FAA Safety BRIEFING

May/June 2010

Your source for general aviation news and information

The Wings of Change

Introducing the Next Generation Air Transportation System

Federal Aviation Administration

www.faa.gov/news/safety_briefing/

In this issue, we introduce the Next Generation Air Transportation System, or NextGen, and highlight the changes and the enabling technologies that will bring more efficient navigation, more effective communications, and greatly improved surveillance capabilities.

Photo courtesy of Cessna

Features

Departments

U.S. Department of Transportation

Federal Aviation Administration

ISSN: 1057-9648
FAA Safety Briefing
May/June 2010
Volume 49/Number 3

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

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/

Comments or questions should be directed to the staff by:

- E-mailing: SafetyBriefing@faa.gov
- Writing: Editor, *FAA Safety Briefing,* Federal Aviation Administration, AFS-805, 800 Independence Avenue, SW, Washington, DC 20591
- Calling: (202) 267-8212
- Faxing: (202) 267-9463

SUBSCRIPTION INFORMATION

The Superintendent of Documents, U.S. Government Printing Office, sells *FAA Safety Briefing* on subscription and mails up to four renewal notices.

For New Orders: Subscribe via the Internet at http://bookstore.gpo.gov, telephone (202) 512-1800 or toll-free 1-866-512-1800, or use the self-mailer form in the center of this magazine and send to Superintendent of Documents, U.S. Government Printing Office, Washington, DC 20402-9371.

Subscription Problems/Change of Address: Send your mailing label with your comments/request to Superintendent of Documents, U.S. Government Printing Office, Contact Center, Washington, DC 20408-9375. You can also call (202) 512-1800 or 1-866-512-1800 and ask for Customer Service, or fax your information to (202) 512-2104.

Jumpseat

JOHN W. MCGRAW
DEPUTY DIRECTOR, FLIGHT STANDARDS SERVICE

Turning Headwinds into Tailwinds

In his book *The Next Hour*, pilot and former editor of *Flying* magazine Richard L. Collins writes about flying safely the next hour, which, he says, is the most important hour in any pilot's logbook. Collins stresses the importance of understanding and managing the risks inherent in flying. And, to the theme of this issue of *FAA Safety Briefing*—the Next Generation Air Transportation System, or NextGen—from his perspective of 50-plus years of flying, Collins looks ahead. He is confident better things will come and writes, "for general aviation, today's headwind can and will be turned into tomorrow's tailwind."

I agree. Better things are coming. We talk about many of them in these pages. At the same time, our nation's aviation community faces some strong headwinds. Here are the three biggies—growing demand, the rapid pace of change, and the public's clear expectation of an even better safety record.

One, as the FAA recently published in its annual commercial aerospace forecast, the economic downturn has dampened near-term growth across the aviation community. Yet, for commercial air carriers and general aviation, long-term growth is coming. According to the FAA's forecast, total airport operations will grow at an average annual rate of 1.5 percent and reach 69.6 million in 2030. That growth will include more types of aircraft, including unmanned aircraft. In short, there will be more demand in the same finite airspace. Yet, that's the point of NextGen: Incrementally evolving to a system that more safely and efficiently accommodates greater demand.

Two, the pace of change is unrelenting. Look at electronic flight bags, also discussed in this issue. What used to take up reams of paper and pounds of carry-on can now be handled in an electronic device. Other changes are coming, too, and they must come with, if not "some assembly required," definitely understanding and getting the needed training. Technology alone has never been the answer, which is your challenge. As 21st century airmen, you must keep abreast of new developments, take advantage of technology as you are able, and make sure you are proficient—with new technologies as well as with tried and true stick and rudder skills. There are many new technologies, such as the expanded use of flight training devices, that provide high technology resources for those still-essential flying skills.

Three, expectations for safety are high. In the public's mind there is no turning back on safety. Our mission at FAA is to constantly improve. That should be your goal as well. With the move to NextGen, we have the opportunity to provide aviation with much better tools. ADS-B, for one, will offer better situational awareness. Performance-based navigation dramatically improves navigation. These, and more, will improve your aircraft's capabilities.

Everyone in this complex system needs to be mindful of their crucial role in staying educated and proficient.

Yet, as futuristic as all of this technology may seem compared with a wet compass, it is still pilots, not computers, who are in command and responsible for the aircraft's safety. It is still mechanics, not software programs, who repair and sign out aircraft, parts, and components. Everyone in this complex system needs to be mindful of their crucial role in staying educated and proficient for the system to function safely—for all of us to benefit from those tailwinds that Collins predicts.

As the Flight Standards Service's Deputy Director, Policy, McGraw, a 4,000-hour pilot, oversees the Flight Standards divisions that produce policy and work instructions for aviation safety inspectors and guidance for the aviation industry.

ATIS Aviation News Roundup

A mechanic performs an exhaust inspection.

FAA Promotes Carbon Monoxide/ Exhaust System Safety

On March 10, 2010, FAA issued a Special Airworthiness Information Bulletin (SAIB) that focuses on carbon monoxide (CO) safety for GA aircraft owners and operators. The bulletin stresses two important actions that can help safeguard pilots against the dangers of CO poisoning: Proper inspection and maintenance of exhaust systems and installing a CO detector.

FAA recommends owners/ operators continue to inspect an aircraft's complete engine-exhaust system during 100-hour/annual inspections and at inspection intervals recommended by the aircraft and engine manufacturers.

The SAIB also highlights results of a product study that sampled 43 CO detectors and five different sensor technologies commercially available and reviewed the effectiveness of various types of CO detectors in GA aircraft. You can find a technical report from National Technical Information Services that tabulates the findings of this study at: http://www.tc.faa.gov/its/worldpac/techrpt/ar0949.pdf. The study found that electrochemical sensor-based CO detectors installed on the instrument panel are the best combination of product and location for GA.

To view the SAIB, go to http://www.faa.gov/aircraft/safety/alerts/SAIB/ and search for CE-10-19.

FAA Proposes New Policy on Antidepressants for Pilots

The FAA no longer will impose an across-the-board ban on pilots suffering from depression. The agency is willing to issue special certificates to pilots who are taking medication for mild to moderate depression, conditions that up to now have prevented them from flying.

On a case-by-case basis as of April 5, 2010, pilots who take one of four antidepressant medications—Fluoxetine (Prozac), Sertraline (Zoloft), Citalopram (Celexa), or Escitalopram (Lexapro)—will be allowed to fly provided that they have been satisfactorily treated on the medication for at least 12 months. The FAA will not take civil enforcement action against pilots who take advantage of a six-month opportunity to share any previously non-disclosed diagnosis of depression or the use of these antidepressants.

The rationale behind relaxing the policy is improving safety. "It is important to know who is being treated for depression so they can be properly monitored," said Administrator Randy Babbitt. "The FAA wants to remove the stigma associated with depression," he added.

"Many of today's antidepressants are very effective in treating depression, with few side effects," said FAA Federal Air Surgeon Fred Tilton. "I'm confident that some pilots can fly safely, while taking these medications."

The impetus for this policy change stems from an increased understanding of depression and the evolution of medicines treating the condition. The FAA's new policy is consistent with recommendations from the Aerospace Medical Association, Aircraft Owners and Pilots Association, Air Line Pilots Association, and the International Civil Aviation Organization. The Civil Aviation Authority of Australia, Transport Canada, and the U.S Army already allow some pilots to fly using antidepressant medications.

Forecast Predicts Steady Growth for GA

At the 35th annual FAA Aviation Forecast Conference in March, the mood was one of cautious optimism as industry experts predicted the future of an industry known for its high volatility, as well as its remarkable resilience. Administrator Randy Babbitt echoed these sentiments, assuring conference attendees that looking back shows aviation has recovered from every major obstacle.

Building on this premise, Babbitt stressed, is the strong business case for NextGen and continued investment in airport infrastructure projects. "Without NextGen, we won't be able to handle the increased demand for service this forecast anticipates."

While the focus of the conference highlighted commercial air carrier operations, there was much discussion on how a transformed industry with a more robust infrastructure would affect the GA world. The Wide Area Augmentation System (WAAS) is already making a difference by providing nearly 2,000 localizer performance with vertical guidance (LPV) approaches in place at 1,050 airports. More than 900 of these LPV approaches were added in the last two years, with more on the way. Babbitt added that 32,000 aircraft are equipped with avionics to take advantage of these procedures.

GA experienced a second consecutive year of decline by several measures of activity. There were sharp declines in year-over-year GA activity at FAA air traffic facilities (down 11.7 percent) and in the number of student pilots (down 10.8 percent).

Looking forward, FAA forecasts that GA activity will slowly rebound as the economy recovers. Through 2030, GA is forecast to have annual increases in active fleet size (0.9 percent) and the number of hours flown (2.5 percent). The light-sport aircraft sector is expected to see a more dramatic increase in hours flown (5.9 percent annually), primarily due to growth in the fleet. Sport pilots, who numbered 3,248 at the end of 2009, are estimated to increase to 14,100 by 2030.

Pratte Joins FAA General Aviation and Commercial Division

In February, Dennis Pratte was named Deputy Division Manager, General Aviation and Commercial Division. Pratte had been serving as Acting Deputy Division Manager since November 2009.

Pratte brings FAA and flight operational experience to his responsibilities of supervising the division staff who oversee the development of regulations and policy governing the certification, inspection, and surveillance of general aviation operations, air agencies, and part 91 corporate and fractional ownership operations. One of his previous FAA positions was manager of the Central Region FAA Safety Team where he oversaw safety outreach efforts across the central United States.


Dennis Pratte

"I'm excited to be working with a group of talented professionals in the division, and with our industry stakeholders on making general aviation safer," Pratte says.

Previously, Pratte was the part 135 Air Carrier Operations Branch manager where he oversaw the development of national standards, policies, and regulations applicable to part 135 fixed-wing and helicopter operations, which included cargo on-demand operations, helicopter emergency medical services (HEMS), and air tour operations.

Before joining FAA in 2000, Pratte was a pilot for several airlines including, Mesa Airlines, Trans States Airlines, and Cape Air Airlines. Pratte holds an airline transport pilot certificate and is a flight and ground instructor.

If You Cross the Line, You've Crossed the Line

This spring, FAA's Runway Safety Office launched a new campaign to help reduce pilot deviations. Called "If You Cross the Line, You've Crossed the Line," the program is designed to improve awareness among pilots (and vehicle operators) about what happens when you enter the protected runway safety area—"cross the line"—when not cleared to do so.

"Crossing the line" without permission can result in various problems, such as causing an aircraft on final approach to go-around, or forcing a departing aircraft to abort takeoff. The program also highlights the dangers of crossing the line in a less literal sense, and urges pilots to be especially vigilant of taxi instructions and airport signage.

"The crux of the new campaign is to keep runway safety as a high priority in the minds of airmen," says Director of FAA's Runway Safety Office Wes Timmons. "By using a catchy phrase like, 'You've Crossed the Line,' we believe we can get people's attention and convey an important surface-safety awareness message that can be taken both literally and figuratively."

The new safety initiative will target about 30 airports initially before evolving into a nationwide campaign.

Fast-track Your Medical Certificate

With FAA MedXPress, you can get your medical certificate faster than ever before.

Here's how: Before your appointment with your Aviation Medical Examiner (AME) simply go online to FAA MedXPress at https://medxpress.faa.gov/ and electronically complete FAA Form 8500-8. Information entered into MedXPress is immediately transmitted to the FAA and forwarded to your AME before your medical examination.

With this online form you can complete FAA Form 8500-8 in the privacy and comfort of your home and submit it before scheduling your appointment.

