data can be like drinking from a firehose, and it's tricky business for a pilot already task saturated. But as Clay Shirky's quote points out, it's a matter of discipline to leverage the right sources of information and filter out what we really need.

A good example is the preflight weather briefing process. Most pilots are not meteorologists, so the plethora of available weather information can cause "analysis paralysis," especially with the migration towards online self-briefings. The folks at Leidos Flight Service, the FAA contractor that handles flight service duties for the continental United States, know how important it is for pilots to get the essentials they need to make sound go/no-go flight decisions. Leidos' website, 1800WXBRIEF.com, has evolved significantly in recent years to give pilots greater access to the information they need and when they need it, but in a way that also doesn't make your brain explode. Allow me to highlight a few features that will help you be better prepared and more familiar with all available resources for your next flight.

## You Had Me at Login

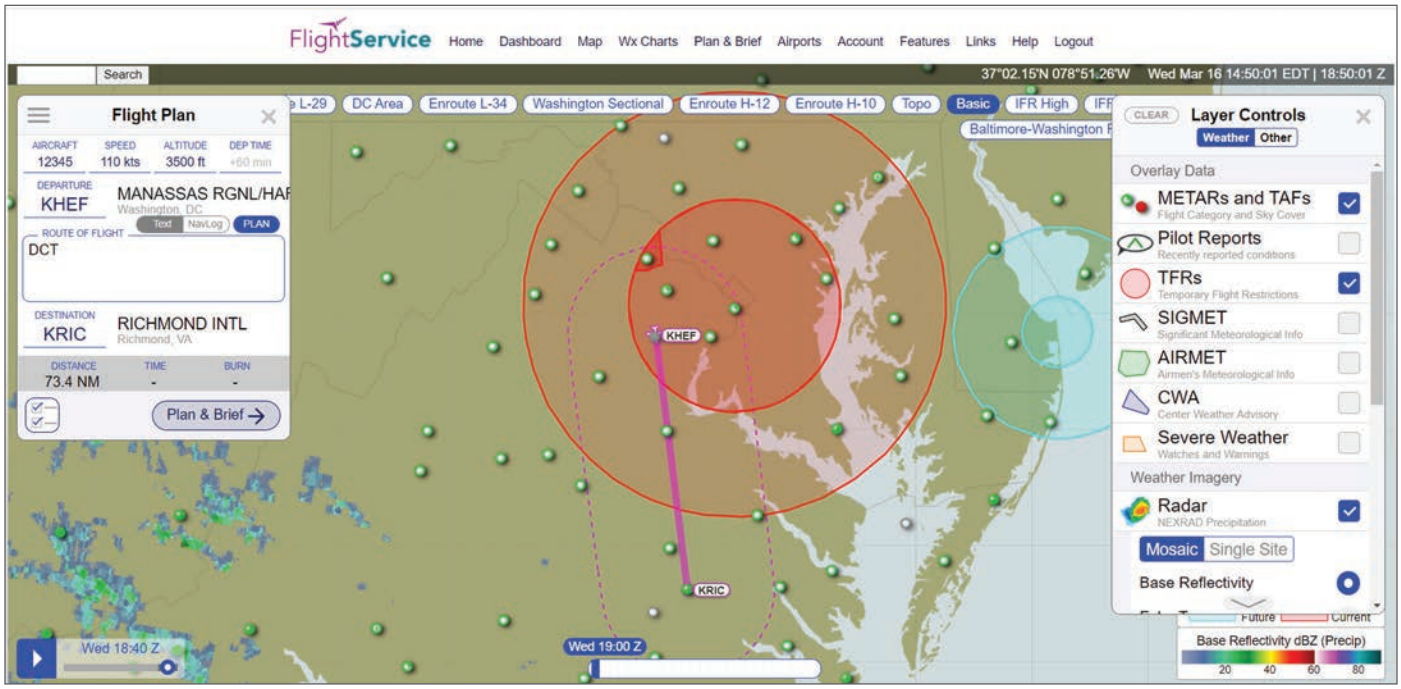
First things first. If it's been a while since you've visited 1800WXBRIEF.com, or if it's your first time (welcome!), you'll want to make sure you can log in. This is important as the site is only partially accessible until the user has logged in and, in some areas, tracks and records user activity to the Pilot History page. This history remains for 45 days and provides evidence that you received a weather briefing — a nice thing to have in your back pocket. New users can register by clicking the Create Account link on the home page. If you already have a call-in profile set up with Flight Service, the system will link that information to your new web account. Once logged in, your dashboard page will appear and get you on your way.

The interactive map is one particular area of the website that Leidos Innovation and Outreach Director Jeff Arnold likes to showcase. "It's one-stop shopping for weather briefing and flight planning that you can view side by side," explains Jeff, referring to the flight plan mask that appears once you're on the interactive map page. Simply type your departure and arrival airport in the flight plan box. A direct route of flight (magenta line) will display on the map along with NEXRAD precipitation imagery, nearby Meteorological Aerodrome Reports (METARs), Terminal Area Forecasts (TAFs), and Temporary Flight Restrictions (TFRs). Using the layer control button in the upper right corner, you can toggle several other layer tools on and off (stacked white squares icon). These include AIRMET/SIGMET weather advisories, cloud imagery, turbulence, icing potential, and much more. There are also several map backgrounds to choose from beyond the basic default, like a VFR sectional, IFR en route charts, and aerial satellite views.

> **Leidos is firmly committed to updating and improving the features and functionality of its website and services.**

## Getting Some Local Flair

Another awesome and somewhat overlooked feature of layer tools is the vaguely named "Other" section, directly adjacent to the weather layers. This section gives pilots unique insight into local area conditions. It is based on




**The interactive map feature of 1800WXBRIEF.com lets you easily see weather and information relating to your plotted route of flight. Toggle through the layer controls (right side) to show different overlay data, like METARs, TFRs, and mosaic radar imagery.**

**Leidos Flight Service knows how important it is for pilots to get the essentials they need to make sound go/no-go flight decisions. The Flight Service website has evolved significantly to give pilots greater access to the information they need, but in a way that also doesn't make your brain explode.**

pilot feedback after Leidos consolidated its briefer locations. With a series of options, pilots can explore local weather phenomena and potential aviation hazards that were once the domain of local briefers.

"To capture this valuable local area knowledge, we took the material we use to train our briefers, then uploaded, categorized, and placed it on the map. There's a lot of good-to-know information on there that you won't find anywhere else," says Jeff, who notices many a raised eyebrow during presentations of this feature.

It's an excellent idea to explore these area knowledge options, especially if you're flying through unfamiliar territory. You'll see topography and aviation hazards, like high-volume flight school activity areas (yellow boxes), and how land features like mountain passes or plateaus can affect weather in a specific region. You can even click on an individual state to view the major weather makers or see how the climate in that area varies by season. There are also helpful overlays of common military training routes and special-use airspace like prohibited or restricted areas that are sometimes hard to discern on a sectional. Think you might need the help of Flight Service in flight? All Flight Service Station, Air Route Traffic Control Center, Approach, and Automated Surface/Weather Observing System (ASOS/AWOS) frequencies you might need on your route of flight are available with a click.

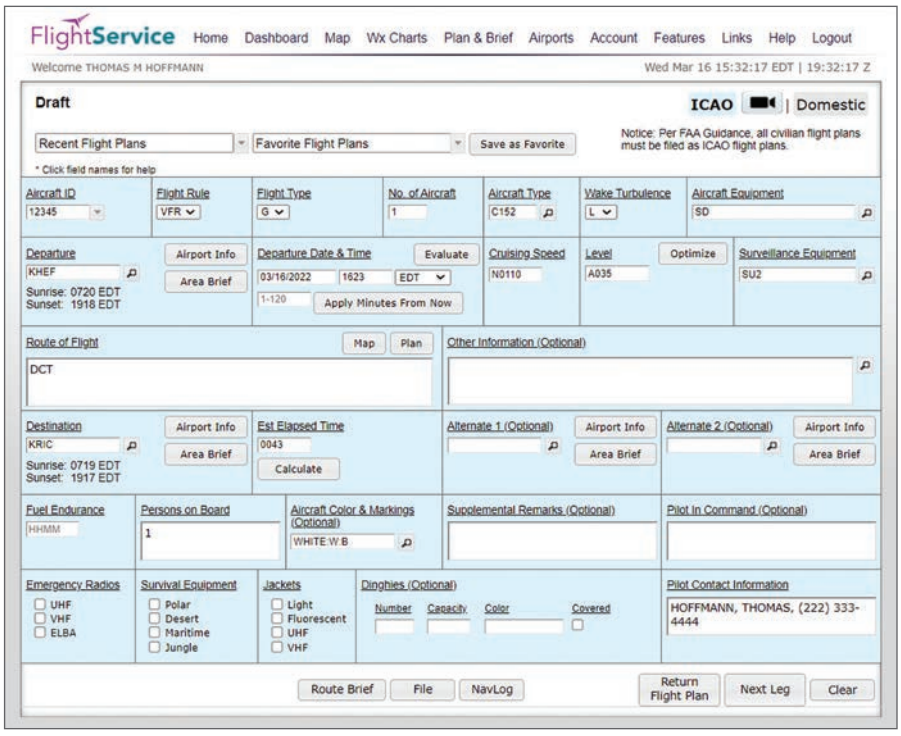
"This area knowledge feature serves as an excellent teaching tool for flight instructors, too," adds Jeff. "You can easily show students what all these areas look like and how they could affect the safety of flight." That's not to mention the importance of getting students to appreciate the value of the Leidos website at an early stage. I wish I had had such a detailed resource during my training!

One last feature of the interactive map worth noting is the briefing checklist available on the flight plan overlay (button with two small checkmarks). The checklist will take you through all of the different layers and features mentioned earlier in a more methodical manner. Note that every filter you choose gets logged into your pilot history. The checklist can be customized to best suit your needs and includes several weather charts to aid your weather research efforts.

## Sounds Like a Plan

The weather for your trip looks good, so your next step is filing the flight plan. Leidos makes that part easy as well. From the flight plan mask, click the Plan & Brief button to bring up an electronic ICAO flight plan form. To help save time, all of the info you fill out on the map will carry over to the form. Leidos makes filling out the rest as painless as possible, with help fields to guide you. Just hover over each section title of the form for tips on the required input or the magnifying glass to search for and select items. For example, you can choose your specific make/model of aircraft from a stored list and choose aircraft and surveillance equipment types from a checklist. *Tip*: By entering your aircraft information beforehand into your account, the form will provide you with an estimated cruising speed, time en route, and an optimized altitude based on your flight details.

