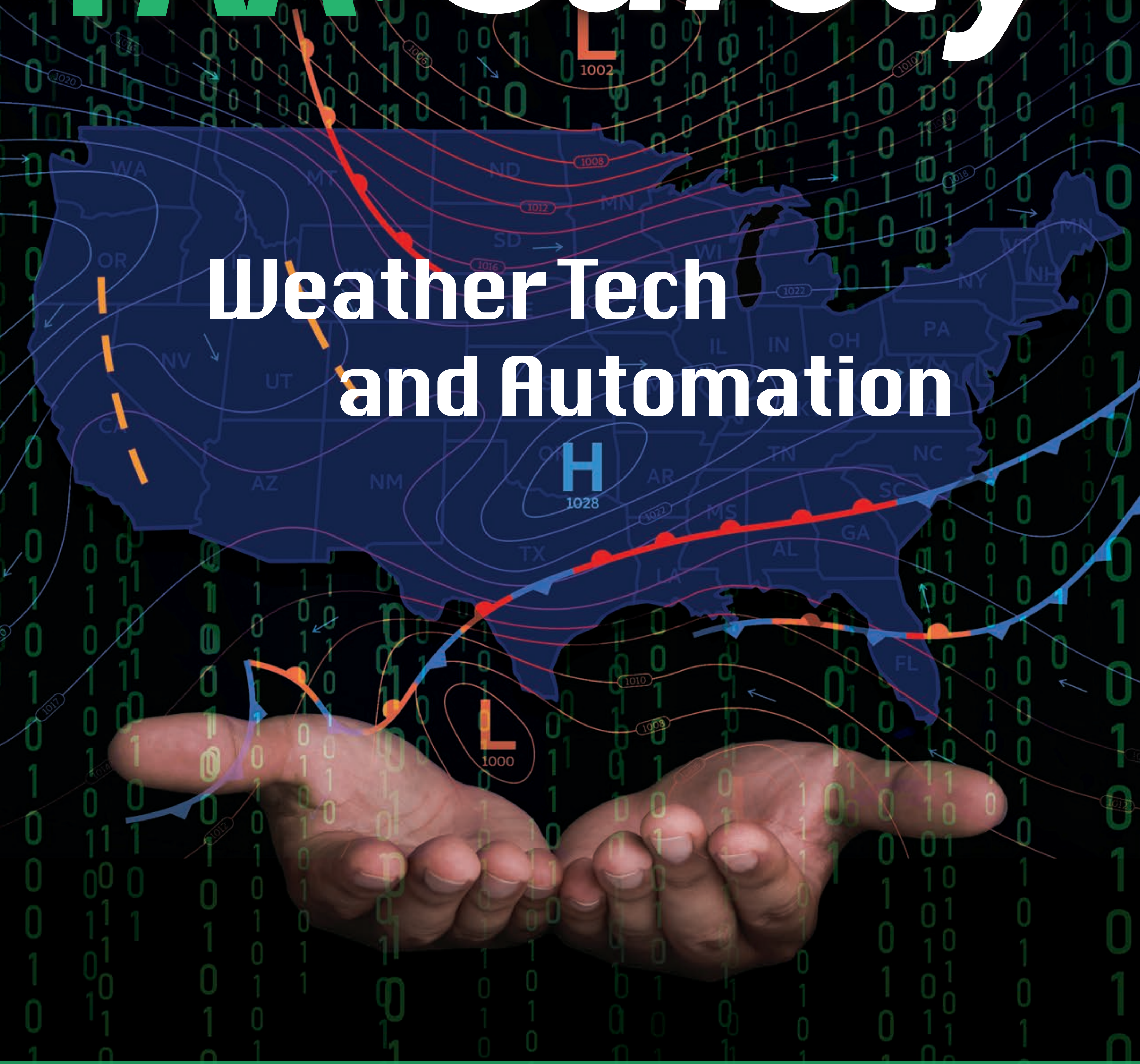
May/June 2025

# FAA Safety BRIEFING




## Weather Tech and Automation

Federal Aviation Administration

U.S. Department
of Transportation

**Federal Aviation
Administration**

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www.faa.gov/Safety_Briefing

## ABOUT THIS ISSUE...


The May/June 2025 issue of *FAA Safety Briefing* focuses on the variety of tools and technology pilots use to safely avoid and mitigate risk during flight. Feature articles cover some of the FAA's latest weather research work and programs and provide important tips on how to properly "tame" your technology. We also explore the many benefits of participating in the annual GA and Part 135 Activity Survey.

**Contact Information**
The magazine is available on the internet at:
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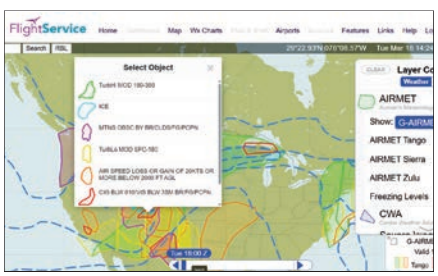
# FAA Safety BRIEFING

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

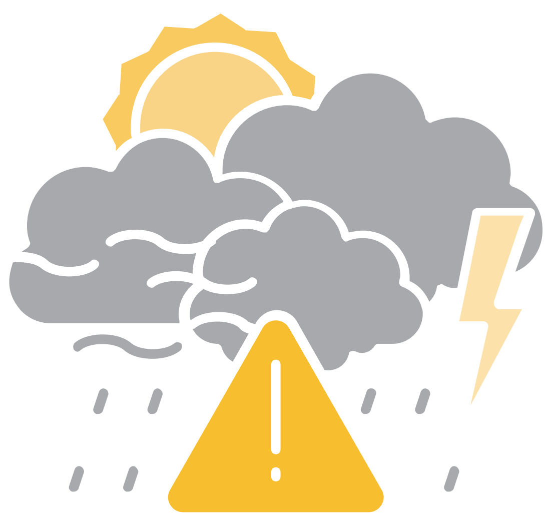







## DEPARTMENTS





ROBERT RUIZ, ACTING FLIGHT STANDARDS SERVICE EXECUTIVE DIRECTOR

# TAMING TECHNOLOGY

As we welcome the warmer and sunnier days of spring, I'm sure many of you are eagerly returning to the skies to enjoy more routine flying. To help shake off the rust that may have accumulated during the colder months, it's important to focus on sharpening our flying skills of course, but also on the technology we regularly rely on to get us to our destination safe and sound.

The excellent weather tools and technology we have today would have been the envy of airline pilots not that long ago and are one of the many reasons why it's such a great time to be in aviation. But even the best technology isn't very helpful without clear thinking and correct actions. This issue of *FAA Safety Briefing* is one tool you can use to "tame" your technology and ensure you know how to properly use the information at your disposal.

A good example is your preflight weather briefing, which is essential to a safe flight. But are you getting the most out of your briefings? In the article, "Giving Color to Aviation Safety," we explain some of the recent updates on the flight planning site 1800WxBrief.com that can help improve situational awareness of weather conditions, including the recent transition from text to Graphical AIRMETs (G-AIRMETs) and the addition of Graphical Forecasts to Aviation (GFAs) to their interactive map of the Continental US.

On the subject of weather, the FAA has been at the forefront of advancing weather data and research for nearly 20 years, including products that improve weather forecast capability and more accurately depict turbulence and icing potential. You can learn more about these various contributions including future plans to advance weather technology in the article "The Foundation of Forecasting."

A recent study shows some exciting progress for the FAA's Pilot Cognitive Assist Tool (PCAT), which aims to aid pilots with decision-making during flight. The feature "Just in Time Weather," showcases the PCAT's potential, particularly its ability to aggregate weather data and provide actionable insight to pilots regarding unexpected or adverse weather changes during flight.

As we stated, technology can be a great asset in the flight deck, reducing workload and enhancing safety. But there are risks when we depend too much on our devices to navigate or make aeronautical decisions, not the least of which is a degradation of manual flying skills and pilot proficiency. In the article "The Dangers of Overreliance on Automation," we take a closer look at these technology pitfalls and some strategies we can use to avoid any unwanted surprises.

**WHEN IT COMES TO TECHNOLOGY, IT ALL COMES BACK TO PEOPLE AND A COMMITMENT TO STAYING CURRENT IN EVERY WAY.**

On a final note, many of you may have likely received an invitation to participate in this year's General Aviation and Part 135 Activity Survey. A postcard is usually mailed out in late February to a random set of aircraft owners and fleet operators to capture what kind of flying activity you had the previous year. I understand the survey fatigue that often sets in with so many industries asking for feedback. Yet, I know many of you do take the time to carefully answer the questions asked of you, and for that, I say thank you. Data collected in this survey really does make a difference. For those who receive a survey request, but maybe have not yet had a chance to respond, I encourage you to do so. This issue's article, "Appraising Aviation Activity" takes a closer look at the survey, its long history, and its direct impact on safety for NAS operations.

When it comes to technology, it all comes back to people and a commitment to staying current in every way. Thank you for making this publication part of your educational toolkit. Enjoy reading and I'll look forward to meeting you again in the next issue.

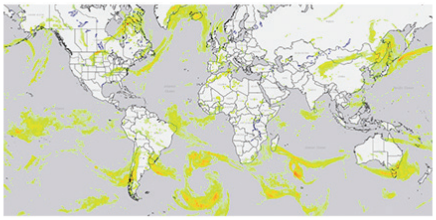
Safe flying!

# AVIATION NEWS ROUNDUP

## The Next-Generation Turbulence Forecast System

Turbulence remains a cause of aviation accidents, mainly in the form of serious injuries to crew members and passengers, and the FAA is continuing to improve the detection and prediction of this hazard. Increased automated turbulence observations (spatially and temporally) and more accurate forecasts of location and intensity of turbulence enable pilots, dispatchers, and air traffic controllers to better anticipate or avoid all known types of atmospheric turbulence. This includes clear-air, mountain-wave, and convectively-induced turbulence. These efforts help to improve safety and increase capacity within the National Airspace System (NAS).

The FAA sponsors research and product development for turbulence mitigation, including the Graphical Turbulence Guidance (GTG) which computes the results from multiple turbulence algorithms, and then compares the results of each algorithm with turbulence observations from PIREPs, AMDAR data, and EDR reports to determine how well each algorithm matches reported turbulence conditions from these sources. Graphical Turbulence Guidance version 4 (GTG4) is on track to be operational at the end of January 2026. Once available, pilots, dispatchers, air traffic managers, aviation forecasters, and other decision-makers will be able to access GTG4 through various software applications. One of the enhancements GTG4 will offer is the ability to upgrade the horizonal resolution from 13-km to 3-km grid spacing to capture finer details and add forecasts of convectively-induced turbulence, not only in thunderstorms but well outside thunderstorms where atmospheric disturbances or waves can travel hundreds of kilometers downstream.



The current operational version of GTG available globally is Graphical Turbulence Guidance Global (GTGG).

In April 2026, GTG Nowcast (GTGN) — a tactical aid for aviation — will transition to operations. GTGN will provide a nowcast of the current turbulent state of the atmosphere over the contiguous U.S. in near real-time, updating every 15 minutes. The basis for the nowcast will be the most recently available 1-hour forecast from GTG4. Recent observations of turbulence will be used to update the GTG4 forecast and create a blended nowcast. This capability will be expanded worldwide in 2028 with GTGN Global, at the request of airlines that have praised GTGN Beta.

A future upgrade to GTG4, planned for 2027, will incorporate machine learning techniques to improve prediction of turbulence. These techniques will enable automated calibration (currently a labor-intensive process) of the GTG algorithm in response to changes in underlying numerical weather prediction models.

Learn more at bit.ly/3Fq3fyc.

## Retirement of TAC AIRMETs and OCONUS FAs

The Weather Information Modernization and Transition (WIMAT) team under the Policy and Requirements Branch of the FAA's Aviation Weather Division worked diligently with the National Weather Service (NWS) to retire a couple of legacy text-based aviation weather products and transition toward higher resolution graphical products. As of Jan. 27, 2025, both the Traditional Alphanumeric Code (TAC) and text Airman's METeorological Information (AIRMET) for the Contiguous United States (CONUS) and the Outside

**#FLYSAFE GA SAFETY ENHANCEMENT TOPICS**

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

**MAY**

**Approval for Return to Service** — The importance of proper return to service determination and documentation.

**JUNE**

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

of the Contiguous United States (OCONUS) Area Forecasts (FAs) were officially retired. The OCONUS regions for this retirement did not include Alaska. The Alaska FA is still available to users.

The FAA conducted a safety risk management panel for the text CONUS AIRMET retirement in 2020 and the panel occurred for the OCONUS FAs retirement in 2024. Both panels concluded that there were no major risks to the safety of the National Airspace System (NAS) due to these changes. The WIMAT team also assisted in the socialization of these changes to the aviation community and coordinated with various FAA lines of business to prepare for this transition and alert users of these changes prior to the retirement.