The service is free and can be found at:

https://medxpress.faa.gov/

FREDERICK E. TILTON, M.D.
FAA FEDERAL AIR SURGEON

Aeromedical Advisory

Respecting the Laws of Gravity

The Next Generation Air Transportation System (NextGen) may be changing the face of aviation technology, but the human body's reaction to the ever-present, accelerative force of gravity is a constant. Described in units of "G," this force causes a constant acceleration of 32 feet-per-second squared. A pilot in a steep turn may experience forces of acceleration equivalent to many times the force of gravity. This is especially true in military fighter jets and high-performance aerobatic aircraft where the acceleration forces may be as high as nine Gs. Air race pilots in a tight pylon turn also experience high G-forces, but the important thing to remember is that any aircraft operated in a maximum-performance profile will subject the pilot to acceleration that is greater than the one G acceleration encountered on the ground. Pilots need to understand this to successfully master flying.

Types of Acceleration

There are three types of acceleration:

Linear Acceleration involves a change of speed in a straight line. This type occurs during takeoff, landing, or in level flight when a throttle setting is changed.

Radial Acceleration involves a change in direction, such as a sharp turn.

Angular Acceleration involves a simultaneous change in both speed and direction, such as in spins and climbing turns.

A pilot may experience a combination of these accelerations, categorized as Gx, Gy, and Gz.

Gx acts from chest to back. Positive Gx pushes the pilot back as the aircraft accelerates during the takeoff roll. Negative Gx can occur during landing and pushes the pilot forward into the shoulder strap.

Gy acts from shoulder to shoulder. It is encountered during aileron rolls. Aerobatic pilots routinely encounter Gy.

Gz acts on the body's vertical axis. If experienced from head to foot, as in pulling out of a dive, it is positive Gz. Negative Gz travels from foot to head, as when a pilot pushes over into a dive.

Respecting G-Force

Aviators need to understand and respect G-force, because any flight maneuver has the potential to expose the body to more than one positive Gz. When the pilot experiences positive Gz, the cardiovascular system must respond to keep blood flowing to the brain. One of the first indications of trouble may be a progressive loss of vision, because the eyes are extremely sensitive to low blood flow. If the rapid onset of G-force continues and the cardiovascular system does not keep pace, the result may be G-induced loss of consciousness (GLOC). NOTE: In some acrobatic airplanes it may be possible to experience GLOC without experiencing any early visual symptoms.

A well-rested, well-hydrated, and fit aviator will physically be able to withstand higher G-forces.

G tolerance is degraded by alcohol, fatigue, and dehydration. Lack of physical conditioning, a sedentary lifestyle, and smoking can also reduce G tolerance. A well-rested, well-hydrated, and fit aviator will be able to withstand higher G-forces. A regular conditioning program with a mix of aerobic exercise and resistance weight training will increase resistance to the effects of Gs. Regardless, a smart aviator will always include consideration of G-forces when it comes to flight planning.

Dr. Tilton received both an M.S. and a M.D. degree from the University of New Mexico and an M.P.H. from the University of Texas. During a 26-year career with the U.S. Air Force, Dr. Tilton logged more than 4,000 hours as a command pilot and senior flight surgeon flying a variety of aircraft. He currently flies the Cessna Citation *560 XL.*

For More Information

See the "Acceleration in Aviation: G-Force" brochure at http://www.faa.gov/pilots/safety/pilotsafetybrochures/media/Acceleration.pdf

DR. WARREN S. SILBERMAN

Ask Medical Certification

Dr. Warren Silberman and his staff administer the aeromedical certification program for about 600,000 holders of U.S. pilot certificates and process 450,000 applications each year.

Q: Why are there such long delays in the special issuance process? Why does the Cardiac Board only meet every other month?

A: There would not be enough cases to review if the Federal Air Surgeon's Cardiology Consultant Panel met more often. However, many airmen do not know the panel only concentrates on airmen who request first or unlimited second-class privileges. A limited second-class airman does not have to be sent to the panel unless our medical review officer feels it is necessary. Also, we have a cardiologist who comes in on the off months and reviews complicated third-class cardiac cases as well as first and second-class airmen cases that have accumulated after the panel meets.

Regarding delays, we have a performance objective that our average processing time is no greater than 30 days. Currently, we are operating slightly below our performance objective. Our work is labor intensive, which means the loss of even one employee affects our case processing. We recently lost two employees. The good news is their replacements are beginning to become productive.

Send your question to SafetyBriefing@faa.gov. We'll forward it to Dr. Silberman without your name and publish the answer in an upcoming issue.

Q: In March 1997, my left carotid artery was found to be blocked; the right carotid 80 percent blocked. That same month, the right carotid was surgically cleared. My annual duplex carotid ultrasound shows good flow, and I also have good collateral flow. The surgeon who cleared the right carotid said I was safe to fly. I would like to get a third-class medical. Can I?

A: It sounds like the left carotid is totally occluded. You will need to provide the history and physical examination, discharge summary, and operative report from the carotid surgery hospitalization. We will need to know the current status of your carotid arteries, which means we will need a current carotid ultrasound. The concern is that if you have vascular disease in certain blood vessels then you may have it in others. This is why we require anyone who has had carotid artery disease to have a cardiovascular workup. This means we need a letter from your treating physician about your cardiovascular health. We also need a current heart echocardiogram and a maximal Bruce protocol stress test if you want to fly as a private pilot and a maximal nuclear stress test if you want to fly with a first- or second-class medical certificate. Here is an FAA Web site with more information on the required cardiovascular evaluation: http://www.faa.gov/about/office_org/headquarters_offices/avs/offices/aam/ame/guide/dec_cons/disease_prot/cardiovascular/.

Q: I was arrested 20 years ago for driving while intoxicated following a college party. I was young and immature, but I've been clean and sober ever since. I'd like to take flying lessons. Will this prevent me from obtaining a medical certificate?

A: A DUI offense 20 years ago should not impede an FAA Aviation Medical Examiner (AME) from issuing a medical certificate. Come to the examination prepared to explain the circumstances surrounding the incident and your current use of alcohol. If the AME determines that you do not have a problem with alcohol, then he/she may issue you an unrestricted medical certificate. Here's a Web site about DUI offenses and actions: http://www.faa.gov/about/office_org/headquarters_offices/ash/ash_programs/investigations/airmen_duidwi/airman_faqs/.

Warren Silberman, D.O., M.P.H., manager of FAA's Aerospace Medical Certification Division, joined FAA in 1997 after a career in the U.S. Army Medical Corps. Dr. Silberman is Board Certified in Internal Medical and Preventive/Aerospace Medicine. A private pilot with instrument and multi-engine ratings, he holds a third-class medical certificate.

MEL CINTRON

Vertically Speaking

Defying Gravity, Anticipating Trouble

"Helicopters are different from airplanes. An airplane by its nature wants to fly and, if not interfered with too strongly by unusual events or by a deliberately incompetent pilot, it will fly. A helicopter does not want to fly. It is maintained in the air by a variety of forces and controls working in opposition to each other, and if there is any disturbance in the delicate balance, the helicopter stops flying, immediately and disastrously. There is no such thing as a gliding helicopter.

"This is why a helicopter pilot is so different… from an airplane pilot, and why in general, airplane pilots are open, clear-eyed, buoyant extroverts, and helicopter pilots are brooders, introspective anticipators of trouble."

— Harry Reasoner, journalist

We couldn't think of a better way to start a new column on rotorcraft safety than by reprinting the above quotation. For "rotorheads," as helicopter pilots, mechanics, and vertical-flight "aficionados" are known, this is a beloved, frequently cited quotation.

As Reasoner makes abundantly clear, there are stark differences between these two major classes of aircraft. Some of these differences are striking. For one, the challenging missions assigned to many helicopters, such as search-and-rescue operations or operating at low level over densely populated urban areas, can produce flight environments rarely encountered in fixed-wing operations. Two, finding a "safe harbor" for landing a helicopter can be challenging when you operate at low levels over often difficult terrain or vast expanses of water—and the word "glide" is not in your vocabulary.

While the differences are dramatic, there are more similarities than differences between the two types of aircraft and of the airmanship both require for safe operations. That's why we're introducing this column on rotorcraft safety to the pages of this publication. For both helicopter and airplane pilots and aviation maintenance technicians, there are similar requirements for training, testing, and inspecting. There is the same strong emphasis on developing basic skills, maintaining proficiency, and continuously improving. Above all—and the pun is intentional—rotorcraft and fixed-wing pilots share the same sky with the same meteorological challenges. They just "defy gravity" differently.

Vertical flight brings many benefits to our nation— including emergency-medical services, search and rescue, electronic-news gathering, heavy lift, surveillance, law enforcement, off-shore energy applications, and more. There are also a growing number of individuals with private helicopter pilot certificates. The personal-use category of helicopter operations accounts for the highest percentage—20 percent—of fatal accidents. Yet, for all categories of rotorcraft operations, there have been recent improvements in the safety record.

Write us at SafetyBriefing@faa.gov to let us know what you want to hear about vertical flight.

There are a number of reasons for the stronger performance. For one, there's been a concerted effort across the rotorcraft community, especially from key segments of industry, such as the air-tour and emergency-medical-services communities, to improve safety practices and invest in safety-enhancing technology. There's also the International Helicopter Safety Team reviewing accident data, discerning trends, and implementing improvements. And, we must add, there's also been a stronger FAA focus on regulation and oversight.

We want to keep the vertical-flight safety record improving. We will use this space in coming issues to "anticipate trouble" by identifying risk areas and stressing key safety developments. We will also point to good practices and highlight FAA and rotorcraft community resources.

In the meantime, let us know what you want to hear about vertical flight. Write us at SafetyBriefing@faa.gov.

Mel O. Cintron, manager of FAA's General Aviation and Commercial Division, holds a commercial pilot certificate—rotorcraft/helicopter, airplane single-engine land with private pilot privileges—and an airframe and powerplant certificate with inspection authorization.

MEREDITH SAINI

Next

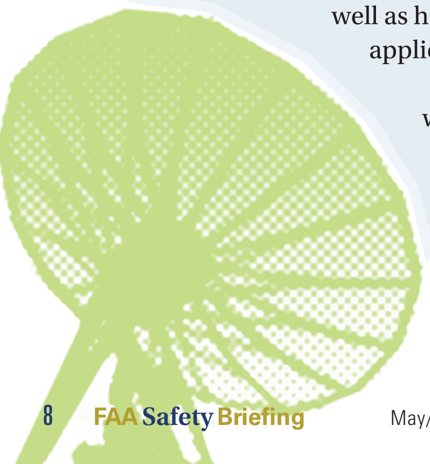
Traffic? Weather? Navigation?

NextGen is shorthand for the FAA's Next Generation Air Transportation System, a long-term, ongoing, wide-ranging transformation of the National Airspace System (NAS). Everyone who is responsible for moving aircraft through space and time needs to know that this is much more than just an upgrade. It's an evolution in the way we fly. NextGen will transform the NAS from a ground-based air traffic control system to a satellite and performance-based air traffic management system.

The latter term, management, implies a more proactive approach to the flow of air traffic, made possible by a sophisticated framework of new technologies, processes, and infrastructure. The goal is to address growth, improve safety, increase user access to the NAS, and, at the same time, reduce environmental impacts. The overall concept is built upon relying more extensively on the satellite-based Global Positioning System (GPS) as the primary means for determining aircraft position and less on ATC radar.

Advances in digital communications and networking will allow all players in the NAS— air traffic controllers, pilots, dispatchers, weather forecasters, and others—to have instant access to the information they need to do their jobs. As the NextGen infrastructure continues to mature, avionics choices are likely to expand to include a broad selection of panel-mounted systems as well as handheld devices that run all sorts of applications. The possibilities are wide open.

When fully implemented, NextGen will safely allow more aircraft to fly more closely together on more direct routes while reducing delays, carbon footprints, and noise. Pilots can expect to have access to richer and faster in-flight traffic and weather data. Here's a snapshot of where we are today and what we can expect in the months and years to come.



