

FAA Safety

BRIEFING

January/February 2015

Your source for general aviation news and information

Airspace and ATC

NAS of the Future –
A New Era in Safety, p. 8

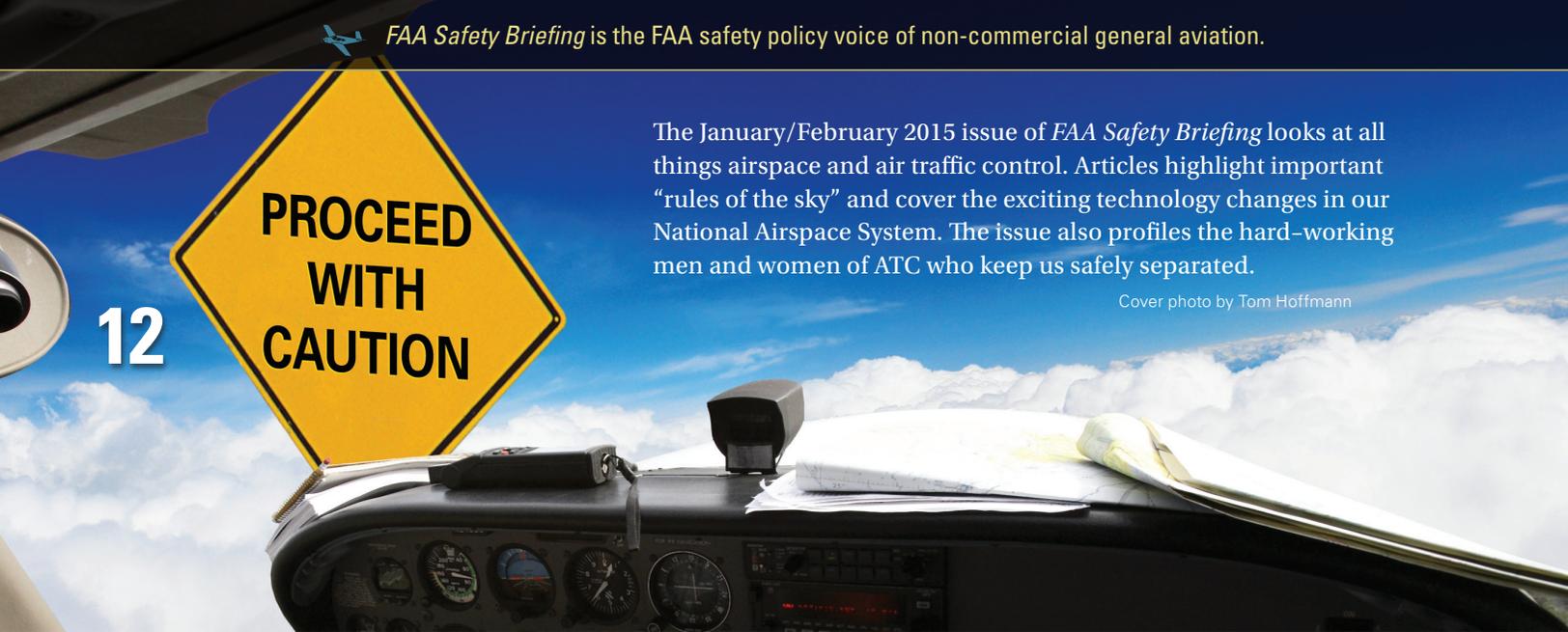
Proceed With Caution –
A Review of Special Use
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Straight Talk:
Featuring ATC, p. 20



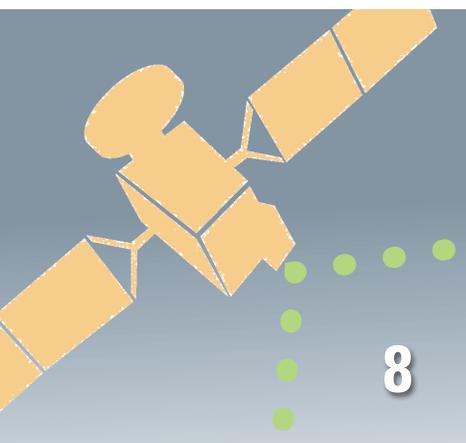
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The January/February 2015 issue of *FAA Safety Briefing* looks at all things airspace and air traffic control. Articles highlight important “rules of the sky” and cover the exciting technology changes in our National Airspace System. The issue also profiles the hard-working men and women of ATC who keep us safely separated.

Cover photo by Tom Hoffmann



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The ABCs of ADS-B

A few weeks ago, I had the opportunity to participate in a well-attended government-industry gathering to discuss issues associated with the 2010 Automatic Dependent Surveillance-Broadcast (ADS-B) Out rule. This rule requires all aircraft flying in certain designated airspace to be equipped with ADS-B Out by January 1, 2020.

As you probably know, ADS-B is a foundational technology for the NextGen modernization of the national airspace, which involves transitioning from a ground-based radar system to satellite-based GPS technology. An important point is that ADS-B technology is really “NowGen.” Operators in the U.S. National Airspace System (NAS) have already been using ADS-B for several years and, in 2014, the FAA completed the installation of the nationwide ADS-B infrastructure.

Advantages

ADS-B uses GPS technology to provide much greater precision and reliability than the current radar system can offer. It increases safety and situational awareness, because aircraft equipped with ADS-B Out broadcast their flight position not only to controllers on the ground, but also to other pilots equipped with ADS-B. With ADS-B Out, controllers get an update of the aircraft position almost continuously, compared to five seconds or longer with radar. This, in turn, allows for more efficient spacing of aircraft and better use of our busy airspace.

Aircraft equipped with ADS-B avionics already enjoy the benefits of improved safety and efficiency. I saw it first-hand during my time in Alaska, where the FAA first deployed ADS-B several years ago. Even if you’ve never been to the forty-ninth state, you undoubtedly know that Alaska has some of the world’s most remote and rugged terrain. These areas have never been hospitable to radar coverage. Through the Capstone program, though, the agency equipped more than 300 aircraft in Alaska with ADS-B systems and related avionics. The improved situational awareness for pilots and extended coverage for controllers resulted in a 47 percent drop in the fatal accident rate for equipped aircraft in the southwest area of the state.

The advantages to all users will continue to increase as more aircraft are equipped with ADS-B Out, but the full benefits of increased safety and efficiency in the NAS depend on 100 percent equipage for aircraft that fly in the designated airspace.

Barriers

As with any new technology and as with any new requirement, there are barriers that impede the kind of progress the FAA would like to see in terms of ADS-B Out equipage. As discussed at the ADS-B “Call to Action” meeting I mentioned, our industry partners have identified some of the key barriers to equipage as: cost and availability of upgrading GPS receivers (more on that below); and the need for things such as streamlined certification procedures; development of more low-cost avionics; improved product availability; and ensuring repair station resources are available to complete the required ADS-B Out installations.

Costs

Because it is perceived as a major consideration and a significant barrier to many operators, especially those in the GA community, cost deserves its own heading. As an aircraft owner myself, I can relate. Flying is already expensive and, as some of our industry colleagues stated at the Call to Action meeting, some ADS-B Out options constitute a high percentage of the aircraft’s overall value — especially for older airplanes.

The good news is that the avionics manufacturing industry is busily developing a wide range of options. According to a fellow aircraft owner on my staff, there are already a number of options and price points available for ADS-B equipage — everything from bare bones “just meet the requirement” options to high-end boxes that also enable ADS-B In weather and traffic data. The buzz around my flying community — likely in yours as well — is that the time for watchful waiting is fast giving way to the time for choices and action.

To help overcome the barriers, including cost concerns, the NextGen Institute (a joint government/industry planning and research team) has created a working group called Equip 2020. This group will look for ways to encourage and help get the nation’s aircraft equipped with ADS-B technology, so that we can all enjoy the benefits it brings.

ADS-B is a foundational technology for the NextGen modernization of the national airspace, which involves transitioning from a ground-based radar system to satellite-based GPS technology.

Realization of full safety and efficiency benefits depends on 100 percent ADS-B Out equipage for aircraft that fly in the designated airspace.



New NASA Technology Brings Critical Data to Pilots Over Remote Alaskan Territories

NASA has formally delivered to Alaskan officials a new technology that could help pilots flying over the vast wilderness expanses of the northernmost state. Known as the Traffic and Atmospheric Information for General Aviation (TAIGA), this technology is a collection of algorithms, concepts and data designed to help pilots make better flight decisions, especially when disconnected from the Internet, telephone, flight services and other data sources normally used by pilots. TAIGA is the result of a joint effort between NASA's Ames Research Center and the state of Alaska, and is part of the FAA's NextGen effort.

Over the vast expanses of Alaska, with its mountainous terrain and extreme weather events, pilots often are disconnected from vital navigation aids and communication. Taking on these factors, NASA developed a satellite-based communication method through which regional data is sent only to that specific region. The customized data sets can be downloaded quickly and plugged into a mobile application.

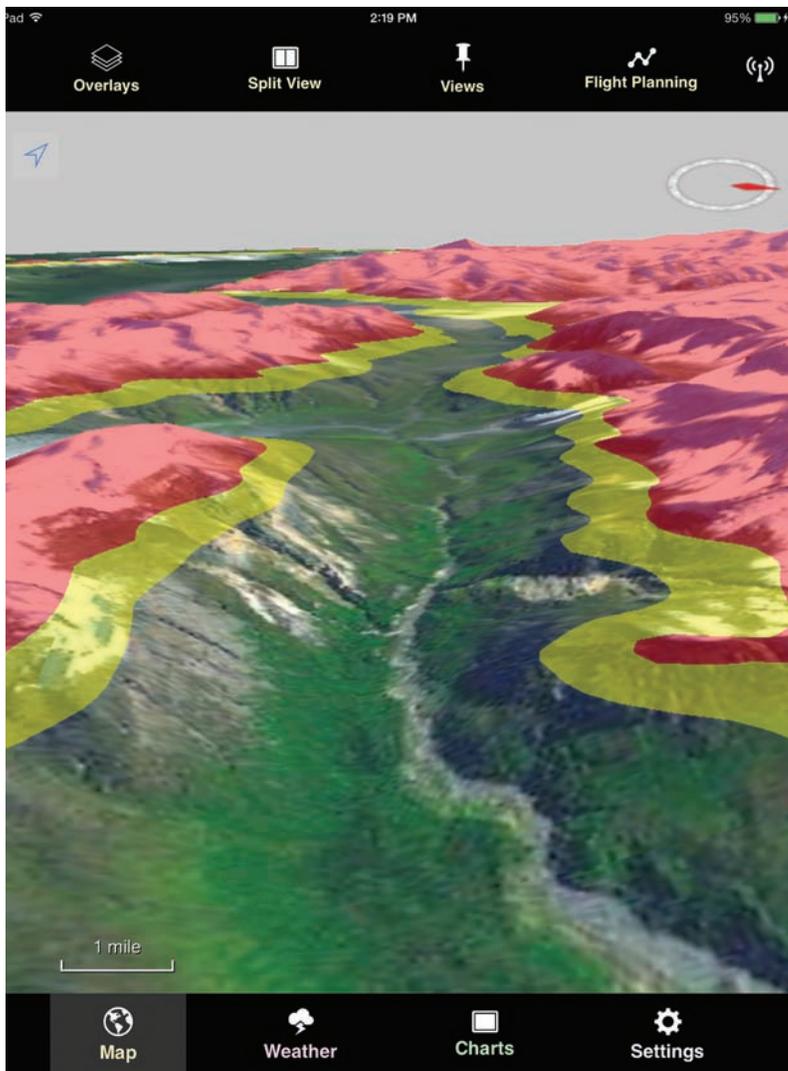
NASA has developed only a conceptual version of the mobile software application, which includes full 3-D terrain visualization. The algorithms, concepts, and data are available as an open-source project for further development by industry and the aviation community into an end-user system. The 3-D terrain visualization software will be made available separately.

The next step in development of the TAIGA concept will be for engineers with the state of Alaska to take the NASA concept and develop it to an app that meets the specific needs of Alaskan pilots. Ames will continue to investigate new functionalities, and Alaskan officials hope to distribute a production prototype app to general aviation pilots for testing early in 2015.

NTSB Safety Seminar Focuses on Technically Advanced Aircraft

On Saturday, November 8, 2014, the National Transportation Safety Board (NTSB) hosted a free safety seminar for pilots and mechanics on technically advanced aircraft (TAA) and the challenges of transitioning to glass-cockpit technology. An NTSB safety study completed in 2010 concluded that glass cockpit aircraft experienced a lower total accident rate, but a higher fatal accident rate, than the same type of aircraft equipped with conventional analog instrumentation. (To see this report, visit www.ntsb.gov/safety/safetystudies/ss1001.html.)

The four-hour event, held at the NTSB's training center in Ashburn, Va., explored the causes of TAA accidents, the current government and industry efforts to prevent them, and the resources available to the pilot community. NTSB Board Member Dr. Earl Weener kicked off the event with a discussion on GA accident trends, highlighting weather avoidance strategies and how some pilots fail to realize the limitations of their weather radar source. "Storms don't sit still," Member Weener stated. "A NEXRAD mosaic shows where the weather was, not where it is."



Graphic courtesy of NASA

Jim Viola, manager of the FAA's General Aviation and Commercial Division, also presented at the event emphasizing the importance of pilots being able to stay ahead of automation. "Be proficient with your hand-flying skills in case your automation fails," said Viola. "And don't be afraid to drop down a level of automation. If there is any doubt, disconnect."

The seminar wrapped up with a review of some sobering accident case studies involving a common theme of human versus machine scenarios. The FAA will continue to look at ways to improve education on this important topic, including a renewed emphasis on single-pilot resource management (SRM). For more information on the NTSB event, go to www.ntsb.gov/news/2014/141009.html.

ADS-B Call to Action

The FAA and aviation industry leaders renewed their commitment to equip aircraft with new Next-Gen avionics technology by the January 1, 2020, deadline. Under a 2010 rule, all aircraft flying in designated airspace must be equipped with Automatic Dependent Surveillance-Broadcast (ADS-B) Out avionics to increase safety and efficiency in the National Airspace System.

In order to meet the deadline, agency representatives and industry leaders identified the barriers delaying operators from equipping with ADS-B Out avionics. The organization agreed to work together to resolve them in a working group formed under the

NextGen Institute called Equip 2020, which is led by retired Air Force Maj. Gen. Marke "Hoot" Gibson, also the executive director of the NextGen Institute.

Some of the key barriers to equipage identified by industry include: cost and availability of upgrading GPS receivers; streamlined certification procedures; development of more low cost avionics; improving product availability; clarifying requirements; and ensuring repair station resources are available to complete installations.

