FAA Safety BRIEFING

November/December 2018

Your source for general aviation news and information

Birds of a Different Feather

Federal Aviation Administration

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The November/December 2018 "Birds of a Different Feather" issue of *FAA Safety Briefing* explores the tremendous diversity of general aviation and encourages you to expand your aviation horizons and appreciate the many ways in which you can "enjoy the ride." The issue also focuses on the new perspectives and the new skills you'll need to consider when moving on to a different type of flying.

Features

Departments

RICK DOMINGO
EXECUTIVE DIRECTOR, FLIGHT STANDARDS SERVICE

New Perspectives, New Skills
Changes and Challenges

It seems very appropriate that my Jumpseat department debut appears in the *FAA Safety Briefing* magazine's focus on "birds of a different feather." As you will read in these pages, there is a tremendous amount of diversity in aviators in terms of background, experience, and interests. Whether we fly aircraft or maintain them, we aviators enjoy an equally vast range of aircraft diversity — everything from the smallest drone (more formally called Unmanned Aircraft System) to the largest commercial airplane. That means there is always a new challenge to take on and, no matter how much experience you have, moving to a new aircraft type inevitably demands both new perspectives and new skills.

That aligns pretty closely with how I feel about my new job as Executive Director of the FAA Flight Standards Service. I've been with the agency for nearly a quarter of a century now, and I've had the good fortune to serve in a number of interesting and challenging positions. I am honored to have this opportunity to lead the 5,000-plus Flight Standards Service employees around the country. But no matter how much experience I bring, my new position is already pushing me to develop new perspectives and new skills. So, I can enthusiastically relate to some of the encouragement and advice you will read in this issue — especially about the need to balance relying on what you already know with being open to crucial differences.

A Bit of Background

With that in mind, let me take this opportunity to introduce myself. My educational background is in industrial technology — I have a Bachelor of Science degree in that field from the University of Nebraska at Omaha, with a minor in aviation management. My pre-FAA career included working for two, part 121 air carriers, a helicopter emergency medical service provider, and several general aviation entities. I joined the FAA in 1995 as an Aviation Safety Inspector in the Boise Flight Standards District Office.

Since then, I have held a variety of positions around the country, overseas, and in Washington, DC. Most recently, I was back in the northwest as the manager of the legacy Northwest-Mountain and Central region. I continued to live in Seattle after I became the director of the Flight Standards Service Office of Safety Standards. I was very much at home both geographically and professionally, since the Safety Standards office deals with establishing and managing criteria for operations, repair and alteration of aircraft and operations, the use of designees or delegation, flight technologies, safety promotion, and international operations. Among other things, that office oversees the Flight Standards Service divisions that work on the ongoing development of the Airman Certification Standards (ACS).

No matter how much experience I bring, my new position is already pushing me to develop new perspectives and new skills. So, I can enthusiastically relate to this issue's advice about the need to balance relying on what you already know with being open to crucial differences.

A few months ago, I had the opportunity to serve as the acting Deputy Associate Administrator for Aviation Safety. In July, when former Flight Standards Executive Director John Duncan was selected to serve permanently in that position, I was named to succeed him in Flight Standards. That means that I now oversee what you might call "birds of many feathers," since the job includes the development, coordination, and execution of policies, standards, systems, and procedures; as well as public rules, regulations, and standards. I also have responsibility for programs and plans governing the operations, maintenance, and airworthiness of all U.S. civil aircraft, including those of U.S. flag carriers and foreign carriers when operating in and over the United States, and its territories and possessions. In addition, my portfolio includes oversight for the proficiency and certification of air agencies (flight schools/maintenance bases) and of qualified airmen (other than air traffic control personnel).

I am very glad that my new job will include travel to places and events that will allow me to meet some of you — hopefully many of you — on a face-to-face basis. I look forward to getting to know you, and to sharing my "Jumpseat" perspective with you in each issue of *FAA Safety Briefing*.

New Video Highlights Wrong Surface Landings

Wrong surface landings are serious events that occur at an all too common rate. When pilots approach an airport for landing, there are opportunities for miscommunication and visual mistakes that can lead to the aircraft arriving on the wrong surface. Parallel runways account for 75-percent of wrong surface landings overall.

Data shows that 85-percent of wrong surface landings involve general aviation (GA) aircraft and 89-percent of those events occur during daytime hours in VFR conditions. To learn more about what contributes to wrong surface landings and how to prevent these errors, watch the video at: https://youtu.be/5II-s_j35cI.

NTAP Part 1 Removed from Publication

The FAA will remove part 1, sections 1 (*Airway NOTAMs*), 2 (*Airport, Facility, and Procedural NOTAMs*), and 3 (*General NOTAMs*), from the Notices to Airmen Publication (NTAP) as soon as the corresponding manuals and order are updated.

Flight data center (FDC) NOTAMs are critical to the safe planning and execution of a flight for a pilot operating under instrument flight rules (IFR). However, part 1 contains many inaccurate and outdated FDC NOTAMs because the publication cycle is only produced every 28 days and many NOTAMs are cancelled or added mid-cycle. These FDC NOTAMs reflect changes to the Terminal Procedures Publication, flight restrictions, and aeronautical chart revisions.

As part of FAA's Air Traffic Top 5 safety issues, stakeholders have expressed concerns about confusion due to the volume of NOTAMs and the lack of a

search capability in the NTAP. Prior to Dec. 7, 2017, the NTAP was not electronically searchable and the format of the document made it difficult for pilots to quickly find the information pertinent to their flight. These NOTAMs are available online at NOTAM Search and Pilot Web, which are both public, searchable databases.

- NOTAM Search: https://notams.aim.faa.gov/notamSearch
- Pilot Web: https://pilotweb.nas.faa.gov/PilotWeb

Removing part 1 of the NTAP will reduce pilot confusion and make the remaining content useful as a stand-alone document for flight planning. Revisions to FAA Order 7110.10 and the Aeronautical Information Manual will indicate that FDC NOTAMs are briefed only on request.

Pilots may request preflight IFR route and amended FDC NOTAM information when receiving a weather briefing and filing a flight plan through 1800wxbrief.com or other commercial providers.

LAANC Spreads to the Central North

The FAA is committed to the safe integration of drones into the National Airspace System (NAS). We know we cannot do it alone. Collaboration with private industry is helping us take important steps forward.

Acting FAA Administrator Dan Elwell made a public commitment to accelerate the safe integration of drones into our airspace by expanding the Low Altitude Authorization and Notification Capability

(LAANC) nationwide. The final installment of LAANC went live in the Central North region in September. LAANC successfully expanded to 288 air traffic control facilities and 470 airports across the United States. Drone pilots using LAANC can receive authorization to fly in certain airspace in near real-time.

Learn more about LAANC at: http://bit.ly/2PN5QmQ.

New Nall Report

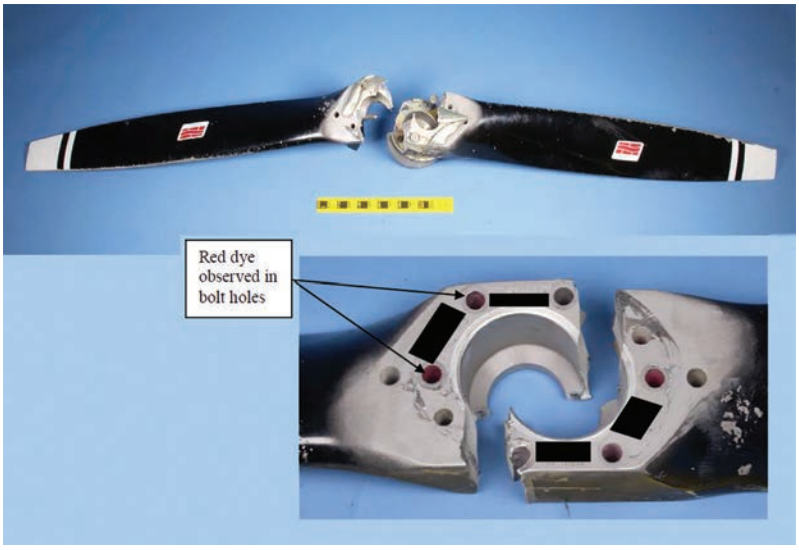
The overall general aviation (GA) accident rate per 100,000 flight hours declined even as total flight hours have increased, according to the 27th Joseph T. Nall Report, released by the AOPA Air Safety Institute.

The Air Safety Institute also released the 2016-2017 GA Accident Scorecard, a brief statistical summary that supplements the Nall Report's detailed examination of 2015 data. It noted that for the third consecutive year, the overall GA fatal accident rate declined.

Download the latest Nall Report at http://bit.ly/2JL1nxM and AOPA's 2016-2017 GA Accident Scorecard at http://bit.ly/1617GAscore.

New SAIB Affects All Propellers

A recent accident involving an in-flight propeller failure and separation has again brought to light the need for continued diligence in the use of liquid penetrant inspection methods. These methods

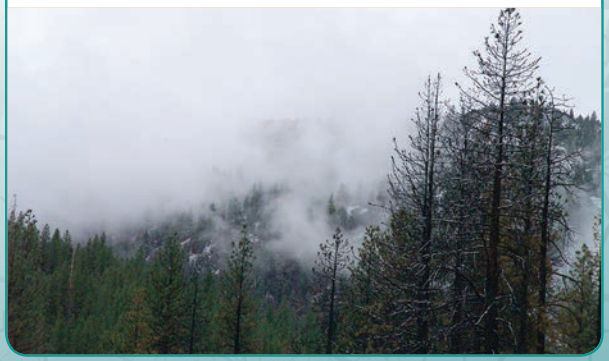


involve the use of Type I fluorescent penetrants (visible under ultraviolet light) and Type II visible penetrant (visible under ordinary white light). During the examination of the failed propeller, there were remnants of visible dye penetrant (red dye) material found in the bolt holes, which may have affected subsequent inspections.

Visible dye penetrants can make existing cracks nearly impossible to detect when using fluorescent penetrant inspection for the next inspection. Pre- and post-inspection cleaning is critical to ensure the ability to detect cracks during current and follow-on inspections and is essential to ensure proper detec-

Safety Enhancement Topics

November: Controlled Flight Into Terrain (CFIT)
Understanding the importance of training and currency when flying in mountainous areas.



December: Aircraft Performance Monitoring
Learn how to improve your aircraft performance predictions and better adhere to operating limitations.

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

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**Federal Aviation
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CONTACT INFORMATION

The magazine is available on the Internet at:
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- Calling: (202) 267-1100
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tion of the anomalies and cracks in the article. Inspection material residuals can also lead to corrosion.

Download the Special Airworthiness Information Bulletin (SAIB) at: http://bit.ly/2QIEn6X.

Oh Deer!

The protocol for reviewing wildlife hazards at US airports has been updated, which includes a ranking of wildlife by the level of threat that they pose to flights.

The rankings published in Advisory Circular (AC) 150/5200-38 is intended to guide airport wildlife management personnel and inspectors in prioritizing the wildlife that should be kept off airport property. The list ranks wildlife species with instances of at least 100 strikes on civil aircraft. White-tailed deer topped the list.

Download AC 150/5200-38 at: http://bit.ly/2plZY8E.

New Airman Testing Contract

The Airman Certificate Testing Service (ACTS) Contract has been awarded to PSI Services, LLC.

The ACTS contract is a comprehensive, best-practices approach aimed at enhancing the overall quality of FAA Airman Knowledge Testing. PSI Services, LLC, will support the FAA in development, assessment, maintenance, and enhancement of test items, tests, and supplementary materials with automated state-of-the-art technology and academic expertise.

The implementation of ACTS is a phased approach taking several years to complete. The work on phase one will begin soon, which mostly entails behind-the-scenes preparations to lay the groundwork for the duration of the ACTS contract.