Timeline for Implementation

If money is what makes airplanes fly, then NextGen is a giant engine with an equally massive appetite for cash. On February 1, 2010, U.S. Transportation Secretary Ray LaHood announced that President Obama's $79 billion budget for the U.S. Department of Transportation includes $1.1 billion for NextGen air traffic control technologies, an increase of $275 million, or 32 percent, over the previous year's budget.

"There is much to be done and the timeline for completion is drawing near," LaHood said.

The clock is ticking, indeed. As of this publication's deadline, the final rule defining the operational requirements for Automatic Dependent Surveillance-Broadcast (ADS-B) within the NAS was set to be published in the *Federal Register* in April/May 2010, officially opening the door for the aviation industry to bring ADS-B products and services to the market. While NextGen includes a diverse cast of characters, the star of the show is ADS-B. The ADS-B orchestra of ground stations, satellites, and cockpit avionics is offering pilots new ways to maintain situational awareness. (See story on page 11.) Though ADS-B has existed in some form for more than decade, the NextGen version of ADS-B is slated to be available throughout the NAS by 2013—fewer than three years from now, with mandatory equipage and compliance by 2020.

"NextGen benefits will be maximized when the majority of operators are properly equipped," said Leslie Smith, Manager, FAA Flight Technologies and Procedures Division. "While these avionics will also support capabilities implemented beyond 2018, additional equipage may be necessary to take advantage of capabilities introduced beyond the mid-term."

Gen *for the Masses*

Yes, we've got an app for that.

Enabling Technologies

NextGen isn't so much a comprehensive overhaul of our national airspace system as it is an information technology project of grand proportions, with teams of software engineers working to build the network of systems that will keep everything humming. With that in mind, the FAA has identified six "enabling technologies" of NextGen, with ADS-B positioned at the top of the list. The other five are the subsystems that allow ADS-B and all of the other NextGen technologies to function.

System-Wide Information Management (SWIM) is the information technology standards base that will help to make sure that every NextGen application is compliant within the NAS. The goal of SWIM is to improve operational decision making by allowing easier data exchange between systems. The program's first segment will focus on applications related to flight and flow management, aeronautical information management, and weather data dissemination.

The **Data Communications (Data Comm)** subsystem defines the increasing importance of digital communications between air traffic controllers and aircraft, in addition to traditional analog (radio) voice communications with pilots, which are workload intensive and prone to errors in both delivery and receipt. ("Potomac, was that approach clearance for Seven Papa Whiskey or Two Papa Whiskey?")

Initially, data communications will be a supplemental means for two-way exchange between controllers and flight crews for air traffic control clearances, instructions, advisories, flight crew requests, and reports. As the system matures, the majority of air-to-ground exchanges will be handled by data communications for appropriately equipped users.

NextGen Network Enabled Weather (NNEW) will serve as the infrastructure core for aviation weather support services, providing access to a NAS-wide common weather picture. NNEW will identify, adapt, and use standards for system-wide weather data formatting and access. The FAA is calling this collaboratively built, but centrally accessed, data source the "4-D Weather Data Cube," where aviation weather information from multiple agency sources will be developed and stored. The Cube will provide a single national—and eventually global—picture of the atmosphere, updated as needed in real-time and distributed to authorized users and systems. The National Weather Service will have primary responsibility for operational management of the Cube, while the FAA will define requirements and coordinate and implement changes to FAA infrastructure that support it.

NextGen includes a diverse cast, with ADS-B as the star of the show.

National Airspace System Voice Switch (NVS) is a program to replace current voice switches, some of which are more than 20 years old. With the current voice architecture, linkages do not support sharing of airspace within and across facility

A GA cockpit equipped with ADS-B avionics

FAA photo

Garmin photo

A cockpit display showing ADS-B and non-ADS-B traffic

boundaries, reconfiguration capability of controller position to radio frequency and volume of airspace is inflexible, and reconfigurations are laborious and time consuming.

Performance-Based Navigation (PBN) includes both area navigation (RNAV) and required navigation performance (RNP). RNAV enables aircraft to fly on any desired flight path within the coverage of ground- or space-based navigation aids. The concept is not new—VOR/DME and LORAN were types of RNAV systems—but the NextGen application of it is new, with the emphasis on GPS as the position source. RNP takes RNAV and adds an onboard performance monitoring and alerting capability. A defining characteristic of RNP operations is the ability of the aircraft navigation system to monitor the navigation performance it achieves and inform the crew if the requirement is not met during an operation. For more information on PBN, see the article on page 15 of this issue.

What NextGen Means for General Aviation

The NextGen component that is likely to have the most immediate impact on general aviation is ADS-B. Pilots will have access to improved traffic and weather information in the cockpit, which if used properly can enhance situational awareness and safety. But since so much of this is, as they say, a coming attraction, the best we can do right now is educate ourselves about what's coming, and be ready to play ball when the first pitch is thrown.

Meredith Saini is a flight instructor and active general aviation pilot. She works as a contractor supporting the Flight Standards Service, General Aviation and Commercial Division at FAA Headquarters in Washington, DC.

For More Information

Here are some helpful Web sites on NextGen:

http://www.faa.gov/about/initiatives/nextgen/

http://www.faa.gov/about/initiatives/nextgen/media/NGIP_0130.pdf

http://www.dot.gov/affairs/2010/dot2010a.htm

http://www.faa.gov/news/fact_sheets/news_story.cfm?newsid=8145

An Electronic Flight Bag

photo courtesy Lufthansa Systems

Get Ready *for* ADS-B

Photo courtesy of Cessna

MEREDITH SAINI

Those of us who fly within the United States enjoy what is arguably the safest and most accessible airspace system in the world. It's also one of the most congested. The FAA's answer to this conundrum is the Next Generation Air Transportation System, or "NextGen," modernization initiative.

A critical component of NextGen is a surveillance technology called Automatic Dependent Surveillance-Broadcast (ADS-B). Introduced more than a decade ago, ADS-B enhances air traffic controllers' ability to identify and guide aircraft. It can also provide coverage in areas where radar is not possible, like the Gulf of Mexico or remote regions of Alaska.

Pilots can also benefit from enhanced traffic and weather information that ADS-B technology brings to the cockpit. ADS-B traffic and weather services are already available in Louisville, Kentucky; South Florida; the Gulf of Mexico; Philadelphia; and Juneau, Alaska. By 2013, we'll have ADS-B coverage across the nation everywhere there is radar coverage today.

Why ADS-B?

ADS-B is more timely and accurate when compared with conventional surveillance radar systems, which are limited by line-of-sight geometry problems created by mountains and other large obstacles. GPS is used for the ADS-B position source for aircraft today, which is why there is an increase in the accuracy of information that is being provided to controllers and pilots.

ADS-B enables properly equipped aircraft to broadcast their identification, position, altitude, and velocity to other aircraft and to ATC. This is known as ADS-B *Out*. The receipt by an aircraft or vehicle of ADS-B data is known as ADS-B *In* (a cockpit display is required to receive this data). By 2020, all aircraft operating within designated ADS-B airspace will be required to comply with the equipment performance requirements of ADS-B Out, which will be defined in Title 14 of the Code of Federal Regulations (14 CFR) section 91.225. As of this article's writing, the final rule was expected to appear in the *Federal Register* on April 30, 2010, however, the review requirement could take this timetable into May.

For more information on ADS-B, visit the FAA's NextGen Web site at www.faa.gov/about/initiatives/nextgen/.

All aircraft operating within Class A, B, and C airspace, and some portions of Class E airspace—essentially everywhere you need a transponder today—will be required to meet the prescribed performance standards for positional integrity and other criteria associated with ADS-B avionics.

Meanwhile, two new Advisory Circulars (AC) are being developed to provide guidance on ADS-B equipment certification and installation, as well as provide information on the operational approvals needed to comply with the rule. The ADS-B Technical Standard Order (TSO) for avionics manufacturers is already in place.

Equipment Choices

In the United States, ADS-B-equipped aircraft and vehicles exchange information on one of two frequencies: 1090 or 978 MHz. The 1090 MHz link is already used by Mode A/C and S transponders and Traffic Collision and Avoidance System (TCAS) equipment. ADS-B extends the message elements of Mode S with additional information about the aircraft and its position. This is known as the *extended squitter* and is referred to as 1090ES. Universal Access Transceiver (UAT) equipment operates on 978 MHz.

In the late 1990s, FAA and EUROCONTROL formed an international technical advisory committee to develop standards for ADS-B. The committee issued its final report in 2001, identifying 1090ES as the ADS-B link to be supported by the international aviation community moving forward, with 1090ES being the preferred link for higher-altitude operations. The 978Mhz/UAT link is a U.S. regional link mainly used for Flight Information System-Broadcast (FIS-B) services.

In terms of enabling ATC to identify and track your aircraft, an ADS-B transceiver operating on either link does essentially everything a standard transponder does, plus a lot more. While a Mode C transponder provides ATC with your position (as detected by radar) and pressure altitude, an ADS-B transceiver also emits other data about your flight, including your aircraft's type, velocity, and "geometric altitude," which is used to develop a more accurate indication of position.

The requirements of 14 CFR section 91.215 will remain because aircraft that are required to use TCAS rely on the interrogation function of your transponder for their TCAS to work. (They can only see you if your transponder is squawking a code.) So, while all aircraft flying in ADS-B airspace will continue to need a transponder and an ADS-B Out, modifications or upgrades may be available for certain existing transponders to make them compliant with the new ADS-B Out requirements, possibly eliminating the need for a separate ADS-B Out device. Check with your avionics shop for more details.

ADS-B information is available to any aircraft equipped to receive it, so aircraft on like frequencies can "see" each other on compatible cockpit displays.

However, some translation is required to allow the two links to operate simultaneously. ADS-B ground-based radio stations process the messages received on each frequency and send them back out again on the opposite frequency. This process is known as ADS-Rebroadcast (ADS-R) and it is how 1090ES and UAT users can identify one another on traffic displays.

Because commercial airliners and some larger business jets and turboprops are required to have Mode S and TCAS installed, the FAA expects these aircraft will choose to equip with the 1090ES link for ADS-B. Although some general aviation aircraft already have digital transponders that can be upgraded to 1090ES, other general aviation aircraft, typically smaller piston airplanes and light twins that are not required to have TCAS, may choose to equip with UAT avionics.

Operators should consider the impact of the new airspace requirements on their operations before equipping with ADS-B avionics. Your avionics shop can provide you with options tailored to your individual operational and economic needs, so make sure to include them in the decision process.

The Ins and Outs of ADS-B

There are three ways that ADS-B In-equipped aircraft can receive traffic information:

- Directly from other aircraft that are using the same link and are flying within receiving range
- From other ADS-B-equipped aircraft on the opposite link via ADS-R
- Via Traffic Information Services-Broadcast (TIS-B)

TIS-B is the service provided when ADS-B ground-radio stations broadcast traffic information obtained from ATC radar. Pilots flying aircraft that are equipped to receive and display this data (ADS-B In) get a more complete traffic picture in situations when not all aircraft are equipped with ADS-B. On a cockpit display, radar targets will be depicted differently from ADS-B aircraft. Pilots must also remember that TIS-B is not designed or intended to be a collision avoidance system like TCAS. TIS-B traffic data serves only to enhance situational awareness and to aid in the visual spotting of other aircraft.

Weather uplink Flight Information Service - Broadcast (FIS-B) shows an Alaskan thunderstorm

FAA photo

The other ADS-B In service is called Flight Information System-Broadcast. The FIS-B data stream is packed with information from the National Weather Service, including NEXRAD radar, winds aloft, pilot reports, and many others. FIS-B also includes information on temporary flight restrictions (TFR) and special use airspace (SUA).

Reality Check

Given all the safety benefits that ADS-B will offer to pilots and controllers, it is also important for users to understand what ADS-B is *not*. It is not yet a replacement for your transponder or ground-based radar. While some radar sites are indeed slated for decommissioning, all primary radar and 50 percent of the secondary radars will remain functional as a backup in the event of a GPS outage.