ADS-B is a foundational technology, which modernizes the national airspace from a ground radar system to satellite-based GPS technology. The full benefits of increased safety and efficiency of the national airspace depend on 100 percent equipage for aircraft that fly in most airspace controlled by air traffic control.

Cold Temperature Altitude Corrections

Cold temperature restricted airports are now specifically designated in the NAS. The list of airports, the segment of the approach requiring the altitude correction, and operating procedures may be found in the Notices to Airman, part 4 (Graphic Notices), section 1, which is online at www.faa.gov/air_traffic/publications/notices.

A snowflake symbol will be placed on approach plates for restricted airports. The symbol also indicates that a cold temperature altitude correction is required on the approach when the

Safety Enhancement Topics

January: Fly the Aircraft First — A pilot's primary duty is to always aviate first.



February: Personal Minimums — Understanding how to establish, maintain, and adhere to personal minimums when flying.



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



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reported temperature is at or below the published temperature. Some airports may have two temperature restrictions.

These temperatures are also completely separate from the temperatures published on Area Navigation (RNAV) approaches. Temperature restrictions on RNAV approaches must be followed, even if warmer than the temperature listed with the snowflake symbol.

Pilots must understand they are responsible for applying altitude corrections and advising ATC when these corrections are to be made. Advising ATC of altitude corrections in the final segment is not required. ATC will not be responsible for making any altitude corrections and/or advising pilots that an altitude correction is required at the restricted airport. Cold temperature altitude corrections are only required at the listed airports and only at or below the restricted temperature. Applying this procedure is not required at any airfield greater than 2,500 feet that is not included on the cold temperature restricted airport list.

New Loss of Control Report Issued

In an effort to reduce the general aviation accident rate, the General Aviation Joint Steering Committee’s Loss of Control working group (LOCWG) submitted a final report in October 2014 that outlines a series of comprehensive GA safety enhancement (SE) strategies. The report is an addition to the LOCWG’s first report in 2012 and focuses specifically on accidents during the en-route and departure phases of flight. New SE topics include: pilot response to unexpected events; a list of medications for pilots; test pilot utilization and Experimental-Amateur Built pilot proficiency; development of Airman Certification Standards; and airman safety culture.

“The SEs provide a roadmap for how to focus on these topics to reduce accidents,” says National FAA Safety Team Operations Lead and LOCWG co-chair Kevin Clover. “Now the assigned FAA or industry group must follow the map and complete the work.” To view the report, visit: www.gajsc.org/document-center.

Do You Know Your Canary?

Flying through the clouds can be a wonderful thing, but with most of our country firmly in winter's grasp, flying around or over them can be the better option. The expanded use of turbocharging and turbine engines in general aviation has helped make this possible for more and more GA pilots. With that added flexibility though, come new concerns. Unrecognized hypoxia is now a real threat, so it becomes even more imperative that you know your symptoms — your hypothetical canary in the coal mine — because everyone reacts differently.

Defining the Canary and the Coal Mine

To expand on this metaphor we must first define both the canary and the coal mine. Because early detection of hypoxia is absolutely key, it's important to know what the early symptoms look like in a safe environment. Hypoxia can affect people in different ways, so a simple text book description might not be very useful. Another challenge is that hypoxia has an insidious onset and is rather quickly reversed upon descending. In fact, there is a good chance that you've been at least mildly hypoxic without knowing it at some point during a flight.

These factors are very similar to the threats of toxic gases faced by miners in the days before modern alarm equipment. One of the chief threats to miners of that era was carbon monoxide, which is odorless, tasteless, and likely to create a similar hypoxic condition in humans. To combat these threats, miners began using small animals — most notably canaries — that were more sensitive to these gases. Signs of trouble with the canary would signal the miners to quickly exit or don protective gear.

As for defining the coal mine, it can be quite literally a hole in the ground for miners, but for us it's a set of conditions. In the simplest terms, a pilot's "coal mine" starts with an altitude but it is more complex because it can change with day/night or atmospheric conditions. Susceptibility to hypoxia is also affected by personal medical conditions like Coronary Artery Disease, Chronic Obstructive Pulmonary Disease (COPD), or other conditions than can reduce oxygen saturation at any altitude. After considering these factors, you'll want to select a personal altitude at which you need to be thinking about hypoxia.

How to Find the Right Canary for You

As we discussed earlier, knowing your personal "canaries" is extremely important to the early detection of hypoxia. These are the early warning signs that give you enough time to get back down to a more oxygen-rich altitude. This is where we come in. The best way to find out what your hypoxia canaries are, and in what order they arrive, is by experience. The FAA's Office of Aerospace Medicine offers you a few ways to do that in a safe way.

The first way is to enroll in the free aviation physiology course offered at the FAA's Civil Aerospace Medical Institute (CAMI) in Oklahoma City. This course covers many topics of interest to aviators, but one of the truly special parts is that you get a chance to experience "real" hypoxia in CAMI's altitude chamber, under the supervision of professionals. The instructors can also help point out impairments you may not notice by asking you to complete basic tasks while "in flight."

While this is probably the best way to find your canary, the location, along with a number of possibly disqualifying medical complications, may not make this a viable option for some. To address both of those issues, CAMI developed the Portable Reduced Oxygen Training Enclosure (PROTE) and its follow-on system, the Hypoxia Awareness & Recognition Trainer (HART). Both of these systems use technology to "scrub" oxygen out of the air and replace it with inert nitrogen. This allows them to reduce the oxygen level from 21 percent to nearly seven percent, which can simulate an approximate altitude of 25,000 feet at ground level. Being portable, these systems can be transported by the FAA to pilot events or meetings, greatly expanding the number of pilots who can receive this life-saving training. For more information please call the Airman Education Program at (405) 954-4837.

Hypoxia can affect people in different ways, so a simple text book description might not be very useful.

James Fraser received a B.A., M.D., and M.P.H. from the University of Oklahoma. He completed a thirty year Navy career and retired as a Captain (O6) in January 2004. He is certified in the specialties of Preventive Medicine (Aerospace Medicine) and Family Practice. He is a Fellow of the Aerospace Medical Association and the American Academy of Family Practice.

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ATTENTION:
As of Oct. 1, 2012, pilots
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Certificate.





Q1. What are the requirements for a person with two DUIs on his or her driving record who wishes to obtain a second or third class medical?

A1. This depends on when the DUIs occurred. If one is recent and the other is within 10 years, a substance abuse evaluation and driving record history over the past 10 years would be required. If both DUIs are quite remote, we may only ask for a personal statement from the applicant. If both are quite recent, a full set of psychological and psychiatric evaluations may be required.

Q2. If I have a package of medical data to be reviewed for issuance of my certificate, will the evaluation come via regular mail? And is there any guesstimate on how long reviews are taking?

A2. At this time we still use regular mail to transmit required documentation. There is some variation on the review, according to the complexity and nature of the case. The Certification Division had some major challenges with the IT support systems last year, but these have been mostly resolved. In general, most cases take about six weeks to review and disposition once they get to Oklahoma City.

Note from the editor: The following two questions are from two different individuals but being that they are so close in nature, the answer given is relevant to both.

Q3. I had a kidney stone attack about two months before my FAA flight exam. The [Aviation Medical Examiner] AME didn't renew my third class medical and printed out the regulations pertaining to my situation. How long will I likely have to wait before the FAA renews my medical certificate once I complete the required tests?

A3. Kidney stones, or a history thereof, is disqualifying for medical certification. However, if the stones have passed or been extracted by medical procedures, certification is almost always granted. If the stones are retained, then the FAA will require appropriate imaging to demonstrate size and position of the retained stones, and a statement from the treating urologist as to the likelihood of these stones being a problem. If the stones are not likely to be a problem, special issuance is usually granted, with periodic follow up.

Q3.1. My third class medical is due in a few years. I have had two kidney stone attacks during the last 12 months. The stones passed on their own without the need of any special medical procedures. A urologist is performing some tests as required by the FAA and is going to write a letter for the FAA explaining my current condition and what he plans to do to rectify my kidney stone issue. I had some X-rays taken and they indicate that I have some additional kidney stones but the urologist has indicated that only one of the stones is large enough to cause a problem when and if it passes.

Please provide your recommendations. For example, what tests are required by the FAA given my facts and circumstances, and should I have the large kidney stone removed prior to going in for my bi-annual? Will the FAA accept the opinion of my urologist that only one of my kidney stones is large enough to cause a problem? If not, please provide your recommendations.

A3.1. Per the previous answer, you would be considered for special issuance. You might ask your urologist if it would be appropriate to evaluate why you have had so many stones and see if there are dietary changes or medications that might help to alleviate this. As you work with your urologist, you might also consider if the residual stone that might be a problem is in a position where it might be possible to extract it or treat it with a lithotripsy procedure. This is a clinical decision that the FAA will not make or weigh in on.

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

Courtney Scott, D.O., M.P.H., is the Manager of Aerospace Medical Certification Division in Oklahoma City, Okla. He is board certified in aerospace medicine and has extensive practice experience in civilian and both military and non-military government settings.



TOM HOFFMANN

THE NAS OF THE FUTURE

Entering a New Era in Airspace Safety

At 10:31 p.m. on June 30, 1956, the United States' National Airspace System (NAS) reached a critical turning point. On this fateful day, the country witnessed one of its worst aviation disasters as a United Air Lines DC-7 and a Trans World Airlines Lockheed *Constellation* collided over the Grand Canyon, killing all 128 persons onboard both aircraft.

Subsequent hearings by the Civil Aeronautics Board (predecessor to the National Transportation Safety Board) exonerated air traffic control of any wrongdoing, but the findings exposed some eye-opening airspace infrastructure shortfalls. Foremost was a dire need for additional personnel, facilities, and equipment to mitigate mid-air collisions in an airspace system that had nearly doubled in size from the previous decade. In fact, in the five years leading up to the Grand Canyon accident, there had been 65 similar mid-air collisions. These unfortunate events helped build a strong case for being able to separate visual flight rules (VFR) traffic from instrument flight rules (IFR) traffic.

Shortly after this watershed moment, an air traffic modernization plan was developed, which included longer-range radar technology and enhanced communications capabilities. It was a challenging, yet defining moment for the fledgling Federal Aviation Agency (as it was then called) to adapt to an exponential growth in air traffic that now included both commercial and military jet operations. Progress was slow, but aviation safety soon began to rebound.

Since the late 1950s, aviation fatality rates have steadily declined, supported by advances in systems integration and avionics technology (e.g., traffic collision avoidance systems, advanced auto-pilots, and more recently, glass cockpit technology).

Despite these advances, the backbone of our ATC system has largely existed as an analog system in an increasingly digital world. With ever-changing advances in GPS technology and mobile computing power — not to mention forecasts calling for a whopping 61.9M aviation operations by 2034 — the FAA now stands at a crossroads similar to that of 60 years ago. In addition, the growing diversity among NAS users, like unmanned aircraft systems (UAS) and commercial space ventures, is rapidly pushing the boundaries of our airspace capability in some unexpected and unique ways. Accommodating these new demands requires new solutions.

Enter the NextGen air traffic management modernization program: a shift to smarter, satellite-based technologies and procedures that combine to make air travel safer and more predictable. For over a decade now, the FAA has been hard at work on many NextGen initiatives that are already, or will soon be providing benefits to NAS users. So, let's take a look at where some of these new systems are today, and what they mean for you as a GA pilot. Be forewarned though: multiple acronyms ahead!

Radar Completely Turned Around Is ... Still Just Radar

Pardon the palindromic pun, but it does serve to highlight the significant upgrades our current "radar-centric" system requires in order to achieve the next level of safety and efficiency in the NAS. NextGen

represents just that: a more networked and scalable solution that fundamentally transforms airspace operations. At its very heart is the Automatic Dependent Surveillance–Broadcast (ADS-B) system, which uses a GPS receiver and transponder/transmitter (ADS-B Out) to relay an aircraft’s position to controller screens via a network of ground receivers. With the installation of 634 ground receivers now complete, pilots flying properly equipped ADS-B In aircraft can use displays to see — for free — bad weather, where they are in relation to other aircraft, as well as flight information such as temporary flight restrictions.

While many aircraft owners have yet to equip, the word on the street is that pilots who use ADS-B really do value the weather and traffic updates. That’s according to a 2014 MIT survey on pilot perceptions of ADS-B, which polled 1,407 pilots of varying experience levels. Of the total surveyed, 56 percent stated they used ADS-B traffic and weather services. For those pilots who stated they use ADS-B regularly, 42 percent said it helped them avoid a mid-air collision. The study also showed that having ADS-B weather information available to pilots clearly had a positive impact on their pre-flight and in-flight decision-making.

Everyone Plays a Part

Much like a chain is only as strong as its weakest link, the same can be said for ADS-B. For the system to be a truly comprehensive safety solution, it requires an across-the-board integration of the equipment that sends out individual position information (ADS-B Out). The FAA’s deadline for having this equipment installed on participating aircraft is January 1, 2020.

“This is an important milestone for a core NextGen technology that will revolutionize the National Airspace System,” said FAA Deputy Administrator Michael Whitaker at an October 2014 ADS-B Call to Action meeting. During this meeting, industry experts from across the aviation spectrum discussed some of the challenges that exist regarding the 2020 mandate. Some of the key barriers identified included: cost of upgrading existing GPS receivers; streamlined certification procedures; development of more low cost avionics; improving product availability; clarifying regulatory requirements; and ensuring repair station resources are available to complete installations.

A special cross-cutting working group named “Equip 2020” was formed to help resolve these issues and champion ways to help the industry move for-



Photo by H. Dean Chamberlain

ward with meeting the mandate. The group is led by Maj. Gen. Marke “Hoot” Gibson, U.S. Air Force retired, and executive director of the NextGen Institute. In support of various stakeholders, Equip 2020 is comprised of many specialized workgroups meeting regularly in hopes of having integration timelines in place by summer 2015. That list will likely include incentives for operators who may be more price-sensitive to this change.

“I want to make sure we cast a really wide net as we seek solutions to meet the mandate,” says Gibson. “This is going to be a team effort and we want to work with the GA community at large to get to solutions we can all agree on.” Gibson also stresses the importance of supporting an education campaign to dispel any rumors and/or misconceptions about ADS-B equipage and capabilities. This magazine is one such vehicle for disseminating that message.

Soon You’ll Be SWIMming and Seeing STARS

Of course, NextGen is more than just ADS-B. There are a number of other systems that come into play. One such key element of NextGen is SWIM, or System Wide Information Management. This is basically the digital data-sharing backbone of NextGen providing end users with flight, weather, and surface data. SWIM allows more efficient data sharing by streamlining connections and translating data from different systems. You might envision the SWIM transition feeling much like upgrading to Windows 8 from MS-DOS, a lot of paddling.