The retirement of these products completes the official transition toward graphical products that are already being produced by the Aviation Weather Center (AWC). The Graphical AIRMETs (G- AIRMETs) for the CONUS have been available since 2010 and provide users with the same information as the text-based product. The Graphical Forecasts for Aviation (GFA) will replace the text-based OCONUS FAs with higher-resolution graphical information. The GFA expansion for these OCONUS regions occurred back in 2019 and 2020. You can find both the G-AIRMETs and GFA on the AWC website at AviationWeather.gov.

### General Aviation Provides Robust Contribution to U.S. Economy

A recently released updated study details the robust contributions of general aviation (GA) to the U.S. economy, determining that GA supports a total of 1,330,200 jobs and a total of $339.2 billion in U.S. economic output.

The Aircraft Electronics Association (AEA), Aircraft Owners and Pilots Association (AOPA), Experimental Aircraft Association (EAA), General Aviation Manufacturers Association (GAMA), National Association of State Aviation Officials (NASAO), National Air Transportation Association (NATA), National Business Aviation Association (NBAA) and Vertical Aviation International (VAI) sponsored the study. Leaders of the associations were encouraged by the study's depiction of the significant contribution that the GA industry has on the U.S. economy.

To determine the total U.S. economic impact of GA, the study calculated the direct, indirect, induced, and enabled economic impacts, based on the most recent data available from 2023. You can read the full report at bit.ly/3Dy5KOp (PDF).

### Transformation of Aircraft Registry

In 2022, aircraft owners and operators faced frustrations as FAA aircraft registrations took an average of 191 days to process. The FAA's Civil Aviation Registry knew change was critical and in response, the team worked tirelessly to cut processing times and implement long-term solutions. Their game-changing effort? The launch of the Civil Aviation Registry Electronic Services (CARES), a cloud-based platform that has transformed aircraft registration.

Since its debut in December 2022, CARES has continued to evolve, adding several key search capabilities, enhancing cybersecurity protections, and improving responsiveness to stakeholders. Today, registration processing averages just 10 business days, a significant improvement.

But innovation isn't stopping there. With future enhancements on the horizon — including electronic delivery of registration certificates and full digitization of the process — the registry is setting a new standard for efficiency, security, and service. Check out CARES for yourself at cares.faa.gov.

### National GA Awards Winners

Since 1962, the General Aviation Awards (GAA) program and 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 the vital leadership roles these individuals play in promoting safety, education, and professionalism throughout the aviation industry.

The 2025 national honorees have been announced and awards will be presented in July during EAA AirVenture 2025 in Oshkosh, Wisc. The recipient's names will also be added to the large perpetual plaque found in the lobby of the EAA Aviation Museum.

Recipients of the 2025 National General Aviation Awards are:

- Certificated Flight Instructor of the Year — Adam Boyd, Cabot, Ariz.
- Aviation Maintenance Technician of the Year — Samuel "Beau" Hardison, Mountain View, Ariz.
- FAA Safety Team Representative of the Year — Josselyn Slagle, New Castle, Penn.

For more information visit generalaviationawards.com.

DR. SUSAN NORTHRUP, FAA FEDERAL AIR SURGEON

# BUILDING THE RIGHT TEAM

Approximately seven years ago, my predecessor, Dr. Mike Berry, penned an article discussing the FAA medical certification team. While excellent, it's time for an update.

As Berry explained, medical certification is a process that involves more than simply receiving a sheet of paper. Pilots benefit most by building a partnership with an Aviation Medical Examiner (AME) that will serve them better in the long run over the course of multiple medicals and their career. This is especially important if you have underlying medical conditions.

Medical certification involves at least three team members: You, your AME, and the FAA. Your AME is often your liaison between the FAA and medical specialists in the community when additional evaluations are necessary. Therefore, your AME can be critical to how smoothly your medical certification goes.

AMEs, like any large group of professionals, have different strengths and weaknesses. Many AMEs practice another specialty and perform FAA medical examinations as a "labor of love" typically because they enjoy aviation and interacting with pilots. Many are pilots and aircraft owners themselves. In fact, we draw many of our medical consultants (cardiology, ophthalmology, pulmonology, etc.) from these AMEs. However, if you have any significant medical issues, it is best to have a short discussion with the AME before beginning the examination to ensure that you and the AME will be a good fit. For individuals with multiple medical conditions or high-risk conditions such as cardiac, neurology, or drug and alcohol issues, it isn't unusual to spend significant time preparing an airman's application and supporting documents to ensure smooth passage with the FAA. Not all AMEs can expend that much effort on FAA exams; believe it or not, the high office overhead for many sub-specialists can easily consume the basic fee they charge you.

Another thing to consider is that we review and update our policy on an ongoing basis. If you have medical issues that complicate your certification, an AME may not be as up to date in the latest FAA policy which is outside their specialty area. Thus, your medical certificate could be deferred or denied unnecessarily. On the other hand, the AME might be very interested in helping you with a problem in their specialty area. Communication with your AME early in the certification process is critical.

Unfortunately, it's not uncommon to see cases in which the AME unnecessarily deferred issuance of the medical to the FAA. We also see cases where the AME could have been more helpful with obtaining the correct medical documentation. This can mean delays for you and more work for the FAA. So what can you do?

If you are in generally good health without a significant medical history, any AME should be able to issue a medical. We recommend that you consider building a relationship with an AME who is familiar with current FAA policy, willing to spend the time necessary, and can provide you with the best possible certification experience. Various aviation organizations often have individual AMEs whom they recommend. Your fellow aviators can also be an excellent resource for a recommendation. Additionally, your regional flight surgeon (RFS) can be very helpful. RFSs know which AMEs in your local area have expertise for specific conditions. Even if you don't currently have a problem, it can be good to work with someone who may be able to help you avoid problems with certification (bit.ly/RFS_POC).

Both the Aerospace Medical Certification Division (AMCD) in Oklahoma City and the RFS can also help if your medical certificate is deferred. Both have added new physicians, and sometimes they can review and provide a disposition to your case while you are in the office. This saves time for you and can allow the FAA to be more efficient in working your case and coming to a certification decision. Helpful hint: To account for any unexpected issues, build some time in your schedule to wait in the AME's office while they try to contact the FAA. Make sure that you bring all the necessary medical documentation with you as well.

I hope that these tips can help you have a better experience during your next exam.

# THE FOUNDATION OF FORECASTING

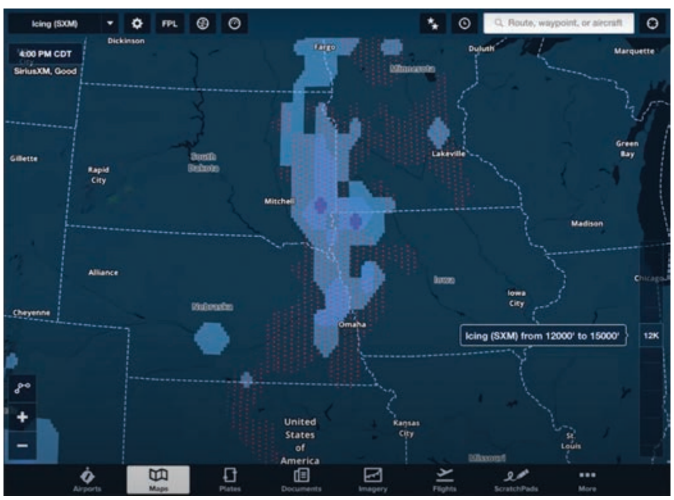
## *How FAA Research Has Helped Redefine Access to Weather Technology*

*By Darcy Gagnon*

For the past two decades, one of the FAA's focuses has been transforming the National Airspace System (NAS) into a digital environment, with more efficient data access and distribution for the airspace's various users. While these and other evolving advancements have been most noticeable in commercial air travel, the benefits to general aviation (GA) pilots have also been plentiful.

## "-B"ig Changes

The most noticeable contribution to a digitized airspace was through the rollout of Automatic Dependent Surveillance-Broadcast (ADS-B) services to airports and aircraft. These services enable air traffic controllers to track aircraft more accurately and give GA pilots access to information about nearby traffic, weather, terrain, and temporary flight restrictions (TFRs) through their cockpit display. While some pilots were initially apprehensive about the cost and complexity to equip, many have grown to appreciate the technology, and since 2019, FAA researchers have been gradually improving the latency and efficiency of data, including weather, to ADS-B In.

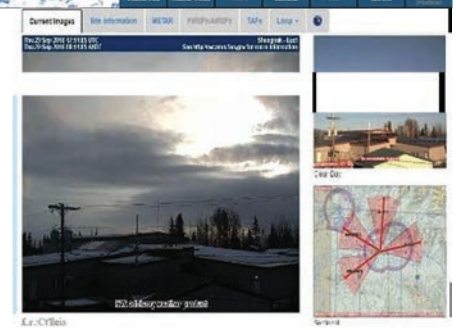



A screenshot of a ForeFlight icing forecast.

But what if you want even more tech beyond what you can get from ADS-B? In the past two decades, the FAA has increased access and transparency of data directly to pilots. Therefore, the reason you can trust technologies like Garmin and ForeFlight for additional weather data is because the FAA not only supplies them with the weather data, but our researchers are also vetting those technologies.

## Gearing Up

A vital preflight resource for pilots is the National Weather Service (NWS) Aviation Weather Center, which provides graphical forecasts for aviation and covers everything from wind to icing conditions. However, few know that FAA research directly supports these services.

Screenshots of FAA Weather Cameras.

"The NWS has a massive amount of people and industries relying on it outside of aviation," said Danny Sims, FAA physical scientist and inflight icing project lead. "Because they have to balance so many priorities, we told them that if they supply us with all the weather data they're generating, we'll do the research on our end on how to make it more granular for pilots." The byproduct of this collaboration is the Aviation Weather Center webpage at AviationWeather.gov.

So, what was improved? A lot of aviation weather forecasting in the past was focused on altitudes that pertained mostly to commercial aircraft but didn't necessarily reflect lower altitudes. One of the FAA's early projects in improving weather forecasting technology was to provide a way for emergency medical helicopters to access lower-altitude weather information. After concluding that program, it was revamped to aid GA operations, which is why you can now find lower altitude weather data on your preferred websites or apps.

Another favorite tool of pilots is weather cameras, which are about as close as you can get to looking out your window. Still, 2D visualization is limited, which is why FAA researchers have taken it a bit further to provide visual estimation analytics.

"On weather cameras, a cloud might look further away than it actually is," said Gary Pokodner, manager of the Weather in the Cockpit program. "This upgrade to weather cameras helps calculate distance so you can better plan your preflight."

## Reacting in Real Time

Pilots should never plan a flight based on their perceived ability to dodge inclement weather. However, improvements in weather technology mean pilots are certainly better able to react to sudden meteorological shifts using

ADS-B and the tools in their flight bag. One factor that has plagued pilots for ages is in-flight icing.

"In the past, the most we could tell people was 'you might encounter icing in these regions over *some amount of time*,'" said Sims. "Now we can tell you what level icing conditions are occurring at, and we are updating those predictions every hour."

To do this, the FAA brings in weather information from the NWS and supplements it with weather radar, surface reports, satellite data, and pilot reports. Icing forecasts are updated at the top of the hour, and because of ADS-B equipage, that information goes straight to your cockpit display.

These products already provide awareness benefits for pilots en route, but FAA researchers are working to make icing data more detailed during the key stages of departure, approach, landing, and takeoff.

"At the moment, the rule of thumb for many is to stay away from ice, period," said Stephanie DiVito, an FAA meteorologist working on a new weather product that provides greater icing information surrounding airports.

A screenshot of a Garmin icing forecast.

Photos of icing on an aircraft and removed for measurement.

"As aircraft hardware and weather analysis and visualization improves, there might be more flexibility for pilots to navigate this hazard in the future."

For example, with this new data, a pilot could request a path that avoids icing near an airport if, say, icing is present on the north side of the airport but not the south. Similarly, if an aircraft is certificated to fly safely in freezing drizzle but not freezing rain, these factors may inform a pilot's flight plan or best route to escape icing conditions.

"We want pilots to see weather in a way that doesn't require them to become a full-on meteorologist during those critical stages of flight," DiVito said.

## Back to the Classroom

We can confidently say that weather technology and forecasting have improved over the past two decades. But another crucial factor in the FAA's weather research is the correct use of that weather technology.

"Even though the latency of what you're seeing on your radar has improved, weather can change in an instant," Pokodner said. "Too much reliance on weather technology can lead to poor decision-making."

Pokodner and his group regularly host training events and attend air shows to educate pilots on how to use weather technology. Their free aviation weather courses on YouTube have accrued over 100,000 views, and they work closely with flight schools to ensure that pilot exams accurately assess a pilot's weather awareness.

Looking forward, Pokodner and his team are researching ways to use virtual reality and gaming technology to train pilots in weather preparation. They are also working on an app for flight instructors allowing them to easily create customizable weather scenarios to use in classrooms.