Complying with the rule is not a one-size-fits-all solution—the answer for each individual depends on what you fly, how you fly, where you fly, and what your budget is, among other factors.

The traffic information offered by TIS-B does not relieve pilots of the responsibility to see and avoid other aircraft. FIS-B information does not relieve pilots of the responsibility to obtain an official preflight briefing or to gain complete information for the intended flight.

The enhanced ATC surveillance services offered by ADS-B Out most likely will not allow instrument approach minima at smaller airports to be lowered, as these minima are more dependent on obstacle and terrain clearance than on surveillance coverage. However, ADS-B may give controllers additional flexibility when clearing aircraft for instrument approaches at non-towered airports, because they may be able to identify outbound IFR aircraft at lower altitudes, possibly all the way to the ground.

Although there is no subscription fee to receive the ADS-B In services, operators and aircraft owners will need the appropriate equipment to display the data, such as a multifunction display or a moving-map GPS receiver.

Operators must meet prescribed performance requirements in order to operate in ADS-B-designated airspace. Any position source that meets the prescribed ADS-B performance standards is acceptable. Today, GPS or WAAS are examples of position sources that meet the performance requirements of ADS-B Out. But, as history has shown with consumer electronics, such as cell phones and microwave ovens, enterprising individuals will continue to build new, better capabilities with each passing year. We can only guess as to what new technologies and avionics will be available to meet the ADS-B performance requirements by the 2020 mandate.

Moving Forward

The FAA recognizes that aircraft owners and operators have concerns about equipping too early. There are significant costs involved and lingering uncertainty among operators about whether today's technology will be viable 10 years from now. The FAA is working hard to ensure that manufacturers bring suitable equipment to the marketplace when it's needed, and that any required upgrades are available at a reasonable cost.

Meanwhile, ADS-B services are expanding as deployment of the ground infrastructure marches forward. By 2013, ADS-B will be available across the NAS everywhere there is radar coverage today. Even though it may seem like a long time until you'll be required to have ADS-B Out to fly in airspace that will be designated by the rule, it's not too early to start understanding the technology and thinking about how you can benefit from its capabilities.

Meredith Saini is a flight instructor and active general aviation pilot. She works as a contractor supporting the Flight Standards Service, General Aviation and Commercial Division at FAA Headquarters in Washington, DC.

An ADS-B data-link transceiver

Photo courtesy of Garmin

SUSAN PARSON

NextGen:

Setting the Stage for Performance-Based Navigation

A fundamental American value is the notion that ability and performance determine whether an individual can navigate beyond his or her starting position. We cherish the idea that with the right ability and performance, anyone can move freely from one station in life to another—the sky is the limit.

You might think of performance-based navigation (PBN) as the aviation expression of that value. Traditionally, operations in the National Airspace System (NAS) have been restricted to "station-referenced navigation systems," which limit an aircraft to flying over standard ground-based navigation aids such as very high frequency omnidirectional range (VOR) and non-directional beacon (NDB) facilities.

The Sky's the Limit with PBN

Now, however, the advent of the "coordinate-referenced" PBN means that an aircraft is no longer restricted to what is often a circuitous station-to-station journey. Unlike the station-referenced system, which specifies required technologies, such as VOR, or particular avionics, such as an ILS receiver, a PBN system simply defines the aircraft navigation capabilities and required performance necessary to operate on a given air traffic route, instrument procedure, or in a defined airspace. Given the right supporting infrastructure, such as the Global Positioning System (GPS), any aircraft whose navigation system meets the defined performance and functionality requirements has access to that route, procedure, or airspace.

The foundation concepts for PBN are area navigation (RNAV) and required navigation performance (RNP). Let's take a look.

RNAV Means Flexibility

Area navigation is not a new concept. It first appeared in the United States in the 1960s, with the first RNAV routes published in the 1970s. In simple terms, RNAV is a navigation method that allows an aircraft to operate on any course within a network of navigation stations, rather than navigating directly to and from the stations. More formally, it is a method of navigation which permits aircraft operation on any desired flight path within the coverage of ground or spaced-based navigation aids or within the limits of the capability of self-contained aids, or a combination of these.

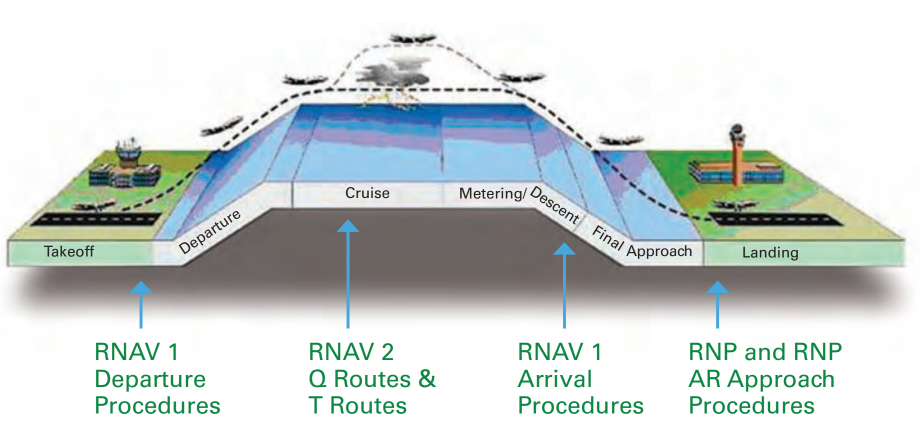
For example, RNAV can use the following:

- Station-based systems, such as distance measuring equipment (DME);
- Coordinate-based systems, such as GPS;
- Or, self-contained systems, such as the inertial navigation systems (INS) found in large air transport aircraft.

Regardless of the system used to provide area navigation capability, the benefits of RNAV are clear and the recent standards developed for RNAV operations account for modern aircraft capabilities. The advantages of current RNAV routes and procedures include greater safety, navigational flexibility, shorter routes and reduced time en route, less fuel usage, and reduced dependence on ATC radio transmissions.

Area navigation is not a new concept.

Current U.S. PBN Implementation



RNP = RNAV + Navigation System Performance Monitoring and Alerting

From an operational point of view, RNP means that the aircraft, or the aircraft in combination with the pilot, provides onboard monitoring and alerting of navigation-system performance. In essence, RNP is RNAV with enhanced knowledge of how the aircraft navigation system is performing. This onboard monitoring and alerting capability improves the pilot's situational awareness, and it can also enable reduced obstacle clearance or closer route spacing without ATC surveillance. If your aircraft is equipped with GPS, you will recognize RAIM—receiver autonomous integrity monitoring—as an example of this safety-critical characteristic.

RNP is the statement of the navigation performance necessary for operation within a defined airspace.

With respect to airspace or a specific operation, the associated RNP states the navigation performance necessary for operation in that airspace. This RNP is typically expressed as a distance in nautical miles from the intended centerline of a procedure or route.

The Strategy for PBN

In 2006, the FAA published its *Roadmap for Performance-Based Navigation,* which focused on the continued implementation of PBN in the United States. The information in this plan has since been incorporated into the annual *FAA NextGen Implementation Plan,* the most recent version of which was published in March 2010.

RNAV allows an aircraft to operate on any course within a network of navigation stations, rather than navigating directly to and from the stations.

Over the past decade, the FAA has worked with its global partners to develop worldwide standards for PBN in the interest of improved safety and reduced costs to the aviation community. The result of much of this work is embodied in the International Civil Aviation Organization (ICAO) *PBN Manual,* which, among other things, contains aircraft and operational standards categorized as "navigation specifications." It's likely you're already familiar with a number of U.S. operations that are reflected in the manual. For example, if you're qualified to fly an approach titled *RNAV (GPS)* or *GPS,* then you've already met the requirements for what is now being called an "RNP Approach."

ICAO criteria for *RNAV 1* departure and arrival procedures, *RNAV 2* routes (Q and T), and *RNP Authorization Required* (AR aka SAAAR—Special Aircraft and Aircrew Authorization Required) approaches also match our U.S. operations. Additional standards for more advanced RNP operations will likely be published in the next year or so and the FAA will work to get the word out regarding any changes via updates to Advisory Circulars, the A*eronautical Information Manual* (AIM), and other publications.

The Pilot's Role

PBN operations offer enormous potential for improved safety, access, capacity, predictability, and efficiency but also demand sound preparation and strict maintenance of the procedure centerline. In addition, pilots must possess a strong working knowledge of their aircraft navigation system and the fundamentals of RNAV. So, as with any navigation system, the success of PBN ultimately depends on—you guessed it—the pilot.

Susan Parson is a special assistant in FAA's Flight Standards Service. She is an active general aviation pilot and flight instructor.

For More Information

See the Performance-based Navigation Fact Sheet at:
http://www.faa.gov/news/fact_sheets/news_story.cfm?newsId=8768

Electronic Flight Bag

Photos courtesy of Avidyne, Garmin, and navAero

SUSAN PARSON

Flying Paper*less* Airplanes

Okay, I admit it: I love gadgets, especially gizmos that let me dispense with paper. Address book? That's in the iPhone, which is also well-stocked with a variety of handy aviation apps. Latest version of a draft magazine article? That would be on the thumb drive—but also accessible via a newly-acquired app that lets me put files in one place and read them on any device with an Internet connection. Weather info? The stack of dot-matrix printer paper I used to lug around has long since been supplanted by datalink weather acquired through a collection of handheld and panel-mounted devices.

In my increasingly paperless world, the recent arrival of updated paper instrument approach procedure (IAP) charts is admittedly something of an anomaly. I do like the "security blanket" aspect of those neatly folded paper charts, possibly because I have personally seen how one mistaken button-push can lead to instant and simultaneous amnesia for two GPS moving-map navigators. Paper prevailed on that occasion.

Still, the lure of lightening my flight-bag load and dispensing with the clutter of a papered airplane is strong. Envy of a pilot pal's e-chart setup was the final push I needed to do some basic research into the concept of the Electronic Flight Bag (EFB). Here's what I learned.

There's a Doc for That

Like airplanes themselves, EFBs come in a variety of forms, capabilities, and restrictions. The FAA defines those forms, capabilities, and restrictions—plus the term itself—in Advisory Circular (AC) 120-76A, *Guidelines for the Certification, Airworthiness, and Operational Approval of Electronic Flight Bag Computing Devices.* It can be found at: www.faa.gov/regulations_policies/advisory_circulars/index.cfm/go/document.information/documentID/23222.

Let's get one important point on the table right away: As stated in the opening paragraph of AC 120-76A, the guidance material in this AC applies to the usual collection of commercial operators in Title 14 Code of Federal Regulations (14 CFR) part 121, 125, 129, or 135 operations. For 14 CFR part 91, it applies to large and turbine-powered multi-engine aircraft operating under 14 CFR part 91, subpart F (which covers fractional ownership), but only if the operating regulations require specific functionality and/or equipage under 14 CFR section 91.503 for *Flying equipment and operating information.*

Like airplanes themselves, EFBs come in a variety of forms, capabilities, and restrictions.

Other part 91 operations—including those of us who fly light general aviation aircraft for business or pleasure—do not require any specific authorization for EFB operations, as long as the EFB does not replace any system or equipment required by the regulations. Yet, even if the EFB conditions and restrictions outlined in the AC don't apply to the kind

of flying you currently do, it is still useful to know how the FAA defines and classifies these devices.

The ABCs of EFBs

Advisory Circular 120-76A defines the term EFB as:

> *An electronic display system intended primarily for cockpit/flight deck or cabin use. EFB devices can display a variety of aviation data or perform basic calculations (e.g., performance data, fuel calculations, etc.). The scope of EFB system functionality may include various hosted databases and applications. Physical EFB displays may use various technologies, formats, and forms of communication. These devices are sometimes referred to as auxiliary performance computers (APC) or laptop auxiliary performance computers (LAPC).*

Pilots of paperless airplanes need to use their discretion wisely.

