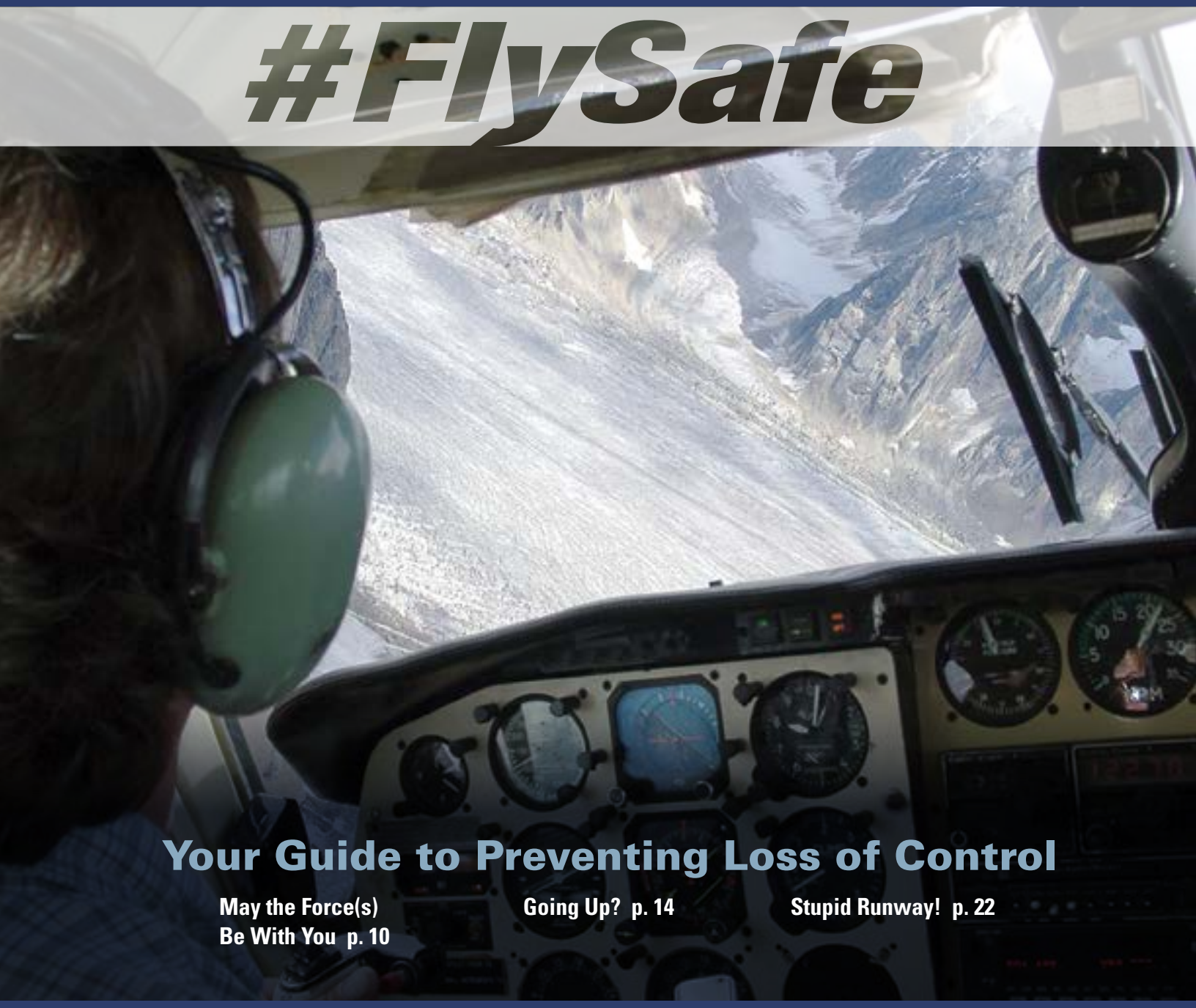
FAA Safety BRIEFING

March/April 2016

Your source for general aviation news and information

#FlySafe



Your Guide to Preventing Loss of Control

Federal Aviation Administration

faa.gov/news/safety_briefing

@FAASafetyBrief

The March/April 2016 issue of *FAA Safety Briefing* focuses on the leading cause of general aviation accidents – loss of control. Articles in this issue will help pilots better identify loss of control warning signs, as well as fine tune mitigation strategies and recovery techniques that can improve flight safety in these situations.

Features

Departments

JOHN DUNCAN
DIRECTOR, FLIGHT STANDARDS SERVICE

#FlySafe

If you read the January/February issue of *FAA Safety Briefing*, you might remember that we talked about "risk-based decision making." In a nutshell, risk-based decision making involves using data to identify trends, analyze accident/incident precursors or causes, and develop a targeted risk mitigation strategy.

That's why the FAA is focusing its general aviation (GA) risk mitigation strategies so heavily on preventing or at least reducing the number of Loss of Control (LOC) accidents. A LOC accident involves the unintended departure of an aircraft from controlled flight, and it can occur in any phase of flight. The numbers speak loudly:

- Approximately 450 people are killed each year in GA accidents.
- Loss of Control is the number one cause.
- There is one fatal accident involving LOC every four days.

What, Why, and How

Improvement starts with understanding the nature of the problem. The "unintended departure from controlled flight" happens when the aircraft enters a flight regime outside its normal flight envelope. Because it is unintended, the pilot is usually surprised — and startled pilots (especially those lacking the requisite knowledge and skill) too often react with control inputs that can cause a stall or a spin.

Reducing LOC accidents involves at least two kinds of mitigation.

The first is identifying and addressing factors that contribute to these events. Studies show that contributing factors include poor judgment/aeronautical decision making, failure to recognize an aerodynamic stall or spin and execute corrective action, low pilot time in aircraft make and model, lack of piloting ability, failure to maintain airspeed, failure to follow procedure, pilot inexperience and proficiency, VFR into IMC, or the use of over-the-counter drugs that impact pilot performance. Sadly, intentional regulatory non-compliance — "buzzing" and other reckless actions — is the second factor contributing the LOC accidents.

To educate the GA community on how to mitigate these factors and thus help prevent LOC accidents, the FAA and a diverse group of industry stakeholders teamed up last June to launch the #FlySafe national safety campaign. FAA Deputy Administrator Mike Whitaker officially kicked off the #FlySafe effort at the Aircraft Owners and Pilots Association's (AOPA) Fly-In at the Frederick Municipal Airport, Frederick, Md. Among other activities, #FlySafe features information each month on the FAA website about an LOC contributing factor and mitigation strategies. (*See below for the full list of topics and links.*)

A second mitigation strategy is to invest in upset prevention and recovery training. A good program will include both ground school "academics" and hands-on practice in an appropriate airplane, with well-qualified instructors. This kind of training is not cheap, but the benefits to your knowledge, skill, and confidence make it well worth the investment.

As most of you know, I have been an active GA pilot for nearly 50 years. Like you, I enjoy the freedom that GA allows to personally manage risk. That freedom cannot be taken for granted. It demands that we properly manage risk, not only to save lives but also to maintain the freedom we have. So the most important risk mitigation strategy is your personal action to make sure you are prepared, current, and competent. We need to be accountable to one another, so I hope you will also insist that your friends and colleagues in GA be similarly prepared, current, and competent. The preservation and growth of the GA community depends on it.

Learn More

Enhanced Vision Systems
www.faa.gov/news/updates/?newsId=84335

Angle of Attack Indicators
www.faa.gov/news/updates/?newsId=83106

Vmc Training
www.faa.gov/news/updates/?newsId=83106

Survival
www.faa.gov/news/updates/?newsId=83869

Medications
www.faa.gov/news/updates/?newsId=83625

Flight Risk Assessment Tools
www.faa.gov/news/updates/?newsId=83392

Unexpected Events
www.faa.gov/news/updates/?newsId=83285

Transition Training
www.faa.gov/news/updates/?newsId=83205

New Student Pilot Application Requirements

The FAA issued a rule in early January that requires student pilots to apply for, obtain, and carry a plastic pilot certificate to exercise the privileges of the pilot certificate. Additionally, it modifies the process by which student pilots apply for a certificate; they must now apply in person at a Flight Standards District Office, through a Designated Pilot Examiner, with an airman certification representative associated with a part 141 pilot school, or with a CFI.

Student pilots who currently have a paper student pilot certificate may continue to use it, or can request a plastic replacement for $2. The plastic certificates will not expire, which will give the student unlimited time to complete training without having to apply for another student pilot certificate.

For more information on the rule, which becomes effective April 1, 2016, go to https://federalregister.gov/a/2016-00199.

Small UAS Registration Rule Now in Effect

If you own a drone or other recreational model aircraft, you must register it with the FAA's Unmanned Aircraft System (UAS) registry. A federal law effective December 21, 2015, requires unmanned aircraft registration for small UAS weighing more than 0.55 pounds (250 grams) and less than 55 pounds (approx. 25 kilograms) including payloads such as on-board cameras.

Once you complete the registration process (www.faa.gov/uas/registration), you will be provided with a Certificate of Aircraft Registration/Proof of Ownership along with a unique identification number which must be marked on the aircraft. Owners using the model aircraft for hobby or recreation will only have to register once and may use the same identification number for all of their model UAS. The registration is valid for three years and costs $5.

For more questions and answers about registration, go to www.faa.gov/uas/registration/faqs.

FAA's B4UFLY app tells users about current or upcoming requirements and restrictions in areas of the National Airspace System (NAS) where they may want to operate their unmanned aircraft system (UAS). Within two taps, users know if it is safe to fly at their current location. The app provides a status indicator that tells users: "Proceed with Caution," "Warning – Action Required," or "Flight Prohibited." The app also features a planner mode that allows users to select a different time and location for an upcoming flight and determine if there are any restrictions at that place and time. For links to download and more information, go to faa.gov/uas/b4ufly.

Fuel System Ice Inhibitors

On March 22, 2009, a Pilatus PC-12 crashed killing 13 occupants headed to a Montana ski resort. Investigators determined the aircraft experienced fuel system icing when the operator did not use the proper anti-ice fuel additive for the operating conditions that were expected. The FAA would like to stress the importance of recognizing indicators of the potential for fuel icing and understanding your aircraft's limitations and procedures for coping with this condition, including the use of fuel anti-icing inhibitors. For more information, check out Advisory Circular (AC) 20-113 online at http://1.usa.gov/1Tq5uy0 and Special Airworthiness Information Bulletin (SAIB) CE-13-29 online at http://1.usa.gov/1PxtOPF.

Safety Alert for Noise Cancelling Headsets

A Special Airworthiness Information Bulletin (SAIB) has been issued to advise GA pilots and operators of a concern with the use of noise cancelling headsets. In many cases, pilots are using the noise cancelling headsets as supplementary equipment during operations. When wearing these headsets, the pilot may be unaware of environmental sounds and audible warning annunciations in the cockpit that do not come through the intercom system.

The FAA recommends that if any audible alarms or environmental sounds cannot be discerned, operators should elect to find other solutions to discern such alarms or sounds, or discontinue the use of noise-canceling headsets. The agency also recommends pilots

review the information found in an earlier bulletin (InFO 07001) on noise-cancelling headset use which can be accessed at http://go.usa.gov/cZdDz. Download the SAIB at http://1.usa.gov/1R8Cop4.

FAA Updates Airspace Obstruction Standards

The FAA issued a revised Advisory Circular (AC 70/7460-1L) that updates guidelines for the proper way to light and mark obstructions affecting navigable airspace. Among the changes include the requirement for the FAA to determine whether a structure that is 200 feet above ground level (AGL) or higher, or near an airport, does not pose an airspace hazard. Also included are new lighting specifications for wind turbines, new lighting and marking standards for reducing the impact on migratory bird populations, and standards for voluntary marking of meteorological evaluation towers lower than 200 feet. To view the AC, go to http://go.usa.gov/cKxbA.

2016 AMT Awards Course Available

The 2016 Aviation Maintenance Technician Awards program core course, titled "Failure to Follow Procedures – Rationalizations," is now available on the FAA Safety Team website (www.FAASafety.gov). You can find it by searching for course ALC-445 in the site's course catalog or by clicking the Hot Topics banner on the home page.

The course is intended to provide an understanding about why policies, procedures, instructions, rules, regulations, and best practices exist and

why they are the "safety net" foundation for aviation maintenance safety. The course also introduces five of the most common "rationalizations" that mechanics use to justify when they are about to intentionally deviate from these safety nets. Using a fictitious nose gear collapse scenario, the video provides the learner an opportunity to practice seeing and hearing when this "rationalization-mode" is active and shows how to prevent this type of situation from leading to an unsafe condition.

The course takes approximately one and a half hours to complete and also counts as training that mechanics with Inspection Authorization (IA) can use toward their IA renewal.

So far, feedback on the course has been positive. "I like the examples and the role playing," commented one person completing the course. "The scenario with the technician, pilot, owner and FAA brought out some valuable rationalizations."

Safety Enhancement Topics

March: Personal Minimums (Wind)
Understanding the safety benefits of establishing personal limitations for flight in windy conditions.

April: Aircraft Performance and Limitations
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.

U.S. Department
of Transportation

**Federal Aviation
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The Office of Management and Budget has approved the use of public funds for printing *FAA Safety Briefing*.

CONTACT INFORMATION

The magazine is available on the Internet at:
http://www.faa.gov/news/safety_briefing

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- Writing: Editor, *FAA Safety Briefing*, Federal Aviation Administration, AFS-850, 800 Independence Avenue, SW, Washington, DC 20591
- Calling: (202) 267-1100
- Twitter: @FAASafetyBrief

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Photo by Lynn A. Jensen

Piper Aircraft AD Issued

An airworthiness directive (AD) for 3,000 Piper aircraft has been issued for models PA-23-250, PA-24-250, PA-24-260, PA-24-400, PA-30, PA-31, PA-31-300, PA-31P, PA-39, and PA-E23-250. It was prompted by an accident caused by fuel starvation where the shape of the wing fuel tanks and fuel below a certain level in that tank may have allowed the fuel to move away from the tank outlet during certain maneuvers. The AD requires installing a fuel system management placard on the airplane instrument panel and adding text to the Limitations Section of the pilot's operating handbook (POH)/airplane flight manual (AFM). Download the AD at http://1.usa.gov/1TzCrrL.

Sun 'n Fun 2016

Get ready for some fun in the sun aviation style at this year's Sun 'n Fun International Fly-In and Expo, scheduled to take place April 5-10, 2016, in Lakeland, Fla. This aviation extravaganza attracts aviators and airplane enthusiasts from all over the globe. The event features aerial performances, exhibits, and a wide variety of educational seminars (visit www.sun-n-fun.org for more information). The FAA will also host a series of safety forums between 8:30 a.m. and 2 p.m. each day at the FAA Safety Team's National Resource Center. NTSB Board Member Dr. Earl Weener is scheduled to speak there as well as U.S. Rep. Sam Graves who will host a general aviation town hall discussion on that Saturday. Go to http://bit.ly/1OSgCpH for the latest list of forums.