Another vital NextGen component making headway in the NAS is En Route Automation Modernization (ERAM). ERAM replaces the 40-year old en route computer and backup system used by 20 FAA Air Route Traffic Control Centers to process, distribute, and track high altitude aircraft movements nationwide. It also provides a platform for programs like ADS-B and SWIM to function collaboratively. A similar automation project underway at the TRACON level, the Standard Terminal Automation Replacement System (STARS), is helping to modernize air traffic control technologies at hundreds of local radar control facilities. When these automation technologies are complete, any single ATC facility in the nation will be able to see any part of the NAS, utilizing nearly triple the amount of current radar data. How's that for coverage?

Committed to Success

In October 2014, the FAA rolled out the NextGen Implementation Plan (NGIP), which accelerates the delivery of a few other “high priority, high readiness”

NextGen initiatives over the next three years. These include the use of multiple runway operations at 36 airports; rolling out the more efficient Performance Based Navigation (PBN) procedures at three key metroplex areas (Northern California, Atlanta, and Charlotte); enhanced Surface Operations, which includes phasing out the old-timey paper flight progress strips used by ATC; and prioritizing Data Communications (Data Comm) services allowing pilots and ATC to communicate more accurately via electronic text messages.

While some metroplex locations associated with these initial milestones many not immediately impact your GA flying, they will help lay the foundation for a more expanded use of these technologies in the near future. Keep in mind that these prioritized initiatives are also just a subset of the many programs and activities the FAA is executing for NextGen.

Of interest to GA now is the prevalence of approaches that feature Localizer Performance with Vertical Guidance (LPV) minima that are available at 1,718 airports and counting. NextGen's Wide Area Augmentation System (WAAS) — essentially a more accurate GPS signal — allows the FAA to design special GPS approaches with the lower LPV minima. These procedures, known as Area Navigation (RNAV) approaches, have vertical guidance and decision altitudes as low as 200 feet AGL — similar to an ILS (Instrument Landing System) — and can significantly broaden landing options for a pilot flying in limited visibility. Also in a GA pilot's arsenal are the more than 500 non-precision RNAV approaches with LP minima — minus the V (vertical guidance) due to obstacle or infrastructure limitations at those airports. The FAA expects to roll out 400 more WAAS procedures by 2017, at which time every qualified runway in the country will have greater all-weather access.

As expected, the proliferation of these satellite-based procedures has prompted the FAA to begin a retirement plan for some ground-based navigational aids we no longer need and which are too costly to maintain, such as non-directional beacons (NDBs) and VORs. The FAA will continue to work together with the aviation community during the decommissioning process and intends to retain a minimum operating network of VORs by 2025 that will play more of a support and/or contingency role.

Of Flying Robots, Rocket Ships, and Seeing Eyes

A discussion about the future of the NAS would not be complete without mention of some of its



US Air Force Photo Joe Davila

newer participants, namely UAS and commercial space ventures. The anticipated demand from these two new entrants will require the FAA to adapt certain services and regulatory approaches to maintain a high level of safety.

“NextGen will be the key enabler for UAS,” said Jim Williams, Manager of the FAA’s UAS Integration Office at the 2014 Air Traffic Control Association conference. “It is absolutely critical in achieving a long-term vision.”

And that vision is rapidly becoming clearer. While UAS are still the “new kids on the block” in terms of NAS integration, much is being learned about their operations by way of the agency’s individual approvals for both public and civil use and through the ongoing research at six UAS test sites across the nation. The information gathered from these ventures will help the FAA mitigate certain risks associated with UAS operations and fine-tune how NextGen technologies can aid their integration into the NAS.

Another area under swift development is *literally* out of this world. The FAA’s Office of Commercial Space Transportation (AST), which licenses and regulates U.S. commercial space launch activities, is forecasting an average of 30.1 commercial orbital launches a year until 2023. So far, AST has issued licenses for nine commercial spaceports located in seven states, with several more in various stages of development.

While both the UAS and commercial space industries are still in early stages of development and are yet to be considered widespread users of the NAS, their future integration may require a few changes to the way airspace is managed in the U.S. NextGen’s collaborative approach towards problem-solving will be an effective tool for handling these and other challenges that might arise during the next phase of airspace evolution.

An example of that collaboration was apparent with a series of meetings last year that brought together the FAA, U.S. Air Force officials, and industry representatives to discuss the challenges of integrating space missions into the NAS. The meetings, organized by the FAA’s new Joint Space Operations Group, helped clarify any misunderstandings about each other’s operations and bring any new issues to light. Information swaps like these are important steps toward an endgame of not just accommodation of space ventures in the NAS, but full and safe integration as well.

ADS-B Check Up

Are you ADS-B equipped? Find out how your equipment is performing. Email 9-AWA-AFS-300-ADSB-AvionicsCheck@faa.gov and include your N-number, ADS-B transmitter, and GPS make/model numbers to find out.



And in case you were thinking that the smaller and somewhat less glamorous Class G airports were not part of the overall NAS-of-the-future picture, think again. Plans are now underway to test the feasibility of remote tower operations at airports that are non-towered (or towered part-time). This is where ATC would be able to direct traffic — while stationed hundreds of miles away — via an array of sensors, HD cameras, and microphones. The FAA has agreed to allow Saab Sensis Corporation to conduct a three-month data collection trial later this summer at Virginia’s Leesburg Executive Airport (KJYO). If the trial proves successful, it could pave the way for this safety-enhancing technology to be a reality at a non-towered airport near you. And while control towers at places like JFK are not going anywhere, a blended approach using this remote technology could prove beneficial at larger airports too.

It’s Not Your Father’s Airspace Anymore!

So what will the NAS of the future look like? It’s hard to say exactly, but as NextGen progress continues, more and more pieces of the puzzle are taking shape. One thing we know for sure is that with FAA’s focus on risk-aversion and accident prevention, the NAS of the future promises to be a place where participants of all categories and sizes — from Atlas rockets, to a Zenith *Zodiac* — can coexist safely and efficiently. Here’s looking to the future. 

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

For more information:

FAA Advisory Circular 90-114A, ADS-B Operations

<http://go.usa.gov/ssZe>

NextGen web page for general aviation

<http://www.faa.gov/nextgen/ga/>



JAMES WILLIAMS

Where NOT to Go

PROCEED
WITH
CAUTION

A Review of Special Use Airspace

Years ago I was having a discussion with a pilot who'd recently decided to trade his long serving airplane for a boat. He said, "You know, one advantage of the airplane was the FAA can't board you." While this is still true, the world has changed since that conversation in that the government can, and will, intercept you. That tends to lead to unpleasant conversations in small rooms with federal agents which, all doctors agree, isn't particularly good for your health. In an effort to help you avoid such disagreeably close encounters, we offer this article on the kinds of Special Use Airspace (SUA) you may find during your flights.

Do Not Pass Go

The first and most restrictive form of SUA is the prohibited area. As the name suggests, this is airspace where all flight is prohibited within its boundaries, from the surface to the prescribed altitude. These areas are usually associated with national security and do not have an effective time. They can, at times, be surrounded by TFRs as well. Luckily these most restrictive areas are relatively rare. That said, the serious nature of any encounter with their boundaries

provides a strong incentive to note and avoid them by a safe margin — not the 0.0001 nautical mile "miss" made possible by GPS. Prohibited areas are noted on charts with a "P" and a two or three digit number, e.g., P-40 — the Camp David presidential retreat, in a cyan box, circle, or other shape.

Coordination Required

Next we move on to restricted areas. Again, the name implies the meaning. Prohibited areas prohibit flight. Restricted areas constrain, but do not

completely outlaw operation within the boundaries. Another key difference is that a restricted area may not go all the way down to the surface. While prohibited areas are defined by a need to protect something on the surface, restricted areas in many cases are more about airspace. Also, restricted areas are only restricted when they are “active” in terms of the reason for the restricted use. That means that a pilot may pass through this airspace at times outside of that “active” window. The best way to ensure that you are transiting during the inactive time is to contact the controlling ATC facility or operate on an IFR flight plan. Restricted areas are a good bit more common than their prohibited cousins. They are labeled on the charts with an “R” and a number, usually three or four digits, and possibly a letter. An example would include R-2515 which covers airspace around Edwards Air Force Base, home to extensive flight testing by the government and private industry.

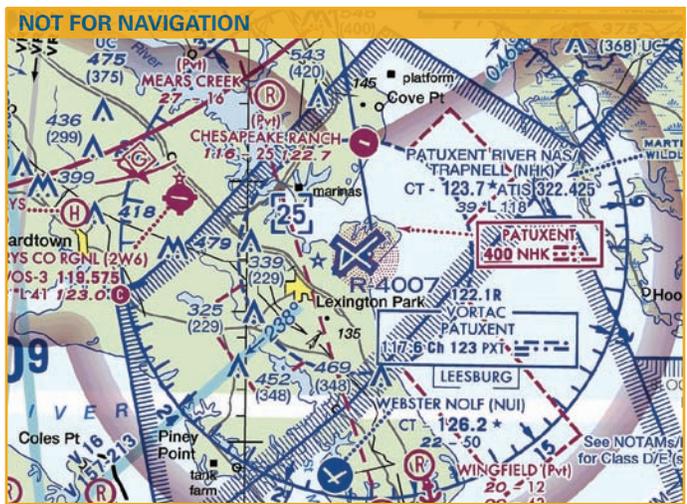
The twin sibling of the restricted area is the warning area. While the two are nearly identical in terms of depiction and description, a warning area differs in that it extends beyond the three-mile boundary of U.S. airspace. Since the FAA can’t technically restrict airspace outside the country, the agency has established warning areas to identify airspace that pilots should avoid without contacting the controlling ATC facility. Warning areas also differ in that you are not actually restricted from the airspace under threat of enforcement action but rather warned that the activities within could be hazardous to non-participating aircraft. Both warning and restricted areas are depicted on the charts as cyan boxes.

Management is Not Responsible for Lost Aircraft

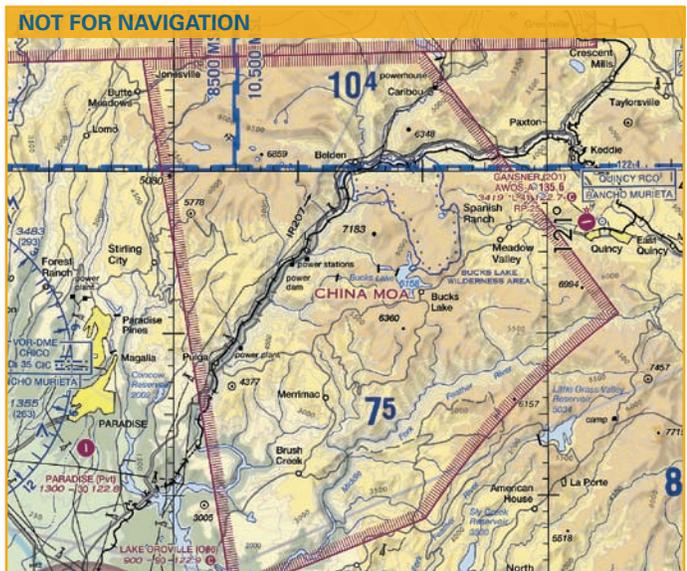
Next we come to Military Operations Areas (MOA). These are areas where the military can practice activities that may require more space than the restricted area will allow. What makes the MOA different from a restricted area, though, is that IFR pilots may be cleared through an active MOA if separation can be provided by ATC. Also, MOAs aren’t technically restricted — which means that that VFR pilots may enter one even if it is active. Much like a Flight Service briefer will tell you VFR is “not recommended” during bad weather, entering an active MOA is likewise “not recommended.” MOAs usually have a name, like Bull Dog or Avon Park, and are depicted on charts as magenta boxes.



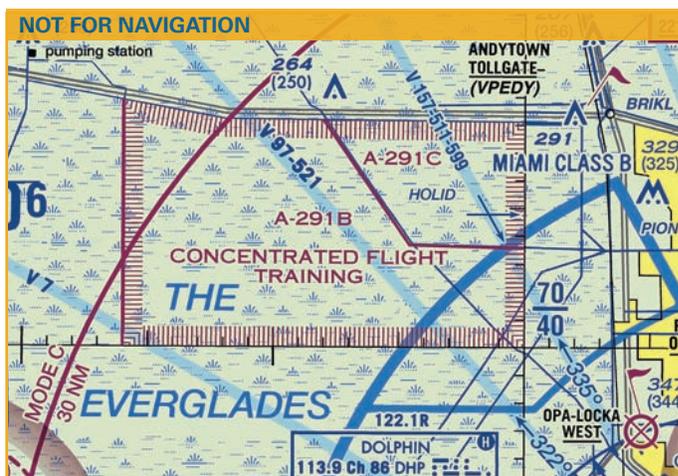
This is Prohibited Area P-40 as depicted on the sectional chart.



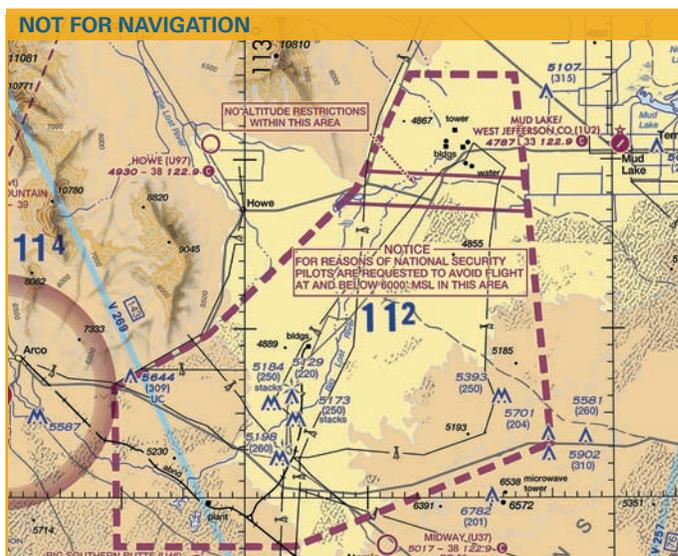
R-4007 is a restricted area that covers the airspace surrounding the Patuxent Naval Air Station.



China Military Operations Area is located east of Chico, Calif.



This is an alert area west of Fort Lauderdale.



This is a national security area west of Idaho Falls, Idaho.

Heads Up

Another type of area that should concern pilots is the alert area. These are areas of increased flight training or other unusual aeronautical activity. Alert areas are designed to keep transient traffic away from pilots doing air work or other operations that might not fit neatly with through traffic. Alert areas don't have a controlling ATC facility, so you don't have to ask permission to enter or transit the alert area. It's charted only so you can be aware of it and not be surprised by the airplane that could be maneuvering in an unpredictable way. Florida has several alert areas due to the close proximity of many flight schools. Alert areas are depicted on the charts with a magenta box and an "A" followed by numbers and possibly a letter.