Additionally, they want to provide more tools for current pilots, like the ability to download pilot reports (PIREPs) on the fly and more improvements to weather cameras.

Advancements in meteorological education along with greatly improved situational awareness from emerging technology are just a few of the ways the FAA are helping pilots navigate the challenges posed by weather.

Darcy Gagnon is a communications specialist with the FAA's NextGen Office.

**LEARN MORE**

Aviation Weather Courses on YouTube
**bit.ly/WxVideos**

FAASTeam Course ALC-521, *Enhancing Wx Knowledge and Training*
**bit.ly/ALC521**

# Giving Color to Aviation Safety

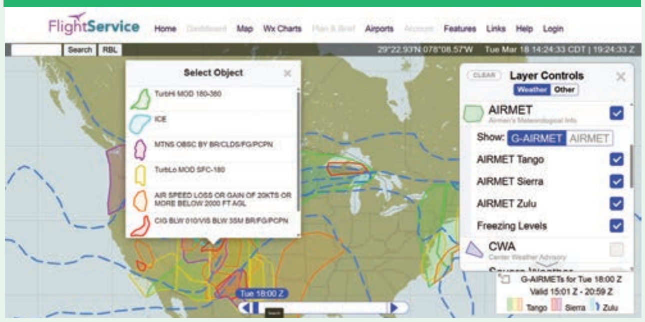
## *New Graphics Enhancements Debut on 1800WxBrief.com*

***By Jeff Arnold***

Recent upgrades to Leidos Flight Service weather products now allow pilots to access enhanced weather graphics, offering clearer and more comprehensive data to support flight planning and decision-making activities.

These newly improved graphics offer a more detailed and intuitive presentation of critical weather data, including turbulence forecasts, icing conditions, convective outlooks, and more.

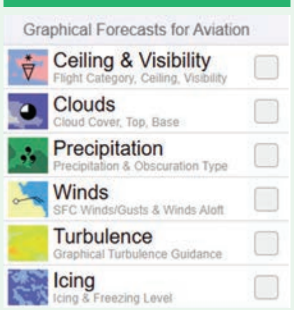
**Upgrading Textual AIRMETs to G-AIRMETs for the Lower 48 States**



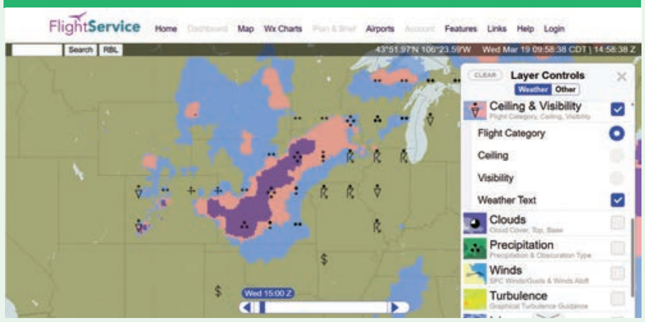

We've replaced static graphical forecasts for aviation (GFA) charts with GFAs on the interactive map. The GFAs have six distinct layer controls, along with complete legends, time and altitude sliders, and textual graphical overlays that include:

- Ceiling & Visibility
- Clouds
- Precipitation
- Winds
- Turbulence
- Icing

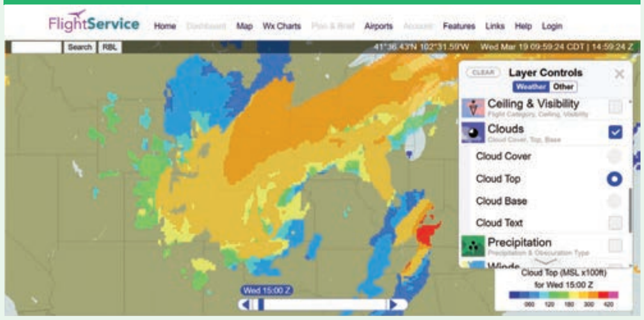
**GFA Layer Control**



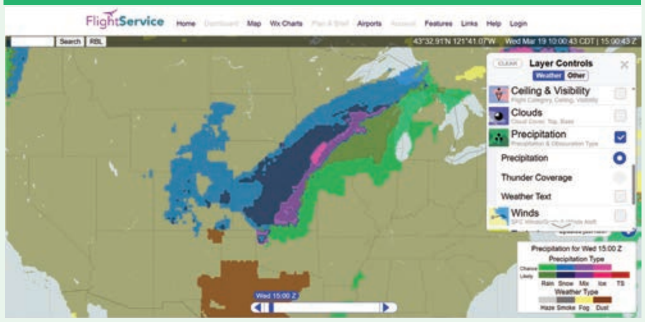

**Ceiling & Visibility**




**Clouds**

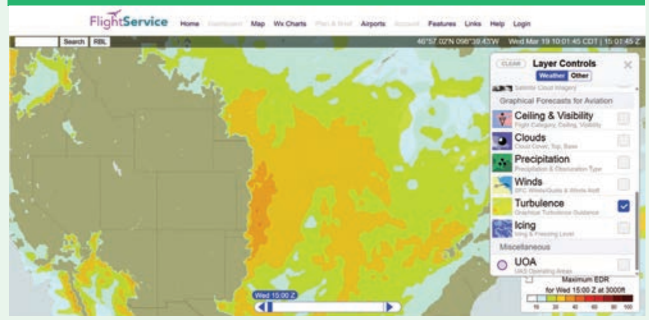



**Precipitation**

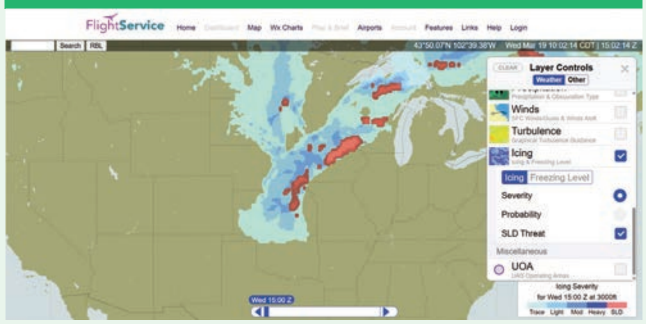


## Winds


## Turbulence

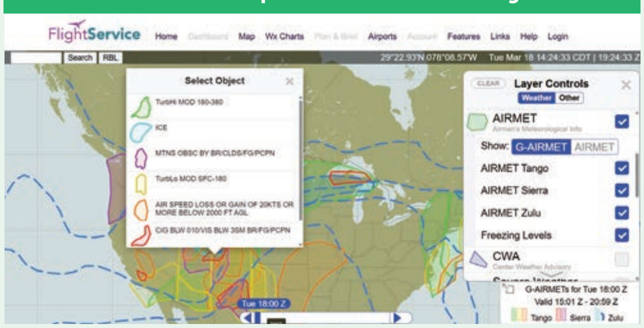



## Icing




Additionally, the new Leidos Flight Service weather products have been thoroughly integrated with our briefing engine. The relevant validity and forecast periods and timeframes were added to the top of the image.

## G-AIRMETs represented in the briefing




## GFA Cloud Top information represented in the weather briefing

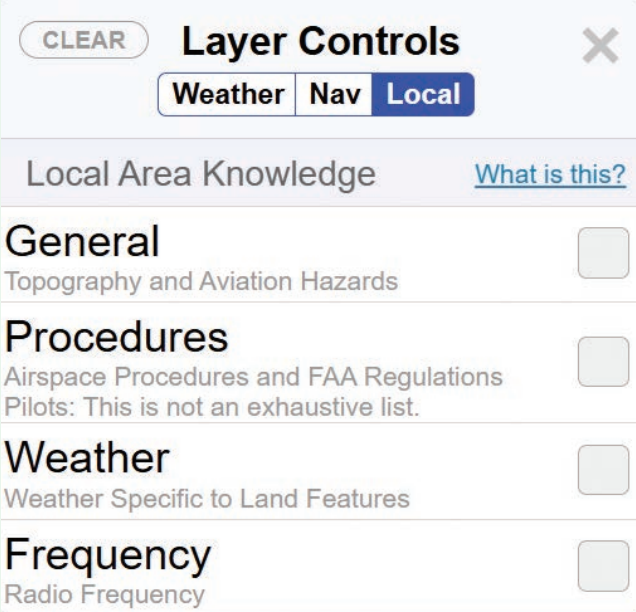

The GFAs are structured similarly to the G-AIRMETs in the briefing product and are displayed for the relevant portions of the flight during the expected traversal time.

## New changes to the 1800WxBrief.com Interactive Map

The layer controls tab on the interactive map is now sorted into three sub-menus or categories: Weather, Nav, and Local. The Weather sub-menu focuses on weather tools, charts, and graphical depictions of weather phenomena. The Nav sub-menu displays airspace and special use airspace. Finally, the Local sub-menu provides area knowledge information, local frequencies, topographical data, and more. The area knowledge information is a collection of data gathered from the experiences and insights of Flight Service Specialists.

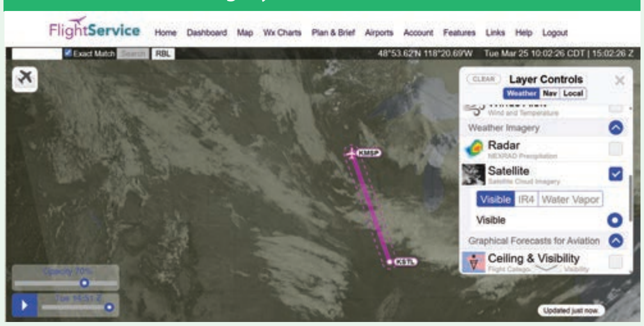
- The new Nav sub-menu will contain the following layers:
- Airspaces (e.g., MTRs, SUAs) (Relocated)
- U.S. Air Defense Identification Zone (ADIZ)
- More to follow in future releases

**Layers control Menu**

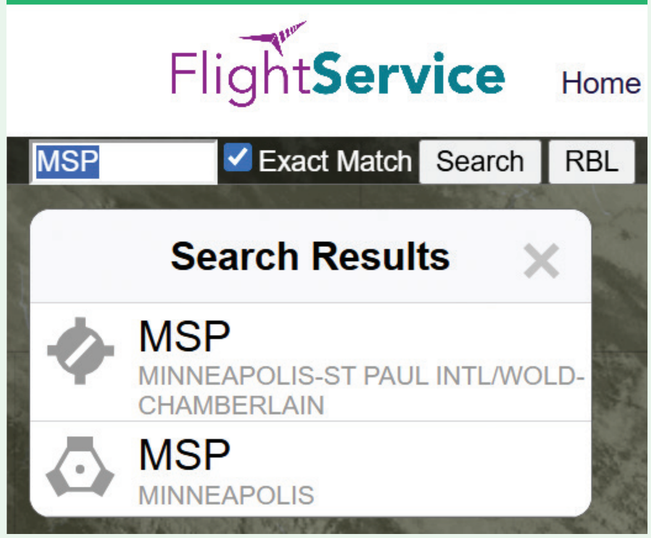



The interactive map opacity slider allows users to adjust the transparency of graphical overlays, making it easier to view multiple data layers simultaneously. Additionally, improvements to the interactive map search functionality now allow for exact match searches to be conducted and easily identified in the map view.

**Satellite imagery on the Weather sub-menu**




**Search Tool**




This screenshot shows the search tool, which is located on the upper left of the interactive map.

## Coming in Future Releases

Future releases include additional interactive map layers to properly overlay NavAids, airports and heliports, airspace color coding to match sectional charts, and more.

We are excited about these enhancements and remain committed to continuously improving our services to better serve the aviation community. As always, pilots are encouraged to provide feedback on these updates to help us refine and optimize their experience. Feedback can be submitted from the bottom of any 1800WxBrief.com page by selecting "Request Help or Submit Feedback."

Visit 1800WxBrief.com for more information, and to explore the new graphics.

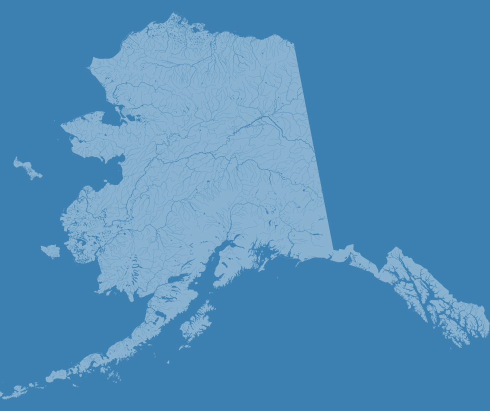
Jeff Arnold is a graduate of Oklahoma State University, has held flight and ground instructor certificates for over 16 years, and is a former Leidos Flight Service weather briefer and air operations manager. Jeff currently serves as the director of innovation and outreach for Leidos Flight Service.