And if you're planning to fly to Sun 'n Fun, don't forget to read the 2016 Sun 'n Fun Notice to Airmen (NOTAM) available at www.faa.gov/air_traffic/publications/notices.

FAA Safety Forums at SUN 'n FUN 2016

April 5 - 10, 2016 - Lakeland, FL

	8:30 – 9:30	10:00 – 11:00	11:30 – 12:30	1:00 – 2:00
Tuesday April 5, 2016	**ADS-B and NextGen** Robert Jex Orlando FSDO	**Pilot Reports** Paul Suffern NTSB Air Safety Investigator	**ADS-B Avionics Solutions** Jay Shears Bendix-King	**Expectation Bias in Pilot Deviations** Rick Lovell Daytona Beach Air Traffic Organization
Wednesday April 6, 2016	**Vintage Aircraft Maintenance** Al Kimball DAR; Retired FAA Insp.	**GA Maintenance Issues** Ric Peri Aircraft Electronics Assn VP, Gov't & Industry Affairs	**Amateur-Built Aircraft Construction Errors** Zoe Keliher NTSB Air Safety Investigator	**Airmen Certification Standards Update** Susan Parson Flight Standards FAA
Thursday April 7, 2016	**Sm UAS Ed. Outreach** Ken Kelley Nat'l FAASTeam HQ FAA	**The Kings on Avoiding Unwanted Adventure** John & Martha King King Schools	**Flying into Large Airshows** Jim Silliman, NTSB Air Safety Investigator	**Gen Aviation Regulation Update** Jim Viola GA & Comm Div. FAA HQ
Friday April 8, 2016	**Flight Standards Update** AFS-1 Leadership FAA	**Wright Brothers Master Pilot and Charles Taylor Master Mechanic Awards** Presented by Deputy FAA Administrator Michael G. Whitaker		**Meet the FAA** FAA Leadership
Saturday April 9, 2016	**AOPA / FAA Joint Initiatives** Jamie Beckett AOPA Ambassador	**Town Hall with Congressional Rep's** US Representatives TBD	**In-Flight Loss of Control Prevention** Dr. Earl Weener NTSB Board Member	**Florida DOT Aviation Programs** Robert Jex Orlando FSDO
Sunday April 10, 2016	**Accident Prevention** Patrick Hempen AVP-100 FAA	**In-Flight Loss of Control** Paul Cox NTSB Air Safety Investigator	**Unmanned Aircraft Systems 101** Mike Wilson ASO-220 (FAA)	**Bahamas Flying** Elizabeth Vance Bahamas Ministry Of Tourism

Link to http://bit.ly/1OSgCpH

or the QR code for updates:

Official FAA Forums are held at the FAA's Orlando Field Office located in the middle of the exhibit area at the corner of Laird Drive and Sun 'n Fun Drive. The FAA Center opens daily at 8:00 a.m. and the FAA Exhibits are open daily 9:00 a.m.—5:00 p.m.

JAMES FRASER, M.D.
FEDERAL AIR SURGEON

Staying In Control as We Age

Age is just a number, right? While the passage of time may bode well for wine, it doesn't work out quite as well for humans. The performance of nearly all of our body's systems diminishes with age. If unchecked, that degradation can easily make its way into the cockpit and contribute to the leading cause of accidents — loss of control.

Keeping you in control of your aircraft is one of our highest priorities here in the FAA's Office of Aerospace Medicine. We strive to keep as many pilots in the cockpit as we can safely certificate. In that context, one of our major concerns is incapacitation. Along with impairment, incapacitation greatly contributes to loss of control accidents. There are two varieties that manifest themselves very differently: sudden incapacitation and subtle incapacitation.

Sudden Incapacitation

This threat is somewhat self-evident. It's also the one that makes headlines and drives a lot of decision making regarding which conditions are disqualifying. It's easy to see why; sudden incapacitation represents a clear threat to pilots, passengers, and even people on the ground. The risks are both real and well-documented. One third of all myocardial infarctions (MI), aka heart attacks, present as sudden cardiac death which means that the patient dies within one hour of the onset of symptoms. As if that wasn't bad enough, the odds of an MI increase dramatically with age. When compared with a male at age 30, a male at age 40 is six times more likely to have an MI. At 60 it jumps to 100 times more. That's one reason why our medical certification folks and Aviation Medical Examiners are so careful with cardiac issues.

Subtle Incapacitation

As obvious a danger as sudden incapacitation is, subtle incapacitation can be far more insidious. Subtle incapacitation can occur through a degradation of either physical or mental ability. Mental degradation is probably the biggest challenge for pilots because it tends to come on slowly and we are usually not even aware it's happening. Recent medical literature tells us that anywhere between five and eight percent of people at age 65 have a diagnosable form of dementia. That percentage doubles for every additional five years of age. Since pilots are a microcosm of the general population, there is every reason to believe that these numbers are just as representative within our pilot population. Subtle incapacitation can affect the executive functions of the brain. Things like attention, problem solving, memory, and multitasking can all be dramatically impaired, and those are exactly the kind of functions that a pilot really depends on to stay safe and make good decisions.

Because subtle incapacitation can happen so gradually, it is especially hard to self-diagnose. By working with your AME and/or personal physician, you can more easily identify and treat conditions that can lead to it. Your family and fellow aviators are also great resources. Have family members who used to regularly fly with you begged off? Have your hangar buddies asked about your flight review a lot in the last year or two? It's possible they've noticed something you've missed about your flying skills. We regularly receive hot line calls and complaints about a pilot's medical fitness. Sometimes these are from antagonists and without merit. But sometimes they come from worried family members who have good reason for their concern. Although we rarely act on these complaints, the fact that family members feel so strongly should be a wakeup call for all of us. Being a pilot is a big part of who we are, even if it's not what we do to pay the bills. That can make any conversation about curtailing or limiting how much we fly very difficult. Nevertheless, it's important to have these conversations as we age to make sure we hear any concerns they may have.

What can you do to prevent incapacitation issues? In addition to maintaining good health and having regular checkups with your doctor, schedule regular checkups with a flight instructor. The standard flight review is a good place to start but as you age, think about increasing the frequency. This activity provides regular feedback on the condition of your flying skills. In addition, time with a CFI will improve your general proficiency — and is a benefit regardless of your medical condition.

Bottom line: it's important to talk with friends and family and take any steps needed to ensure you maintain the skills necessary to be safe.

James Fraser received a B.A., M.D., and M.P.H. from the University of Oklahoma. He completed a thirty year Navy career and retired as a Captain (06) in January 2004. He is certified in the specialties of Preventive Medicine (Aerospace Medicine) and Family Practice. He is a Fellow of the Aerospace Medical Association and the American Academy of Family Practice.

Ask Medical Certification

PENNY GIOVANETTI, D.O.
MANAGER, AEROSPACE MEDICAL
SPECIALTIES DIVISION

Q1. I have a special issuance (SI) due to having two stents. The issuance says it is to expire 2019. I haven't had any symptoms, and have had perfect blood tests and perfect stress tests for the past three years. With these results is there any chance the FAA could waive the SI earlier than 2019 and I can go back to a Class 3 Medical every two years instead of annually?

A1. The medical standards prescribed by Title 14 Code of Federal Regulations (14 CFR) part 67 state that airmen with coronary artery disease requiring treatment (e.g., stenting) can only receive time-limited special issuance medical certificates. The facts are that coronary artery disease is a progressive condition and is not "cured" by stenting or surgery. Even under the best medical care, many individuals develop new obstructions, sometimes even in their stents or bypasses.

The annual testing that you undergo is based on recommendations by a panel of Federal Air Surgeon cardiology consultants who meet every two months to review pilot cardiac cases and the Federal Air Surgeon's current cardiac guidelines. Your annual evaluation to check on the condition of your heart is no different than regular inspections and maintenance of your aircraft, and just as important to flight safety. However, we are always willing to modify our policies, should evolving medical evidence show a way to identify individuals at low risk who may be followed less intensively.

Q2. I've written to the FAA asking why I need a special issuance of my medical certificate for hemochromatosis but have never received a response. I was diagnosed with the disease in the early 1990's and have been treated with regular phlebotomies. I have always included the information on my medical application. In 1999, I was informed that more information (blood tests, etc.) were needed to obtain a medical certificate which I have always supplied. For my 2006 medical certificate, my AME said he could issue it without going through regional approval.

Jumping to 2012, I had an ankle operation which precluded aviation/air traffic control duties until the AME could ascertain that I could walk without crutches. Upon getting that clearance, the Northwest Mountain medical branch noticed my history of hemochromatosis. I was grounded until I provided blood tests and a doctor's statement that I was healthy. I asked why this was necessary (and has been since) and was told to contact FAA HQ. I did so and have still received no response. My AME says he can (and should) be the sole arbiter of my health. But I have to take the extra time (two months prior to renewing my medical certificate) and expense to send the information to the Northwest Mountain medical office.

A2. In most cases, hemochromatosis is a condition we follow on a special issuance as it can cause problems with multiple organs such as your heart (abnormal heart rhythms or congestive heart failure), liver, pancreas (leading to diabetes) or joint problems. We are glad you are getting regular treatment to decrease your current and future risk.

You should not fly 24 hours after a single unit blood donation and 72 hours if they remove more than one unit. An AME is a designee of the FAA and as such, he or she is the first line of evaluation of an airman. However, the final decision rests with the FAA. If your AME has questions regarding certification, he can contact the Aerospace Medical Certification Division or the Regional Flight Surgeon office (especially if you are an air traffic controller).

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

SABRINA WOODS

HUMANS *and* HARDWARE

Preventing Inflight Loss of Control in General Aviation

The National Transportation and Safety Board (NTSB) is concerned over a growing trend in general aviation. Pilots are losing control of their aircraft at takeoff, inflight, or upon landing, resulting in a crash. Loss of control is defined as "an extreme manifestation of a deviation from the established flight path" and 40 percent of all fatal GA mishaps are the result. Consequently, the NTSB gathered together some of the most knowledgeable and experienced industry, academia, and government aviation safety advocates for an all-day forum discussing loss of control: prevention and educational outreach.

The forum was held on October 14, 2015, in the NTSB conference center. After opening remarks from NTSB Member Dr. Earl Weener and NTSB Senior Air Safety Investigator Paul Cox, the forum convened discussion panels focusing on Industry and Government Perspectives and Actions, Human Performance and Medical Issues, Pilot Training Solutions, and Equipment and Technology Solutions. This format highlighted the multi-tiered approach to mitigating the problem.

Panel 1: Industry and Government Perspectives and Actions — Representatives from the FAA's Office of Accident Investigation and Prevention (AVP), the Experimental Aircraft Association (EAA), Aircraft Owners and Pilots Association (AOPA) and Old Republic Aerospace Insurance discussed the movement from a reactive stance on dealing with aircraft mishaps, to more of a proactive one. This includes establishing more cross-talk through the Aviation Safety Information Analysis and Sharing (ASIAS) program and advancements in education such as AOPA's Essential Aerodynamics Course (accessible on your favorite mobile device), EAA's safety pledge initiative, and development of the "Party of One" safety management systems program for solo pilots.

Panel 2: Human Performance and Medical Issues — Some of the world's foremost human factors specialists discussed key issues in the man-machine interface and how pilots engage in risk based decision-making. Dr. Dennis Beringer from the FAA's Civil Aerospace Medical Institute (CAMI) and Dr. Christopher Wickens from Colorado State University and author of *Engineering Psychology and Human Performance* talked about the effects of automation surprise and hypothesized that the activation of an aural alarm can be almost as distracting as the onset of a problem itself. Dr. Frédéric Dehais from the Institut Supérieur de l'Aéronautique et de l'Espace (French Aerospace Engineering University) discussed how developing an established scan pattern can prevent fixation issues, and AOPA's Dr. Jonathan Sackier presented data about loss of control accidents resulting from medical incapacitation.

Panel 3: Pilot Training Solutions — Representatives from the American Bonanza Society, Mindstar Aviation, AOPA, and Rich Stowell — a master aerobatic instructor — discussed how the aviation industry can come together to produce long term results by starting the safety risk management process early when student pilots are first introduced to the program, and how type clubs have a responsibility to keep the safety conversation going among their members.

Panel 4: Equipment and Technology Solutions — The technology panel was made up of representatives from the University of North Dakota, whose flight training school is beta testing AoA indicators; Avidyne; the American Society for Testing and Materials (ASTM); and Earl Lawrence — former FAA Small Airplane Directorate Director and the current Director of the Office of Unmanned Aircraft Systems Integration. Innovations in automation and upset recovery devices such as emergency auto-land, ballistic recovery devices, and AoA indicators dominated this panel discussion.

The forum ended with a round table open discussion where all the panelists met to answer and vigorously debate questions and comments sent in advance. The questions sent in made it obvious that the movement to address and mitigate loss of control incidents is gaining steam in the GA community — much to the approval of the forum. While there is a long way to go in eliminating accidents due to loss of control, the sense that the aviation community is getting closer was apparent throughout the conference.

Member Weener provided closing remarks with several of the panelists being assigned side tasks to continue working in their prospective fields. Anyone interested in watching the day's events is encouraged to check out segments from the forum, or the entire conference on the NTSB's YouTube channel: http://bit.ly/1Yxo7qy

A/C Transition

The Unexpected

FRAT Tools

Pilots & Meds

1.usa.gov/1QmoKz8

1.usa.gov/1UnMn91

1.usa.gov/1HqCkGR

1.usa.gov/1XgLXDX

FLY SAFE

Scan and Download the Facts!

Survival

V_{MC} & AoA

Enhanced Vision

Best Glide Speed

1.usa.gov/1VReU5N

1.usa.gov/1STI0Sd

1.usa.gov/1RtkfkV

1.usa.gov/1OZtHgN

For a complete list of #FlySafe (GAJSC) topics, go to faa.gov/news/safety_briefing.

MAY THE FORCE(S) BE WITH YOU

SUSAN PARSON

Using the Four Forces to Maintain Aircraft Control

Even if you aren't a *Star Wars* fan, you undoubtedly know about "The Force." You've probably found yourself wielding this handy meme in conversation once or twice, perhaps to wish someone good luck ("May the Force be with You") or to encourage greater effort ("Use the Force, Luke!").

If you are a pilot, you do a lot more than just talk about The Force. You use it every time you take to the skies. In fact, you use all four of the forces you first met in ground school: lift, weight, thrust, and drag. Though it may not have been presented quite this way, in both ground school and flight training you learned (I hope) that the pilot's job is to manage the Four Forces in order to comply with the Pilot's Prime Directive: to maintain aircraft control (yes, I know I am mixing sci-fi movie metaphors). You learned that in straight-and-level unaccelerated flight, lift is equal to weight and thrust is equal to drag. And you learned techniques to manage the Four Forces, both individually and collectively, in order to maintain aircraft control.