Nothing to See Here

The last area we need to look at is a national security area. These are areas where pilots are requested not to fly through below a certain altitude. Unlike the mandatory nature of prohibited or restricted areas, a national security area simply shows airspace that pilots are requested to avoid. This could be a military installation or a nuclear plant. Something that would not require a prohibited area, but that the FAA or other agencies would prefer pilots to avoid. They are depicted by dashed heavy magenta lines and a text box with an explanation. A word of caution: these areas may be subject to a temporary flight restriction (TFR). That TFR would be issued by NOTAM.

All Together Now

Another thing to be aware of is that some of these special use airspace types can overlap. For instance, you could encounter a restricted area that sits on top of a prohibited area. Just because you flew over the prohibited area doesn't mean you're free and clear. You may also see restricted areas and MOAs that overlap or abut.

To avoid problems while navigating around these more complicated airspace scenarios, it's always a good idea to contact Flight Service or ATC before entering the vicinity of SUA. Operating under IFR is another good way to help keep you in the clear. If you are not instrument rated, consider asking ATC for flight following.

In conclusion, there are three basic strategies to avoid an unpleasant run in with SUA. First, know the types of SUA around your route of flight and what the requirements of each are. Second, get a good briefing so you know what's active and what's not. Finally, stay in contact with ATC when possible. This will help you avoid last minute SUA and TFR issues. 

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

For more information:

Aeronautical Information Manual, Section 4, Special Use Airspace

https://www.faa.gov/air_traffic/publications/atpubs/aim/aim0304.html

FAA's Enhanced SUA Website

<http://sua.faa.gov/sua/siteFrame.asp>

PAUL CIANCIOLO

You've Been Intercepted!



Behind the Scenes of a TFR

A fighter jet practices the safe interception of a small airplane during Operation Noble Eagle.

Today is one of those perfect weather flying days. It's so nice outside that you cancel your plans and take your airplane out for a joyride. Everything is going well — fuel was cheaper than expected, the air is smooth, and you're heading to your favorite fishing spot. Nothing can put you in a bad mood today.

That is ... except for that F-16 on your left outside the window rocking back and forth. You begin to think, "uh-oh, where am I!? What did I do?" You flip the radio over to COMM 2, which is programmed to 121.5 MHz, and hear: "... Cessna on

heading 130, you have entered restricted airspace." This is no longer a good day, and now you think: "Just what are those in-flight intercept procedures that I thought I would never need?"

Similar scenarios played out in the National Airspace System (NAS) as the military's Continental U.S. NORAD Region (CONR) responded to more than 170 "tracks of interest" (TOIs) so far this year. It is down from the more than 190 TOIs investigated in 2013, but that's still way too many pilots unintentionally causing *America's AOC* (the 601st Air and Space Operations Center) at Tyndall Air Force Base,

Florida, to scramble fighter jets and helicopters to stop a joyride in the wrong place at the wrong time.

Accessing the Airspace

A temporary flight restriction (TFR) can pop-up at any time, even without advanced notice. It can feel like you are bouncing around the NAS in an epic game of pinball. However, you can take comfort in knowing that the FAA is on your side with keeping the game in your favor.

Providing “free access to our airspace” is a mandate that the FAA’s Office of System Operations Security takes very seriously. The office serves as a referee between pilots and local, state, tribal, and federal government officials requesting that certain airspace be restricted for an event or incident.

The FAA gets requests from virtually every police department, city council, mayor, and town manager with an event that they believe merits a TFR. Only one out of 10 requests actually becomes a TFR.

Examining the Risks

The system operations security staff starts by reviewing potential threats and operational mission needs against the likely impact that the TFR will have

on normal air traffic, including general aviation (GA) flights. This analysis includes ongoing consultation with interagency stakeholders such as the Transportation Security Administration (TSA) and FBI. In most cases, after consulting with these partners, no credible threat is found and the TFR request does not meet the requirements for restricting the airspace.

On the rare occasions when the TSA or FBI believes that there is a credible threat, the FAA will establish a TFR.

However, once a TFR is agreed upon, the FAA’s priority shifts to determining how the restrictions will impact the flying community and can be mitigated. An air traffic control filter is applied each time. Can the restricted airspace be 58 miles out versus 60? Can the TFR be activated 10 minutes later? Could there be a cut-out area for an airport on the fringe? Can GA gateway airports be established? The FAA tries to lessen the impact on normal airspace users whenever possible.

Gaining Situational Awareness

The FAA’s biggest challenge is letting pilots know about TFRs, especially those that pop up under tight time constraints. In addition to staying on top of the latest Notices to Airmen (NOTAMS), a very helpful thing that a pilot can do to see and avoid a TFR is to have the capability to receive Automatic Dependent Surveillance-Broadcast (ADS-B) in the cockpit.

According to the FAA’s Surveillance and Broadcast Service Program Office, TFRs — both text and graphical — are scheduled for transmission through ADS-B ground stations as soon as they are received. The initial TFR transmission starts within 10 seconds of receipt. After the initial transmission, the TFRs are retransmitted on a periodic basis of at least once every 10 minutes until they expire.

Although ADS-B In capability is optional, ADS-B Out capability will be required in five years. Having ADS-B In will significantly improve a pilot’s situational awareness in the cockpit.

Other ways to check for TFRs include going online to trf.faa.gov, calling Flight Services at 1-800-WX-BRIEF (992-7433), and subscribing to email alerts from the Safety Program Airmen Notification System (SPANS) at faasafety.gov/spans. It’s important to check just before your flight. You never know when a TFR will pop-up.

What Do I Do Now?

Let’s go back to Joe Pilot on his intended fishing trip. He has now been intercepted by a pair of fighter



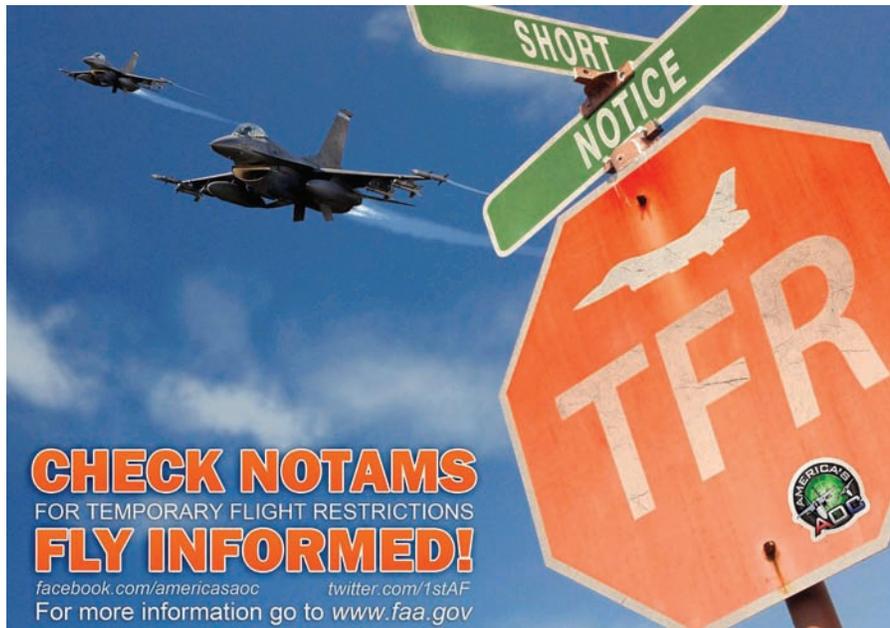
Photo courtesy Civil Air Patrol National Capital Wing

A law enforcement helicopter may also intercept a small airplane. In the DC Special Flight Rules Area, helicopters may have a marquee sign on the right side to display a message to the pilot.

jets ready to defend the airspace. Lucky for Joe, he has his in-flight intercept procedures handy. If you need a refresher, see the intercept procedures chart on the next page.

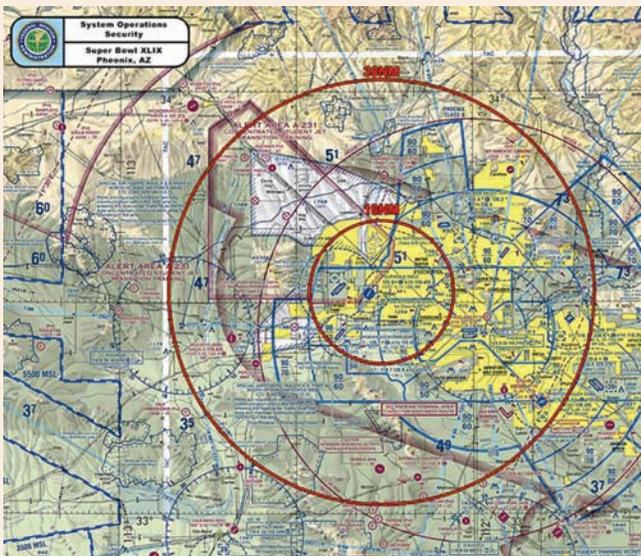
Next, Joe notifies ATC of his predicament and acknowledges the F-16 by rocking his wings. He then follows the *Fighting Falcon* and lands where directed. Joe eventually gets back on his way, but the entire episode (and the associated inconvenience and expense) could have been avoided. Please make it a priority to check for TFRs before every flight so you don't find yourself with an armed escort!

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



Flying When the Big Game is On

The FAA recently updated the special security NOTAM relating to sporting events (<http://1.usa.gov/1u7f8vm>). All aircraft operations, including parachute jumping, unmanned aircraft, and remote controlled aircraft, are prohibited within three nautical miles and under 3,000 feet of any stadium or racetrack having a seating capacity of 30,000 or more people. This includes Major League Baseball, National Football League, NCAA Division I football, NASCAR Sprint Cup, IndyCar, and Champ Series races. For a list of stadiums and speedways, go to <http://bit.ly/1snFsNq>. The TFR is in effect an hour before to an hour after each event.



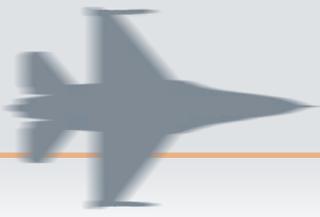
During high-profile games, a special TFR will also be issued. For the upcoming Super Bowl at the University of Phoenix Stadium, an advisory will be issued approximately 30 days prior and the actual NOTAM 10 days prior.

Within the 30 nautical mile TFR ring around the stadium, flight training, practice instrument approaches, aerobatic flight, glider operations, parachute operations, ultralight, hang gliding, balloon operations, agriculture/crop dusting, animal population control flight operations, banner towing operations, sightseeing operations, model aircraft operations, model rocketry, seaplane/amphibious water operations, unmanned aircraft systems (UAS), and commercial cargo carrier operations that fail to comply with their TSA approved security program are not authorized. Within the TFR:

- All aircraft must be on an active IFR or VFR flight plan with a discrete beacon code assigned by ATC;
- Aircraft must be squawking the discrete code prior to departure or entering the TFR and at all times while in the TFR;
- Aircraft are not authorized to overfly the inner core while attempting to exit the TFR; and
- Two-way communications with ATC must be maintained at all times while operating in the TFR.

Only approved law enforcement and military aircraft directly supporting the Super Bowl and approved air ambulance flights, all of which must be squawking an assigned discrete transponder code and on an approved airspace waiver (<https://waivers.faa.gov>), are permitted within the 10 nautical mile inner core of the TFR.

Please check the current NOTAM for updates.



In-Flight Intercept Procedures



If you are intercepted by U.S. military or law enforcement aircraft, remain predictable. Do not adjust your altitude, heading, or airspeed until directed to by the intercepting aircraft. An intercepted aircraft must, without delay:

1. Adhere to instructions relayed through the use of visual devices, visual signals, and radio communications from the intercepting aircraft.
2. Attempt to establish radio communications with the intercepting aircraft or with the appropriate ATC facility by making a general call on guard (121.5 MHz), giving the identity, position, and nature of the flight.
3. If transponder equipped, squawk 7700 unless otherwise instructed by ATC.
4. The crew of the intercepted aircraft must continue to comply with interceptor aircraft signals and instructions until positively released.

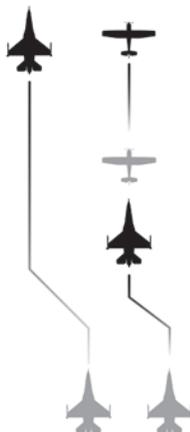
For more information, read section 5-6-2 in the Aeronautical Information Manual (AIM).

Visual Intercept Signals

Fighter Aircraft:	Meaning:	Intercepted Aircraft:
Approaches pilot-side of aircraft and matches speed and heading. (Nighttime) Will also flash navigation lights.	You have been intercepted.	(Daytime) Rock wings to acknowledge. (Nighttime) Rock wings and flash navigation lights to acknowledge.
Initiates a slow, level turn.	Follow me. Fly this way.	Match heading and follow. Continue on heading in direction of fighter.
Initiates abrupt turn across nose; may dispense flares.	Warning! Turn now in direction of fighter.	Immediately match heading and follow.
Circles airport, lowers landing gear, and overflies runway in direction of landing. (Nighttime) Will also turn on landing lights.	Land at this airport.	Lower landing gear (if equipped) and land on runway. If airport inadequate, raise landing gear (if equipped) while flying over runway and flash landing lights. Continue to circle airport between 1,000-2,000 feet until fighter signals to follow to alternate airport.
Performs the breakaway maneuver.	Fighter understands intercepted aircraft's intentions.	If cannot comply, switch on and off all available lights at <i>regular</i> intervals. If in distress, switch on and off all available lights at <i>irregular</i> intervals.

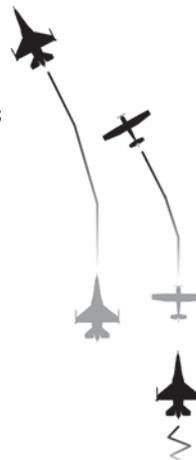
Approach & Identification

Typically two fighter jets approach from the rear. One fighter flies around to make visual contact with the pilot. This may also be conducted with a law enforcement helicopter.



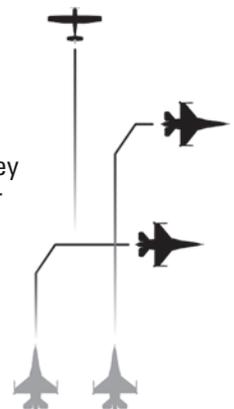
Fly This Way

A slow turn by a fighter jet indicates that you should follow in the same direction. Be cautious of wake turbulence.



Breakaway Maneuver

Fighter jets will abruptly break away from pursuit when they understand your intentions.