## New Toll-Free Number for pilots in Alaska.

A new toll-free number is available for pilots in Alaska. Pilots can now call 1-(833) 252-7433 (AK-Brief) to connect with an Alaska Flight Service hub facility.

Previously, some pilots faced difficulties reaching Flight Service when calling 1-800-WX-BRIEF due to network provider issues. The new Alaska-specific number was implemented for easy access and to ensure reliable connectivity.

Alaska's regional hubs — Juneau (JNU), Fairbanks (FAI), and Kenai (ENA) — will continue to operate with their existing toll-free and local numbers. Pilots using the new number can select which hub to call. We encourage Alaska pilots to begin using the new number for seamless access to Flight Service in Alaska.



# The Dangers of Overreliance on Automation

## Safety Concerns and Mitigation Strategies for Pilots

*By Jason Blair*

Automation has significantly transformed aviation — enhancing safety, efficiency, and workload management for pilots. However, the increasing reliance on automation tools in general aviation (GA) presents some safety risks. Unlike many commercial pilots, who undergo extensive and regular recurrent training, GA pilots may not get such training and are often left to their own devices to figure out new technology and how to incorporate it into their flight operations. As aviation technology advances, it is important for pilots to understand how it is utilized and get appropriate training before relying on it.

### The Rise of Automation in General Aviation

Modern GA aircraft are increasingly equipped with sophisticated avionics, including glass cockpits, autopilots, and GPS-based navigation systems. These technologies have provided immense benefits, such as:

- Enhanced situational awareness through moving maps and terrain warnings;
- Reduced workload via autopilot capabilities;
- More precise navigation with GPS approaches;
- Increased efficiency and fuel savings.

While these advantages are clear, the growing dependence on these systems raises concerns about pilot proficiency and safety. Let's examine some of these concerns.

### Overreliance on Automation: Safety Concerns

#### Degradation of Manual Flying Skills

One of the most significant risks of overreliance on automation is the erosion of manual flying proficiency. When pilots frequently engage autopilot systems, their hand-flying skills may deteriorate. This becomes critical in emergency situations where automation may fail, requiring immediate manual control. The crash of Air France Flight 447 in 2009 demonstrated how pilots who lacked hand-flying practice and relied on automation did not properly recover from a stall during an automation failure in a highly trained airline environment.


**The interface of a general aviation autopilot system. (Garmin photo)**

GA pilots are not exempt from the challenges of becoming over-dependent on automation systems. As our aircraft are equipped with more advanced and more capable systems, they allow us to disengage our flying skills more and more, relying on programming skills too often.

If manual flying skills are not also practiced, they decay.

#### Complacency and Reduced Situational Awareness

Automation can create a false sense of security, leading to complacency. Pilots may assume that automation systems can be relied upon to handle more aspects of flight than may be logical. This results in diminished vigilance during flight operations. Situational awareness may decrease as pilots become passive monitors rather than active participants in flight management. This can lead to delayed responses to system malfunctions, failure to cross-check automation inputs and flight path deviations, and even the inability to detect potential hazards, such as airspace violations or terrain conflicts.

#### Automation Dependency in Emergency Situations

Automation failures often require immediate pilot intervention. If a pilot is too dependent on automation, they may struggle to transition to manual control during an emergency. Some common automation failures include:

- Reliance on autopilot systems during flight operations and the inability to physically fly the aircraft without autopilot engagement;
- Inability to manage added workload while hand-flying the aircraft, especially during instrument conditions;
- Instrument failures that require operating in reversionary modes with which the pilot may not be familiar.

Inadequate training in handling such scenarios can have disastrous consequences.

#### Misinterpretation of Automation and Mode Confusion

Pilots must understand the operational logic of automation systems. Mode confusion occurs when pilots incorrectly assume the state of an automation system. This can lead to:

- Unexpected autopilot disengagement;
- Failure to recognize that automation is not following the intended flight path, whether lateral or vertical;
- Incorrect reliance on automation modes, such as altitude capture or vertical speed hold, without verifying actual aircraft behavior.

Lack of, or training deficiencies in automation logic can contribute to accidents where pilots fail to recognize or correct automation errors in time.


A general aviation autopilot system. (Garmin photo)

### Mitigating the Risks of Automation Dependence

There are ways to mitigate these risks and minimize the potential for accidents and incidents that occur due to incorrect use of automation in modern aircraft.

The first is regular manual flight practice. Pilots should actively maintain their manual flying skills by regularly disengaging automation and hand-flying in different phases of flight. Don't give up those basic flying skills. Practice hand-flying en route segments, particularly in visual meteorological conditions (VMC). Also fly instrument approaches without autopilot engagement to maintain proficiency.

A second way to reduce automation overreliance risk involves the continued use of scenario-based training and emergency preparedness. Pilots, and their instructors, should include scenario-based training that emphasizes automation failures and manual flight recovery in their initial and ongoing training. Including this type of training during flight reviews and instrument proficiency checks (IPCs) is critical. Flight instructors and training programs can help make this happen by including things like simulations of autopilot failures, partial panel exercises, and presenting emergency scenarios that have a pilot transition from automation to manual flight.

### Enhanced Understanding of Automation Logic and Systems

Pilots need to fully comprehend the systems in their aircraft. Navigation equipment, audio panels, communications radios, and especially autopilots must be fully understood if you are going to use and rely upon them. It is important that a pilot know the limitations of these systems also.

Many autopilots have operational limitations that their pilots have never seen. Know if or when an autopilot will disengage on its own, or how you would disengage the unit if it isn't doing what you want it to be doing. Be ready and able to verify any inputs and outputs of systems in your aircraft to ensure they are doing what you want them to, and think they are doing. We even now have some aircraft with automatically switching fuel tank feeds. If items such as these fail, the pilot needs to know how to identify those failures and how to remedy them.


### Avoiding Overdependence on GPS Navigation

Following the magenta line can be easy but also misleading. Reliance on GPS can be dangerous in cases of improper programming, signal failure, or even equipment failure. While the latter of these two items is not that common, mis-programming the information in the GPS system with regard to how you want the aircraft to navigate or perform is very common.

It is critical to know how to program your GPS navigation system to include using flight plan sequencing and loading approaches. Another key tip is to know how to insert or remove a hold at waypoints in an approach or in the en route environment. Take your programming skills well beyond the "direct-to" button and simply loading and activating an approach in the "vector-to-final" option.

A healthy bit of professional skepticism goes a long way when using your GPS navigation systems. If it is taking you somewhere you don't think it should, be ready to disengage, hand-fly, ask for a vector, or set up the approach or flight plan path again. This may also mean transitioning to more traditional methods of navigation such as using a VOR or using some pilotage and dead reckoning. Charts and the ability to use them are still a critical part of pilot proficiency.

### Staying Engaged as the Pilot-in-Command

Automation should serve as an aid rather than a replacement for active flight management. Pilots should be continually monitoring flight instruments and automation settings. It is important to cross-check system inputs and aircraft performance. Maintain a high level of engagement rather than passively relying on automation. There should never be a moment where the pilot lost awareness of what the aircraft is doing or where they are is lost just because they are on a long cross-country flight and "the autopilot has it" for now.

### The Role of Flight Instructors

Flight instructors play a critical role in ensuring GA pilots develop balanced automation skills. There is much they can do in initial training and when they work with clients who are coming back to them for recurrent training or advanced training. Instructors should:

- Encourage students to practice manual flying during each lesson;
- Introduce controlled automation failures in training scenarios;
- Help students understand the full functions, capabilities, and limitations of automation systems in their aircraft;
- Reinforce the importance of situational awareness and active cockpit management.

By incorporating automation-related emergency procedures into checkrides, currency flying, and training syllabi, pilots will be better equipped to handle automation failures.

While automation has undoubtedly improved safety and efficiency in general aviation, excessive reliance on it can lead to skill degradation, complacency, and increased risk during failures. Pilots have a duty to find a way to strike a balance between leveraging automation and maintaining fundamental flying skills. Regular manual flight practice, scenario-based training, and a deep understanding of automation systems are essential to ensuring pilots remain proficient and prepared for any situation. By adopting a proactive approach to automation training, systems failures, and keeping your flying skills sharp, you can ensure your overall safety of flight is increased. Learn to monitor and mitigate failures related to potential overreliance on automation.

**Jason Blair is a flight instructor and FAA designated pilot examiner (DPE) actively engaged in training and testing pilots in single- and multi-engine airplanes in both general aviation and commercial pilot training environments. He has been a DPE since 2007 and actively flies his 1947 Stinson.**

**LEARN MORE**

FAA Fly Safe Topic, *CFIT and Overreliance on Automation*
**bit.ly/CFIT_Automation**

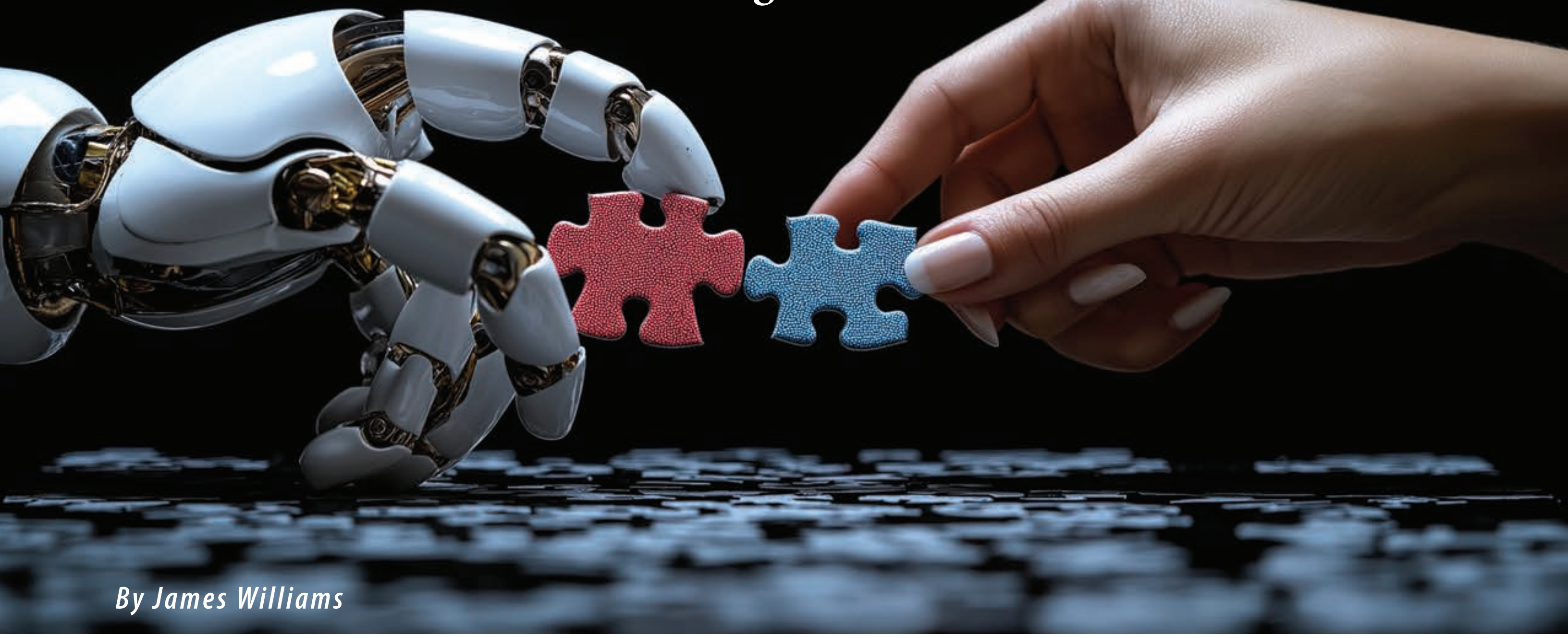
"No Surprises! Keeping Control of Avionics and Automation," *FAA Safety Briefing*, Jan/Feb 2020
**adobe.ly/4hpaBiS**

"Where the Heck Are We? Understanding the Lost Art of Aerial Navigation," *FAA Safety Briefing*, Jan/Feb 2018
**adobe.ly/41Bg2oS**

"Teaching Technology – Instilling the Right Aptitudes and Attitudes for Safety," *FAA Safety Briefing*, Sep/Oct 2017
**adobe.ly/4hnHZ9x**

# Just in Time Weather

## *Using Technology to Help Navigate Fickle Flight Weather*



*By James Williams*

Imagine you are a VFR pilot on a cross-country flight, and you notice that the weather is gradually changing from VFR to IFR. You realize that you need to do something (i.e., decide) either to turn around and return to your departure airport or divert to an alternate airport. In this situation you could really use a tool to aid in your decision-making, but that's not in the cards. Or is it? Well, welcome to the Pilot Cognitive Assistance Tool (PCAT).