A pilot's job is to manage the Four Forces in order to comply with the Pilot's Prime Directive: to maintain aircraft control.

The problem is that too many of us continue to violate the Pilot's Prime Directive, to the point that loss of control has acquired its own acronym: LOC. As you've seen elsewhere in this issue, there is a fatal accident involving LOC about every four days. LOC — specifically, loss of control in flight (LOC-I) — is the number one cause of GA fatal accidents, which take around 450 lives every year.

We have to do a lot better in managing the forces. That's the reason for the ongoing government/industry #FlySafe campaign, and that's why we chose to focus this *FAA Safety Briefing* issue, which traditionally opens the year's flying season, on ways to avoid LOC. Since LOC can occur in every phase of flight, we have structured this issue's articles to look at maintaining aircraft control in the takeoff/departure, cruise, and approach/landing segments. But let's start by considering the role each of the Four Forces plays in aircraft control.

The Force - Lift

For a pilot, *the* force is lift. Lift equals life, because it keeps the airplane aloft.

As you learned in ground school, a scientist named Bernoulli discovered the inverse relationship between the velocity of a moving fluid (like air) and its pressure. When air flows over an obstacle like a wing (airfoil), the speed of the air moving over the wing increases as its pressure decreases. The pressure differential between the upper and lower airfoil surfaces is what creates lift.

A wing is specially designed to create the pressure differential and produce lift in an efficient way. Up to a point, the pilot can increase the pressure differential (and thus the lift) by flying faster, or by

increasing the angle of attack (AoA). The AoA is the angle between the wing chord line (an imaginary line through the center of the airfoil) and the relative wind (that is, the direction of the air striking the wing).

When it comes to aircraft control, proper management of AoA is a Very Big Deal. If the pilot increases AoA beyond the "critical" AoA, which is a set value for any given airfoil, the moving air breaks away from the top of the airfoil. This disruption causes loss of lift and, if the pilot fails to immediately and decisively reduce AoA, the result is an aerodynamic stall. If the pilot does not reduce AoA to recover from the stall, or if the pilot aggravates the situation by using rudder in a way that stalls one wing more than the other, the result can be a spin and another LOC-I accident.

It seems simple enough to "just" manage AoA, and hopefully the proliferation of cost-effective AoA indicators will make this task easier still. However, too many pilots still focus on airspeed. Pilots tend to associate lift and loss of lift (stalls) primarily with airspeed for several reasons. First, there is a clear relationship between lift and speed. Lift is proportional to the square of the airplane's speed, so doubling the speed will quadruple the lift. Second, for every AoA, there is a corresponding airspeed required to maintain altitude in steady, unaccelerated flight. An airplane flying at a higher airspeed can maintain level flight with a lower AoA, while an airplane flying at a slower airspeed must have a higher AoA to generate enough lift for level flight. Third, maneuvers practiced in early flight training, such as demonstration of the effect of airspeed changes and stalls entered from a wings-level attitude, tend to emphasize the relationship between AoA and airspeed. Finally, the term "stall speed," which refers to the speed at which the wing reaches critical AoA in a wings level unaccelerated (1g) condition, further reinforces this association.

It is important to understand, however, that airspeed is not the only consideration. Factors such as gross weight, load factor, center of gravity loading, and configuration (e.g., flap setting) have a direct effect on stall speed; therefore, it is possible to stall the wing at any airspeed, in any flight attitude, and at any power setting.

Just to consider weight as one of these factors: because lift must equal weight, an airplane that is heavier must generate more lift in order to maintain level flight. For any given airspeed, a heavier airplane must be flown at a higher AoA in order to generate sufficient lift for level flight. Since an airfoil always stalls at the same AoA, an airplane with additional weight (e.g., passengers, fuel, baggage) flies at an AoA closer to the critical value. The same thing happens in a level turn, where additional lift must be generated by increasing AoA so that its vertical component balances weight. Again, that increase in AoA puts you closer to its critical value. Here's the bottom line on managing lift: never exceed the critical AoA.

Weight

Weight is the force of gravity. It acts in a downward direction, toward the center of the Earth. Weight includes both the airplane itself and its useful load. While your ability to control the weight of the airplane itself is limited, almost everything else — how many passengers, how much fuel, how many bags — is up to you. It is also up to you to load the airplane without violating the fore and aft center of gravity (cg) limits.

Properly managing the force of weight is essential to maintaining aircraft control. For example, consider the consequences of loading an airplane beyond its aft center of gravity limit. In a worst case scenario, this situation could make it impossible to lower the nose and recover from a departure stall.

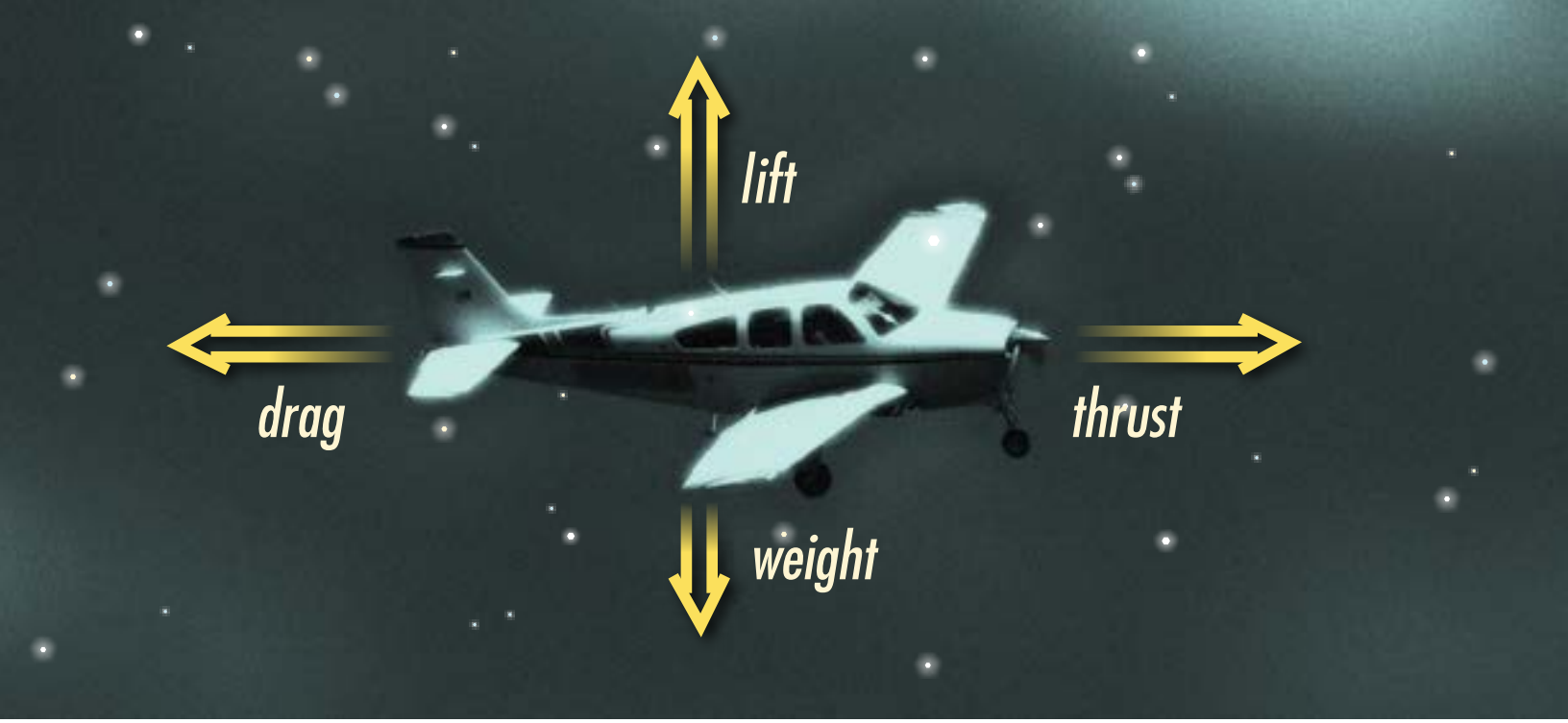
Thrust

Generated by some kind of propulsion system, thrust is the force that moves an airplane through the air in level flight. While modern airplane engines are remarkably reliable, engine failures do occur. As any competent glider pilot will tell you, it is absolutely possible to maintain aircraft control without engine-produced thrust. For a powered airplane, though, loss of engine power can result in loss of control if the pilot fails to follow the proper procedures for such an event. Make it a point to practice simulated engine-out approach and landing procedures on a regular basis.

To prevent LOC-I accidents and adhere to the Pilot's Prime Directive of maintaining aircraft control, we pilots would do well to become GA Jedi.

Drag

Drag is the force that acts opposite to the direction of motion through the air, and it results from both friction ("parasite drag") and when some of your lift points aft ("induced drag"). For purposes of this discussion, we'll focus on induced drag, which is an inescapable by-product of lift. Whenever an airfoil is producing lift, the pressure on its lower surface is greater than on the upper surface. As a result, the



air tends to flow from the high pressure area below the tip upward to the low pressure area on the wing's upper surface. These pressures tend to equalize around the wingtips, resulting in a lateral flow that creates vortices circulating counterclockwise about the right tip and clockwise about the left tip. The downwash flow they create bends the lift vector aft and creates induced drag.

While induced drag creates a performance penalty for the aircraft producing it, the real issue is how wingtip vortices — aka "wake turbulence" — affect airplanes that encounter them. Flying into the wake turbulence generated by a larger/heavier aircraft can result in an upset — an unintentional exceedance of the pitch, bank, and airspeed parameters associated with normal operations. An upset — which can result from any number of environmental, mechanical, or human factors — is usually unexpected. A pilot who reacts with abrupt muscular inputs or by instinct can quickly aggravate an abnormal flight attitude and cause a potentially fatal LOC accident.

Becoming a GA Jedi

In the *Star Wars* construct, a Jedi is "a Force-sensitive individual" who studies and uses its mystical energies for the good of the order. To prevent LOC-I accidents and adhere to the Pilot's Prime Directive of maintaining aircraft control, we pilots would do well to become GA Jedi. To develop from "Padawan" to Jedi Master:

- Make yourself "Force(s)-Sensitive" by increasing knowledge and understanding of the Four Forces of Flight. You need to understand how each one works, and how to manage them both individually and collectively to maintain aircraft control.
- Seek focused, disciplined training and practice on all aspects of aircraft control.
- Learn all you can about upset prevention, a term that refers to pilot actions to avoid a divergence from the desired airplane state. Awareness and prevention training can help you avoid incidents, because early recognition of an upset scenario coupled with appropriate preventive action often can mitigate a situation that could otherwise escalate into a LOC accident.
- Consider investing in upset recovery training, which aims to instill the pilot with the proper actions and behaviors to promptly return an airplane that is diverging in altitude, airspeed, or attitude to a desired state.

May the Forces be with you!

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Learn More

Advisory circular (AC) guidance is available at www.faa.gov:

- AC 61-67C Stall and Spin Awareness Training
- AC 120-109A, Stall Prevention and Recovery Training
- AC 120-111, Upset Prevention and Recovery Training

FAA video on LOC Accidents
www.faa.gov/tv/?mediaId=1231

SABRINA WOODS

GAJSC Who are They?

The Federal Aviation Administration is responsible for providing the safest, most efficient aerospace system in the world. The 1990s, however, saw a nasty aviation mishap trend when several commercial accidents occurred, culminating in Valujet Flight 592 crashing into the Florida Everglades, and Trans World Airlines Flight 800 exploding over the Atlantic Ocean. In response to these high profile accidents, and in order to ensure the safety of a rapidly growing commercial aviation system, the Commercial Aviation Safety Team (CAST) was founded. The team, made up of aviation industry and government partners, has researched, invested, and implemented the right tools, procedures, and technology upgrades to continuously reduce the fatal mishap rate. CAST has now moved beyond what was once considered a post mishap "reactive" way of doing business, to a more forward-thinking paradigm focused on data-gathering and analysis and good old fashioned word-of-mouth. The system has worked incredibly well for the commercial side, so when general aviation safety mishap rates began to stagnate, the FAA and several power-house industry partners decided to get together and make the magic happen again.

Enter the General Aviation Joint Steering Committee (GAJSC). Launched in 1997 and revamped in 2011, this "CAST" for GA is made up of the FAA, NASA, AOPA, EAA, and the General Aviation Manufacturers Association (GAMA), to name only a few. Their mission is to apply the same concepts that have worked so well for CAST to general aviation operations. They identify risks, pinpoint trends, do root cause analysis and come up with solutions.

The GAJSC is broken into three primary branches. The first is the steering committee which is co-helmed by the FAA's Director of the Office of Accident Investigation and Prevention (AVP), Wendell Griffin, and Bruce Landsberg from AOPA's Air Safety Institute. This section of the GAJSC is responsible for strategic-level guidance of the group. They also have the final approval on any safety plans the Safety Analysis Team (SAT) coordinates.

The SAT is the second branch and is co-chaired by Corey Stephens from AVP, and Jens Hennig from GAMA. The SAT uses various working groups (the third branch) consisting of subject matter experts from industry and government to identify future areas for study, gather data from various sources, develop safety plans for the GAJSC's consideration, and measure effectiveness.

Together, the branches employ a multi-tiered approach to the business of safety, everything from aircraft design and upgraded technologies, to engagement and outreach. The GAJSC, using data from NTSB and FAA, has identified the leading causes of fatal GA accidents. The primary accident causes during the past decade are loss-of-control, controlled flight into terrain, engine failures, and fuel-related accidents. The GAJSC started by systematically analyzing GA accidents, identifying risks in those accidents, and figuring out ways to prevent them from recurring.

You have likely heard or have seen some of what the GAJSC has come up with in your day-to-day aviation activities. The GAJSC is behind the push for angle of attack (AoA) indicator installation and training, and the additional pilot program for amateur-built aircraft. They placed the focus on pilot education about the risks associated with impairing medications. They are responsible for the #FlySafe safety campaign that has provided essential information to pilots about what they can do to ensure their aeronautical sailing is as smooth as possible. The GAJSC produces the safety enhancement topics you may have seen up at your local FSDO, FBO, online, and in this magazine. And in conjunction with International Helicopter Safety Team (IHST), the GAJSC is fighting to lower the civil helicopter accident rate by 80 percent this year alone.

The GAJSC employs a multi-tiered approach to the business of GA safety, everything from aircraft design and upgraded technologies, to engagement and outreach.

The GAJSC is made up of the industry's preeminent aviation leaders and they are focused, energized, and working hard to make general aviation as safe and reliable a mode of transportation as commercial air is today. In short, they are working for you.