Email questions to AirmanKnowledgeTesting@faa.gov.

Remote Pilots Renewals

The FAA Remote Pilot Certificate is valid for two years from the date of issue. Anyone who earned their certificate in 2016 should review the certification renewal requirements and prepare to take recurrent training or testing. You can find all the information you need to renew your certificate at http://bit.ly/2OCudn0.

MICHAEL BERRY, M.D.
FEDERAL AIR SURGEON

A Path to Yes for Cancer Patients

Medicine, like any science, is never in a steady state. We are constantly learning, and the state of the art is constantly changing. This change creates friction for those of us in medical certification because regulations and policy tend to be static in nature and certainly slow to change. To alleviate this friction, we routinely evaluate our policies. However, over time, our periodic revisions do not always keep pace with the speed of what is happening in some areas of medicine. We felt such was the case with certain forms of cancer.

Reexamining Cancer

In 2017, we had 1,887 Special Issuances (SI) for airmen suffering from various forms of cancer. In the five-year period between 2013 and 2017, there were a total of only 76 denials for cancer. One reason why this number is so low is because many airmen with cancer do not apply for medical certification, under the assumption that they are not qualified.

In reviewing cancer treatment today, we realized that there were a lot of changes occurring. Cancer is always a tough condition to quantify, because there's so much variety in this disease. Two different cancers may share little in many aspects besides the name. But what's promising is that we've noticed a significant change in the approach to treatment with certain types of cancer. It used to be that certain cancers were curable, but many, if not most, were an all or nothing affair. If you could shrink it and kill it, or cut it out, you might survive. If you couldn't, your options were limited to delaying actions to improve the quality of the time you had left.

Today, that is changing. Some types of cancer are now becoming manageable, chronic conditions. This means that while they might not be curable in the classic sense, they are not the existential threat they once were. So how does this affect airman medical certification, if an airman may more likely be managing a cancer?

Finding a Path to Yes

To answer the previous question, we decided to hold a Federal Air Surgeon's Oncology Summit. We've previously used this approach on complex medical issues with great success. The mission of the summit is to find a path to YES, so that more airmen can receive a medical certificate. In order to do that safely, we must not only educate our own policy makers, but also the visiting experts who are helping us. To that end, we scheduled a three-day meeting in early September 2018.

In order to have the best possible insight into the current state of cancer research, we had ten oncology experts join us with specialization in breast, colorectal, and thyroid cancers, in addition to blood malignancies, bone marrow transplants, and pharmacology.

The first day of the summit focused on explaining to our visiting experts how medical certification works. This is important because clinical and regulatory medicine use very different approaches. Our major concern is subtle and sudden incapacitation that would endanger the National Airspace System (NAS) and the environmental challenges a pilot could face. On the second day, our FAA medical experts focused on learning about the latest in cancer research and assessing the risks of both the disease itself and the treatments. The variety within the broad category of different cancers, in addition to the variety of treatment options, meant there was quite a bit of ground to cover.

Some types of cancer are now becoming manageable, chronic conditions.

The final day of the summit was dedicated to both groups of experts working together to see where changes might be made. What cancers could the FAA safely certificate depending on the treatment and prognosis? Could the FAA safely monitor these pilots who were traditionally denied medical certificates? What are reasonable recheck time periods?

These are just a few of the many questions that are on the path to YES. Building that path will improve our ability to make reasonable, risk-based decisions for these airmen. While it's still a bit too early to share any outcomes or changes, I'm confident this summit was a positive step for airmen facing a cancer diagnosis.

Dr. Michael Berry received an M.D. from the University of Texas Southwestern Medical School, and an M.S. in Preventive Medicine from Ohio State University. He is certified by the American Board of Preventive Medicine in Aerospace Medicine. He served as an FAA Senior Aviation Medical Examiner and Vice-President of Preventive and Aerospace Medicine Consultants for 25 years before joining the FAA. He also served as both a U.S. Air Force and NASA flight surgeon.

Condition Inspection

LEO M. HATTRUP, M.D.

Asthma Action Plan

Asthma is a chronic lung disease that affects more than 25 million Americans. It inflames and narrows the airways causing recurring episodes of wheezing, chest tightness, shortness of breath, and coughing. The narrowing of the airways reduces airflow into the lungs and severe cases can be life threatening, even at sea level. Obviously, this is of greater concern in the low oxygen and low humidity environments that are typical in aviation.

Asthma can be provoked by exercise as well as by irritants (which vary with the person), but some individuals can suffer an asthma attack without an identifiable provocative agent. It should go without saying that smoking, both legal and illegal substances, is bad for your health. This is especially true for the asthmatic, even if exposure is secondhand.

Asthma has no cure. Many who have had childhood asthma believe that they have "grown out of it." This is a misconception. As we grow, our airways get larger and the resistance to airflow decreases dramatically. However, the tendency for hyper-reactivity of the airways remains, and there is a risk of recurrence. You may experience flare-ups at any time, even years apart. But with modern knowledge and treatments, asthma can be effectively managed in a manner safe for continued flying. In fact, most people who have properly treated asthma can live normal, active lives.

But with modern knowledge and treatments, asthma can be effectively managed in a manner safe for continued flying.

Asthma treatment focuses on long-term control and quick relief of any flare-ups. Long-term control involves both medication (to treat the underlying mechanisms in asthma, e.g., airway constriction and thickening, mucus production, and inflammation) and lifestyle changes that improve your general lung health and help you avoid asthma triggers to reduce your need for quick-relief treatments. Quick-relief medicines (such as albuterol) are used to rapidly relieve the symptoms of flare-ups. The actual methods of both long-term control and quick-relief should be determined in consultation with your doctor as part of your Asthma Action Plan.

Frequently Asked Questions

Can I get a medical certificate if I have asthma?

Yes, if you have mild or seasonal asthmatic symptoms, you may qualify for our *Conditions AMEs Can Issue* (CACI) program. Under this program, the Aviation Medical Examiners (AME) can issue an unrestricted medical certificate during your visit if you meet specific criteria. To qualify for this program you MUST bring the required documentation to your AME at the time of your exam. You can find those criteria and what information to bring to your AME appointment at go.usa.gov/xP8t2, or go to faa.gov/go/caci for information on all the CACI conditions.

What if I don't meet the CACI criteria?

If you do not meet the CACI criteria, you may still be able to get a medical certificate through the Special Issuance (SI) process. You should bring the same information as required above to your AME at the time of your exam. Your AME must defer to the FAA for the initial decision. If the SI is approved, the AME may issue follow up certificates under the AASI (AME Assisted Special Issuance program) without deferring to the FAA so long as certain criteria are met. Specific requirements on what information to bring during a follow up will be spelled out in your Authorization Letter. This allows for much faster turnaround in certification and therefore, a shorter delay for you.

Are there any medications or symptoms associated with asthma that would disqualify me?

Ongoing use of oral steroids or poorly controlled asthma present additional risks and are handled on a case-by-case basis. Most airmen with asthma can safely be allowed to continue to fly.

Leo M. Hattrup, M.D., received bachelor's degrees from Wichita State University, a Master's in Public Health from Harvard University, and a doctorate from Vanderbilt University. He is retired from the USAF in which he spent the majority of his career in aerospace medicine. He is board certified in aerospace and occupational medicine. He is a certified flight instructor and enjoys flying airplanes, helicopters, and gliders.

JENNIFER CARON

Birds of a Different Feather

So Many Ways to Reach the Skies

For centuries, birds have captured our imagination and inspired us to fly. It was the Wright brothers who carefully observed the wing tips of large soaring birds to invent the first successful airplane capable of controlled and sustained flight.

The famous brothers' ingenuity effectively combined the imagination of flight with the spirit of inventiveness to create many different types of aircraft. From their home-built gliders to their experimental aircraft to their innovative biplanes, each and every iteration of both non-powered and powered craft served to provide our fearless inventors with a deeper understanding of the principles of flight.

It is that same spirit of originality, imagination, and experimentation that lures many in this vast aviation community to pilot a "bird of a different feather" — a different type of aircraft. These can include piloting a glider to experience a new perspective of lift and maneuverability, or a glass cockpit aircraft to learn an avionics system different from the analog dials and gauges you've used before.

A Copious Flock of Flying Machines

Indeed, one of the pure joys of general aviation (GA) is that it provides us an opportunity to choose from a wide variety of craft to soar us into the skies. We are not just limited to the two- or four-seater trainer airplane used for certification. We can choose to fly gyroplanes, helicopters, gliders, balloons, drones, or ultralights. If we're so inclined, we can even build our own airplanes from our mind's eye or from factory-made kits. There is much out there for us to enjoy.

Indeed, one of the pure joys of general aviation (GA) is that it provides us an opportunity to choose from a wide variety of craft to soar us into the skies.

GA aircraft come in all different shapes, sizes, and speeds and there's an aircraft out there to match whatever type of flying you want to do. In this issue, we'll introduce you to the bounty of aircraft goodies in a diverse aviation buffet just waiting for you to fly. We'll talk about what makes these aircraft special and give you a sense of what to expect, along with the pilot and airworthiness certifications that you'll need.

Try Before You Fly

But before you get too caught up in all the possibilities, it's important to remember that any unfamiliar aircraft or avionics system requires proper instruction and transition training in your new aircraft's systems and operating characteristics.

Even if you've flown similar aircraft before, learn the aircraft's limitations and get a feel for what you can and can't do in flight. Focus on what to expect on takeoff, landing, climb, cruise, and descent. Know your aircraft's emergency procedures, speeds, and power settings. Train with a qualified instructor, and practice, practice, practice.

Broaden Your Horizons

The Wright brothers famously said, "The desire to fly is an idea handed down to us by our ancestors who ... looked enviously on the birds soaring freely through space ... on the infinite highway of the air." Imagine, like the Wright brothers, all the possibilities out there to reach the skies and the aircraft that will take you there. Peruse the pages of this issue to see what other types of aircraft you would like to experience and enjoy. Not only will you have fun, but you'll open your horizons to a wider perspective of GA and come to appreciate new ways to enjoy the ride.

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

TOM HOFFMANN

The Experimental Experience

Blazing a New Trail in a "Special" Place

As a pilot whose flying has been mostly limited to the more traditional and plain-vanilla type-certificated trainers, I must admit to the fleeting curiosity that registers whenever I see the word "Experimental" painted on the side of an aircraft. I suppose anyone who is not familiar or has never been exposed to experimental aircraft might also consider this genre of aviation a bit of a mystery. While some of the more well-known experimental aircraft are the centers of attention at air shows and fly-ins across the country, you might be surprised to learn that the experimental tag is hardly limited to just vintage warbirds and flashy home-builts.

From Scaled Composite's massive 1.3 million-pound *Stratolaunch*, powered by six 747 engines, to the nimble 16-foot SubSonex personal jet, to the backpack-sized JB-6 JetPack, experimental aircraft cover all extremes of the aviation spectrum and everything in between. Equally diverse and somewhat less apparent about experimental aircraft is how greatly they can vary in terms of their scope and purpose, not to mention their operating characteristics and limitations.

Ok, you might be asking yourself, why do I need to know about the experimental world? You may very well be content with flying a type-certificated aircraft with a standard airworthiness certificate, and that's just fine. But maybe the thrill of showcasing an aviation antiquity or the excitement of building or even racing your own aircraft is an aviation itch you've always been eager to scratch. If so, understanding more about these "birds of a different feather" could be your ticket to some exciting new aviation opportunities.