The FAA and the MITRE Corporation, a nonprofit that manages federally funded research and development centers, recently conducted a joint research study on technology that might provide that help in the future. The PCAT is designed to provide cognitive support to pilots, particularly in single-pilot operations. This is accomplished by accessing weather data that could be available during a flight, interpreting it for the pilot, and presenting it on an electronic flight bag (EFB) in a way that allows the pilot to make better-informed decisions. This would aid in reducing pilot cognitive workload.

### Just in Time

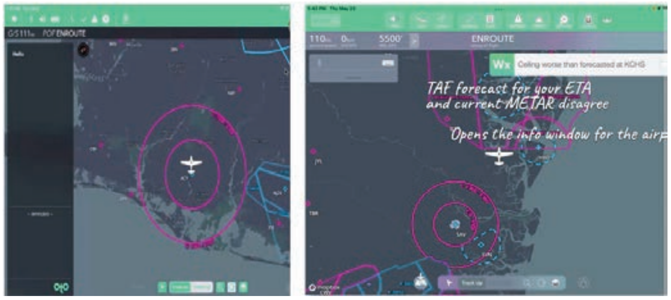
Allowing pilots advanced notification of changing weather conditions to determine if it would improve decision-making by allowing more time to consider the changes was the premise behind a recent research study conducted by the FAA and MITRE using the PCAT. For example, would the pilot divert to an airport with better weather, return to the departure airport, change course, etc., if they had more time to consider the weather information? Also, would a tool that could handle cognitive tasks like comparing runways for crosswind components when the wind didn't favor one runway or alternate routes in the event of deteriorating weather be beneficial?

The study was based on an experiment where pilots flew a series of five scenarios in a simulator configured as a Cessna 172 with a 180-degree visual display, a Garmin G1000-type display, and an EFB system displayed on a tablet. From there, the pilots were split into an experimental group and a control group. Both groups had access to the same information and technology, but the experimental group had the PCAT system providing notifications on the EFB. The PCAT provided visual and auditory notifications of important weather changes on the flight route during each scenario. The control group had the same information available but had to actively search it out. From there, the researchers collected objective and subjective data about the scenarios. The objective data were things like deviations from the intended flight path, response time to changes, and what kind of decisions the pilots made in response to changes. The subjective data included post-scenario and post-experiment surveys to measure the pilot's perceived mental workload and general information about the pilot's experience and currency.

**A photo of the experimental set up.**

### And the Results Are …

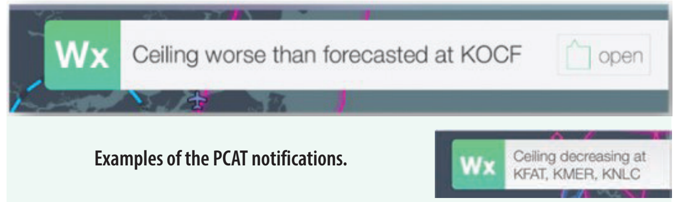
Well, interesting and complicated. Getting subjects for




An Image of the EFB screen without the PCAT notification (left) and with the notification (right).

any experiment can be challenging, and it's worse when you require specific qualifications for your subjects (i.e., people with some kind of training or qualification, like a pilot certificate, rather than any person off the street). I only dipped my toe into this world but ran into that issue with a far simpler and shorter experiment in an environment with a high concentration of pilots to draw from. In this study, a representation of the GA pilot population covering a variety of ages and experience levels was used.

The study found that both groups made decisions at similar times in each scenario with similar choices (e.g., deviate, land at a new airport, continue flight, pop-up IFR, etc.). The control group took longer to view important information or updates and had a higher number of touch-screen interactions. This makes sense as the experimental group was getting push notifications that resulted in views of information while increasing situational awareness. Both groups felt they had a high level of situational awareness and adequate weather information. The average of the mental workload ratings provided by both groups in the post-scenario questionnaire did not show a clear difference. Mental workload ratings increased with age and a greater

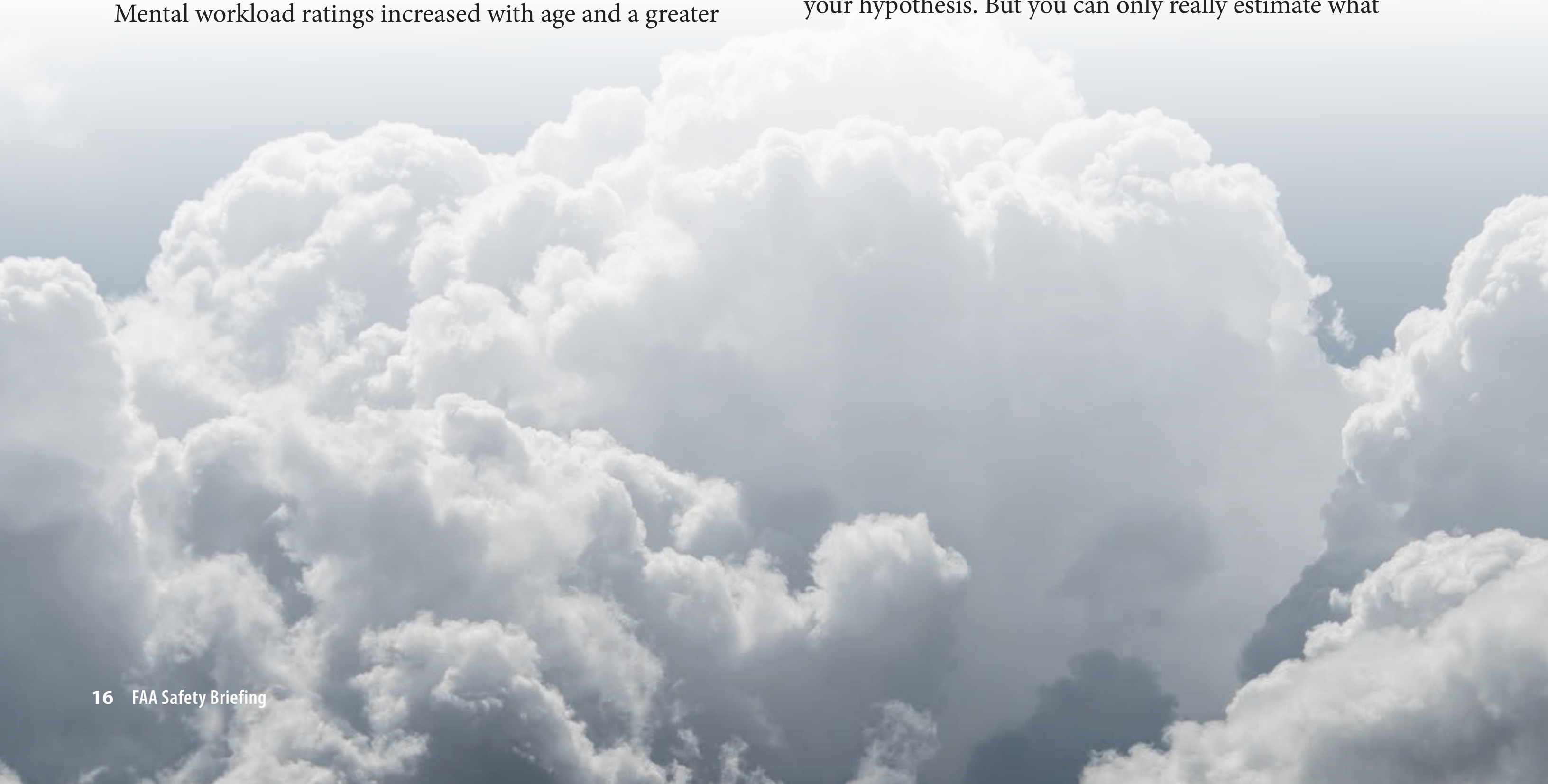



Examples of the PCAT notifications.

number of years as a pilot. However, the mental workload ratings decreased for pilots with a greater number of hours flown in the last 12 months (pilot currency).

So, what about the study's other parameters, like altitude, pitch, and roll? They didn't really show a meaningful difference between the groups. It came close at a few points, but close doesn't count. This is where the challenges I mentioned earlier come in. The sample size for the study was small, with 12 in each group for a total of 24 participants. With an even slightly larger sample, I would bet that you would get more significant results. Also, the scenarios were somewhat simple. If you used more complex scenarios and ramped up the workload, you would likely see an increased value for a system like the PCAT that offloads processing work from the pilot.

So why didn't researchers just do a bigger, more complex experiment? There's always a tension between perfect and good enough. More complex scenarios require more time to design and execute. They also introduce more opportunities for design or interpretation errors. Adding more participants extends the amount of time spent collecting and analyzing data. That, in turn, increases costs because you're probably having to pay someone to run the experiment and crunch the numbers afterward. In an ideal world, you'd use a sample just big enough to prove or disprove your hypothesis. But you can only really estimate what



Training devices are excellent tools for testing new technologies without risk to the participants.

that number might be while designing your experiment. Even with unconstrained resources, you wouldn't want to automatically use a huge sample size because, with a large enough sample size, you can make trivial differences appear to be significant. So, it's always a balancing act. But in total there were promising results when comparing PCAT vs. non-PCAT conditions and the study did accomplish an important goal of showing benefits that indicate future development should go ahead.

The researchers recommended larger and longer experiments to explore the value that a tool like the PCAT could provide. As I read the study report, I agreed with that recommendation. This experiment offered more than enough to show the promise of the PCAT. Think back to the hypothetical laid out in the opening of this article. Would using a PCAT tool be beneficial in these circumstances? I think so. It could help address plan continuation bias; "Well, I'll continue on and see if I can make it." If something like the PCAT popped up a notification saying your destination or enroute weather is worse than forecast, it would give you a chance to quickly evaluate whether or not to continue, avoiding additional potential risk exposure.

The PCAT could function as a cognitive assistant giving you updates that let you have greater control over your flight and increase your situational awareness and safety. The intelligent nature of the system means you get advanced notice of changes when they are happening along with some suggestions to modify your flight in response. But you're still in charge. You're actually more situationally aware while looking at secondary screens and systems less. I can't wait to see what a more complex and larger experiment will reveal. While anything is possible, I feel like higher workload situations are where tools like this will shine.

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

**LEARN MORE**

NextGen Weather
**faa.gov/nextgen/programs/weather**


# Appraising Aviation Activity

## How the GA Survey is Making Your Voice Heard

*By Nicole Hartman*

Surveys — sigh. There's no shortage of them. It often feels like we're being bombarded with requests, eagerly seeking our feedback on everything from market research and demographics to good old customer satisfaction. While surveys are intended to collect valuable insights, they can feel overwhelming, making us hesitant to participate. We might even think: *Does my input really matter?*

When it comes to the FAA General Aviation and Part 135 Activity survey (GA survey), the answer is unequivocally YES!

The GA Survey is voluntary and is the **only** source of information on the general aviation fleet, the number of hours flown, and the ways people use general aviation aircraft. The data is used to assess safety, economic impact, and the effects of regulatory changes.

Let's take a look at the history of the survey and how your participation directly supports aviation safety.

### Starting the Survey

Before the first implementation of the annual GA Survey in 1978, the FAA used the Aircraft Registration Eligibility, Identification, and Activity Report (AC Form 8050-73) to collect data on general aviation activity. The form was sent annually to all owners of civil aircraft in the United States and served two purposes:

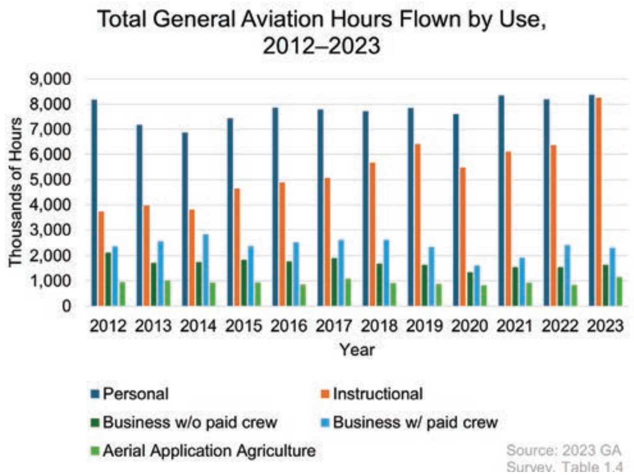
- Part 1 was the mandatory aircraft registration revalidation form; and
- Part 2 was voluntary and applied to general aviation aircraft only, asking questions on the owner-discretionary characteristics of the aircraft such as flight hours, avionics equipment, base location, and use.

In 1978, the FAA replaced AC Form 8050-73 with a new system. Part 1 was changed to a triennial registration program. Instead of requiring all aircraft owners to revalidate and update their aircraft registration annually, the FAA only required revalidation for those aircraft owners who had not contacted the FAA Registry for three years. In 2010, the FAA eliminated the voluntary Triennial Aircraft Registration Report Program and established rules that require the renewal of an aircraft registration every three years and place time limits on interim statuses.