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

Going Up?

TOM HOFFMANN

Taking Control of Your Takeoffs

Takeoffs are a breeze, right? Just firewall the throttle, keep the nosewheel on the centerline, and rotate at XYZ knots. While seemingly simple in procedure, takeoffs are a lot more complicated and, as accident data reveals, more deadly than most people might think. In fact, takeoff and departure accidents for GA have remained in a deadly pattern for more than a decade, averaging just under 150 per year between 2003 and 2012.

A dominant factor in these accidents is loss of control (LOC). As highlighted in the most recent Joseph T. Nall Report, LOC accounted for half of the 150 take-off and departure accidents in 2012 and nearly a quarter of those were fatal. A chief factor in both the frequency and lethality of takeoff and departure accidents is the limited amount of time pilots have to plan a response to an emergency or unexpected situation. You may have mere seconds to retain or resume control, so your actions need to be fluid and near-instinctive. That's also why you need to have a plan in mind (and rehearsed) well before you push the throttles to full blast.

For example, do you know where your abort point is? Did you account for runway conditions, temperature, and wind? How about weight and balance? And what's your plan should you encounter the eerie silence of an engine failure on takeoff? No pilot should ever leave the ground without giving careful thought to each and every one of these questions. Sadly, GA accident reports are rife with examples of pilots disregarding these important precursors of safety. Join me as we explore how to take back control of takeoffs.

Photo by James Williams

Strive to be Normal

A good place to start with takeoff safety is looking at what exactly comprises a "normal" takeoff. According to the FAA's *Airplane Flying Handbook*, a normal takeoff is one in which the airplane is headed into to the wind, or the wind is very light. Also, the takeoff surface is firm and of sufficient length to permit the airplane to gradually accelerate to normal lift-off and climb-out speed, and there are no obstructions along the takeoff path.

It would be nice if every takeoff conformed to those conditions, but in reality, it doesn't always play out this way. But just because you may not be lucky enough to have normal conditions doesn't mean you can't expect a normal outcome when taking to the sky. All it takes is solid preparation and legwork.

Windy Wisdom

It starts with the planning process — well before you even set foot inside the aircraft. As part of your preflight preparation, you'll want to carefully study weather conditions, taking note of wind direction and velocity. Both of these will help you estimate your direction of takeoff, anticipate wind correction inputs during taxi and takeoff roll, and determine if an existing crosswind component is within your (and your aircraft's!) comfort zone.

If there is a crosswind, be sure to use full aileron into the wind once you start the takeoff roll. As you feel increased pressure on the ailerons and they become effective for maneuvering, you can gradually reduce control input. You'll want to maintain some aileron pressure on the takeoff roll to prevent that upwind wing from lifting once airborne and to keep the airplane from side-skipping (see Fig. 1). Proper rudder control is also critical on the takeoff roll to keep the aircraft from becoming a giant weathervane and to correct for its left-turning tendency at full power. Crosswinds require a careful balancing act; overcorrecting or underestimating their effects can lead to a LOC situation in the blink of an eye. Practicing crosswind takeoffs with an instructor can help you fine tune your coordination as well as help develop your personal go/no-go threshold for future flights.

Studying the wind will also give you an idea of which runway is in use and allow you to plot out what landing options you might have should you lose power on takeoff. If you're in unfamiliar territory, studying the sectional should give you a good indication of where it may be safe to set down (fields, roads) as well as what areas to completely avoid (dense housing areas, office buildings). You can also

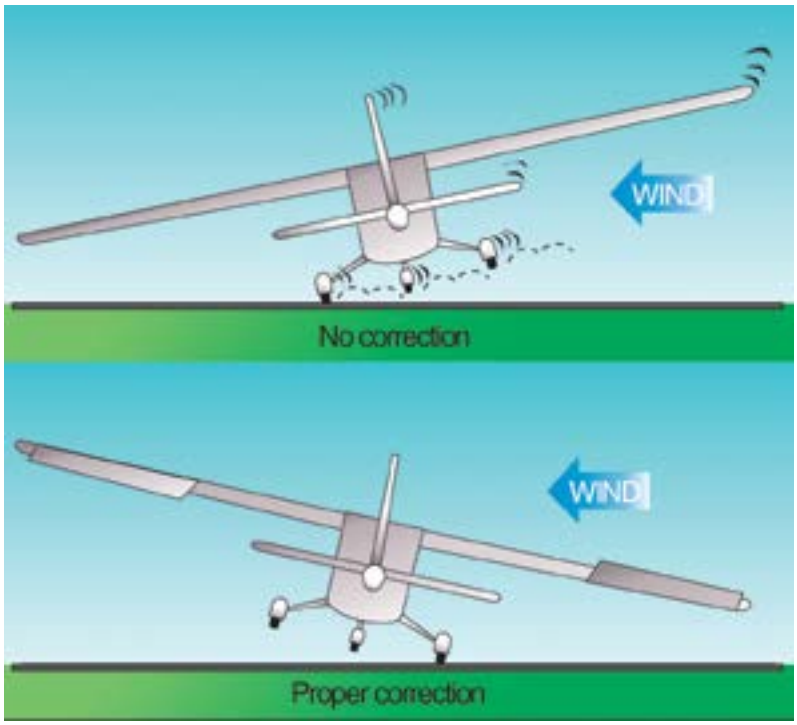

Fig. 1 – Correction technique for crosswind effect

check out Google Earth aerial maps on your smart phone or tablet, and ask a local pilot or instructor to help you get a better lay of the surrounding land. This will help you discover any hidden obstacles (trees, towers, power lines, etc.) that you'll want to factor in on your takeoff roll.

Another important consideration of your pre-flight weather research is density altitude. Being high, hot, and heavy before takeoff is often a disastrous mix. Be sure to check your aircraft's performance limitations with regard to temperature, altitude, payload, and how much pavement you'll need to get airborne. It can be an eye-opening experience when you run the numbers and see how much more takeoff distance you need to stay safe with high density altitude. It goes without saying that a weight and balance check should be a part of every pre-flight plan. Carrying extra weight (or less than you're used to hauling) can affect several aspects of your takeoff and departure, including ground roll and V speeds. (Always check your POH). If the numbers don't add up or are too close to call, consider delaying your takeoff until cooler and more performance-friendly conditions prevail.

Know Thy Runway

A huge factor in determining a successful and safe takeoff is studying up on the runway you plan to use. In addition to some of the more obvious things

Ten Common Errors on Takeoff

1. Failure to adequately clear the area prior to taxiing into position on the active runway.
2. Abrupt use of the throttle.
3. Failure to check engine instruments for signs of malfunction after applying takeoff power.
4. Failure to anticipate and/or properly correct the aircraft's left turning tendency.
5. Relying solely on the airspeed indicator rather than developed feel for indications of speed and controllability during acceleration and lift-off.
6. Failure to maintain proper lift-off attitude.
7. Inadequate compensation for torque/P-factor during initial climb resulting in a sideslip.
8. Over-control of elevators during initial climb-out.
9. Limiting scan to areas directly ahead of the airplane, resulting in allowing a wing (usually left) to drop immediately after takeoff.
10. Failure to attain/maintain best rate-of-climb airspeed (V_y).

like length, surface, and condition, you'll want to pick out some prominent landmarks, like a windsock or taxiway intersection at or near the halfway point along the runway. These will help provide a visual abort point should your takeoff not go according to plan. There's a good rule of thumb to estimate that abort point; you'll want to see 70 percent of your rotation speed (V_r) by the time you reach the halfway point.

Another somewhat more insidious factor for runways is slope. Taking off uphill can greatly affect your acceleration and ground roll and make obstacle clearance a teeth-gnashing experience if you don't account for it. There's also the matter of restricted visibility when you have a steep runway gradient; two pilots on opposite ends of a runway may easily lose line of sight with each other. Check the Airport/Facilities Directory (A/FD) or consult with local pilots for details on gradient. Some aircraft will have takeoff performance charts that factor in gradient. If not, a good rule of thumb is to add 10 percent to your effective runway length for every one percent of runway grade.

Obstacles are another common foe of safe takeoffs. Just how high is that tree at the end of the runway? Keep in mind that factors like grass, soft ground or snow will require a correction factor in that calculation. Once you're able to estimate the height of an obstacle — use the A/FD, Terminal Procedures Publications or a local pilot's knowledge to start — consult your POH/AFM to run the numbers on how much runway you'll need. Since these num-

Photo by James Williams

bers are never an absolute, it's best to hedge on the side of safety. Another good rule; add 50 percent to your numbers.

Laying the Groundwork

Many takeoff accidents are caused by simply overlooking basic but critical aircraft functions and configurations while still on the ground. A thorough preflight and strict adherence to checklists are the best tools you have to prevent complacency from creeping in. They can also help prevent that "taxi of shame" moment after you realize there's a big red REMOVE BEFORE FLIGHT flag dangling from your left wing.

Some less obvious, but no less critical things to check include tire pressure, trim tabs (set for takeoff?), flaps (set as needed?), and flight controls (free and correct?) Some people might get the free part, but take for granted they're correct. Make sure everything moves the way it's supposed to, especially if your bird's been in the shop recently. A good opportunity to double check this is when you're holding flight control corrections for wind on taxi. Barreling down the runway at full speed is the very last place you'll want to discover that your elevator is rigged in reverse or that a control lock is still in place.

The Impossible Turn

It would be hard to talk about takeoff risks without mentioning the dreaded engine failure on takeoff. Seconds matter, so you should always be mentally prepared for what to do in this situation. Otherwise, a poor decision, or no decision at all, will likely result in tragedy.

A good plan for handling a loss of power on climb-out should always involve maintaining control and flying the aircraft first. At climb pitch attitude with no power you'll be close to a stall, so lowering the nose (reducing angle of attack) is imperative. Some pilots will instinctively react by turning back towards the safety of the runway they just departed. This aggressive maneuver may require more altitude and airspeed than you can spare, not to mention the danger of conflicting traffic. Circumstances will vary, but the general recommendation is to establish a controlled glide toward the safe landing spot you hopefully have already scoped out during your preflight prep. Knowing — and quickly establishing — your best glide speed will go a long way toward ensuring you are able to maximize your choices for a place to set down safely.

Boiled down to the basics, takeoffs are not generally a difficult maneuver. But without the right planning and preparation, it's the phase of flight than can be least forgiving if something goes awry. If something doesn't look or feel right to you, stop and give yourself more time to review your situation. As the saying goes, takeoffs are optional, but landings are mandatory.

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

SABRINA WOODS

SURPRISE!

Combating the Startle Effect

Photo by Adrian Eichhorn

Who doesn't like a good surprise? Like the kind when someone you care about meets you somewhere unexpected, or when you receive a nice treat from out of the blue. Those surprises are almost always welcome, but when the "surprise" comes at 5,000 feet and going 100 kts, it can often lead to mishap. Between 2001 and 2014, over 40 percent of fixed wing GA accidents occurred because pilots lost control of their airplanes during various phases of flight. The "startle effect" has definitely played a prominent role in many of those accidents.

For many pilots, the cockpit is starting to be quite a busy place as more and more technological upgrades are introduced. Dazzling electronic and LCD flight deck arrays are replacing traditional analog gauges. Electronic flight bags (EFB) can tell you almost everything you want to know with a single finger swipe. ADS-B In and Out monitor traffic. Once you've hit that desired altitude and cruise speed, an autopilot can take over, leaving you to sit back, relax, and observe the progress of your flight.

Everything is perfect. That is, until your autopilot switches off for a reason unknown to you and you don't realize it. Or that electronic array goes out leaving you, quite literally, in the dark. Or an aural warning from your terrain avoidance system sounds and doesn't correlate with what you think to be true. Or worse, the stick starts rattling violently, desperately trying to get your attention even as you cannot identify the reason why. These are all nasty surprises that have been suspected causal as the factors in a loss of control in-flight (LOC-I) mishap.

What is the Startle Effect?

To "startle" is the result of a sudden shock that can disturb or agitate the recipient. Also known as the "limbic hijack" or colloquially as "fight or flight," it is a response to an unexpected stimulus. The limbic center is that part of our brains that rules our reactions to things — typically, without the benefit of any additional logic or reason. The result of limbic hijack can cause a person to have an involuntarily physical reaction (e.g., jerking back on the yoke), can induce a significant emotional or cognitive response (e.g., fear, confusion, or anger), or can simply cause a person to freeze in place. In the latter, inaction can often exacerbate a problem just as much as failing to provide the right corrective action can.

Automation or aviation startle occurs when something in the aircraft suddenly deviates from its expected performance, resulting in one of the aforementioned responses. The startle effect can lead to distraction or fixation, which can lead to calamity. In one tragic example, a Cessna 421 *Golden Eagle* on a nighttime instrument meteorological conditions (IMC) flight over terrain experienced a vacuum pump failure at approximately 27,000 feet. The post-mishap investigation revealed that the autopilot was also likely malfunctioning, possibly forcing the pilot to take manual control of the aircraft. In the confusion, the pilot subsequently lost control and dove 10,000 feet before an in-flight break-up commenced.

Automation startle typically follows one of two gambits. The first is the "without warning" surprise that can leave you completely unaware of what is actually happening. The second is what I call the "three-alarm-fire" scenario. This is when an alarm (or several) goes off and it can be even more jarring than the problem itself.

Without Warning

When the cockpit voice recorders were finally recovered from the lost Air France Flight 447, they revealed that the last words of the crew were "… we're going to crash! This can't be true. But what is happening?" The flight entered the waters of the Atlantic Ocean at a tremendous rate and the crew never fully understood what was happening to them.

While we rarely have the benefit of CVRs to study in general aviation mishaps, there is no doubt that the "What is it doing *now*?" sentiment prevails in many. This "without warning" form of automation surprise is insidious, can sneak up on you and put you in a precarious situation before you have a full grasp of what is happening. While automation is a wonderful tool, it can sometimes lull you into complacency. You believe everything is going as it should, because why wouldn't it? Incidents born of this category of automation startle are typically the result of failing to carefully monitor cockpit instruments and gauges, and missing when something goes wrong.

Luckily, prevention is really very easy. Benjamin Franklin is credited with observing that "An ounce of prevention is worth a pound of cure." So first and foremost, ensure you and your bird are ready to go way before you ever get wings aloft. Running your personal minimums checklist, making sure you are mentally and physically ready to fly, and conducting a solid in-depth preflight are just parts of this. These are the steps that can make sure nothing goes wrong later.

Next, it is all about the scan. Monitor those gauges; don't take them for granted! Practice your desired scan pattern on the ground so it becomes second nature, then stick to it in the air. Even though many of the latest advancements help take the burden of manual flying, it is your job to continuously observe and monitor the execution of things. A careful scan should help you pick up quickly when something stops working as it should. It also gives you much more time to deal with the situation.