Isn't That Special

Let's start with a few basics. The FAA issues two classifications of airworthiness certificates: standard and special. Experimental is just one of several categories that applies to a special airworthiness certificate. Others categories include restricted, limited, and light-sport, each of which are governed by a particular set of regulations. In this article, we're going to focus on experimental special airworthiness certificates, which can be issued for the following purposes:

- **Research and development (R&D):** to conduct aircraft operations as a matter of research or to determine if an idea warrants further development. Typical uses for this certificate include new equipment installations, operating techniques, or new uses for aircraft.
- **Showing compliance with regulations:** to show compliance to the airworthiness regulations when an applicant has revised the type certificate design data or has applied for a supplemental type certificate or field approval.
- **Crew training:** for training an applicant's flight crews. This normally includes a manufacturer's employees who need to be trained in experimental aircraft but may also include a company/applicant that operates

an experimental aircraft and needs to train its pilots/employees to obtain an appropriate type rating or authorization to serve as pilot in command (PIC) of the aircraft.

- **Exhibition:** to exhibit an aircraft's flight capabilities, performance, or unusual characteristics for air shows, motion pictures, television, and similar productions, and for the maintenance of exhibition flight proficiency.
- **Air racing:** to operate an aircraft in air races, practice for air races, and to fly to and from racing events.
- **Market surveys:** to conduct market surveys, sales demonstrations, and customer crew training for U.S. manufacturers of aircraft or engines, or a person who has altered the design of an aircraft type-certificated in the normal, utility, acrobatic, or transport category.
- **Amateur-/kit-built and LSA:** Operating amateur-built, kit-built, or light-sport aircraft (LSA).
- **UAS:** Special airworthiness certificate, experimental category for Unmanned Aircraft Systems (UAS) and Optionally Piloted Aircraft (OPA).

We'll touch on some of these different areas, but first let's review the basic intent of the experimental category. This category is intended to allow operation of an aircraft that does not have a type certificate, or does not conform to its type certificate but is in a condition for safe operation. While this might seem a bit daunting on the surface, the concept has been safely embraced and practiced since the early days of aviation. A more formal codification of the experimental category came later on during the post-WWII R&D and rule compliance "experiments" conducted with surplus and new-entrant aircraft, and with a burgeoning home-built market in the 1950s.

Rule number one for flying an experimental aircraft is that you must comply with all of the operating limitations on that special airworthiness certificate.

Historical sidebar: Until 1949, experimental aircraft in the United States were noted with a "NX" prefix to their identification numbers, after which, only the letter N plus the registration number was used (with some exceptions to amateur-built replica aircraft). History buffs may recall the NX-211 registration number from Charles Lindbergh's *Spirit of St. Louis*. Other early airworthiness category identifiers included NC (standard), NR (restricted) and NL (limited).

Law and Order

There are two main sets of FAA regulations that pertain to experimental aircraft: Title 14 Code of Federal Regulations (14 CFR) section 21.191 covers the issuance of a certificate, while 14 CFR section 91.319 covers the operating limitations. Both are vital to understanding how experimental certificates work, and what the FAA uses as its letter-of-the-law basis for compliance and guidance material. There are also a number of Orders, Advisory Circulars, and related forms that help compose the policies and procedures for experimental aircraft. A full list of links is available here: go.usa.gov/xP42V.

Chief among these is FAA Order 8130.2J, *Airworthiness Certification of Aircraft*. Chapter 4, Section 2 of this document provides common policies and procedures for issuing special airworthiness certificates for experimental purposes. While the Order applies to aviation safety inspectors and FAA designees, it provides immense detail on how to get your "ducks in a row" when it comes to obtaining an experimental airworthiness certificate. A separate chapter for each of the previously listed experimental categories provides step-by-step procedures of the certification process, including any applicable inspection and flight test requirements.

Given its importance in the growing experimental arena, Order 8130.2 has become a living document in the true sense of the term. According to Aviation Safety Inspector (ASI) Tom Leahy of the FAA's General Aviation and Commercial Division, the FAA relies on weekly, if not daily communication with the aviation community to ensure consistency of future updates to the Order. Leahy also notes the Order is heavily reliant on due process and public comment to keep it aligned with evolving industry needs.

Despite its great importance to experimental flying, Leahy notes the Order is not always well known in the community. "Take the time to read and review this Order and really understand what you can and can't do with your aircraft." That's important since rule number one for flying an experimental aircraft is that you must comply with all of the operating limitations on that special airworthiness certificate. This applies to subsequent owners too. If you don't, you are in violation of part 91 operating rules (section 91.9 to be precise).

The good news is that revisions to Order 8130.2 have made checking your limitations a lot easier. Appendix D of the Order includes a list of what parameters and operating limitations might apply to your situation, as well as which FAA office to contact in case you need clarification or help. For example, since part 43 does not apply to experimental aircraft, operating limitation 15 in Table D-1 of the appendix details the maintenance program requirements that must be met depending on the aircraft type. It lists the FAA's Aircraft Maintenance Division as the responsible office. This limitation would be particularly relevant to the aforementioned *Stratolaunch* — you don't want just anyone working on a six-engine, 1.3 million pound aircraft that launches satellites into space!

To further assist with building your list of operating limitations, the Order also has a link to a simplified online job aid at go.usa.gov/xPrsj. Just remember that 8130.2 lists the minimum limitations that may be applied to a special airworthiness certificate; additional limitations can still be applied depending on the aircraft type, operating area, intended use, etc.

Experimenting with Ingenuity

Now that we have some regulatory context for the experimental category, let's look at some of the practical applications this type of airworthiness certificate can allow you to do. For starters, both individuals and manufacturers can use an experimental certificate to help them do something special with an aircraft that might otherwise be outside the scope of its type certificate or supplemental type certificate (STC). In this case, the R&D and compliance categories would allow someone to research and/or test out a design, and then validate that the changes still keep the aircraft in compliance with the regulatory structure of the NAS. These experimental categories would be something that a manufacturer like Boeing typically uses if they want to bring a new aircraft into the part 25 arena with a standard airworthiness certificate.

On a more personal scale, maybe you've noticed a new composite propeller you think would work great on your Cessna 182, but is not approved for use on your aircraft. You could pay a visit to your local Aircraft Certification Office and put together an STC project to try to get the new prop approved. Using the forms and information we discussed earlier, you would then apply for an R&D experimental certificate, test the aircraft in accordance with the applicable operating limitations prescribed, and report that data back to the FAA. If it passes muster, you could continue to use that prop through issuance of an STC or a field approval. Other similar R&D/Compliance examples might include installations of new engines, winglets, or wheels and brakes.

Construction Zone

Another exciting opportunity that an experimental airworthiness certificate offers is to build an aircraft from scratch. In this case, you must provide evidence to the FAA that:

- the "major portion" (more than fifty percent) of the aircraft was fabricated and assembled by an individual or group of individuals;
- the project is for educational and recreational purposes; and
- the aircraft complies with acceptable aeronautical standards and practices.

Amateur-built aircraft may be constructed from a builder's original design, purchased plans, from a kit, or a combination of these. Three important resources for someone who wants to embark on an amateur-built project include Advisory Circular (AC) 20-27, *Certification and Operation of Amateur-built Aircraft*, the FAA's amateur-built website (faa.gov/aircraft/gen_av/ultralights/amateur_built) and the Experimental Aircraft Association's website (eaa.org).

Experimental certificates for operating amateur-built or LSA aircraft (as well as exhibition and air racing) may have operating limitations issued in two phases. Phase I is considered the initial flight testing phase, where a pilot must demonstrate the aircraft can perform according to your plan (i.e., how it's supposed to handle during a range of maneuvers and speeds) and ensure the proper operation of systems. The end result of Phase I is the creation of your aircraft's flight envelope and your very own customized Pilot's Operating Handbook. This process typically takes 40 hours but that can be reduced to 25 in some cases. (*Note*: the FAA is looking closely at developing a risk- and task-based Phase I flight test program in the near future that produces quantifiable results. Stay tuned for more). Once Phase I is completed, the operator may enter Phase II, which is essentially normal operations

with much more liberal limitations.

To flesh out the basics of a Phase I flight test plan, refer to AC 90-89, *Amateur-Built Aircraft and Ultralight Flight Testing Handbook*. This comprehensive document takes into account everything from selecting the right airport and runway to an exhaustive list of first flight and emergency procedures.

Another question to consider before you make that first flight in an experimental amateur-built airplane is how much time and experience you have in this type of aircraft. Reviewing AC 90-109, *Airmen Transition to Experimental or Unfamiliar Airplanes*, will help you develop the skills and knowledge you'll need *before* you participate in a flight test program.

One final point on flight testing: you may notice that it is based on utilizing "required crew" only, which for many experimental amateur-built aircraft means a solo operation. That's not always an ideal situation given the trepidation among many homebuilders to put on their Chuck Yeager test pilot caps, not to mention the ever-increasing complexity and capability of today's kit aircraft.

Realizing the value an extra set of hands and eyes can provide during this crucial period, the FAA adopted AC 90-116, which 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. For more information on this program, see the article "There's an APP for That" in the Jan/Feb 2015 issue of *FAA Safety Briefing*. Although the FAA is still gathering data on the program, the agency believes that APP has had a firm impact on stemming the accident rate in this segment of flying, especially in those first few hours of operation where 65-percent of accidents occur.

Flight instruction is another good way to gain experience in amateur-built, LSA, or any other type of experimental aircraft you're not familiar with. "There's a common misconception with receiving flight instruction in an experimental aircraft," says Craig Holmes, an ASI in the FAA's General Aviation and Commercial Division. "If you own an experimental aircraft, you can hire a properly-qualified instructor and receive instruction in that plane all day."

A Modern-day Mosaic

The future of experimental is bright, and it is evolving and expanding at an unprecedented rate. Today's experimental market includes everything from a simple powered-parasail to the most technically advanced turboprops available. In addition, new entrants to the U.S. Aircraft Registry now far outnumber their standard type-certificated colleagues. "We're finding out more and more that not everything fits in the bucket that is experimental," says Leahy. "A vast majority of it is no longer even an experiment."

To address these changes head on, the FAA is now in the early stages of rulemaking to modernize provisions for issuing special airworthiness certificates. The Modernization of Special Airworthiness Certification (MOSAIC) intends to address barriers to new entrants and current aircraft owners and provide a smoother continuum of entry points into aviation, operating purposes, and operating privileges. It also aims to level the playing field across both manned and unmanned communities in terms of privileges and limitations. For example, some of MOSAIC's proposed provisions would expand privileges for UAS entrants outside the current small UAS rule and enable larger and more robust LSA.

For the experimental market, MOSAIC proposes to segregate the current purposes for issuing experimental certificates into those that involve experiments and others that simply represent operations in the NAS. This, in turn, should alleviate operating limitations for many operators. It will also help usher in a new era of technology and innovation and ultimately preserve the legacy and pioneering spirit of experimental aviation now and for future generations.

Experimental aviation holds a special place in our nation's aviation history and at the same time presents an exciting path forward for future innovation. Its recognition of the value of human endeavor and ingenuity is what makes the future of aviation such an exciting prospect.

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

Learn More

FAA Regulations and Policies for Special Airworthiness Certificates
https://go.usa.gov/xP42V

Checklist

SUSAN PARSON

The Right Approach

A Case Study in Using AC 90-109A

Over the summer, I had the pleasure of reconnecting with a Virginia-based flying friend who found himself in Phoenix for flight training. Naturally, we immersed ourselves in every pilot's favorite pastime of enthusiastic hangar flying. As David regaled me with his training stories, I realized once again that he exemplifies the concept of pilot professionalism. One of those ways is demonstrating what it means to use the recommendations in AC-90-109A – *Transition to Experimental or Unfamiliar Airplanes.*

I first flew with David and Lissa, his pilot wife, when they owned a very capable Cessna 206 *Stationair*. It was always impressive to see how carefully and, indeed, how professionally, they flew both as individuals and as a crew. They are still the only GA pilots I know who fly with a detailed, crew-oriented checklist that delineates duties for Pilot Flying and Pilot Monitoring. They also got regular training, which included a memorable and most enjoyable "learn-to-use-the-airplane" T206 trip from Virginia to Arizona a few years ago.