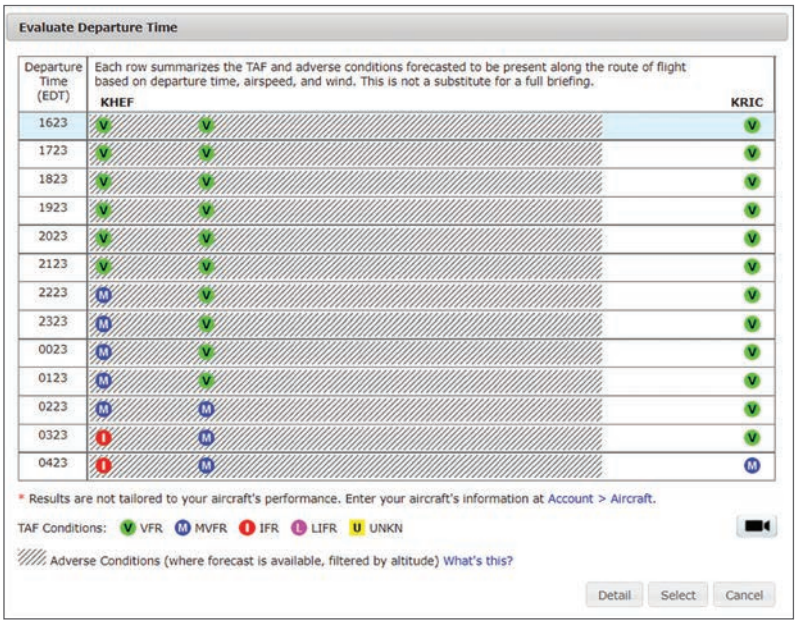
To further help with go/no-go decisions, the flight plan form's Evaluate Departure tool lets pilots enter a departure time (Zulu time is converted for you) and view a list of addi-




**The electronic ICAO Flight Plan Form has several features to help make filling out the form faster and easier.**

tional departure windows along with the estimated route conditions for those times. It lets you easily see how you can avoid marginal VFR conditions or convective activity by delaying the departure time. Click on each proposed time slot for more detail and to view TAF stations along your flight route.

Do you need weather info and charts for your departure, destination, or alternate stations? Click on the Airport Info or Area Brief buttons next to any of these items on the flight plan form. You can also customize your route of flight by using the Plan button adjacent to the Route of Flight field. Once you're done with the form, use the buttons at the bottom to customize a weather briefing for your chosen route, file your plan, and create a kneeboard-sized navigation log to take on your flight. (Watch this video to learn more on the ICAO Flight Plan form on the Leidos Flight Service website: bit.ly/ICAOFltPlns.)




**To help with go/no-go decisions, the flight plan form's Evaluate Departure tool lets pilots view a list of additional departure windows along with the estimated route conditions for those times.**

## Right-Sized for Everyone

With our growing dependence on mobile technology, it's a given that Leidos made platform scalability a high priority. "When we say we're mobile-friendly, we're not joking," quips Jeff. He adds that it's rare to see any device-related complaints but that you are limited to the screen size of your device. There is an option to switch to the full desktop version on a mobile device if that's preferred.

Another feature for smartphone users is the ability to text Flight Service at 358-782 or FLTSVC to get METARs, TAFs, and adverse condition reports. You can also use the EasyActivate & EasyClose email or text messaging features to activate and close your flight plan. And if you've got an at-home smart device (e.g., Alexa, Google Assistant), try using it to retrieve METARs, TAFs, and Aviation Forecast Discussions. (This PDF guide can help with setup bit.ly/SmartSetUp.)

Leidos is firmly committed to updating and improving the features and functionality of its website and services. At the time of this writing, Leidos issued a notice outlining several new web enhancements, including the addition of ASOS/AWOS and FSS frequencies to navigation logs, the ability to amend flight plans with ATC route changes via text (Easy Amend), and something pilots have been eagerly awaiting, the ability to filter out Flight Data Center (FDC) NOTAMs from briefings. The complete list of website updates is available here: bit.ly/LEIDOSUpdates.

## Free and Easy

While there are simply too many features of the Flight Service website to highlight in this article, I hope this high-level tour provides a few pointers and reminders that can help you leverage this vital weather resource with greater efficiency and success.

"We realize most GA pilots are uncomfortable with the weather," says Jeff. "But we're here, and we're free. So go online, check the weather, and if you have questions, call us."

According to Jeff, the best way for pilots to genuinely tackle weather issues is to get their hands on the weather information and make a run at doing regular self-briefings. The more you get used to using the tools and seeing what's available, the more weather wisdom you'll accrue and the better prepared you'll be for your next flight. Of course, pilot feedback is critical to ensure continued success, so be sure to let Leidos know what you think at bit.ly/LEIDOSFeedback. Blue skies and tailwinds!

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

### LEARN MORE

Leidos Flight Service Web User Guide
**bit.ly/LEIDOSWebGuide (PDF)**

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

FAA Safety Team Course ALC-683, *Conducting Preflight Self-Briefings for VFR/Student Pilots*
**bit.ly/CourseALC683**

"The Century Club: 100 Years of Flight Service," *FAA Safety Briefing* — May/Jun 2020
**bit.ly/2Y8DnOb**

# Surfing the Digital Atmosphere

## *What's Cool, Fun, and Free for Pilots to Learn Aviation Weather*

*By Jennifer Caron*


Garmin Photo.

*"Weather forecast for tonight: dark. Continued dark overnight, with widely scattered light by morning."*

**— George Carlin**

Here's a shocking statistic — did you know that general aviation (GA) accounts for 88% of all weather-related accidents in the National Airspace System (NAS)? (*see Learn More for the report*). Let's let that one sink in for a bit. 88%! Air carriers only account for 3%. Commuter aircraft? Just 5%.

Here's an even more sobering statistic — most GA pilots do not walk away from weather-related accidents — the outcome is fatal more often than not. Visibility is the number one problem.

There's no doubt that aviation weather is a serious threat to GA safety with numbers like these. But why? With all the advances in weather technology and all the resources pilots can access, such as in-person briefings, phone apps, websites, and the alphabet soup of PIREPS, NEXRAD, TIBS, ATIS, AWOS, AIRMETs, SIGMETs, METARs — oh my! — there's an all-you-can-eat buffet of up-to-date weather reports and forecasts for pilots to fill up their plates.

So, with all the weather information that's available, why do weather-related accidents continue to plague GA? The answer is not so simple; it's complex — just like a bank of towering clouds ahead — it's multi-faceted with many layers.

The bottom line is that aviation weather information is frequently misinterpreted. First, most weather products are not meant for or geared towards aviation. The vast majority of weather information is for people on the ground, not in the air. Add to that the fact that some weather products and information are not intuitive enough for cockpit use, then top that off with the need for improved weather training and standardized competency requirements, and you've got yourself an atmosphere that makes it tough for pilots to recognize rapidly changing weather conditions.

## Under the Weather

Pilots are not meteorologists and are not expected to give the local forecast on the evening news. However, pilots do need to know and understand the weather and how it can impact the aircraft, the flight, and the ability to control the aircraft.

So which type of weather data would you rather have in the cockpit? Do you want weather data that is a forecast of conditions valid at the current time but may not be completely accurate? Or, would you rather have a weather display that's picture-perfect at the time the weather conditions were measured but is now anywhere from 15 to 20 minutes old? Of these, which would you use to make a good decision to avoid bad weather?

These are the kinds of questions that the FAA's Weather Technology in the Cockpit (WTIC) program examines. They look for the most effective ways to present weather information in the cockpit, determine the most relevant weather data for aviation use, make weather easier to understand, improve training, and make recommendations to the aviation industry on how to deliver weather in a more manageable format. Their goal is to help pilots consistently and accurately interpret weather information, understand its limitations, and use it effectively to avoid adverse weather.

WTIC is one of two research programs in the FAA's Next Generation Air Transportation System Aviation Weather Division. Along with the Aviation Weather Research Program, WTIC seeks to enhance aviation safety by minimizing the impact of adverse weather on flights operating within the NAS.

"GA pilots struggle to interpret weather products, which places them at a greater risk of flying directly into hazardous weather," says Dr. Ian Johnson, engineering psychologist and human factors researcher in the WTIC program.

"We've run experiments and found that most pilots focus primarily on the weather they have at takeoff or landing. The mindset is, 'If I can just get up safely, then I'll look out the window and decide what to do,'" explains Gary Pokodner, WTIC program manager. While it is not necessarily a bad idea to take off and take a look, staying safe requires staying alert to weather changes. Other pilots focus more on the weather at the landing to make sure they can get down.

GA aircraft operate in (rather than above) most weather, and many pilots do not get to see hazardous weather until they fly into it. That's why in-flight updates are vital. A 200-mile trip, for instance, can leave a two or three-hour weather information gap between your preflight briefing and your actual flight.

"Almost everybody seems to neglect in-flight weather," says Pokodner. In-flight weather forecast tools present a challenge to pilots, and they find them harder to use.

"If you only understand 50% of the weather radar, satellite data, or an AIRMET, for example, then there's a good chance you don't actually know if the weather is good enough for you to fly or not," Pokodner explains. It's important to develop an overall picture of current and forecasted weather to determine how it will affect visibility, turbulence, aircraft performance, and your personal minimums.

**"If you only understand 50% of the weather radar, satellite data, or an AIRMET, for example, then there's a good chance you don't actually know if the weather is good enough for you to fly or not."**

"We need to find a better way to teach pilots the weather and determine areas where pilots have a weakness," says Dr. Johnson. One of WTIC's main objectives is to uncover gaps in pilot training and gauge a pilot's understanding and interpretation of cockpit weather sources (e.g., METARs) and weather products (e.g., SIGMETs).

## Ceiling and Visibility Unlimited

So, where can pilots go to learn aviation weather? I'm not just talking about weather sources or some boring meteorology text that doubles as a sleeping pill. I'm talking about learning tools that engage your eyes and teach us with immersive experiences. Visualization is a much more effective teacher than words on a page because images stick with us longer, and they help us get a *feel* for the weather. Pictures are priceless when it comes to displaying complex, dynamic information like cloud cover and precipitation.

A wealth of virtual courses, videos, and augmented and virtual reality experiences really up the coolness factor to learn aviation weather. There are apps for your phone and videos that are light, enjoyable, and informative and won't chew up a chunk of your time to learn some valuable safety tips to make better go/no-go and in-flight decisions.

Let's dive into the digital atmosphere of cool, fun, and free products and explore some exciting weather tools on the horizon.

## See It

Augmented Reality (AR) uses technology to superimpose a computer-generated image or video on real-world objects. If you've ever tried "view in your room" from your smartphone, that's AR. Retailers use it to let you see and "try on" products in your home before you buy them. To see how AR works for weather, check out this cool video on the formation of a thunderstorm: bit.ly/ARThunderstorm.

Use your smartphone or tablet to download the free AR aviation weather app WeatherXplore, available for iOS and Android on the App Store and Google Play.

WeatherXplore makes printed pages come alive with enhanced graphics, images, and videos linked to the book

*Aviation Weather with Augmented Reality* to give you an interactive print experience. Content is animated, and there are videos, courses, quizzes, and interactive 3D. Press the scan image button in the app to see weather conditions in real-time and know what lies ahead on your route. What's more, you can use your smartphone to create a 3D virtual reality experience from any sectional chart.