Deviating from your scan or fixating on just one instrument or gauge can mean you might miss something, or worse, can lead to spatial disorientation — another common catalyst for loss of control. In a very well-known fatal mishap, John Fitzgerald Kennedy Jr. was flying in hazy weather at night over water. He likely succumbed to spatial disorientation when what he thought to be true differed greatly from what was actually happening. He eventually lost control of his Piper *Saratoga* and crashed just off the coast of Martha's Vineyard. None of the three on board survived.

Photo by Tom Hoffmann

Maintaining a careful scan should help you pick up when something stops working as it should.

Photo by James Williams

Should you ever encounter a conflict between what you think (and feel) is happening and what your gauges say, go with the gauges. Remember, there are no red bars or warning lights for the human body when it has been compromised.

Three-Alarm-Fire

While in cruise flight, the pilot of a Raytheon A36 (Beechcraft Bonanza) was switching fuel tanks when the engine suddenly lost power and several gauges illuminated with warning indicators. While he was busy trying to interpret the gauges and troubleshoot the issue, the pilot failed to continue flying the aircraft. At one point, ATC radioed the pilot to advise that he was "flying in circles and losing altitude." Alarmed, the pilot thought the plane was in a spin. As he struggled to regain control, he entered a stall and wound up crashing into a cornfield at a high rate of speed. The pilot, although seriously injured, survived the mishap. This is an example of what I call the three-alarm-fire; a situation in which so many things are happening at once that a pilot can become overwhelmed and lose focus on the core issue.

Incidents born of this category of automation startle are typically the result of failing to carefully monitor cockpit instruments and gauges, and missing when something goes wrong.

Several preeminent human factors specialists have recently theorized that an alarm might result in worse distraction to the pilot than the underlying issue (i.e., the reason for the alarm). The alarm startles the pilot and diverts attention from the priority of flying the airplane. For instance, the "stick shaker" is highlighted as being the single most disruptive warning, often triggering a fight or flight response. Although some would argue that "scaring the daylights" out of a pilot is exactly what it was meant to do, others agree that alarms are meant to point you in a direction that needs attention, not put you in cardiac arrest.

While these new theories are being considered in the latest rounds of aircraft design and manufacturing (e.g., alarms featuring a gradual run up instead of the startle) you can prevent this form of automation surprise from getting the best of you by preparing ahead of time. Recognize the failure modes of your instruments and systems and read up on what they mean. You should be very familiar with all the contents of your airplanes Pilot's Operating Handbook or Airplane Flight Manual.

Prior experience can often be the best mitigation tool. Many of the scenarios that lead to mishap arise from problems the pilot has never encountered, so there is no ready response. Developing and running through scenarios and corrective actions with a CFI, possibly in a flight training device is a great way to build some of that experience without actually being in a real-life situation where the learning curve (and consequences) gets immensely steeper. Last, just in case the initial situation ever does get away from you, another great idea is to invest in upset recovery training. It is a great opportunity to receive ground and hands-on training that might prove invaluable later.

Maintain Good SA

Simply put, the best way to avoid nasty surprises once in the air is to maintain constant awareness of what is going on around you. Aviation situational awareness (SA) is equal parts information gathering, painting a mental picture, and anticipating what might happen, and then using all of this data to control the aircraft. In the information gathering phase, your scan, plus any additional information you glean from traffic and weather reports, help you build that all-important sight picture. With that picture, taking time to consider what might go wrong at each crucial interval helps you to be ready to spring into action if needed.

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

Checklist

SUSAN PARSON

Mastering the Machine

If you haven't read David McCullough's *The Wright Brothers*, I highly recommend it. I enjoyed it for many reasons, but the most relevant one for this issue's focus on avoiding Loss of Control (LOC) is the discussion of how Wilbur and Orville learned the basics of aircraft control. As McCullough explains:

> *Equilibrium was the all-important factor. (…) The chief need was skill rather than machinery. It was impossible to fly without both knowledge and skill, — of this Wilbur was already certain — and skill came only from experience — experience in the air.*

In many ways, the history of aviation is very much the story of aircraft control. As you may know, spins — the ultimate loss of control — were initially considered "unpredictable" in terms of occurrence, though painfully predictable in terms of their fatal outcome. The first (accidental) spin recovery took place in 1912, but it was another two years before Henry Hawker successfully recovered from an intentional spin over England. It took three more years for experiments by English physicist Frederick Lindemann to produce an understanding of spin aerodynamics.

It's not an exaggeration to say that we modern pilots are still struggling to master the art and science of aircraft control. However, thanks to the bravery of pioneers like Lindemann and those who have built on his work, today's pilots — both novices and experienced aviators — have a wealth of resources to help us develop the knowledge and skill to keep our magnificent machines under control. I hope you have already found and absorbed some of the many excellent books and videos that industry experts have developed. You can also benefit from these FAA resources:

Stall and Spin Awareness Training (AC 61-67C) http://go.usa.gov/cU57k

This advisory circular (AC) explains the stall and spin awareness training required under 14 CFR part 61 and offers guidance to flight instructors who provide that training. In addition, it informs pilots of the airworthiness standards for the type certification of normal, utility, and acrobatic category airplanes prescribed in 14 CFR part 23, section 23.221, concerning spin maneuvers.

Stall Prevention and Recovery Training (AC 120-109A) http://go.usa.gov/cU5AC

Revised in November 2015, this AC provides guidance for training, testing, and checking pilots to ensure correct responses to impending and full stalls. Although this AC guidance was created for operators of transport category airplanes, many of the principles apply to all airplanes. Core principles include reducing angle of attack (AoA) as the most important pilot action in recovering from an impending or full stall.

Upset Prevention and Recovery Training (AC 120-111) http://go.usa.gov/cU5AR

Issued in April 2015, the goal of this AC is to describe the recommended training for airplane Upset Prevention and Recovery Training (UPRT). AC 120-111 emphasizes comprehensive pilot academic training on aerodynamics, early recognition of divergence from intended flightpath, and upset prevention through improvements in manual handling skills.

Transition to Unfamiliar Aircraft (AC 90-109A) http://go.usa.gov/cU5sT

Updated in June 2015, this AC is primarily intended to help plan the transition to any unfamiliar fixed-wing airplanes, including type-certificated and/or experimental airplanes. It is relevant to the topic of maintaining control because it includes recommendations for training in experimental airplanes in groupings based on performance and handling characteristics.

Angle of Attack (AoA) Awareness Video (www.faa.gov/tv/?mediaId=1172)

This awareness video presents an analysis of AoA devices in the GA environment. It promotes FAA policy concerning non-required/supplemental AoA based systems for GA airplanes. More on the installation, training, and use of AoA systems can be found in InFO 14010 (http://go.usa.gov/cU5vC)

Coming Soon – Airplane Flying Handbook (FAA-H-8083-3) Revision

Working with a number of industry experts, the FAA is making substantial revisions to the *Airplane Flying Handbook's* treatment of this topic. Expected in June 2016, FAA-H-8083-3B will include a chapter called "Maintaining Aircraft Control."

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.*

WILLIAM E. DUBOIS

Stupid Runway!

Techniques to Avoid Joining the Crash Landing Club

A brisk crosswind (but within your aircraft's crosswind component and your personal minimums) has messed up your beautiful turn to final. The stupid runway is not in front of you as planned. It's now to the left. To realign, you bank left. Oops! Now you need to pull the nose up a hair to keep your descent rate on target. Hey … what's that funny vibration …?

And just like that, you become an accident statistic.

Nearly half of all non-commercial general aviation accidents happen during landings, go-arounds, and takeoffs, according to the *24th Joseph T. Nall Report*, the seminal yearly deep dive into general aviation accident statistics from AOPA's Air Safety Institute. The report attributes this type of crash to "poor airmanship." The National Transportation Safety Board has another label. They define this type of crash as "loss of control," a tagline that suggests they are fully preventable had the pilot stayed in control of the aircraft.

While other types of GA accidents, like controlled flight into terrain, fuel starvation, or flying from visual conditions into instrument meteorological conditions have been dropping over time, loss of control crashes remain fundamentally unchanged, and have now become the lion's share of pilot-killers. The FAA, the industry, and pilots' organizations are all focused on ways to change this. The Experimental Aircraft Association (EAA) is even offering a $25,000 cash prize for the person who comes up with the best idea for reducing loss of control accidents.

As the majority of these loss of control accidents happen during landing operations, let's talk about landings. What makes a good landing? Well, don't judge a landing by its flare. That guy who just bounced three times on touchdown might just have out-flown the gal who greased her bird onto the runway. That's because, in truth, a good landing starts on the downwind.

A landing that looks smooth, but is really an aerobatic performance of constant changes in roll, pitch, and power to stay on target and achieve a constant glide path is really just a plane crash waiting to happen. Gross changes to stay on target aren't stable, and the current playbook for safe landings is called a *stabilized approach*.

The Stabilized Approach

Long used by airline pilots, the stabilized approach is now the recommended landing technique for all airplanes. It's officially defined in the *Airplane Flying Handbook* as an approach "in which the pilot establishes and maintains a constant angle glidepath towards a predetermined point on the landing runway." But it's much more than that. It's establishing a configuration that doesn't require significant changes to power and pitch to maintain a constant glide angle and speed.

A key element of the stabilized approach is rock-steady final descent airspeed with the plane trimmed for minimum control pressures — nearly "hands off flight." (But don't you dare take your hands off during a landing!)

Of course, that's not to say that some changes of pitch and power don't occur during stabilized approaches, but they should be more like minor tweaks than corrections. In the FAA parlance, "slight

Photo by Lisa Bentson

and infrequent adjustments" should be all that's needed to maintain a stabilized approach.

The stabilized approach is built on observing visual cues outside of the cockpit. A growing runway sight picture that does not change in shape. An aiming point on the runway where you will start your flare that doesn't appear to move as you approach it. And remember that the aiming point isn't the touchdown target. Rather, it is the spot in which your plane would smack into the runway if you neglected to roundout and flare. Touchdown is downstream of the aiming point due to the float effect of flare.

The goal of all of this? Quoting again from the *Airplane Flying Handbook*, "With the approach set up in this manner, the pilot will be free to devote full attention towards outside references." More bluntly put, there's enough to concentrate on in landing that a stabilized approach removes variables and greatly increases safety.

And it's not only the FAA that champions the stabilized approach for general aviation airplanes. The tongue-twisting General Aviation Joint Steering Committee's Loss of Control Work Group, an FAA/industry collaboration whose goal is to reduce the fatal accident rate in general aviation, included stabilized approaches as a key element of changes it recommended in aeronautical decision-making education. They also focused on the stabilized approach as one of their recommended safety enhancements and urged both the FAA and the industry to "promote and emphasize the use of the stabilized approach," even going so far as recommending in 2012 that stabilized approaches be added to the practical test standards. The FAA has since adopted this recommendation in the Practical Test Standards for sport pilot and up.

Naturally, the alternative to the stabilized approach is the *unstabilized* approach, one that requires more than just "slight and infrequent adjustments." An unstabilized approach involves gross corrections and, while there might be an endorphin rush to pulling a bad landing out of the fire, the reality is that rescuing a bad approach is a near miss when it comes to loss of control. *Un*stabilized approaches also include those that feature poor drift correction on base, over or undershooting the turn to final, and flat or skidding turns — all configurations that put the plane at risk when it's low and slow.

The bottom line is that if small corrections can't fix the problem, your approach isn't stable. So what next?

You should abort the landing and go around.

Go-arounds

We usually think of go-arounds as a technique to avoid things that happen on the ground in front of us. Crazy things happen on short final. Examples from the author's personal experiences alone include: a tractor pulling out onto the runway from the cornfield beside it; another plane taking off on the reciprocal runway; the plane landing ahead stopping dead in the middle of the runway and staying there for no apparent reason; and a small herd of deer galloping across the numbers. Wait, do deer gallop? Maybe it was more of a loping, bounding motion. But either way, hitting one or more deer would be a violent end to an otherwise lovely flight.

We should also realize that the problem is not always with the ground; rather it's with the plane or

the plane's relationship to the ground. Sometimes the wind changes suddenly. Sometimes your stabilized approach de-stabilizes. Other times your approach is just plain ugly and salvaging it requires unstabilized maneuvers. We need to accept that the go-around is the only solution to an unstabilized (or de-stabilized) approach due to either unforeseen circumstances, or those of our own making.

Go-arounds, like landings, have a high level of accident statistics associated with them, so the skill set required to execute a smooth go-around — and the mental willingness to execute it — is a key component of the capable pilot's tool kit. The recipe, in this order, is: power, attitude, and configuration. ("PAC it in" is the memory cue.) Bring the throttle up smoothly and smartly. As speed increases, establish a climb attitude. Once the plane is climbing it's time to clean it up, raising flaps first, then the gear.

Tech to the Rescue?

Pop Quiz: What's the stall speed of your favorite airplane?

Whatever answer you just gave, it's wrong.

Sorry, but stall speed is a myth. Despite the fact that you've memorized the stall "V" speeds to impress your examiner, and the fact that colored arcs on your airspeed indictor show you what speed your plane is supposed to stall at, it's all smoke and mirrors. The April 2015 Addendum to the *Instrument Flying Handbook* says it best: "Speed by itself is not a reliable parameter to avoid a stall. An airplane can stall at any speed."

The truth is that a plane's stall speed changes with weight, bank angle, temperature, density altitude, and center of gravity — all of which vary throughout even the shortest of flights. However, the one thing that never changes is the critical angle of attack, the angle between the wing and the oncoming air at which the wing stalls. Once a wing reaches a severe enough angle, it stops flying. And so does your plane.

The problem is that there's no way to see the angle of attack by looking out the window at the wing. Cloaked in multiple layers of variables, angle of attack remains invisible to the naked eye. But luckily for us, there's a technological solution to bring it out of the shadows and into the cockpit: the Angle of Attack, or AoA Indictor. Generally mounted above the instrument panel so that it's in plain sight where your eyes should be during landing, most AoA indicators feature color-coded lights and symbols that show how near to a stall the wing is, and what direction to change pitch to lower the stall risk if it develops.

If you own an airplane, it will set you back about the cost of an annual inspection to purchase an AoA indictor and have it installed. That's quite a pinch on the wallet and can be hard to justify for some older, low-value GA aircraft. But on the other hand, it will greatly reduce the chance that your family will get to cash in on your life insurance policy. So much so, in fact, that in 2014, the FAA simplified the design approval requirements for supplemental AoA indicators. Not only was design approval simplified for indicator manufacturers, but in aircraft that don't include an AoA indictor as part of the type certificate, the FAA now allows them to be installed by a mechanic as a minor alternation. That means they can be installed in pretty much any GA plane without requiring an act of congress to do so.