Life intervened. They sold the *Stationair* and, apart from occasional jaunts in friends' airplanes, David and Lissa took a seven-year break from flying. But then a new kind of aircraft caught David's eye, and rekindled his interest in general aviation flying. He fell — hard, it seems — for a PJ-260 that will likely be his by the time you read this issue.

If you don't know the model, the AeroSport PJ-260 is a two-seat derivative of the Parsons-Jocelyn PJ-260, an aerobatic tailwheel biplane first built for the 1962 World Aerobatic Championships and named for the two pilots who commissioned it. Variants of the PJ-260 were later marketed to home builders and, after a long search, David found "the" one and made a handshake deal to purchase the plane from its owner.

The PJ-260 is obviously different from the T206 and, even without any "encouragement" from Lissa, David recognized the need for training to fly this unfamiliar make and model. He started with the obvious first step of getting a tailwheel endorsement, logging some time in a venerable Aeronca *Champ* before switching to a more-capable American Champion *Citabria*. That took care of the basic endorsement, but David knew that wasn't sufficient to make him safe in something as zippy as the PJ-260. Since it's not a model that one can easily find — much less rent — for training purposes, more research ensued.

In so doing, David followed a key piece of advice in AC 90-109A:

> *The choice of airplane and instructor used for this flight training is very important. To accomplish the best training, use the specific airplane that you plan to routinely operate, with a well-qualified instructor who, preferably, has recent experience in the specific make and model. The second-best choice would be in the same make and model as the one the pilot is planning to fly. For pilots intending to operate an experimental aircraft, a third choice is to fly an airplane with similar characteristics, which may include a TC'd [type-certificated] airplane.*

He exemplifies the concept of pilot professionalism, in part by demonstrating what it means to use AC-90-109A – Transition to Experimental or Unfamiliar Airplanes.

To get the kind of training that safety demands, David found that the Great Lakes 2T biplane, also known as the Great Lakes Sport Trainer, would be a viable option. So he located a flight school with a Great Lakes in the fleet and instructors on staff with experience in the airplane. From the stories I heard, it is very clear that he is also following this suggestion from the AC:

If you purchased your plane from a previous owner, learn all you can from him or her.

I can't wait to see David flying his new bird with Lissa. Knowing how carefully he has prepared for this transition, I will also look forward to hitching a ride myself.

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

Learn More

faa.gov/documentLibrary/media/Advisory_Circular/AC_90-109A.pdf

JAMES WILLIAMS

Ride the Lightning

Aviation's Electric Future?

FAA photo by Bryan Dahlvang

My relationship with electrification of transportation is, well, … complicated. I am simultaneously a strident advocate and a deep skeptic of electrification. People always want simple answers, but complex situations rarely offer them.

So here is where my dissonant world view on electrification comes from. I drive a range extender electric vehicle (EV). That means that my car is primarily electric but has a gas engine that can be used as a generator to recharge the battery for longer trips. The majority (about 75-percent) of my trips rely on just the battery. That number is skewed by a few longer trips where I didn't have access to a charging station. In everyday life, I can go weeks or even months without burning a drop of gas. My experience with EVs has been overwhelmingly positive. So why do I doubt?

My skepticism is rooted in seeing the often-hyperbolic claims of those advocating for the technology. Like many new technologies, the benefits are trumpeted while the limitations are often ignored. In the long term, this consistent over-promising and under-delivering damages the public's confidence in the technology. What follows is my hopeful skeptic's view on the benefits of, and challenges for, aviation's electric future. I'll also take a look at a couple of projects that are making their way toward the general aviation (GA) community.

Energy density is probably the greatest challenge in the electrification of transportation.

Electrical Elation

There are a number of great benefits that come from using electrical propulsion on an aircraft. Among the most recognizable is just how quiet this technology is. While the propeller still creates a noise signature, engine noise is all but eliminated. Along with that noise reduction is also a major reduction in vibration. This could be a major factor in reducing fatigue and creating a more pleasant environment for everyone.

Then you have the biggest potential advantage: "fuel" cost. According to the U.S. Energy Information Administration, Americans pay roughly 11 to 30 cents per kilowatt-hour (kWh) depending on where they live. The average for the country is about 13 cents per kWh. So to "fill up" the usable capacity on my EV (14 kWh) costs a whopping $1.82. That gives me somewhere between 40 and 70 miles of range depending on a host of factors from driving style to whether I run the windshield wipers. The straight operational economics (i.e., the direct operating cost per mile) work out to less than 40-percent of what a fairly efficient gas-powered car would run.

On the other hand, the total cost of ownership is a less rosy picture. There is a significant price

premium on EVs compared to a traditional car. This is also true of airplanes. But the higher fuel costs in aviation may help offset that.

I have expressly ignored the larger sustainability argument for electrification: No matter how worthy a cause sustainability is, we won't see large scale adoption until a strong economic case can be made. I think we'll get there, but there are a few challenges on the way.

Energy Density is a Harsh Taskmaster

There's no way around this one. Energy density is probably the greatest challenge in the electrification of transportation. This applies to EVs but is even more critical to airplanes, as they are more sensitive to added mass. The real problem is that as a fuel, petrochemicals are actually really, really, good in terms of energy density. For reference, jet fuel has a specific energy of about 11.9 kWh per kilogram (kWh/kg). Gasoline is about 12.9 kWh/kg and diesel is 13.3 kWh/kg. Lithium Ion (Li-ion) batteries come in between 100 and 243 Wh/kg. To put it another way, the worst petrochemical (jet fuel) has 48 times more energy per unit of mass than the best Li-ion battery. In practical terms, that means that for every kilogram of fuel you are looking to replace, you need between 48 and 54 kilograms of battery. Keep in mind that this is specific energy measured at the cell level, without any of the additional packaging, wiring, and cooling capacity that has to be built into the battery pack. When these factors are considered, EV batteries wind up having between 100 and 168 Wh/kg.

There is a weight savings from electric motors, which are significantly lighter than an internal combustion engine (ICE). An installed Rotax 912, a common Light Sport ICE, weighs in at about 64 kilograms, while an equivalent electric motor only weighs 11 kilograms. But this weight savings isn't nearly enough to offset the massive battery weight relative to standard fuel tanks.

Will energy density improve? Yes, but the consensus on that rate of improvement seems to be five- to eight-percent per year and research suggests that we may be approaching the limits of the current technology. There is promise in solid-state battery technology. Solid-state batteries replace the liquid or gel electrolyte in the battery with a solid electrolyte. This change offers much better packaging, cooling, and energy density capability than traditional Li-ion batteries. Solid-state batteries do exist and will provide a major step forward. The catch is that to build them in large scale is astronomically expensive.

The top battery is an 18650 Li-ion cell (AA battery shown for scale). 18650s are used in Tesla Model S and Model X battery packs.

Therefore, the widespread application of solid-state batteries will likely take many years, even with massive private and public research efforts.

Chemistry, Cobalt, and Capitalism

If you're in the battery business, chemistry is the name of the game. Batteries of all kinds use chemistry to store electricity and the exact nature of that chemistry can have significant effects on the performance of the batteries. That's why there's so much focus on battery research. Any potential gains could have huge economic benefit to those who discover and commercialize them. But that search to find even better chemistry can lead to interesting materials. And those materials have concerns of their own.

One key material is cobalt. Cobalt is a metal that is used in a number of applications, notably Li-ion batteries. Battery manufacturers have been working to reduce the amount of cobalt in their cells because it is expensive and prices have been climbing. Cobalt also requires significant processing as it is very rare in its pure form. Cobalt's supply chain is also a concern. The majority of cobalt is mined in the Democratic Republic of Congo as a byproduct of copper mining. About half of the cobalt supply is refined in China. An expensive metal with massively increasing demand and a geopolitically sensitive supply chain is another challenge for electrification.

The challenges for electric aircraft are real and daunting, but the benefits can be very meaningful.

Then there's the industry's dirty little secret. None of the headline-grabbing car makers actually make their own batteries — not even Tesla and its Gigafactory. Battery cells for Tesla's Model S and Model X vehicles are made by Panasonic in Japan, and its Model 3 battery cells are made by Panasonic in the Gigafactory in Nevada. This approach is not unique to Tesla; it's actually standard practice in the

The Pipistrel Alpha Electro in flight.

Photo courtesy of Pipistrel

industry. GM, Hyundai, Daimler, Ford, and Volkswagen buy cells from LG Chem and BMW buys cells from Samsung.

This industry practice has an interesting aspect for us in GA. It is a potentially tremendous benefit in that all of the research and development in battery technology can be easily transferred. This is a massive game-changer. In the electrical space, any advancement made by any battery manufacturer can be directly dropped in. That's huge. But on the flip side, it also means that you are competing for cells with all of these other users.

So where does that leave us? About five years ago, I would have said that we were very much in the experimental/proof of concept phase. Today, we are beginning to see the transition to the potential to field truly functional GA airplanes with electric propulsion. Let's take a look at two projects and where they stand right now.

Pipistrel Alpha Electro

Pipistrel is a Slovenian manufacturer known in the United States for its Light Sport Aircraft. In 2017, the company introduced an electric version of its *Alpha* airplane. The *Electro* swaps the standard *Alpha's* Rotax engine for a 60 kW (80 hp) electric motor. The *Electro* sports a 21 kWh battery capacity split between two packs located ahead of and behind the cockpit. This capacity allows for one hour of flight time with a 20-minute reserve.

Manufacturers are building in modularity in battery solutions to allow for the potential upgrades that could make current electric aircraft much more usable.

During development, Pipistrel thought that battery swapping would be the way to go for fast "refueling." But the company soon found that it was possible to charge the batteries in less than the flying time of the aircraft. The key was to manage battery temperatures to keep them as cool as possible. Reducing temperature increases charging speed. The current battery packs are air-cooled, but Pipistrel is actively researching liquid cooling to bring the charging time down even further. Initial testing has yielded charge times less than 30 minutes after one hour of flight time. This would allow operational usage on par with gas-powered trainers.

This change of philosophy is actually the kind of smart thinking you want to see from engineering companies, and it shows the value of these pioneering efforts. What looks good on paper can often be less effective in reality. Today, the focus of almost all Li-ion battery users is in improving charging efficiency and speed. Modern large batteries are sophisticated and expensive pieces of equipment. They are also heavy. The *Electro's* battery packs are still removable, but this feature is now used for maintenance and storage rather than "refueling." With regard to energy innovation, the *Electro* has another trick up its sleeve. Much like an EV, the *Electro* is able to regenerate power through the wind-milling of the propeller. This means that when you're descending, you can actually add power to the battery.

The *Electro* meets the LSA criteria with one significant caveat. At the time of this writing, the FAA's LSA regulations do not allow for powerplants other than a reciprocating engine. Earlier this year, Pipistrel delivered four *Electros* to a pilot training program in California and expects to start full-scale deliveries next year. The *Electro* is aimed squarely at the training market with focus on initial training to solo, which should be easily accommodated by the current battery capacity. But at the moment that training agenda is on hold until the *Electro's* LSA status can be resolved.

Sun Flyer

The next project is Bye Aerospace's Sun Flyer. While the *Alpha Electro* is targeted primarily at the LSA/Cessna 152 market, the *Sun Flyer* is more of a Cessna 172 competitor. The company has stated it is planning to sell two- and four-passenger versions of the airplane. The *Sun Flyer* 2 is the two-passenger version slated to have a 3.5 hour endurance from a 92 kWh battery pack with a 90 kW (120 hp) motor. That size is in line with some of the largest packs in the EV space. The planned four-seat *Sun Flyer* 4 is listed to have a 4.2 hour flight endurance with a 105 kW (140 hp) motor. The *Sun Flyers* are being certificated under part 23. The *Sun Flyer* project is still in development as the *Sun Flyer* 2 prototype made its first flight in April 2018. Bye Aerospace anticipates certification in 2020.