There's more with WeatherXplore — ten short, free mini-video lessons based on real-world weather scenarios that are light, fun, take less than 15 minutes to watch, and cover topics such as density altitude and carburetor ice. You can find them on the Fly8Ma website for free (bit.ly/FLY8MAWeatherXplore), on the Western Michigan University site with a free account (bit.ly/WMichElevate), and on YouTube at bit.ly/FreeWeather.

WeatherXplore was sponsored by WTIC and developed in partnership with PEGASAS (the FAA's Center of Excellence for General Aviation), and Western Michigan and Purdue Universities, with contributions from Tietronix Software and Fly8MA.com, an online private pilot ground school.

## AND Believe It

If you haven't tried virtual reality (VR), you are missing out. VR is next-level immersion inside a 360-degree world. All your senses respond to sights and sounds in the virtual world just as they do in the real world, which makes for an astonishingly true-to-life experience. With many of us grounded due to COVID-19, VR is a great way to fly to any airport you choose, learn a new flight management system, and practice your procedures. With VR, it's as if you're right inside the cockpit, working the controls, feeling what it's like to maintain control through turbulence, or watching thunderstorms develop around you. Keep in mind that while VR is a good learning tool, it is not currently FAA approved to accomplish any minimum experience or proficiency requirements for pilot certification or currency, as specified in 14 CFR part 61. To learn more about the world of virtual flying, check out "Fly Into the Matrix" here: bit.ly/FlyInVR.

## Riders on the Storm

Take a virtual flight in the WILD, the Weather Information Latency Demonstrator, to try your skill at navigating hazardous weather in the safety of a simulator, free of charge. Do you know when visibility starts to deteriorate? What about the difference between in-cockpit images and out-the-window conditions? WILD teaches you the effects of latency and how to better spot weather change color cues on a display.

**Dr. Ian Johnson and Gary Pokodner with the WILD simulator at EAA AirVenture.**

It's another innovative collaboration between WTIC and PEGASAS, and the plans are to have WILD available at this year's EAA AirVenture airshow. You can also find the WILD weather scenarios in the Mindstar and Redbird flight simulators. The Redbird Pro app is available for iOS and Android devices on the App Store and Google Play.

## PIE in the SKY-REPs

The better the observation, the better the forecast, the better your go/no-go decision. So spread the word. Your pilot report (PIREP) informs everyone in the airspace about actual weather conditions that may not be in the forecast or to confirm the forecast is correct. It helps you and other pilots. But because of the system today, some pilots are deterred from filing a PIREP.

Instead of filing PIREPs by radio or ATC, try the free app by Virga (flyvirga.com) to share in-flight weather conditions and pictures right from your smartphone. With Virga, you'll enjoy the super intuitive interface and its full integration with the National Oceanic and Atmospheric Administration's Aviation Weather Center and Leidos. PIREPs submitted by radio are synched right in. It's available now for iOS and coming soon for Android users.

WTIC is also looking at a new, user-friendly way to file PIREPs. Called "Speech to PIREP," this promising research uses voice-enabled technology to speak your PIREP directly into your smartphone, where it's instantly displayed and distributed nationwide.

Potholes in the sky reports, aka turbulence reports, are tough to come by in GA, but research by WTIC and the National Center for Atmospheric Research has shown great promise using ADS-B. It's extremely accurate, shows the exact time and location, and could potentially increase the number of aircraft providing turbulence observations by over 100 times compared to PIREPs. A working demo is coming soon, but check out the article on turbulence inside this magazine issue for more.

## It's Raining Resources

Sign up for your free account on FAASafety.gov for a self-service array of seminars and webinars on all things weather from the FAA Safety Team (FAASTeam). Just type "weather" in the search bar to find everything you need and earn credit in the WINGS Pilot Proficiency Program while you're learning.

Check out the training module links on this page for online — free! — courses that can teach you more about weather observations and forecasts and the limitations of weather displays in the cockpit.

Last but certainly not least, stop by the FAA's YouTube Channel (youtube.com/FAAnews) for plenty of videos on weather products and how to use them.

Stay tuned; we'll keep you posted on the large portfolio of WTIC projects to help you make good decisions about bad weather.

Jennifer Caron is *FAA Safety Briefing*'s copy editor and quality assurance lead. She is a certified technical writer-editor in the FAA's Flight Standards Service.

**LEARN MORE**

FAA's WTIC Program
**bit.ly/FAAWTIC**

Combined Report: Aviation Weather Knowledge Assessment and General Aviation (GA) Pilots' Interpretation of Weather Products. Embry-Riddle Aeronautical University (Blickensderfer et al., 2019).
**bit.ly/GAWxInterp**

National Weather Service Aviation Weather Center
**aviationweather.gov**

Pilot's Handbook of Aeronautical Knowledge
**bit.ly/PHAKCh13**

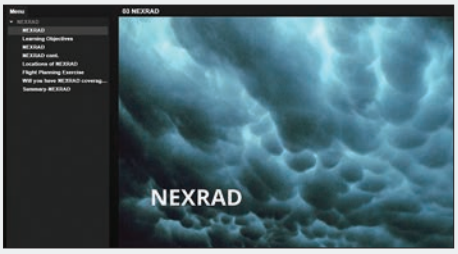
NTSB Weather Safety Study
**bit.ly/NTSBWxStudy**

### 1. Graphical Forecast for Aviation | *bit.ly/GFATool*


### 2. Latency Training Module | *bit.ly/LatencyTrain*


### 3. Visibility Training Module | *bit.ly/VisibilityTrain*


### 4. NEXRAD Training Module | *bit.ly/NEXRADTrain*



# Dislike Turbulent Flights?

## *This FAA Group Works to Make Your Ride Smoother*

*By Eric Spears and Tammy Flowe*

Pilots and passengers hate turbulence. The frequencies are full of pilots requesting "ride reports" and altitude changes from air traffic control to avoid bumpy air. It's not about just comfort; turbulence can cause injury to passengers and crew, damage to the aircraft, or even lead to an accident. Help is on the way! To reduce turbulence-related accidents and injuries in the National Airspace System (NAS), the National Transportation Safety Board (NTSB) conducted a study to address forecasting, reporting, and additional risk-mitigation measures. The study generated a report that included over 20 recommendations to the FAA, the National Weather Service (NWS), and air carrier associations.

Although NTSB's report indicated that there is still work to do in forecasting and mitigating the impacts of turbulence on aviation, the FAA has made great strides in its nearly 30 years of turbulence-related research and development (R&D).

Currently, the FAA's NextGen Aviation Weather Division (AWD) is the office responsible for much of the FAA's weather-related R&D work. AWD is made up of meteorologists, engineers, human factors scientists, and other professionals who research the effects of weather on the NAS and explore ways to mitigate its impact on aviation.

AWD's work involves developing and transitioning new weather detection and forecasting capabilities and information to the NWS, as well as translating and integrating current and emerging weather information into the decision-support processes and tools for Air Traffic Managers, pilots, dispatchers, and airport operators.

"The NTSB report showed that while we've made significant progress in identifying areas of turbulence and intensity, as well as improvements in forecasting turbulence, there is still work to do," said Randy Bass, AWD manager. "NTSB also highlighted one of our initiatives, the Graphical Turbulence Guidance (GTG) Nowcast (GTGN), and recommended it for transition into operations as soon as possible."

AWD's work in mitigating the potential effects of turbulence has traditionally been focused on observation and reporting of real-time turbulence information from aircraft (known as *in situ*), forecasting of turbulence for airspace operations, and nowcasting turbulence, which are extremely short-term forecasts for use in tactical decision-making.

### Observation and Reporting Real-Time *In Situ* Turbulence Information

In the early 1990s, the FAA's Aviation Weather Research Program (AWRP) began developing an automated turbulence reporting capability at the National Center for Atmospheric Research (NCAR). This capability would help address shortfalls in manual (i.e., not autogenerated) Pilot Reports (PIREPs), which today remain an important source of real-time information about turbulence that pilots encounter.

While there are several different methods for obtaining turbulence information from aircraft, the FAA chose to invest in NCAR's Eddy Dissipation Rate (EDR) algorithm, which is installed on an aircraft's avionics system and uses data from existing sensors (e.g., winds, pressure) as well as derived information from other existing sensors (e.g., angle of attack, roll angle) to calculate a measure of the atmospheric turbulence that an aircraft is transiting.

Because EDR is a measure of the state of the atmosphere, it is aircraft independent and applicable across airframe types. In 2008, the International Civil Aviation Organization (ICAO) named EDR the official metric for reporting *in situ* turbulence.

As of September 10, 2021, there were more than 1,250 equipped U.S. aircraft, reporting an average of greater than 68,000 measurements per day. The FAA and the NWS actively use these data in the production and dissemination of weather advisories throughout the NAS.

In addition, the FAA's Weather Technology in the Cockpit (WTIC) program is currently funding promising research to derive turbulence information from Automatic Dependent Surveillance–Broadcast (ADS-B) data. Thanks to the large number of ADS-B-equipped aircraft, ADS-B Turbulence has the potential to provide vast amounts of additional automated turbulence information to supplement *in situ* EDR data without the need for additional equipment and sensors installed on the aircraft. ADS-B Turbulence is still in development, but research conducted so far has shown an accuracy in reporting turbulence encounters in space and time and in identifying encounters with turbulence. The primary focus of the current research is to improve the output scaling so that ADS-B Turbulence outputs are consistently closer in value to *in-situ* EDR measures. The goal for these outputs is to have the same result in operational decisions as an *insitu* EDR output when encountering the same level of turbulence.

## Forecasting Turbulence

In the late 1990s, the FAA and NWS recognized the need for a forecast product specifically geared toward turbulence information. Initially under NWS funding and then transitioned to the FAA's AWRP, NCAR developed the GTG product.

Implemented operationally in 2003, the first GTG product has undergone regular upgrades, with the current operational generation of GTG, GTG3, providing turbulence forecast at 13-kilometer (km) horizontal grid spacing for both clear-air turbulence and mountain-wave turbulence.

Furthermore, GTG3 presents data in 1,000-ft increments for all atmospheric levels from the surface to 45,000 feet, valid in 1-hour increments (out to 18 hours) and updated hourly. GTG3 products are available through the NWS' aviationweather.gov website.

Currently in development by the FAA and planned for NWS operational implementation in 2023, GTG4 will add convectively induced turbulence as well as machine learning techniques and a finer horizontal grid spacing of 3 km. This finer grid space should greatly improve the detection of small-scale turbulence features that may not be revealed at the current 13 km spacing.

Another capability under development is a probabilistic forecast versus the deterministic forecast currently in use because this has become a global requirement in civil aviation. Additionally, the FAA is working in collaboration with the World Area Forecast System to update the current global GTG product with a probabilistic capability by 2026.

## Nowcasting Turbulence Information for Tactical Decision-Making

While the previously mentioned operational GTG product is useful for strategic flight planning, it has long been recognized that, for useful cockpit applications, a short-term forecast — known as a nowcast — is necessary.