Back to Where We Started

A brisk crosswind (but within your aircraft's crosswind component and your personal minimums) has messed up your beautiful turn to final. The stupid runway is not in front of you as planned. It's now to the left. To realign, you bank left. Oops! Now you need to pull the nose up a hair to keep your descent rate on target. Suddenly, your AoA indicator flashes red and signals you to get your nose down. You push forward and level the wings. The AoA returns to green, but the runway is still left and you've busted through your landing speed. Your approach has destabilized.

You shrug. Live to fight another day. You smoothly apply full power, pickup speed, and start the go-around.

And just like that, you avoid becoming an accident statistic.

William E. Dubois is an aviation writer whose work appears in a wide variety of aviation publications. He is a commercial pilot and ground instructor, has a degree in aviation, and holds a world speed record. He blogs his personal flying adventures at www.PlaneTales.net

Learn More

FAA InFO 14010 – Installation, Training & Use of Non-required/Supplemental AoA Based Systems for GA Airplanes
http://go.usa.gov/cnt8Q

Advisory Circular 61-98C (Flight Review Guidance), Chapter 2, page 6 – Criteria for Stabilized Approaches Conducted in GA Airplanes
http://go.usa.gov/cQ3Mm

It Ain't Over 'Til it's Over ...

When you think of the end of a flight, what comes to mind? If you're honest, it's probably that moment the wheels touch down (hopefully smoothly) on the runway and the airspeed bleeds off. I know I've been guilty of this faulty assumption as well. It's easy to understand why there's a good bit of relief to be "on the ground" again, especially if the flight didn't exactly go as planned. You may even feel that all of the flying is done. But, the reality is that your flight doesn't really end until you are out of the airplane and safely back to the FBO (Fixed Base Operator) or your car. There are safety concerns that start before takeoff and last until well after landing.

Keeping it Down on the Ground

Airplanes make really lousy cars. There are a few manufacturers working very hard to change that, but as a rule, airplanes just aren't that great when it comes to ground handling. In fact most of the things that make an airplane a good airplane make it more challenging as a ground vehicle. The small tires, narrow track, high center of gravity, and three wheel configurations (particularly with nose gear) make for one of the worst possible ground conveyances this side of a unicycle with a flat tire. And that's before you consider all of those large aircraft surfaces that actively work against you keeping the aircraft of the ground (i.e., wings and horizontal stabilizers). But never fear, here are a few suggestions to help you finish the flight without a mishap.

- Keep your speed down: While you want to be as expeditious as possible, it's also important to discourage unintended flight by keeping a healthy gap between your taxi speed and V_r, especially in windy conditions.
- Know your wind: Remember that the wind direction and speed don't cease to be important after touchdown. Just as you correct for a crosswind on takeoff and landing, correcting for wind during taxi is equally critical.
- Know where you're going: Nothing ruins your day like a runway incursion. Trust me — I've been there. Neither the offending or offended party wants anything to do with that. In today's world of endless information, it's easy to bookmark or even print out an airport diagram for use in navigating your way around. And remember that when in doubt, hold short.

A Dash to the Finish Line

Finally you've pulled into the parking spot. You're done, right? Not so fast. While the loss of control threat may have ended, you're not out of the woods just yet. The ramp is full of potential safety challenges, especially for any passenger unfamiliar with the GA environment. At night, and even sometimes during the day, things like tie downs, equipment lockers, tow bars, light poles, and of course, the propellers, can represent dangers from mild to deadly. This is why you should brief your passengers on what to expect and what they should and shouldn't do after parking. Make sure you have the airplane secured and are prepared to shepherd your passengers before you "turn off" the seat belt sign. This is especially important in aircraft like Bonanzas or some Pipers where they may have to exit the aircraft before you. Even things that seem like second nature to you (like the step down off a low wing airplane) could present a hazard to an inexperienced passenger. A quick briefing could limit the risk and make your passengers feel more comfortable. As a GA ambassador, it's your job to safely escort your guests through a world that may be strange to them.

Flight control positions during taxi.

Your flight doesn't really end until you are out of the airplane and safely back to the FBO.

There is a world of safety implications to consider when your aircraft is still ground bound. It's easy to overlook given the anticipation of your upcoming flight or the relief of its being over. To help you maintain the right mindset, just remember the words of the late great Yogi Berra: "It ain't over 'til it's over."

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

ROLL *of* HONOR

Wright Brothers *Master Pilot Award*

The FAA's most prestigious award for pilots is the Wright Brothers Master Pilot Award. It recognizes pilots who have demonstrated professionalism, skill, and aviation expertise by maintaining safe operations for 50 or more years. The following master pilots were recognized in 2015. For more about the award, go to faasafety.gov/content/MasterPilot.

Roger Brown	AK
David Cochran	AK
Bruce Moroney	AK
Stuart Sibitzky	AK
Marie Carastro	AL
Lawrence Carastro	AL
John Gamble	AL
Kenneth King	AL
Frank Patten	AL
Jimmy Shehee	AL
William Snead	AL
James Weir	AL
Woodrow Williams	AL
Thomas Beasley	AR
James Brown	AR
Kenneth Schreiber	AR
Richard Bowden	AZ
James Cheney	AZ
Donald Finn	AZ
Gail Halvorsen	AZ
Westly Hoffman	AZ
John Keller	AZ
John Kerekes	AZ
Daniel Meyer	AZ
Leslie Morris	AZ
Joseph O'Neill	AZ
Phillip Pearce	AZ
Charles Perry	AZ
James Wallace	AZ
Clarence Anderson, Jr.	CA
Chester Chang	CA
Dan Chauvet	CA
Guy Fortier	CA
Robert Francis	CA
Morton Groves	CA
John Hazlet, Jr.	CA
Michael Herman	CA
Russell Hopf	CA
Raymond Kinney	CA
Donald Laurila	CA
Michael Lawrence	CA
Warren Lev	CA
George Lewis	CA
Mark Lindberg	CA
Carl Lindros	CA
Strohm Lippert	CA
Dennis Nikolaus	CA
John Moore	CA
Donald Oaks	CA
Rodney Philbrick	CA
David Pinsky	CA
Walter Ramseur	CA
Robert Rider	CA
Ralph Riffenburgh	CA
Robert Rinehart	CA
Terry Rinehart	CA
William Roberts	CA
Michael Rossi	CA
Jack Washington	CA
James Weddell	CA
Herbert Zuidema	CA
John Bradford, Jr.	CO
James Charnesky	CO
James Dunlop	CO
Robert Fobes	CO
James Hughbanks	CO
Michael Larson	CO
Howard Morgan, Jr.	CO
Stanley Peters	CO
John Singer	CO
David Walmsley	CO
Emily Warner	CO
Robert White	CO
Salvatore Manganaro	CT
William McKenzie	CT
John Seymour	CT
David Barron	FL
William Bauer	FL
Dick Blue	FL
Richard Boehmke	FL
Walter Bradshaw	FL
Harold Britton	FL
Theodore Brousseau	FL
Jon Brown	FL
John Castronover, Jr.	FL
William Corely, Sr.	FL
Richard Dayton	FL
David Dollarhide	FL
Daniel Duran	FL
Charles Ebbecke	FL
Orval Fairbairn	FL
Jay Gathmann	FL
Henry George	FL
Peter Hecht	FL
Carles Hewison	FL
Arthur Hurst	FL
Frank Karins	FL
Michael Kelly	FL
John Kihm	FL
Charles Kohler	FL
Jerome Kulesia	FL
Stephen Lester	FL
Charles Lopez	FI
Troy Mashburn	FL
Douglas Matthews	FL
Lawrence McClure	FL
Charles Melot	FL
Werner Meyer	FL
James Naylor	FL
Burton Olson	FL
Paul Posti	FL
Paul Posti	FL
Roger Ringelman	FL
Frank Schulte	FL
Ronald Stuke	FL
Stanley Tooley	FL
Terry Trappen	FL
James Naylor	FL
James Vitale	FL
David Wimberly	FL
Robert Bible	GA
Paul Bishop	GA
Asa Brown, Jr.	GA
Billy Bryant	GA
James Giles, Jr.	GA
Rick Gowthrop	GA
Albert Koller	GA
Terry McDowell	GA
Robert Meadows, Jr.	GA
Robert Ramsay	GA
Thomas Stachiw	GA
Charles Weems	GA
Lyle Brooksby	HI
Robert Frost	HI
Jamie Alexander	IA
Carl Carson	IA
Allan Culbert	IA
Homer Focht	IA
William Gross	IA
Donald Gurnett	IA
John Hemann	IA
Roger Oppedahl	IA
Ernest Smith	IA
Terry Spitzer	IA
Joseph Spreitzer	IA
Lynn Taylor	IA
Morris Trimble	IA
Norman Yeager	IA
Charles Allen	IL
Barbara Brusseau	IL
Dwight Dendy	IL
Daniel Deufel	IL
Carroll Dietz	IL
Carl Heinrich	IL
Kermit Kirby	IL
Paul Kirik	IL
Robert Lasecki	IL
Charles Midyett	IL
Matthew Poleski	IL
William Ritchie	IL
Dominick Ruscitti	IL
Stephen Schilling	IL
Gerald Spear, Jr.	IL
John Spitzer	IL
Walter Szeremeta	IL
William Terbell	IL
Donald Weder	IL
George Werderich	IL
Robert Wildenradt	IL
Donald Born	IN
John Brill	IN
Bruce Epmeier	IN
Berl Grant	IN
Richard Norris	IN
Larry Powell	IN
William Reeves	IN
Gary bailey	KS
Ronald Blaha	KS
Marilyn George	KS
Brian Hancock	KS
Richard Henkle	KS
Richard Henkle	KS
Allan Kirby	KS
Earl Knighton, Jr.	KS
Rudolph Bertsch	LA
Paul Borgatti	LA
Hypolite Landry, Jr.	LA
Peter Conner	MA
Richard Farrell	MA
Alfred Huey	MA
John Race, Jr.	MA
Gilbert Pascal	MD
Mary Carpenter	MI
Mary Creason	MI
Jay Dean	MI
Ronald Fritz	MI
Geoffrey Geisz	MI
Walter Hancook	MI
Daniel Holtzclaw	MI
Fred McClellan	MI
Charles Moore	MI
Wayne Phillips	MI
Richard Sipp	MI
Maisie Stears	MI
Nihl Storey	MI
Arthur Sundeen	MI
John Wagner	MI
Jerry Zerbe	MI
James Hancock	MN
Donald Horton	MN
Forrest Lovley	MN
Roger Poore	MN
Terrel Stern	MN
James Williamson	MN
Truman Cole, III	MO
Rockney Dollarhide	MO
Carl Henke	MO
Alvin Howard	MO
Thomas Kuhn	MO
Ronald Magos	MO
Curtis Sanders	MO
Peter Sherwin	MO
Robert Spiegel	MO
Charles Stone	MO
Jay Underdown	MO
Aero English	MS
Andrew Greenwood	MS
Bennie Kirk	MS
Edward Segar	MS
Larry Ashcraft	MT
Kenneth Wendland	MT
Gary Woltermann	MT
Henry Balch, Jr.	NC
Martin Beckman, Jr.	NC
John Beyerle	NC
Billy Brooks	NC
Phillip Clegg	NC
Jerald Gartman	NC
Saul Hyman	NC
David Ivey	NC
Richard Miles	NC
Richard Miller	NC
Monroe Miller, Jr.	NC
Lloyd Morgan	NC
Charles Thomas	NC
George Welsch	NC
Larry Dahl	ND
Richard Gunter	ND
Lyndon Thompson	ND
Daniel Peterson	NE
Varel Freeman	NH
Gerry Hawes, III	NH
K. Kloeppel	NH
Robert Beavis	NJ
Michael O'Connor	NJ
W.B. Todd, Jr.	NJ
W.B. Webster, Jr.	NJ
David Johnson	NM
Robert Mudd	NM
Morris Newton, Jr.	NM
Michel Aiello	NV
John Brown	NV
Guido Deiro	NV
Daniel Eikleberry	NV
Lawrence Grihalva	NV
Jules Kabat	NV
Gordon Kraus	NV
Maurice Leach	NV
Frank Monroe	NV
George Pinjuv	NV
William Schroeder	NV
Robert Shawhan	NV
Larry Wilkinson	NV
Alex Alexander	NY
Thomas Cawley	NY
Frank D'Angelone	NY
Cary Frankel	NY
Walter Gezari	NY
Howard Huff	NY
Vernon Johnson	NY
Walter Kahn	NY
Allen Kidder	NY
Thomas Melito	NY
John Ogozalek	NY
James Baldwin	OH
Jerry Benson	OH
John Ference	OH
Jeffery Fine	OH
Banard Kemter	OH
Richard King	OH

Mark Miller	OH
Thomas Padovano	OH
Thomas Palmer	OH
Sandford Vaughn, Jr.	OH
James Brooks	OK
Len Kauffman	OR
Allen Patterson	OR
John Shearer	OR
James Anderson	PA
Ronald Barone	PA
Eugene Cosklo	PA
Arthur Cunningham, Jr.	PA
Joseph Englert	PA
James Falcione	PA
Jeffery Halliday	PA
Robert Noll	PA
Jack Ruland	PA
Russell Schleiden	PA
Phaon Shafer	PA
Douglas Decker	SC
Jesse Garrison	SC
Richard Hawkins	SC
Fleet Jones	SC
William Simmons	SC
John Stickney	SC
Milton Stombler	SC
Larry Yon	SC
Donald Blumenberg	SD
Allen Neal	SD
John Baugh, Jr.	TN
Ted Beckwith, Jr.	TN
Robert Falk	TN
Jerry Kirby	TN
Robert Langston	TN
Thomas Lawrence	TN
Walter Peters	TN
Robert Stow, Sr.	TN
Owen Yarbrough	TN
Lorraine Adams	TX
Harvey Argenbright	TX
William Arnold	TX
Marcus Blacketer, Jr.	TX
Jay Blume	TX
James Brice	TX
Arthur Brown	TX
Cletus Browne	TX
Curtis Bumgarner	TX
Jerry Burke	TX
Byron Burris	TX
Michael Carlozzi	TX
Daniel Cerna	TX
Paul Chapman	TX
Joe Christian	TX
Clarence Corbin	TX
Henry Dainys	TX
Ronald Damrill	TX
Danny Duewall	TX
Dale Eddy	TX
Kent Ellis	TX
James Evans, Jr.	TX
Richard Fairlamb	TX
Homer Feucther	TX
James Gardner	TX
John Gary	TX
Frederick Genett	TX
Frederick Genett	TX
John Gray	TX
Charles Hair	TX
Curtis Hamme	TX
David Herron	TX
Richard Hewgley	TX
Claude Hobbs	TX
Barry Howard	TX
Dwain Ideus	TX
Robert Johnston, Jr.	TX
Lawrence La Beau	TX
Howard Landry	TX
John Latson	TX
Thomas Latson, Jr.	TX
Woody Lesikar	TX
Raymond Lewis	TX
Sidney Lotz, Jr.	TX
Michael Lovelace	TX
Clyde Lynn, Jr.	TX
Larry Mann	TX
Duane Martin	TX
Michael Mckenna	TX
Kenneth Medcalf	TX
Samuel Merrill	TX
Gene Miller	TX
Fred Mooney	TX
Daniel Nicholson	TX
Richard Norat	TX
Jon Pricer	TX
Ronald Rice	TX
Jimmy Rollins	TX
Robert Skinner	TX
Larry Smith	TX
James Speight, Jr.	TX
Michael Vance	TX
Rogers Warren	TX
John Weiland	TX
Charles Williams	TX
Eliga Williams	TX
Stephen Wilson	TX
David Baird	UT
Thomas Horne	UT
Richard Jankowski	UT
Alexander Loeber	UT
Steven Smith	UT
Daniel Stam	UT
Robert Fiscella	VA
Allen Jorsey	VA
John Peterson	VA
John Snidow	VA
Clayton Vickland	VA
Truman Whiting, Jr.	VA
Donald Bowie	WA
Charles Britts	WA
Robert Irvine	WA
George Luck	WA
John Meyers	WA
Richard Schoel	WA
Michael Sealfon	WA
Richard Smith	WA
Dennis Toepke	WA
Richard Vanderflute	WA
Stephen Myers	WI
Douglas Weiler	WI
Larry Ferren	WV
Harold Christensen	WY
Edward Snell	WY

Charles Taylor *Master Mechanic Award*

The FAA's most prestigious award for aircraft mechanics is the Charles Taylor Master Mechanic Award. It is named in honor the first aviation mechanic in powered flight and recognizes the lifetime accomplishments of senior mechanics. Charles Taylor served as the Wright brothers' mechanic and is credited with designing and building the engine for their first successful aircraft. The following master mechanics were recognized in 2015. For more about the award, go to faasafety.gov/content/MasterMechanic.