These projects are just examples of what exists now and what's coming. The challenges are real and daunting, but the benefits can be very meaningful. The vanguard of this electrical revolution is arriving now in the form of airplanes like the *Alpha Electro*. The *Electro* has to make certain sacrifices, namely in range, in order to meet weight and cost metrics. Airplanes like the *Sun Flyer 2* will arrive in the next few years to alleviate some of those range concerns, albeit at the cost of a much heavier and more expensive battery pack. Manufacturers are building in modularity in battery solutions to allow for the potential upgrades that could make current aircraft much more usable.

Raw cobalt ore

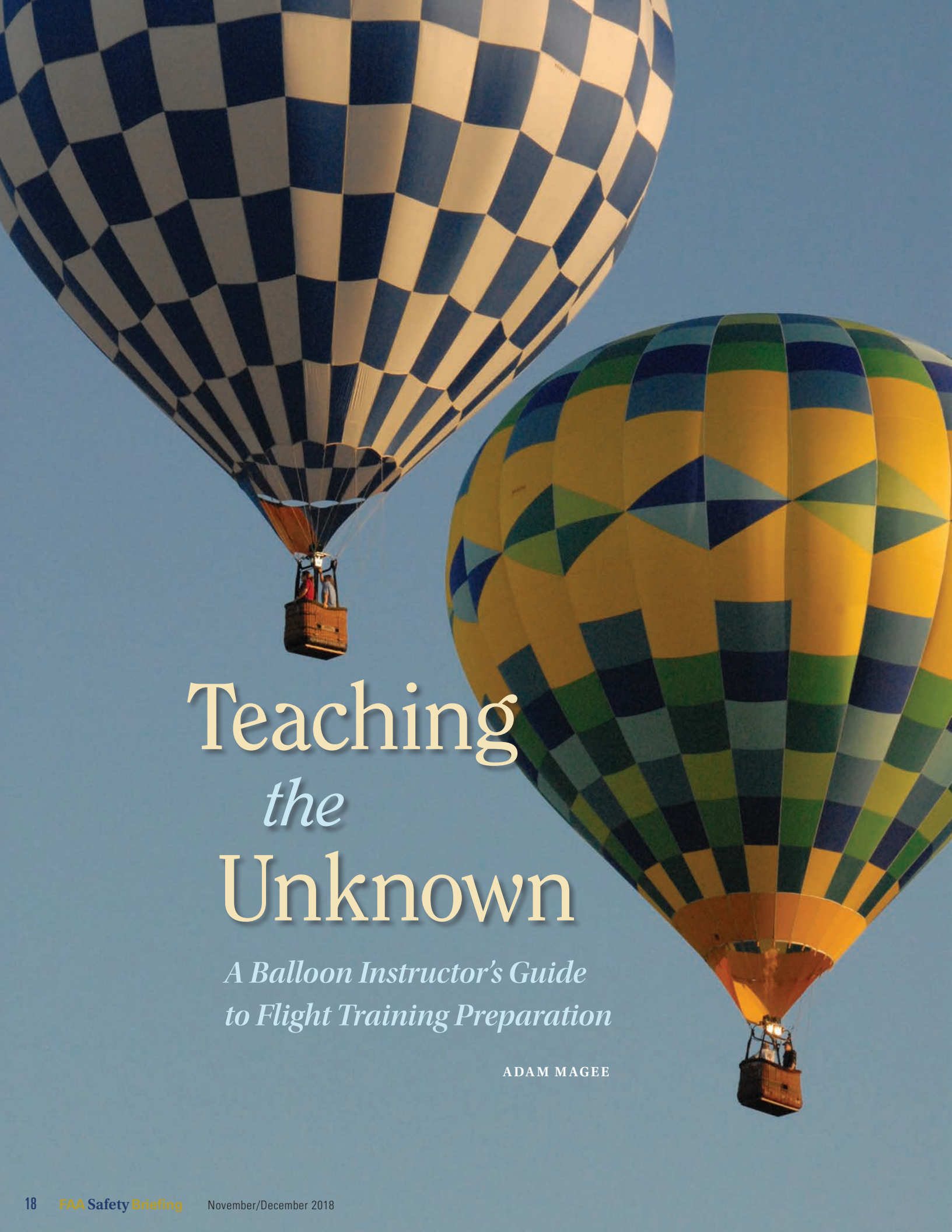
But all of these projects are incredibly important in helping us build out the potential that exists. There are many assumptions that need to be tested. Some of them will prove correct and others not so much. How should we design our charging networks? What's the ideal battery size? Do our current procedures work for electric aircraft? How do I schedule an electric fleet? How fast will it pay back the price premium of an electric aircraft? These questions are just the tip of the iceberg.

We might think we know, but until we've tested it in the real world we don't. The experience gained from these pioneers will tell us just how close our electric future is. In the meantime, I'll continue as a skeptic — but a hopeful one.

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

The Sun Flyer 2 prototype.

Photo courtesy of Sun Flyer



Teaching *the* Unknown

A Balloon Instructor's Guide to Flight Training Preparation

ADAM MAGEE

Things that look easy can be quite difficult, in fact. Balloon flying is one of those things, and I can personally attest to the fact that it is more challenging to plan flight training in a hot air balloon than instruction in an airplane or helicopter. In a balloon, the instructor does not have the luxury of knowing where a landing will occur, nor is there the ability to fly to a practice area to work on specific maneuvers. Being at the mercy of the wind, hot air balloon training involves teaching the unknown and a more intense knowledge of microscale meteorology. Here are some tips to help you plan a safe and productive balloon training flight.

The FAA requires that the pilot in command (PIC) become familiar with all available information regarding the flight, including obtaining a weather briefing. However, planning a balloon flight involves more than simply obtaining a standard weather briefing or reading a routine weather report or area forecast. Using one of the many microscale meteorology resources such as www.ryancarlton.com or www.windy.com, hot air balloon pilots can get detailed winds aloft forecasts for their location at much lower altitudes than the standard 3, 6, and 9,000-foot forecasts provided in a standard weather briefing. Using Rapid Update Cycle (RUC) models, these sites provide winds aloft starting at the surface and increasing in altitude by small increments. Prior to the creation of these microscale meteorology resources, pilots had to use the winds aloft at 3,000 feet to judge an acceptable wind aloft speed.

Unless you live in an area that is significantly above sea level, knowing the winds at 3,000 feet will not always help you accurately judge the conditions you'll need to conduct a safe flight. On many clear sky nights, especially in the Midwest, a temperature inversion will form with strong winds in the 500-800 foot range. Using a more microscale weather resource, pilots are able to see if the winds at altitudes above the surface are suitable for flight, and as well as when any fast winds are expected to drop down to the surface. Pilots can note a temperature inversion and the temperature to which the surface must warm in order for the winds to mix down to the surface. This allows pilots to know the time they should be on the ground.

My mother, a commercial pilot, took me for my first balloon flight at the age of five. The day started off unsuspecting with light winds. However, the inversion weakened and the stronger winds aloft dropped to the surface causing my first flight to involve a high wind, drag-out landing. While I loved the flight and especially the fun landing, I am sure my mother would have loved for these microscale weather sites to be available before she took her five-year-old up on what turned out to be a windy day.

Also of note are the forecasted temperatures and dew points, which are shown next to the forecasted wind speed for each altitude in the profile. This is very valuable and simplifies useful information usually found on the more complicated Skew-T chart. The last thing you'll want is having fog roll in during your flight. I've heard stories of ground crews having to honk their horns to help guide pilots to safe landing spots. Noting the altitude where forecasted temperature and dew point are close can help pilots anticipate fog or low clouds.

At this point in the planning process, a flight instructor can begin to create a lesson plan based on the forecasted winds at their location. Using a paper map and plotter, or mapping software for an iPad such as MotionX, the instructor can plot out a take-off location which, based on the forecasted winds, would take the balloon to appropriate areas to practice maneuvers. Using the forecasted wind profiles, the instructor can plan ascents, descents, and level flight to navigate the balloon to suitable areas to practice landings before taking off again to resume the flight.

As the instructor and student approach flight time, small helium balloons called pibals can be used to measure the actual wind direction. By releasing a pibal and reading the direction on a compass, the instructor can fine-tune the planned flight plan based on the actual winds. In order to read a pibal correctly, instructors must be careful to visualize the balloon flight in three dimensions.

Some pilots release a pibal in a field and then as it ascends and turns with the direction of the wind, they sprint down the road to get an accurate pibal reading. There's no need to work that hard! Use the following steps to accurately measure the wind direction.

As stated in the FAA's *Balloon Flying Handbook,* the average pibal climbs at 300 feet per minute provided that there are no significant wind speed changes. With some quick calculations, we know that after 30 seconds, a pibal will be approximately 150 feet above ground (AGL).

To begin plotting the pibal recording information, release the pibal and track it with a compass. At 30 seconds, take a reading and make a mark on graph paper to represent the starting point. Make a second mark to represent the direction plotted. In Figure 3-6, a track of 300° at 5 mph is depicted. Label the first two points "A" and "B."

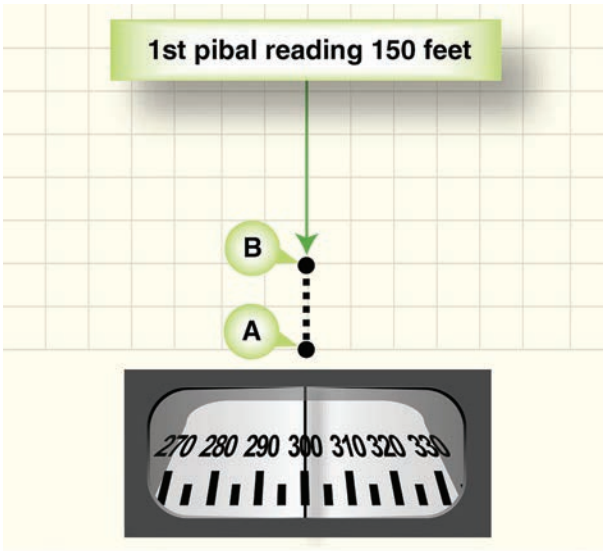


Figure 3-6. First pibal plot showing 300° at 30 seconds.

At 1 minute, take a second reading. The pibal will be at approximately 300 feet AGL. In this example, the reading taken is 310°. Using your plotter, draw a line 10° off the original azimuth (the A-B line), and make another mark approximately two squares away from the mark labeled "B." For clarity, this will be labeled "C." See the example in Figure 3-7. (NOTE: The angles in the successive graphics are exaggerated for clarity.)

At 1:30 minutes, take another reading. The pibal should be at approximately 450 feet. Using the plotter, draw a line 30° off the original azimuth (the A-B line), and make another mark approximately two squares away from the mark labeled "C." This mark may be labeled "D" for clarity (see Figure 3-8). This plotting can be continued as long as the pibal remains in sight.

To determine the wind directions at different altitudes, extend lines between the plotted points as shown in Figure 3-9 back through the initial azimuth. Using the plotter, measure the angle between the lines (the angle between the A-B line and the C-D line). That angle, added to the original azimuth heading, gives a good approximation of the winds at that altitude. For the example shown in this sequence, the true track at 450 feet AGL is 005°.