In 2007, the FAA began funding the development of GTGN at NCAR. GTGN uses the 1-hour GTG forecast (updated every 15 minutes with the current in situ EDR data) as well as PIREPs and weather radar-inferred in-cloud turbulence information to provide an extremely short-term forecast of turbulence.

**Although there is still work to do in forecasting and mitigating the impacts of turbulence on aviation, the FAA has made great strides in its nearly 30 years of turbulence-related research and development.**

Evaluations with airline users during development were highly positive, with some crewmembers calling it a "game-changer." Since completing development in 2016, GTGN has undergone a formal Quality Assessment, a Technical Review Panel (TRP), and a Safety Risk Management Panel (SRMP) evaluation. Both the TRP and SRMP unanimously approved GTGN for transition to operations.

The FAA and NWS are actively collaborating on a transition plan with a proposed transition to operations in 2024. In the meantime, the FAA funds the production of GTGN at NCAR in a pseudo-operational mode. While this is not intended to be a permanent solution, users view the product as so promising that the FAA believes it is beneficial to the Agency to do so until it is operationalized by the NWS. Users are actively providing feedback on the pseudo-operational GTGN to NCAR, which is helping to improve the product.

### Cockpit Turbulence Applications

The WTIC program sponsored the Remote Oceanic Meteorological Information Operational (ROMIO) project, which provides near-real-time contours of thunderstorm areas over oceanic regions using Cloud Top Height and Convective Diagnosis Oceanic (CDO) products. CDO depicts locations and intensities of convective weather areas. These products are updated frequently and can be transmitted to the cockpit during transoceanic flights every 15 minutes. Pilots can then use the contours to maintain distance from a storm at flight altitude to avoid the convective turbulence areas. While designed for use in the cockpit, it can also be used in Oceanic Air Route Traffic Control Centers as well as in Airline Operations Center flight dispatch operations.

In addition, WTIC recently completed a Technical Transfer Package for the Global Weather Note algorithm, which provides cockpit notification of impending turbulence or other adverse weather conditions within the next 3 – 20 minutes.

Global Weather Note runs on the ground, projecting each aircraft's position forward in time (based on the aircraft's flight plan, speed, and heading), and calculating a qualitative categorical turbulence severity (light, moderate, severe) based on a given weather grid and parameterized thresholds along the aircraft's path.

Global Weather Note was recently merged into ROMIO to provide even more situational awareness information for aircrews and operators.

"Our focus is keeping the flying public safe. That's what we've been doing for the last 30 years," said Tammy Flowe, research meteorologist and turbulence project lead in the FAA's NextGen Aviation Weather Division.

Eric Spears is a senior technical writer in the FAA's NextGen Portfolio Management and Technology Development Directorate.

Tammy Flowe is a research meteorologist and turbulence project lead in the FAA's NextGen Aviation Weather Division.

**LEARN MORE**

Aviation Weather Center's GTG Forecast page
**aviationweather.gov/turbulence/gtg**

FAA's NextGen Weather Program
**faa.gov/nextgen/programs/weather**

# Make Your Weather Briefing as Easy as 1, 2, 3

## *Developing Smarter and Safer Self-Briefing Habits*

*By James Williams*

I've lived in two very different worlds — the world before and after the Information Revolution. My aviation career has neatly straddled that divide. I spent my formative years in aviation calling and, on a few occasions, personally visiting Flight Service Stations to receive various weather briefings. But as technology advanced and information became more available, pilot preferences shifted to self-briefing rather than phone briefings. While the tools may have changed, the same three steps still apply: Define your limits, gather information to determine conditions, and decide if those conditions are acceptable for you. Let's take a look at that process.

### **Step 1** — Define the acceptable limits of your skills and equipment.

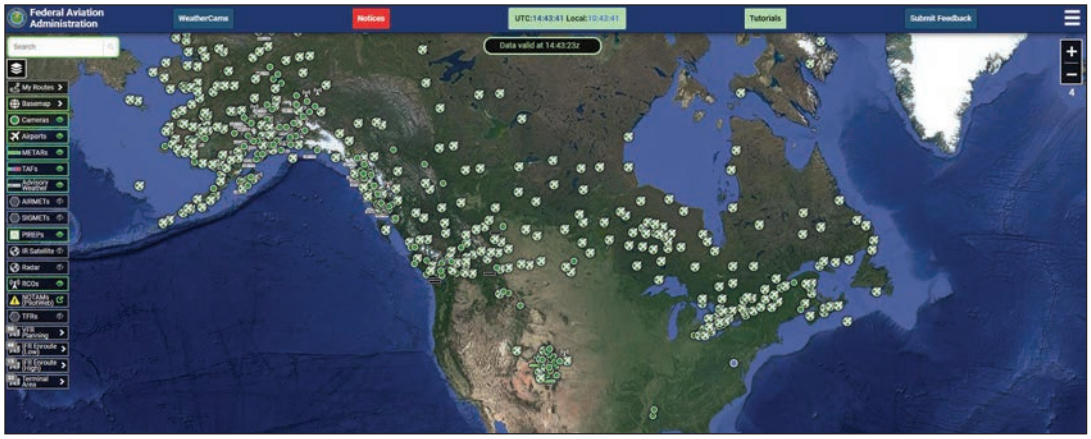
#### The Digital Download

The FAA definition of a pilot briefing is the gathering and translation of weather and aeronautical information into a form usable by the pilot to assist in flight planning and decision-making for the safe and efficient operation of aircraft. A self-briefing uses all means and sources of reporting, including automation, to thoroughly evaluate weather and aeronautical information in advance of a flight. So what's the best way to accomplish this?

"Know your minimums," explains Frances "Frankie" Prott, an Air Traffic Control Specialist with the FAA's Flight Service Safety and Operations Group. The most crucial part of any self-briefing isn't part of the actual briefing; it's setting your own personal minimums and knowing your sources. "Read the manual for your onboard weather product and make sure you know the source's particulars, like color palette, update rate, information source, etc.," Prott says. It is important to inventory all available information sources you will have access to during the flight and be familiar with what they are telling you. Also, know what your aircraft is capable of handling and what should be avoided. If your onboard sources and self-briefing sources don't match, it's essential to know that before you take off because it can trick you into thinking conditions are better than they are. For more on establishing your own personal minimums, see Your Safety Reserve: Developing Your Personal Minimums, Mar/Apr 2015, *FAA Safety Briefing*, p. 30.

> **The most crucial part of any self-briefing isn't part of the actual briefing; it's setting your own personal minimums and knowing your sources.**

Advisory Circular (AC) 91-92, *Pilot's Guide to a Preflight Briefing* (bit.ly/AC-9192), contains an excellent list of U.S. government resources for self-briefings (Appendix A) that covers everything from ADS-B availability to volcanic ash advisories. These resources are drawn from FAA and National Weather Service sites. Numerous private services and applications can also provide you with an excellent briefing. Some can also integrate these resources into a one-stop shop and can function as an electronic flight bag (EFB) on the flight.




FAA Weather Cameras.

[*Editor's note: we are not mentioning specific non-federal resources to avoid the appearance of an endorsement.*]

Whether you're going to brief on your own or via a third-party service, it's essential to make sure you're covering all the bases. "Use a checklist to ensure you gather all information for the intended flight," says Prott. See the sample checklist in AC 91-92 (Appendix B) and modify it to meet your needs. It may seem redundant, but the process is just like your aircraft checklist — it helps catch errors that you may not even know you made. Another adaptable checklist option is the graphic checklist on the interactive map feature on 1800WXBRIEF.com.

## **Step 2** — Gather information to determine conditions.

### Practice Makes Perfect

"After defining your terms and assembling your resources, all that's left is putting it all into practice. Identify risks and compare the information collected against your situation," Prott explains. "If you accept the risks, have a mitigation plan in place. Use your knowledge, skills, experience, and tools to make a wise go/no-go decision. Don't let ego or external pressures (the need to get there, not disappointing others, etc.) interfere with a safe decision."

For a bit of help with that, we can turn to a scenario-based training course developed by Flight Service and hosted by the FAA Safety Team: ALC-683 — Conducting Preflight Self-Briefings for Student and VFR Pilots (bit.ly/CourseALC683). While the course is aimed at visual flight rules (VFR) pilots, it is an excellent refresher for a pilot at any level. An IFR version is on its way and may well be available by the time you read this. These courses can give you good tips and tricks to help improve your self-briefing skills and practice implementing them.

"On self-briefings, people tend to miss the trends," says Prott when asked about common mistakes pilots make. "Forecasts can be inaccurate, especially in areas where weather reporting points are few and far between. Flight Service specialists spend eight to ten hours a day, five to six days a week following trend weather through PIREPs, weather cameras, METARs, satellite, and radar." This is why calling Flight Service can be a great idea to check your self-briefing work, especially if you are inexperienced or traveling to a new area. As you improve your skills, you may find less need to check in.

Prott notes that "Most self-briefings are 'snapshots' at a point in time. This is a significant issue when flying to and from an unfamiliar area with patterns and trends unknown to the pilot." Then there's the matter of NOTAMs, another area of concern that Prott says pilots sometimes miss during a briefing. "Pilots can easily overlook an important NOTAM, like a restricted area activity, due to the volume of these notices on a briefing, or if the pilot just focuses on the departure and destination airport. Sometimes it is hard to sort through so much information."

## **Step 3** — Decide if those conditions are acceptable to your limits.

### Go/No-Go, and Gone

Pilots often think that a go/no-go decision is final. However, pilots have a choice at almost any point during the flight to make a change. "You should continually assess the environment," Prott explains. "Maintain awareness of changes in the weather conditions and, if needed, call Flight Service in-flight to help you reassess the situation." To reinforce this point, you can build checkpoints into your flight and ask yourself, "Is the weather still as expected/good enough to continue?"

One suggestion Prott offers is to use a weather log. "Studies by the FAA and Embry-Riddle Aeronautical University have found that after a weather briefing, pilots often forget where the weather is and when it could later impact the route of flight." Having a weather log can help you compare the forecasted conditions versus what you see and make it easier to spot changes while in flight.