Stay Current With **WINGS** Online

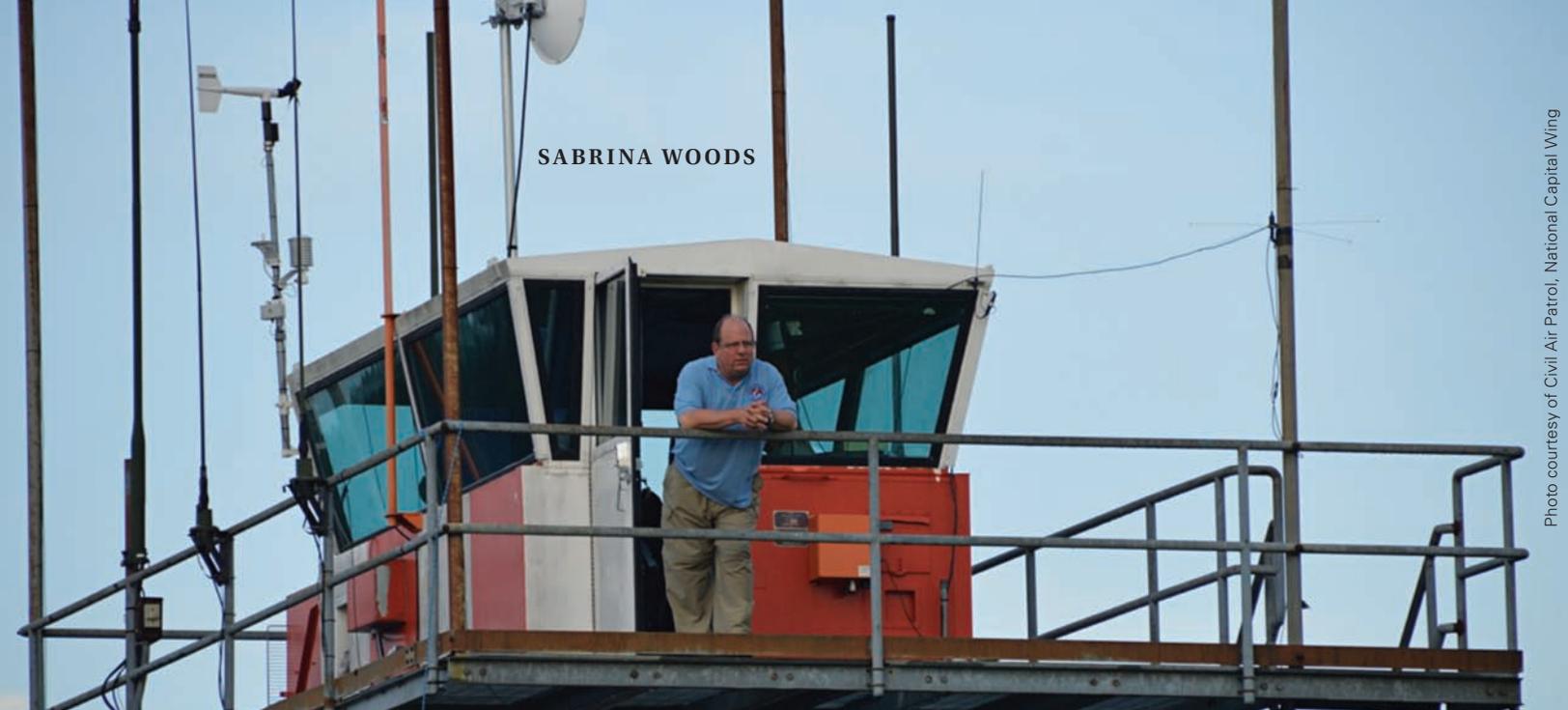


www.FAASafety.gov

- Complete any phase of the WINGS Pilot Proficiency Program to satisfy the requirement for a flight review.
- Maintain currency and proficiency in the basics of flight to enjoy a safer and more stress-free flying experience.
- Complete online courses, attend seminars, and participate in webinars to improve your skills and knowledge as pilots.

Photo Courtesy of Cessna





SABRINA WOODS

Straight Talk:

Featuring Air Traffic Control

“Know the airspace you are going to be flying into, out of, or through.”

“Know the procedures.”

“Don’t keep us in the dark if it is an emergency or might become an emergency. Let us know and we will clear the way.”

“If you are not sure of an instruction issued to you by ATC, ASK for clarification!”

For this air traffic and airspace edition of *FAA Safety Briefing* we turned the “mic” over to various air traffic controllers from all over the national airspace system (NAS) and asked: if they could tell the pilots who frequent their airspace anything they wanted, what would it be? These are just a few of the responses we received from an overwhelmingly positive and engaged corps of aviation professionals. Whether you are a grizzled flying vet with over 10,000 flight hours, or a brand new student with fewer than 10, there are bound to be one or two nuggets of information you can pick up as we introduce Straight Talk: Featuring Air Traffic Control.

Know the Airspace

Airspace classifications are designed to mitigate risk while providing the maximum flexibility possible to the pilot. Operating in any type of airspace requires situational awareness and communication.

Most of all, it requires a certain measure of planning. You need to know the airspace you are going to be flying into, out of, or through. In particular, Class B airspace is designed to protect the traffic flying into and out of major airports around the country. If you are flying in Class B, know the VFR corridors that are designed to keep you safely out of the way of the larger commercial traffic that frequently makes use of the hub airport. When planning your route, take into account where the Class B starts and ends, to include both the upper and lower limits. Apply this rule to Class A, D and C as well. If you are simply traversing the airspace, ask for clearance and then stick to the assigned transition route to ensure the safest passage. Doing this takes a load off the controller by allowing the pilot to navigate on a published route through less congested areas.

Temporary flight restrictions (TFRs) can also be a challenge for controllers and pilots alike. They can pop up quite unexpectedly and with rather short notice. Regardless, pilots and controllers have to adhere to the established parameters. Pilots should check notices to airmen (NOTAMs) before each flight by contacting flight service and/or using one of the direct user access terminal (DUAT) services. Published TFRs can also be found here: <http://tfr.faa.gov/>.

Airspace violations send controllers scrambling to maintain separation, and they put you and your fellow aviators at an unnecessary risk. They can also result in administrative action. One controller from a Class B tower lamented, “I never enjoy having to call up an aircraft to tell the pilot to call us after landing. By then the paperwork has already been started ...”

This “paperwork” can lead to an investigation by the local Flight Standards District Office and possibly to an enforcement action, so it’s best to carefully plan your route beforehand to avoid any conflict during flight. In addition to the route, take the airport layout into account and be familiar with any “hot spots” that may exist. Every airport’s known hot spots are clearly charted on airport diagrams.

One last note from a terminal radar approach control (TRACON) operator to VFR-filed pilots, “Know your VFR reporting points. They are designed and placed in certain areas for a reason.”

Know the Procedures

Differences in class aren’t the only things you need to be aware of when flying through the nation’s airspace. Obstacles and hazards are a “need to know,” and avoiding them needs to be an intrinsic part of your flight planning. That includes understanding Obstacle Departure Procedures (see “Learn More” for additional information).

Here’s what can happen when pilot and controller expectations are out of sync. A controller in a mountainous region in the Salt Lake area tells the crew that they are “cleared as filed.” The crew was expecting to fly an obstacle departure procedure or to receive vectors — something the controller could not provide below the minimum vectoring altitude. Based on guidance in the AIM, the controller was expecting the crew to fly the obstacle departure procedure until reaching controlled airspace.

The result: the crew departed and flew runway heading, which took them directly into the mountains. Fortunately for everyone, the controller quickly realized something was amiss, queried the crew, and clarified expectations before the misunderstanding caused a controlled flight into terrain accident.

Clearly, this kind of misunderstanding can be dangerous, so the take-away is be sure you understand ATC’s expectations. In instrument meteorological conditions (IMC), aircraft departing VFR-towered or non-towered airports, especially in mountainous areas, are expected to fly the published ODP until reaching controlled airspace and/or the controller’s minimum vectoring altitude. To make

your intentions perfectly clear, though, you can use the “remarks” section of the flight plan to state that you will depart via the published ODP. You can also provide a similar notification on your first contact with the departure controller.

Don’t Keep Us in the Dark

From a senior controller:

There is a LOT going on in the NAS in particular at larger hubs. We are constantly scrambling to give everyone what they need, and to artfully direct you in, around, and on the ground at our airports. We do this by interpreting what we see on the radar, what we can immediately see in the air around us, and what we are told over the radio. What we can’t see is what’s going on in your cockpit. So when you are at the onset of what might become a no-kidding emergency, don’t keep us in the dark! We are trained in emergency procedures. Whether the situation is immediate, urgent, or an emergency, we WILL clear a path or direct you to safety so you can get down or resolve your issue as expeditiously — and as safely! — as possible.

There is a LOT going on in the NAS, in particular at larger hubs. We are constantly scrambling to give everyone what they need, and to artfully direct you in, around, and on the ground at our airports.



Photo courtesy FAA Air Traffic Organization

After one harrowing situation, a controller asked the pilot, who just barely managed to get his crippled aircraft safely back down on the ground, why he hadn't declared an emergency sooner, or asked for help. Unbeknownst to the pilot, he had passed up a suitable airstrip almost 12 miles back in his fight to get to the one where he landed. The pilot had no real answer.

To offer some insight into this phenomenon from a human factors perspective, there seems to be several reasons why pilots do not call for help when they should. Sometimes they feel that "any second now" they will regain command of an out-of-control situation. There is the fear of embarrassment or perception that they "don't know what they are doing." There

is also the fear of an enforcement action for having gotten themselves into the situation in the first place. Regardless,

If you are lost, confused, or unsure, let ATC know so we can assist you.

avoiding that radio call can turn a small problem into a full-fledged disaster in the making. Mitigating disaster will most likely include a call for help. "Never, ever have I laughed in the face of an emergency," says a controller from a military base in Arizona.

"In that same sense, however, don't inundate us with information that is 'nice to know,' but not particularly pertinent to the current situation," advises the senior controller. The savviest of pilots have mastered that delicate balance of relaying exactly enough information with brevity. Sometimes all it takes is a little bit of practice while on the ground.

Also, if you are a CFI working with a student, you need to know when it is no longer beneficial to have the student on the radio. A controller from Honolulu TRACON says, "Some instructors allow students to make transmissions without enough practice. A student keying the mic and making excess transmissions takes away valuable time from a controller who is handling other aircraft."

If the student is fairly new and you have entered busy airspace with a controller issuing rapid-fire instructions to numerous aircraft, letting the student stumble around on the radio may not be the best idea. Practice in less-congested areas, and use other techniques (e.g., scripts or ground sessions listening to ATC frequencies) to build the student's proficiency and confidence. The student needs both proficiency and confidence in simultaneous handling of flying and radio before being endorsed for solo operations.

"We have all seen our share of students who are good aviators, but don't know how to ask for a landing or take-off clearance," one senior controller reflects. "Complete flying mastery is not just about your skills at the yoke and throttle."

For the more seasoned aviators, try not to be "hot-mic-happy." It is entirely likely you are not the only aircraft a controller is working, and "your" controller may be using more than one frequency. If you hear a controller making several transmissions and you are not hearing any replies, this is more than likely the case. Please wait for a pause and then key the radio. Don't always expect the controller to immediately respond to you. Controllers prioritize the traffic they are working based on need, location, altitude, etc. You might not be the highest priority on the list.

One last bit of advice from the controller in Salt Lake, "I've had a couple of pilots telephone the area and ask about the airports we service. This is a great opportunity for us to let pilots know how to fly in and out of our airports, what our radar and radio coverage is, approaches to expect, and also to give an overview of the sector operations. It's much easier for me to answer questions on the phone and coach pilots on what to expect than to try to do it on frequency."

If You Are Not Sure, Ask!

This brings us to THE most important concept that every controller wants every pilot to know: If you are not sure — about approaches, departures, hazards, restrictions, instructions, whatever — just ask! Never, never, *never* be afraid to ask the controller if you're not exactly sure what he or she wants you to



Photo courtesy FAA Air Traffic Organization

do. Many pilots, students in particular, seem intimidated to ask a controller to explain a clearance they didn't understand. Don't try to assume you know and just hope it works out. If you are lost, confused, or unsure, let ATC know so they can assist you.

"Never forget that controllers are your allies, not the enemy. You do not have to fear the controller on the other end of the radio. We would much rather have you stumble through a radio call asking a bunch of questions because you are not sure, rather than have you end up in close proximity to weather, terrain, or another aircraft," says the senior controller from Honolulu International.

Come Check Us Out!

Have you ever actually seen what goes on in a controller's world? All GA pilots should take

advantage of ATC's periodic Operation Raincheck programs to tour their local facility (tower, TRACON, center), to see what happens on the other side of the mic. "GA pilots visiting our tower are amazed to see the operation from a broader perspective, and they gain better understanding why it's so important to know the airport layout by memory," says the TRACON operator. So be on the lookout for opportunities — or just call the facility to ask when the next such event is scheduled. You might be surprised by what you learn and your controller will certainly appreciate your interest. 

Sabrina Woods is an associate editor for FAA Safety Briefing. She spent 12 years as an aircraft maintenance officer and an aviation mishap investigator in the Air Force.

Instrument Departure Procedures (AIM 5-2-8)

All departure procedures (DPs) provide a way to depart the airport and transition safely to the en route structure, but proficient instrument pilots need to understand the difference between obstacle departure procedures (ODPs) and standard instrument departure procedures (SIDs). From the AIM:

Instrument departure procedures are preplanned instrument flight rule (IFR) procedures which provide obstruction clearance from the terminal area to the appropriate en route structure. There are two types of DPs, Obstacle Departure Procedures (ODPs), printed either textually or graphically, and Standard Instrument Departures (SIDs), always printed graphically.

ODPs provide obstruction clearance via the least onerous route from the terminal area to the appropriate en route structure. ODPs are recommended for obstruction clearance and may be flown without ATC clearance unless an alternate departure procedure (SID or radar vector) has been specifically assigned by ATC. Graphic ODPs will have (OBSTACLE) printed in the procedure title, e.g., GEYSR THREE DEPARTURE (OBSTACLE), or, CROWN ONE DEPARTURE (RNAV) (OBSTACLE).

Standard Instrument Departures are air traffic control (ATC) procedures printed for pilot/controller use in graphic form to provide obstruction clearance and a transition from the terminal area to the appropriate en route structure. SIDs are primarily designed for system enhancement and to reduce pilot/controller workload. ATC clearance must be received prior to flying a SID. All DPs provide the pilot with a way to depart the airport and transition to the en route structure safely. Pilots operating under 14 CFR Part 91 are strongly encouraged to file and fly a DP at night, during marginal Visual Meteorological Conditions (VMC) and Instrument Meteorological Conditions (IMC), when one is available.