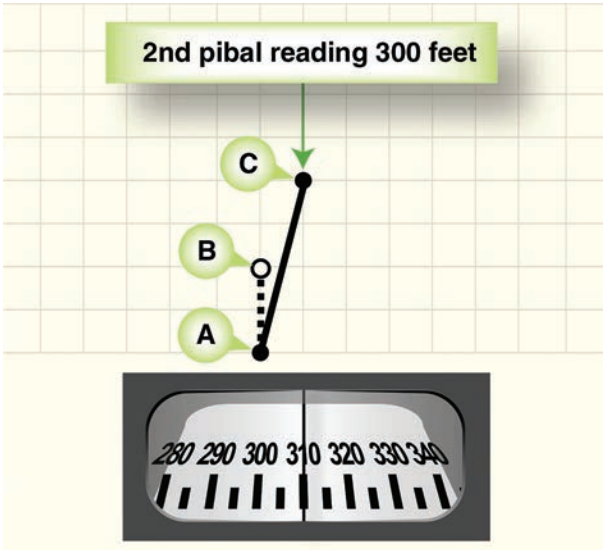


Figure 3-7. Second pibal plot showing 310° at 1 minute.

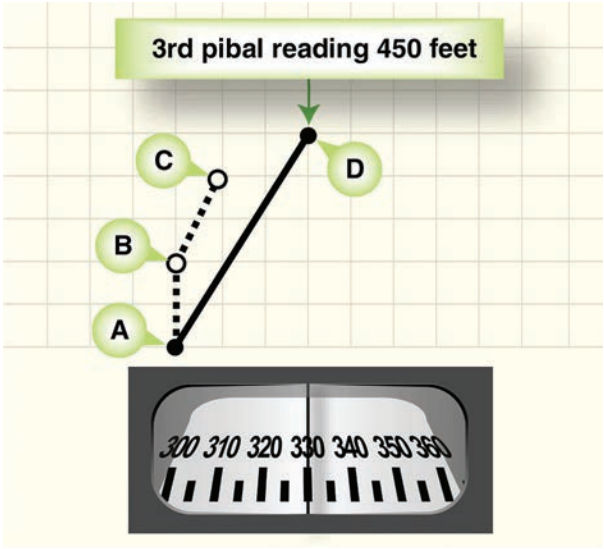


Figure 3-8. Third pibal plot showing 330° at 1:30 minutes.

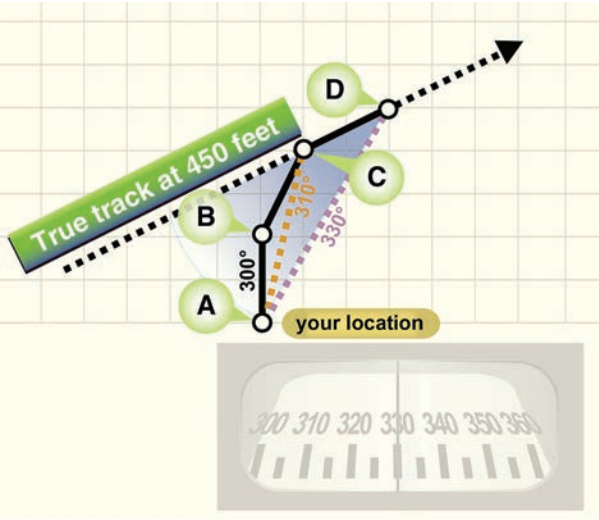


Figure 3-9. A line drawn through the last two plots provides a basis to measure the angle and determine the wind at that altitude. In this case, it is 450 feet.

The information on basic surface winds and winds aloft readings gathered by this method can be used by a pilot to project a flight path and anticipated landing sites with a sectional or topographic map, or a tablet. This plot will form a "V," with the cone beginning at the launch site. The two legs will represent the extremes of the plotted measurements. The difference between these two extremes is called steerage. Flying higher will track the flight path closer to the winds aloft reading, while contour flying (i.e., flying close to the surface) will put the balloon closer to the ground track leg. Varying altitude will allow the pilot to fly down the middle of the "V." Accuracy will depend on the consistency of the conditions, but flight paths and landing sites may be predicted, through practice, with a high degree of reliability.

The balloon pilot, more so than pilots who fly other types of aircraft, must have the capability of visualizing the winds in three dimensions. Continued spatial awareness (how the balloon is moving through the air), is important for maintaining control of the balloon and navigating to the desired point on the ground. Every other safety measure taken is compromised by taking off without proper planning and an understanding of the winds and terrain to be navigated.

Instructors who want to really sharpen a more advanced student's skills should pick points along the flight path and have the student navigate as close to that point as possible. For example, if there is a school with soccer fields one mile downwind, tell the student prior to launch that you want him or her to navigate to those fields and make an approach as close as possible to midfield. In this scenario, students can instantly see their ability to navigate and make a successful approach. Allow for time in the flight debrief to explain to the student how to improve navigation or how the approach could have been managed to be closer to midfield.

When you're at the mercy of the wind, all plans can become nonexistent in a heartbeat. For that reason, flight instructors should always have a plan B, and sometimes a plan C for every flight. Just like our fixed-wing brethren, having a backup plan can go a long way to avoiding safety issues upon landing.

Take the time to plan your instructional flight and don't forget to share your flight plans with your student! Teaching your student to master the unknown will help them better navigate and avoid safety issues throughout their ballooning career.

Adam Magee is a commercial hot air balloon pilot/flight instructor and an FAA Safety Team (FAASTeam) Representative. He is Co-Founder/President of The Balloon Training Academy, a 501(c)(3) non-profit organization and an appointed Training Provider of the FAASTeam.

Learn More

FAA's Balloon Flying Handbook
bit.ly/2DFWiIO

Balloon Flight Instructor Refresher Course on FAASafety.gov
bit.ly/2xR3QT3

Flying Light!

WILLIAM E. DUBOIS

Managing Expectations with Light-Sport Aircraft

Have you ever taken a close look at a light-sport aircraft? Even if you've flown GA your whole life, you might be hard-pressed to tell an LSA from its standard airworthiness certificate-toting siblings. Although they may pass the "duck" test at first glance, LSA really are birds of a different feather. They may look like the planes we fly all the time, but in fact handle differently than what we may be used to. If LSA flying is in your near future, I urge you to get schooled on some of the differences.

The nearly 15-year-old Light-Sport Rule created a new class of airplanes, and pilots. The defining characteristics of the LSA are as follows (see 14 CFR section 1.1 for a full list):

- light weight (maximum takeoff weight of 1,320 pounds, or 1,430 if it's an amphibious or seaplane),
- one engine,
- fixed gear (for land planes),
- fixed or ground adjustable prop,
- maximum stall speed of 45 knots, and
- maximum speed (Vh) of 120 knots in level flight.

Limited to two seats, some are factory built and some are kits. A few legacy airframes qualify, mostly some models of the Champ, Cub, Ercoupe, Luscombe, and Tayorcraft, but most LSAs are modern "carbon-fiber" airplanes — although the category technically embraces everything from two-person powered parachutes and weight shift trikes up to the sleek and sexy all-metal Sling, which I ask Santa for every Christmas to no avail. I guess I haven't been a good enough boy.

LSAs aren't just for light-sport pilots. Pilot certificates, like those Russian nesting eggs, contain within them all the privileges of certificates below them, so all licensed pilots (with the appropriate category and class) can legally fly light-sport aircraft. Got a recreational license? A private ticket? A commercial? You're also legal to fly a light-sport aircraft. Yes, even Airline Transport Pilots qualified in 737s are qualified to operate light-sport aircraft.

Why would pilots accustomed to flying heavier general aviation airplanes want to mess around with LSAs? Well, partly because they're new — not the old beaters that have been baking in the sun for too many decades — and partly because many LSAs have drool-worthy, glass cockpits. But the main

reason is because it's less expensive to operate an LSA. With its quiet Rotax engine sipping less than 5 gallons per hour, it's about the same cost as operating a motorcycle. All that adds up to more plane for the money when it comes to rentals, making LSAs a tempting source of flying fun for many pilots who are used to flying larger, heavier airplanes. Many flight schools have at least one LSA in their stable now.

But these featherweight aircraft will likely require more than the legal minimum, three-times-around-the-patch checkout to master, regardless of the weight of your logbook because they just don't fly like what you are used to flying.

The first LSA I flew was a Remos, a modern German-made miniature, 152ish-looking airplane. The flight was shocking. The light wing loading let us feel every bump, eddy, ripple, and bubble in the otherwise calm-looking sky. As it happened, I was coming out of one of those lapses in flying that had lasted a couple of years and my main thought was: *I don't remember flying being this rough*. I learned later that many LSA owners fly their light birds only in the morning hours.

In addition to riding the chaotic atmosphere in a kite-like manner, LSAs also takeoff and land differently than their heavier cousins. Some offer impressive climb rates, levitating off the runway and climbing like homesick angels. At the other end of the flight, in general, they tend to float more on landing. Oh, and because of their lighter carbon fiber feathers in the wind, crosswind landings can get … exciting. In fact, for pilots used to heavier birds, *any* landing in an LSA can get exciting until you learn their flight characteristics.

Flight Instructor Louis Mancuso spends a lot of time teaching in LSAs. In a safety piece he penned for *Aviators Hotline*, when it comes to landings he notes that, "the LSA lacks mass to maintain inertia. They quit flying quickly when there is a headwind and will *not* stop flying when there is no wind."

This is not what we are used to.

In addition, that light wing loading, which makes an afternoon flight in an LSA good practice for being a rodeo cowboy, makes the plane susceptible to any swirl of wind churned up by crosswinds over hangars, trees, buildings, or other obstacles — as well as heat radiating off of the threshold of the runway — potentially destabilizing the best stabilized approach. Plus, in addition to being light in mass, LSAs are remarkably nimble, requiring a light touch on the controls. Until you get the hang of the minuscule movements that net big results, they can be easy to over-control.

These featherweight aircraft require more than the legal minimum, three-times-around-the-patch checkout to master, regardless of the weight of your logbook because they just don't fly like what you're used to flying.

That's not to say that you shouldn't partake of an LSA. They are fun and economical to fly. But the bottom line is that being safe in these birds takes more than the simple new aircraft checkout that you are accustomed to. You're going to need to log a few hours of dual learning to fly light right. But it's a change of pace that will keep your skills sharp, regardless of the size — or kind — of bird you take up next.

William E. Dubois is an aviation writer, world speed record holder, and two-time National Champion air racer. He teaches Rusty Pilot seminars for AOPA, blogs his personal flying adventures at www.PlaneTales.net, and has one hour of helicopter time in his logbook.

Learn More

FAA's Light Sport Aircraft web page
www.faa.gov/aircraft/gen_av/light_sport

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Federal Aviation Administration

MARILYN PEARSON

Drones Aren't Just Quads

Flying an unmanned aircraft system (UAS), commonly referred to as a drone, is a hobby for thousands of aviation enthusiasts. There are a wide variety of drones on the market today, and it's important to educate yourself on the different types that are available so that you can choose the one that's right for you.

The newest and most popular entrants into the world of drones are the quadcopters, or quads. A quad is a type of drone that is controlled by four rotors. Unlike its closely related, engine-controlled UAS cousins, a quad is always operated by a remote pilot instead of a pre-programmed onboard computer.

Since quads are relatively easy to learn to fly, mechanically robust, and provide a very stable platform, they are a popular choice for those who want to venture into aviation, or embark upon aerial photography or videography.

But unless you're convinced that a quad flying camera is the ultimate drone and a must, before you buy that quad, think about a UAS without an on-board camera. Do you want to enjoy the flying as much as the photography? A kit Cessna aircraft flies just like the real thing, with a much smaller investment. Or maybe a helicopter is the perfect challenge. With any of these aircraft, the investment may be less than that quad, and much less for you to lose if your fledgling quad skills result in a broken aircraft!

It's also a good idea to consider the many model aircraft types and the community of modelers available to join and share with others in the fun. Try the self-launch models and see how far you can fly, or test your catapult-launched aircraft around the "airfield." Modelers can purchase kit aircraft that are scale models of many single and multiengine aircraft, while others use their creativity to design and build more elaborate aircraft. I've even seen the B-29 Superfortress model!