The FAA categorizes EFBs in three classes. Class 1 and Class 2 EFB systems are both based on commercial off-the-shelf (COTS) systems and both are considered to be personal electronic devices (PED). Also, both are portable (not permanently installed in the aircraft). The difference between Class 1 and Class 2 is primarily derived from how they are mounted in the aircraft and what must be approved.

A Class 1 system is not attached to an aircraft mounting device, aircraft primary power supply, or data connectivity. Class 1 EFB systems can be used both on the ground and during flight, but must be stowed for takeoff and landing. They are limited to providing supplemental information and cannot replace any required system or equipment. A Class 1 EFB may be connected to aircraft power through a certified power source to operate the EFB and recharge its batteries. A Class 1 EFB can display tabular data, such as performance tables, checklists, and the pilot operating handbook (POH).

A Class 2 EFB system can be attached to a structural-mounting bracket to ensure that it does not interfere with other aircraft systems. Though considered a PED, the use of a structural-mounting bracket made only for that device means that a logbook entry is required to remove a Class 2 EFB from the aircraft. A Class 2 system can be connected to aircraft power and to a certified data connection in order to exchange data with aircraft systems and make interactive performance calculations. In addition, a Class 2 EFB can be used to compute weight–and-balance information as well as takeoff-and-landing V-speeds. It can also provide flight-critical data, such as navigation charts. Since it is not necessarily stowed for takeoff and landing, a pilot can also use the Class 2 EFB to display departure, arrival, and approach charts.

Class 3 EFB systems, which are the most capable, require approvals. A Class 3 EFB system is installed equipment that, with exceptions for user-modifiable software used to host certain kinds of applications, requires a Supplemental Type Certificate (STC) or certification design approval as part of the aircraft equipment. It is also subject to certification requirements that enable additional applications and functions.

Know When to Hold 'Em

There was a time when features such as moving maps, airport diagrams, and datalink weather existed only on Class 3 EFBs. Today, however, these functions (and many more) are available in Class 2 models that are—as the COTS characterization would imply—widely available commercial devices that anyone can buy. However, due to lack of airworthiness approval to demonstrate reliability, the display of "own-ship" position in flight on a Class 1 or Class 2 device is not authorized

where regulatory compliance is required. A unit with current IAP charts can be characterized as a Class 1 EFB, if it is not attached to the airplane, or as a Class 2 EFB, if it is mounted in the panel.

The question is: Can you legally use an EFB? According to the guidance, 14 CFR part 121 and 135 operators must obtain specific operational authorization to use them. For those in part 91 operations, however, the FAA states that use of Class 1 and 2 EFBs to replace paper charts is at the pilot's discretion.

Know When to Fold 'Em

That's good news, of course, but pilots of paperless airplanes need to use that discretion wisely. Reasons for caution include:

- Devices not subject to FAA approval of components or installation are not guaranteed to provide the kind of reliability you expect from products that have successfully made it through these processes.
- Devices can fail, and they often fail at inopportune moments. In the personal example mentioned earlier, the pilot's hand was jostled by turbulence and he accidentally pressed the GPS data-card ejection button instead of the flight-plan key he meant to activate in response to an amended ATC clearance. The unit—and the secondary unit configured for "cross-talk" with the primary navigator—immediately went into reboot mode and "forgot" everything connected with the flight.
- The cables, cords, and antennas required for portable EFBs can create more clutter—and, potentially, more hazardous clutter—than the paper charts they are intended to replace.

The bottom line: EFB technology is available here and now, and proper use of any class of EFB system can improve efficiency and safety while eliminating considerable weight in paper. Sounds like I need to shop for my next gadget.

Susan Parson is a special assistant in FAA's Flight Standards Service. She is an active general aviation pilot and flight instructor.

Calling All Mechanics

Keep Informed with

FAA's Aviation Maintenance Alerts

Aviation Maintenance Alerts (Advisory Circular 43.16A) provide a communication channel to share information on aviation service experiences. Prepared monthly, they are based on information FAA receives from people who operate and maintain civil aeronautical products.

The *Alerts*, which provide notice of conditions reported via a Malfunction or Defect Report or a Service Difficulty Report, help improve aeronautical product durability, reliability, and safety.

Recent *Alerts* cover:

- Control yoke corrosion on the Cessna 172/180/185
- Corroded flap bell crank bolts on the Cessna 208B
- Failed gear shaft on the Slick magneto

Check out *Aviation Maintenance Alerts* at: *http://www.faa.gov/aircraft/safety/alerts/aviation_maintenance/*

Eye in the Sky

Assuring the Safe Operation of Unmanned Aircraft Systems

TOM HOFFMANN

Photo by James Sizemore

The General Atomics Altair *was the first civil UAS to receive an experimental airworthiness certificate.*

On a crisp, cool New Mexico morning, brilliant shades of orange and indigo sky paint an endless backdrop for the lone operator at Las Cruces International Airport (KLRU). After taxiing to Runway 4, the aircraft carefully positions itself on the centerline before its engine roars to life. The pilot slowly increases back pressure on the control stick until the small, but remarkably nimble aircraft accelerates into the morning sky.

Another routine takeoff at KLRU, right? Perhaps. What might not be routine, however, is the pilot in this scenario never left the ground. The takeoff is part of a growing number of test flights to gain a better understanding of Unmanned Aircraft Systems (UAS), the core component of a burgeoning industry ripe with opportunities and seemingly destined for success on a much larger scale.

Thanks partly to frequent appearances in movies, TV, and even video games, UAS awareness has "skyrocketed" over the last few years. Headlines boasting of UAS success in military operations are hard to miss. Additionally, the unique advantages of UAS continue to create a buzz among government and private sector businesses as they ponder potential uses that seem to increase every day.

Yet, despite the numerous environmental, economic, and safety benefits of UAS, there remains an underlying, and understandable, apprehension of how these "flying robots" will perform alongside manned aircraft, especially during an unexpected event or emergency. Crucial to the success of this new aviation endeavor are well-planned policies and regulations, along with leveraging the technology of the very system—NextGen—that holds the key to safety and efficiency for future civil aviation operations.

In a November 2009 speech, FAA Administrator Randy Babbitt extolled the merits of UAS and said, "The technology has shown amazing potential and it's provided an astonishing value in use for what they're intended."

However, likening the effect of UAS to the advent of the jet engine, Babbitt also recognized the level of technical maturity is not where it needs to be for full operation in the National Airspace System (NAS). "We're talking about an exponential leap in capability," said Babbitt, referring to the development of sense-and-avoid technology, considered by many as the backbone for a successful UAS integration plan. "We have to make sure sense-and-avoid is more than a given —it must be a guarantee."

Back to the Future

A fundamental aviation tenet—collision avoidance—is traditionally a pilot responsibility. Removing the human element from where it was originally based (in the cockpit) and putting it on the ground presents its own challenges and can change our understanding of aviation.

"What we've experienced with UAS is almost a retrograde action in terms of trying to understand aviation," says FAA UAS Program Policy and Regulatory Lead Stephen Glowacki. "In many ways, we're forced to re-evaluate the same things we thought we understood." Glowacki offers this example: The need to rethink the concept of a cockpit, and, subsequently, the cockpit door. Will a UAS pilot, seated at a ground-operation station, be required to have the same door-security system as those installed on commercial aircraft? Will seatbelt requirements apply to UAS operators? The answers to these and many other questions, says Glowacki, will require the FAA to dig deep into its experience of being a regulator and service provider to come up with an understanding of aviation that remains consistent with UAS integration.

Among the more pressing questions is how to tackle the complexity of collision avoidance. NextGen technologies, such as ADS-B, as well as digital-data communication and performance-based navigation systems, will no doubt be key to integrating UAS into the NAS. However, the sheer variety of unmanned aircraft—which range in size from a Boeing 737 to the size of a cell phone—make an across-the-board installation difficult at best. There's also the issue of differing performance characteristics among unmanned aircraft, not to mention the differences from their manned brethren. This makes speed and climb/turn rates difficult to predict and incorporate into standard procedures, especially when considering critical evasive maneuvers.

RTCA Special Committee 203 is helping to close knowledge gaps caused by operational variations. FAA asked the committee to provide recommendations to establish minimum performance standards for UAS. The committee's guidance will help serve as a foundation to assure safe, efficient, and compatible UAS operations with other vehicles operating in the NAS. As part of these standards, the committee plans to recommend standards and procedures for UAS sense-and-avoid systems that will provide a safety level equivalent to that of manned aircraft. The standards are scheduled to be completed in late 2013, according to the committee's most recent plenary session, and once established, will allow the FAA to begin a more detailed approach towards certifying and regulating specific components and systems.

"What we experience in UAS is almost a retrograde action in terms of trying to understand aviation—we're forced to re-evaluate the same things we thought we understood."

Although technological barriers abound for UAS, they do have an important out-of-the-box advantage over manned aircraft. Starting off with an inherent network-like infrastructure, UAS can

Photo courtesy of UVS International

Many UAS models are equipped with high-quality camera equipment for surveillance, terrain mapping, and search and rescue.


Photo courtesy of Insitu, Inc.

Insitu's* ScanEagle *UAS can perform long-range operations—24 hours on a gallon and a half of gas—and with a variety of payloads.

easily upload critical operational performance and flight-control-systems data quickly, and wherever needed. "From a system-engineering perspective," says Glowacki, "UAS have robust data-sharing capabilities as part of their design, unlike manned aircraft that function more as independent entities in comparison." This same advantage is what may help UAS platforms be considered as proof-of-concept test beds for manned aircraft operations in the future NextGen environment.

Testing One, Two, Three

Recognizing there is still much knowledge and experience that must be acquired with UAS, FAA is working towards getting smarter on UAS. The New Mexico Flight Test Center is a prime example of the efforts to better understand UAS impact on the environment, which until now, remains fairly speculative. This 12,000 square-mile facility, administered and co-located within the wide-open confines of New Mexico State University (NMSU), is the country's first FAA-approved UAS Flight Test Center.

"We have to make sure sense-and-avoid is more than a given—it must be a guarantee."

Through a Cooperative Research and Development Agreement with the FAA, NMSU can conduct UAS research and development in a controlled testing environment and, in return, provide FAA with useful data for developing future standards and regulations. While the NMSU Test Center remains the only one of its kind in the United States, FAA recognizes the importance of enabling further testing and evaluating of new products to expand this developing technology and welcomes expanding these types of facilities, provided they meet guidelines and present no negative impact on other NAS users.

The FAA also conducts in-house UAS testing at the William J. Hughes Technical Center in New Jersey, including the use of a *Shadow* and a *Predator B* simulator. FAA Aerospace Engineer Kerin Olson, who works with Technical Center test engineers to collect data, knows firsthand how these UAS flight demonstrations are changing the way we think about unmanned flight. "By observing simulated operations of UAS flights, we're getting a better picture of the system's overall performance, including the intricacies of aircraft commands and communications," she says. From a human factors standpoint, these same tests also help the FAA gain better insight into UAS flight-crew dynamics, providing much needed data on flight-crew roles and responsibilities, minimum crewmember requirements, as well as which types of data-display systems work best. Studying these interactions will play an important role in determining future policy and regulation.

Soon to be added to the Technical Center's UAS test arsenal will be a full-scale *Scan Eagle* platform provided by Insitu, Inc. With more than 300,000 flight hours, the *Scan Eagle* is a veteran UAS design that can perform long-range operations—24 hours on a gallon and a half of gas—and with a variety of payloads. The *Scan Eagle* is also completely runway-independent and uses a pneumatic catapult-launching system and a patented recovery system that catches the aircraft with a suspended rope.