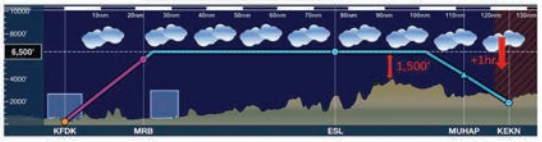
Just having a lot of information doesn't make a good decision automatic. "I remember one briefing, there was a solid line of extreme weather — embedded thunderstorms, hail, wind shear, the works! — going from New York to Alabama," Prott recalls. "The flight was planned from Ohio

## Weather Log

| | |
|---|---|
| Date of Flight | |
| Time of Flight | 3pm |
| AC# | N123WC |
| AC Type | C182 |
| Altitude | 6.5K |

| Briefing Info | |
|---|---|
| Type | ABRV |
| Time | 130pm |
| Source | Self |
| | |

| Personal Minimums | |
|---|---|
| Wind | 10 |
| Gust | 12 |
| Vis | 5 |
| Ceiling | 30 |




| Segment | Name KFDK — miles, mins, 2 hrs Fuel left | Name MRB — 20 miles, 8 mins, 1.8 hrs Fuel left | Name MUHAP — 110 miles, 45 mins, 1.1 hrs Fuel left | Name KEKN — +1hr 120 miles, 51 mins, 1 hrs fuel left |
|---|---|---|---|---|
| Clouds | 8K AGL | 8K AGL | 5K AGL | 5K AGL then <1K |
| Visibility | 10 SM | 10 SM | 10 SM | 6 SM then <1 SM |
| Wind | 340@4 | 5KT HDWND | 5KT HDWND | 320@8 |
| PRECIP | | | | |
| Density Alt | | | | |
| AIRMET | | | | IFR +1hr |
| SIGMET | | | | |
| PIREP | | | | |

| Risk | Note |
|---|---|
| Cross wind TO/LDG | |
| Gusty TO/LDG | |
| DA reduced takeoff performance | |
| VFR on top; unable to Land @ Waypoint | |
| Low Clouds en route | Close to clds, High mtn |
| Low clouds at night | |
| Low Visibility/Haze/Virga/Rain | |
| Conditions worse +/- 1 Hr | + 1hr IFR @EKN |
| VFR WX alternate beyond range | Possibly |
| METARs worse than prior TAFs | Yes |
| WX products disagree | |
| Bad PIREPs | |
| Strong TB | |
| Nearby IFR | Yes |
| Nearby convective activity | |
| Unfamiliar Dep/ER/Dest | |
| Strong headwinds | |
| Route close to mountains | Yes |
| Close or exceed personal mins | |
| other | |

**An example of a completed weather log.**

to southeastern Georgia in a single prop. The briefing went to a level of detail that took nearly an hour. I am still surprised the pilot decided to give it a go." Prott continued, "I reluctantly filed the flight plan and started following the pilot on FlightAware. My colleagues and I watched that tiny plane icon for hours. It was nerve-wracking. They made it without having to stop."

Many of us have a story of picking that one piece of "go" information out of a mountain of "no go" information to justify an ill-advised flight. The goal of a good self-briefing process is not to make that mistake.

- First, establish a set of personal minimums against which you can set the current and forecast conditions.
- Next, build up a good network of resources for both preflight and in-flight. This could be as simple as choosing a one-stop solution like 1800WXBRIEF.com (see page 8 for more on this or other services). Maybe you prefer to use individual sources so that each step is a separate process you can check off. Find the collection of resources that work best for you. Don't be afraid to occasionally add sources to the mix to see if they might be better for you.
- Keep a checklist and update it periodically.

From there, practice in low-stress situations to work the bugs out. Maybe it's a mock flight plan you won't actually file and fly or just a trip to the airport for some pattern work. This gives you experience working through your process and gets you used to telling yourself no. If you'd no-go your mock flight/touch and go's, you should do the same for a real flight in the same conditions.

Decision-making is a skill. The more repetitions you do, the better you get at it. Then, if you do go, you repeat the process in part throughout the flight. Does what you see, either with your eyes or on your cockpit displays, match the expected conditions? If not, how should you mitigate that? It's also true that, just like with your flying skills, you need to practice your decision-making skills regularly to maintain proficiency.

**Finally** — Repeat steps two and three periodically during the flight.

You can practice this process without even going to the airport. Every time you do it, you'll get better and begin to recognize the local weather trends. As you practice, remember that you can always "phone a friend" over at Flight Service and talk to a specialist to "check your work" and see if there is anything you missed.

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

**LEARN MORE**

Conducting Preflight Self-Briefings for Student and VFR Pilots
**bit.ly/CourseALC683**

National Weather Service Aviation Weather Center
**aviationweather.gov**

Weather Cams
**weathercams.faa.gov**

FAA Special Use Airspace
**sua.faa.gov**

NOTAMs, TFRs, and Aircraft Safety Alerts
**bit.ly/FAAalerts**

# How to Maximize the Benefits of Your ADS-B

## What Every GA Pilot Needs to Know

*By Paul Von Hoene*

Just because the first word in Automatic Dependent Surveillance-Broadcast (ADS-B) is "automatic" doesn't mean you can forget about it once you've been equipped. You need to know and understand a lot about this technology to ensure you have optimized its performance in your aircraft. To help, we've highlighted here several important facts that every pilot should know about their ADS-B system, including transmitting requirements, failure indications, performance requirements, and operating considerations. Additionally, for pilots who also take advantage of ADS-B In services, we'll highlight what you need to know about your ADS-B system to maximize those benefits.

### Know the Transmit Requirements and Check Your Startup Procedures

Did you know that to comply with rules that cover ADS-B requirements, your ADS-B equipment must be in the "transmit" mode at all times (14 CFR section 91.225(f)), both during flight and while taxiing? It seems like a simple requirement, but it's actually not that simple, depending on the ADS-B system.

For example, one popular system gets its power through the navigation lights, which means the lights have to be on day and night to transmit a signal. Another system has a specific power-up sequence for proper ADS-B operations — if you don't follow this sequence correctly, it will not transmit. The extended squitter, which broadcasts the ADS-B message, can be unintentionally disabled with other systems.

We recommend that you add a step — *check that your ADS-B system is on* — to your preflight checklist for every flight, day or night, regardless of the airspace you fly in.

You might be wondering, "But isn't it simply just a matter of turning the ADS-B system to 'On' for it to transmit?" Well, not exactly. Proper transmission of ADS-B includes broadcasting all of the correct message elements identified in 14 CFR section 91.227, the equipment performance requirements. The requirements include approximately 19 pieces of information, including barometric pressure altitude. Some systems can

transmit most ADS-B message elements without transmitting pressure altitude. These systems have an "On" position and an "ALT" position. The "On" position does not broadcast pressure altitude, which would result in not complying with the rule.

In addition, failing to transmit pressure altitude renders the aircraft altitude invisible to nearby ADS-B In aircraft, diminishing a key safety benefit of the system.

If ADS-B In-equipped aircraft are not transmitting at all, they are not receiving broadcasts of two valuable ADS-B traffic information services, Traffic Information Service – Broadcast (TIS-B), which provides non-ADS-B traffic in the vicinity, and ADS-Rebroadcast (ADS-R), which provides opposite link ADS-B Out traffic. More on these services later.

**Just because the first word in Automatic Dependent Surveillance-Broadcast (ADS-B) is "automatic" doesn't mean you can forget about it once you've equipped. There's a lot to know and understand about this technology to ensure its performance is optimized in your aircraft.**

## Know How to Recognize Failure Indications

In addition to knowing how to power up your ADS-B and select the correct transmit mode, you should know how to recognize when your ADS-B Out has failed. Per Advisory Circular (AC) 20-165, *ADS-B Installation Guidance*, ADS-B Out systems must have the capability to alert the pilot of a failure using some indication.

Your ADS-B installation documents should include how to recognize if the ADS-B transmitter has failed (device failure) or the GPS receiver input to the ADS-B transmitter has failed (function failure). (Also, take a look at your Pilot's Operating Handbook.) Failures may occur in one of two major components — the ADS-B transmitter or the position source (GPS or Wide Area Augmentation System (WAAS) receiver).


**Figure 1 - Example of an ADS-B failure indication light.**

It may not be an obvious indication, so you may really need to dig into the documentation for your particular system. For example, some installations use the existing transponder fail light, while others have a dedicated indicator. The ADS-B indicator shown in Figure 1 has a dual purpose — it indicates a device failure or a position source failure, depending on whether it is flashing or steady.

There are also some ADS-B systems where the failure indication is only visible from outside the aircraft. This external indication setup is due to the method used to install a Universal Access Transceiver (UAT) on aircraft with only a Mode C transponder, typically navigation light and taillight installations. For these systems, it is important to include the external failure indications and operation of the exterior lights in the preflight inspection.

## Know the Performance Requirements

Now that you know how to recognize a failure indication, you probably think you're good to go, right? Well, unfortunately, the failure indication does not tell the whole story. The ADS-B rule has performance requirements that take inputs from multiple sources on and off the aircraft to meet those requirements (see Figure 2). Because of its many inputs, your system still may not indicate a failure, even though it's not performing correctly.

The best and easiest way to determine if your ADS-B Out system meets all the requirements is to request a Public ADS-B Performance Report (PAPR) at bit.ly/PAPRequest. It's free, and you can request it as often as you like, after any flight. We strongly encourage you to request a PAPR at least annually, but particularly after you have had any maintenance performed on your aircraft.

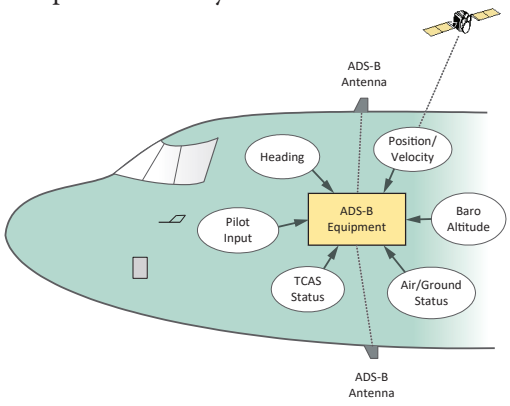
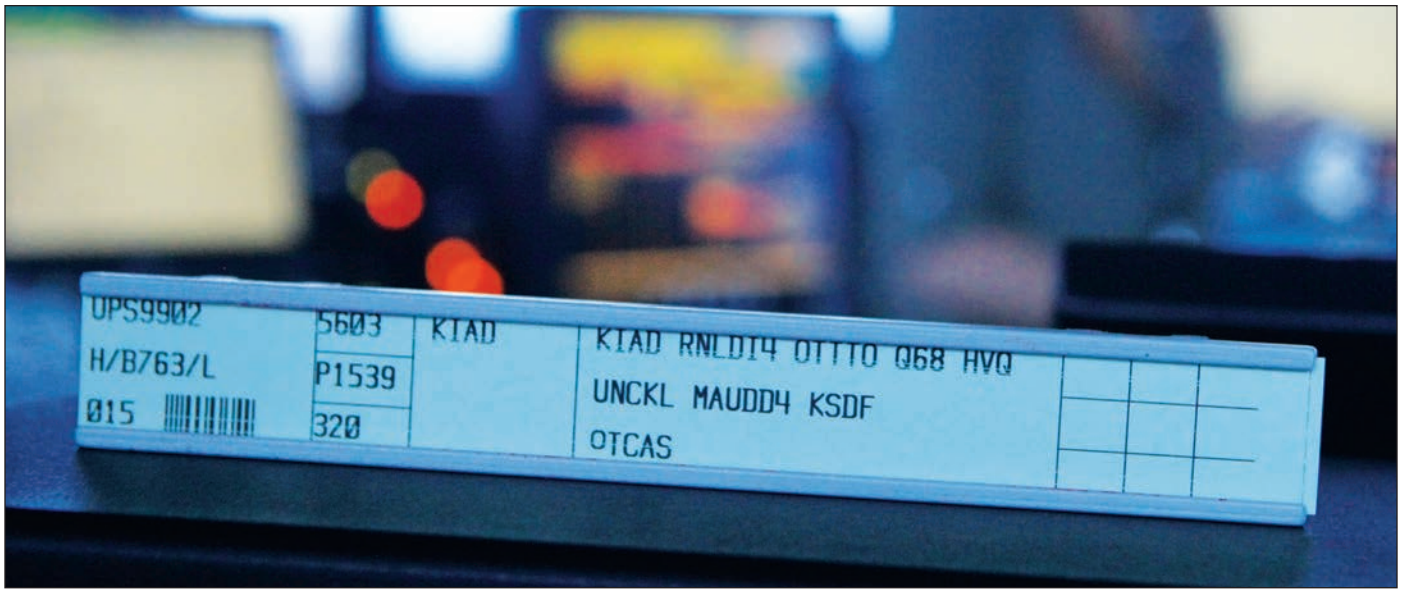



**Figure 2 - Multiple inputs for the ADS-B system.**

You can also ask the FAA Flight Standards ADS-B Focus Team to pull a PAPR report for you or help you understand it by emailing adsbfocusteam@faa.gov or 9-AWA-AFS-300-ADSBAVIONICSCHECK@faa.gov. For more information on how to check ADS-B performance, watch the virtual PAPR seminar on YouTube at bit.ly/ADSBPerformanceCheck.