Barry Blumenthal	AK
Salvatore Esposito	AL
Robert White	AR
Rhuno Nelson	AZ
William Baggelaar	CA
Rick Browning	CA
Robert Cupery	CA
Michael Farris	CA
Neil Houston	CA
William Kerchenfaut	CA
George Kirkwood	CA
Merlin Knittel	CA
Larry Kuntz	CA
Regino Lopez	CA
Gene O'Neal	CA
Joseph Peppito	CA
John Phillips	CA
Ronald Reinert	CA
Charles Slezak	CA
James Storms	CA
James Ward	CA
Herbert Williams	CA
David Walmsley	CO
John Nygard	CT
Ellis Jones	DE
Robert Barkley	FL
Harold Britton	FL
Harold Britton	FL
Charles Cunningham	FL
Kirk Goranson	FL
James Hays	FL
James Lawson, Jr.	FL
Benny Luzader	FL
James Naylor	FL
Claude Pratt	FL
James Ross	FL
Dennis Russell	FL
Stuart Schwartzberg	FL
Charles Seila	FL
John Tarmey	FL
Terry Trappen	FL
Jerrell Wilkey	FL
Edward Zurawski	FL
Thomas Baker	GA
William Dickerson, Jr.	GA
John Flynn	GA
Charles Kennedy	GA
Albert Koller	GA
Conrad Michels	GA
Joe Roper	GA
Ruben Torres	GA
William Grater	HI
Wendell Nelson	HI
Marvin Roshek	IA
Morris Trimble	IA
William Gontko	IL
Paul Kirik	IL
Robert Powell	IL
Gene Scheuwimer	IL
David Vlasaty	IL
Dennis Boyle	IN
Roger Tretera	IN
Richard Lawrenz	KS
Paul Tillotson	KS
Urban Bienvenu, Sr.	LA
John Torrance	LA
Peter Conner	MA
Maurice Hovious	MI
Wilfred Landry	MI
Wilfred Landry	MI
Richard Pifer	MI
William Santina, Jr.	MI
Steven Seeley	MI
Forrest Lovley	MN
Conrad Maxwell	MN
Mark Shough	MN
Daymond Coleman	MO
Fredrick Fulmer, III	MO
David Klevorn	MO
Thomas Kuhn	MO
Winfred Davis	MS
Kenneth Wendland	MT
John LaTorre	NC
Ronald Lentz	NC
George Macrae	NC
Robert Wall	NC
Thomas Groshans	ND
Lavern Wolf	ND
Charles Andersen	NJ
Charles Anderson	NJ
Charles Holzer	NJ
Arthur Lawshe	NJ
Barry Scharaga	NJ
Douglas Brooks	NY
Thomas Harper	NY
James Hillin	NY
Walter Kahn	NY
Mark Krezmien	NY
Anthony Marano	NY
Otto Reuss	NY
Samuel Goforth, Jr.	OH
Justin Siak	OH
Edger Miller	OK
Paul Osinski	OK
John Shearer	OR
Edwin Christensen	PA
James Moll	PA
Graig Stephan	PA
Joseph Gray	SC
Robert Batterman	TN
Tom Duncan, Jr.	TN
James Block	TX
Gary Bradley	TX
Tommy Campbell	TX
Homer Feuchter	TX
Frederick Genett	TX
Harry Kifer	TX
Lawrence La Beau	TX
Richard Monahan	TX
Leo Sporleder	TX
Clarence Ayscue	VA
James Erwin	WA
Steven Knopp	WA
Richard Smith	WA
Dennis Toepke	WA

SABRINA WOODS

Win-Win:

Learn and Save with Owner Assisted Inspections

Well, if you are anything like me (and a few million others) you weren't one of the big winners in the historic Powerball lottery that occurred back in mid-January. Which means you might also be the type of person who looks for an opportunity to save a bit of money from time to time. For aircraft owners, one great way to save is by working with a certified aircraft maintenance technician (AMT) on any inspections (100-hour, condition, annual, etc.) that might come due. The added bonus? You get to learn a lot more about the inner workings of your bird at the same time.

14 CFR 91.403(a) spells it out: "the owner or operator of an aircraft is primarily responsible for maintaining that aircraft in an airworthy condition … ." And while you might not be authorized to perform any part of an annual inspection — that responsibility is for certificated mechanics or repair stations who have an inspection authorization (IA) rating only — there is certainly no reason why you shouldn't get involved in any maintenance leading up to, or that might become required as a result of that inspection. In fact, it is encouraged.

Go On and Get Dirty

As an owner/operator you can help perform maintenance actions on your aircraft so long as you do so under the direct supervision of an airframe and powerplant (A&P) mechanic. Provided you can work out an agreement with yours, the things you might learn can go a long way into enhancing your understanding of how different aircraft systems integrate with one another, and what could happen when any one item fails.

Some general maintenance actions you can take part in include removal of panels, cowlings and fairings; draining and refilling engine oil; removing and replacing screens, filters, lines, and tubes; leak and rigging checks; and of course, giving the aircraft a good clean inside and out, to name a few. And don't forget that every panel you remove and reinstall is one less task your A&P has to do. That means costs go down, and so does the time your plane is out of service.

No Time?

I fully understand that because you didn't win the lottery, you probably don't have an infinite amount of free time on your hands. You, like I, likely have a "daytime" job that affords you the ability to keep you (and your bird) properly housed and fed. While I insist that taking the time out to participate in an annual inspection, at least once, is well worth your investment, if taking that much time just can't be done, I offer a few alternatives.

The first is to sit down with your IA before and after the inspection to have a detailed conversation about how it is going to go and later on, how it went. What you are trying to achieve is a better understanding of any trending issues your IA might be aware of, and the approach he or she is going to take in ensuring your aircraft is up to task. Next, after the inspection, go through the discrepancy list (if there is one) and the aircraft forms very carefully to ensure you understand each and every write-up and for what reason that determination was made. In addition, you will want to follow up with your A&P to make sure the maintenance gets done and inquire about how it was done.

If you can't be there for the entire duration, try to at least go out, roll up your sleeves, and join in for the initial de-panel/removal of components. This task will give you the opportunity to work through the parts and aircraft manual, and have some hands-on experience using the right tools for the job. Just that one day can be eye-opening for the inexperienced.

Another option is that once the panels are opened up for the inspection, take a day to go out and have your technician familiarize you with the inner workings of the aircraft and point out any discrepancies he or she is seeing before the corrective maintenance takes place. Then go out again once the maintenance is complete so you can have a clear before and after understanding of what went on.

The benefits are huge in participating in owner assisted inspections. Time and cost savings, getting to know the intimate bits of your plane, and the best part — peace of mind knowing exactly what was done and how. It's a win-win situation.

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

TOM HOFFMANN

Most Wanted List

Tracking Down the Felons of Flight Safety

As a young child, I regularly came face-to-face with dozens of New York City's most wanted criminals. Well, actually, they were just posters I would see while waiting in line at the bank with my mom, but they were still very scary. I can remember staring at the dark and fuzzy images as my mom would prepare her deposit slips, thinking how frightening it would be to ever inadvertently run across one of these "most wanteds." Below each of their creepy likenesses (and adding to their intrigue) was a description of the crimes they were wanted for: robbery, assault, and sometimes even homicide! I can also recall having my attention drawn to the cascading amounts of reward money offered for information leading to the arrest of these individuals. Hmm, maybe an encounter wouldn't be so bad.

Although different in many respects, the NTSB's annual Most Wanted List (MWL) for transportation improvements does have some noteworthy similarities to the bank posters of my youth. Replacing those sketchy-looking silhouettes are instead heaps of mangled metal that convey the chilling consequences of not properly heeding the transportation industry's most dangerous pitfalls — particularly in aviation. The culprits on this list of multi-modal advocacy priorities vary, but all are based on safety issues commonly identified from the NTSB's accident investigations. You might even say they're repeat offenders. And, as with the wanted posters of old, it's good to be familiar with the faces of these aviation "criminals." That way, if you do cross paths, you'll know exactly how to disarm them — or better yet, avoid them altogether.

Of interest to the general aviation community, this year's MWL has one of those repeat offenders — loss of control (LOC) in flight. According to the NTSB, in between 2008 and 2014, roughly 47 percent of fatal fixed-wing GA accidents in the United States involved pilots losing control of their aircraft in flight, resulting in 1,210 fatalities. Statistically, approach to landing, maneuvering, and initial climb are the deadliest phases of flight — and that's why we cover each of these in depth in this special LOC issue. In addition to increased education on the warning signs and recovery techniques for LOC situations, pilots might also consider technological aids like angle of attack indicator systems.

Other GA-relevant topics on the MWL include reducing fatigue-related accidents, disconnecting from deadly distractions, ending substance impairment, and medical fitness. Also on the list is expanding the use of data recorders to enhance safety. While such items may not have been financially feasible in the past for many GA operators, advances in technology have made this a more affordable option. In addition to providing investigators key information on what happened in an accident, data recorders also give the operator a means of personally reviewing their flights to spot unwanted patterns and to improve overall performance. See the article "In Data We Trust" from the January/February 2016 issue of *FAA Safety Briefing* for more information.

"The multi-modal Most Wanted List is an annual roadmap to assist in improving transportation safety," said NTSB Chairman Christopher A. Hart in a recent press release. "The issues on the list are, by definition, among the most challenging transportation safety issues, and we hope that focusing more attention on them will encourage industry and government agencies to take action that will help move the needle."

As individual aviators, you can help too. Be sure to take a good hard look at the aviation "criminals" we've listed. The more you learn about them and share that knowledge with your fellow flyers, the more power you'll have over them and the closer we'll get to putting them away for good.

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

Learn More

NTSB's 2016 Most Wanted List
www.ntsb.gov/mostwanted

GENE TRAINOR

Continuous Improvement

Safety is the FAA's top priority, so it has been troubling to see that in spite of an overall downward trend in rotorcraft accidents, the rotorcraft fatal accident rate over the past decade has remained steady at 0.75-0.80 per 100,000 flight hours. More than 4,200 U.S. helicopter accidents — at least 1,300 resulting in fatalities — have occurred in the U.S. since federal rules to help prevent blunt force trauma became effective in 1989. FAA helicopter experts believe it's time to look at new ways to reduce the sector's fatal accident rate, and that equipment or configurations that help protect against blunt force trauma and post-crash fires can help. Consequently, the agency has asked the Aviation Rulemaking Advisory Committee (an industry body that provides advice on a broad range of rulemaking activity) to provide recommendations on possible regulations that would reduce helicopter injuries and deaths.

In the 1980s and 1990s, the FAA amended regulations to incorporate occupant protection rules that cover emergency landing conditions and fuel system crash resistance, for new type designs. Unfortunately, three factors contribute to a low compliance rate:

- The rules were not retroactive, so they do not apply to helicopters manufactured before the effective dates (1989 for blunt force trauma, 1994 for crashworthy fuel systems).
- Helicopters manufactured after those dates do not have to comply if they were produced on a certification basis that predates the rules.
- Under 14 CFR section 21.101, new models are allowed to keep the older certification basis if added to an existing type certificate, and if the aircraft is not considered to have significant changes the type certificate.

The result is that only 10 percent of U.S. helicopters actually meet federal occupant protection requirements, and around 16 percent meet federal standards for crash-resistant fuel systems.

It matters, because studies clearly show that head, chest, and other blunt force trauma injuries pose the largest threat to surviving a helicopter crash. A 2014 study by a team from the Rotorcraft Directorate and the FAA Civil Aerospace Medical Institute (CAMI) that reviewed fatal accidents from 2008 through 2013 also showed that post-crash fire is a significant danger.

Seventy percent of all injuries in fatal accidents involve skeletal injuries to the ribs. Fifty percent involve the skull, and over thirty percent damage protective bones in the core body region. The most frequently cited organ injuries are to the brain (65 percent), lungs (55 percent), liver and heart (40-45 percent). These numbers reinforce the importance of helmets, which can vastly reduce the high rate of skull and brain injuries in helicopter accidents.

With regard to post-crash fires, a study completed in 2013 found that such fires occurred in 30 of 76 fatal accidents in normal category (part 27) helicopters lacking crash-resistant fuel systems. By contrast, only one post-crash fire occurred in the 11 fatal accidents in helicopters equipped with the systems. In the cases where a post-crash fire occurred, it contributed to occupant deaths in 20 percent of the accidents involving helicopters with no crash-resistant fuel systems. With the systems, post-crash fires did not contribute to a single death.

In transport category (part 29) helicopters, no helicopter with a crash-resistant fuel system was involved in a fatal accident during the five years studied (2008-2013). Of the 10 part 29 helicopters involved in fatal accidents without crash-resistant fuel systems, four had post-crash fires, two of which contributed to a fatality. (*Note: Key aspects of part 27 and part 29 helicopter crash-resistant fuel system regulations stipulate the fuel tanks cannot leak after being dropped at least 50 feet, and fuel lines must have self-sealing breakaway couplings unless leaks can be prevented through other means*).