Insitu Business Development Executive Paul McDuffee is optimistic this testing agreement will move the industry closer to a sense-and-avoid solution. "While we don't have a pair of eyeballs on the aircraft," says McDuffee, "there are several feasible alternatives that need to be tested and evaluated." Existing test data show current ground-based radar and TCAS systems are able to pick up nearly any vehicle within 12 to 15 miles of a UAS. "By working with the FAA," adds McDuffee, "we're seeking to obtain the safety 'street' credit for these systems, along with rules that permit reasonable access."

One Small Step for UAS…

Currently, UAS operations for civilian commercial purposes are largely prohibited, limited to mainly research and development, product demonstration, or crew training with an experimental certification. Public-use applicants for UAS must obtain a Certificate of Waiver or

Authorization (COA) which is processed by the FAA's Air Traffic Organization and reviewed by the FAA's Unmanned Aircraft Program Office, FAA's primary point of contact for unmanned operations. The application is reviewed to ensure the operation is safe and appropriate safety mitigations are imposed. If there are any questions about the safety of the operation, safety studies are required for those situations where a proponent wants to do something that is outside the bounds of the interim operational guidance material. FAA grants COAs on a case-by-case basis and only when it is clear that operations can be conducted safely.

Despite the multitude of restrictions, applications have increased nearly tenfold in the last six years. Realizing the rapid expansion of this billion-dollar industry, the FAA is taking steps toward allowing small unmanned aircraft (under 55 pounds) to operate commercially in the NAS—under low-risk conditions—in the near future. As part of the rulemaking process, the FAA formed an Aviation Rulemaking Committee to develop recommendations for consideration. The FAA expects to have a published Special Federal Aviation Regulation (SFAR) by mid-2011, with a final rule expected in late 2012.

The purpose of this SFAR is threefold:

- Educate
- Promote controlled safe development of UAS technology
- Gather data for future rulemaking efforts

Among the SFAR team members is Flight Standards Aviation Safety Analyst Silas Still, who is helping develop UAS pilot qualification and training requirements. "The Small UAS rulemaking will still only allow limited access to the NAS," says Still, "but it is an important step towards tackling some of the challenges of this industry, and will help us integrate future waves of UAS."

...One Giant Leap for Aviation

While there are still many obstacles and unknowns to overcome before full UAS integration, it's important to keep in mind the many benefits UAS missions can offer: search and rescue, weather mapping, security surveillance, and wildlife preservation, to name a few. The possibilities for uses are endless, but there's no denying the significant element of both procedural and cultural change involved with embracing UAS.

"We still have a long way to go, and there are no easy answers," says Glowacki. "By utilizing NextGen technologies, working together with industry, and adopting an incremental approach towards ensuring harmony and safety between manned and unmanned operations in the NAS, the FAA will be poised to meet this challenge."

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

For More Information

The Links provided in the printed edition were current at press time. They are in the process of being moved to a new site. An updated PDF will be provided when the new links are available.

The* ScanEagle's *light weight design and unique retrieval system allow for launch and recovery at land or sea without a net or runway.

Photo courtesy of Insitu, Inc.

SUSAN PARSON

Checklist

Getting Your Money's Worth

A well-worn book in my aviation library is Anne Morrow Lindbergh's *North to the Orient,* which is the author's account of the 1931 flight she and her famous spouse made from New York to China via the Great Circle Route. Modern-day pilots might envy her the lack of congestion and restrictions that characterize today's National Airspace System (NAS), but Lindbergh stresses that some things never change:

> *Flight rests, firmly supported, on a structure of laws, rules, principles—laws to which plane and man alike must conform. The firm black lines which we ruled straight across Canada and Alaska, preparatory to our flight, implied freedom, but dearly won. Months, and indeed years, of preparation made such freedom possible.*

The FAA *Instrument Procedures Handbook* addresses concepts and procedures for RNAV, RNP, and many other aspects of operating in today's NAS.

The kind of straight-line freedom promised by performance-based navigation (PBN) and the NextGen technologies that we highlight in this issue is also dearly won—and achieved through years of effort and preparation.

A Handy Resource

Not surprisingly, getting the greatest benefit from new procedures and technologies requires preparation and effort on the part of the pilot. A quick Google™ search will produce dozens of documents with varying degrees of detail on the elements of NextGen and performance-based navigation. If, however, you are in search of a single-source reference on both "old" and new procedures for operating in today's NAS, take a look at the FAA's *Instrument Procedures Handbook* (FAA-H-8261-1A).

Originally designed as a reference for pilots who operate under instrument flight rules (IFR) in the NAS, the FAA *Instrument Procedures Handbook* expands on information provided in the more basic *Instrument Flying Handbook* (FAA-H-8083-15). It includes advanced information for real-world IFR operations, such as detailed coverage of instrument charts and procedures. The *Instrument Procedures Handbook* specifically covers IFR takeoff, departure, en route, arrival, approach, and landing.

Best of all (at least for purposes of this issue's theme), the handbook addresses the concepts and procedures for area navigation (RNAV), required navigation performance (RNP), RNAV routes and designators, and many other aspects of operating in today's NAS. You will find a general discussion of these topics in the handbook's first chapter.

General aviation pilots who use—or expect to use—RNAV(GPS) approaches will find it especially helpful to read and study chapter 5, "Approach," which presents RNAV, RNP, and approaches enabled by the Wide Area Augmentation System (WAAS) in practical operational terms. Still another part of this chapter explains the concept and the charting of terminal arrival areas (TAA).

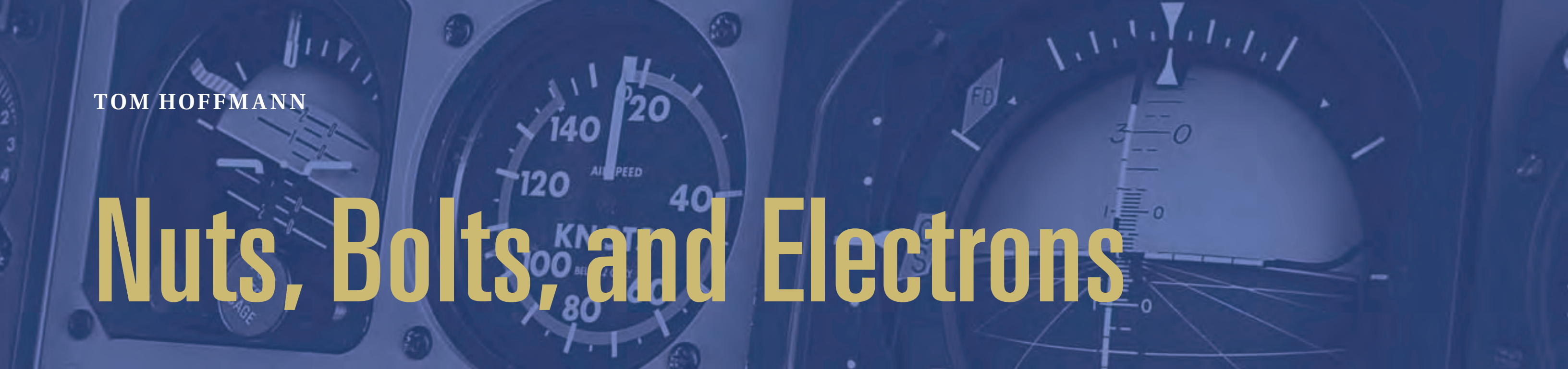
For the TAA discussion as well as for other sections of the *Instrument Procedures Handbook,* the graphics and illustrations are great, too. Check it out, and let your new knowledge help you make the most of NAS modernization.

Susan Parson is a special assistant in the FAA's Flight Standards Service. She is an active general aviation pilot and flight instructor.

For More Information

Instrument Procedures Handbook (FAA-H-8261-1A)
http://www.faa.gov/library/manuals/aviation/instrument_procedures_handbook/

Instrument Flying Handbook (FAA-H-8083-15)
http://www.faa.gov/library/manuals/aviation/instrument_flying_handbook/



TOM HOFFMANN

Nuts, Bolts, and Electrons

Understanding Field Approvals

In a world of ever-advancing technology, aircraft owners can be easily overwhelmed with the many new ways to improve the look and feel of their aircraft, beef-up engine performance, or navigate from point A to point B with greater accuracy. Equally overwhelming can be the process of obtaining authorization to make these changes, which in some cases can be done with a field approval.

While securing a field approval is not usually on an aircraft owner's favorite-thing-to-do list, there are some changes in the works that should simplify the process, especially when it's time to outfit your aircraft with equipment needed to leverage the exciting benefits of NextGen technology.

What Is a Field Approval?

A field approval is one way FAA approves the technical data for either a major alteration or major repair to a type-certificated product. The field-approval process provides a method to have acceptable data approved by the FAA to return-to-service a product after a major alteration or repair. The FAA Form 337 (or the electronic e 337) is used to document the details and approvals of a major alteration or repair. Once approved, the Form 337 becomes part of that particular altered or repaired product's type design. An FAA aviation safety inspector (ASI) approves the acceptable data in block 8 by signing block 3 of the Form 337. This approval verifies the changes made to that particular product's type design meet your aircraft's certification requirements.

During the review process, an ASI may decide a field approval is not required. This may be because the ASI determined the repair or alteration to be minor or because FAA already approved previous data specific to this type of repair or alteration. Yet, a field approval can be denied, usually for not having all the necessary data to support the procedure or because, in the case of the alteration, the alteration exceeds the scope of a field approval and requires an amended type certificate (TC) or supplemental type certificate (STC). [See 14 CFR section 21.113]

With so many possible variations and combinations of aircraft and equipment, it's not surprising how determining the need for a field approval can challenge even the savviest aviation maintenance technician (AMT). Contributing to the confusion has been a lack of details and standardization in some of the guidance materials. This is often compounded by the fact that policy changes have lengthy turnaround times, which in turn, makes keeping guidance up-to-date a constant challenge.

"The most important step is to establish clear lines of communication with the FAA."

FAA has made some changes in the guidance that facilitate more efficient field approvals. "What we've developed," says FAA Avionics Maintenance Branch Manager Tim Shaver, "is a checklist-type approach for evaluating an installation that stresses core items like electric load analysis and electromagnetic compatibility. By getting away from the specifics of each type of new technology and standardizing the common threads in these new systems, AMTs will be able to address the common factors on *how* to evaluate, as opposed to *what* to evaluate."

Individual field-approval requests will continue to be evaluated on a case-by-case basis to ensure proper and consistent application of the approval criteria. This consistent approach is important. "Our goal is to help eliminate confusion often caused by having to analyze and compare installation requirements on a component-specific basis," says Shaver.

Changes to the field-approval guidance are scheduled to be published in the *Federal Register* in about a year, along with a companion Advisory Circular (AC) update. And, to prepare the ASI workforce for this new change, a training course is scheduled to be available in summer 2010. The three-day avionics course is designed to allow ASIs to apply this information out in the field today before the scheduled implementation.

When Engineers Get Involved in Field Approvals

By Barry Ballenger

You have decided to modify your aircraft by installing a Gizmo 4000 and plan to get it field approved. You, or your mechanic, have dutifully put all the information together and submitted it to your local flight standards district office (FSDO) for consideration. In a few days, you get a call with the ominous statement that they sent it to an aircraft certification office (ACO) for engineering assistance.

What in the world does that mean? How much more government red tape is there going to be? Will you ever get your project approved? Engineers don't even speak the same language as mechanics. Before you melt down, let's take a look at what engineering assistance means for a field-approval application.

After reviewing your request, the ASI may decide that some of the data requires an engineer's review. The ASI reaches this conclusion by referring to FAA Order 8900.1 for the types of alterations or repairs they can approve and those needing an engineer's assistance. That means calling on an FAA aviation safety engineer (ASE) at the FSDO's designated ACO to review the Form 337.

ASEs, based at ACOs across the country, deal with a host of certification issues, including continued airworthiness of type-certificated products, certificating new or modified products, technical standard orders, and much more. Many ASEs are certified pilots, mechanics, and even normal people—not your stereotypical pocket-protector-wearing engineer. While the ASI provides airworthiness and operations expertise, the ASE provides engineering know-how, including expertise in aerodynamics, structures, electrical, avionics, propulsion, mechanical systems, and flight test.