An ODP that has been developed solely for obstacle avoidance will be indicated with the symbol "T" on appropriate Instrument Approach Procedure (IAP) charts and DP charts for that airport. The "T" symbol will continue to refer users to Terminal Procedures Publication (TPP) Section C. In the case of a graphic ODP, the TPP Section C will only contain the name of the ODP. Since there may be both a textual and a graphic DP, Section C should still be checked for additional information. The nonstandard takeoff minimums and minimum climb gradients found in TPP Section C also apply to charted DPs and radar vector departures unless different minimums are specified on the charted DP. Takeoff minimums and departure procedures apply to all runways unless otherwise specified. New graphic DPs will have all the information printed on the graphic depiction. As a general rule, ATC will only assign an ODP from a non-towered airport when compliance with the ODP is necessary for aircraft to aircraft separation. Pilots may use the ODP to help ensure separation from terrain and obstacles.

SABRINA WOODS

Regardless of the region, size, or class of the airport, air traffic controllers busy themselves daily with the careful orchestration of air and aviation ground traffic in and around our national airspace system (NAS). Their jobs can be tense, stressful, hectic and ridiculously rewarding. Think you got the chops to join the ranks? Well then, read on.

The Basics

First up is that you have to be an American citizen to control air traffic in the NAS, and since communication is the hallmark of a good controller, you must be able to speak English clearly enough to be understood over the radio. You must be able to pass yearly medical exams, as well as initial medical and background checks. You can't be any older than 30 if you are new to the profession. People with previous experience (such as those coming from the military) can re-enter the profession if they are 31 or older, but only if they have experience working as a controller before turning 31. Last, there are some rather intensive educational and qualification requirements to meet before you can start directing traffic. This article will focus mostly on the training aspect of becoming a controller.

Experience Matters

You must have either three years of work experience or a bachelor's degree, or a combination that totals three years, to be considered for a position as an FAA air traffic controller. Transfers from the military must have at least one continuous year of work experience to be considered for hire. Armed with the proper experience, you must then apply online to a public job announcement on USAJobs (www.usajobs.gov/) to be initially considered for the job. .

The SATs on Steroids

During the job selection process, you will be asked to take two tests. The first is a bio-data assessment that will assess your experience, work habits, education, and other dimensions that are related to success on the job. This is followed by what is the equivalent to a scholastic aptitude test on steroids — an SAT engineered to be air traffic and aviation specific.

The air traffic selection and training (AT-SAT) test is a comprehensive, computer-administered test designed to evaluate your ability to learn how to be an air traffic controller. The test consists of math questions, airplane control/dial questions, questions on radar and angles, and a series of different flight scenarios, just to name a few. For a great comprehensive study guide and self-

assessment website, check out http://atbasics.faa.gov/index_atc. You must pass the test with a minimum score of 70 to earn placement on a job referral list.

Academy Bound

Once you have met the experience requirements, passed the medical, physical, and qualification tests, completed a background security check, and been interviewed and selected for a position, the next step is training at the FAA Academy at the Mike Monroney Aeronautical Center in Oklahoma City. The Academy is responsible for the technical and managerial training and further professional development of the FAA's workforce and the aviation community.

The Air Traffic Basics course is the entry level course for newly hired air traffic control specialists and marries lecture (supplemented by embedded questions and discussion points), video segments, animation, two- and three-dimensional graphics, and individual and group exercises. Coursework includes an in-depth study of FAA regulations, the airway system, how various aircraft perform, and how to use job-specific equipment.

Air Traffic Basics is followed by additional course and simulation work specific to one of the three types of air traffic control facilities; Terminal Tower, Terminal RADAR or En Route.

A new controller can expect to become fully certified within two to four years, depending on performance and facility complexity, and must pass various steps in the training program to reach certification. Once certified, however, all air traffic controllers are still subject to performance reviews.

Are You In?

So there you have it: air traffic controllers are people trained to maintain the safe, orderly and expeditious flow of air traffic through our NAS. In case this article didn't pique your interest in pursuing a career in ATC, this video about a day in the life of a controller might: www.faa.gov/tv/?mediaId=394. It offers just a sampling of what controllers face in their day-to-day lives. Each split-second decision-making, non-consistent, emergency-negating, euphoria-inducing day in the tower is what makes the ATC profession one of the most mentally challenging and incredibly rewarding careers — so are you in? 

Sabrina Woods is an associate editor for FAA Safety Briefing. She spent 12 years as an aircraft maintenance officer and an aviation mishap investigator in the Air Force.

Nuances of the NAS

Every ground school graduate is probably familiar with the FAA's basic set of training-related publications for a range of airman certificates and ratings. These include the *Pilot's Handbook of Aeronautical Knowledge*, the *Airplane Flying Handbook*, the *Risk Management Handbook*, the *Instrument Flying Handbook*, the *Instrument Procedures Handbook*, and *Aviation Weather Services*.

It's natural to focus on the basics, especially while training for a given certificate or rating. However, the airspace and ATC focus of this issue provides a great opportunity to point out several additional resources that can deepen your knowledge of the national airspace system (NAS).

Aeronautical Chart User's Guide

Published by the FAA's AeroNav Products division, the *Aeronautical Chart User's Guide* provides introduction to the agency's aeronautical charts and publications. In addition to being a learning aid for new pilots, this document is a great quick reference guide for all aviators. The guide is organized to address VFR terms, VFR symbols, IFR terms, IFR symbols, the U.S. Terminal Procedures Publication (TPP), and TPP symbols.

Though the Aeronautical Chart User's Guide is still available as a PDF document, the FAA now offers it in a web-based format (<http://go.usa.gov/FEC9>). This approach allows the user to easily reference chart symbology on a range of mobile devices as well as via desktop computers. Another advantage to the web-based format is that it enables more frequent updates to the material.

Though I do have the PDF version tucked away in my iPad aviation library, I also keep the URL for the web-based version handy because it scales nicely to whichever device I'm using. Its hyperlinks also provide for easy navigation to the specific content I need.

Pilot/Controller Glossary

The FAA Aeronautical Information Manual (AIM) Pilot/Controller Glossary (P/CG) should be part of every pilot's ready reference material. I think of the P/CG as the Webster's dictionary of our unique aviation language. There are now more than 1,300 terms in this 80-page document, which offers a detailed definition of each. The P/CG also lists nearly 50 terms whose use in the U.S. NAS differs from the official ICAO definition. The number of abbrevia-

tions and acronyms included in the P/CG takes the total to around 2,000 words, phrases, or terms that the pilot is expected to correctly understand and use.

To sound like a professional — and I hope we all strive to exhibit that quality — please take the time to master the content of the Pilot-Controller Glossary, and avoid non-standard terminology. For instance, don't "take the runway," and please, please, please banish the word "active" from your aeronautical vocabulary. Transmitting your intentions with respect to "the active" without a runway number leaves your fellow fliers in the dark as to which runway is in use, and your position.

The "Point Sixty-Five"

If you *really* want to dig deeply into the nuances of the NAS, take a look at FAA Order JO 7110.65, Air Traffic Control. Known affectionately (or not) by such monikers as "the seventy-one-ten," the "point sixty-five" or "the bible" of air traffic control, Order 7110.65 is an FAA manual that prescribes ATC procedures and phraseology for use by all personnel providing ATC services in the United States. The FAA publishes the current version, along with subsequent lettered versions, approximately every six months.

The official language states that controllers are required to be "familiar" with the provisions of the 7110.65 and to "exercise their best judgment if they encounter situations" it does not address. In the case of the latter, the sheer length of the document makes it hard to imagine too many situations it does not cover. With regard to the former, the expectation for controllers to be "familiar" with the 7110.65 order is amusingly understated. In fact, controllers are expected to know this document backwards, forwards, and sideways. We pilots would do well to know our airplane's POH as well as virtually all controllers know their "point sixty-five."

While it is not necessary for pilots to know (much less master) the content of FAA Order 7110.65, you can learn a lot — and perhaps deepen your understanding of how things work on the other side of the mic — from perusing this document.

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

JAMES WILLIAMS

RISE OF THE MACHINES

A Look at Modern Day UAS Operations



Drone: the word just sounds angry. It conjures up images of modern warfare across the far-flung recesses of the planet. But the history and terminology is a bit more complicated than that. In fact, the term drone is probably too old-fashioned to describe this modern technology. The FAA and industry now use the term Unmanned Aircraft System (UAS), which better reflects the advances made since more basic forms of the technology first saw widespread use during World War II. During the war, the German forces extensively used various forms of remote control or autonomous systems with some success, most notably the V-1 buzz bombs. The U.S. Army and Navy also experimented with the idea of remotely controlling timed out bombers packed with explosives to hit high value targets. This early UAS technology may have changed the course of American history when the aircraft piloted by Joseph Kennedy Jr., older brother of President John F. Kennedy, detonated prematurely before Kennedy armed the aircraft and turned it over to remote control.

Air National Guard photo-Senior Airman Michael Quiboloy

Early UAS were used mainly for target practice after the war, but a growing number were allocated for reconnaissance and what would later become cruise missile applications. During the 1970s and 1980s, the systems required to take advantage of UAS, like miniaturized communications, control, and propulsion systems, began to mature. During the 1990s, systems like the General Atomics Predator arrived and others soon followed. The military and intelligence worlds enthusiastically embraced the technology, and the systems have since proven very effective in a variety of roles.

UAS have been very successful in war zones but have been largely missing from our National Airspace System (NAS). That's because UAS integration into the NAS is a highly complex issue that involves several important factors.

A Different World

When considering UAS integration, one question often comes to mind: how are today's UAS operations different from what the military and model aircraft owners have been doing for decades? It was a question I struggled with as the first generation of consumer level UAS began to reach the market. Specifically, I wondered why this technology was more interesting to me than flying model aircraft. I concluded that the combination of vertical flight, stabilization technology, and photography offered a wide range of useful and appealing possibilities. The growing popularity of UAS clearly shows that I am not alone. But the same accessibility that makes these devices so great for so many potential uses is also a potential liability, because the would-be new entrants in the NAS have widely different backgrounds and training.

The government has been operating UAS for quite a while with great success, so many of these would-be UAS operators wonder what makes it so hard to bring them to the civilian side. There are several reasons. First of all, the way and environment in which the government — the military in particular — operate UAS is completely different from a civil airspace system. The military controls every aspect of the airspace in the operating area, but the civil world has much less direct control and must accommodate a much wider range of users.

Second, civil airspace management is predicated on the basic principle of see and avoid. While certainly not perfect, see and avoid is still important. This is a challenge for UAS, as even sophisticated UAS are not yet able to “detect” and avoid possible

conflicting traffic. As several high-profile news stories have shown, the potential does exist for a conflict between UAS and traditional aircraft.

There are also numerous regulatory issues that need to be worked out.

Flying for Fun

Operating UAS for fun is probably what the majority of UAS operators want to do. For this population — myself included — the FAA doesn't require any certificate or approval. We just need to follow certain safety recommendations. Designed around model aircraft operating standards (and thus limited to systems weighing less than 55 pounds), these recommendations were originally outlined in Advisory Circular 91-57 (www.faa.gov/documentLibrary/media/Advisory_Circular/91-57.pdf), currently in revision. In June 2014, the FAA released the “Interpretation of the Special Rule for Model Aircraft” to the Federal Register, in light of the increase of potentially hazardous operations and confusion about what was and was not considered “model aircraft operations.” In a nutshell, these UAS may not be operated for compensation or commercial purposes, and the FAA asks that model/UAS operators avoid populated or noise sensitive areas and keep the model/UAS below 400 feet above ground level (AGL). The Interpretive Rule also states that any flight within five miles of an airport should be conducted only after notifying the airport operator or ATC facility. The FAA also states that the operator must maintain a visual line of sight on the aircraft. This requirement follows the “see and avoid” principle, which makes the UAS operator responsible for avoiding conflict with other air traffic.

As with any aircraft, the ability to comply with these restrictions and limitations is a function of proper training and experience. You'll want to learn and practice the basics of controlling your device in safe and controlled circumstances. You might also want to log “ground school” time with some of the many instructional videos available on the internet for almost any kind of system.

Larger UAS Operations

Currently, the ability to fly a UAS commercially is limited. To do so, the operator must hold a Special Airworthiness certificate in the experimental category from the FAA's Aircraft Certification Service. But the experimental certificate regulations preclude carrying people or property for compensation or hire. This limitation creates a problem

for a number of industries looking to use UAS for commercial purposes.

The other method of flying UAS in the NAS is limited to public or government operations under a Certificate of Authorization or Waiver. This method permits public agencies and organizations

Another important piece of advice — one applicable to both piloted aircraft and UAS operators — is to fly friendly.

to operate a particular UAS, for a particular purpose, in a particular area. Common uses today include law enforcement, firefighting, border patrol, disaster relief, search and rescue, military training, and other government operational missions. These operations can be carried out in a controlled environment and controlled airspace.

What's Happening Now?

In order to gain a better understanding of how UAS would work in everyday use, the FAA has established six Test Sites across the country for UAS operations. The last of the six sites became opera-

tional in Virginia last summer. The research being conducted at these Test Sites includes: agricultural spray and survey; wildlife survey and tracking; UAS procedures; UAS coordination with ATC; detect and avoid technology; and operator training and standards. "Having all six national Test Sites up and running will give us more and better data to help expand the safe use of unmanned aircraft into our airspace," said FAA Administrator Michael Huerta following the opening of the final site.

Additionally, last fall the FAA issued exemptions to certain companies to use UAS in the production of TV and movies and other low-risk activities. This action was taken under section 333 of the FAA Modernization and Reform Act of 2012. This legislation allows the Secretary of Transportation to permit certain low risk activities with UAS. To qualify for this exemption, companies agreed to have certain safety standards and risk mitigations in place. These include ensuring that operators hold private pilot certificates, keep the UAS within line of sight at all times, and restrict flights to the "sterile area" on the set. They also agreed to conduct preflight inspections and to report all incidents and accidents.

"The applicants submitted UAS flight manuals with detailed safety procedures that were a key factor in our approval of their requests," said FAA Administrator Michael Huerta. "We are thoroughly satisfied these operations will not pose a hazard to other aircraft or to people and property on the ground."

The FAA is currently considering other requests for exemption under section 333. As of December 2014, 11 companies have approved exemptions to operate under section 333. These exemptions, along with the research being done in the UAS test sites, will improve the FAA's plans to fully integrate UAS into the NAS.

In addition to the operations currently authorized, the FAA is working on a small UAS (sUAS) rule which will allow greater access for UAS operators, while protecting the welfare and safety of pilots, passengers, and people on the ground. This is no easy task. In fact, to call it a delicate balancing act would understate the challenge by orders of magnitude. The FAA hopes to have a Notice of Proposed Rulemaking (NPRM) on this topic published around the time this publication reaches you.