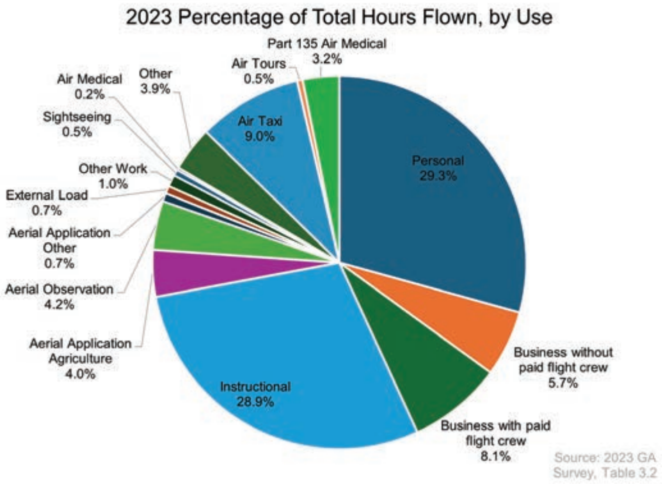
The General Aviation Activity Survey replaced Part 2 of AC Form 8050-73. It was conducted annually based on a statistically selected sample of aircraft and requested the same type of information as Part 2 of AC Form 8050-73. The first survey took place in 1978 and collected data on the 1977 general aviation fleet.

### Survey Shifts

The GA Survey periodically revises the content, implementation, and definition of the GA population to remain current with regulations, activity patterns, and aviation technology. For example, in 1999 the survey form was redesigned to reduce item non-response, add



new content, and be compatible with optical scanning. Air medical services were added to the use categories, and it began collecting avionics data yearly rather than every other year. The 2005 revision included changing the fractional ownership question from yes/no to a percentage of hours flown, reducing the number of fuel type response categories by removing obsolete options, and adding average fuel consumption (gallons/hour). In 2007 the location of the aircraft was revised to ask about the state or territory where the aircraft was "primarily flown" during the survey year rather than where it was "based" as of Dec. 31 of the survey year. The 2019 modification eliminated non-mutually exclusive transponder selection options in the "Installed Transponder/Surveillance Equipment" section of avionics questions. The survey will continue adapting its content based on welcomed feedback and support from GA industry leaders, organizations, and respondents.




## Aim of the Appraisal

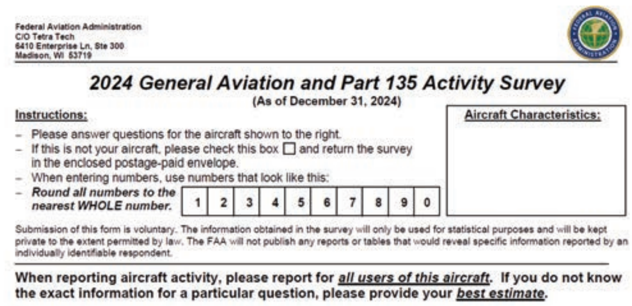
The purpose of the survey is to provide the FAA and the public with a variety of estimates on general aviation and on-demand Part 135 aircraft activity. The collected data enables the FAA to monitor the general aviation fleet so that it can:

- ✔ Evaluate the impact of safety initiatives and regulatory changes;
- ✔ Anticipate and meet demand for National Airspace System facilities and services;
- ✔ Develop more accurate safety measures for the general aviation community.

Other government agencies, industry groups, trade associations, and private businesses also rely on this information to identify safety problems and to form the basis for critical research. The data is used to compute safety metrics such as fatal accident rates, assess the GA industry's economic impact, track the success of safety initiatives (including avionics recommendations), determine funding for infrastructure and service needs, and assess the impact of regulatory changes. In fact, the NTSB's official accident rate for aviation uses the GA survey data as input, while other segments use mandatory reporting, such as the Bureau of Transportation Statistics. Jens Hennig, vice president of operations, safety, and security for the General Aviation Manufacturers Association (GAMA), highlighted this nuance, stating:

> "The GA survey provides a cornerstone to FAA, NTSB, and the aviation industry's work to advance aviation safety …
>
> … The use of a voluntary survey, as opposed to mandatory reporting, also balances the importance of understanding the flying within the industry with the burden imposed on aircraft owners."


An example of the GA Survey post card.



Federal Aviation Administration
C/O Tetra Tech
6410 Enterprise Ln, Ste 300
Madison, WI 53719

**2024 General Aviation and Part 135 Activity Survey**
**(As of December 31, 2024)**

**Instructions:**

- Please answer questions for the aircraft shown to the right.
- If this is not your aircraft, please check this box ☐ and return the survey in the enclosed postage-paid envelope.
- When entering numbers, use numbers that look like this:
- ***Round all numbers to the nearest WHOLE number.*** 1 2 3 4 5 6 7 8 9 0

**Aircraft Characteristics:**

Submission of this form is voluntary. The information obtained in the survey will only be used for statistical purposes and will be kept private to the extent permitted by law. The FAA will not publish any reports or tables that would reveal specific information reported by an individually identifiable respondent.

**When reporting aircraft activity, please report for *all users of this aircraft*. If you do not know the exact information for a particular question, please provide your *best estimate*.**

An example of what the GA Survey looks like.

Each year, about 30% of the fleet (more than 80,000) is surveyed, with certain high-use aircraft — such as turbine aircraft, rotorcraft, newer aircraft, and Alaska-based aircraft — surveyed at 100%. Note: single-engine aircraft are sampled at a rate of ~13% and twin engines are surveyed at ~53%.

We strongly encourage everyone who is contacted to respond so that all aviation activity is represented. Your responses are strictly confidential, and only the survey contractor processes the data to generate estimates.

## 15 Minutes Well Spent

Surveys may seem tedious, but this one is a small effort with a big impact. If you're selected, take those 15 minutes — your input helps keep aviation safe, efficient, and well-supported.

Ultimately, this survey benefits participants and industry partners by providing vital data on the GA fleet. These insights inform research, safety initiatives, and regulatory changes championed by the government, trade organizations, and industry groups.

It is the only source of comprehensive data on the size and scope of the GA fleet, flight hours, and aircraft used. The FAA and industry rely on accurate data from a diverse range of aircraft, and that is where they need your help. We encourage everyone who is contacted to respond to the survey to ensure all aspects of aviation activity are represented.

**Nicole Hartman is an *FAA Safety Briefing* associate editor and technical writer-editor in the FAA's Flight Standards Service.**

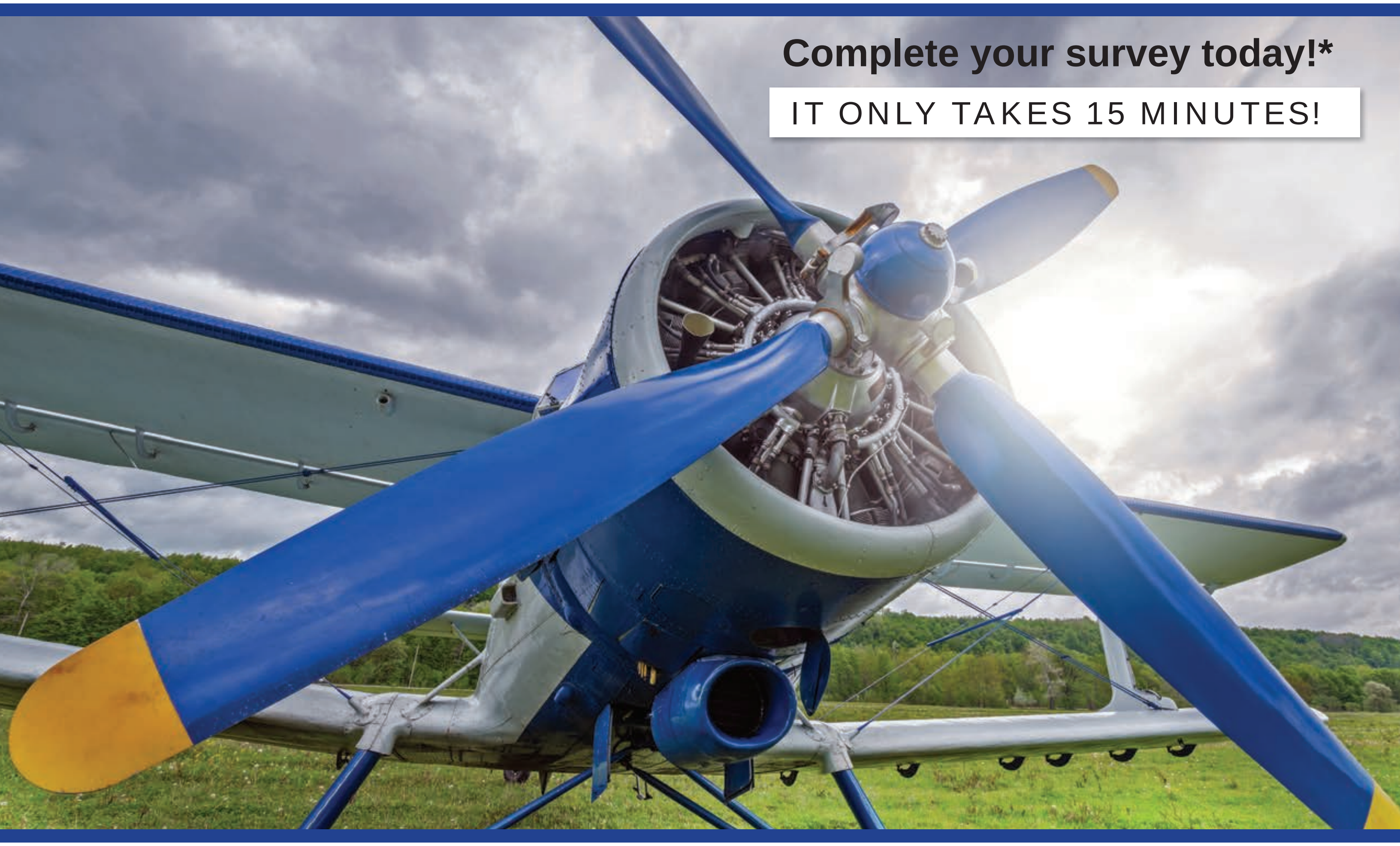
HELP US STAY

# ON TRACK

WITH THE

## $47^{TH}$ 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**

# HOW DOES AN UNLEADED FUEL GAIN APPROVAL THROUGH THE FAA FLEET AUTHORIZATION PROCESS? (Part 2)

This is the second of a three-part series explaining how the next generation of unleaded aviation fuels may be authorized for use in specific engines and aircraft. This segment focuses on the FAA's Fleet Authorization process, developed utilizing the Piston Aviation Fuels Initiative (PAFI) along with the use of ASTM testing standards. The first installment covered supplemental type certificates (STC) and approved model list STCs. For more information, visit flyEAGLE.org/updates.

### Q: What is the FAA Fleet Authorization process, and why is it important to pilots and aircraft owners?

Pilots and aircraft owners should be aware that the Fleet Authorization process will result in the FAA, through PAFI, authorizing a qualified unleaded fuel for use in aircraft and aircraft engines. The makes and models of type-certificated and non-type-certificated piston aircraft and aircraft engines that can safely operate with the qualified unleaded avgas will be compiled and published by the FAA in a document called the Eligible Fleet Authorization Summary Report (EFASR). EAGLE highlighted the FAA's Fleet Authorization process in a recent fact sheet available at bit.ly/3XpcZPu (PDF).

### Q: How does the Fleet Authorization process work?

Under the Fleet Authorization process, the FAA collaborates with industry partners to conduct comprehensive testing of candidate unleaded fuels. This includes evaluating the fuel's compatibility with various aircraft materials, engines, operational environments, and supply chain components. This data, along with an approved ASTM production specification, is required for a qualified replacement fuel. Once it is qualified and the EFASR is published, the FAA will issue a Special Airworthiness Information Bulletin (SAIB), which will "identify the qualified fuel, specify the aircraft and engines eligible to use the qualified fuel, and provide references and other information to accomplish the alteration necessary to enable the use of the fuel."

It should also be noted that type certificate applicants and holders, as well as owners/operators of non-type certificated piston-powered aircraft, may refer to the EFASR and SAIB to determine whether the fuel can be safely used with their aircraft and engines. Owners of special light-sport aircraft (SLSA) can also use the information provided to meet the operating limitations specified in 14 CFR section 91.327(b)(5).

### Q: What role does PAFI play in the Fleet Authorization process?

PAFI is a collaboration between the FAA, industry stakeholders, and technical experts to identify and evaluate unleaded fuel candidates. Established in 2014, PAFI defines and executes comprehensive testing protocols to ensure that candidate fuels meet necessary safety, performance, and environmental standards.