Aeromodeling, the official term for the flying of model airplanes, features competitions and championships that are held locally, nationally, and internationally for racing and precision flying. Aerobatic pilots test their skills with maneuvers similar to those that national champion, manned aerobatic pilots are performing.

Small-scale "airports" and flying sites located throughout the country support every conceivable type of model aircraft. Enthusiasts gather to fly everything from "foamie" trainers, flying wings, biplanes, rotorcraft, aerobatic aircraft, single/multi-engine, turbine and jet-powered aircraft, scale model vintage military aircraft, seaplanes, and much more.

Still wondering what to buy? Take a trip to a local field and find a mentor who will teach you the intricacies of assembling the aircraft, manipulating the remote controller, and maneuvering in flight.

Explore membership in a community-based organization and leverage the many benefits they offer like training, safety, insurance, competitions, etc. Spend some time exploring the many types of UAS available and find the best platform for your enjoyment. Many fields have reserved areas for quads only! Aviators love to show off their aircraft and recruit new flyers, so consider a test flight before you decide what your perfect aircraft might be.

Spend some time exploring the many types of UAS available and find the best platform for your enjoyment.

Flying drones can be a fun, family activity too. While the minimum age is 16 to become a certificated remote pilot under part 107, enthusiasts of all ages may participate in aeromodeling and engage with a community of unmanned pilots sharing their love of flying. The FAA recognizes model operations under 14 CFR part 101 so be sure to familiarize yourself with it and follow the regulations. Whatever you choose to fly, be safe and enjoy the experience!

Marilyn Pearson is an aviation safety inspector with the FAA's General Aviation and Commercial Division.

JENNIFER CARON

Three Myths About Experimental Amateur-Built Maintenance

To set the record straight about experimental amateur-built aircraft maintenance, we asked the experts to dispel three of the leading myths on the subject.

Myth #1:

I Need Credentials or a Certificate to Perform Maintenance or Repairs on My Amateur-Built Aircraft

This is one of the most common myths in the amateur-built world. To bust this myth, let's first start off with what we already know to be true. Title 14, Code of Federal Regulations (14 CFR), section 21.191(g), defines an amateur-built aircraft as an aircraft in which "the major portion has been fabricated and assembled" by you, the amateur builder, for education and recreation. You've heard of the 51-percent rule? Well this is it. The major portion — aka more than 50-percent of the aircraft — was built by you.

That's an easy one. You built it. You know your aircraft better than anyone else. As the builder, you don't need any special certificates to do the maintenance or make repairs on your amateur-built aircraft. You can do the maintenance and log the work.

However, you do need a Repairman Certificate – Experimental Aircraft Builder (E/AB) to perform the required, once-a-year Condition Inspection on your aircraft to verify that it's safe for continued operation.

Note that this E/AB Repairman Certificate is not the same as an aircraft repairman certificate issued for work at a repair station, commercial operator, or air carrier, and is also different from a repairman certificate for light-sport aircraft. Check out 14 CFR section 65.103, "Repairman Certificate: Privileges and limitations" for more details on the E/AB Repairman Certificate.

14 CFR part 43 on maintenance, rebuilding, and alterations, does not apply to experimental aircraft. It only applies to type-certificated aircraft.

Bear in mind that even though 14 CFR part 43 on maintenance and alterations is not applicable to amateur-built aircraft, most amateur-built operating limitations require the aircraft to be inspected to the scope and detail of part 43, Appendix D.

I encourage you to use Appendix D as a helpful guide to perform your Condition Inspection. And if you want a handy list of items for inspection, the Experimental Aircraft Association (EAA) has created a Condition Inspection Checklist that is based on Appendix D, which you'll find at bit.ly/2IlB0PH.

A Condition Inspection (CI) can be performed by an A&P, an FAA-approved repair station (if appropriately rated), or you, the builder of the aircraft — *if you have a Repairman Certificate – E/AB* **for that particular aircraft only**. This stipulation is what confuses some amateur builders, but read on — I'll explain further in myth number two.

Myth #2:

I Can Use My Repairman Certificate - Experimental Aircraft Builder to Work on Any and All Homebuilt Aircraft

This is a widely held belief that is just not true. What *is* true is that the Repairman Certificate – E/AB **only applies to one aircraft at a time**. It is not universal, and it is not transferable from aircraft to aircraft. It is make, model, and serial number specific. Just because you have the experience to perform a CI on one aircraft, doesn't qualify you for a CI on a different make, model, and serial-numbered aircraft, even if it's similar in type or design.

For example, let's say you have a Repairman Certificate – E/AB for your Sonex *Onex* kit-built aircraft. Then later on, you want to get a Kitfox *S7 Super Sport*. The repairman certificate you have for your Sonex is not transferable to your Kitfox, and you'll need to apply for a brand-new repairman certificate to perform the CI.

In fact, **the Repairman Certificate – E/AB does not transfer from owner to owner; it stays with the builder.** To illustrate this, let's say you sell the Sonex to your neighbor. Your neighbor is not eligible for a repairman certificate to perform the CI, because he did not build that aircraft.

Again, don't confuse the repairman certificate for light-sport aircraft (LSA) owners with amateur-built aircraft owners. There is a distinction. For LSAs, individuals can be trained in different classes of LSA, and then make application for a repairman certificate with either a maintenance or an inspection rating in that class. But when it comes to amateur-built aircraft, only the *builder* of that aircraft is eligible for a Repairman Certificate – E/AB.

The main point here is that the neighbor who bought your Sonex can perform the repairs and

maintenance on that aircraft, but he or she cannot perform the CI. They'll have to get either an A&P, an FAA-approved repair station, or the original builder with a Repairman Certificate – E/AB to do it.

And here's a nifty tip. If you sell an amateur-built aircraft, and you hold the Repairman Certificate – E/AB on it, you may continue to exercise the privileges of that certificate, for that aircraft. Your certificate is valid until surrendered, suspended, or revoked.

Bottom line: as the builder, you could let your buyer know that you'd be happy to perform the CI for him or her, and who knows, you could maybe even factor in the cost to sweeten the deal!

Myth #3:

I Qualify for an A&P Certificate Since I Have Experience Maintaining Homebuilt Aircraft

This is another big myth that we need to bust. Time spent performing amateur-built aircraft maintenance **may or may not** count towards the practical experience requirements for an A&P certificate. It is not guaranteed.

Aviation safety inspectors (ASIs) will review your experience. You must have verifiable experience in 50-percent of the subject areas listed for the rating sought (refer to part 147 appendices B, C, and D) and meet both experience and time components in order to be eligible.

Keep in mind that ASIs can only evaluate documented experience and time; therefore, if you have experience maintaining amateur-built aircraft, you want to keep detailed records of the type of work you performed, as well as the amount of time spent performing that work, to present to an ASI for review.

Also, the ASI would need to determine if the work you performed did indeed involve basic knowledge of, and skills in, the procedures, practices, materials, tools, machine tools, and equipment used in aircraft construction, alteration, maintenance, and inspection … relative to aircraft standard practices overall and those subject areas found in the part 147 appendices.

The time requirements are 18 months for one rating, or 30 months for both the airframe and powerplant ratings, for a person working full-time (i.e., a standard work week of 8 hours a day, 5 days a week, or a 40-hour work week, or a total of approximately 160 hours per month). Check out 14 CFR 65.77 for more details.

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

Learn More

Ultralights & Amateur-Built Aircraft
bit.ly/2Rjs01D

AC 20-27G – Certification and Operation of Amateur-Built Aircraft
bit.ly/2OwZ5Z3

AC 65-23 – Certification of Repairmen (Experimental Aircraft Builders)
bit.ly/2NjWHk3

Amateur-Built Fabrication and Assembly Checklist (2009) Job Aid:
bit.ly/2zOpdGL

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Federal Aviation Administration

For additional runway safety education, take the AOPA Air Safety Institute's Runway Safety online course at www.airsafetyinstitute.org/runwaysafety.

TOM HOFFMANN

A Safe Experiment

With promising results from both the recent AOPA/Air Safety Institute's Nall Report and preliminary FAA aviation accident data for fiscal year 2018, the efforts to reduce the fatal GA accident rate appear to be paying dividends. As of August 2018, the GA fatal accident rate was holding at about .91 per 100,000 flight hours, below the annual not-to-exceed rate, and was 22 fatal accidents below the same period in 2017.

Mirroring that positive trend is the fatal accident rate for the Experimental/Amateur-built (E/AB) community. As of this writing in mid-September, the total number of E/AB accidents stood at 41. This number marks a 10-percent decrease from the previous year (well below the current 1-percent annual improvement goal) and is part of an overall, multi-year reduction in fatal accidents in this fast-growing sector of aviation. (*Note*: this number is a cumulative total for all of the experimental aircraft categories: amateur-built, experimental light-sport, racing, exhibition, R&D, and regulatory compliance.)

"There's a really good news story here," says Mark Giron, manager of the FAA's General Aviation Operations Branch. "We're flying and building more [E/AB] aircraft than we ever have before and yet our accident rate continues to trend down. The programs and policies we put into effect to help this community appear to be working."

One of those programs Giron refers to is the Additional Pilot Program (APP) for Phase I flight testing which is outlined in Advisory Circular (AC) 90-116. The APP was developed to improve safety and mitigate risks associated with Phase I flight testing of aircraft built from commercially produced kits by allowing homebuilders to have a qualified additional pilot on board to assist with flight tests. In addition to being an optional pathway for conducting Phase I flight testing, APP was also designed in a user-friendly format to minimize administrative hurdles for the participant.

Giron attributes this to its success. "We've kept it simple," says Giron. "You don't have to show me any paperwork and you don't have to apply for anything. You just have to do what it says in the AC and you get to use the program." The goal, he states, is to try to get as many people as possible into the program.

In further support of the program, the FAA is looking closely at developing a risk- and task-based Phase I flight test program in the near future. "We're working with the FAA towards a task-based program that would work hand-in-hand with APP to have an even more meaningful outcome," says Sean Elliott, Vice President of Advocacy and Safety for the Experimental Aircraft Association (EAA). "This would help with not only understanding your airplane better, but having a more scientific way of ensuring that the time is well-spent, that everything that you need to know about your particular airplane you've derived, developed, and measured, and that you are ready to go into Phase II armed with that knowledge."

Giron considers APP as an 80-percent solution focusing on the fixed-wing community, but he is strongly in favor of augmenting the program to include appendices for gyroplanes and turbine-powered aircraft in the future.

For the E/AB community, the primary safety concern has and continues to be how to address loss of control. "With a program like APP, you're getting some important training and a better understanding of your aircraft early on," says Giron, "and that is going to carry through to Phase II where a majority of these LOC accidents occur."

"We've worked exceptionally hard with several different organizations like EAA and the General Aviation Joint Steering Committee (GAJSC) to chip away one, two, and three accidents at a time to get this rate lower and lower," says Giron. With the help of targeted safety enhancements developed by the FAA and other industry partners, as well as a continued focus on programs like the APP, the FAA is well poised to build on its momentum and continue improvement in this critical area of aviation safety.

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

GENE TRAINOR

Helicopter Safety Enhancements

The FAA does everything it can to ensure that helicopters — including home-built birds — are safe to fly. Building your own "bird of a different feather" is a worthwhile endeavor, but be sure to review all the regulations and policies found here: faa.gov/aircraft/gen_av/ultralights/amateur_built/amateur_regs.

Because proper training, equipment, and preparation makes all the difference between a safe flight and a disaster, you might also want to review the safety enhancements that the government/industry United States Helicopter Safety Team (USHST) has developed. For a full list, see USHST.org.

In the past three issues, we discussed a number of the USHST's 22 helicopter safety enhancements (H-SE). We complete the series in this issue by covering the remaining enhancement topics.