What Does It Mean for Me?

If you're a pilot, the proliferation of UAS means that you need to be even more aware of your surroundings, particularly at altitudes below 400 feet AGL.



If you're a UAS operator, you need to follow the guidance as closely as possible, and be constantly mindful of altitude and location. There are a number of aeronautical chart websites and applications that will allow you to familiarize yourself with the airspace in your area. Use these resources to make sure your UAS flight areas aren't too close to an airport, or located under likely approach paths used by piloted aircraft. UAS operators might also consider pilot training, starting with a private pilot ground school course that will enhance understanding of airspace and "rules of the road" for aviation.

Another important piece of advice — one applicable to both piloted aircraft and UAS operators — is to fly friendly. In the UAS context, that means taking care to avoid flight around non-participating persons and private property. Apart from the obvious need to avoid causing injury or damage, UAS operators need to remember that scaring people is not a good way to win friends or avoid tighter regulation of this particular recreational activity.

On a personal note, I sit at an interesting intersection in this debate. As a pilot, UAS hobbyist, and FAA employee, I can see all sides. I see pilots' fears that swarms of UAS will blot out the sun and clog the

airways. I see the anger of the UAS community, whose members believe they should have greater access to the airspace. And I see the monumental task the FAA faces in figuring out how to get both of these groups neatly and safely integrated into the NAS.

This is a complex issue that can't be easily solved with hasty actions by the FAA. Through our current research and feedback on the sUAS NPRM, the FAA hopes to design a rule that can open up the NAS to innovation, while still following our mandate to provide the safest and most efficient NAS possible.

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

Learn More

FAA UAS site:

<http://www.faa.gov/uas/>

What Can I Do With My Model Aircraft?

http://www.faa.gov/uas/publications/model_aircraft_operators/

Section 333 – Special Rules for Certain UAS

http://www.faa.gov/uas/legislative_programs/section_333/





Red Light, Green Light

A 2005 Cessna *Skyhawk* was attempting to land when an airport vehicle crossed in front of it. The aircraft hit the vehicle, lost its landing gear, and crashed onto the runway. While the pilot was not seriously injured, both vehicle occupants had to be taken to the hospital.

While zipping down a parking apron at night, an FBO vehicle ran into a taxiing Cessna resulting in substantial damage to both and sending the driver of the truck to the hospital.

On a misty day, a taxiing Piper PA31 collided with a parked car. No one was hurt in the mishap, but the aircraft suffered significant damage to its left wing.

And from the commercial side, a maintenance vehicle left unattended and in gear rolled across the active runway and just barely missed colliding with a landing Embraer EMB-190 with 72 people on board.

The underlying theme? Vehicles, (with or without drivers) pose a significant risk to aircraft operating in and around runways, taxiways, parking aprons, and hangars. These incidents are called vehicle deviations and, regardless of the fact that these vehicles were authorized to operate on the premises, through a series of miscues, miscommunication, or lack of communication, they became a hazard.

Red Light

Although a collision can easily occur in non-movement areas (as indicated above), the most dangerous deviations are runway incursions in which a vehicle, person, or aircraft proceeds onto an active runway without authorization. Unauthorized movement on a taxiway is called a surface incident. These situations can lead to some mad scrambling by controllers and approaching aircraft in order to maintain proper separation and that is only *if* the incursion is noticed in time.

Mitigating these instances is relatively simple: communicate! Ground operations personnel, maintenance technicians, and operators traversing back and forth should keep in constant communication, and, if possible, line of sight of the controlling tower. If you are not sure if you are cleared to cross a runway hold-line, stop and ask ATC. Ops and maintenance vehicles should have, at a minimum, markings designating the function of the vehicle (e.g., Ground Ops), working lights, mirrors, a rotating beacon, a two-way radio, and a tower light signal card.

What?! “Light guns” have gone the way of the dinosaur, you say? That is all well and good until the radio goes out, effectively leaving you or the tower voiceless. *It has* happened, so knock the dust off that handy card and give it a review; just in case.

Besides communication, think of maneuvering around the movement (controlled) and non-movement (uncontrolled) areas as something akin to approaching train tracks. Look, listen, and look again. Visually affirm that there are no approaching aircraft when crossing active runways. The tower might have cleared you to cross, but there is always a chance that a wayward aircraft is not communicating itself, or has misunderstood where it is supposed to be.

Lastly, always observe posted speed limits and warning signs, yield right-of-way, and avoid restricted areas. An incident could result in fines or suspension of driving privileges if negligence is found to be a causal factor.

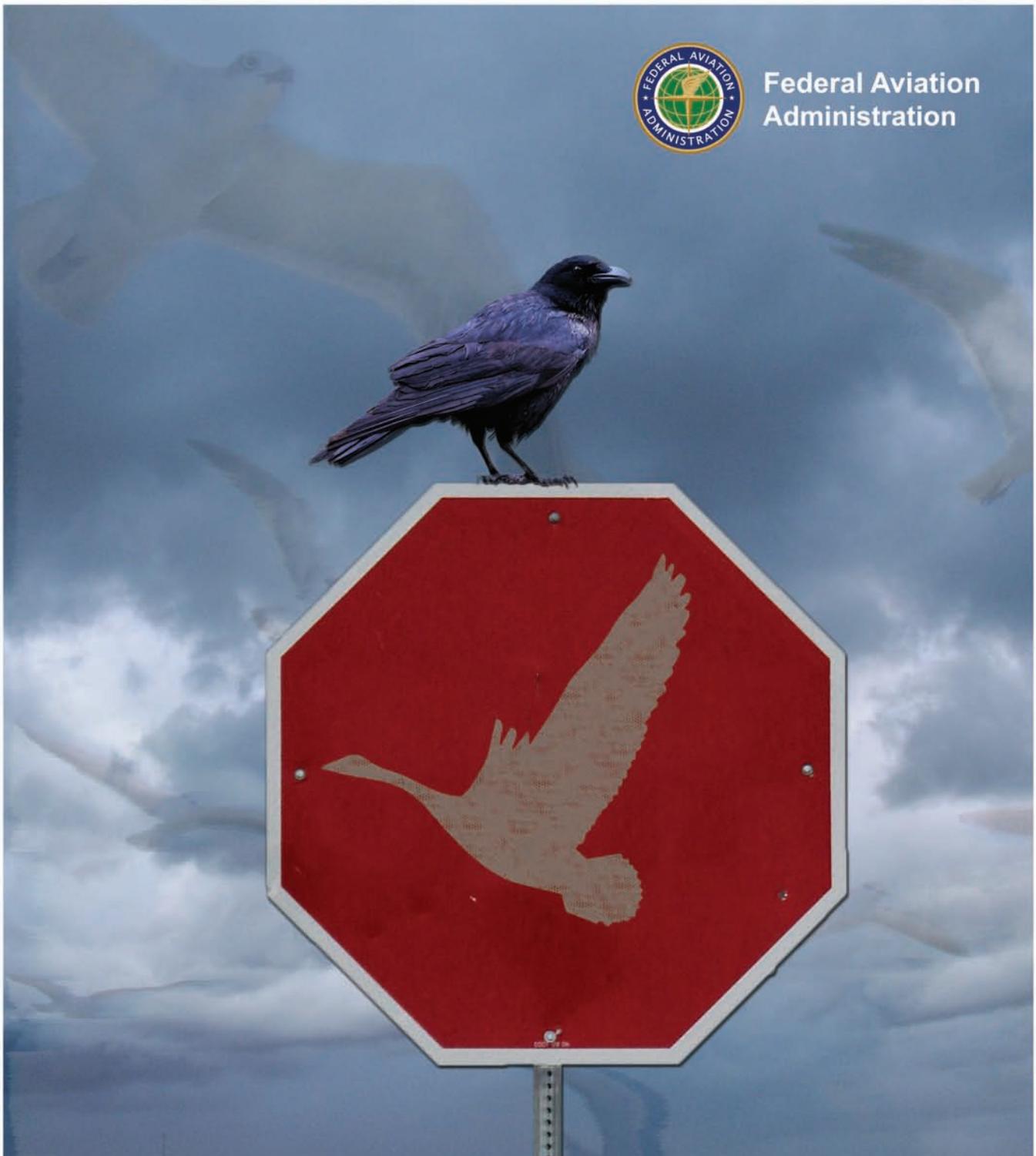
Green Light

There are many “best practices” for traveling around these areas. First, review and understand airfield signage and markings — they apply to you as well as the aircraft! It is a great idea to have a markable airport diagram available for immediate reference. Mark high risk zones such as natural barriers (rivers, embankments, etc.), runway/taxiway closures, and any construction areas. Ensure your vehicle is ready for action. Lights (high beams, flashers, etc.), the speedometer, and parking brake should be in working order. Use correct terminology during radio communications and be succinct! Your controller will thank you for it. Maintain situational awareness. Put away cell phones and other non-essential portable devices, keep “eyes out” of the vehicle, and be aware of similar aircraft or vehicle call signs that may also be operating on the field. If you need to leave the vehicle, set the parking brake. Lastly, if the tower is closed, broadcast your location and intent on the common traffic advisory frequency so everyone else has an idea of where you are.

The last thing you want is to get into a game of “chicken” with an approaching aircraft. It never ends well, so take a moment to brush up on flight-line driving 101. Doing so will give you a “green light” to safety.



Federal Aviation
Administration



Report Wildlife Strikes

 <http://wildlife.faa.gov>  <http://www.faa.gov/wireless>





There's an APP for That

How the FAA's New Additional Pilot Program Can Improve Flight Test Safety

With a proud smile, you buff out the final bit of wax on your newly-built green and white Rans S-6 *Coyote II*. She's a real beaut! And, like most owners of a now-complete kit airplane, you're undoubtedly eager to get her airborne. But before you do, there are a few important things you'll want to consider.

You may recall that in the March/April 2014 *Angle of Attack* column in this magazine, we discussed the basics of formulating a Phase I flight test plan using FAA Advisory Circular (AC) 90-89, *Amateur-Built Aircraft and Ultralight Flight Testing Handbook*, as your guiding light. The guidance provides some excellent groundwork for a safe flight test strategy, but it is based on utilizing "required crew" only. For many experimental/amateur-built (E-AB) aircraft, that means a solo operation. Since many homebuilders are understandably anxious about donning their Chuck Yeager test pilot caps and launching freshly-built aircraft with ever-increasing complexity and capability, that's not an ideal situation.

Realizing the value an extra set of hands and eyes can provide during this crucial period, last September the FAA adopted AC 90-116, which offers E-AB pilots an alternate pathway to conducting Phase I flight testing. The AC introduces the Additional Pilot Program (APP), a program designed to improve safety by allowing homebuilders to have a qualified additional pilot on board to assist with flight tests.

Before adopting this policy change, the FAA took a hard look at causal factors surrounding Phase I accidents over a 10-year period and correlated that with more high-fidelity data collected in 2011. The agency found that all the accidents were related (nearly equally) to one of three factors: powerplant, loss of control (LOC), and conditions similar to LOC — like hard contact with the runway. The FAA also discovered that 65 percent of all Phase I accidents occurred within the first eight hours of testing, and 20 percent on the very first flight! The findings sharply illustrated the value of having a qualified additional pilot to help mitigate LOC issues as well as a number of the remaining causal factors — the earlier in the testing phase, the better. To address the vast number of powerplant-related issues, engine eligibility and minimum initial testing standards were also specified.

If you think the APP is for you, you'll want to first make sure that you, your aircraft, *and* your powerplant all meet the eligibility requirements stated in the AC. Given the ubiquity of kit-built aircraft in the E-AB community, the program is currently limited to these aircraft. However, the FAA may consider expanding the program to include plans-built aircraft if initial results indicate positive safety trends.

Next up is determining the qualifications and required skills for the additional pilot. Depending on the tasks already completed during Phase I, the additional pilot is referred to as a Qualified Pilot (QP) or Observer Pilot (OP). To assist in making sure the QP/OP is the best match and resource for your aircraft, the AC provides both a Recency-of-Experience and Experience Qualification scoring matrix. QP/OP applicants must meet the minimum score requirements on both matrices before each flight of the test aircraft. Though early feedback indicated these matrices seemed complicated and time-consuming, I can assure you that's not the case. It took just a few quick minutes for me to complete both.

The APP also specifies an initial cadre of tests (Initial Tests Package, or ITP) to be accomplished early in Phase I. These tests can be used to ensure the aircraft and builder/owner have reached experience levels intended to reduce LOC-related accidents. The AC contains a detailed worksheet on the ITP, along with applicant, QP, and OP qualification worksheets. Of note also is the requirement for your test aircraft's operating limitations to reference the AC. See the AC (<http://go.usa.gov/FE2J>) for more details.

Aviation Safety Inspector Mark Giron, who was involved with drafting the AC along with several industry members and kit manufacturers, is optimistic about the APP's benefits to aviation safety. "On the surface, the program looks like an excellent way to save lives during Phase I, but I believe the benefits go beyond that and should also carry over to Phase II [normal flight operations] to improve safety further down the road."

Your feedback is critical, so please send any comments to Mark.E.Giron@faa.gov.

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

Going Down to the Wire

Helicopters and Low-Level Flight

If aircraft were measured from the ground up, helicopters would rank near the bottom. This isn't a criticism; it's just the nature of the beast. Helicopters spend a large portion of time flying close to the ground and, as a result, they are increasingly susceptible to wire strikes.

Analysis conducted by the United States Helicopter Safety Team (www.USHST.org) reveals that approximately 16 percent of all helicopter accidents are attributed to wire or obstacle strikes. In addition, 17 percent of these accidents results in fatalities. This unfortunate reality has led the USHST to emphasize greater awareness among helicopter pilots about the dangers of low-level flight.

Airspace Needs More Space

With the exception of Class A airspace, wires are strung throughout all classes of airspace from B to G. Whether in controlled or uncontrolled airspace, pilots must be vigilant because wires often go undetected by human eyes. You might even say they lurk in the shadows waiting to ensnare their victims. One wire "strike" and you're out, and that could mean it's "game over."

Complying with FAA weather minimums does not exempt pilots from run-ins with wires. So, maximizing time and space for see-and-avoid duties is a great strategy for eluding these often near-invisible hazards. Sometimes it's only a matter of seconds that can make the difference between escaping from or safely avoiding being ensnared in a wire strike accident.

Cutting Your Loses

Many safety devices installed on helicopters can aid situational awareness for avoiding wires. The Wire Strike Protection System, otherwise known as "wire cutters," is one of the most trusted and proven of these devices. This wire chomping mechanism literally cuts through undetected wires coming in contact with the helicopter. Although this system does not prevent wire strikes, cutting through the intruding danger can be a life saver.