The FAA requires PAFI to make fleet-wide authorization decisions, and it generates the technical data required to support the ASTM specification. This data undergoes extensive peer review by aviation and fuel experts involved in avgas production, distribution, storage, dispensing, operation, maintenance, and aircraft usage to ensure the fuel's safety and reliability. The resulting data helps the marketplace determine whether approved fuels are viable not only for aircraft operation but also for long-term production and distribution.

### Q: How does the Fleet Authorization process compare to the STC process?

While both the Fleet Authorization and STC processes aim to ensure safe fuel use, they differ significantly in scope and application.

***STC Process:*** The STC process requires FAA approval for each aircraft and aircraft engine model. In the STC process, fuel developers work directly with the FAA to conduct required testing to collect data proving compatibility, safety, and performance for specific engines and airframes. This data is provided to the FAA for evaluation, determination of means of compliance, and authorization to approve the unleaded fuel for the requested aircraft and engines. Aircraft and engines each require their own STC. Once the fuel is authorized by the FAA, aircraft owners must then purchase the approved STC and work with a certificated mechanic to implement the required modifications.

***Fleet Authorization Process***: As stated above, the FAA, through PAFI, collaborates with industry partners to conduct comprehensive testing of candidate unleaded fuels. This includes evaluating the fuel's compatibility with various aircraft materials, engines, operational environments, and supply chain components. This data, along with an approved ASTM production specification for the unleaded fuel, is required to have a qualified replacement fuel. Once there is a qualified replacement fuel and the EFASR is published, the FAA will issue an SAIB, which will "identify the qualified fuel, specify the aircraft and engines eligible to use the qualified fuel, and provide references and other information to accomplish the alteration necessary to enable the use of the fuel." This process may also require engine and other modifications to the aircraft.

### Q: Is there information available regarding the PAFI test plans, including engines, airframes, and materials that will be tested?

Yes, this information is available at flyEAGLE.org/resources.

Stay tuned for Part 3, where we will explore the role of industry consensus standards, such as those from ASTM International, in ensuring the safe, consistent production, distribution, and use of unleaded aviation fuels.

***To learn more, visit flyEAGLE.org.***

JAMES WILLIAMS

# OUTSIDE YOUR COMFORT ZONE?

I've always said that if you started flying out of either a towered or non-towered airport, it has an impact that stretches beyond your first tentative flights. Although my first flight at the controls was out of a non-towered airport, the vast bulk of my initial training was out of a small, towered, class D airport. And henceforth I have always felt just a little bit more comfortable at towered airports. On my first solo cross country I still remember arriving at a non-towered airport for the first time without an instructor alongside. I initially thought, "What are these people doing? They're everywhere! It's chaos!" It wasn't. It was a mildly busy morning at a fairly normal GA airport. In retrospect, I know that now. But at the time it was a culture shock. I've witnessed an equal but opposite effect on those who 'grew up' at a non-towered field. These tendencies can be overcome by experience. Personally, I spent a summer operating out of a non-towered GA reliever airport on a regular basis and that made me a lot more comfortable in the non-towered environment going forward. But not everyone has that opportunity, so what should we do?

## There's an AC for That!

There may not be an app for that, but there is an Advisory Circular (AC). ACs are one of the FAA's ways of sharing information and helping people comply with regulations. ACs certainly aren't the only way to comply with a given rule or regulation, but they are a good way to ensure compliance if in doubt. They can also be a good starting point for deeper research on a topic. In this case AC 90-66C, *Non-Towered Airport Flight Operations*, last revised in 2023, calls attention to recommended procedures and processes for use at airports without a control tower or where the control tower is not operating. The AC combines guidance from a collection of FAA sources into one relatively brief document. These include the *Airman Information Manual* (AIM), Chart Supplements, the *Pilot's Handbook of Aeronautical Knowledge* (PHAK), and more. The AC includes references to those other documents so that you can dig deeper if you need more info from the original source.

## Increasing Comfort

The AC offers a lot of guidance in less than 30 pages, and it reads faster than that when you account for the formatting. While the whole thing is worth reading, we will mention a few areas of emphasis here. First is knowing about your airport before you arrive: whether it's your departure, destination, or anything in between, like radio frequencies, traffic patterns, airport conditions, and procedures. The FAA doesn't regulate traffic pattern entry, only pattern flow. This means that when entering the traffic pattern at an airport without an operating control tower, inbound pilots are expected to observe other aircraft already in the pattern and conform to the traffic pattern in use. (Reference AC 90-66C, AIM, PHAK, and 14 CFR 91.126 (b)). While most airports utilize a standard left pattern, some don't. These will be documented on the VFR chart or in the Chart Supplement and checking ahead of time will inform your approach to the airport.

Next, we want to focus on communication. Non-towered airports are more like a jam band than an orchestra. Without a conductor (ATC) they rely on good communication between the players. The AC emphasizes the need for clear and concise transmissions. One example is when preparing for takeoff, make sure to provide relevant information, i.e., "XYZ traffic, Cessna 123, taking off Runway 32, XYZ traffic." By sandwiching the info with the airport name, you give anyone who missed the beginning of the message a chance to catch up. Avoid using phrases like "taking the active." That doesn't tell anyone anything. *You* know what the "active" is but you're assuming everyone else is on the same sheet of music. So you want to make sure your messages are the right mix of information and brevity. Also, you want to start monitoring communications at least 10 miles out so you can start developing a mental picture of the activity before you arrive and for 10 miles on departure to avoid conflict on your way out.

Lastly, one of the often-repeated pieces of advice is to avoid straight-in approaches. While the FAA doesn't regulate pattern entry, straight-ins are not good for mixing into established traffic and increase the risk of a midair collision. With advice from this AC and a little practice, you can expand your comfort zone to include non-towered airports that once were "off limits."

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

### LEARN MORE

AC 90-66C, *Non-Towered Airport Flight Operations*
**bit.ly/AC90-66C**

14 CFR section 91.126 (b), Operating on or in the Vicinity of an Airport in Class G Airspace
**bit.ly/14CFR_91_126b**

REBEKAH WATERS

# THE FAST PASS FOR DRONES

It's a warm summer day, and you've decided to take your drone out for a spin. But then you realize you're near an airport and you'll need special permission to fly. Waiting for an airspace authorization used to be like waiting in line for a popular ride at a theme park. Thanks to the Low Altitude Authorization and Notification Capability (LAANC), the "fast pass" for drones, that wait time has been cut from days to almost seconds in some cases. With just a few taps on an app, remote pilots can receive near real-time authorization to fly in controlled airspace, making the skies more accessible while still keeping them safe.

Drone operators who want to fly in controlled airspace at or below 400 feet, around many airports, must receive an airspace authorization from the FAA. Before LAANC, pilots had to apply for authorizations through the FAA DroneZone (faadronezone-access.faa.gov). The FAA collaborated with industry to streamline the process and make it efficient for drone operators. Today, LAANC automates the application and approval process for airspace authorizations and offers near real-time approvals.

LAANC directly supports unmanned aircraft system (UAS) integration into the National Airspace System (NAS). It provides the framework that makes the automated application and approval process for airspace authorizations possible. Companies are approved by the FAA to provide LAANC services. Once approved, they become UAS service suppliers (USS). USSs provide desktop and/or mobile apps that utilize the LAANC capability to issue near real-time approvals. This is accomplished through the UAS data exchange,

> BORN OUT OF A PARTNERSHIP WITH INDUSTRY THAT IS FOCUSED ON SAFETY AND EFFICIENCY, LAANC IS YOUR "FAST PASS" TO THE SKY!.

which facilitates the sharing of airspace data between the FAA and USS.

Drone pilots who want to fly in LAANC enabled controlled airspace at or below 400 feet use an FAA-approved USS app to request an airspace authorization. Requests are checked against multiple airspace data sources in the FAA UAS data exchange, such as UAS facility maps, special use airspace data, airports, and airspace classes, as well as temporary flight restrictions (TFRs) and notices to airmen (NOTAMS). If approved, the pilot receives the authorization in near real-time. Unless specifically requested in an authorization, drone pilots don't need to notify the tower before they fly.

If you are thinking about requesting an airspace authorization through LAANC, here are some things to consider:

- Airspace authorizations are available to pilots flying under part 107 or the exception for recreational flyers.
- You can apply up to 90 days in advance of your operations, but it's a good idea to apply at least a day or two before you want to fly. This is to give adequate time for air traffic control situational awareness.
- You can submit a "further coordination" request above the designated altitude ceiling in a UAS facility map up to 400 feet. This is only available for part 107 operations, and approval is coordinated manually through the FAA, so it will take longer.
- If you are planning an operation in controlled airspace that requires a waiver *and* an airspace authorization, you must apply for both through the FAA's DroneZone. For more information on waivers go to bit.ly/107waiver.

Born out of a partnership with industry that is focused on safety and efficiency, LAANC is your "fast pass" to the sky! It is available at 597 LAANC-enabled facilities and 828 airports (bit.ly/LAANCairports). If you want to fly near an airport that doesn't participate in LAANC, you can request airspace authorization through FAA DroneZone. Remember, LAANC provides airspace authorizations only. Pilots must still check NOTAMs, weather conditions, and follow all airspace restrictions. To find a list of FAA-approved USS, go to bit.ly/LAANCsuppliers.

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

REBEKAH WATERS

# THE CARE AND KEEPING OF BATTERIES

Batteries are an important part of any aircraft. They provide the initial power needed to start the engine, energize critical systems, and keep everything functioning. The primary role of the battery is to provide a reserve of electrical power in case the alternator fails, allowing pilots to navigate, communicate, and get the aircraft back on the ground safely. If the battery is weak or neglected, the whole system struggles — starting the engine becomes unreliable, avionics may fail, and safety is compromised. Regular maintenance keeps both the battery and the engine in top shape, ensuring smooth operation when it matters most.

Battery types vary. Most small private aircraft use lead-acid batteries, while most commercial and military aircraft use NiCad batteries. However, other types are becoming available such as gel cell and sealed lead-acid batteries. The battery best suited for a particular application will depend on the relative importance of several characteristics, such as weight, cost, volume, service or shelf life, discharge rate, maintenance, and charging rate. Any change of battery type must comply with the aircraft's type certification basis and may be considered a major alteration to the aircraft. To ensure safety and reliability, it's essential to update the aircraft's instructions for continued airworthiness (ICA) to include maintenance and inspection requirements specific to the new battery type.

Regular inspection and maintenance of aircraft batteries is crucial to ensure optimal performance and safety. Mechanics should conduct routine checks for physical damage, electrolyte levels, and signs of corrosion. Regularly inspect and clean battery terminals and keep them free from corrosion to ensure proper electrical contact. Poor connections can lead to several potentially dangerous issues, including increased electrical resistance, battery drainage, system malfunctions, and overheating and potential fire hazards. Always follow manufacturer-recommended charging procedures. Overcharging or deep discharging batteries can significantly reduce their lifespan. A good charger has the option to select the type of battery you are charging which helps protect the battery.

> **REGULARLY INSPECT AND CLEAN BATTERY TERMINALS AND KEEP THEM FREE FROM CORROSION TO ENSURE PROPER ELECTRICAL CONTACT.**

Proper storage of aircraft batteries is crucial to maintain their functionality and extend service life. Store batteries in a dry, temperature-controlled environment. Extreme temperatures can degrade battery performance and shorten lifespan. Maintain batteries at an appropriate state of charge during storage. For lead-acid batteries, this typically means keeping them fully charged to prevent sulfation. Perform regular checks during storage to monitor voltage health and recharge as necessary to maintain optimal charge levels.

Even with proper maintenance and storage, there comes a time when batteries must be replaced. Several factors, including capacity degradation, physical damage, manufacturer's

service life limits, and safety concerns, can lead to the decision to remove and dispose of an aircraft battery. When this happens, proper disposal is crucial to ensure safety and compliance. Follow all federal and state regulations regarding hazardous materials.

Aviation mechanics who follow good maintenance and storage practices significantly enhance the safety, reliability, and lifespan of aircraft batteries, which in turn contributes to overall flight safety! To find out more about battery care, see the resources listed below.

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

**LEARN MORE**

Aviation Maintenance Technician Handbook — Airframe, Chapter 9
**bit.ly/43H2Ygx**

AC 43.13-1B, *Acceptable Methods, Techniques, and Practices — Aircraft Inspection and Repair*
**bit.ly/AC43131B**

# WEATHER OR NOT

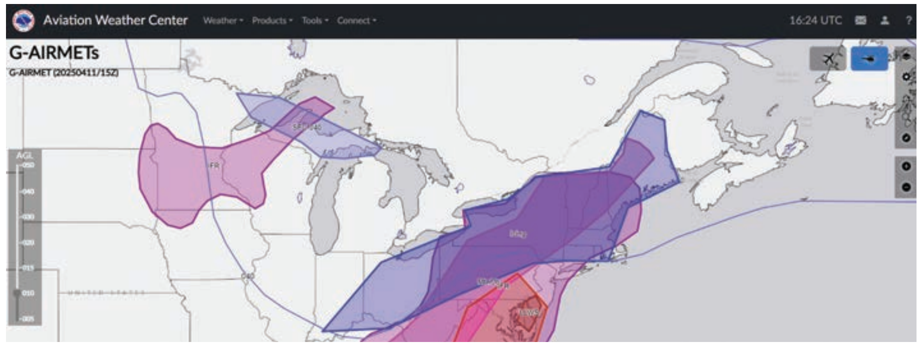
Every preflight should include a comprehensive weather check, but for helicopter pilots operating in low-level flight environments, weather planning can look a little different.