These numbers underscore the importance of the new ARAC task, assigned to the government, industry, and advocacy organizations represented on the existing ARAC Rotorcraft Occupant Protection Working Group. Over the next six to 24 months, the group will address occupant protection in newly manufactured rotorcraft, followed by existing rotorcraft.

"The ARAC process is very significant," FAA Rotorcraft Directorate Manager Lance Gant said. "It's the first ARAC tasking we've had in the rotorcraft arena in quite some time. I think this effort will have a very large impact on survivability in helicopter accidents."

Gene Trainor is a technical writer and editor for the Rotorcraft Directorate in Fort Worth. He previously worked as a newspaper reporter and editor.

Flight Forum

Reference Please?

In the article "Keeping your Head in the Clouds" in the September/October FAA Safety Briefing; it states, "If you are using an FSTD or authorized ATD to acquire recent experience, an authorized instructor must be present to observe the use of the device. The instructor must also sign your logbook noting the time and the content of the training session…"

I am unable to find a reference for this requirement in the FARs. Can you help me out?

— Bill

Thanks for reading the article and for the inquiry. The reference you are looking for is in 14 CFR section 61.51 (g)(4):

> *A person can use time in a flight simulator, flight training device, or aviation training device for acquiring instrument aeronautical experience for a pilot certificate, rating, or instrument recency experience, provided an authorized instructor is present to observe that time and signs the person's logbook or training record to verify the time and the content of the training session.*

We hope this is helpful!

Up in the Air

In regards to all that is being done to safely integrate UAS into the NAS, will members of the Hot Air Balloon community be included in the process? We would be vulnerable if in the flight path of any UAS.

— Larry

With regard to participating in the process, the Rulemaking Task Force (RTF) completed its work on November 21, 2015 and issued a final report. None of the 4,700 commenters to the FAA's notice on the RTF commented specifically on lighter-than-air operations. Nonetheless, FAA and AOPA participated in deliberations and they advocate for safety with an eye toward all categories of aircraft (including lighter-than-air).Thank you for your question and for reading FAA Safety Briefing.

Great Job!

What a great issue on IFR operations! [Referring to Sept/Oct 2015 www.faa.gov/news/safety_briefing/2015/media/SepOct2015.pdf]

— W.A.

Thanks! We are happy to hear you found the edition and subject useful.

IFR Feedback

Just got through a quick read of the [SeptOct 2015] *FAA Safety Briefing*. Very good issue overall, however, I have a couple of comments on "As the Gyro Spins." Pitot-static system errors were discussed pretty well. One notable addition would be that the blockage symptoms will be similar or identical on most GA glass/computer systems since they are using the same inputs. The glass systems use the same data input, but process them electronically instead of mechanically.

There was one error, however. On page 18 under Blockage of Both the Pitot Tube and the Static Port, it states first that "…all three instruments freeze…" then two sentences later says "…only the airspeed indicator will change…" and goes on to describe the same indication error described a few paragraphs earlier. If all static and pitot systems are completely blocked then there will be no change in any indications since there will be no change in any of the inputs that cause those indications.

Thanks for the good publication. Lots of good information for students and instructors alike!

— David

Thanks for taking the time to write and we appreciate the feedback on the issue. With regard to the "As the Gyro Spins" article, you are correct in pointing out an error we made on page 18 when describing the effects of a both a pitot and static system blockage. As you noted, when both systems are blocked, all instruments are frozen, including the airspeed indicator.

FAA Safety Briefing welcomes comments. We may edit letters for style and/or length. If we have more than one letter on a topic, we will select a representative letter to publish. Because of publishing schedule, responses may not appear for several issues. While we do not print anonymous letters, we will withhold names or send personal replies upon request. If you have a concern with an immediate FAA operational issue, contact your local Flight Standards District Office or air traffic facility. Send letters to: Editor, *FAA Safety Briefing*, AFS-850, 55 M Street, SE, Washington, DC 20003-3522, or email SafetyBriefing@faa.gov.

Let us hear from you — comments, suggestions, and questions: email SafetyBriefing@faa.gov or use a smartphone QR reader to go "VFR-direct" to our mailbox. You can also reach us on Twitter @FAASafetyBrief or on Facebook — facebook.com/FAA.

Postflight

SUSAN PARSON

There I Was …

Family, friends, and colleagues all know that I have a near-primal need for order and structure in my universe. This personal Prime Directive engenders an intense need for control — not so much control over other people (yes, opinions differ), but rather control over self and life circumstances.

I'm in Control Here!

This zest for order, structure, and control aligned very nicely with the discipline of flight training. I read, I learned, I practiced, and then practiced still more to make the airplane do what I wanted it to do at any given moment. In an article I wrote for this magazine several years ago, I even compared the principles of airplane control to canine obedience training ("Secrets of the Airplane Whisperer" – FAA Aviation News, July/August 2007).

… Except When I'm Not …

As we all know, though, life has a way of disrupting the most carefully made plans. And, as the list of "LOC contributing factors" in the #FlySafe campaign shows, a variety of factors can conspire to upset — literally — a pilot's grasp on airplane control. Even before I qualified as a flight instructor, I always had the nagging feeling that the (many) things I didn't know about airplane control could bite — and bite hard.

Management and Mastery

That's why, in early 2008, I journeyed to the southwestern desert to invest in highly structured upset recovery training. Control freak that I am, I had carefully researched the school I chose to assure myself of its top-notch instructors, aircraft, and training techniques. I've since been back several times for refresher training, but I can say unequivocally that the initial three-day training I did was the best aviation investment I've ever made.

Life has a way of disrupting the most carefully made plans. And, as the list of "LOC contributing factors" in the #FlySafe campaign shows, a variety of factors can conspire to upset — literally — a pilot's grasp on airplane control.

The training program included every kind of stall you can imagine, and I quickly learned why the skidding stall featured in far too many base-to-final LOC accidents merits its reputation for disaster. I learned how to recover from such self-induced upsets. More importantly, though, I learned how to prevent them in the first place. Just as a dog will rarely bite without warning, I found that an airplane generally gives its pilot plenty of "I'm-really-not-happy" signals before it departs controlled flight.

Another benefit of specialized training was the ability to experience and repeatedly recover from fully developed spins, both upright and inverted. I had of course practiced spin recovery as part of my flight instructor training program, but I came away from the upset recovery sessions with a lot more knowledge, skill, and confidence in this crucial area.

The stall and spin recovery training was terrific, but even better were the lessons on recovering from unusual attitudes, whether pilot-induced (e.g., during those infamous VFR-into-IMC forays) or otherwise-induced (e.g., wake turbulence encounters). When it was time to tackle the wake turbulence part of the syllabus, my instructor in the tandem cockpit airplane very cleverly set me up "on approach" behind a simulated larger aircraft. Even though I knew what he was up to, it was impossible to be fully prepared for the sudden simulated "wake turbulence encounter" that rolled the airplane nearly inverted.

Obviously it's important to avoid such things in real life by strict adherence to wake turbulence avoidance procedures, but — as I said — we all know that real life and real life flying are full of unseen perils. I'm glad I had a chance to learn techniques for quickly restoring order to a wake-disrupted aviation universe.

The upset recovery training I took wasn't cheap. As with many GA training programs, it required a positively painful withdrawal from my checking account. Nevertheless, it was worth every penny and, in pursuit of LOC-proofing myself, I would enthusiastically do it again.

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.*

PAUL CIANCIOLO

FAA Faces

Jeff Guzzetti

Manager, FAA Accident Investigation Division

"When I was a kid, I always looked up when I heard an airplane," Jeff explains. "It was, and still is, an all-consuming 'affliction.' I have always had an inherent love for aviation and space." Growing up in the shadow of the Apollo space program can have that effect on a person. Jeff wanted to be an astronaut, but he didn't have the eyesight needed at the time to become a military pilot. That didn't stop him from fulfilling the *primal* need to hop into a cockpit and fly.

Jeff enrolled at Embry-Riddle Aeronautical University after learning from *Time* magazine that it was considered "The Harvard of the Skies." He earned his private pilot certificate, but later wound up switching to aeronautical engineering. His first stint with the FAA was as a student intern at the William J. Hughes Technical Center in Atlantic City, where he got to set parts of airplanes on fire to conduct research of fire-retardant materials.

"I developed a morbid fascination with aircraft accidents during these internships," notes Jeff. "I also flew in different types of helicopters in an effort to characterize the wake turbulence they generate. This study helped further define safe separation standards behind rotorcraft."

After a job as a safety engineer for the Navy, Jeff spent two years working for Cessna Aircraft Company in Wichita assisting FAA and NTSB investigators with identifying key parts of Cessna airplanes at crash sites across the country. After that, he was recruited by the NTSB to be a general aviation (GA) field investigator. During his 17-year hitch with NTSB, Jeff also served as an aerospace engineer for the NTSB "go-team" and worked several major aviation investigations, including the loss-of-control (LOC) accident that killed JFK Jr. His varied experiences led to a promotion as NTSB's deputy director for regional aviation operations, requiring executive-level oversight of the investigation, analysis, and probable cause determination of nearly 1,600 GA accidents each year.

Following a short time with the DOT Inspector General, Jeff returned to accident investigation work by joining the FAA's Office of Accident Investigation and Prevention. He leads the division that serves as the FAA's primary liaison to the NTSB and controls the policies and procedures for all FAA employees who become involved with investigating an accident or incident. It is staffed by a small group of the agency's most senior investigators who launch with the NTSB "go-team" on major aviation accidents and incidents around the world.

During an aircraft accident investigation, the NTSB determines the cause while the FAA implements improvements to prevent future accidents. "I like to think of our office as a powerful and honest broker to facilitate safety improvements in aviation," Jeff said. "We are not enforcers or rule-makers. Rather, we are independent investigators who get the big picture which we then communicate to those at FAA who are in a position to accelerate a safety action such as an emergency airworthiness directive, a procedural change, or a new safety priority."

The division also reviews all daily GA accidents and incidents that are reported and posts basic data on these events for the public to see at www.asias.faa.gov.

Jeff has seen a lot of aircraft accidents, and his advice for pilots to prevent losing control of the aircraft is to have a healthy respect for that aircraft.

"The airplane doesn't care how rich or poor you may be, what job you have, or where you come from," he notes. "It will respond only to what you are doing at any given moment in the cockpit — and it will kill you and your passengers if you let it. A healthy respect means constantly learning and remembering everything there is to know about the airplane's operation, including stall speeds for all configurations and situations."

Jeff has taken this advice to heart while advancing his own flying skills in recent years. In addition to his private pilot training, he also earned instrument, glider, and seaplane ratings as well as a commercial pilot certificate. "I have never flown professionally, but I love to fly."

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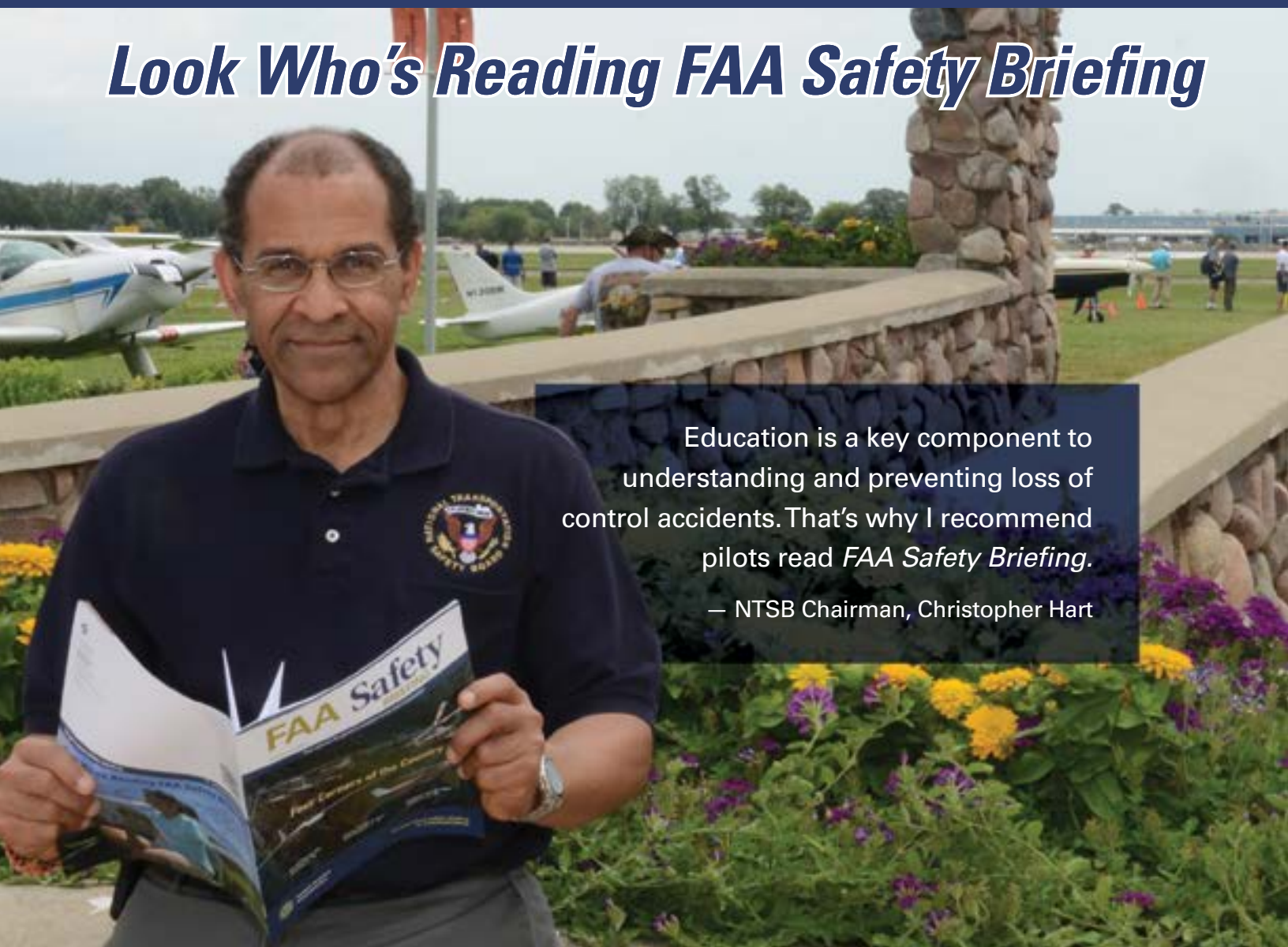

Education is a key component to understanding and preventing loss of control accidents. That's why I recommend pilots read *FAA Safety Briefing.*

— NTSB Chairman, Christopher Hart