When an ACO receives a field-approval package, it goes to an engineer with the appropriate background for the product under review. The ASE's primary responsibility: Review the data package to determine if the data is adequate and accurate for the type of repair or alteration being considered.

If the data is adequate, accurate, and shows compliance with the regulations, fine. The ASE sends the ASI a letter or memo indicating concurrence. If the data is inaccurate and/or incomplete, however, the ASE will coordinate with the ASI, or with you, the applicant, to request additional data. By communicating directly with you, especially on more complex data issues, the ASE reduces the time lag and also possibly reduces any chances for miscommunication.

After the ASE completes review of the data package, the next step is to provide the ASI a letter or memo stating the engineering review is complete indicating the ASE, representing the ACO, either concurs or non-concurs with the data. The finding could be that the field-approval application is inappropriate. In that case, the ASE recommends an STC application for the project. In all cases of non-concurrence, the ASE provides a written explanation to the ASI.

Once the FSDO ASI receives the engineering concurrence for the data, the ASI can then sign off on the field approval by signing block 3 of FAA Form 337. At this point, FAA has approved all data documented in block 8 for your airplane. Your mechanic may now perform the alteration or repair and return the aircraft to service.

The next time you have a field approval sent to an ACO for engineering assistance, rest easy. Employees across FAA will work as a team to assist you, the applicant, in getting your data package reviewed and, if approved, get you on your way with that new Gizmo 4000 installation.

Barry Ballenger is an aerospace engineer with the Small Airplane Directorate in Kansas City, Missouri. A private pilot, he holds an A&P with Inspection Authorization. Jason Brys, Flight Test Engineer, Wichita ACO, and ASIs Danny Morford and Blayne Camp assisted with this article.

How Can I Increase My Field-Approval Chances?

Upcoming guidance will help streamline the process for field approvals, but here are some steps you can take now to help secure your chances of a successful approval request.

"The most important step is to establish clear lines of communication with the FAA," says Shaver. "Let the ASI assigned to your request know what you plan to do and provide as much specific information as possible."

FAA recommends using a standard data package (SDP) that includes the following:

- Field-approval checklist (see Appendix 1 of AC 43-210)
- Data describing the alteration (drawings, photos, manuals, etc.)
- FAA Form 337 (paper or electronic)

Using this approach is not the only way to present data to the FAA, but it can be the fastest. You should also review FAA Order 8310.6 – *Airworthiness*

A cockpit in the midst of being upgraded to newer avionics

Aftermarket cockpit displays

Compliance Check Sheet Handbook. The order provides easy-to-review lists to help ensure that you address relevant certification rules and their means of compliance.

Working Together

FAA Program Manager Steve Thompson, who works with the Small Airplane Directorate, sees the field-approval process as a collaborative effort. "If you believe an engineer's (see article on page 26, "When Engineers Get Involved in Field Approvals") or ASI's decision on your project is inconsistent with FAA regulations and policies, talk with the engineer or inspector about your concerns." Thompson also suggests elevating your concerns up the chain of command if you are unable to resolve your concerns.

"We know the approval processes may be frustrating at times," says Thompson. "But we are committed to helping make the process as simple as possible."

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

For More Information

AC 43-210 – Standardized Procedures for Requesting Field Approval of Data, Major Alterations, and Repairs
http://rgl.faa.gov/Regulatory_and_Guidance_Library/rgAdvisoryCircular.nsf/list/AC%2043-210/$FILE/AC43-210.pdf

FAA Order 8310.6 – Airworthiness Compliance Check Sheet Handbook

http://www.faa.gov/documentLibrary/media/Order/Order%208310.6.pdf

TOM HOFFMANN

Hot Spots

Helping "Serve and Protect" the NAS

In the National Airspace System, pilot deviations are considered especially dangerous. At the FAA, the dedicated individuals who identify, track, and work to prevent these offenses are part of an elite squad known as the PDMW. This is their story…

(chung-CHUNG!)

While a day at the office for a Pilot Deviation Mitigation Workgroup (PDMW) member might not be as intense as a day for characters on TV's *Law and Order,* the products of the workgroup also improve safety, just as do the police officers and prosecutors on television work for public safety.

The task: Reducing the number of pilot deviations.

Counsel, Lay a Foundation

In response to an increasing trend in pilot deviations (PD) over the last decade, FAA formed the PDMW to develop a strategy to reverse that trend. This 28-member workgroup focuses on better understanding the causes of PDs and then exploring the root causes in more detail.

The workgroup has two main objectives: One, to reduce PDs by expanding pilot awareness through education and training and, two, to build data-gathering mechanisms that will allow for more effective root-cause and mitigation analysis. Both objectives support reducing runway incursions.

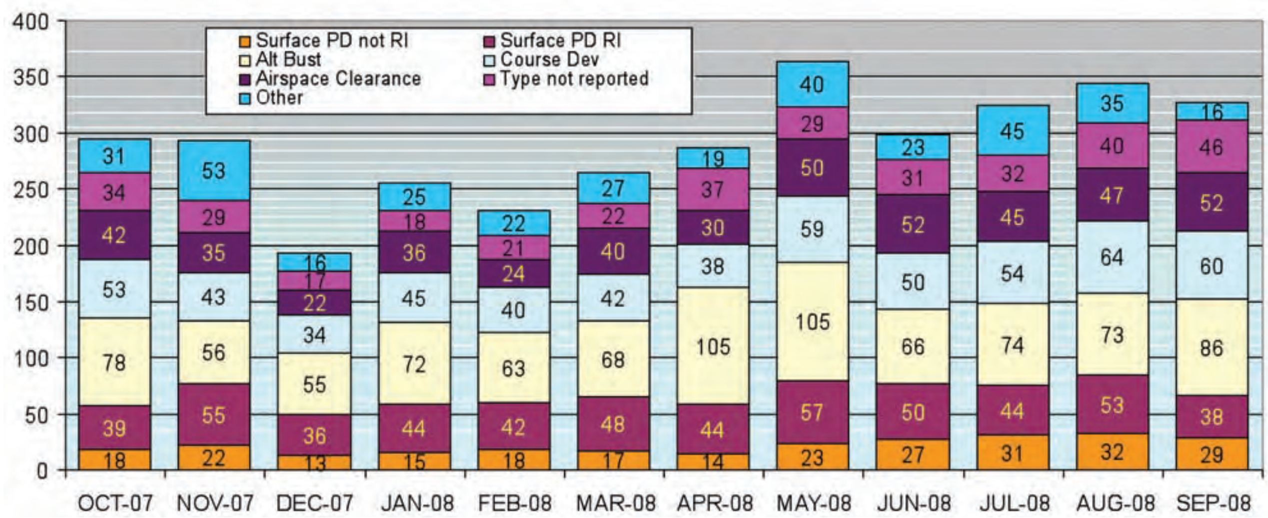
Over the course of four meetings since the group's inception in May 2008, the PDMW has developed 11 initiatives that cover training, data acquisition, and policy. Of the 11, all but one have been fully implemented. Let's take a closer look at some of the initiatives and the role they play in keeping pilots safe.

Marked as Evidence

Of the PDMW's three focus areas, training is the area receiving the most attention. The training initiatives include:

- *CFI/DPE Workgroups.* Quarterly meetings that bring together CFIs and DPEs (designated pilot examiners) for targeted briefings based on PD trends in the local area.
- *Flight Instructor Refresher Clinics.* Working with FIRC providers, FAA is encouraging an increased emphasis on the bigger picture of PDs, rather than only focusing on runway incursions in training courses.

Pilot Deviation by Type - FY 2008



- *PD Document Clearinghouse.* The FAASTeam developed a "one-stop-shopping" Web site for PDs, which consolidates articles, presentations, and training materials that are often scattered and difficult to find.
- *Safety Videos.* FAA-funded safety presentations, in the form of videos and graphics, to examine four airports with relatively high numbers of PDs. These are: Teterboro, New Jersey; North Las Vegas, Nevada; Dekalb-Peachtree Airport, Atlanta, Georgia; and General Mitchell International Airport, Milwaukee, Wisconsin. The Teterboro video is complete and available on the Internet. The other three are under development and are expected to be completed by summer 2010.

I'll Rephrase the Question

Understanding the "why" behind PDs has become increasingly important, especially as they continue with discomforting regularity. Part of the problem has been a lack of root-cause data that is being addressed by updating the mechanism that ATC and FAA inspectors use to process a PD.

Deviation reports are filed through the Air Traffic Quality Assurance (ATQA) system using an electronic online form. However, the PDMW found that most reports lacked any useful data beyond a simple description of the event. The open-ended questions also made standardizing the data difficult. As a result of the PDMW efforts, the form has been re-engineered to standardize answers to the questions and make the data easier to analyze.

One new practice that came out of the workgroup is alerting CFIs whenever a past student (current or recent) is involved in a PD. The FAA sends the letter to make the instructor aware of "how close to home" the problem of PDs is and to encourage them to take up the topic any time they interact with a pilot. "Instructors need to know that this effort is informative only," says PDMW co-chair and Aviation Safety Inspector Greg French. "As a flight instructor myself, I'd sure like to know if one of my folks had gotten involved in a PD."

Let the Record Show...

What are the results of this intensive focus on PDs? The jury may still be out, but the data for fiscal year 2009 are encouraging and show a three percent reduction in the PD rate for GA operations compared with the previous year. In 2009, virtually all categories of pilot deviations were down to some degree from 2008.

"While this is great news," says French, "we still need to better understand how we can make a bigger difference."

This year the workgroup is focused on sharpening and quantifying its measures of success so the members can better identify where to focus their efforts. The metrics developed for the CFI/DPE workshops offer a good example of how success can be measured. For example, for a three-month period after a workshop, the FAASTeam analyzes accident/incident data related to the workshop topic. This data is then compared to pre-presentation data to determine if a decline in incidents can be attributed to the initiative.

Have You Reached a Verdict?

"We've still got our work cut out for us," adds French, "but by monitoring and measuring the effectiveness of our safety campaign, we'll have a much better idea where to focus our efforts and how to maintain our momentum on reducing PDs."

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

Flight Forum

Correction: Calibrated vs. Indicated

In the article "Flying by the Numbers" in the March/April 2010 issue of FAA Safety Briefing, *several readers noted an error in a final approach speed calculation for a Cessna 182S. Calibrated, not indicated, airspeed should have been used as the basis for calculating Vref, or reference landing speed. Using calibrated airspeed shows that the published final approach speed is not greater than Vref, as the article indicated, and is the minimum speed a pilot should fly. Although atmospheric conditions might dictate flying faster approach speeds, using Vref will enable a pilot a better chance of meeting the published performance numbers.*

Thank you to the astute readers who helped us flag this.

Plastic Pilot Certificates

I haven't gotten around to exchanging my paper pilot certificate for a plastic one and know that I have missed the deadline. What should I do now?

Name Withheld

As was widely publicized, March 31, 2010, was the deadline for the expiration of paper pilot certificates. The certificate remains valid, however, the pilot may not exercise privileges—much like the requirement for a biennial flight review or other proficiency check, i.e., the certificate remains valid, but the holder may not exercise privileges until all currency requirements are met.

The FAA's Civil Aviation Registry Airmen Certification Branch says that if an airman still does not have a plastic certificate, he/she can call or contact the Registry and the Registry can send him/her a temporary authority or they can order one from the Web for their use to give them time to send in for or request an on-line replacement certificate. The temporary authority is valid for 60 days.