When you file a flight plan, the call sign broadcast by your ADS-B must precisely match the aircraft identification you entered on the flight plan as your call sign.

### Know How Your Call Sign Affects Your Operation

The operation of ADS-B is intentionally simple — set it to transmit and ensure your call sign is correct. But your aircraft call sign is a critical piece of the ADS-B broadcast message.

Air Traffic Control (ATC) uses it to communicate with pilots, but they also use it to help match the flight plan to the track the controller sees on their display. When you file a flight plan, the call sign broadcast by your ADS-B must precisely match the aircraft identification you entered on the flight plan as your call sign. Otherwise, the controller will receive a call sign mismatch (CSMM) alert.

> **The best and easiest way to determine if your ADS-B Out system meets all the requirements of 91.227 is to request a Public ADS-B Performance Report (PAPR) at bit.ly/PAPRequest. It's free, and you can request it as often as you like, after any flight.**

The call sign is just the aircraft registration number for most general aviation aircraft, which doesn't change. However, it's a little more complicated for operations where the call sign is not the registration number or if the call sign changes from one operation to the next. For example, airlines use an approved three-letter code and assigned flight number as their call sign. When the call sign changes, they change it in the ADS-B transmitter.

Those aircraft that file with a third-party flight planning company or participate in public benefit flying with an approved local or other call sign have to take extra precautions to ensure that the call sign matches the aircraft identification in the filed flight plan.

We recommend using a standard procedure before taxiing to check that you have entered the correct call sign. Also, be aware that in some installations, whenever power is removed from the ADS-B unit, such as during maintenance activity, the call sign field may change to the manufacturer's preset setting.

For more information on Call Sign Mismatch, watch the virtual CSMM seminar on YouTube: bit.ly/CallSignMismatch.

### Know your ADS-B In Benefits (and Limitations)

Once you've gotten to know your ADS-B *Out* system, you will also want to get to know your ADS-B *In* system to maximize its benefits as well. TIS-B and ADS-R are important services for transmitting nearby traffic information to properly equipped ADS-B aircraft. However, it is not necessarily a complete traffic picture even with this information.

As noted earlier, your ADS-B Out system must be properly configured and transmit all the required information. Your aircraft and opposite link ADS-B-equipped aircraft must be in range of the ADS-B ground stations, while any nearby non-ADS-B traffic must be equipped with an operating transponder and be within FAA radar coverage. You must always use ADS-B In to supplement your outside visual scan, not replace it.

In addition to TIS-B and ADS-R, Flight Information Service-Broadcast (FIS-B) is a free service available to aircraft that can receive data over 978 MHz (UAT). FIS-B automatically transmits a wide range of aeronautical products with a national and regional focus.

While it does not replace a proper preflight weather briefing, FIS-B offers a wealth of aeronautical information, including weather products like Terminal Aerodrome Fore-


Garmin Photo.

**Flight Information Service-Broadcast (FIS-B) offers a wealth of aeronautical information, including weather products like Terminal Aerodrome Forecasts (TAFs) and NEXRAD (pictured here), as well as airspace information like TFRs.**

casts (TAFs) and NEXRAD, as well as airspace information such as Temporary Flight Restrictions (TFRs). The availability of certain FIS-B products depends on several factors, including the altitude tier in which the aircraft operates, the look-ahead distance factor, and, in some cases, the size factor of an airport.

It's important to know how FIS-B delivers information to you because it affects the type and timeliness of the products you receive.

You might be wondering what altitude tiers are. FIS-B radio stations are assigned to one of four altitude tiers: high, medium, low, or surface, to make more efficient use of available bandwidth. This allows the system to provide tailored sets of products that most effectively serve the different customer groups at each altitude tier.

The look-ahead distance factor is an indication, in nautical miles, of how close you need to be to a particular airport to receive a FIS-B product for that airport. For TAFs and other weather products, the size of the airport also determines when you can receive those products for a particular airport.

You'll also need to understand how often the FIS-B product is updated and transmitted. The update interval is the rate at which the product data is available from the source. The transmission interval is the amount of time a new or updated product transmission must be completed, along with the rate or repetition interval at which the product is rebroadcast.

Now consider the performance of your aircraft in relation to the update and transmission intervals. For example, a pilot of a light twin aircraft, flying at a medium altitude with a tailwind, could easily have a ground speed of over 200 knots. Thus, traveling at over three nautical miles per minute, a pilot may not have enough time to receive and decipher a pop-up TFR, based on the 100 nautical mile look-ahead and a 10-minute transmission interval.

## Now You Know Your ADS-B!

The better you know your ADS-B system, the more you can enjoy its benefits, including real-time precision, shared situational awareness, and a new level of safety and efficiency.

**Paul Von Hoene is an aviation safety inspector and ADS-B policy and guidance lead in the FAA's Flight Operations Branch.**

**LEARN MORE**

For more information, see our Equip ADS-B website
**faa.gov/nextgen/equipadsb**

Getting to Know Your ADS-B System
**www.faa.gov/go/knowadsb**

SUSAN K. PARSON

# THE SCOOP ON SELF-BRIEFINGS

When I learned to fly in the late 1990s, the drill for getting an aviation weather briefing was to call or visit a Flight Service Station (FSS). Back then, my home airport was co-located with an actual, no-kidding FSS with student-pilot-friendly briefers always at the counter. On my second or third lesson, my instructor escorted me into the FSS to make introductions and oversee my very first briefing. Then and ever after — the expectation was that I would *always* stop by the FSS before reporting to my instructor — I walked out with the evidence inscribed on a stack of dot-matrix-printed paper.

Like most other pilots, today I enjoy the convenience of acquiring aviation-specific weather information from many sources, to include apps on my iPhone (and a few that also work on my smartwatch). Some of my fellow self-briefers wonder, though, how to be sure they are getting a "legal" or "approved" weather briefing. This topic is of particular interest in an era where the number of sources, formats, and delivery methods is large and growing all the time.

## AIM for the Bottom Line

As explained in Chapter 7 of the *Aeronautical Information Manual* (7-1-3), air carriers and operators certificated under the provisions of 14 CFR part 119 are required to use the aeronautical weather information systems defined in the Operations Specifications issued to that certificate holder by the FAA. Part of this approval includes FAA acceptance or approval of the procedures for collecting, producing, and disseminating aeronautical weather information, as well as the crew member and dispatcher

training to support the use of system weather products.

So, what about the rest of us? The AIM states that operators not certificated under 14 CFR part 119 are "encouraged" to use FAA/National Weather Service products through today's Automated Flight Service Stations (AFSS) or Flight Information Services-Broadcast (FIS-B). In a nutshell, then:

- There is no regulatory requirement for part 91 GA operators to use any particular weather source.
- There are no "required" or "approved" weather sources for part 91 operations.
- There is no prohibition on using other sources either as a substitute for or a supplement to the AFSS briefings that the AIM encourages GA pilots to use.

## Why Call?

As noted in the AIM (also in 7-1-3(f)):

*(W)eather services provided by entities other than FAA, National Weather Service (NWS), or their contractors may not meet FAA/NWS quality control standards. Hence, operators and pilots contemplating using such services should request and/or review an appropriate description of services and provider disclosure. This should include, but is not limited to, the type of weather product (e.g., current weather or forecast weather), the currency of the product (i.e., product issue and valid times), and the relevance of the product.*

Encouraging GA pilots to use AFSS provides several benefits. The first is a known, comprehensive, and standardized weather briefing product. The FAA specifies the elements that must be included for standard, abbreviated, and outlook briefings. AFSS briefings include all these elements, provided in a logical and predictable sequence.

Second, AFSS briefers are certified as pilot weather briefers, which means they are trained to translate and interpret NWS products. The briefer can thus explain things that may not be immediately apparent to the pilot and respond to questions about specific altitudes, routes, and locations.

The third benefit is that there is a record that the pilot received a specific type of weather briefing at a specific date and time. Does it matter? GA pilots are not required to use "approved" weather. Neither I nor my colleagues are aware of enforcement actions for a "bad" weather source. However, if there is an accident or incident, a documented official weather briefing would help show that the pilot complied with the 14 CFR section 91.103 requirement to obtain "all available information."

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

# FOG FORECASTING WITH DRONES

Over the last ten years, weather-sensing drones have become a new proven technology for gathering weather data in the lower atmosphere. At the same time, weather-related commercial applications for drones have grown rapidly. Some commercial drones carry weather sensors to provide operators with situational awareness of environmental conditions. Weather-sensing drones can conduct observation flights multiple times an hour to collect profiles of temperature, moisture, and winds at much greater frequencies than traditional sensors. In addition, they're environmentally friendly and more cost-effective.

A mix of targeted flights by weather-sensing drones and observations collected by commercial drone flights could provide unprecedented weather observation capabilities that would improve model predictions of fog, low ceilings, low-level wind shear, wind-shift boundaries, and convection initiation.

These weather hazards are disruptive to both traditional airport operations and low-altitude drone flights. According to Dr. James Pinto, Science Deputy of the Aviation Applications Program at the National Center for Atmospheric Research (NCAR), drone observations can be a game-changer to improve aviation weather hazard guidance for low-altitude flight operations. He believes that as drone technology and capability continue to evolve, they will substantially improve their weather guidance as well as guidance for commercial and general aviation.

The FAA, NASA, and the National Oceanic and Atmospheric Administration are currently sponsoring research to study the potential benefit of drone observations to improve the prediction of low-altitude flight hazards. In partnership with the Cincinnati/Northern Kentucky International (CVG) Airport, NOAA Wilmington Ohio Weather Forecast Office, NCAR, and the University of Kentucky, the FAA Aviation Weather Research Program (AWRP) is funding a study called FOGMAP — Frequent in-situ Observations above Ground for Modeling and Advanced Prediction of fog — to assess the benefit of drone observations in predicting the occurrence, timing, and severity of fog at major U.S. airports.