In the Weeds

Agricultural pilots constantly operate in wire-infested environments. The slightest distraction can get these pilots tangled up without warning. They must constantly keep their heads on a swivel to make sure their flight paths are clear.

During basic training, helicopter pilots learn the importance of conducting high and low reconnaissance prior to conducting low-level missions. Pilots should also identify clear areas that could be used as possible forced landing zones in case of an emergency. Sensory overload close to the ground is bad news, and it can overwhelm even the most experienced pilots. Remember, pushing aircraft and personnel limits is foolish and often deadly.

Have We MET?

Meteorological Evaluation Towers (METs) are a major threat to helicopters. METs are used to gather wind data for developing new wind farm sites. These slender, hard-to-see structures are supported by nearly-invisible guy-wires and often stand slightly below 200 feet above ground level to avoid the need to comply with FAA obstruction marking requirements (See FAA Advisory Circular 70/7460-1K for more).

FAA and NTSB personnel have investigated several accidents involving aircraft colliding with METs. Pilots often report problems seeing METs while flying until finding themselves uncomfortably close to one. As our nation aggressively pursues alternative energy sources, the outcrop of METs will only intensify. If you know of any unmarked METs lurking in your area, please contact an FAA Flight Service office and/or a local FAA Team Representative to report the finding.

Prevention

Helicopter pilots can follow several basic procedures to mitigate wire strike accidents. For example, maintain maximum altitude as long as possible and use conservative routes when transitioning from point A to point B. The extra minutes invested following these basic steps will prevent many surprises from happening.

Bottom line: high voltage lines, guy wires, and other low-level obstacles are lethal when mixed with the operational envelope of helicopters. When it comes to maintaining aviation safety, take the path of least resistance and leave the "shock factor" to the wires.

Dr. Steve Sparks is an Aviation Safety Inspector with the General Aviation and Commercial Division (AFS-820) specializing in Human Factors and helicopter operations. He is a certified flight instructor and serves as Coordinator for the US Helicopter Safety Team (USHST).

*Mark Your Calendars
for the*



2015 International Rotorcraft Safety Conference

April 21-23, 2015 www.faaahelisafety.org

Reports like these come in almost daily to the Rotorcraft Directorate in Fort Worth, Texas:

A bird strikes a helicopter while a pilot is on a training flight in Oregon. The pilot lands the aircraft to inspect for damage. The damage is minor and he appropriately determines he can safely fly the helicopter back to the airport.

The same day, a helicopter strikes a power line in California and crashes into a dry river bed. The pilot, who was building time toward a commercial pilot certificate, loses his life.

Five days later in Minnesota, a crop-dusting helicopter strikes a tree and crashes into a barn. The pilot dies several days later from his injuries.

It is not surprising that these accidents all fall into three major categories: personal/private, instructional/training, and aerial application. These three categories of operations are typically represented in monthly statistics involving fatal and non-fatal helicopter accidents.

As part of its commitment to reducing helicopter accidents, the FAA's Rotorcraft Directorate will host the 2015 FAA International Rotorcraft Safety Conference focusing on greater safety in personal/private, instructional/training, and aerial application operations. The conference will be held April 21-23 at the Hurst Conference Center near Fort Worth, TX. Admission is free.

The conference will feature presentations, hands-on activities, and training sessions geared toward reducing helicopter accidents. A diverse audience is expected including pilots, mechanics, flight training organizations, OEM executives, and government regulators from the United States and abroad.

"We will all be working toward the same goal — to improve helicopter safety," said Kim Smith, FAA Rotorcraft Directorate manager. "This conference provides an opportunity to share ideas, lessons learned and maybe spark new safety initiatives."

The directorate is still seeking ideas from pilots, mechanics, flight safety officers, and others on topics they would like to see included at this conference. Organizers also want to know how they can further encourage the personal/private, instructional/training, and aerial application communities to attend.

On a positive note, FY14 experienced the lowest number of helicopter accidents in the past 32 years. Of these 128 accidents, though, the three categories already mentioned — personal/private,

instructional/training, and aerial applications — accounted for 21, 17, and 16 percent, respectively. Twenty (out of 128) were fatal claiming a total of 32 lives. Though we do not know why these categories account for such a large percentage of total helicopter accidents each year, accident investigators have identified several possible reasons:

- Many personal/private helicopter pilots are not career pilots and so they are not required to attend yearly recurrent training. They typically have less flight experience and may not take advantage of more advanced training resources.
- A large number of accidents occur on instructional/training flights during takeoff, landing, hovering, and while practicing autorotations. These operations leave little time to correct mistakes.
- Aerial applicators often fly at high rates of speed close to the ground, which increases the risk of striking power lines, trees, and other obstacles. They also tend to work from sunup to sundown with few breaks in between missions.

The directorate believes with proper training, better education, and technology, the risk of accidents can be reduced. With that concept in mind, the 2015 FAA International Rotorcraft Safety Conference will explore these areas and strive to enhance rotorcraft safety culture.

To submit programming ideas for this conference, send your recommendations to eugene.trainor@faa.gov. For more information on how to register for this event, please visit www.faaahelisafety.org.





Flight Forum

Great In-Class Tool

One of the things that we do at our FAA Team seminars is point people to *FAA Safety Briefing*. The personal minimums worksheet you featured (in the May/June 2006 edition) is one example we use and serves as a great teaching tool. The seminar we held recently was with a small group of new or student pilots. We got them at the right time to get them to start thinking about the link between risk management and establishing personal minimums as a tool to mitigate risks “up front.” This is the third seminar session we have used your material in, with more planned in the future.

— Steve

Thanks for the feedback and for steering folks to the magazine. We are very proud of everything the magazine has accomplished. We hope your audiences will continue to learn something, and that the FAA Team will continue to find it a useful teaching tool.

AoA Ergo Issues

I am a low-time student pilot and appreciated your article about Angle of Attack (in the September/October 2014 edition). I would like to say that though airspeed must be managed precisely especially during landing and takeoff, I believe there is a problem with the ergonomics of the KIAS indicator. The needle-on-dial gauge is low and on the left on our club’s Cessna 152 which places it out of the lower peripheral vision. This placement also induces what I believe is called “read error” (not looking directly at the face of an instrument).

How would you feel about a Digital air speed indicator placed on the surface of the dashboard? Maybe only about two inches tall, but well within the peripheral vision of the pilot? Thanks for taking time to read my thoughts on this issue.

— Frank

We asked around a bit to get some opinions on the matter of digital vs. analog indicators and although this is subjective, there was consensus that the digital readout might be a bit of a distraction, especially for someone in ab initio training. An analog indicator would help to discern trends better than a digital readout since you could more easily see in which direction your airspeed is headed, and how quickly, without even having to focus on the specific numbers.

As far as ergonomics and instrument placement; read error is a reality of using an analog gauge, however, in most six-pack displays the airspeed indicator is on the top left so it shouldn’t be that hard to see. A flat panel display would help eliminate the read error, but that’s not always an option given the cost. Usually digital readouts that are TSO’d have an analog display.

Hopefully we’ve supplied you with a few additional things to consider. Best of luck in your flight training and thank you for reading FAA Safety Briefing!

Part I?

Excellent September/October issue but where’s the Student Pilot Guide Part I?

— Carol

Thank you for the positive feedback! The first Student Pilot Guide was in January/February of 2012 edition and you can find it here: https://www.faa.gov/news/safety_briefing/2012/media/JanFeb2012.pdf.

*FAA Safety Briefing welcomes comments. We may edit letters for style and/or length. If we have more than one letter on a topic, we will select a representative letter to publish. Because of publishing schedule, responses may not appear for several issues. While we do not print anonymous letters, we will withhold names or send personal replies upon request. If you have a concern with an immediate FAA operational issue, contact your local Flight Standards District Office or air traffic facility. Send letters to: Editor, *FAA Safety Briefing*, AFS-850, 800 Independence Avenue, SW, Washington, DC 20591, or email SafetyBriefing@faa.gov.*



Let us hear from you — comments, suggestions, and questions: email SafetyBriefing@faa.gov or use a smartphone QR reader to go “VFR-direct” to our mailbox.

Decision Time

In many ways, January 2020 seems forever away. At the time of this writing, January 2015 seems pretty remote as well. But the progression of time is relentless and, regardless of how it feels right now, I know it will be January 2015 before long — and January 2020 won't be far behind.

The January 2020 focus is because of the ADS-B Out mandate. Like many other aircraft owners, my flying club is grappling with the numerous issues arising from compliance.

We are trying to determine how best to comply with the ADS-B Out rule, with “best” being fuzzily defined in terms of balancing what we can afford with what we would like to have in an ideal world.

There's no question of whether we will meet the requirements of the regulation. Our location — just under the Washington D.C. Tri-Area Class B airspace and on the edge of the Washington D.C. Special Flight Rules Area — means that we comply or else we don't fly. What we are trying to determine is how best to comply, with “best” being fuzzily defined in terms of balancing what we can afford with what we would like to have in an ideal world.

Finding a Way “Out”

The ideal world would include a top of the line ADS-B unit that provides not only the required ADS-B Out capability, but the full range of no-cost ADS-B In weather and traffic data long touted as one of the major advantages for most non-commercial GA operators. Of course our ideal world would also include a nice three-axis autopilot and glass-cockpit avionics, but for the purposes of this article I'll limit the discussion to ADS-B.

One of our members has just finished researching options appropriate for our group, ranging from an ouch!-but-affordable ADS-B Out only solution, to the full-bore “comes with everything” box that we can consider only if everyone in the group agrees to a fairly hefty assessment, and to having the airplane out of service for longer than most would like.

The upper end is likely out of reach for my club, which has suffered through several years' worth of ugly and largely unexpected repair bills. At the same time, those who use the airplane primarily for personal/family transportation and vacation travel are eager to ensure that we don't miss out on the benefits of ADS-B In.

To that end, we've kicked around the idea of a hybrid approach to getting the best of both worlds. In the hybrid solution, we would take the lower end option for ADS-B Out only, thus ensuring that we are in compliance with the legal requirements for operating in our home airspace after January 1, 2020. To get the benefits of ADS-B In, we would purchase an iPad, one of the hand-held ADS-B receivers, and a flight planning app that, in conjunction with the ADS-B device, could display ADS-B In weather and traffic information on the club-owned iPad. Since most of the members who would benefit from ADS-B In capability already have their own suite of DIY ADS-B In devices and apps, there may not even be any need for a corporately-owned ADS-B In solution.

Only two things are certain at this point: (1) we need to get moving on an ADS-B Out compliance solution in the very near future; and (2) much, much debate and discussion will go in to the decision-making process.

“In” the Know

There is actually one other point of certainty, at least from my individual perspective: however much we all grouse about the expense and the inconvenience, we're going to like the benefits. And, much as it has been with GPS, my fearless prediction is that it won't take very long for us to wonder how we ever got along without this technology. As one of those early adopters with my own complement of DIY ADS-B In devices and apps, I've clearly seen how helpful it will be to have the extra information. Though I have lots of non-ADS-B options for getting in-flight weather information, ADS-B technology is the only (affordable/practical) means for getting traffic information in my club's airplane. I've flown enough with radar-based TIS-B in Civil Air Patrol-owned airplanes to have a sense of how much traffic that the “Mark II Eyeball” method doesn't see in this heavily-congested airspace. So I'm very eager for a world in which everyone is equipped with ADS-B Out, and in which my club and I have a range of options for seeing all those airplanes we aren't spotting today.

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

Richard A. Wayne



Richard A. Wayne (Rich) is a front line manager at Honolulu Control Facility (HCF). Talk with him and you will learn three things: he is an avid golfer, he adores his family, and he *loves* his life as an air traffic controller.

Rich has been a controller since 1989. Originally, he wanted to be a pilot after a family friend introduced him to the flight deck of an old Boeing 727. Understandably, Rich was hooked and was determined to make aviation a part of his life. Due to monetary constraints, however, obtaining a certificate wasn't a possibility. Instead he decided the "next best thing" was to become a controller.

Enter the United States Air Force. From the heights of the McChord Air Force Base tower in Tacoma, Washington, the military first afforded Rich the opportunity to experience "flying" several aircraft at once. Supervisors and mentors taught him that "if you take care of your people, they will take care of you and the job." It is a motto that he still lives by today.

McChord also presented one of Rich's funnier moments (that was recorded, that is) while he was working several "heavy" aircraft in a VFR pattern. After instructing an aircraft that happened to be carrying the base commander to make two 360s and then enter the pattern, the pilot proceeded to inform Rich just *who* was on board — probably with the intention of gaining quicker access. Rich, being somewhat unsympathetic to the bid answered, "Roger. Take him with you ..." earning a few chuckles and probably a place in infamy — or at least to the young pilot trying to complete his check ride at the time.

Rich retired from the Air Force in 2003 and, after spending some time working in the Federal Contract Tower program in Chandler and Glendale, Ariz., he was hired by the FAA in 2006. His new duty location would be Sky Harbor Tower in Phoenix. "I love every tower I have ever worked, but Phoenix was my favorite. Busy traffic, awesome weather, and great people."

His time in Arizona also let Rich bear witness to one of the more scary moments of his career when a student pilot on his first solo panicked and drove his plane into the perimeter fence.

"It was like slow motion, waiting to see if he would stop or lift off. He ran off the end of the runway, jumped a berm, and got hooked by the fence. The fence unraveled, slowed, and slammed him down on the road outside the airport. He was very shaken, but okay. While watching we knew a mishap was imminent; we just didn't know how bad it would be. Thankfully he walked away and even successfully soloed a few weeks later."

Managing aircraft and incidents is par for the course for air traffic controllers. Today, Rich works at what he feels is the most complex facility of his career so far. Honolulu International (HNL) is endowed with four runways (two that intersect with the main arrival runway); land and hold short operations; heavy transoceanic flights, inter-island, GA traffic, and tour flights — just to make things interesting. "The first time I stepped into the cab at HNL I couldn't believe how it worked, but the controllers who run it are very good at what they do," says Rich. For the future, Rich hopes to become an operations manager at HCF and then on to the role of Air Traffic Manager.

To escape the controlled chaos of ATC life and decompress, Rich can be found at the Kapolei Golf Club playing a round or hitting a bucket. He, his wife Ellen, and sons Chris and Thomas, are also big hockey fans following the Chicago Blackhawks and the Arizona Coyotes.

With enthusiasm that is evident in every word he speaks, Rich Wayne is still enjoying every single day. "I am proud of my profession and the people I have the privilege of working with. Yes, it can be stressful at times, just like every other job. You have to want to do this. It is a calling. If you ever get the chance to visit a facility and see controllers in action, please do. It will give you a unique look into our world. Oh, and bring cookies ... we love cookies."



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