Here is how to contact the Airmen Certification Branch:

By telephone: *Toll-free long distance (866) 878-2498 or Oklahoma City area (405) 954-3261*

By e-mail: *Go to this Web address: http://registry.faa.gov/Airmenemail/Airmenemail.asp*

By fax: *(405) 954-4105*

By U.S. Mail: *Federal Aviation Administration*
Airmen Certification Branch, AFS-760
P.O. Box 25082
Oklahoma City, OK 73125-0082

Laser Tag

As a pilot myself, I would be concerned if a high power laser was aimed at my aircraft, as mentioned in your July/August 2009 article. However, I feel the FAA is failing to inform pilots that it is not unlawful for any individual to use a laser, or to point it into the sky. Just because a pilot may see a laser in the sky, does not mean there is any reason at all to report it to ATC, so that law enforcement can make a "speedy apprehension." Without explaining this to the public, and to our pilot community, I feel that the FAA is encouraging pilots to report any laser beam seen (and they can be seen sometimes from a 100 miles away!) This could cause a very unfair and unjust arrest by law enforcement of a completely innocent individual who has every right to play or use his or her laser in any way other than to directly point it at an airplane.

Steven F. Groce

The point of the article was to raise awareness of the serious consequences that can result from careless and reckless use of these devices. For that reason, and to help everyone better understand the scope of the problem, the article encouraged pilots who experience laser illumination to report such incidents to the appropriate authorities.

With respect to general reporting of laser incidents, it was our aim to encourage reporting only those incidents that demonstrate malicious intent or jeopardize safety of flight. The procedures and actions stressed in the article are solely to prevent malicious actions by irresponsible laser users.

Thank you for your comments, and for the opportunity to clarify the article's key points.

CO Poisoning

In your November/December 2009 article, Plane Poison, I am surprised that you don't mention something obvious. When flying my Cessna 150 in the Midwest winters I found that heat alone was too much, but opening the fresh air vent successfully mixed fresh cold air and warm air to a very comfortable temperature. And, it was reasonably safer!

Rose Dickeson

Thanks for reminding us of the obvious solution, but sometimes the CO is still too much for the human body.

On Runways in Winter

I read your November/December 2009 article on icy runway operations with interest, although I was disappointed with the final paragraph: "Ice, slush, and snow can turn your aircraft into a sled…so when the runway glistens lace up your ice skates—and leave the airplane in the hangar." I find that this is not true for a Cessna *Skyhawk*.

One of my favorite airports is Alton Bay (B18), New Hampshire, which in winter becomes Alton Bay Ice Airport. A 2,500 runway is normally plowed on the lake ice in January, and the airport is open for operations for a month or two, weather permitting. This airport is FAA and state certified, the only one of its kind in the continental United States. I have personally landed there in my own C172S twice, and it's not hard. You must perform a short field landing, aim short of the threshold, and use no brakes until the plane slows to taxi speed. In my airplane, that requires about 1,200 feet. Then, you taxi very slowly and use minimal braking.

If we get a good winter, you ought to make the trip. In a typical winter, there will be dozens to a hundred operations.

Robert Bruccoleri

More Winter Advice

"When the Runway Becomes an Ice Rink" in your November/December 2009 issue is a good article to remind pilots of the risks of ice and well written. But, I have to disagree with your advice to land on Runway 16. Runway 11 is just as wide and approximately 4,500 feet long (2,000 feet shorter than runway 16). With the 15 gusting to 20 knot headwind, I think a C182 can be landed in 1,500 feet with no braking. Since I think that both runways are way longer than needed, I would choose the runway with the smallest crosswind component, i.e., Runway 11. As a flight instructor at a Michigan airport that averages over 200 inches of snow a year (CMX), I think that directional control and sliding sideways is a much bigger risk than landing long in these conditions. So, since length is not a factor (my opinion) go with the winds closest to down the runway.

Jeff Burl

Thanks to everyone who took the time to comment. Everyone agreed that when you land let the airplane slow down before you hit the brakes on slippery runways.

Double Check?

I enjoyed reading your article "Acronym Soup" in the January/February 2010 issue of *FAA Aviation News*. Looking over the NextGen Implementation Plan Acronyms (NIPA?) list, I noticed that the acronym "TA" stands for "Tailored Arrival." It should be noted that in current usage "TA" stands for "Traffic Alert" for TCAS-equipped aircraft.

I sincerely hope that in the rush to modernize, the FAA doesn't concern itself with "looking good" (tailoring) over "feeling good" (safety).

Brian Fallon

As mentioned in the article, an acronym can sometimes have several meanings, so it is always wise to ask if you are in doubt. And, as always, FAA's first concern is safety.

FAA's FAA Safety Briefing *welcomes comments. We may edit letters for style and/or length. If we have more than one letter on the same topic, we will select one representative letter to publish. Because of our publishing schedules, responses may not appear for several issues. We do not print anonymous letters, but we do withhold names or send personal replies upon request. Readers are reminded that questions dealing with immediate FAA operational issues should contact their local flight standards district office or air traffic facility. Send letters to: Editor,* FAA Safety Briefing, *AFS-805, 800 Independence Avenue, SW, Washington, DC 20591, or FAX them to (202) 267-9463, or e-mail SafetyBriefing@faa.gov.*

SUSAN PARSON

Editor's Runway

"Old" Airplane, New Technology

When non-pilots ask how old my flying club's Cessna 182 *Skylane* is, I have become accustomed to the inevitable shock when I tell them that it rolled out of the factory in 1967. That's why I have a well-rehearsed follow-up stating that our airplane is the newest 40-something airplane on the ramp, having been substantially reconstructed after a deer strike in the summer of 2006. That tidbit generally erases the non-pilot's doubts about safety, but it really doesn't do justice to the effort that we—like so many other general aviation pilots—have gone to to ensure that our older airplane is equipped to operate in the brave new world of NextGen technology.

Bit by Bit

I seriously doubt that the original owner of our airplane would recognize anything but the tail number. That's partly because our *Skylane* sports a spiffy new paint scheme courtesy of the reconstruction required when Bambi bashed into the empennage. A decade ago, we voted to refurbish the instrument panel. Out went the cracked and faded plastic, and in came a powder-coated metal panel. It was an obvious aesthetic improvement, but the real benefit was the opportunity to move the basic instruments into the standard "six-pack" configuration.

We—like many other general aviation pilots—have made significant efforts to ensure that our airplane is equipped to operate in the world of NextGen technology.

The next big leap in technology came just a few years ago when the sale of the club's under-utilized Cessna 150 gave us the capital for a few more upgrades. The number one item on our shopping list was a GPS moving-map navigator. It was goodbye to the LORAN-C and an enthusiastic hello to the Garmin GNS 430. IFR-certified from the start, the GNS 430 was our admission ticket to the vastly increased RNAV and performance-based navigation (PBN) possibilities that GPS can offer.

That world got bigger still when we exercised the option to upgrade our original unit to WAAS (Wide Area Augmentation System) capability. WAAS lets us take full advantage of the new augmented GPS approaches that Cathy Majauskas (see the *FAA Faces* column) and her colleagues in FAA's Flight Technologies and Procedures Division are busily developing.

Although it wasn't as glamorous as the GPS, another useful bit of technology that we financed through the C150 sale was a sophisticated engine monitor. The ability to monitor our powerplant's health in almost excruciating detail has resulted in operating guidelines and procedures that have doubtless extended its life.

Still on the Wish List

Not surprisingly, the members of my flying club are full of ideas for spending our capital improvement budget. A near-term priority for upgraded technology is a 406 MHz emergency locator transmitter (ELT). It isn't required, but it's hard to argue against the safety benefits now that satellites no longer monitor ELTs on the traditional 121.5 "guard" frequency.

Like many pilots, we are also trying to position our *Skylane*—and our budget—to take advantage of upcoming NextGen developments. Our club members recently voted on a prioritized "wish list" that includes considering items such as retrofitted "glass cockpit" avionics and the equipment we would need to benefit from the ADS-B technologies discussed in Meredith Saini's article on page 11. Although the pesky realities of financing mean that some of the bigger changes are still a few years away, the bottom line is that we are working to ensure that our *Skylane* will be efficiently navigating the National Airspace System (NAS) for many years to come.

Safe flights and happy landings!

Susan Parson is a special assistant in the FAA's Flight Standards Service. She is an active general aviation pilot and flight instructor.

JAMES WILLIAMS

FAA Faces


Catherine Majauskas

A Helping Hand with NextGen

Like many people, Catherine Majauskas didn't intend to end up in aviation. It just happened. "My parents said my brother and I were interested in aviation growing up," Majauskas says. "But, it wasn't until I was at the U.S. Air Force Academy that I started to think that it could be a reality—I might be able to actually do it."

And, indeed, she did and still does. Majauskas spent eight years in the U.S. Air Force flying C-130s and C-21s (a military version of the LearJet 35A). Following her Air Force career, she joined FAA, initially as a contractor. Majauskas later became an aviation safety inspector with the Flight Standards Service's Flight Technologies and Procedures Division in the Performance-Based Flight Systems Branch.

"A lot of my work is with NextGen," Majauskas explains. "We're doing a lot with area navigation (RNAV) and I work on the augmented approaches, such as WAAS (Wide Area Augmentation System) and LAAS (Local Area Augmentation System), which augment GPS technology. These systems provide more accuracy than GPS and can assure pilots that they are closer to where they should be."

Even in a brief conversation, it's clear that Majauskas can barely contain her enthusiasm for the benefits to come from new technologies and procedures. One of the best developments, she says, is the work FAA is doing with RNAV and required navigation performance (RNP). "NextGen technology is allowing us to open up airports that previously couldn't have approaches, which is a real benefit for GA pilots who perhaps didn't have anywhere nearby where they could do a precision-like approach during bad weather," she adds.

"Now, they don't necessarily have a precision approach in form of an ILS (instrument landing system), but they have near precision minimums with an LPV (localizer performance with vertical guidance)." LPV approaches are operationally equivalent to the legacy ILS but do not require navigation infrastructure be installed at the runway.

Majauskas is more of "desk pilot" in her FAA role. "I had a chance to fly gliders and then Cessna 172s while I was at the Academy," she says. "I haven't had a chance to fly on my own since I joined FAA, but I often get to refresh my pilot skills in various simulators. The RNP SAAAR (Special Aircraft and Aircrew Authorization Required) approaches into Palm Springs, California, are really impressive.

Working at FAA: "It's a great learning experience."

"We use simulators to test out our new procedures from the pilot's point of view," she continues. "I've gotten to fly several kinds of simulators, from air carrier aircraft, like the Boeing 737 and Airbus A319, to GA aircraft such as the Cessna *Mustang*."

"I flew some RNAV (GPS) procedures using the Garmin G1000®," Majauskas adds. "That experience really helps in developing an Advisory Circular (AC) on LPV approaches."

One thing Majauskas wishes more pilots were aware of is all the information that's available for free on the FAA Web site, such as the *Aeronautical Information Manual* (AIM) and ACs. "We're working hard to get AIM updated this summer and we've got an AC coming up on LPV (it hasn't been assigned its designation yet), which will explain the operations available to them and the equipment they need.

"It's been a neat experience to be here at FAA and see all the different backgrounds people have from my own in the military, to air carrier, to GA." She says, "They all bring different perspectives and it's a great learning experience."

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

U.S. Department
of Transportation

**Federal Aviation
Administration**

800 Independence Ave., S.W.
Washington, D.C. 20591

Official Business
Penalty for Private Use $300

The FAA Wants You!

Attention pilots, mechanics, and avionics technicians:

Here is your opportunity to start a career in the exciting field of aviation safety. The FAA's Flight Standards Service is currently hiring aviation safety inspectors and is seeking individuals with strong aviation backgrounds in maintenance, operations, and avionics. Starting salaries range from $41,563 to $78,355, plus locality pay. Benefits include federal retirement and tax-deferred retirement accounts and health insurance.

Qualifications vary depending on discipline. For details, please visit http://jobs.faa.gov/. Under "All Opportunities" you can search by job series 1825 or title containing "inspector."

Start your application today.