Photo courtesy of the University of Kentucky.

**University of Kentucky's Octocopter drone research prototype in flight during the FOGMAP study. It carries pressure, temperature, humidity sensors, and four ultrasonic anemometers for wind and turbulence measurements.**

During the field phase of FOGMAP, which began in January 2022, drones will be deployed on days predicted to have localized airport-impacting fog. FOGMAP scientists from NCAR and the University of Kentucky will evaluate the potential of weather-sensing drones to improve fog predictions near airports that often experience local weather effects.

The FOGMAP study will continue through May 2022. FAA project lead Jenny Colavito says that she is very interested to see if drones can significantly reduce model uncertainty in the prediction of fog. Simply improving the forecast of fog duration by an hour could result in major cost savings for commercial airlines and reduce delays for the flying public.

> **THE FOGMAP STUDY WILL ASSESS THE BENEFIT OF DRONE OBSERVATIONS IN PREDICTING THE OCCURRENCE, TIMING, AND SEVERITY OF FOG AT MAJOR U.S. AIRPORTS.**

Opportunities for fog-forecasting drone flights are looking more promising as research and development efforts on sense and avoid technologies mature. As coverage of weather-sensing drones expands, this observational gap-filling technology will enable improved situational awareness and safety of all low-altitude flight operations and will provide a critical data service for supporting the Advanced Air Mobility of tomorrow.

**Dr. James Pinto is the Science Deputy of the Aviation Applications Program at the National Center for Atmospheric Research.**

**Jenny Colavito, ceiling and visibility project lead with the FAA's Weather Research Branch, and Rogan Flowers, a general engineer in the FAA's Operational Programs Branch of the UAS Integration Office, contributed to this article.**

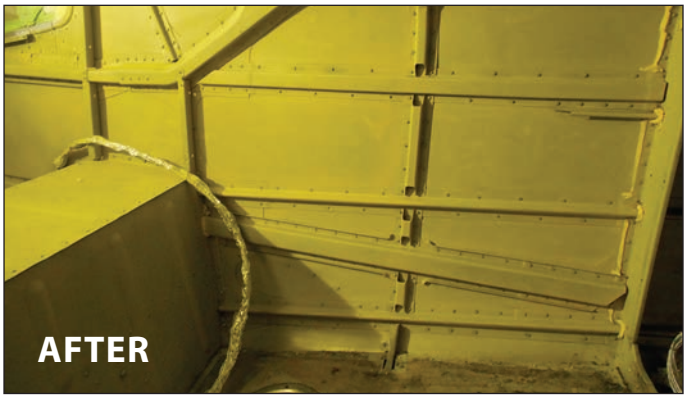
**LEARN MORE**

FAA News Release on Inclement Weather: Cost, Challenges, Solution
**bit.ly/3N7uHAa**

Aviation Weather Research Program
**bit.ly/FAA_AWRP**

DENNIS WOLTER

# AIRCRAFT CORROSION — JUST A NUISANCE, OR A MAJOR PROBLEM?


Photos courtesy of Dennis Wolter.

The most irreversible threat to the longevity of the airplanes we love is corrosion. Is it just a nuisance or a major problem? It depends on how long it is left untreated and where it is.

## Find It, Slow It Down, and Stop It

Cabin areas are particularly corrosion-prone. Keeping water out of the cabin is very important. Take a little moisture in the form of humidity, plus a little salt from your Florida vacation, added to a long winter's nap in a damp hangar, and there's ample opportunity for corrosion to form. We've all heard that ocean-based airplanes are corrosion buckets, but you don't have to live oceanside. If your airplane is exposed to salt air during even one visit, salt crystals will remain inside and cause corrosion.

The first stage of corrosion can be seen in a darkening of the metal, for instance, when a polished bare metal airplane sits outside and begins to look dull. The second stage is the presence of visible aluminum oxide in the form of a gray powder or crust. The third and most advanced stage of corrosion exists when crusty oxidation is removed to reveal severe pitting, cracks, or holes in the metal surface.

**CABIN AREAS ARE PARTICULARLY CORROSION-PRONE.**

Closely inspect, then remove and treat any corrosion you find. Check the upper cabin in high wing airplanes; lower cabin areas in low wing planes. You'll find most problems in critical floor and wing attachments. Check the door latches and seals, the windshield and windows for leaks, floors, carpets, and seat rails. If you see any corrosion, keep looking, you'll probably find more.

Corrosion is dealt with on three levels: prevention, removal, and treatment. The overall goal is to take a surface from corroded to cleaned, treated, and chromated.

A few steps you can take: treat with an anti-corrosion spray, wash your airplane after an ocean trip, keep landing gear wells and bellies de-greased/cleaned, properly maintain all door/window seals, and keep drain holes/battery box drain hoses open.

A heated hangar is unquestionably the best storage for corrosion control, but insulated hangars are the next best choice. Outside, a hard surface is better than grass. Keep animals out. Get your aircraft painted using a qualified shop to avoid future corrosion.

Corrosion can occur anywhere, so keep your eyes open and be tenacious in your efforts to find it. Know that intermittent electrical problems can often be traced to the presence of corrosion. Re-inspect and evaluate at every annual to check that your efforts effectively reduced or eliminated the corrosion. Whether you attempt to do this work yourself or engage the services of a qualified shop, few of us could argue it's a wise investment.

For more on corrosion, refer to chapter 6 in AC 43.13-1B, *Acceptable Methods, Techniques, and Practices - Aircraft Inspection and Repair* (bit.ly/3dGWJzN), a great source of information published by the FAA and a must-have for anyone working on an airplane.

**Dennis Wolter is the 2020 National General Aviation Technician of the Year Award winner and founder of Air Mod, a full-service aircraft renovation company in Batavia, Ohio. He contributes his aircraft renovation expertise in seminars and aviation publications.**

**LEARN MORE**

FAA Advisory Circular 43-4B, *Corrosion Control for Aircraft*
**bit.ly/AircraftCorrosion**

# 5 TIPS TO IMPROVE YOUR WEATHER KNOW-HOW

In this weather technology-themed issue, we cite numerous examples of how advancements in technology are providing pilots with access to more and more aviation weather data, both before and during flight. That's definitely a good thing. However, weather data, no matter how plentiful or accessible, is only helpful if you're able to absorb and comprehend what you really need to make sound aeronautical decisions. It helps to have a greater variety of mediums and methods of obtaining weather information. But the challenge is finding what resources work for you and knowing how to properly leverage the information they provide. To help you sharpen your weather know-how, here are five tips to consider.

1. ***Personal Minimums and Plan B***: When preparing for your next flight, make a conscious effort to pause and ensure you thoroughly understand the weather data at your disposal. Does having a 15-knot crosswind or ¾ mile visibility in fog align with your personal minimums and your aircraft's capabilities? If it's been a while since you last assessed your personal weather minimums, consider what red-flag items would give you pause and how you would address them. Don't wait until you're in the thick of it to figure out how you would handle a weather emergency. The odds for a happy outcome are not in your favor. Rerouting or diverting is much easier — and less stressful — when you have some wiggle room and pre-decided alternates from which to choose. In other cases, you'll want to consider canceling the flight altogether.

> WEATHER DATA, NO MATTER HOW PLENTIFUL OR ACCESSIBLE, IS ONLY HELPFUL IF YOU'RE ABLE TO ABSORB AND COMPREHEND WHAT YOU REALLY NEED TO MAKE SOUND AERONAUTICAL DECISIONS.

2. ***Check the Expiration Date***: When you're reviewing weather data, it's important to also consider its shelf life. Some weather products could be hours old when you receive them. Note the observation times in any particular report and/or the product validity time span, so you always know if you have the latest and greatest versions. Comparing forecasts with more current weather information is also a good way to see the "big picture" and whether the weather is developing earlier or later than predicted.
3. ***Building on the Basics***: In your quest for a complete weather briefing, it might help to think of how three basic elements of weather (temperature, wind, and humidity) can combine in various ways to impact a flight in three primary ways (visibility, turbulence, and aircraft performance). Studying and organizing weather data in terms of how it can affect your specific flight can help you make a more informed decision and more accurately assess whether both pilot and plane are up for the challenge.
4. ***Beware of the Latency***: Another good pointer is to avoid overreliance on in-cockpit information weather displays. Yes, they are excellent tools to improve your weather situational awareness, but the information they relay may not tell the whole story, no matter how sophisticated they are. Bottom line: Don't fixate on a NEXRAD weather display to the exclusion of your other flight management tasks — and that includes looking out the window. Use weather displays strategically, not tactically.
5. ***Expand Your Weather Horizons***: Strive to continue learning about weather and get familiar with as many available resources as possible (see Learn More below). For example, are there weather cameras (weathercams.faa.gov) along your route that will allow for a sneak peek at conditions? A little extra weather know-how can go a long way towards a safe flight!

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

**LEARN MORE**

"I've Got Weather — Now What Do I Do With It?" Mar/Apr 2015, *FAA Safety Briefing*, p. 26
**bit.ly/FAASB-Arc**

JIM TISE

# FAA WEATHER CAMERA SYSTEM FOR HELICOPTER MEDEVAC OPERATORS

As the popularity and success of the weather camera program grows, the FAA is now looking to expand its use among commercial operators, and in the process, possibly save lives. The FAA is loaning weather cameras to helicopter air ambulance (HAA) operators flying out of three hospitals: one each in Grenada and Jackson, Miss., and the other in Ann Arbor, Mich.

This year, the agency will collect data to ascertain the uses and benefits of the images to the air ambulance and aviation industry, especially in locations where the nearest automated surface observing system (ASOS) is located miles away from the heliport or airport.

This demonstration could help enable better-informed flight operations and efficiencies at air ambulance heliports and airports throughout the country where ASOS does not exist. That could mean fewer flight cancellations due to weather, and the lives of more people in need of emergency transportation could well be saved.

Until recently, the FAA has worked exclusively with state governments to install weather cameras and integrate images onto the website in areas where pilots — generally of fixed-wing aircraft — can face hazardous flying conditions. Colorado, Alaska, and Hawaii already have agreements with the FAA, with Montana being the latest state to participate in a demonstration project. The weather camera program shares the design and technology for operating the cameras with states that install, own, and maintain the camera systems under cost-reimbursable agreements.

Fixed-wing medical flights and HAA flights are allowed to operate only if adequate weather data is available to help pilots make an informed go/no-go decision. The difference is that fixed-wing flights are conducted from airports, which more frequently have a weather reporting station. ASOS often provides the weather data that HAA flights use, but its accuracy varies from location to location.

Two employees with the FAA's Flight Standards office, Laennec Ratard and Wayne Fry, helped lead the effort to get the weather cameras installed at the three hospital locations.