Note - There is one remaining H-SE (Installing a Digital Copilot) that has yet to be initiated due to funding issues. If implemented, plans call for the helicopter industry to use existing research on digital copilots to create a low-cost option for the helicopter community. The digital copilot concept would provide "just in time" auditory and visual assistance during flights.

Standardization of Autorotation & Emergency Handling Training:

The USHST identified a disconnect between autorotation training conducted at flight schools, guidance provided in official FAA publications, and the practical application of the maneuver in flight during either a real or simulated engine failure. The USHST plans to create a team of training industry experts who will develop a single reference source to help flight schools incorporate recommendations for autorotation training into flight instructor training programs. Meanwhile, emergency aircraft handling (abnormal operations) training is confined to guidance provided by operator handbooks or localized (tribal) knowledge. No standardized reference exists in training publications. To address this, the team of training experts will generate standard references for emergency and abnormal operations to augment available materials. Target completion date: June 1, 2022.

Add Progressive Approach for Autorotation Training to the Helicopter Flying Handbook:

To help prevent fatal rotorcraft accidents due to improper or poor training techniques, the rotorcraft community needs improved training techniques. The USHST recommends the "progressive approach." Initial lessons will cover the basic concepts, and the maneuver's entry and recovery will be conducted at higher altitudes. As the student develops the necessary skills, the level of difficulty will gradually increase and the entry and the recovery will be performed at lower altitudes. Target completion date: December 1, 2022.

Improve Simulator Modeling for Outside-the-Envelope Flight Conditions:

The USHST developed this safety enhancement to address cases where loss of control occurred during basic maneuvers (hover, quick stop, etc.) and during unsuccessful recovery attempts from potentially unsafe conditions (loss of tail rotor effectiveness, settling with insufficient power, etc.). The USHST will make recommendations to improve the accuracy of full-flight simulators and flight training devices. Target completion date: August 15, 2023.

Stability Augmentation System/Autopilot:

The FAA and industry will encourage the development and installation of a stability augmentation system (SAS) and/or a simple autopilot in light helicopters. Loss of control in flight is a major cause of fatal civil helicopter accidents, according to the USHST's research. SAS/autopilot devices must be designed to reduce loss of control in flight, and should consider new and retrofit configurations. Another specific environment where improved stability could prevent loss of control is when the pilot encounters low visibility, low ceilings, and unintended instrument meteorological conditions (UIMC). Ideally, these devices would embody commercial off-the-shelf pneumatic, electronic, micro-electronic mechanical systems (MEMS) or mechanical devices to sense or control helicopter motion. Target completion date: June 1, 2019.

Improve Understanding of Basic Helicopter Aerodynamics:

The FAA and industry will review and revise materials that explain basic helicopter aerodynamics. The materials will emphasize how to recognize unsafe aerodynamic situations and how to apply appropriate corrective actions. Target completion date: April 1, 2024.

Flight Forum

Simulators and Regulatory Relief

I would like to know if the regulatory relief proposed by the FAA became a final rule or not?

Thank you,

— Mylappan Selvaraj

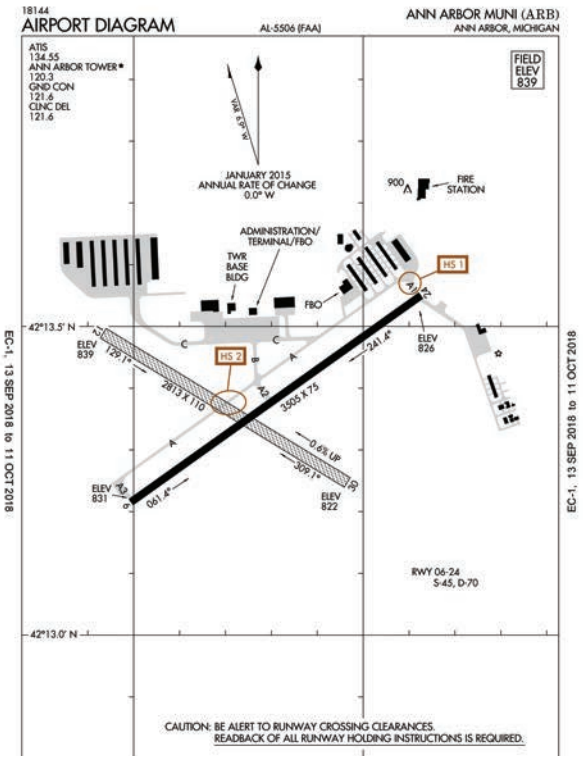
Hello Mylappan, thank you for your question. The regulatory relief rule mentioned in our Nov/Dec 2017 Sim City issue has been published (see bit.ly/2L1U61Q). Provisions of the rule aim to reduce or relieve existing regulatory burdens and costs on the GA community including pilots, flight schools, and part 135 operators. Please note the staggered effective dates for the various provisions. Check out the chart in the Sep/Oct 2018 issue of FAA Safety Briefing that highlights the provisions of the rule.

The Grass is Always Greener

Here's some great feedback we received on Twitter from a post on how to avoid wrong surface events.

More than once, I've been caught off guard at airports with intersecting paved and grass runways. At first glance, it just looks like grass adjoining the main runway, until you realize there's another aircraft using it. It's important to study the entire airport diagram!

— Benjamin



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Postflight

SUSAN PARSON

In Fine Feather

My 2018 AirVenture experience provided multiple opportunities for bird-watching, both biological avians and the mechanical birds that enable us humans to emulate our feathered friends. Before and after EAA's annual extravaganza, my Wisconsin-based beau and I spent sunsets on his deck. From that vantage point, we watched a steady progression: As feathered birds of all kinds flocked to the feeders he lavishly tends, metal birds of many kinds were flocking overhead as they made their way to and from Oshkosh.

We human flyers envy a bird's perfect piloting that results from being — quite literally — one with their craft.

Leonardo to Lindbergh

The human bird shall take his first flight, filling the world with amazement, all writings with his fame, and bringing eternal glory to the nest whence he sprang.
– Leonardo da Vinci

Especially after the overwhelming experience that AirVenture offers, those evenings provided a pleasant opportunity to reflect on the wonder and the miracle of flight. Human beings have always watched birds with envy, longing and, as Leonardo da Vinci predicted, enough determination eventually to succeed. Also accurate was Leonardo's forecast of the amazement, fame, and eternal glory that early human birds such as the Wright brothers and Charles Lindbergh would accrue.

The construction of an airplane is simple compared with the evolutionary achievement of a bird. If I had to choose, I would rather have birds than airplanes.
– Charles Lindbergh

Flying is commonplace today, but it is not possible to visit AirVenture without being awed by the mechanical birds-of-all-feathers diversity that mirrors the biological variety of the avian world. As we watched all the fluttering at the feeders, though, I had to agree that Lindbergh had a point. Notwithstanding the complexity, diversity, and sophistication of the mechanical fleet, the "evolutionary achievement of a bird" is still a wondrous and even mysterious thing. I suspect Lindbergh was thinking of the magnificent design and construction of the "aircraft" part. But we human flyers also envy a bird's perfect piloting that results from being — quite literally — one with their craft.

Back to Bach

That observation led me back to Bach. Regular readers know that Richard Bach's *Gift of Wings* is, along with Mark Vanhoenacker's *Skyfaring*, a guidepost in my personal firmament of aviation literature. A favorite Bach essay relevant to the theme of this issue of *FAA Safety Briefing* is "School for Perfection." It tells the story of how the narrator, a flight instructor, is rejuvenated and inspired by meeting the proprietor of a hidden and highly unusual flight school. Drake has a curriculum that starts with a lengthy study of the wind, the sky, and the dynamics of unpowered flight. The narrator scoffs: "At that rate, it's going to take him a lifetime to learn to fly."

"Of course it will," is Drake's matter-of-fact response. He patiently explains that a true pilot must develop an understanding of, and respect for, the basics of flight itself before actually taking wing. Drake then takes the narrator to watch as a teenage student prepares to aviate with "a great frail set of snow-linen wings, thirty feet from tip to tip," resting on his shoulders. Drake explains that

… the most practical way to bring a pilot to perfection is to reach him when he is caught up with the idea of pure flight, before he decides that a pilot is a systems operator. (…)

Making the Feathers Fly

A bit later in the visit, Drake reminds the narrator that "It's up to us to keep flight alive in a world of airplane-drivers (…) to take time to give a pilot skill and understanding." As we close this survey of flying birds of a different feather, may we all recommit ourselves to both the spirit and the discipline of truly learning to fly like the birds.

Susan Parson (susan.parson@faa.gov or @avi8rix for Twitter fans) is editor of FAA Safety Briefing *and a Special Assistant in the FAA's Flight Standards Service. She is an active general aviation pilot and flight instructor.*

PAUL CIANCIOLO

FAA Faces

Thomas Leahy

Aviation Safety Inspector, General Aviation Operations Branch

Flying is a family affair for Tom Leahy. His wife is a private pilot, his daughter flies Boeing 737s for Delta, and both his sons soloed on floats and skies in a Piper J-3 *Cub* before heading off to college. For Tom, having a family of aviators is no surprise being from Ohio — the "birthplace of aviation" and home of the Wright brothers.

"I really can't remember when I didn't want to fly," Tom recollects. "My earliest interest was actually building and flying model airplanes with my uncles, who were highly recognized in the competitive model arena."

Tom started taking *manned* flying lessons in the early 1970s. He also decided to buy his own airplane around that time — a Piper PA-15 *Vagabond* for $1,200 — because, why not buy your own airplane to get your pilot certificate and get more out of the aviation experience.

He has owned and restored several airplanes since the PA-15.

His first flying job put Tom at the controls of the de Havilland Canada DHC-2 *Beaver* and DHC-3 *Otter*, various Cessnas, and occasionally the Ford Trimotor for Island Airlines out of Port Clinton, Ohio. At the time, Island Airlines had among the shortest scheduled flights in the world with landings averaging every 12 minutes on one of the many Lake Erie islands. Tom accumulated 5,000 hours with the airline and he ferried the last Trimotor from its final Island flight.

Tom eventually ended up "flying the line" and later as a senior check airman and instructor for Northwest Airlines. However, the airline lifestyle following 9/11, coupled with airline bankruptcies and a mandatory retirement age at 60, made it less desirable to be an airline pilot. He mentioned this conundrum to a friend who had been recently hired by the FAA, and the friend suggested he consider working for the government as well.

"The thought of working at the FAA had never crossed my mind before that," Tom said. "A few of his comments caught my attention — no mandatory retirement age, the offer of long-term stability, and weekends and holidays off, which is something I had not been able to accomplish at the airline. The modern FAA has a lot to offer as a career, along with almost endless internal paths to interesting jobs."

Tom is now an aviation safety inspector (ASI) with the FAA's Flight Standards Service. As part of the General Aviation Operations Branch, Tom's work focuses on risk-based policies and safety enhancements, which are created and implemented by collaborating both internally and with pilots, aviation organizations, and industry stakeholders aimed largely at the experimental and light aviation community. The branch does just about everything in the operations area outside of the airlines.

There is a steady decline in the fatal accident rate of general aviation (GA), especially in the experimental fleet, which also has the largest growth rate in the GA community. To contribute, Tom is currently working to integrate everything from personal turbojet wing suites to electronically stabilized fly boards to a six-engine space launch airplane into our national airspace system (NAS). That's quite the gamut of aircraft!

"We spend a lot of time and effort pathfinding — looking for common sense solutions to merge new and novel concepts into the NAS while conforming to the current rule structure," he notes. "We are applying safety enhancements in a way that still allows for the spirit of *experimenting*."

With experienced aviators like Tom at the yoke, the FAA is embracing all the change and moving quickly (and safely) to provide performance and risk-based rules that accept new technology on an almost daily basis.

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

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