One of the greatest risks to helicopter operations is inadvertent flight into instrument meteorological conditions (IMC). Many helicopters are not certified for IMC and lack the instrumentation and stability necessary for safe flight in zero-visibility conditions. Pilots should thoroughly evaluate real-time observations and forecasts to detect potential hazards.

Standard weather products like METARs, TAFs, AIRMETs, and PIREPs can indicate IMC of low ceilings and poor visibility. However, pilots should also recognize less obvious factors that could reduce visibility, even if IMC is not explicitly forecasted. These include showery precipitation, blowing snow, and haze or smoke, all of which can cause temporary IMC that might not otherwise be indicated. Proactively identifying these risks allows pilots to make informed go/no-go decisions and plan safer alternate routes if conditions deteriorate.

A valuable resource for helicopter pilots is weather radar, which provides real-time data on precipitation and storm activity. The Terminal Doppler Weather Radar (TDWR) system, available through the Aviation Weather Center, is a specialized radar system deployed near major airports. It provides high-resolution weather data focused on a local radius, offering critical insights into wind shear, microbursts, and localized precipitation.

Unlike TDWR detecting short-range weather hazards, Next-Generation Radar (NEXRAD) covers a much larger area and provides a broader picture of developing weather trends. While NEXRAD is ideal for long-range flight planning, TDWR is better suited for assessing conditions around departure and destination airports. Using both sources together provides a more complete picture of weather conditions for a planned route.



Screenshot of G-AIRMETs in low altitude mode (forecasts up to 5,000 ft) on AviationWeather.gov.

In 2006, the helicopter emergency medical services (HEMS) weather tool was introduced as an experimental product designed specifically for the helicopter air ambulance industry. Its creation was in response to an unfortunate history of controlled flight into terrain (CFIT) and loss of control (LOC) accidents in helicopter operations. Many air ambulance flights require pilots to accept a flight request within minutes, leaving little time for extensive weather analysis. The HEMS tool was developed to provide quick, easy-to-understand weather data tailored for low-level flights.

Since its inception, the tool has evolved significantly in its presentation, accessibility, and the range of information it provides. Today, it is fully integrated into the Graphical Forecasts for Aviation-Low Altitude (GFA-LA) web-based platform, available through AviationWeather.gov.

As an FAA-approved source of aviation weather information, the HEMS tool is an essential resource for any pilot operating in the low-level flight environment. Those unfamiliar with this tool should take time to explore its features on both desktop and mobile devices to ensure they can use it effectively when needed.

To access the tool:

- Navigate to the Graphical Forecasts for Aviation page at AviationWeather.gov/gfa.
- At the top right, select the helicopter icon to activate the low-altitude mode, which displays weather information up to 5,000 feet.
- Use the tabs and sidebars to customize the displayed information, including ceilings and visibility, winds, icing conditions, and more.

Helicopter pilots should integrate multiple weather sources to build a comprehensive preflight plan.

By thoroughly evaluating weather conditions, understanding radar imagery, and setting conservative flight limits, pilots can reduce the risk of inadvertent IMC, CFIT, and other weather-related hazards.

**Leah Murphy is a dual-rated flight instructor and helicopter air ambulance pilot. She is also an FAA Safety Team Representative in Cleveland, Ohio.**


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

If you're not a member, we encourage you to join the group of nearly 17,000 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.

## Lukewarm Lights?

**One question about "A New Look for Night Lights" (bit.ly/41IuFqx), with LEDs producing much less infrared radiation (heat) than incandescents, how is the front face of these lights kept free of snow and ice?**

**— Robert**

*Hi Robert, thanks for reading and for your great question! The LEDs will have heaters built into the unit that are thermostatically controlled. This will prevent the accumulation of ice and snow, so the LEDs aren't left out in the cold.*

## Night Currency Clarification

**Regarding the paragraph on night currency in the article "Flying into the Dark" (bit.ly/4ht0sSg), unless I've missed something, a pilot can be pilot-in-command and solo at night, he/she just can't carry passengers without having done the three takeoffs, landings to full stops. 61.57(b)(1) "... no person may act as pilot in command of an aircraft carrying persons during the period beginning 1 hour after sunset and ending 1 hour before sunrise ..." Can you please clarify?**

**— Jon**

*Hi Jon! It's actually the same as daytime. You can't carry passengers without three takeoffs and landings, but you can get current before the flight solo. The only difference is that at night, you have to do full stops rather than touch-and-gos.*

*It is true that a pilot can be pilot-in-command (PIC) of an aircraft and solo at night if that pilot has not met the requirement for completing three take-off-and landings (TOL) to a full stop (within 90 days) as specified by § 61.57(b)(1). It is also true that a pilot cannot be the PIC of an aircraft carrying passengers without and until accomplishing three takeoffs and landings to full stops as required by § 61.57(b)(1). Thanks for reading, fly safe!*

## Public Engagement to Modernize Pilot Schools

**Recently, the FAA held an introductory meeting (virtual) to collaborate with the public on innovative flight training strategies to modernize pilot school regulations. Current part 141 pilot school training regulations have foundational ties to the early years of pilot training and elements directly linked to the Civil Air Regulations [sic] from the 1940s. Therefore, updating part 141 regulations would ensure the training conducted at pilot schools meets the 21st century challenges of technology, safety, and the advancements in teaching and learning methods.**

**These forums will be a key resource in the FAA's ability to identify and address the demands and needs of the flight training industry and additional public meetings will be held throughout the year. The FAA expects to publish a findings report in early 2026 at the conclusion of the project. Learn more about how to get involved and the meeting schedule at bit.ly/3WueoDH.**

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

*Let us hear from you! Send your comments, suggestions, and questions to SafetyBriefing@faa.gov. You can also reach us on X (formerly Twitter) @FAASafetyBrief.*

*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 District Office or air traffic facility.*

# ON THE UPGRADE

I'm dating myself, but in my early years of flight training, my experience with magenta lines had more to do with depicting the boundaries of an airport radar service area (ARSA) than a direct-to-navigation tool. While I do prefer flying with a traditional steam-gauge six-pack, I certainly see and have experienced some of the many benefits that the latest glass technology provides.

There are many alluring upsides to using this tech including improvements in reliability, accuracy, and workload management. It's what motivates many pilots to upgrade their aging birds. But there's a lot to consider when making these upgrades; some obvious, others not so much. In this technology-themed issue, I thought I'd highlight a few things to consider when upgrading and help you get the most safety bang for your buck.

## Do Your Homework

A good first step is to assess the type of flying you do with your aircraft and determine which upgrades might best contribute to safety and functionality. For example, if you primarily fly daytime VFR trips of an hour or less, funds spent on an angle of attack indicator (AoA) might make more sense than a new electronic flight instrument system (EFIS). Both have positive safety benefits, but the AoA might offer more of a safety benefit for that type of mission profile.

Incidentally, an AoA indicator is typically a device that you never knew you needed until you install it and learn how to use it. Wings fly based on the angle of attack with the relative wind. Whether we realize it or not, we use our airspeed indicator as a way of crudely approximating angle of attack, without consideration of weight or gravity (G)-forces. An AoA can help pilots focus their attention where it needs to be to avoid a stall. See the FAA's recent bulletin on AoAs at bit.ly/SAIB_AOA.

A good approach toward upgrade options might be to focus on the hazards you are primarily concerned with and the tools you can install to help mitigate them. If you're concerned about an inflight structural failure, for example, you could look at options for a ballistic recovery system (i.e., airframe parachute).

Be sure to also leverage all sources of knowledge about potential upgrades and ask questions. Reach out to type clubs, research online forums, and check with fellow pilots. There are lots of good upgrade options, but not all of them are worth the cost.

## The Big Picture

When researching for upgrades, be sure to look at the project holistically, with consideration for future changes. This was top of mind for Brad Zeigler, an FAA aviation safety analyst, who was considering some upgrades to his 1975 Cessna 182 *Skylane*. "When my attitude indicator failed, I knew that I wanted to replace my old vacuum-powered round gauges with a new large digital display, but funds only allowed for a pair of smaller round electronic flight instruments," explained Zeigler. "By considering my future plans for an autopilot upgrade, I was able to select a unit that would eventually control my future autopilot, and when I save up the funds for a 10-inch EFIS, my round electronic display will serve as a required backup display, albeit relocated on the instrument panel."

Panel upgrade to a 1975 Cessna 182 Skylane.

## Budgeting for Time and Money

Two items sometimes overlooked by pilots are the time and expense needed for an upgrade. For example, even a simpler avionics installation may still require a technician to spend several hours perched upside down under your panel tracing cables and replacing wiring harnesses. Many owners are often surprised by how long the aircraft is out of service. For that reason, it might be prudent to schedule any interior work while the engine is being overhauled or during an annual inspection.

## Post-Mod Considerations

After your shiny new upgrades are installed, there are still many things to consider, including training, potential checklist modifications, and new maintenance considerations. Take the opportunity to find an instructor familiar with your aircraft model and any enhancements you've made. Don't try to teach yourself how to navigate your new navigator or pilot your new autopilot. Do the bookwork ahead of time, watch videos, do some ground instruction, and finally, fly with an instructor who can teach you how to use your new avionics in flight.

PAUL CIANCIOLO

# JAMES KENNEY

*Aviation Safety Inspector, FAA's Flight Technologies and Procedures Division*

As a teenager, James (Jim) Kenney was udderly devoted to working at a small dairy farm in New Jersey. However, his mother was concerned he would become a farmer.

"My mom suggested that I go to school for hotel management instead," Jim said. "I had to find something more exciting — so I picked aviation. She was at least happy that I went to college."

Jim started flying when he was 17 and earned his airline transport pilot certificate when he was 22. He then built hours as a flight instructor and flew charters. Soon after reaching more than 4,500 flight hours, Jim was offered an aviation safety inspector job in Cleveland. He later transferred to the Chicago Certificate Management Office (CMO) to provide air carrier oversight.

"A few years later, I transferred to Washington, where I started as a subject matter expert in the part 121 flight operations," he continues. "I worked on many interesting projects. Then I got a call from the director of Flight Standards asking if I would like to focus on international issues."

One of Jim's significant accomplishments was designing and implementing the International Aviation Safety Assessment (IASA) program. When another country's air carrier flies into the U.S. or codeshares with a U.S. air carrier, it must meet safety standards set by the International Civil Aviation Organization (ICAO). Through IASA, the FAA focuses on a country's ability, not the ability of individual air carriers, to adhere to international safety standards and recommended practices. Before leaving the FAA in 1996, Jim also served as the manager of the Scottsdale Flight Standards District Office (FSDO).

Before returning to the FAA, Jim worked in senior management roles at four small part 121 and 129 air carriers. He also spent 10 years at an aviation consulting firm managing many large aircraft leases, engineering, and maintenance.

In 2013, Jim worked briefly in the FAA's unmanned aircraft group before returning to his passion for crewed aircraft.

"I accepted a position in the Flight Technologies and Procedures Division and immediately began working on ADS-B issues," he adds. "One of my duties has been to reduce the number of transmitted callsign errors, commonly called a callsign mismatch. We have seen excellent improvement in this area as the error rate has dropped from 5% to less than one-fifth of 1%."

That decrease is attributed to the considerable time spent educating the public about Automatic Dependent Surveillance-Broadcast (ADS-B) technology operation. Jim notes that the team's work on ADS-B traffic and weather has also positively impacted general aviation (GA) safety.


James Kenney in front of a McDonnell Douglas DC-10 when he served as president of Laker Airways in England.

"I've had dozens of GA pilots tell me that the ADS-B In traffic information saved their lives," Jim explains. "If any GA pilot does not have access to this inexpensive technology, it should be the first thing on your to-do list. I guarantee that you will be surprised by what you see."

The biggest challenge with ADS-B is equipping and ensuring the equipment works correctly. Air traffic control does not usually advise pilots of ADS-B errors when the transponder is functioning properly. A free Public ADS-B Performance Report (PAPR) is key to eliminating errors. Jim recommends that all aircraft owners request a PAPR (bit.ly/PAPRequest) at least once a year before the aircraft's annual inspection.

"I believe we are just scratching the surface with ADS-B In technology," he expands. "With additional investment and testing, ADS-B In will continue to provide more significant safety enhancements for the GA community."

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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*FORWARDING SERVICE REQUESTED*