Ratard is a principal operations inspector working out of the Baton Rouge (La.) Flight Standards District Office (FSDO), where he oversees Metro Aviation, a helicopter air ambulance company. Metro Aviation operates 30 to 45 flights a month out of Ann Arbor, with anywhere from two to five flights canceled because of inadequate or misleading weather reporting data.

"That hospital does not have its own weather reporting," explained Ratard. It instead relies on an ASOS that sits in a valley about five miles south of the hospital that Ratard believes leads to unnecessary flight cancellations.

The issues down south were even more pronounced. "In rural Mississippi, the alternative to a 45-minute helicopter medevac flight could be a 5-hour ambulance ride," noted Wayne Fry, manager of the General Aviation Division in the FAA's General Aviation Safety Assurance office.

"We're out there to serve these communities in their time of need," said Mike LaMee, director of operations for Med-Trans Corp., the air ambulance company that operates out of Jackson and Grenada. He estimates that 35 percent of his company's medevac requests are canceled because weather data indicates it's not safe to fly.

The camera installations at all three hospitals are now operational. LaMee remarked upon the ease with which the collaborative effort came together.

"What I see today are regulators working with industry in a very meaningful way to enhance safety," LaMee said. Fry is thinking long-term with the weather camera demos. "Our hope is that the pilots and operators will come to understand what a boost they are and go out and purchase some of their own," said Fry.

LaMee noted that there are cutting-edge weather observation systems being produced that offer additional information such as cloud ceilings, visibility, and air pressure. "If we can improve availability and reliability of weather reporting, it's going to absolutely revolutionize what we're able to do as helicopter air ambulance operators," he said.

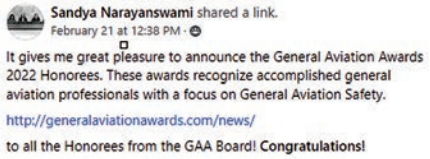
**Jim Tise is an editor with the FAA's Office of Communications.**

**LEARN MORE**

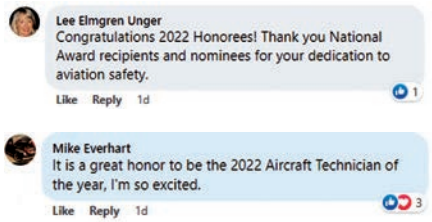
More Eyes on the Skies in Colorado, Montana
**bit.ly/EyesonSkies**


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

If you're not a member, we encourage you to join the group of more than 15,000 participants in the GA community who share safety principles and best practices, participate in positive and safe engagement with the FAA Safety Team (FAASTeam), and post relevant GA content that makes the National Airspace System safer.


Sandya Narayanswami shared a link.
February 21 at 12:38 PM ·
It gives me great pleasure to announce the General Aviation Awards 2022 Honorees. These awards recognize accomplished general aviation professionals with a focus on General Aviation Safety.
http://generalaviationawards.com/news/
to all the Honorees from the GAA Board! **Congratulations!**

**GA Awards Board Chair Sandya Narayanswami invites you to learn more about the 2022 GA Awards Honorees at generalaviationawards.com/news. Stop by the awards ceremony at EAA AirVenture this July to meet and congratulate the Honorees in person.**


Lee Elmgren Unger
Congratulations 2022 Honorees! Thank you National Award recipients and nominees for your dedication to aviation safety.
Like Reply 1d
1
Mike Everhart
It is a great honor to be the 2022 Aircraft Technician of the year, I'm so excited.
Like Reply 1d
3

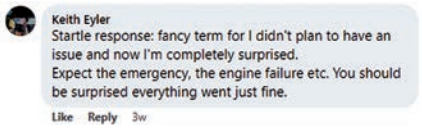
## Expect the Unexpected

**Do you know how to respond to aircraft stalls, spins, and upsets? Preparation is key. Learn how to train for airplane upsets in our latest #FlySafe GA Safety Enhancement Topic: bit.ly/35QFgq0.**

**Do you have a good survival kit? In this episode of the Pilot Minute, Federal Air Surgeon Susan Northrup gives examples of first aid, nutrition, signaling, and shelter items you should consider when assembling your kit. Watch more and follow our Pilot Minute playlist for future videos at bit.ly/3J1uSep.**


Bill Lattimer
Good guidance!

**How do you react in an unexpected emergency? Don't get caught by surprise. Learn how training can reduce startle response and prepare you for unexpected events at bit.ly/3FGzC6f.**


Keith Eyler
Startle response: fancy term for I didn't plan to have an issue and now I'm completely surprised.
Expect the emergency, the engine failure etc. You should be surprised everything went just fine.
Like Reply 3w

## Preventive Maintenance: It's Not Just for AMTs

**Performing maintenance on your aircraft can save time, money, and open doors to a new level of understanding your aircraft. But along with this new knowledge comes responsibilities. Learn more about what kind of maintenance you can legally perform on your aircraft in the Angle of Attack department in our Mar/April issue at bit.ly/OwnerMaintenance.**

*As an owner, I have changed oil, rotated and gapped the sparkplugs, cleaned battery terminals, replaced broken safety wire, and other minor preventive maintenance tasks. I have also done owner-assisted annuals. That said, one should know when to seek the approval of an A&P mechanic.*
*— Jake*

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

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

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

SUSAN K. PARSON

# THINKING STILL REQUIRED!

Photo by National Oceanic and Atmospheric Administration (NOAA).

We are now well into the tablet/app and ADS-B-driven shift to anytime, anywhere mobile capability for instrument flight planning, risk analysis, and all aspects of flight monitoring. The most popular apps even include information about the ground facilities and services you might need if the weather data they provide persuades you to divert.

We've talked about some of today's terrific tech in this issue of *FAA Safety Briefing* magazine, but even the best technology can improve safety only if we pilots use it in the context of overall critical thinking about what we realistically can — and can't — safely do in a typical GA airplane. Just as pilots differ widely in their levels of knowledge, training, experience, and piloting ability, it's a fact of life that some airplanes are more capable than others. Think of the plane you're flying as your partner in this activity. The weather analysis for every flight should thus consider the collective capabilities of the pilot and the airplane.

Remember:

- No matter how skilled a pilot you are, you can't adequately compensate for what your airplane partner lacks in terms of performance capability. You may be a Super Pilot, but there are limits to what kind of weather you can consider when you are flying, say, a Super *Cub*.
- Your technologically advanced airplane can be very helpful, but no airplane can adequately compensate for deficiencies in its pilot's knowledge, training, experience, or skill.

## 4 Questions to Ask Yourself

Use every electron at your disposal to help plan and conduct a safe flight. But it's also important to be sure you are not delegating decisions and thinking to the magic boxes. Listen when the technology talks. Then ask yourself these four questions:

1. ***Is there any convective activity?*** There is no category of airplane certified to fly in or through thunderstorms. If the forecast calls for convective activity along your intended route of flight, dig deeper, develop a solid understanding of the situation, and ensure that you have both a plan for, and a commitment to, diverting to a safe alternate destination. If you conclude it's safe to launch, appropriate use of weather technologies such as ADS-B and datalink can help you monitor developments and stay well clear of convective activity.
2. ***What is the freezing level?*** We associate icing with winter operations, but it can occur at any time of the year. ADS-B, datalink, and even radar are all blind to icing, so your best defense includes a very careful preflight analysis of forecast and actual conditions (including any pilot reports on icing) and then disciplined in-flight monitoring of the outside air temperature. My personal policy is to never launch into the clouds without knowing that I can stay below the expected freezing level without hitting anything.
3. ***How low is too low?*** Your instrument rating allows you to shoot an approach to minimums legally, but "legal" and "smart" are not synonymous. Here's where it pays to have well-established and frequently reviewed personal minimums that account for your actual proficiency and comfort level in instrument meteorological conditions (IMC). My personal rule is to avoid low IFR (LIFR). LIFR conditions add more risk to single-engine GA operations even with another pilot on board.
4. ***Do I have options?*** Having real options (not just legal alternates) is another important factor in preflight planning for a trip in IMC. In my book, widespread IMC strongly indicates a "no-go" decision, especially if there isn't even a marginal VFR airport in range.

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

# FRANCES PROTT

**Air Traffic Control Specialist, FAA Flight Service's Safety and Operations Policy Group**

Aviation was not always in the cards for Frances (Frankie) Prott. Her trajectory shifted after a high school friend was accepted to the U.S. Naval Academy to study aerospace engineering. Then another happenstance aligned Frankie with someone else studying aerospace engineering at Embry–Riddle Aeronautical University in Daytona Beach, Fla.

"I took it as a sign and applied to Embry–Riddle," she revealed.

Something as interesting as aviation can have that effect on people. Her first year was both a culture shock and a language struggle as a native Puerto Rican. However, that didn't stop Frankie from pushing the envelope and powering on.

"Towards the end of my second semester, I took a job as a restaurant host, which turned everything around," Frankie explained. "I got over the language barrier in just a few weeks and adapted to the environment little by little. I worked with others attending Embry–Riddle and started expanding my network and horizons."

Nothing could rain on her parade, and after her first year, she changed course, joined the meteorology program, and graduated in 2004. She was one of only two women who had earned a bachelor's degree in meteorology from Embry–Riddle at the time.

Frankie's time working at the restaurant paid off when a former coworker called about a weather-related job with Lockheed Martin's Flight Services. After seven years there, she took a break to earn a master's in business administration. Later with Jeppesen, Frankie tasted airshow life at EAA AirVenture and Sun 'n Fun before the prevailing wind moved her toward the FAA. While working at AvMet Applications, she supported the FAA's NextGen Aviation Weather Division. She also served as an advisor for the U.S. member of the International Civil Aviation Organization (ICAO) Meteorology Panel.

"A few conversations with friends put me on the aviation path, but I got hooked once I started working in Flight Service," Frankie recalls. "I realized how much one can do in aviation and that it's not just for pilots and air traffic controllers. As a scientist, I found it energizing to have opportunities to apply my knowledge and experiences to such an important and exciting industry."

Later at LS Technologies, she supported the FAA's NextGen Technology Development and Prototyping Division and was an ICAO advisor. The clouds broke, and an opportunity presented itself at FAA headquarters.

Now Frankie is the subject matter expert in aviation weather for drones at FAA Flight Service's Safety and Operations Policy Group. She also analyzes changes in the operational environment, determines the impact and feasibility of accomplishing mission objectives, and ensures consistent policy application. Frankie represents Flight Service on projects and programs that plan for the future, including research, strategy, and planning.

As technology continues to evolve and weather services and information expand, pilots continue to self brief. Frankie notes that this may lead to misinterpretation of weather data and displays. Not understanding features and how to interpret the available information may lead to inaccurate weather expectations. One of the new ways to help conduct comprehensive, regulatory-compliant, preflight self-briefings using automated resources is a new course (ALC-683) for VFR pilots available on faasafety.gov. Another is Advisory Circular (AC) 91-92, *Pilot's Guide to a Preflight Briefing*.

Frankie is working hard to ensure you have the skills needed to avoid a weather-related accident in the air. If life gets a little turbulent now and then, push on and take the time to learn more about aviation weather. The resources are out there.

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

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